



ASAN AND AGAT UNITS MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

WAR IN THE PACIFIC NATIONAL HISTORICAL PARK



January 2024



Visitors walk along path to the Ga'an Point flags at the Agat Unit. Photo: NPS.

War in the Pacific National Historical Park

**ASAN AND AGAT UNITS MANAGEMENT PLAN
AND ENVIRONMENTAL ASSESSMENT**

War in the Pacific National Historical Park
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LETTER FROM THE SUPERINTENDENT

Håfa Adai Friends and Partners,

We are pleased to present the unit management plan and environmental assessment for the Asan Beach, Asan Inland, Agat, and Mt. Alifan Units of the War in the Pacific National Historical Park. This plan will guide the long-term management of these four unique areas, which include some of the most popular visitor destinations within the park.

In developing this plan, we explored a range of ideas for managing the four units. The Asan and Agat invasion beaches and the upland terrain of Asan Inland and Mt. Alifan commemorate the courage and sacrifices of all those involved in the Battle of Guam. These sites protect cultural resources that reveal a rich and layered history before, during, and after the battle. They additionally are host to an exceptional diversity of native terrestrial and marine species.

This document describes two alternative strategies for enhancing visitor use and resource protection within the units, as well as an analysis of the environmental impacts and consequences of implementing each of these strategies. Alternative A is the no-action alternative and assumes that park management, programming, and facilities would continue at current levels. Alternative B has been proposed as the National Park Service's preferred alternative, and this set of actions and programs is intended to become the overall guidance for the future management and development of Asan Beach, Asan Inland, Agat, and Mt. Alifan.

Your involvement in the planning process has been critical to the creation of this plan. Your thoughts and suggestions received through written comments and public meetings have helped to guide the process, and you will find that many of the ideas that you contributed are represented here.

We invite you to continue to help shape the long-term management of the units by sending us your comments on this plan. The "How to Comment on this Document" section that follows this letter provides instructions for how to comment. Your continued involvement will assist the National Park Service in achieving its mission at the Asan Beach, Asan Inland, Agat, and Mt. Alifan Units.

Thank you for your support and interest in the long-term management of these important sites.

Sincerely,

Barbara Alberti, Superintendent

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INTRODUCTION

War in the Pacific National Historical Park was established on August 18, 1978. A general management plan (GMP) for the park was prepared in 1983, and since its adoption additional resource threats have arisen, new information about park resources has been discovered, and park visitation has increased. Therefore, this plan is needed to prepare for the influence of increased flooding and storm surge on facilities and resources related to climate change-driven sea level rise and degradation of coral reefs; to identify management strategies to protect the park's unique natural resources from invasive species and overexploitation; and to address resource and facility pressures resulting from high levels of visitor use; among other priorities.

This unit management plan proposes two possible management strategies or “alternatives,” and examines the impacts of implementing these alternatives in the Asan Beach, Asan Inland, Agat, and Mt. Alifan Units. These alternatives address visitor use and the preservation of natural and cultural resources to protect and interpret the significance of the sites. They comply with NPS planning requirements and respond to issues identified during the civic engagement process. If approved in a Finding of No Significant Impact (FONSI), the NPS preferred alternative will become the management plan for the Asan Beach, Asan Inland, Agat, and Mt. Alifan Units of the park.

Alternative A: the No-Action Alternative assumes that current management, programming, facilities, staffing, and funding would generally continue at their current levels and that existing plans would be implemented.

Alternative B: the NPS Preferred Alternative focuses on enhancing the visitor experience within the four units, while anticipating and providing guidance for how the park will address climate change impacts to resources and facilities.

This document includes a detailed description of the alternatives followed by a description of park resources affected by the alternatives and the projected environmental consequences of the alternatives. Also included in this document are the results of public involvement and consultation with other agencies, organizations, and individuals associated with planning for the site's future. In accordance with 36 Code of Federal Regulations (CFR) Part 800.8(c) (Use of the NEPA process for Section 106 purposes), this plan and environmental assessment (EA) integrate compliance with the National Environmental Policy Act and Section 106 of the National Historic Preservation Act. This allows a more comprehensive consideration of historic properties along with other environmental factors. The public review of the plan and EA will help fulfill the public engagement and consultation requirements of 36 CFR 800.8(c).

This unit management plan (UMP) is presented in four chapters and appendices.

Chapter 1: Introduction and Background sets the stage for the UMP by describing the planning area, the planning process, and the purpose and need for the plan. It also describes the issues that are addressed in the UMP, resources and values at stake in the planning process, and the relationship of this UMP to other plans in the park unit.

Chapter 2: Alternatives describes two management alternatives. The alternatives represent reasonable management directions consistent with NPS policy and applicable laws and planning requirements.

Chapter 3: Affected Environment and Environmental Consequences describes the resources present in the planning area and the impacts of each alternative on affected resources. This chapter also includes the identification of historic properties and assessment of effects under Section 106.

Chapter 4: Consultation and Coordination summarizes public involvement and the consultation process that were integral to the creation of this UMP. This chapter also summarizes public comments received by the National Park Service during civic engagement.

Appendices provide more detailed information related to the plan.

Figures are referenced within the text of the applicable chapters and appendices. The reader must rely on the text and figures taken together to fully understand the actions described in this UMP.

HOW TO COMMENT ON THIS DOCUMENT

This plan has been distributed electronically to agencies, interested organizations, and individuals for their review and comment. The public comment period for this document will extend for 30 days.

This document is available online at the NPS Planning, Environment, and Public Comment website at https://parkplanning.nps.gov/wapa_ump. We prefer that readers submit comments using this website, which provides an online public comment form.

Additional written correspondence may be addressed to:

Asan and Agat Units Management Plan
Superintendent
War in the Pacific National Historical Park
135 Murray Blvd., Suite 100
Hagåtña, Guam 96910

Before including your address, phone number, email address, or other personal identifying information in your comments, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

A NOTE ON CHAMORU LANGUAGE

Throughout the Pacific during World War II, residents and Indigenous island people were trapped between global warring nations and were deeply impacted by a conflict not of their making. The people of the Pacific Islands endured invasions, occupation, warfare, relocation, recovery, and reconciliation, while retaining their cultural identity, language, and traditions. War in the Pacific National Historical Park commemorates the bravery and sacrifice of all those who participated in or were affected by the campaigns of the war's Pacific Theater. The park conserves and interprets outstanding natural, scenic, and historic values and objects on Guam. To that end, the park honors the unique experiences of the CHamoru people and other island communities during World War II.

Guåhan, which means “having in abundance” in CHamoru, is the original name for Guam, reflecting the diversity of natural resources on the island. The historic sites preserved at War in the Pacific National Historical Park are inseparably tied to these resources and the cultural traditions of the CHamoru people. For thousands of years, the CHamoru have harvested Guåhan's abundant natural resources for food, medicine, and to build shelters and canoes. The park strives to support continued traditional uses of the land and ocean by the Indigenous people of Guam and aims to highlight the importance of these landscapes to ongoing cultural practices. The CHamoru people have special rights to offshore fishing and harvesting of resources (Indigenous Fishing Rights Public Law 29-127, 2008), and traditional CHamoru fishing is practiced in most park waters.

This plan recognizes and honors the rich cultural tapestry of Indigenous use and occupation in designated National Park Service lands and supports the enduring connection between the CHamoru and Guåhan (home to CHamoru people for at least 3,500 years). The plan reflects the ideas and priorities shared by CHamoru stakeholders in meetings and listening sessions held during the project's development, as well as NPS policies to integrate diverse cultural perspectives and values into park planning. To help meet these goals, we have incorporated CHamoru language and place names where possible to encourage readers to consider the concepts presented here through the world view of those who consider the units of War in the Pacific National Historical Park a part of their ancestral home.

In this document, spellings of CHamoru place names are prioritized where possible, except in reference to official NPS place names within the park units. See the table below. These place names are taken from the 2021 *Rapid Ethnographic Assessment Project (REAP) for the Asan Beach Unit and Agat Unit Management Plan*. As noted in the REAP, “the spelling of place names on Guam has changed over time and continues to be modified” (Tomonari-Tuggle 2021).

Key Places and Place Names Used in this Document

CHAMORU NAME	ANGLICIZED NAME
Adilok	Adelup
Assan	Asan
Bangngi'	Bangi
Guåhan	Guam
Gåpang	Camel Rock
Hågat	Agat
Kalåkak (Kalåkkak)	Kalakak
Oppop	Opop
Punta Adilok	Adelup Point
Punta Assan	Asan Point
Punta Bangngi'	Bangi Point
Saddok Assan	Asan River
Saddok Matgue	Matgue River
Saddok Ñåmu	Namo River
Sågua Assan	Asan Cut
Sånta Rita	Santa Rita

ACRONYMS AND ABBREVIATIONS

APE	Area of Potential Effects
BMP	Best Management Practice
CDP	Census Designated Place
CEJST	Climate and Economic Justice Screening Tool
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CISA	Climate Informed Science Approach
DLM	Department of Land Management, Government of Guam
EA	Environmental Assessment
EDRR	Early Detection and Rapid Response
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FFRMS	Federal Flood Risk Management Standard
FIRM	Flood Insurance Rate Maps
FONSI	Finding of No Significant Impact
GDAWR	Guam Division of Aquatic and Wildlife Resources
GMP	General Management Plan
GVB	Guam Visitors Bureau
HABS	Historic American Buildings Survey
HAER	Historic American Engineering Record
HALS	Historic American Landscapes Survey
I&M	Inventory and Monitoring
LED	Light-Emitting Diode
NARA	National Archives and Records Administration
NEPA	National Environmental Policy Act
NHP	National Historical Park

NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
NPS	National Park Service
PEPC	NPS Planning, Environment, & Public Comment website
PIRCA	Pacific Islands Regional Climate Assessment
REAP	Rapid Ethnographic Assessment Project
SHPO	State Historic Preservation Office
UMP	Unit Management Plan
UNWTO	United Nations World Tourism Organization
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey

I DOS PLÅNON AKSION EXECUTIVE SUMMARY





Ruined façade and walls of the Santa Marian Guadalupe church in Sumai on the Orote Peninsula, August 1944. Photo: NARA.

I DOS PLĀNON AKSION

Estague' I diniseha na plānu para I minanehan I unitu siha. U dineskribi I dos na manera ni' para u ma maneha I unitu siha giya Tāsen Assan, I tano' siha giya Hāgat yan i unitu siha giya Sabānan Alifan. Estague' I Plānu A: Na u Tāya'-Aksion pat tinulaika ya u ma kontenuha I hāfa ma kalamtitini pā'go yan I Plānu B: I Dinisehan I Setbesion Plāset Nasionāt. Este siha na plānu, sigun ni' emfotmasion put I guinahā-ña gi uriyan I unitu siha sa' put I ma tulaikan I klema, I ma finatoiguen I bisita siha yan I rinikohen I emfotmasion ginen I Setbesion Plāset Nasionāt yan put I hāfa I minalago'-ñiha i bisita siha, I taotāo I pupbleko siha, I ahensian gubetnamento siha yan otro siha na grupu ni' manggai enteres. Todu I dos na plānu u sinupotte I fondamento-ña I Plāset Hestorikon Nasionāt I Geran I Pasifiku.

Este siha na punto yan plānon aksion para I kada unu, u kinubre yan u tinattiyi I plānon i ginagāo-ña I Setbesion Plāset Nasionāt ya ma ibaluha yan na'siguru na konsiste ni' lai siha yan I rigulasion siha. I ma apreba na plānon minanehan unitu, na para u giniha mo'na para la'apmam tiempo para iya Tāsen Assan, I Tano' siha giya Hāgat yan I Unitu siha giya Sabānan Alifan. Este na plānu u inayuda I manmā'gas I plāset ma disidi hāfa taimanu para u ma prutehi I guinahan I uriyan I plāset, I hāfa para u ma cho'gue kumu guaha tinulaikan klema yan para hāfa siha na aktebedāt yan bida ni' propiu yan I minalago'-ñiha I bisita yan hāfa siha mās na fasilidāt yan supotte ha nisisita I Setbesion Plāset Nasionāt para u minaneha I plāset. Era mās, u ha na'guaha plānon minanehan unitu ni' ma analisa yan inestudia put taimanu u faninafekta I guinahan I uriya siha para I kada unitu.

Plānu A I kontenuhasion ni' hāfa ma susesedi yan ma kalamtitini pā'go para I plānon I lugat siha. Este na plānu u tinattiyi areklamenton I lai put I tano' siha ni' ma estapblisa ni' plānon minanehan plāset gi mit nuebi sientos ochentai tres na sākkan (1983) ni' plānon minanehan hinerāt yan I mit nuebi sientos ochentai ocho na sākkan (1988) na estatmenton minaneha. Adimās

di ma deskribi I fotmāt siha na minanehan tano' siha, ha identifika I plānon minanehan hinerāt, taimanu u ma minaneha I guinahan I uriya, I uson I bisita yan I ma nisisidāt-ña I fasilidāt siha ni' propiu para kada unitu ni' pumarehu I ma kalamtete-ña yan I areklon I minanehan I tano'.

U ma kontenuha ma petsigi I minanehan aktebedāt siha gi tāya' aksion na plānu sin benefisio sigun I etmas nuebu na plānu para la'apmam ni' nuebu siha na sinedda' emfotmasion yan para I inilāo siha put I tinulaikan I klema. I kanton tāsi siha na unitu giya Tāsen Assan yan giya Hāgat, u ma kontenuha sa' put mineggai yan sesso ma bisista achokha' guaha inachāki yan dinestrosan I pākryo yan I ma huchom I fasilidāt siha, taiguihi I fanfa'pusan yan I sagan attomobet siha. Gi plāset giya Puntan Rizal na bānda yan giya Sabānan Alifan yan I Tano' Assan na unitu siha, u tai siñat para u ma faloffāni ni' bisita siha. I mamaneha siha, u inilāo I etmas prisisu siha na cho'cho' ni' para u ma na'fañuha I mansen binenu na gā'ga'siha, ya u ma na'sāfu yan u ma sostieni I sepblan attekulon I Gera Dos siha, I ma tuge'-ña I estorian I lugāt siha ya u fanmaneduka yan gai aktebedāt siha ni' mānu I nina'siña na klāsen manera, yan para u sisigi ha' dumidide' I tiempo para I finatoiguen-ñiha I manemplehāo I Setbesion Plāset Nasionāt guatu gi unitu siha.

I Plānu B. I punto para I plānon I plāset na para u ma na'lamāolek I eksperiansan I bisita siha gi I kuattro siha na unitu yan u ma I'ilāo yan planeha mo'na tāt kumu guaha tinulaikan I klema yan hāfa para u macho'gue kumu inafekta I guinahan I uriya yan I fasilidāt siha. I ma ayek na plānu u guaha klāru na plānu ni' u giniha I ma kalamte-ña mo'na yan gai aktebedāt siha para I mambisita yan para I ma kahāt-ña siha na fasilidāt giya Tāsen Assan, I Tano' siha giya Hāgat yan giya Sabānan Alifan. Este na plānu u ma plānon dos na manera. I primet na u ma na'fañuha I unitu siha gi kanton tāsi giya Tāsen Assan yan giya Hāgat. Ma ditetmina este I dos sa' put I diferensiāo na modu sigun i kinakahlom-ña yan I

kinekuyong-ña I tasi yan kumu pàkyo, sigun i inilão modu siha ginen I Prugrãman Estãdos Unidos put Guinaha Siha yan Inatotgan I Uriyan Tãsi.

I minanehan I guinahan I aktebedât siha, sigun I ma ayek na plãnu u ma cho'gue sa' put I taimanu ti u faninafekta yan langak I tinulaikan I klema, I manna'dãñon I guinahan I uriya yan I hinatmen mambinenon gâ'ga' siha. I Setbesion I Plãset Nasionât u dinalalaki I manehan I plãnu put I kottura ni' para u ma dâkiumementa yan na'siguru na u ma sostieni I hestoriku na estrakturan liheng siha yan I sinedda' ansiãnu siha ni' mãnu siña ni' mansen empottãnte ya u ma sostieni putno I fanmalingu yan ma destrosa. I taimanu ma maneha I manhesterikon lugât siha gi uriya yan i manehan I hinatmen binenon gâ'ga' yan tinanom siha kosaki gof siña manlã'la' achokha' put I tinulaikan I klema, era mãs kumu sumen duru I manglo' yan kumu pàkyo pat uchan pat osino sumen didide' I pineddong uchan gi kada sãkkan. Gi Plãnu B, I plãset u ma na'lameggai ayudu siha ginen i kumunidât ni' para u inadahi yan prutehi I ginasgas I uriyan kãnton tãsi yan I tano' siha ya u ma adadahi mo'na I chinalapon I milak hãnom yan fache' guatu gi tasi yan I tano' kosaki u fansigi lumã'la' I mannatibu na gâ'ga' yan tinanom siha ni' mansen empottãnte para uson tradisionât siha na manera.

I Planu B u inemfasisa mãs put i prugrãma para maneduka yan I estoria siha put I plãset yan I uriyã-ña yan I hãfa ma susedi gi durãnten I gera, ãntes di yan gi duespues di I Gera Dos, era mãs annai ma memoriãyi I Geran Guahan ya I Geran I Pasifiku. U ma emfasisa I hestoriku siha na punto gi gera kosaki u ma iksperensia I mambisita I hãfa kãsi ma susedi gi durãnten I gera. U ma na'laguaha mãs matiriãt ni' uson nuebu na teknoliha yan matiriat siha ni' para u ineksplika mãs I estoria. U ma establisa prugrãma ni' u fanggaige manãotao atten kotturan CHamoru siha ni' para u inadingani put I tano', I uriyã-ña yan I na'an lugât yan I prinaktikan natibu siha. Este siha na manera u nina'libiãnu yan gai siñât lameggai siha na taotãogues kosaki u ma latungo' mãs put minalingon I guinaha siha yan put I finaloffã- ña put este siha na unitu ni' manmappot yan chatsaga ma fatoigue.

EXECUTIVE SUMMARY

This unit management plan describes two alternatives for management of the Asan Beach, Asan Inland, Agat, and Mt. Alifan Units: Alternative A: No-Action (Continue Current Management) and Alternative B: the NPS Preferred Alternative. These alternatives are based on information about the units' resources, expected climate change impacts, visitor use, and visitor preferences gathered from National Park Service data, members of the public, government agencies, and stakeholder groups. Both alternatives would support the purpose and significance of War in the Pacific National Historical Park. The concepts and subsequent actions for each alternative comply with NPS park planning requirements and were evaluated to ensure consistency with current laws, regulations, and policies.

The approved unit management plan (UMP) will guide the long-term management of the Asan Beach, Asan Inland, Agat, and Mt. Alifan Units. The plan will help park managers make decisions about how to protect resources, how to respond to climate change impacts, what visitor activities and experiences are desired and appropriate, and what facilities and infrastructure are needed to support visitor use and NPS management. The UMP additionally provides an analysis of environmental impacts to the units' resources under each alternative.

Alternative A is a continuation of current management practices for the project area. This alternative would rely on the management zoning established in the park's 1983 general management plan (GMP) and 1988 statement for management. Rather than describing formal management zones, the GMP identifies an approach for resource management, visitor use, and facility development specific to each unit that has functioned similarly to management zoning.

Current management activities would continue under the no-action alternative without the benefit of an updated long-term plan that is informed by new data and climate

change projections. The park's coastal units at Asan Beach and Agat would continue to be very popular visitor destinations while grappling with frequent storm surge damage and closure of facilities, such as walkways and parking areas. The Rizal Point area of the park, as well as the Mt. Alifan and Asan Inland Units, would remain largely inaccessible to visitors. Resource management would focus on high-priority invasive species removal projects and cyclic maintenance to stabilize the units' World War II fortifications. Interpretation and educational activities would continue to be provided in multiple, accessible formats; however, the presence of NPS rangers in the units would remain minimal.

Under Alternative B, the park would focus on enhancing the visitor experience within the four units, while anticipating and providing guidance for how the park will address climate change impacts to resources and facilities. The preferred alternative includes updated unit-specific guidance and desired conditions to determine resource management activities and the level of visitor access and facility development within Asan Beach, Asan Inland, Agat, and Mt. Alifan. This alternative describes a two-phased approach to facility development and removal, particularly within the park's coastal units of Asan Beach and Agat. The two phases are each based on a different sea level rise scenario and storm surge model provided by the USGS Coastal and Marine Hazards and Resources Program.

Resource management activities under the preferred alternative would focus on increasing resilience to impacts from climate change and other environmental stressors, such as invasive species. The NPS would follow an adaptive management approach for cultural resources that emphasizes documentation and stabilization of historic structures and archeological features, where possible, and prioritizes preservation treatments in view of their likelihood of loss. Management of the park's cultural landscapes

and diverse ecosystems would focus on invasive species management and enhancing native species that are adaptable to changing precipitation conditions, notably an increasing probability of intense storms, typhoons, and rainfall events but an overall decline in total annual rainfall. Under alternative B, the park would increase partnerships with the community to protect the health of Guam's coastal and upland ecosystems through reef-to-ridge management practices that reduce erosion and promote native plants and animals with traditional use values.

Alternative B emphasizes broadening the scope of interpretive and educational programs to tell the story of the park's landscapes and communities in the years before and after World War II, in addition to commemorating the Battle of Guam and the war's Pacific Theater. To convey the historical context of the war and enrich the visitor experience, the park would incorporate a wider variety of current technologies into interpretive and educational materials. The park would also establish a program of CHamoru cultural practitioners and interpreters to share Indigenous knowledge and experiences about ecosystems, traditional practices, and place names. Alternative media formats would allow the NPS to provide access to park resources that are lost or challenging to reach in person and would allow the park to communicate the units' significance to a greater and more inclusive range of audiences.

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INTRODUCTION





US troops advancing inland from the shore of the Hāgat (Agat) beach. July 1944. Photo: NARA.

CHAPTER 1: INTRODUCTION

DESCRIPTION OF THE PLANNING AREA

War in the Pacific National Historical Park (NHP) is on the island of Guam, an unincorporated US territory in the western Pacific Ocean. Guam is the largest and southernmost island in the Mariana archipelago: see figure 1.1. The park was created on August 18, 1978, to “commemorate the bravery and sacrifices of those participating in the campaigns of the Pacific Theater of World War II and to conserve and interpret the outstanding natural, scenic, and historic values and objects on the island of Guam.” The dual mission to honor all those who were involved in the Pacific War, both military and civilian, and to preserve the island’s rich resources shapes the park’s approach to management and interpretation. The park includes seven units within, adjacent to, and surrounding the villages of Assan, Piti, Santa Rita, and Hågat, all significant locations during the battles that took place on Guam in 1944. The park preserves the invasion beaches, battlefields, pillboxes, caves, and historic structures associated with the battles and protects exceptionally diverse forest, freshwater, and marine resources.

The unit management plan (UMP) will provide guidance for the Asan Beach, Asan Inland, Agat, and Mt. Alifan Units; four of the seven units within the park. See figure 1.2. The coastal units of Asan Beach and Agat, as well as Asan Bay Overlook, receive the highest levels of visitation in the park. By contrast, there is currently no formal visitor access within the inland units of Asan Inland and Mt. Alifan.

Park visitation has varied over the past ten years but has ranged in that time between 266,000 and nearly 490,000 visitors annually. In 2022, more than 380,000 people visited War in the Pacific NHP, spending time at the park’s visitor center as well as at the units. Based on traffic counter data collected in 2022, 276,204 people visited Asan Beach Unit, 47,458 people

visited the Asan Bay Overlook, and 49,380 people visited the Agat Unit, including Apaca and Ga’an Points (NPS 2022a).

The Asan Beach Unit (109 land acres [44 hectares], 445 water acres [180 hectares]) stretches from Punta Adilok (Adelup Point) to Punta Assan (Asan Point), and includes Assan Ridge, the landing beaches, and fringing coral reefs. This area was where the 3rd Marine Division came ashore, under heavy fire, to eventually retake Guam on July 21, 1944. It includes several monuments, a network of concealed caves, gun emplacements, and Japanese pillboxes. Past the reefs lie the remains of an American landing craft, called an amtrac, used to transport troops ashore. The terrestrial portion of the unit also features developed visitor facilities and parking areas, coconut palms along the shoreline, and a large expanse of lawn. A trail leads along Assan Ridge through an intact remnant of limestone forest, allowing visitors to experience a rich diversity of native, culturally significant plants with views of the invasion beach below. The marine area protects an outstanding diversity of aquatic life within the reefs.

The Asan Inland Unit (593 acres [240 hectares]) is the expanse of land uphill from the Asan Beach Unit and includes cliffs and hillsides with thick sword grass, vines, steep ravines, and rocky outcroppings where Japanese troops built defensive structures overlooking the invasion beach below. Within the unit boundary is Bundschu Ridge, where Marines fought for two days as part of Guam’s recapture by American troops; 615 men were killed, wounded, or went missing here (O’Brien 1994). Also located within the Asan Inland Unit is the Asan Bay Overlook, with the Memorial Wall inscribed with names of the American war dead, as well as the names of the people of Guam who died or suffered war atrocities. Except for the Asan Bay Overlook,

there are currently no opportunities for visitor access within the unit.

The Agat Unit (38 land acres [15 hectares], 557 water acres [225 hectares]) includes Apaca and Rizal Points, Ga'an Point, Bangngi' Point, and Bangngi', Alutom, and Pelagi Islands. In this area on July 21, 1944, the 1st Provisional Marine Brigade followed by the 77th Army Infantry landed under heavy Japanese gunfire and took the southern beachhead. The unit features caves, bunkers, several pillboxes, and a World War II latrine foundation. Ga'an Point was the geographic center of Japanese defense of the Hågat (Agat) beachhead and contains a former Japanese bunker, as well as a US naval coastal defense gun and an anti-aircraft machine gun typical of those used in surrounding areas. Another fully intact amtrac is located offshore at Ga'an Point. Apaca Point, at the northernmost end of the unit, has Japanese defensive fortifications from World War II built into its natural ridge. Because of the extensive fortifications, and the difficulty of the ridge's terrain, Apaca Point was avoided during the southern landing of American forces in July of 1944. Today, the area contains various species of lush mixed grasses as well as woodland and coastal strand vegetation above the high tide line.

The Mt. Alifan Unit (158 acres [64 hectares]), containing the park's highest point, sits about 871 feet (265.5 meters) above the Hågat beaches. The mountain is part of the volcanic and igneous rocky terrain, interspersed with limestone outcroppings, that is characteristic of southern Guam (NPS 2021). Mt. Alifan served as the former Japanese command post and contains a network of bomb craters, foxholes, and trenches. The slopes of these hills saw intense battles between US Marines and the defending Japanese forces. The area is now savanna, featuring a diversity of herbaceous vegetation, such as mana (*Dicranopteris linearis*) and karriso (*Phragmites karka*). Due to rugged terrain and a lack of public access points, the unit is not currently accessible to visitors.

HISTORICAL BACKGROUND

Guam's earliest people traveled from Southeast Asia approximately 3,500 years ago, according to current carbon dating methods, and developed a culture that would exist long before European contact. Known as Guåhan to the Indigenous CHamorus living on the island, Guam was isolated from much of the rest of the world until Ferdinand Magellan's arrival in 1521. The CHamoru people brought with them many practices of the places from which they moved, such as maritime navigation skills and pottery. The convergence of the lives and perspectives of people both Indigenous and foreign—through conquest and war, as well as times of hope and resilience—form the unique story of Guam today.

The pre contact period on Guam has traditionally been divided into two phases: the pre-latte and the latte periods. Latte are megalithic stone features composed of haligi (pillars) topped with tasa (caps) that were used as a foundation support for wooden houses. The pre-latte period extends from the initial settlement of Guam around 1500 BC to the appearance of the first latte villages around 1000 AD. Common artifacts found at pre-latte period settlement sites include shell middens, lithic tools, shell ornaments, and fragments of thin-walled, red-slipped pottery called "Marianas Red" (Hung et al. 2011, 913; Spoehr 1957). The latte period begins in about 1000 AD: in addition to latte remains, latte period artifacts include undecorated pottery, lusong (stone mortars), stone and shell tools, and *Spondylus* shell beads (NPS 2021a, 13). Today latte are considered the quintessential symbol of CHamoru history and cultural identity.

Guam's history has also been divided into periods of occupying foreign powers: they include the Spanish era, from 1521 to 1898; the first American, or Naval, period, from 1898 to 1941; the Japanese World War II period, from 1941 to late 1944; the late-war and post-war American period, from 1944 to 1950; and the modern era, from 1950 to now. However, instead of framing Guam's past through periods of colonization, local historians seek to highlight the island's unique CHamoru heritage, emphasizing moments of

Figure 1.1: Guam and the Mariana Islands



Figure 1.2: Units in the Planning Area

War in the Pacific National Historical Park | Asan + Agat Units Management Plan

National Park Service
U.S. Department of the Interior



strength and cultural adaptation throughout these times (Guampedia 2023b). Despite changes brought on by intense globalization, many of Guam's residents still work to preserve traditions that took place prior to European contact.

After Magellan's arrival in the 16th century, interactions between the CHamoru people and the Spanish were infrequent for many years. Eventually Spanish exchanges with the CHamoru grew hostile and tense, foreshadowing the former's intentions: in 1565, Spain claimed the Mariana Islands as a stopover for the Manila galleon trade (Tomonari-Tuggle 2021). Although the Spanish had been on the island for over 100 years after their claim, Spanish ships, upon them mostly soldiers and priests, did not establish a permanent military and religious presence until 1668 (Tomonari-Tuggle 2021). This was due in part to the arrival of Diego Luis San Vitores, a Jesuit missionary with close ties to the court of Spain. Vitores, dismayed by local cultural practices and acting on the political will of the Spanish government, sought to convert the island (Wiecko 2013).

The Spanish quickly imposed a new residential plan on the island, known as *La Reducción*, forcing CHamorus to abandon the places they lived and build new homes in orderly rows that could be easily surveilled. The Spanish additionally installed a church and rectory for a resident pastor in each new village (Tomonari-Tuggle 2021). They also enforced mandatory religious education. This ignited a series of revolts from angry families across the island, as CHamorus' cultural practices were under threat and an increasing number of children, spending most of their time in school, began to express loyalty to their Catholic instructors. While some towns were "friendly" with the Spanish, many sided with forces of resistance, and waves of revolts continued for months (Guampedia 2023c). Eventually, additional troops were sent by the Spanish to extinguish local dissent and ultimately ended the resistance. Soon afterwards, Spanish authorities continued to develop a road and trail network to connect *Reducción* communities, and to increase their influence. The economy transitioned from

subsistence to one focused on supporting international trade, and the arrival of pigs, goats, carabao (a water buffalo introduced from the Philippines by the Spanish), and other cattle, as well as the harvesting of corn, a new staple crop, began to transform the ecological features of the island, "profoundly disrupting land use patterns" (NPS 2021a; Wiecko 2013).

When the galleon trade ended in the early 19th century, for economic reasons, Spanish control of the island receded. Guam became a territory of the US through the Treaty of Paris, which ended the Spanish-American War in 1898. That same year, via executive order, the entire island was placed under the jurisdiction of the US Navy, and in 1899 the island was designated a naval station. During this time, Guam became a station for American merchants and warships traveling to and from the Philippines. This ushered in an era of American power on the island, with significant changes in dress, municipal reorganization, and importantly, a shift from Spanish to English as the designated official language (Tomonari-Tuggle 2021). When the US naval government was established, three-quarters of the adult population spoke their native CHamoru, and about half spoke and wrote Spanish. In 1917—about 20 years into the new administration—Naval Government Executive General Order No. 243 banned speaking CHamoru, "except for official interpreting." In addition to impacting day-to-day business and government operations, the policy was implemented and enforced on baseball fields, local schools, and playgrounds (Guampedia 2023c).

In the 1920s eight municipalities, including Assan and Hågat, were established by the naval government, in some cases expanding the pre-existing Spanish *Reducción* residential plan (Tomonari-Tuggle 2021). Prior to World War II, these were the most developed areas of the island. At this point, several agricultural areas were located along the shore, mostly small farms that produced a range of goods, from tropical fruits like banana and papaya, to citrus fruits, coffee, and staples like rice, corn, and sweet potato. These farms also

commonly had chickens, pigs, carabao, and other cattle (NPS 2021a).

Although Guam was under US military control, there were not many troops on the island to defend it on the eve of World War II. On December 10, 1941, three days after the attack on Pearl Harbor, Japanese troops landed in Agana Bay and Tumon, and within hours, Guam was under Japanese control. As a strategic military and economic post, Guam was a decisive area for Japan's control of the South Pacific during World War II. The years of Japanese occupation were exceedingly harsh for CHamoru people. Supply shortages grew severe, forcing most to subsistence farm and fish, as all other goods were given to Japanese soldiers (Palomo 1994). After three years, Japan began to lose territory in the Pacific and further fortified Guam to prevent the Americans from retaking the island. At various beaches that could serve as possible landing sites, labor crews of CHamorus, as well as Okinawan and Korean imported laborers, were forced by the Japanese military to build defensive structures, many of which remain intact in the park units today (NPS 2021a).

In April 1944, during the United States pre-invasion of the Japanese defenses, American B-24 bombers from Kwajalein destroyed Hågat, Assan, and Piti (Tomonari-Tuggle 2021). Residents were evacuated into refugee camps, and on July 8, the United States Navy Task Force 53 and 58 began a bombardment of the island. Thirteen days later, an invasion from the Assan and Hågat beachheads began, and one week later, on July 28, "the airstrip on Orote Peninsula was secured [by US forces] and ready for aircraft" (NPS 2021a). Amid the destruction, CHamorus were again forced to rebuild. Because village lands were now in use by the military, new villages were established. By November 1944, the new village of Hågat was built just south of its previous location, while Assan was rebuilt inland, as military installations had been built along the beach (NPS 2021a).

After the end of World War II, the US reverted to the pre-war form of naval government in Guam, during which time Navy officials

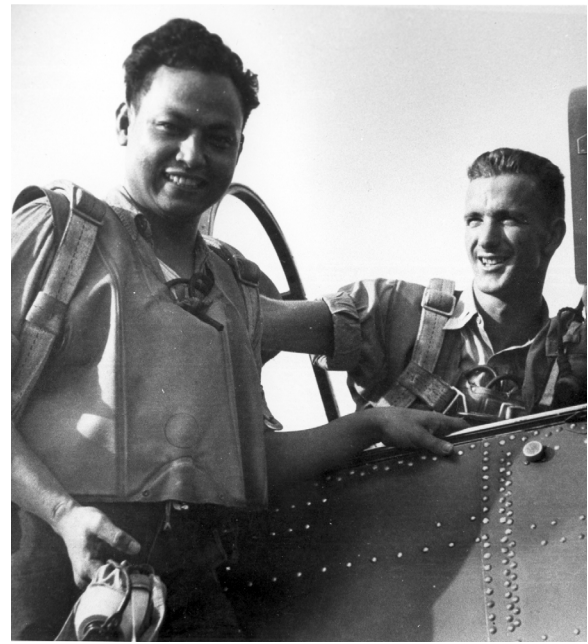
became heads of government departments. In July 1950, the Organic Act of Guam was signed into law, creating the Territory of Guam. The law conferred to CHamoru people many of the rights of US citizens, with an elected but non-voting delegate to Congress, yet did not give them the right to vote in presidential elections (Tomonari-Tuggle 2021).

During the post-World War II period, the US military developed several facilities on Guam as part of the United States' military strategy in Asia. Much of this work was completed with the help of the Seabees, or the US Naval Construction Battalions, who worked 24 hours a day on infrastructure improvements, such as new or upgraded roads, water lines, telephones, and other utilities, primarily to service extensive US military installations. The primary facility built by the Seabees on Guam was Camp Asan. Originally made up of Quonset huts, in 1948 the camp was turned into the "Asan Point Civil Service Community," a formal development that saw 18 two-story buildings connected by paved walkways, with a tennis and basketball court at its center (NPS 2021a).

The large-scale military developments on the island led to thousands of contract laborers being brought in from the Philippines and the US mainland. Following a 1947 agreement between the Republic of the Philippines and the US to bring Filipino laborers to Guam, a large camp for 7,000 laborers, called Camp Roxas, was built in Hågat inland of Apaca Point. Filipino workers were also housed near Punta Assan, and in the early 1960s erected two monuments there to commemorate the Filipino leader Apolinario Mabini, who had been imprisoned at Assan in the years following the Spanish-American War. After their contracts ended, due to a court ruling in 1960, the Filipino laborers were given the opportunity to become US citizens and bring immediate family to Guam. Settlements in Dededo and Hågat became home to large immigrant communities where many descendants still live today (Tomonari-Tuggle 2021).

1. [Top] Two CHamoru women pass a Japanese sentry on Plaza de España, Hagåtña, during the World War II occupation of Guam.
 2. [Middle left] A jeep carrying supplies coming up the road from the shore of Hågat (Agat) beach, summer 1944.
 3. [Middle right] US marines moving into position on the front lines in the foothills of Mt. Alifan, a strongly fortified position held by the Japanese, July 1944.
 4. [Bottom] Marines wade past a downed Japanese plane (left) accompanied by their tank (right) to Hågat (Agat) beach while the aerial and naval bombardment goes on overhead, July 1944.
- Photos: NARA.





1. [Top left] Scene at Assan after the battle, showing tracks of amphibious vehicles struck by land mines as they came over the reef and torn palm trees after 16 days of naval gunfire. Punta Assan is to the right of the picture, July 1944.
2. [Top right] Guam resident F. C. Mesa (left) flew as an observer in a dive-bombing attack before the Battle of Guam with a United States Navy personnel member (right), summer 1944.
3. [Bottom] Guam Combat Patrol (members of the Guam Police assigned to recapture remaining Japanese holdouts after Guam was declared secured) having a meal at a local ranch. Left to right are Navy photographer Lt. Arthur B. Rickerbe, Pedro Rosario, George Flores, Sus Camacho, Felix Wusstig, and Revera Juan, July 1945. Photos: NARA.

Figure 1.3: Unit Overview and Landownership, Asan Beach and Asan Inland
War in the Pacific National Historical Park | Asan + Agat Units Management Plan

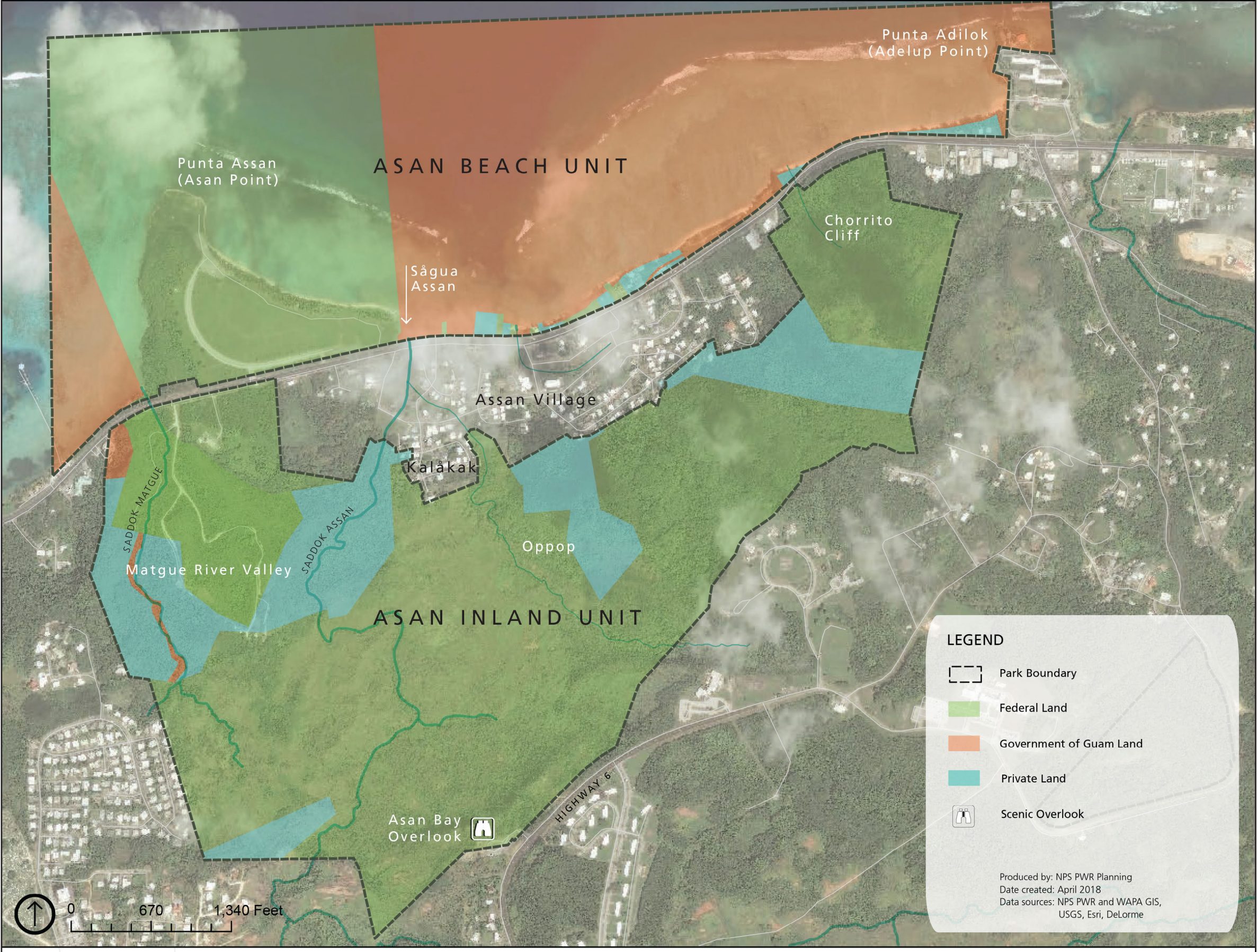
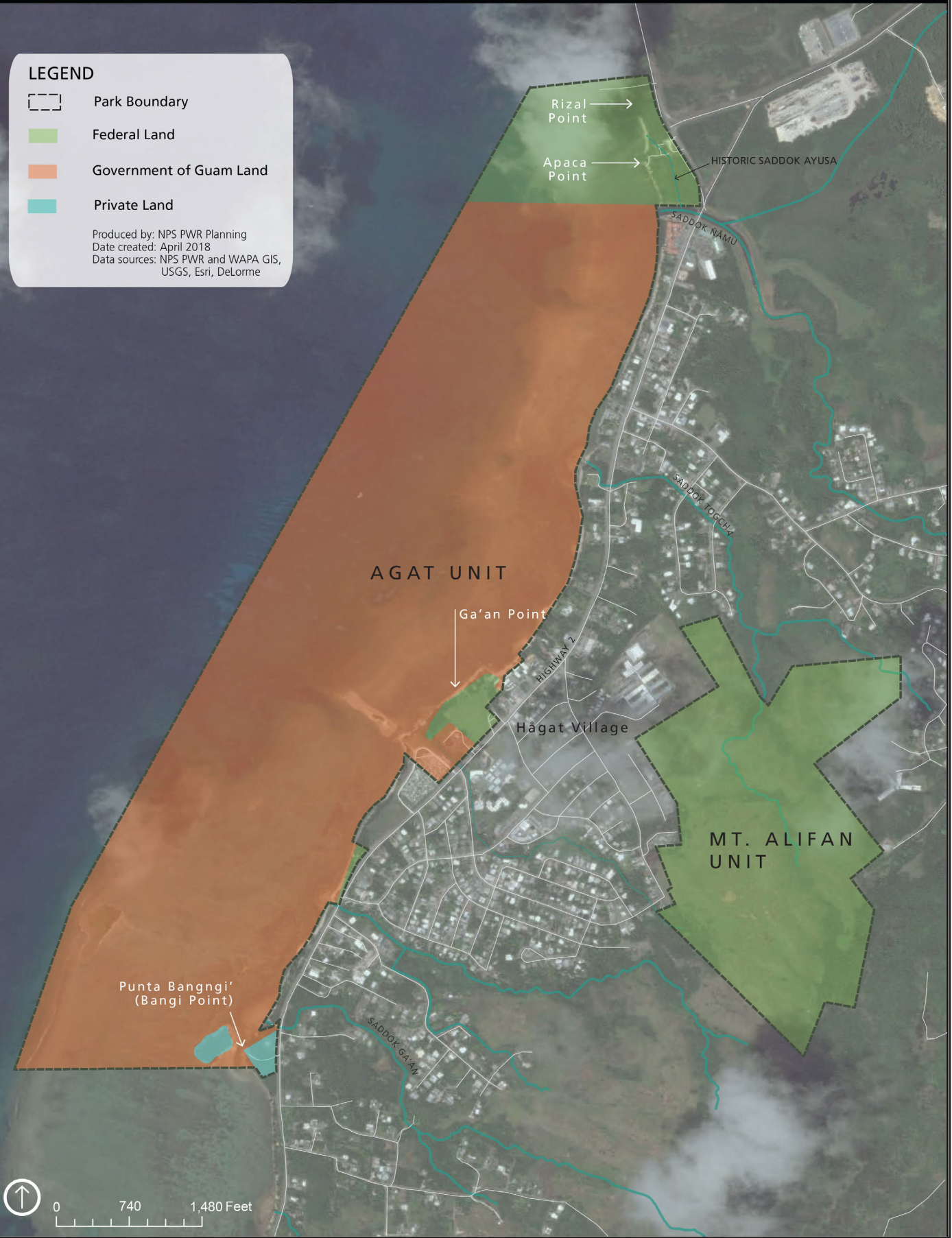


Figure 1.4: Unit Overview and Landownership, Agat and Mt. Alifan
War in the Pacific National Historical Park | Asan + Agat Units Management Plan



During the Vietnam War, Guam also supported the military action in Southeast Asia. In Asan, the Navy renovated the Asan Point Civil Service Community into the “Advanced Base Naval Hospital,” or Asan Annex, which opened in 1968. The hospital was abandoned in January 1971 as the Vietnam War wound down, and in April 1975 was resurrected as one of 12 facilities on Guam for Operation New Life, a program to process thousands of Vietnamese refugees who had been evacuated from South Vietnam at the end of the war. Over 100,000 refugees would be held in detention, waiting to be moved to the mainland US.

Guam’s people understand and define the many periods of the island’s history in different ways, and what may seem like a story of struggle, tragedy, and loss is nonetheless accented by resilience, dignity, and hope. The park’s cultural landscape—from limestone forests to mangroves, shorelines, rugged hillsides, scenic views, and wartime ruins—and the people it has served converge to tell an important story of the impacts of conquest and the spirit of inafa’ maolek (restoring harmony and order).

PLAN PURPOSE, NEED, AND OBJECTIVES

Purpose of the Plan

The unit management plan will establish direction for visitor experience, resource management, and facility development for the Asan Beach, Asan Inland, Agat, and Mt. Alifan Units.

Need for the Plan

The park’s existing general management plan (GMP) was completed in 1983 and lacks updated guidance for the four units. Under 54 USC 100502, “General Management Plans,” each park must have a plan or series of plans that satisfy four statutory requirements:

1. measures for the preservation of the area’s resources,

2. indicators of types and general intensities of development,
3. identification of and implementation commitments for visitor carrying capacities for all areas of the park, and
4. indications of potential modifications to the external boundaries of the park, and the reasons for the modifications.

If a park’s planning portfolio contains documents that address these four elements, it will be deemed to meet the requirements for a GMP per 54 USC 100502. This plan helps to meet these requirements, along with the 2017 foundation document, the 1983 GMP, and the 1988 statement for management. See the Relationship to Other Planning Efforts section below for more detail.

Since the adoption of the 1983 GMP, additional resource threats have arisen, new information about park resources has been discovered, and park visitation has increased. Therefore, this plan is needed to:

- Ensure visitors are better able to understand and connect to the park’s story and key resources,
- Address resource and facility pressures resulting from high levels of visitor use in the Asan Beach, Asan Inland, and Agat Units,
- Address conflicting visitor uses and meet the needs of evolving visitor demographics,
- Identify management strategies to protect the park’s natural resources from invasive species, climate change impacts, and overexploitation, while showcasing the unique ecosystems and species found within the park,
- Ensure the appropriate treatment of cultural resources, including cultural landscapes and deteriorating historic and character-defining features,
- Ensure the availability of key areas and resources for traditional and subsistence uses, gatherings, and storytelling,

and highlight the importance of these landscapes to ongoing cultural practices,

- Determine strategies for the identification, documentation, proper treatment, and preservation of cultural resources in unsurveyed portions of the park, and
- Plan for the influence of increased flooding and storm surge on facilities and resources caused by, among other variables, climate change-driven sea level rise and degradation of coral reefs that protect shorelines from erosion.

Plan Objectives

Objectives are more specific statements of purpose that provide additional bases for comparing the effectiveness of alternatives in achieving the desired outcomes of an action. The objectives of this Asan and Agat Units Management Plan are:

- Integrate cultural landscape treatment guidance for the historic battlefields into site planning to ensure that visitor facilities enhance the units' strong sense of place.
- Identify adaptive management approaches for cultural and natural resources to address human and environmental impacts, including those caused by climate change, invasive species, and overexploitation.
- Provide site-specific guidance for desired experiences, to improve the safety of facilities, and to reduce visitor use conflicts in areas with high visitation.
- Determine the appropriate level and extent of park facilities and reduce the facility footprint in areas that are especially vulnerable to storm damage and flooding.
- Identify more resilient locations for existing monuments.
- Establish a plan of action to pursue the identification and documentation of cultural resources.

PLANNING CHALLENGES AND OPPORTUNITIES

The planning team, with input from members of the public and other agencies and organizations, identified various challenges and opportunities associated with the Asan Beach, Asan Inland, Agat, and Mt. Alifan Units. This information assisted in determining the range of issues addressed by this unit management plan. Planning challenges and opportunities for the UMP can be grouped into three broad categories: sustainable facilities, climate change impacts to resources, and visitor experience and awareness.

Sustainable Facilities

The park manages roadways, parking lots, picnic areas, and buildings that are vulnerable to storm damage and rising sea levels due to climate change. These facilities are aging and may not be the right size or in the appropriate location for current and anticipated visitor and staff use.

Climate Change Impacts to Resources

The park's historic features, commemorative monuments, cultural landscapes, and diverse terrestrial and marine resources are threatened by a variety of impacts associated with global climate change and other human influences. These include sea level rise, invasive and nuisance species, flooding, storm damage, wildland fire, coral bleaching, ocean acidification, and other impacts arising outside park boundaries.



1. [Top] Memorial Day celebration at Asan Beach Unit. 2. [Middle left] Visitor exploring the reef. 3. [Middle right] US marines tour Asan Beach Unit, January 2023. 4. [Bottom] Visitors at Assan Ridge, Asan Beach Unit. Photos: NPS.

CLIMATE CHANGE SCENARIO PLANNING

As noted in this chapter, the park's resources and facilities are being affected by various climate change-related impacts, including sea level rise, storm surge, saltwater intrusion, ocean warming, changing precipitation levels, and increasing storm intensity, among others. The park's vulnerability to extreme weather events was forcefully demonstrated in May 2023 by Typhoon Mawar and the ensuing severe damage from flooding and high wind speeds.

To guide the park's response to climate change impacts, the National Park Service has integrated scenario planning into the unit management plan, following the climate adaptation principles in the *Planning for a Changing Climate* guidebook (NPS 2021b). As part of this effort, the planning team has identified a 4.9-foot (150-centimeter) sea level rise with storm surge as the projected worst-case scenario that could befall the park within the UMP's planning horizon of approximately 20 to 30 years. The estimated range of sea level rise is informed by the 2020 *Climate Change in Guam* report by the Pacific Islands Regional Climate Assessment (PIRCA 2020). Although the Climate Change in Guam report projects a global range of sea level rise between 0.5 and 1.2 feet (15.2 and 36.5 centimeters) by 2050, and a range of 1.0 to 4.3 feet (30.5 to 131.1 centimeters) by 2100, the report states that sea level rise on Guam is expected to be higher than the global average (PIRCA 2020, 23). Given the uncertainty of global climate models and emerging science suggesting that sea level rise could occur more quickly than predicted, the NPS has identified the more accelerated scenario of 4.9 feet (150 centimeters) as the worst case for planning purposes.

In addition to sea level rise projections, the planning team has considered the

influence of storm surge on coastal flooding projections. A combined model predicting the impacts of sea level rise with storm surge was completed for Guam in 2023 by the US Geological Survey (USGS) Coastal and Marine Hazards and Resources Program (USGS 2023a). This model is the first federally approved storm wave and surge flood modeling for Guam, the Commonwealth of the Northern Mariana Islands, American Samoa, and Hawai'i (USGS 2023b). As such, it represents a very important planning tool for the park as well as other land management agencies and residents in Pacific Islands who must contend with increasingly intense coastal impacts from climate change.

The USGS coastal flooding model relies on a mix of oceanographic, coastal engineering, ecological, and geospatial data and methods to map coastal flooding from waves and storm surge at 107.6-square-feet (10-square-meter) resolution for one-year, 20-year, and 100-year storm events. A one-year storm is a storm that has a 100% probability of being equaled or exceeded in a given year. Similarly, a 20-year storm has a 5% chance, and a 100-year storm has a 1% likelihood of occurring. These storm events are each modeled for the current sea level plus six sea level rise scenarios: +0.8, +1.6, +3.3, +4.9, +6.6, +9.8 feet (+25, +50, +100, +150, +200, and +300 centimeters). The USGS model additionally quantifies coastal flood depths and extents (USGS 2023a). See appendix E for more information.

Working closely with the NPS Climate Change Response Program, the park refined the planning scenarios to incorporate the influence of storm surge and identify likely near-term versus longer-term impacts. The planning scenarios and projections were evaluated by an interdisciplinary planning team with experience at the park and other Pacific Island NPS units. This

resulted in a two-phased plan for managed retreat along the shoreline, with each phase tied to a projected sea level in the USGS model. In view of the uncertainty around the projected rate of sea level rise and the impacts of storm surge, these phases are organized by sea level rather than according to a specific window of time. Phase 1 corresponds to a 0.8-foot (25-centimeter) rise in sea level, with storm

surge, and phase 2 corresponds to the 4.9-foot (150-centimeter) worst-case scenario, with storm surge. See figures E.3 to E.8 in appendix E. For each phase, the planning team analyzed the impacts of the projected climate change scenario on cultural and natural resources, park facilities, and visitor experience. This analysis informed the development of the plan's alternatives, described in chapter 2.



1. [Top] Flooding in the Apaca Point picnic area after Typhoon Mawar, May 2023. **2.** [Bottom] Debris and coastal flooding in the aftermath of Typhoon Mawar, near the Apaca Point fortifications. Photos: NPS.



1. [Top] Damage from Typhoon Mawar at Asan Beach Unit's lower parking lot, 2. [Middle left] Storm surge damage to the Liberator's Memorial at Asan Beach Unit, 3. [Middle right] Typhoon damage to the lower parking lot at Asan Beach Unit, May 2023, and 4. [Bottom] Flooding from Typhoon Mawar at Asan Beach Unit's upper parking lot. Photos: NPS.

Visitor Experience and Awareness

Many visitors use the park as recreational open space, and this can sometimes be incompatible with the solemn, commemorative nature of the park's World War II history. The absence of interpretation and interpretive facilities at key locations means that the park is missing critical opportunities to connect visitors to its World War II history, as well as the sites' prehistory and the broader historical context leading up to and following the war. As more and more time passes since the end of World War II, it is becoming increasingly necessary to tell the story of this broad historical context so that today's visitors can understand the significance of the war's impacts on Guam and the Pacific Theater.

RESOURCE IMPACT TOPICS

Impact Topics Retained for Further Analysis

Impact topics represent resources that could be affected, either beneficially or adversely, by implementing any of the proposed alternatives. The National Park Service used an interdisciplinary review process, existing studies and data, and public comments to determine which resources would likely be affected by this project. The following topics are carried forward for further analysis in this EA:

- Floodplains
- Threatened and Endangered Species
- Invasive Species Management
- Cultural Landscapes
- Ethnographic Resources
- Historic Structures
- Archeological Resources
- Visitor Use and Experience

Impact Topics Dismissed from Further Consideration

The following impact topics are among those that were dismissed because they are not present, would not be affected by, or would be affected negligibly by the alternatives evaluated in this document:

- Water Quality
- Wetlands
- Vegetation
- Night Sky
- Public Health and Safety
- Environmental Justice Communities

RELATIONSHIP TO OTHER PLANNING EFFORTS

The following park plans helped inform the development of the unit management plan and management alternatives. In addition to the plans listed below, numerous studies and data collection efforts have supported the planning process and are listed in the References section (see appendix I).

Foundation Document (2017)

The [foundation document](#) for War in the Pacific NHP provides a shared understanding of what is most important about the park and guides all planning and management efforts, including this unit management plan. The UMP is consistent with the park's purpose and significance, as described in the foundation document, and ensures the protection of fundamental resources and values within the four units. The foundation document process identified the UMP as a high-priority plan to address climate change impacts to facilities, the need to balance different types of visitor use, and resource protection and management.

General Management Plan (1983)

The approved [general management plan](#) for War in the Pacific NHP includes proposals for boundary revisions and concepts for management of natural and cultural resources, development of park facilities, and management of visitor use. Although the GMP emphasizes historic preservation and interpretation of the Pacific Theater of World War II, it additionally includes provisions for traditional use of park lands along the shoreline, which were treated as an integral part of cultural resources management. The GMP does not describe formal management zones or desired conditions for resource protection and visitor use. However, it outlines distinct management proposals and approaches for each individual unit within the park. These proposals reflect the unique character and assemblage of resources in each unit, as well as opportunities for facility development and visitor use.

While some of the actions proposed in the GMP have been implemented (such as the Asan Bay Overlook), others have not been completed due to the infeasibility of some of the proposed boundary adjustments, ongoing vulnerability to typhoons and storm damage, changes in staff and park leadership, and lack of funding. The unit management plan supersedes the GMP guidance for the four units in the planning area (Asan Beach, Asan Inland, Agat, and Mt. Alifan), while elements of the GMP relating to the Piti Guns and Mt. Chachao-Mt. Tenjo Units are still relevant. The Fonte Plateau Unit was not part of the park in 1983; however, the addition of the site was proposed in the GMP, and the unit was added in the 1980s. Although the general character of each unit and goals for visitor use reflect current conditions, the actions identified in the GMP did not consider the significant impacts to resources and facilities caused by climate change and invasive species. The unit management plan is therefore needed to complete the park's planning portfolio by proposing updated guidance to address these key challenges.

Statement for Management (1988)

The statement for management supplemented the GMP and provides additional guidance on resource management, facility development, and operations for the park's seven units. This 1988 plan establishes a zoning system for the park based on the location of historically significant sites, structures, and objects; patterns of visitor use; and future management needs. Three zones were identified for the park: a historic zone, which included land and water areas necessary to preserve the integrity of cultural resources; a natural zone, which provided a landscape buffer surrounding cultural resources; and a development zone, which consisted of areas of concentrated park development and visitor use. While the zones are mapped, desired conditions are not identified for each zone.

Similar to the GMP, some actions from the statement for management have been implemented, whereas others have not. The unit management plan also supersedes the statement for management guidance for the four units in the planning area. The statement for management identifies key issues and challenges facing the park that are still relevant, notably related to cultural and natural resources management, invasive species, and the need for storm-resilient facilities. However, it provides only high-level guidance and primarily identifies necessary future plans, projects, and studies, instead of the site-specific management direction outlined in the unit management plan.

ALTERNATIVES





View of Asan Inland Unit and Asan Beach Unit from Asan Bay Overlook. Photo: NPS.

CHAPTER 2: ALTERNATIVES

This chapter describes the alternatives and other actions considered but dismissed. Two alternatives, Alternative A: No Action (Continue Current Management) and Alternative B: NPS Preferred Alternative, are being considered.

Implementation of the approved plan would depend on future funding. Approval of this plan does not guarantee that the funding and staffing needed to implement the plan would be forthcoming. Full implementation of the actions in the approved unit management plan (UMP) would likely take many years. Some actions described in this plan may be modified by further planning and design efforts.

DESIRED CONDITIONS

Desired conditions were developed by park staff to help identify the resource conditions, visitor experiences and opportunities, and facilities that the NPS strives to achieve in the Asan Beach, Asan Inland, Agat, and Mt. Alifan Units. These desired conditions, along with the planning challenges and opportunities identified in chapter 1, informed the development of the park's proposed action. The two alternatives considered in this chapter vary in their ability and approach to address the desired conditions. The park's 2017 foundation document, 2021 draft cultural landscape report, 1983 general management plan, and 1988 statement for management informed their development. Recent studies, models, and other data collection efforts also shaped the desired conditions, in particular projected future climate change scenarios (USGS 2023a, PIRCA 2020).

Desired Conditions for All Four Units

- Visitors are immersed in the World War II battlefield landscape, and through this power of place understand the significance of the sites.

- Visitors experience the diversity of park stories and vibrant ecosystems from many different perspectives.
- Connections between the community and resources important to CHamoru oral traditions are strong, thriving, and shared with visitors.
- Visitors can explore a natural wonderland of distinct and healthy ecosystems, where ecological function and native species diversity are maintained to the greatest extent possible within the cultural landscape.
- Native and traditionally used plants and animals are protected and restored where they are still viable, and critical habitat is preserved elsewhere on the island through community partnerships.
- Cultural resources are preserved in place to the extent possible, and treatment strategies guide and prioritize documentation or other actions when loss or damage is unavoidable.
- Access to and throughout the unit is welcoming for visitors of all backgrounds. Visitors of all ages and abilities can safely connect to the park's fundamental resources and values, and interpretive exhibits share key experiences that may be challenging to reach in person.
- To the greatest extent possible, information about the park is provided in multiple formats and languages, including CHamoru, English, and Japanese.¹
- Facilities are well-maintained and designed to be resilient to the impacts of sea level rise, flooding, erosion, typhoon damage, and wildland fire.

¹ The enabling legislation for War in the Pacific National Historical Park stipulates that "To the greatest extent possible, interpretative activities will be conducted in the following three languages: English, Chamorro, and Japanese" (P.L. 95-348, §6f).

Desired Conditions for the Coastal Units (Asan Beach and Agat)

- Marine ecosystems maintain their rich diversity of species, and visitors have the opportunity to learn about and experience the abundant animal and plant life of the reefs and inshore waters.
- Prominent coral reefs and submerged World War II resources, including two sunken amtracs, provide a fascinating destination for snorkeling and scuba diving.
- Visitors have the opportunity to engage in a variety of quality experiences, ranging from quiet contemplation and remembrance to active recreation, informal gatherings, and events.
- The Agat Unit shares a story of reconciliation and healing, as visitors experience the flags of the US, Japan, and Guam all together, within a cultural landscape that retains the highly intact marks of war.

Desired Conditions for the Inland Units (Asan Inland and Mt. Alifan)

- Community collaboration reduces the impact of invasive species, fire, erosion, and trampling on sensitive native habitats and archeological features.
- Visitors experience the upland battlefield and its expansive views and understand how the cultural landscape has evolved from the destruction of the war to healthy native plant communities.
- Visitors recognize and visualize the experience of US Marines traversing the battlefield from reef to ridge.
- At Asan Bay Overlook, visitors experience a solemn memorial to the many lives lost on Guam during World War II. Families and friends honor their loved ones in a peaceful and reverent environment.
- Visitors are able to see and learn about the park's highest-quality limestone forest and

savanna habitats on Mt. Alifan, which are preserved to the greatest extent possible.

- High on the slopes of Mt. Alifan, visitors experience the exposed mountainous terrain and can still see the World War II foxholes, berms, and fortifications that were built by the Japanese military.

ALTERNATIVE A: NO ACTION (CONTINUE CURRENT MANAGEMENT)

Concept Statement

The no-action alternative describes the current management of the project area and is a basis for comparison with the action alternative. Under the no-action alternative, management activities would continue without the benefit of an updated long-term plan, informed by new data and climate change projections. The park's coastal units at Asan Beach and Agat would continue to be very popular visitor destinations while grappling with frequent storm damage and closure of facilities, such as parking areas. The Rizal Point area of the park, as well as the Mt. Alifan and Asan Inland Units, would remain largely inaccessible to visitors. Resource management would focus on high-priority invasive species removal projects and cyclic maintenance to stabilize the units' World War II fortifications.

Current management activities are informed by multiple plans and guidance documents for resource management. The park's 1983 general management plan (GMP) provided direction for proposed boundary revisions, resource management, facility development, and visitor use. In 1988, the park completed a statement for management that articulated further guidance for zoning, visitor facilities, and resource protection. While the overall management vision included in these plans remains largely relevant, many of their specific recommendations have become outdated. Subsequent planning and data collection efforts currently supplement guidance from the GMP and statement for management and influence park operations today. These include the 2017 foundation document, the draft natural resources condition assessment

(Donaldson et al. 2017), the 2021 draft cultural landscape report for the Asan Beach and Agat Units, and the 2013 cultural landscapes inventory.

Management Zones

Because alternative A is a continuation of current management, this alternative would continue to rely on the management zoning approaches established in the park's 1983 general management plan and 1988 statement for management. As described in Chapter 1: Introduction, the GMP did not describe formal management zones or desired conditions for visitor use and resource protection. However, the GMP identified an approach for resource management, visitor use, and facility development specific to each unit that has functioned similarly to management zoning. This approach is generally consistent with the way the units are managed today.

The GMP identifies the Asan Beach Unit as the unit likely to receive the most visitation in the park. Recommendations for appropriate visitor activities, facilities, and services for Asan Beach reflect its expected high levels of use—both for off-island visitors and for local residents. The Asan Inland Unit is intended to be managed for light visitor and administrative use, due to its rugged terrain and dense vegetation. The GMP additionally proposed the development of the Asan Bay Overlook to commemorate the 50th anniversary of the Battle of Guam.

The Agat Unit is also identified as a primary location for visitor use and visitor-serving facilities in the GMP. For Mt. Alifan, the GMP describes a management vision for light visitor use, primarily by local residents. This management vision has not been achieved in the years since the GMP was approved, largely due to the challenge of providing adequate public access to this unit.

The zones proposed by the 1988 statement for management align with the management approaches described in the GMP but provide increased site-specific guidance. The three zones proposed for all units in the park

include an historic zone, a natural zone, and a development zone. Like the management guidance in the GMP, the zoning in the statement for management is consistent with the way the units are managed today, except for the development zone identified for a proposed trailhead parking area at Mt. Alifan that was not constructed. Visitor use within the park is concentrated at the coastal units and the Asan Bay Overlook, and no formal visitor access currently occurs within the Asan Inland and Mt. Alifan Units.

Site-Specific Management Guidance

ASAN BEACH UNIT

Visitor Use and Facilities

The park would continue to provide visitor facilities, including picnic tables, pedestrian paths and trails, parking, and restrooms for as long as possible. Periodic damage from storms and coastal or overland flooding would continue to occur, and park staff would implement temporary facility closures and conduct repairs as practicable. Weathering, flooding, and other types of damage would continue to impact the six monuments in the unit, and the park would conduct repairs and stabilization as practicable. Given projected impacts from sea level rise and storm surge, facilities and monuments would eventually become inaccessible to visitors or damaged beyond repair.

Park staff would continue ongoing efforts to enhance the accessibility of the beach with beach access mats during programming.

Resource Management

The NPS would continue to conduct vegetation management best practices to protect the cultural landscape. The park would continue to stabilize and protect the historic World War II fortifications in the unit through cyclic maintenance funding. The park is currently developing a project to preserve the World War II concrete fortifications, which would provide additional stabilization treatment to 15 of the fortifications and replace the metal shoring for four

fortifications in locations that are projected to be more resilient to flooding. Preservation and stabilization priorities for cultural resources would continue to be informed by cyclic condition assessments, the 2013 cultural landscapes inventory and the *Protocols for Assessment of Vulnerability of Historic Resources to Climate Change* report (Peterson et al. 2013). The submerged resources study that is currently underway at Asan and Agat would document submerged World War II resources and impacts from the battle on the barrier coral reefs.

The recommendations included in the 2021 rapid ethnographic assessment project (REAP) would be implemented as funding became available. These include compiling existing oral history interviews and continuing current oral history efforts, researching and sharing CHamoru place names for locations within the unit, conducting archeological surveys, and broadening the history shared by the park to include the periods before and after World War II.

Efforts to manage invasive species would continue, including coconut rhinoceros beetle (*Oryctes rhinoceros*) control and the brown tree snake (*Boiga irregularis*) removal project that is currently underway for Assan Ridge in collaboration with the US Geological Survey, US Fish and Wildlife Service (USFWS), University of Guam, and Virginia Tech. In addition to the brown tree snake, which has decimated Guam's native forest bird and lizard populations, the park would pursue an integrated pest management approach to control other detrimental invasive species, including little fire ants (*Wasmannia auropunctata*), rats, cats, and dogs. The park would continue to protect and support the recovering limestone forest ecosystem on Assan Ridge by outplanting native species with habitat, medicinal, and subsistence value. Park staff would continue to collaborate with the USFWS to conduct surveys of endangered tree snails along Assan Ridge.

The NPS Pacific Islands Inventory and Monitoring (I&M) network and park staff would continue to conduct annual assessments of marine resources, including surveys for

abundance and diversity of fish and corals, water quality, and non-coral invertebrates.

Interpretation and Education

The NPS would continue to communicate the park's interpretive themes through interpretation and educational programs hosted in the visitor center as well as through tours and events at each unit. The presence of NPS rangers at Asan Beach Unit would continue to be minimal.

Existing waysides and other interpretive signage would help convey the significance of the invasion beach during World War II, as well as the cultural and ecological importance of natural resources (such as along the Assan Ridge Trail). Events and programs taking place in the unit, including the annual Memorial Day flag display, would continue to foster meaningful connections between visitors and the park's purpose and significance.

ASAN INLAND UNIT

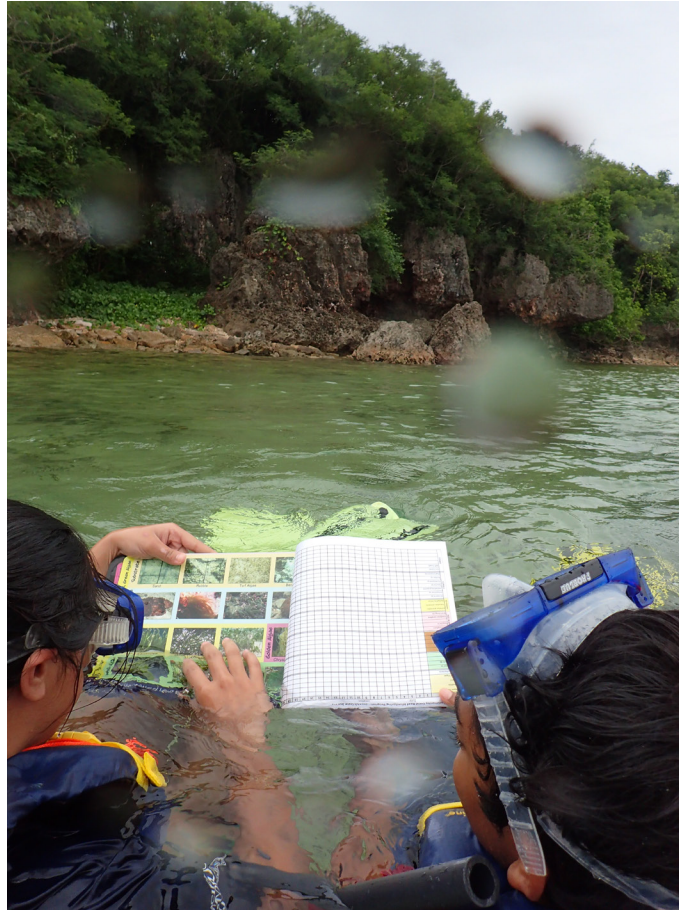
Visitor Use and Facilities

Under the no-action alternative, formal visitor access to Asan Inland Unit would continue to be restricted to the Asan Bay Overlook. Visitors would be able to view the Asan Inland Unit from above but would not have the experience of being immersed in the rugged terrain of the uphill battlefield. Visitor-created trails in the area around the overlook would continue to be used to access destinations such as Tony's Falls and would continue to cause trampling of vegetation and increased erosion.

The park's maintenance facility would continue to be located at the northern boundary of the unit, adjacent to Marine Corps Drive, and would not be accessible to the public.

Resource Management

The park would continue current resource management activities in Asan Inland Unit under alternative A. These include NPS I&M network surveys of vegetation every five years and annual monitoring of stream condition, aquatic species, and water quality at Saddok Assan (Asan River). Efforts to eradicate



1. [Top left] Volunteers clear vegetation at Apaca Point in the Agat Unit. 2. [Top right] Visitors learn about the park's natural resources. 3. [Bottom] Overgrown access drive at Rizal Point, which would become an accessible pedestrian route under alternative B. Photos: NPS.



1. [Top Left] Ga'an Point gun and flags at the Agat Unit. 2. [Middle left] Submerged amtrac off of the coast of the Agat Unit. 3. [Top right] 3rd Marine Monument at the Asan Beach Unit. 4. [Bottom] Monument row at Asan Beach Unit. Photos: NPS.

invasive species would continue, such as little fire ant monitoring and control and clearing invasive plants from endangered *Tinospora* vines. The park would continue efforts to support threatened and endangered species by outplanting rare and endangered plants, outplanting host plants for the endangered eight-spot butterfly, and conducting surveys for and protecting endangered tree snails.

Cultural resources management activities would continue to include cyclic condition assessments of cultural resources within the unit.

Interpretation and Education

Due to current visitor access constraints within the unit, interpretation and educational programming would only occur at the Asan Bay Overlook. The overlook features the Memorial Wall, etched with the names of the people of Guam and the US servicemen who died or suffered atrocities during World War II. In addition to the Memorial Wall, the overlook includes commemorative bronze sculptures and interpretive waysides.

AGAT UNIT

Visitor Use and Facilities

The park would maintain current visitor use opportunities and facilities in the Agat Unit for as long as possible. At Apaca Point, these would include picnic tables, pathways, and a parking area. Rizal Point would remain closed to formal visitor access. Ga'an Point would continue to provide a restroom, picnic tables, pathways, and a parking area large enough to accommodate a tour bus turnaround.

As at Asan Beach, damage from storms and coastal or overland flooding would continue to occur at Agat, and park staff would implement temporary facility closures and conduct repairs as practicable. The three flags and the Japanese defense guns at Ga'an Point would continue to be exposed to weathering and storm damage, including coastal erosion. Similar to Asan Beach, facilities and commemorative features within the Agat Unit would eventually become inundated or too damaged to repair.

Resource Management

Cultural resource management activities within the Agat Unit would be similar to those at Asan Beach, guided by cyclic condition assessments, the cultural landscape inventory, and the REAP. As at Asan Beach, the park would continue vegetation management and ongoing efforts to stabilize and protect the World War II resources along the coast, including submerged resources such as the amtrac. The submerged resources study that is currently underway for the coastal units would provide data to inform management activities for submerged resources.

Invasive species control would continue to address coconut rhinoceros beetles, little fire ants, rats, cats, and dogs. The NPS I&M network and park staff would monitor the same marine resources in the Agat Unit with the same regularity as at Asan Beach.

Interpretation and Education

Most interpretive and educational opportunities would continue to be offered at the visitor center, with most large special events occurring at Asan Beach Unit. Interpretation and education programs would also be held from time to time at Ga'an Point in addition to the visitor center and Asan Beach Unit. The presence of NPS rangers at the Agat Unit would continue to be minimal. Existing waysides would help convey the significance of the southern invasion beach during World War II.

MT. ALIFAN UNIT

Visitor Use and Facilities

The Mt. Alifan Unit would continue to remain difficult for visitors to access under the no-action alternative. There would continue to be no facilities within the unit.

Resource Management

Resource management activities in the Mt. Alifan Unit would continue to be extremely limited. Cultural resources management activities would continue to include cyclic condition assessments of cultural resources within the unit.

Interpretation and Education

Under the no-action alternative, there would continue to be no interpretive or educational programming at Mt. Alifan.

ALTERNATIVE B: NPS PREFERRED ALTERNATIVE

Concept Statement

Alternative B, the NPS preferred alternative, focuses on enhancing the visitor experience within the four units, while anticipating and providing guidance for how the park will address climate change impacts to resources and facilities. Alternative B describes a two-phased approach to facility development and removal, particularly within the park's coastal units of Asan Beach and Agat. The two phases are each based on a different sea level rise scenario and storm surge model provided by the USGS Coastal and Marine Hazards and Resources Program (USGS 2023a).

Phase 1 corresponds to a 0.8-foot (25-centimeter) rise in sea level, with one-year, 20-year, and 100-year storms modeled and analyzed by the planning team (see appendix E, figures E.3, E.5, and E.7). This phase begins at the time of plan completion and continues until the 0.8-foot (25-centimeter) rise is reached, or in the event of sudden loss of resources or facilities. Phase 2 then begins and extends to a 4.9-foot (150-centimeter) rise in sea level, with the same three storm intensities modeled (see appendix E, figures E.4, E.6, and E.8). As noted in chapter 1, the two phases represent climate change scenarios identified by the planning team within the plan's 20- to 30-year planning horizon. See the Climate Change Scenario Planning section of chapter 1 and appendix E for additional detail.

Under alternative B, resource management activities would focus on increasing resilience to impacts from climate change and other environmental stressors, such as invasive species. The NPS would follow an adaptive management approach for cultural resources that emphasizes documentation and stabilization of historic structures and archeological features, where possible, and

prioritizes preservation treatments in view of their likelihood of loss. Management of the park's cultural landscapes and diverse ecosystems would focus on enhancing native species that are adaptable to changing precipitation conditions, notably an increasing probability of intense storms, typhoons, and rainfall events but an overall decline in total annual rainfall (PIRCA 2020, 18–22). The park would additionally continue and build on current invasive species management activities, including measures for prevention and biosecurity, early detection and rapid response (EDRR), and invasive species control in areas where such species are established.

Alternative B emphasizes broadening the scope of interpretive and educational programs to tell the story of the park's landscapes and communities in the years before and after World II, in addition to commemorating the Battle of Guam and the war's Pacific Theater. To convey the historical context of the war and enrich the visitor experience, the park would incorporate a wider variety of current technologies into interpretive and educational materials. Alternative media formats would allow the NPS to provide access to park resources that are lost or challenging to reach in person and would allow the park to communicate the units' significance to a greater and more inclusive range of audiences.

Management Zones

Under alternative B, the four units within the planning area would rely on the management approach established in the park's 1983 GMP, without the additional overlay of management zones provided in the 1988 statement for management. Rather than management zones applied across the park, the NPS preferred alternative would include unit-specific guidance and desired conditions to determine resource management activities and the level of visitor access and facility development within the Asan Beach, Asan Inland, Agat, and Mt. Alifan Units. This site-specific guidance is described below and illustrated in figures 2.1 to 2.8.

Management Guidance for All Four Units

VISITOR USE AND FACILITIES

Coastal Units (Asan Beach and Agat)

The park would proactively manage facilities over time to reduce their susceptibility to climate change impacts. Existing facilities would be repaired and rehabilitated to make them more resilient to flooding and storm damage. If facilities are damaged or lost due to a storm event or episodic flooding, the NPS would not replace them in kind but would instead explore alternative construction methods or locations or determine whether the facility continues to be necessary. See the Asan Beach and Agat sections below for more detailed proposals.

Drainage and stormwater infiltration along roads, walkways, and near parking areas would be improved by using pervious surfaces where possible and creating bioswales. Naturally occurring wetland areas would be enhanced and expanded to absorb additional overland flows.

Public access to the shoreline with pathways and picnic facilities would be preserved for as long as possible. For new pathways or repairs to existing pathways, the park would use materials that are more resilient to shoreline erosion and flooding, such as compacted, crushed coral.

Near-shore marine activities such as snorkeling and tide-pooling would be promoted. The park would improve access to the beach for all people, including people with disabilities, through changes in site design, the use of beach access mats, and by providing beach access wheelchairs.

Inland Units (Asan Inland and Mt. Alifan)

The park would seek opportunities to establish interpretive trails through the inland units to help convey the reef-to-ridge experience of the 1944 battle. Expanding visitor use within the inland units could additionally offset projected future loss of

access and facilities within the coastal units due to sea level rise and storm surge.

The NPS goal to provide hiking trails through the units has existed since the completion of the park's GMP, and implementation has not occurred to date due to topographical and access challenges at Asan Inland and Mt. Alifan. The park would partner with the villages of Assan, Hågat, and Santa Rita, as well as with the Government of Guam and other public landowners to identify suitable locations for trailheads and small parking areas. Trail alignments would be determined based on the location of feasible trailheads. All trails would be routed to avoid impacts to villages and nearby residents as well as cultural and natural resources, including archeological features.

RESOURCE MANAGEMENT

Under alternative B, the NPS would continue the natural and cultural resource management activities described under alternative A. However, the park would additionally strengthen its adaptive management approach to more rigorously address climate change impacts to resources. This would involve additional monitoring and prioritization of management activities, as described below.

Historic Structures and Archeological Features

The NPS would maintain an adaptive management philosophy for historic structures and archeological features, considering new opportunities and risks as they arise and reprioritizing historic preservation projects as appropriate. In the near term, the NPS would emphasize monitoring, maintenance, and stabilization of historic structures and archeological features. The park would continue to undertake stabilization and maintenance activities for resources using cyclic maintenance funding. Historic structures or archeological features that become flooded would be managed as submerged resources. Heritage documentation would be prioritized for resources in the highest-risk areas.

Existing surveys of cultural resources within the park would assist in prioritizing documentation efforts: these include the 2013 cultural landscapes inventory and the 2013 historic resources vulnerability study conducted by Peterson et al. (NPS 2013, Peterson et al. 2013). Additional documentation of fortifications, earthworks, and other features would be conducted in the near- and medium-term, including measured drawings, large-format photography, and 3-D scanning of photogrammetry.

An archeological overview and assessment would be developed to identify and confirm high-priority archeological inventory needs. Archeological survey strategies would subsequently be developed to investigate high-priority areas for cultural resources.

Historic structures at highest risk of loss would be prioritized for documentation through the Historic American Buildings Survey (HABS)/Historic American Engineering Record (HAER)/Historic American Landscapes Survey (HALS) Heritage Documentation Programs or other appropriate methods. Risk of loss would be determined through regular monitoring of the condition of resources.

Historic structures and archeological resources meeting the conditions described below would be prioritized for documentation or other adaptive action:

- Damage from new or increased growth of destructive organisms, including plants, animals, insects, and fungi
- Increased soil erosion due to drought, wildfire, intense storms, and/or coastal inundation
- Exposure of new and known archeological sites through erosion or loss of shoreline
- Deterioration of archeological artifacts due to change in soil saturation and/or soil and water chemistry
- Damage to concrete structures, caves, and tunnels due to increasingly intense rainfall and higher winds

- Deterioration, corrosion, rusting, and salt deposits on materials that were not designed for inundation or saltwater exposure
- Metal corrosion in submerged resources due to ocean acidification
- Increased cracking due to ground heave and subsidence

In addition, sudden and extreme events such as flooding, wildfire, and storms could prompt a need to reprioritize management activities. In the event of severe damage, it may no longer be possible to repair or maintain a historic structure or archeological feature.

In prioritizing resources for adaptive management action, the park would also consider their significance and value to the community. In addition to relying on traditional cultural resources documentation to identify historical and ethnographic significance, the NPS would regularly engage with the public and with stakeholders to identify resources of highest community value.

Cultural Landscapes

The NPS would continue to manage the vegetation to maintain the open character of the cultural landscape.

Ethnographic Resources

In the event that certain native plant species are no longer viable in their original locations or habitats, the NPS would select more resilient native species for replanting. In selecting native plants that are more resilient to climate change impacts, the park would prioritize introducing fire-resistant plant species with traditional cultural and subsistence value. This includes talisai (Pacific almond or *Terminalia catappa*), niyoron (*Cordia subcordata*), and nanaso (half-flower or *Scaevola sericea*), among other species.

In consultation with partners, including cultural practitioners, the park would integrate traditional CHamoru place names into wayfinding and interpretation materials to reflect ancient and ongoing cultural connections to key sites within the park.

To identify and better understand climate change impacts to ethnographic resources within the units, the park would consult with stakeholders and conduct oral history interviews. This could happen through partnerships with local organizations and with the support of dedicated grant funding.

Natural Resources

Natural resources within the units with ethnographic importance would be protected as much as possible, especially for species and ecosystem processes that are more adaptable to climate change. The park would focus resource restoration efforts on endemic and sensitive ecosystems, such as the limestone forest at Assan Ridge and Mt. Alifan, the savanna/grassland ecosystem at Asan Inland and Mt. Alifan, and the marine ecosystem at Asan Beach and Agat.

The park would increase partnerships with the community to protect the health of Guam's coastal and upland ecosystems through reef-to-ridge management practices that reduce erosion and sedimentation. Partnerships could include non-profit, academic, and local and federal government organizations.

Coastal Units (Asan Beach and Agat)

Along the beach and in riparian areas, native vegetation would be enhanced and rehabilitated while maintaining the open character of the cultural landscape. Native mangrove vegetation, including nipa palm (*Nypa fruticans*), and wetland vegetation would be re-introduced where appropriate to protect the coastline and river outfalls from erosion. Invasive species management would be conducted to the greatest extent possible through individually funded projects, best management practices for prevention and early detection (see appendix D), and other base-funded or partnership-supported management activities.

Existing vegetation would be managed to protect key views and vistas that allow visitors to understand the influence of the island's landforms and vegetation on Japanese and US military strategy. The importance of tree

canopy and providing shade for visitors would be considered in viewshed enhancement and vegetation rehabilitation activities.

To support coral reef health and resilience for as long as possible, the park would expand efforts to select and outplant coral species that are more likely to be adaptable to ocean acidification and temperature increase. This would also support the health of other marine species that rely on coral, such as fish and invertebrates. In the event of significant coral loss, the NPS would employ an adaptive management approach to determine the increased risk to the shoreline and necessary mitigation measures.

Inland Units (Asan Inland and Mt. Alifan)

The NPS would increase revegetation efforts and invasive species management to reduce erosion, vegetate bare badlands, provide climate-change refugia, and protect the limestone forest, savanna habitat, and native and endangered species.

INTERPRETATION AND EDUCATION

Interpretation and educational activities in the units would continue to be provided in multiple, accessible formats. Under alternative B, the use of alternate programming formats would be expanded to ensure that the NPS is as inclusive as possible in sharing the park's stories and significance with visitors. Alternate formats may include video with audio description; tactile objects; 3-D digital models of resources that are challenging to reach in person; and information in multiple languages (CHamoru, Japanese, English, and others).

The park would continue to tell the story of the World War II Battle of Guam and the war's resounding impacts on the people of Guam and throughout the world. In addition, the NPS would expand interpretation about the broader context of the park sites to share the rich and layered history of these landscapes and their communities before and after the war.

As part of this effort, the NPS would increase interpretation of historical land uses and traditionally associated native plants and animals. Historic, ethnographic, and ecological values would be described in interpretive programs and waysides. The varied histories of each unit would be portrayed for visitors to increase understanding of land uses and communities in the years before and after World War II. To support such enhanced interpretation, the park would establish a program of CHamoru cultural practitioners and interpreters to share Indigenous knowledge and experiences about ecosystems, traditional practices, and place names. These cultural practitioners would be local residents with familial connections to the park sites.

To address the impacts of climate change and invasive species on unit resources, the NPS would provide information about native species that no longer exist within park boundaries. Impacts of climate change on cultural resources would also be highlighted for visitors at key viewing locations. The use of 3-D modeling of at-risk resources would allow them to be experienced by visitors even if they become submerged or entirely lost due to adverse conditions.

Coastal Units (Asan Beach and Agat)

Because the coastal units are the most heavily visited areas in the park, the NPS could provide a mobile visitor center that would be stationed at Asan Beach, Ga'an Point, and Apaca and Rizal Points on a rotating schedule. The mobile visitor center could serve as a contact station for members of the public to interact with a ranger and learn more about the outstanding resources within the park.

The NPS would increase interpretation of submerged World War II resources, such as the amtrac at Ga'an Point, as well as the rich diversity of marine life protected within the park's boundaries. Information would be shared through interpretive panels or waysides, through videos and digital 3-D models, or through diving tours provided by local companies. Enhanced coastal and riparian vegetation would be interpreted for its traditional use values and ecological functions.

Inland Units (Asan Inland and Mt. Alifan)

The park would provide interpretation of cultural and natural resources along the trails through waysides, digital tools, and/or a printed guide. Wayfinding signage would be provided to clearly identify trail mileage and level of difficulty of each segment.

Site-Specific Management Guidance

ASAN BEACH UNIT

Visitor Use and Facilities

Given its location along the coastline and high levels of visitor use, visitor experience within the Asan Beach Unit is especially likely to be impacted by sea level rise and storm surge. To improve resilience, development in the shoreline area would be reduced as described under phase 1 and phase 2 below. The park would increase existing efforts to maintain the natural shoreline defense of the fringing coral reefs for as long as possible.

Phase 1

The existing restroom and outdoor shower would be retained in place for as long as possible, until damage by storm and/or flooding makes repair infeasible. If damaged beyond repair, the restroom would be replaced with an accessible, portable toilet. An accessible pedestrian route would connect the restroom to the parking area and to the beach. A small storage shed for beach wheelchairs could be erected near the restroom facility.

The parking area closest to the shoreline and Punta Assan (Asan Point), which currently floods regularly, would be closed and re-vegetated. In lieu of the Punta Assan parking area, the NPS would construct an accessible pedestrian route from compacted, crushed coral to connect the existing shoreline path to Punta Assan and the base of the Assan Ridge. Through re-striping and reconfiguring the eastern portion of the lower parking lot, the park would maintain approximately the same number of parking spots despite the closure of the portion nearest the point. The existing picnic areas along the shoreline

Figure 2.1: Asan Beach Unit Development Concept, Phase 1
 War in the Pacific National Historical Park | Asan + Agat Units Management Plan



Figure 2.2: Asan Beach Unit Development Concept, Phase 2
War in the Pacific National Historical Park | Asan + Agat Units Management Plan



would be maintained in place for as long as possible. Low-level, solar-powered lighting would be provided along the primary pedestrian loop through the site. Lighting would be fully shielded and warm-toned to minimize light pollution and impacts on wildlife, such as the green sea turtle (*Chelonia mydas*) and hawksbill turtle (*Eretmochelys imbricata brissa*). See figure 2.1 for a site plan with more detail.

The five monuments along the shoreline would be relocated to protect them from damage or loss due to sea level rise and storm surge. The Third Marine Division Association Monument, the United States Landing Monument, and the Liberators Memorial would be moved to higher ground within the Asan Beach Unit, or relocated to the Asan Bay Overlook, or moved to another site that is protected from coastal impacts and supported by the community. Similarly, the two monuments for Filipino leader Apolinario Mabini would be relocated to a more resilient site identified in collaboration with the Filipino community on Guam. Ethnographic research about the importance of the monuments to the community and a determination of eligibility for listing in the National Register of Historic Places would be conducted before relocation, as part of implementation-level design and planning.

Due to its more protected location, the War in the Pacific Park Plaque near the upper parking lot could be relocated at the same time as the three military monuments or could be moved during phase 2. If not already located at the site (such as at Asan Bay Overlook), the NPS could install flagpoles for both the US and Guam flags in the new monument location to replace the failing poles removed at Punta Assan.

Phase 2

As part of phase 2, the remaining, eastern portion of the lower parking lot would be removed and re-vegetated in preparation for permanent inundation. This would result in the loss of approximately 35 parking spaces near the beach. The existing shoreline pathway would be retained in place for as

long as possible. Once sea level rises 4.9 feet (150 centimeters) or in the event of sudden storm damage or loss, the pathway would be reconstructed inland of compacted, crushed coral. Existing picnic areas would be removed or relocated inland when damaged by storms or flooding or due to imminent loss from shoreline erosion.

The accessible portable toilet would be retained in the current restroom location for as long as possible but would eventually move further inland to be closer to parking facilities. See figure 2.2 for a phase 2 site plan.

Resource Management

The park would replace the existing turf grass in the unit's large, open green space with a noninvasive species that is more salt-tolerant and less labor-intensive. The NPS would increase native strand vegetation along the shoreline and mangrove (including nipa palm) at the mouth of Saddok Assan to enhance ecological function and coastal protection and interpret the environmental history of the site before World War II.

The park would continue its efforts to remove the brown tree snake and other destructive invasive species from Assan Ridge and restore a healthy limestone forest ecosystem. If the park can successfully reintroduce birds to the Assan Ridge area, additional management efforts would focus on establishing a bird sanctuary along the ridge. The park would promote plants and insects along the ridge that are especially beneficial to birds.

Interpretation and Education

The NPS would interpret the multiple historic land uses of the site, including the World War II beach defenses and the location of the historic road and village. Additional interpretation of natural resources would also be provided at Asan Beach, including the marine areas and the limestone forest along Assan Ridge. A small open-air shelter for interpretation and educational programs would be constructed on higher ground near the base of Assan Ridge in phase 1.

ASAN INLAND UNIT

Visitor Use and Facilities

Phase 1

The park would formalize an existing social trail from Asan Bay Overlook to Tony's Falls. The trail would provide visitors with the opportunity to hike into the rugged terrain of Asan Inland Unit and experience unique vegetation and wildlife as well as a waterfall. See figure 2.3.

To pursue the long-term goal of establishing additional interpretive trails through the unit, the park would work with the village of Assan and other public landowners to identify a suitable trailhead for a future reef-to-ridge hike along the unit's abandoned jeep road.

Phase 2

During phase 2, assuming trailhead access is secured, the NPS would establish one or more additional trails through the unit to help visitors experience the full battlefield cultural landscape, landform and ecosystems, and views to the beach below.

AGAT UNIT

Apaca and Rizal Points

Visitor Use and Facilities

Phase 1

Sea level rise and storm surge modeling indicates that the Rizal Point area is likely to be the most resilient coastal site in the park in the long term, due to its higher elevation (USGS 2023a). Therefore, the preferred alternative proposes investing in visitor facilities and promoting visitor access to Rizal Point, which has not been regularly used for many years. This will allow the park to preserve visitor access to coastal resources for as long as possible.

The NPS would establish a pedestrian route from Apaca Point to Rizal Point and provide waysides at key viewpoints to interpret the Hâgat (Agat) invasion beach and fortifications, CHamoru traditional sites, and sea level rise. Four to five new picnic tables would be established near the new pedestrian route. The park would remove the abandoned restroom

at Rizal Point and replace it in a location farther inland, using a more resilient type of structure such as an accessible portable toilet.

A parking area along Shoreline Drive would be created at Rizal Point to accommodate about 15 cars and a tour bus drop-off zone. While Rizal Point itself is likely to be more resilient to storm surge inundation than the other coastal areas, the USGS storm surge model under phases 1 and 2 indicates that some flooding is projected along Shoreline Drive in the 20- and 100-year storm scenarios. The parking area would be designed to withstand occasional flooding, and adjacent bioswales as well as naturally occurring wetland areas would be enhanced and expanded to absorb additional flows. The overgrown driveway leading from Shoreline Drive to the point would be restored to meet accessibility standards and connected to the new restroom and route along the coast. See figure 2.4.

At Apaca Point, the park would maintain the picnic area and beach access in this part of the unit for as long as possible, given its popularity and frequent visitor use.

Phase 2

In phase 2, the picnic and parking areas at Apaca Point would be removed once sea level rises an additional 0.8 feet (25 centimeters) or in the event of sudden storm damage or loss. The riparian wetland area adjacent to the parking area would be expanded to store and filter stormwater and support native plants and animals. As sea levels approach 4.9 feet (150 centimeters) or higher, the low-lying portion of the pedestrian route to Rizal Point could transition into a water-based route for snorkeling, kayaking, or scuba diving. Visitor access would transition north to Rizal Point. See figure 2.5.

Interpretation and Education

As at Asan Beach Unit, NPS would interpret the multiple historic land uses of the site. A small kiosk for interpretive information would be constructed near the new parking area at Rizal Point in phase 1.

Figure 2.3: Asan Inland Unit Trail Concepts (Phases 1 + 2)
 War in the Pacific National Historical Park | Asan + Agat Units Management Plan

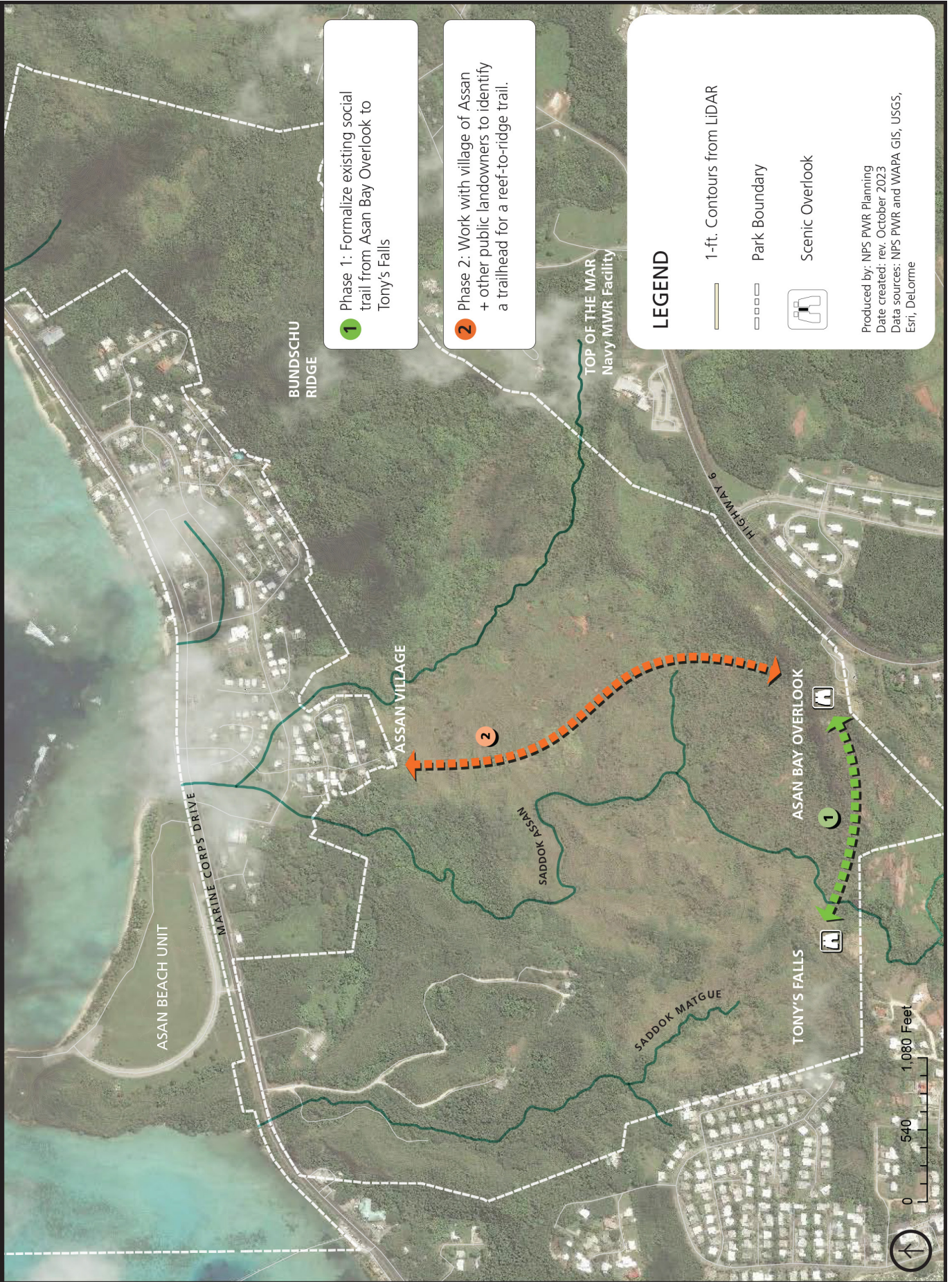
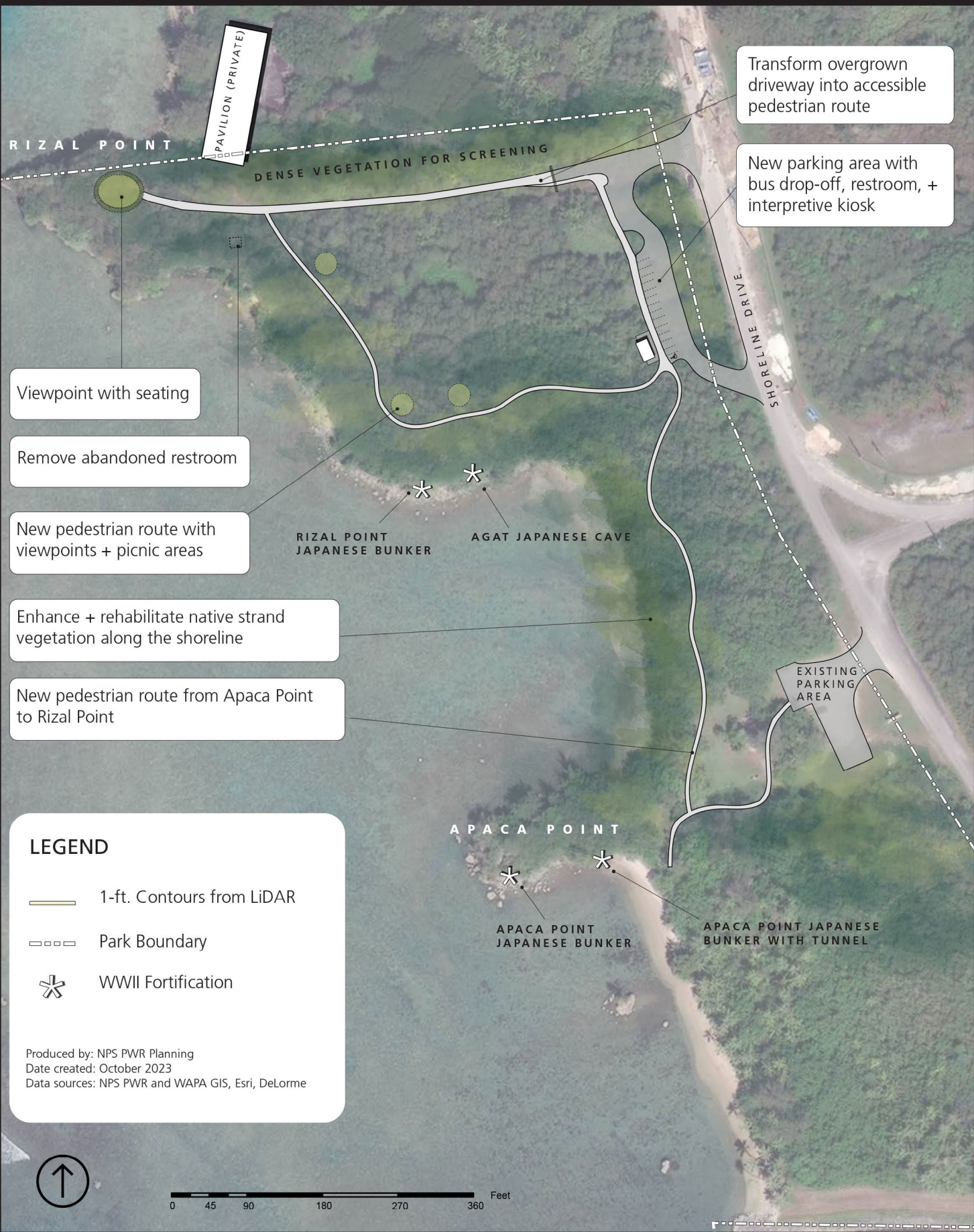


Figure 2.4: Apaca + Rizal Points, Agat Unit | Development Concept, Phase 1
 War in the Pacific National Historical Park | Asan + Agat Units Management Plan



Ga'an Point

Visitor Use and Facilities

Phase 1

In phase 1, the NPS would relocate visitor facilities away from areas of the site that are especially prone to coastal and overland flooding. Because this is another heavily visited area of the park, like the other coastal sites, visitor access would be preserved as long as possible by relocating facilities to higher ground, using construction materials that are more resistant to damage from flooding and erosion, and protecting the shoreline and river outfall with increased vegetation.

The existing parking area would be reconfigured to provide approximately 20 parking spaces, including accessible parking and an area for tour bus drop-off. The parking area would connect to an accessible pedestrian route through the site, constructed of materials such as compacted, crushed coral that would be more resilient to coastal flooding. The park would work with the Hågat Mayor's Office and Guam Waterworks Authority, as well as adjacent landowners such as the Catholic Church and Guam Public Works to connect the Ga'an Point walkways into a larger trail network along the shoreline side of Highway 2.

The restroom, which is currently at risk of loss due to its proximity to the river outfall, would be removed. A new restroom would be constructed to the southwest, along the eastern edge of the wastewater treatment plan. The NPS would consider installing an accessible portable toilet in this location as well.

The NPS would enhance picnic facilities at Ga'an Point by providing several additional tables and locating them along the accessible pedestrian route. See figure 2.6.

Phase 2

The park would preserve the iconic flags and guns onsite for as long possible; however, they would be relocated if they sustain significant damage during a storm, or when coastal erosion and flooding begins to undermine their footings. New, higher-elevation locations

for the flags and guns would be identified in collaboration with members of the public, the village of Hågat, other park partners, and NPS subject matter experts.

The proposed accessible pedestrian route through the site would be retained in place as long as possible. Once sea level rises 4.9 feet (150 centimeters) or in the event of sudden storm damage or loss, portions of the pathway closest to the shoreline would be removed. The eastern portion of the existing parking lot, closest to the river drainage, would similarly be removed in the event of damage or loss. See figure 2.7.

Once water levels rise above 4.9 feet (150 centimeters) or in the event of sudden damage or loss, the NPS would remove the restroom at Ga'an Point and shift formal visitor access opportunities north to Rizal Point.

MT. ALIFAN UNIT

Visitor Use and Facilities

Phase 1

As at Asan Inland Unit, the park would pursue the long-term goal of establishing an interpretive trail or trails through Mt. Alifan and would work with the villages of Hågat and Santa Rita, and other public landowners, to identify suitable trailheads and small parking areas. A trail or trails leading to key viewpoints along the slope of Mt. Alifan would allow visitors to experience the battlefield cultural landscape with views toward the Hågat invasion beach below. A former roadway alignment between Hågat and Santa Rita still exists within the unit and could be partially or fully integrated into a future trail route.

Phase 2

During phase 2, assuming trailhead access is secured, the NPS would establish one or more additional trails through the unit to help visitors experience the full battlefield cultural landscape, landform and ecosystems, and views to the beach below. See figure 2.8.

Resource Management

Resource management activities at Mt. Alifan would be the same as actions common to all inland units, except that the NPS would additionally install exclusion fences to protect the upper limestone forest in the unit from damage from invasive ungulates. The NPS would only fence areas of limestone forest within the park boundary, although the park could partner with the Navy to expanding fencing around other high-quality stands of limestone forest on the mountain.

Cost Estimates

One-time facility costs for implementation of alternative B include costs for the design, construction, as well as the removal or relocation of facilities including parking areas, portions of trails and walkways, small commemorative monuments, and restrooms. Most of these projects are severable from each other and would be accomplished in phases over time. The park would prioritize and implement projects based on impacts from climate change or storms, levels of visitation, operational considerations, and partnership opportunities. Projects would be designed and constructed following the facility investment priorities outlined in the NPS Facility Investment Strategy and would adhere to NPS Investment Review Board requirements. Some actions described in this plan may be modified by further planning and design efforts. Total cost of facility ownership as well as any increased staffing needs would also be considered as part of investment concept planning for project implementation.

No matter which alternative is selected, the implementation of the approved plan would depend on future NPS funding levels and service-wide priorities, as well as partnership funds and efforts. The approval of this plan does not guarantee that funding and staffing needed to implement the plan would be forthcoming. Full implementation of the plan could take many years.

Adaptive Management for Visitor Use and Climate Change Impacts

To provide a quality visitor experience while protecting park resources, the NPS identified indicators and thresholds for visitor use management using best practices created by the [Interagency Visitor Use Management Council](#). Indicators measure conditions that are related to visitor use, and monitoring is conducted to track those conditions over time. Thresholds have been identified that represent the minimally acceptable conditions associated with each indicator. The results from monitoring indicators and thresholds are used to inform and select the strategies park managers would use to achieve and maintain desired conditions.

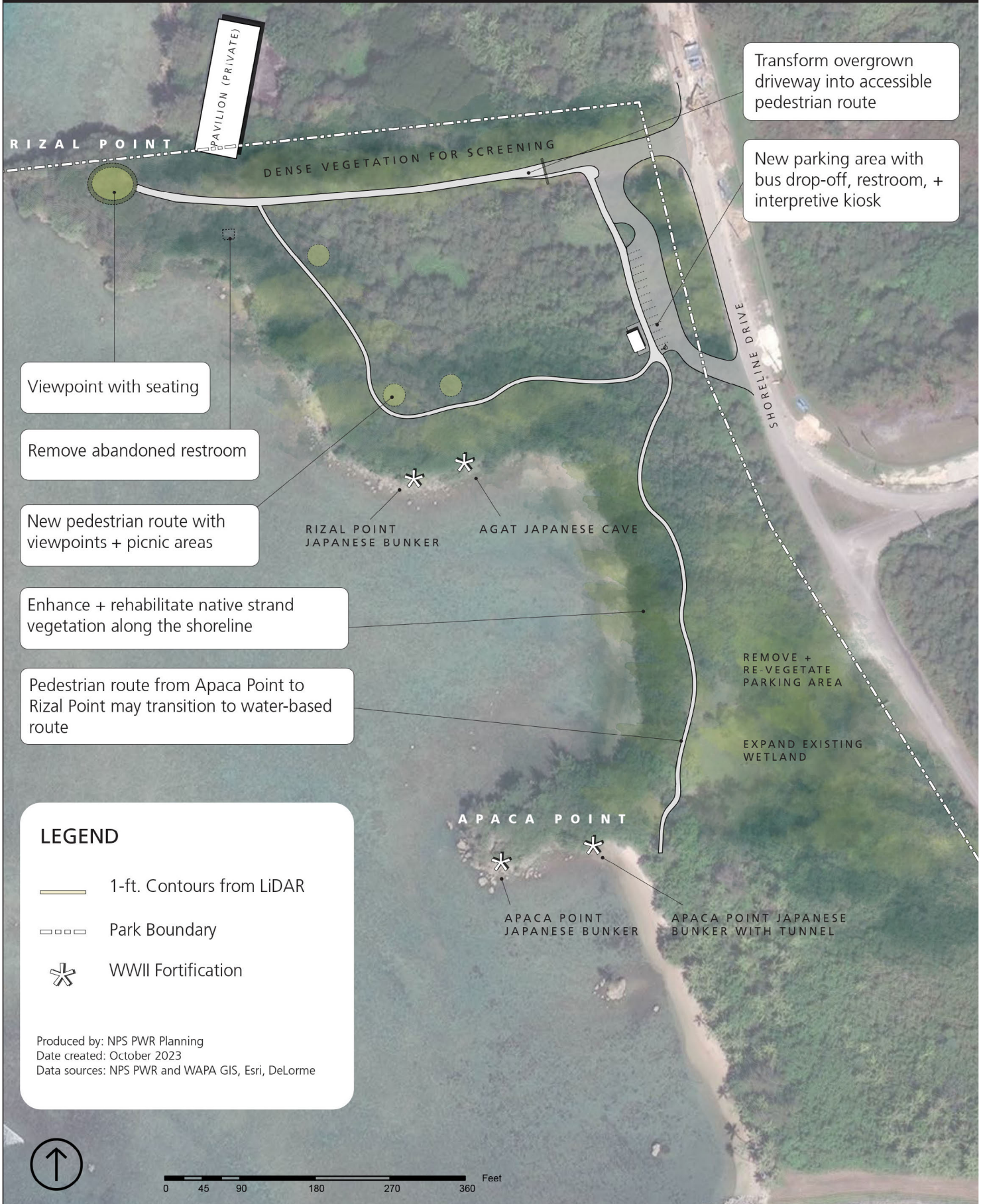
Indicators and thresholds applied to visitor use represent an adaptive management approach that is also useful for the park when responding to climate change impacts. Climate change indicators and thresholds can similarly be monitored to determine when to implement certain management strategies to achieve and maintain desired conditions. Given the direct relationship between climate change and visitor opportunities in the park, the NPS has taken an integrated approach to prioritize which resources and visitor experiences are likely to be the most sensitive to impacts from visitor use and climate change. In addition to the phase-based adaptive management approach described in alternative B, the park has identified the following two high-priority indicators for visitor use related to the unit management plan:

- Number of times per year a visitor facility needs to close due to flooding, storm damage, wildfire, or other natural impacts
- Incidences of human-caused damage to cultural resources

Appendix A identifies a threshold for each indicator, describes a monitoring approach, and lists management strategies that the park would undertake in the event a threshold is reached.

Figure 2.5: Apaca + Rizal Points, Agat Unit | Development Concept, Phase 2
 War in the Pacific National Historical Park | Asan + Agat Units Management Plan

National Park Service
 U.S. Department of the Interior





1. [Top] and 2. [Bottom] Park staff interpret resources for visitors. Photos: NPS.

Figure 2.6: Ga'an Point, Agat Unit | Development Concept, Phase 1
War in the Pacific National Historical Park | Asan + Agat Units Management Plan



Figure 2.7: Ga'an Point, Agat Unit | Development Concept, Phase 2
War in the Pacific National Historical Park | Asan + Agat Units Management Plan



LEGEND

- 1-ft. Contours from LiDAR
- Park Boundary
- Boundary: Federal Lands
- WWII Fortification

Produced by: NPS PWR Planning
Date created: October 2023
Data sources: NPS PWR and WAPA GIS, Esri, DeLorme

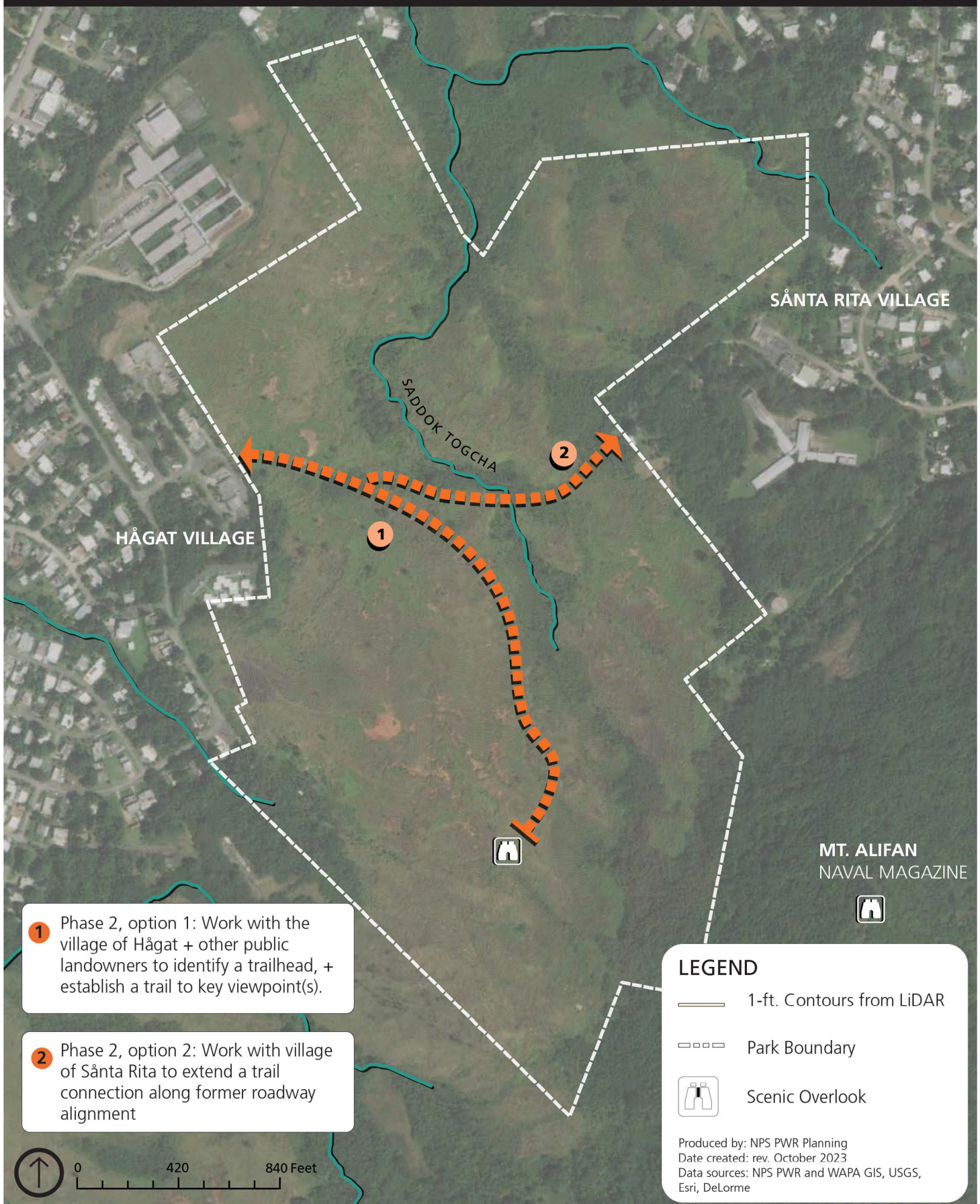
- Enhance + rehabilitate native strand vegetation along the shoreline
- Small picnic area + connection to existing trail system
- New restroom connected to accessible pedestrian route

- Reintroduce native mangrove vegetation, such as nipa palm, at river mouths
- Existing restroom near river outfall removed + area re-vegetated
- Expand small picnic area + provide informational kiosk
- Remove eastern portion of the parking area nearest the river outfall in the event of damage or loss



Figure 2.8: Mt. Alifan Trail Concepts (Phase 2)

War in the Pacific National Historical Park | Asan + Agat Units Management Plan



In identifying high-priority indicators, the park also considered the potential future need for an indicator related to trail and adjacent resource conditions, in view of the proposed trail additions within the inland units. Because alignments for trails have not yet been identified (except for the trail to Tony's Falls), trail-specific indicators would need to be developed as part of implementation-level design and planning.

VISITOR CAPACITY

Like indicators and thresholds, visitor capacity is a component of visitor use management. Visitor capacity is defined as the maximum amount and types of visitor use that an area can accommodate while sustaining desired resource conditions and visitor experiences, consistent with the purpose for which the area was established. Each park in the national park system must have a plan or a series of plans that satisfy the requirements identified in the National Parks and Recreation Act of 1978 (54 USC 100502), including the requirement for "identification of and implementation commitments for visitor carrying capacities for all areas of the system unit."

As described in NPS Director's Order 2: Park Planning, comprehensive plans provide overall direction and guidance on a variety of issues and topics in one document. Comprehensive plans include general management plans for entire parks or unit management plans, such as this one, that address multiple issues and topics within specific units of a park. As noted in Director's Order 2, given their general nature, comprehensive plans such as the unit management plan initially address the requirement to identify visitor capacities by assessing current levels of visitor use and baseline conditions for resources and visitor experiences. They typically include qualitative statements about the types and levels of visitor use that a unit could accommodate, while achieving and maintaining desired conditions consistent with the park's purpose. The director's order recommends that more detailed direction on visitor capacity should be provided in implementation-level planning. Given their general nature, comprehensive plans may not completely address the

requirement for visitor capacity due to the need for additional detailed analysis and subsequent decision-making on management strategies that inform the amounts and types of use that can be accommodated. Per the director's order, the full requirement for visitor capacity can be met as part of the park's planning portfolio, through subsequent plans that have a significant visitor use component.

In the case of the Asan and Agat Units Management Plan, the plan assessed baseline conditions for use, developed desired conditions, and identified management strategies, which provide vital guidance for how the park will provide for and manage the types and levels of use that can be accommodated. The park anticipates that future visitation levels and patterns will shift in response to climate change impacts, particularly at the park's popular coastal units. It is difficult to predict at this time how rising sea levels and storm surge, as well as changes in precipitation and storm frequency, will influence visitor use within the units. While visitation levels at the units are not currently considered a significant issue and do not pose a threat to visitor experience or resource conditions, the park has identified the need to evaluate and identify visitor capacity in the future as part of the site-specific implementation projects tiering from this UMP. For more information about current levels of visitor use in the park, see the Visitor Use and Experience section of chapter 3.

Plans, Studies, and Agreements

Several specific plans, studies, and agreements would be developed to implement alternative B. Some of these items would require additional project funding or increases to the park's operating base funding and staffing. Future plans for actions with potential to affect the environment would require formal analysis of alternatives in compliance with National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), the Endangered Species Act (ESA), and related laws. Such documents would reference and be tiered from this plan.

The following plans and studies are among the identified planning and data needs under alternative B.

PLANS

- Conservation plan for monuments
- Conservation recommendations to protect coral reefs (complete 2023)
- Cultural landscape report for all four units
- Historic structures report(s) and treatment plan (complete 2025)
- Land protection plan update
- Long-range interpretive plan (currently underway)
- Signage and wayfinding plan
- Trails plan for Asan Inland and Mt. Alifan Units
- Value analysis and plan for visitor and educational facility
- Vegetation management plan
- Wayside exhibit plan

STUDIES

- Archeological overview and assessment
- Archeological strategy
- Archeological surveys (section 110)
- Assess impacts of fishing and marine recreational activities on reef resources
- Ethnographic overview and assessment
- GIS data for cultural resources to support mapping and 3-D modeling
- Visitor use survey
- Visual resource inventory

Future agreements that could be needed to implement the plan would include agreements with villages and other public landowners to provide access or connections to new trails on NPS property.

ALTERNATIVES CONSIDERED BUT DISMISSED

The park considered other potential actions, including those identified through civic engagement, that were analyzed as part of the planning process. Actions that were determined to be infeasible and/or not responsive to the purpose and need for action were not carried forward for further analysis. These actions and the rationale for dismissing them are summarized in appendix B.

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AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3





Beach at Apaca Point in the Agat Unit, Photo: NPS

CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter combines discussion of the affected environment and environmental consequences and is arranged by impact topic. It was prepared under the guidance of the NPS NEPA Handbook (2015) and 2022 NEPA regulations issued by the Council on Environmental Quality (CEQ 2022b).

The affected environment describes the physical, biological, cultural, and social environments of the planning area that could be affected from implementing the alternatives described in chapter 2. Effects (or impacts) mean changes to the environment that are reasonably foreseeable and include the following:

- Direct, which are caused by the action and occur at the same time and place,
- Indirect, which are caused by the action and occur later in time or are farther removed in distance, but are still reasonably foreseeable, or
- Cumulative, which are caused by the action's incremental effects when added to the effects of other past, present, and reasonably foreseeable actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions.

Direct and indirect effects are discussed for each alternative and impact topic. Cumulative effects are discussed at the end of each impact topic.

Impacts are also described in terms of duration, whether short-term or long-term:

- A short-term impact is temporary, generally lasting for the duration of the project activities or construction period associated with project activities.
- A long-term impact is typically an effect that would last several years or more beyond the date the project is fully implemented.

IMPACT TOPICS ANALYZED IN DETAIL

The NPS followed the criteria in the 2015 NEPA Handbook to identify environmental issues and impact topics to analyze in detail in this chapter. The list of impact topics was developed based on internal NPS scoping, agency consultation, and public meetings and communications. Impact topics dismissed from detailed analysis are described in appendix C.

The following impact topics have been retained for analysis:

- Floodplains
- Threatened and Endangered Species
- Invasive Species Management
- Cultural Landscapes
- Ethnographic Resources
- Historic Structures
- Archeological Resources
- Visitor Use and Experience

Floodplains

The Asan Beach and Agat Units regularly experience coastal flooding due to storm surge, which is projected to increase with sea level rise: see the Climate Change Scenario Planning section of chapter 1. The units also experience overland flooding from storms with intense rainfall. Most recently, these coastal park units received significant coastal and overland flooding from Typhoon Mawar in May 2023.

Floodplain Management, Executive Order 11988 issued in May 1977, directs all federal agencies to avoid to the extent possible both long- and short-term adverse effects associated with occupancy, modification, and development in floodplains. Floodplains are defined in this order as “the lowland

and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at a minimum, that area subject to a 1% or greater chance of flooding in any given year.” Areas subject to a 1% or greater chance of flooding annually are also known as 100-year flood zones.

NPS proposed actions that may adversely affect floodplains must also comply with Director’s Order #77-2: Floodplain Management, which requires the preparation of a Floodplain Statement of Findings if the action falls within the defined regulatory floodplain. Appendix E: Floodplain Statement of Findings describes the general nature of floodplain processes within the planning area and their associated site-specific flood risk.

DATA SOURCES ANALYZED

Three data sources inform the affected environment and analysis of environmental consequences. The first is the sea level rise and storm surge model developed by the US Geological Survey (USGS) Coastal and Marine Hazards and Resources Program (USGS 2023a). This model provides seven different sea level rise scenarios modeled with a one-year, 20-year, and 100-year storm. This is the first government-approved storm wave and surge flood modeling undertaken for Guam, Saipan, American Samoa, and Hawai’i and represents the most updated and site-specific projections for coastal flooding within the park. Appendix E illustrates several of the storm surge scenarios proposed under this model.

The second data source is provided by the Federal Emergency Management Agency (FEMA) in the form of Flood Insurance Rate Maps (FIRM) developed in 2007 that identify special flood hazard areas. These hazard areas include riverine and pluvial (from rainfall) flooding in addition to coastal flooding. Because the FEMA coastal data is not as current as the USGS model, the planning team has based the analysis on the USGS data for coastal areas and the FEMA data for overland and riverine flooding.

The third data source is the tsunami evacuation zone for Guam, modeled in 2009 by the National Oceanic and Atmospheric Administration (NOAA) Pacific Marine Environmental Lab. NOAA modeled five bays vulnerable to tsunami damage, including Apra Harbor, Tumon Bay, Pago Bay, Agana Bay, and Inarajan Bay. This was done by developing digital elevation models for the bays and testing them against historical data and preliminary worst-case inundation scenarios. Appendix E provides additional descriptions of these data sources.

AFFECTED ENVIRONMENT

Coastal Flooding

Based on the USGS coastal flooding model, the planning area already experiences vulnerability to flooding from the annual storm at current sea levels. Under these current conditions at Asan Beach Unit, the Punta Assan (Asan Point) area is flooded up to the base of Assan Ridge. Flooding also occurs along the coastline and at the mouth of the Saddok Assan (Asan River).

At Agat, Rizal and Apaca Points experience very minor flooding at current sea levels with a one-year storm. Ga’an Point receives significantly more flooding, particularly in the area west of the current restroom and at the mouth of the existing drainage. At current sea levels, the 20-year and 100-year storms substantively increase flooding within the coastal units, with the most significant impacts to Ga’an Point.

Inundation of the planning area from storm surge is expected to increase over time with sea level rise and storm systems of growing intensity, as illustrated by the model’s projections. As described in chapter 2, the park has identified two sea level rise scenarios to inform the two phases outlined in the proposed action. The first scenario and phase correspond to a 0.8-foot (25-centimeter) rise in sea level, and the second scenario corresponds to a 4.9-foot (150-centimeter) rise in sea level. As the maps in appendix E demonstrate, areas that will experience the greatest impacts from coastal flooding across all scenarios are:

Asan Beach Unit

- Punta Assan and the low-lying areas to the east of Assan Ridge
- The mouth of the Saddok Assan and eastern edges of the grassy open space
- For 100-year storms, the entire unit is impacted except for the high ground at Assan Ridge.

Agat Unit: Apaca and Rizal Points

- Areas near the Apaca Point parking and picnic areas
- The lower-lying area between Apaca and Rizal Points
- Wetlands north of the mouth of the Saddok Ñāmu (Namo River)
- For 100-year storms at the 4.9-foot (150-centimeter) sea level, most of the site is impacted except for the higher ground at Rizal Point.

Agat Unit: Ga'an Point

- The majority of the site is flooded at the projected 20-year storm at current sea level, except for the water treatment plant to the south that is within the boundary and on Government of Guam land.
- For 100-year storms, the NPS-owned and -managed site is projected to be fully flooded.

The three coastal sites of Asan Beach, Apaca and Rizal Points, and Ga'an Point are also included in Guam's tsunami evacuation zone, as noted above.

Riverine and Pluvial Flooding

FEMA FIRM maps for Guam include areas prone to riverine and pluvial flooding. In addition to coastal flood hazard zones, the FEMA maps illustrate a 500-year floodplain (area with a 0.2% chance of flooding annually) within the Asan Beach and Asan Inland Units in the vicinity of the Saddok Assan, as well as along the Saddok Matgue (Matgue River) primarily in the Asan Inland Unit. The Saddok Assan is additionally identified as a regulatory floodway within the coastal flood hazard zone. The FEMA FIRM maps do not indicate any

other pluvial or riverine flooding zones within the four units.

Most overland flooding zones mapped by FEMA are included within the projected flooding zones from the USGS coastal model, with the exception of the Saddok Matgue 500-year floodplain. Although coastal, riverine, and pluvial flooding are described separately, this is due to the limitations of current models. In reality, coastal and overland flooding will interact in a storm situation to exacerbate the effects of each. Rising groundwater will also likely occur due to sea level rise and would further increase flooding. Anecdotal, park staff have observed pluvial flooding from strong storm systems occur in lower areas of the park that are also projected to flood in the coastal storm surge model. These include the vulnerable parking areas and area surrounding the restroom at Asan Beach Unit, the river drainage near the restroom at Ga'an Point, and the parking and picnic areas at Apaca Point. Under all scenarios, inundation of park resources and facilities in the units adjacent to the ocean is expected to increase over time. Appendix E: Floodplain Statement of Findings includes additional descriptions of floodplain characteristics and flood risk.

ENVIRONMENTAL CONSEQUENCES

Impacts from Alternative A: No-Action Alternative

Under the no-action alternative, coastal flooding would continue to affect the Asan Beach and Agat Units. Limited development, such as walkways, parking areas, and restrooms, would remain within the floodplain and continue to impede natural floodplain processes to a minor degree. The park would continue vegetation management activities to maintain the health of existing shoreline vegetation, resulting in minor beneficial impacts to floodplain processes. Under all sea level rise and storm surge scenarios, flooding within the units adjacent to the ocean is expected to increase over time.

Impacts from Alternative B: Preferred Alternative

As in alternative A, the park's coastal units would continue to be vulnerable to coastal and overland flooding. The preferred alternative would promote the removal or relocation of facilities and related structures within floodplains (such as restrooms, parking lots, and picnic tables) and would substantially increase native vegetation along shorelines, at the mouths of rivers, and in wetland areas to protect against storm surge and better absorb overland flooding.

The removal of visitor facilities from areas prone to inundation and erosion would have long-term beneficial impacts on floodplains by restoring coastal floodplain functions. Facilities that are relocated and reconstructed would utilize materials and construction techniques that impede floodplain processes as little as possible. These include using pervious materials, such as crushed coral for pathways, and installing structures such as raised portable restrooms or interpretive kiosks to allow water to flow through or underneath with minimal damage.

Conclusion

Floodplain processes would continue largely unimpeded under both alternatives A and B. However, when compared with alternative A, the actions proposed in alternative B would further restore natural floodplain processes by removing infrastructure along the shoreline and restoring coastal vegetation. This would result in long-term beneficial impacts to floodplains.

Cumulative Impacts

There are no past or present NPS projects within the planning area or on adjacent lands that would result in cumulative impacts when analyzed with the preferred alternative. The US Army Corps of Engineers (USACE) has recently funded a project to protect the Hågat Mayor's Office from the threat of sea level rise. The proposed action is not yet known, but USACE is considering two alternatives: a rock revetment and a seawall. Both proposed project alternatives could impact floodplain processes within the Agat Unit of

the planning area. Since compliance has not yet been undertaken, the impacts on park resources, including floodplain processes, are unknown at this time.

In addition, the Guam Department of Public Works has proposed two future projects for Assan: (1) a replacement of the Asan Bridge along Marine Corps Drive (Route 1) and (2) pavement hardening of Marine Corps Drive through the village. Both projects are expected to occur primarily within the footprint of the existing road prism and immediate vicinity. The impacts from alternative B would not add appreciably to these cumulative effects, given that the proposed action doesn't result in adverse effects to floodplains, and both of these improvement projects would be expected to follow all applicable laws and site-specific mitigation regarding flooding and associated flood risk.

Threatened and Endangered Species

AFFECTED ENVIRONMENT

The forest, freshwater, and marine resources within park boundaries rank War in the Pacific National Historical Park as the most biologically diverse park in the national park system. The planning area therefore includes an exceptional variety of species found in terrestrial, aquatic, and marine ecosystems. As an island, Guam has historically provided habitat for a rich array of unique and endemic species. However, the isolation of Guam's ecosystems has also made them more vulnerable to species extinction. Since World War II, the island's fragile ecological communities have suffered devastating impacts from invasive species, development and urbanization, military activities, hunting, and climate change.

Wildlife species diversity is negatively affected by the proliferation of invasive, introduced predators. For example, almost all native bird species that were present four decades ago in the park are now locally extinct or extinct in the wild because of the invasive brown tree snake (*Boiga irregularis*), which preys on eggs, chicks, and small adults. A total of 29

species of birds have been recorded within the park. Two of these, the yāyaguak (Mariana gray swiftlet or *Aerodramus vanikorensis bartschi*) and pulåttat (Mariana common moorhen or *Gallinula chloropus guami*), are native terrestrial species; two are migratory raptors that visit occasionally; six are invasive terrestrial species; three are native freshwater or wetland species; eight are shore birds; and eight are seabirds (Donaldson et al. 2017).

Additionally, four native terrestrial bird species were extirpated from the park: the ko'ko' (Guam rail or *Hypotaenidia owstoni*), the sihek (Micronesian kingfisher or *Halcyon cinnamomina cinnamomina*), the sālì (Micronesian starling or *Aplonis opaca*), and the āga (Mariana crow or *Corvus kubaryi*). Of these, only the sālì may still be found in the wild on Guam. Another ten species of native terrestrial, aquatic, and sea birds may have resided within the park historically but have been extirpated from Guam or are extinct in the wild. An additional 48 species have been reported as visitors to Guam but have not been recorded within the park (Donaldson et al. 2017).

In contrast, no aquatic plants, invertebrates, fish, or amphibians found in freshwater habitats are known to be threatened or endangered in the park. However, the freshwater eels *Anguilla bicolor* and *A. marmorata* are species of concern due to climate change and effects of overfishing. The park also protects over 175 native plant species, many of which can be found in the planning area (Donaldson et al. 2017). Of these, three species are endangered and two are listed as threatened. In addition, the endangered Guam tree snail (*Partula radiolata*) is found within the Asan Beach and Asan Inland Units, and two additional endangered tree snails have the potential to occur within the planning area.

In terms of the marine ecosystem, the coral reefs at the Asan Beach and Agat Units are distinct from one another, resulting in much greater biodiversity than what would be found in a single reef system. This is due to the difference in reef character between the Asan Beach Unit (exposed) and the Agat Unit

(comparatively sheltered), which effects the structure and assemblage of the coral species and the type of fish inhabiting the reefs (Donaldson et al. 2017).

Future trends for threatened and endangered species are dependent on the ability of the park and partnering agencies and organizations to manage and minimize nonnative species proliferation, and other concerns such as poaching and habitat degradation. Additionally, climate change is expected to play a considerable role through correlated changes in precipitation and storm intensity that will affect the habitat and means of survival for many of the special species discussed in this plan. Direct intervention by the park and partnering agencies and organizations is expected to continue for the foreseeable future to prevent extinction of species within the planning area. The park is optimistic that future efforts to combat threats to listed species, such as brown tree snake removal, will assist in the direct repopulation and proliferation of many of the threatened and endangered species discussed in this section.

The park obtained a list of threatened and endangered species that could occur within the planning area from the US Fish and Wildlife Service (USFWS) on August 14, 2023, via the USFWS Information for Planning and Consultation project collection tool. Due to the size of the island, the NPS conservatively estimated the boundaries of the project to include all of Guam, given priorities in the plan to increase biodiversity and enhance partnerships to increase habitat for protected species on the island to the extent feasible. The NPS further relied on information in the draft natural resources condition assessment (Donaldson et al. 2017) and the 2020 and 2023 *Federal Register* notices for proposed designation of critical habitat for Indo-Pacific corals and the haggan betde (green sea turtle or *Chelonia mydas*).

Table 3.1: Threatened and Endangered Species That May Occur in the Planning Area

CHAMORU NAME	ENGLISH NAME	SCIENTIFIC NAME	STATUS	CRITICAL HABITAT PRESENT IN PLANNING AREA
Mammals				
Fanihi	Mariana Fruit Bat	<i>Pteropus mariannus mariannus</i>	Threatened	Designated Critical Habitat but not in Planning Area
Birds				
Pulåttat	Mariana Common Moorhen	<i>Gallinula chloropus guami</i>	Endangered	No
Yåyaguak	Mariana Gray Swiftlet	<i>Aerodramus vanikorensis bartschi</i>	Endangered	No
Reptiles				
Haggan or Haggan Betde	Green Sea Turtle	<i>Chelonia mydas</i>	Endangered	Yes: Proposed Critical Habitat
Haggan Karai	Hawksbill Turtle	<i>Eretmochelys imbricata brissa</i>	Endangered	No
Gastropods				
Akaleha'	Guam Tree Snail	<i>Partula radiolata</i>	Endangered	No
Akaleha'	Humped Tree Snail	<i>Partula gibba</i>	Endangered	No
Akaleha'	Fragile Tree Snail	<i>Samoana fragilis</i>	Endangered	No
Insects				
Ababbang	Mariana Eight-spot Butterfly	<i>Hypolimnys octocula marianensis</i>	Endangered	No
Flowering Plants				
Aplokating-palaoan	-	<i>Psychotria malaspinae</i>	Endangered	No
Pau Dedu	-	<i>Hedyotis megalantha</i>	Endangered	No

CHAMORU NAME	ENGLISH NAME	SCIENTIFIC NAME	STATUS	CRITICAL HABITAT PRESENT IN PLANNING AREA
-	-	<i>Tinospora homsepala</i>	Endangered	No
-	-	<i>Tuberolabium guamense</i>	Threatened	No
Conifers and Cycads				
Fadang	Cycad	<i>Cycas micronesica</i>	Threatened	No
Sharks				
Ulon Matiyu na Halu'u	Scalloped Hammerhead Shark	<i>Sphyrna lewini</i>	Threatened	No
Coral				
Kuraling	Coral	<i>Acropora globiceps</i>	Threatened	Yes: Proposed Critical Habitat
Kuraling	Coral	<i>Acropora retusa</i>	Threatened	Yes: Proposed Critical Habitat
Kuraling	Coral	<i>Seriatopora aculeata</i>	Threatened	Yes: Proposed Critical Habitat

Based on these sources of information, the park has identified that the species and proposed critical habitats listed in table 3.1 have the potential to occur within the planning area. The following discussion provides a brief overview of the habitat requirements and current threats facing each of those species.

Mammals

Pteropus mariannus mariannus Fanihi (Mariana Fruit Bat)

The fanihi inhabits mangroves, limestone forests, and coastal areas in northern Guam. Roosting fanihi are typically located near or on cliff lines or at other locations protected from strong winds and human disturbances. At night, they forage widely on nectar, fruit, and leaves of various native plant species, primarily in limestone forest. Fanihi is an important traditional food in CHamoru culture. The primary threats to this species include habitat loss and overhunting. Historically, fanihi were found in habitats within the park's boundaries but have since been extirpated from the planning area. It is not known if this species currently forages within the park (Donaldson et al. 2017).

Birds

Most native bird species on Guam are locally extinct or extinct in the wild due to decimation by the brown tree snake. Feral cats, feral dogs, and rats also prey upon bird species and are considered a threat. Of the federally listed bird species on the island, two are known to occur within the planning area.

Gallinula chloropus guami Pulåttat (Mariana Common Moorhen)

The pulåttat is a member of a species found worldwide; the Mariana subspecies is endemic to the Mariana Islands. The pulåttat is a nonmigratory freshwater wetland dweller and may be found along the Saddok Assan in Asan Inland Unit and the Saddok Ñåmu, near Apaca Point in the Agat Unit (Donaldson et al. 2017). It typically inhabits tropical freshwater lakes, marshes, swamps, and wet rice paddies and prefers open water fringed by emergent aquatic plants. The pulåttat requires permanent wetland habitats, and threats include habitat loss and degradation

of wetlands, predation, military activities, poaching, and climate change (USFWS 2020a).

Aerodramus vanikorensis bartschi Yâyaguak (Mariana Gray Swiftlet)

The yâyaguak is one of the few remaining birds found in Guam's forests. The yâyaguak is a terrestrial species endemic to Guam and several other islands in the Mariana archipelago. This species has been reported to forage over a wide variety of habitats including grasslands, limestone forest, ravine forest, and coconut groves. The yâyaguak roosts exclusively in caves. However, the species has declined on Guam due to the brown tree snake, habitat loss, nest loss due to nonnative insects, and climate change (USFWS 2020b). The yâyaguak has been recorded within the park and may occur incidentally within the Mt. Alifan Unit, because it is known to nest in a cave in the nearby Naval Magazine (Donaldson et al. 2017).

Reptiles

Chelonia mydas Haggan or Haggan Betde (Green Sea Turtle)

The haggan betde is found in coastal waters, primarily in tropical and subtropical areas, including around Guam (USFWS 2023a). It spends almost its entire life in the ocean but uses beaches for egg laying. There are 11 distinct population segments worldwide, which vary in species status and threats: the Marianas are part of the Central West Pacific distinct population segment (DPS), which is considered endangered. The park's draft natural resources condition assessment indicates that sea turtle nesting has not been reported at either of the two coastal units to date (Donaldson et al. 2017). However, aerial surveys of Guam's inshore coastal habitats, conducted by Guam's Department of Agriculture, Division of Aquatic and Wildlife Resources (DAWR), have identified sea turtles in the waters offshore of the two units, with higher densities at Agat than at Asan Beach Unit (Ibid.). Threats to the Central West Pacific DPS include habitat loss (including destruction, barriers to nesting habitat, and alterations due to both human activities and climate change), hunting and egg gathering,

predation, fisheries bycatch, vessel strikes, and ingestion of or entanglement with marine debris.

Proposed Critical Habitat for Haggan Betde

The proposed critical habitat for the Central West Pacific DPS of the haggan betde extends around the entire island of Guam, including offshore of the Asan Beach and Agat Units (NOAA 2023d). The proposed critical habitat covers the area from the mean high-water line to 66 feet (20 meters) in depth and includes the following essential physical and biological features needed to support turtle reproduction, foraging, and nesting:

- Sufficiently dark and unobstructed nearshore waters adjacent to nesting beaches to allow for transit, mating, and internesting of reproductive individuals, and the transit of posthatchlings; and
- Underwater refugia and food resources (i.e., seagrasses, macroalgae, and/or invertebrates) of sufficient condition, distribution, diversity, abundance, and density to support survival, development, growth, and/or reproduction.

Eretmochelys imbricata brissa Haggan Karai (Hawksbill Sea Turtle)

The haggan karai inhabits shallow coastal waters throughout tropical and subtropical regions, including the Mariana Islands. Populations in the Pacific Ocean are declining, and only five to ten females are estimated to nest in the Marianas. As noted above, nesting in the park has not been reported for sea turtles, however turtles have been observed offshore of the Asan Beach and Agat Units, with higher densities at Agat (Donaldson et al. 2017). Threats to the haggan karai include habitat loss, hunting and egg gathering, fisheries bycatch, predation, vessel strikes, and ingestion of or entanglement with marine debris.

Gastropods: Akaleha' (Tree Snails)

One endangered akaleha' species has been observed within the planning area. The Guam tree snail (*Partula radiolata*) has been documented in the Asan Beach and

Asan Inland Units, as well as the Piti Guns Unit (Donaldson et al. 2017). Two other endangered akaleha', the humped tree snail (*Partula gibba*) and the fragile tree snail (*Samoana fragilis*), have the potential to occur within or near the planning area.

Threats to akaleha' include loss of habitat due to development and urbanization, grazing by nonnative ungulates, military activities, destruction from wildfire and typhoons, habitat modification by invasive plants, and predation by nonnative invertebrates such as the manokwari flatworm (*Platydemus manokwari*), little fire ants (*Wasmannia auropuncta*), and three species of rats (*Rattus exulans*, *R. norvegicus*, and *R. tanezumi*) (USFWS 2022).

Partula radiolata Guam Tree Snail

The Guam tree snail is an endemic species to the island of Guam and is not found on other islands in the Mariana archipelago. This akaleha' inhabits moist native and nonnative forests. It is typically found on the undersides of leaves, branches of trees, shrubs, and vines during the daytime. During wet, rainy days it is also observed on the ground, feeding on decaying plant materials or fungal growth.

Partula gibba Humped Tree Snail

The humped tree snail is endemic to the forests of Guam, as well as multiple other islands in the Marianas. It inhabits the same subcanopy areas as the Guam tree snail, in cool, humid forest habitats.

Samoana fragilis Fragile Tree Snail

The fragile tree snail is endemic to the forests of Guam and Rota. Like the other akaleha', it inhabits the subcanopy in areas of dense forest and may be found on both native and nonnative plants.

Insects

Hypolimnast octocula marianensis Ababbang (Mariana Eight-Spot Butterfly)

Guam's forests were historically home to two ababbang in the Nymphalidae family: the Mariana eight-spot butterfly and Mariana wandering butterfly. These two ababbang, now listed as endangered species, have not been observed within the planning area. While the Mariana eight-spot butterfly may have the potential to occur within the four units, the Mariana wandering butterfly is believed to be extirpated on Guam (USFWS 2020c).

The historical range of the Mariana eight-spot butterfly on Guam corresponded to areas of limestone forest with karst terrain and an abundance of the ababbang's two host plants, *Procris pedunculata* (no common name) and tapun ayuyu (*Elatostema calcareum*) (USFWS 2021). Habitat destruction due to human development and agriculture, as well as invasive plant encroachment and damage by feral ungulates have greatly decreased this range, however eight-spot butterflies have been observed in the rugged high-quality limestone forest near the Mt. Alifan Unit, on neighboring Navy lands (USFWS 2021). A cooperative program with the USFWS began in 2017 to re-establish the ababbang's rare native host plants within the park, in an effort to support its recovery.

Flowering Plants and Cycads

The planning area includes a wide variety of native vegetation communities, ranging from shoreline strand vegetation to savanna/grassland ecosystems to wetlands and limestone forest. Seven species of plants are listed as endangered on Guam, and three of these species may be found within the park: aplokating-palaoan (*Psychotria malaspinae*), pau dedu (*Hedyotis megalantha*), and *Tinospora homosepala* (Donaldson et al. 2017). Another seven species are listed as threatened, and two of these may occur within the park: *Tuberolabium guamense* and *Cycas micronesica* (Ibid.). Threats to listed plants on Guam include loss and degradation of habitat due to development, impacts from invasive plants and animals, typhoon damage, and climate change

impacts such as increased storm intensity and changes in precipitation.

Psychotria malaspinae Aplokating-palaoan

Aplokating-palaoan is a small tree or shrub in the coffee family and endemic to Guam. Historically, this species was found scattered in forested habitats on the island, and it is found today within the Asan Inland and Mt. Alifan Units (Donaldson et al. 2017).

Hedyotis megalantha Pau Dedu

Pau dedu is an herbaceous perennial in the coffee family and is endemic to savannas on Guam. It is found frequently in patches with the native fern mana (*Dicranopteris linearis*) and low-growing shrubs and sedges and appears to be absent from areas that have been converted to dense grass by wildfire. Areas within the Asan Inland and Mt. Alifan Units may provide suitable habitat for this species, although vegetation surveys to date have only identified it as "likely present" within the park (Donaldson et al. 2017).

Tinospora homosepala

The vine *Tinospora homosepala* was historically found in forests on Guam and, although present in the Asan Beach Unit, is considered rare on Guam (Ibid.). Only male plants have been observed in recent years on Guam, making sexual propagation of the species unlikely. The park is conducting an ongoing project to remove invasive plants from known *Tinospora* vines in order to protect them.

Tuberolabium guamense

Tuberolabium guamense is an epiphyte in the orchid family endemic to forests in the Marianas. Although the park's draft natural resources condition assessment indicates that it may be found within the park, its location within the planning area is unknown. The species grows on the branches of native canopy trees, particularly *Hernandia layrinthica*, *Premna obtusifolia*, and *Elaeocarpus joga* (Ibid.).

Cycas micronesica
Fadang (Cycad)

Fadang occurs in forest and coastal habitat on Guam, as well as on Rota, Palau, and Yap (USFWS 2023a). It is a native species of Guam and used to be a common understory plant in limestone forests. Today, it is found in the Agat Unit at Bangngi' Point and in the Mt. Alifan Unit (Donaldson et al. 2017). Since the introduction of the nonnative insect cycad aulacaspis scale (*Aulacaspis yasumataui*) 10 years ago, fadang is experiencing mortality rates of over 90% across all life stages. It may be extirpated from Guam unless an effective control is found for the cycad aulacaspis scale.

Sharks

Sphyrna lewini

Ulon Matiyu na Halu'u (Scalloped Hammerhead Shark)

Ulon matiyu na halu'u is considered a circumglobal species, living in warm temperate and tropical seas. The shark is partly migratory, traveling along continental margins and between oceanic islands (NOAA 2020b). The Indo-West Pacific DPS of the shark is known to use Apra Harbor as a nursery area. The harbor is located between the park's two coastal units, and the shark is likely present in park-managed waters (Donaldson et al. 2017, 71). Guam's Department of Agriculture, Division of Aquatic and Wildlife Resources has undertaken aerial surveys of the island's inshore coastal habitats over the past 50 years that identified mean densities for sharks as relatively low in the habitats at the Asan Beach and Agat Units (Donaldson et al. 2017). Threats to the shark include degraded water quality in nursery and juvenile habitats, pollution, global fishery practices including the shark fin trade, and global climate change impacts to ocean temperatures, currents, and food sources (NOAA 2023a).

Indo-Pacific Corals

Acropora globiceps, *Acropora retusa*,
and *Seriatopora aculeata*
Kuraling (Coral)

Proposed critical habitat for Indo-Pacific corals was identified by a *Federal Register*

notice in November 2020 (NOAA 2020a). Of the seven kuraling included in the proposed critical habitat designation, three are found in the waters around Guam: *Acropora globiceps*, *A. retusa*, and *Seriatopora aculeata*. The endangered kuraling *Acropora globiceps* has been observed on reefs in NPS-managed waters. The other two kuraling have not been documented to-date in reef surveys in the park (Donaldson et al. 2017). Threats to listed kuraling include ocean warming, land-based sources of pollution, ocean acidification, coral disease, fishing, predation, sea level rise, and collection and trade (NOAA 2023b).

Proposed Critical Habitat for Kuraling

Proposed critical habitat for these three kuraling extends from 0 to 131 feet (40 meters) in depth offshore of the park's Asan Beach and Agat Units (NOAA 2020a). To support the normal function of all life stages of kuraling, suitable habitat for reproduction, recruitment, growth, and maturation is needed (Ibid.). This includes sites with natural, consolidated hard substrate or dead coral skeleton free of algae and sediment. Suitable habitat, as described in the *Federal Register* notice, also includes:

- Substrate with presence of crevices and holes that provide cryptic habitat, the presence of microbial biofilms, or presence of crustose coralline algae;
- Reefscape (all the visible features of an area of reef) with no more than a thin veneer of sediment and low occupancy by fleshy and turf macroalgae;
- Marine water with levels of temperature, aragonite saturation, nutrients, and water clarity that have been observed to support any demographic function; and
- Marine water with levels of anthropogenically introduced (from humans) chemical contaminants that do not preclude or inhibit any demographic function (Ibid., 76267).

ENVIRONMENTAL CONSEQUENCES

Impacts from Alternative A: No-Action Alternative

Under the no-action alternative, listed species would continue to be threatened by predation, climate change impacts, and habitat loss, all of which remain an island-wide challenge on Guam. The park would continue to manage threatened and endangered species and their habitat within the units, based on available funding and staff. The park would also continue to work with partner agencies, such as the USFWS and other local organizations to protect, preserve, and restore the habitat and the listed species described above.

Impacts from Alternative B: Preferred Alternative

Mammals

Pteropus mariannus mariannus | Fanihi (Mariana Fruit Bat)

Construction activity has the potential to startle or alarm roosting, foraging, and transiting Mariana fruit bats. Under the preferred alternative, limited construction to remove or relocate facilities along the shoreline or develop new trails has the potential to result in short-term adverse impacts to wildlife such as the fanihi. However, the preferred alternative includes mitigation measures and best management practices (or BMPs) that would be applied as projects from the plan are implemented in the future: see appendix D. These include requiring pre-construction biomonitoring surveys for fruit bats and roost sites, requiring that work would not occur within 492 feet (150 meters) of a bat or roost site, and requiring that ongoing work would pause if a bat enters the work area.

Artificial lighting also has the potential to disrupt fanihi roosting, foraging, and transiting. Under the preferred alternative, the park would implement low-level, solar-powered lighting along the primary pedestrian loop at Asan Beach to accommodate safe public use in the early morning and evening. However, lighting would be fully shielded and warm-toned to minimize light pollution and impacts to bats. The park would consult with the USFWS and NOAA about proposed

lighting design and locations in advance of implementing projects tiering from the plan that may include lighting. To further reduce the potential for adverse effects, the preferred alternative also includes BMPs such as contractor education and training to promote awareness of bats, limiting work to daylight hours, and additional measures to shield artificial light.

Birds

Gallinula chloropus guami | Pulåttat (Mariana Common Moorhen) and *Aerodramus vanikorensis bartschi* | Yâyaguak (Mariana Gray Swiftlet)

There are no specific actions in the preferred alternative that are likely to adversely affect these endangered bird species. The plan does not identify actions within the immediate vicinity of locations where the birds are known to occur (namely along the Saddok Assan and Saddok Ñāmu and near the Naval Magazine). Furthermore, as described in the list of best management practices in appendix D, surveys for listed species by qualified biologists would occur before implementing any projects identified in the plan that might include ground disturbance or other construction impacts. Buffers surrounding listed species would be imposed to prohibit physical damage to identified populations or habitat, and natural features with obvious high value to wildlife would be preserved.

Under the preferred alternative, the park would continue its efforts to remove the brown tree snake and other destructive invasive species from Assan Ridge and restore a healthy limestone forest ecosystem. This would have long-term beneficial impacts to protected avian species. If the park is able to successfully reintroduce birds to the Assan Ridge area, additional management efforts would focus on establishing a bird sanctuary along the ridge. The park would promote plants and insects along the ridge that are especially beneficial to birds. The preferred alternative also proposes enhancing wetland habitat in the Asan Beach and Agat Units, which would have long-term beneficial impacts on the habitat type required by the pulåttat.

Reptiles

Chelonia mydas | Haggan or Haggan Betde (Green Sea Turtle) and
Eretmochelys imbricata brissa | Haggan Karai (Hawksbill Turtle)

The preferred alternative proposes that the park promote near-shore marine activities, such as snorkeling and tidepooling. These activities have the potential to affect sea turtles. However, these activities would occur through park interpretation and educational programs, and the park would continue its standard practice of providing Leave No Trace education and training in advance of any snorkeling or tidepooling programs. Through this training, visitors are informed about the sensitivity of the park's marine ecosystems, the importance of not disturbing sea turtles, and the need for reef-safe sunscreen. These educational programs would continue to raise awareness of the importance of protecting the park's marine environment. Information would also be provided by interpretive waysides and other materials describing reef- and turtle-friendly practices. The park could additionally restrict visitor access to portions of the beach, if necessary, in order to avoid disturbance to resting or nesting sea turtles.

The lighting proposed for the pedestrian loop at Asan Beach Unit has the potential to adversely affect sea turtles, however lighting would be installed at a low level and would be fully shielded and warm-toned to minimize light pollution and impacts to turtles. As noted above, the park would consult with the USFWS and NOAA about proposed lighting design and locations in advance of implementing projects tiering from the plan that may include lighting. To further reduce the potential for adverse effects, the preferred alternative also includes BMPs such as educating contractors and staff to promote awareness of turtles, ensuring a buffer between vessels and listed species, limiting vessel speeds, and additional measures to shield artificial light.

For the park's coastal units, the preferred alternative includes a managed retreat strategy that would remove some parking lots and paved walkways and replace them with native

strand and wetland vegetation. While these activities have the potential to temporarily increase erosion and turbidity in the water, erosion would be avoided or minimized through the mitigation measures outlined in appendix D. These actions would have long-term beneficial impacts on turtles by reducing vehicle and pedestrian infrastructure near the shoreline, which would reduce pedestrian and car traffic near turtle habitat and lessen runoff from impervious surfaces into nearshore waters. In the long term, the preferred alternative would result in an overall decrease in erosion and sedimentation impacts to marine ecosystems—a beneficial impact.

Proposed Critical Habitat for Haggan Betde

Actions within the preferred alternative would not result in destruction or adverse modification of haggan betde critical habitat and would not obstruct areas used for transit to or from nesting beaches, mating, or interesting areas. Activities that may interfere with access to nesting beaches, mating, or disturb internesting females include erecting structures offshore or nearshore, construction, dredging, artificial lighting, oil and gas activities, power generating activities, fishing, aquaculture, shipping, and military activities (NOAA 2023d, 46610). Other activities that contribute to degradation of the nearshore marine environment include general shoreline development, sedimentation caused by runoff and erosion, pollution, wastewater effluent, and invasive species (Ibid.).

Of the list of activities above, the preferred alternative includes only minimal construction, which is focused primarily on removing developed infrastructure from the shoreline and revegetating the shoreline with native strand plant communities. All construction activities would follow the mitigation measures outlined in appendix D, and impacts would be short-term and sited so as not to impact adjacent areas of proposed critical habitat. As noted above, the preferred alternative also calls for the installation of minimal pathway lighting for safety at the Asan Beach Unit, which would be designed and installed to minimize impacts on proposed critical habitat for turtles. The actions

included within the preferred alternative therefore fall within the category of effects that are temporary, small-scale, or occur outside of the migratory season, which are not expected to result in a destruction or adverse modification determination.

Gastropods

Partula radiolata | Akaleha' (Guam Tree Snail)

Partula gibba | Akaleha' (Humped Tree Snail)

Samoana fragilis | Akaleha' (Fragile Tree Snail)

The preferred alternative would not have any direct effects on endangered tree snails, and implementation-level projects tiering from the plan would include site-specific consultation with USFWS to avoid impacts to snails. Individual projects within the preferred alternative that may have the potential to affect tree snails include the proposed development of trails within the Asan Inland and Mt. Alifan Units, and the extension of an accessible pedestrian walkway along the base of Assan Ridge in the Asan Beach Unit. Tree snails may experience direct effects of physical disturbance, injury, or mortality from construction activities, and tree snail habitat may be impacted by vegetation clearing for construction activities.

Implementation of the BMPs in appendix D, which include pre-impact surveys and monitoring by a qualified biologist, would reduce the potential for direct impacts to snails. Any vegetation clearing for proposed trails would be minimized, and trail corridors would follow former roadway alignments and social trails to the greatest extent possible, further reducing potential impacts to snail habitat. Due to the limited area of potential trails, the minimal amount of vegetation removal that would be required is likely to be insignificant in comparison to the amount of suitable habitat within the rest of the planning area and adjacent lands (including limestone forest). In addition, the preferred alternative's emphasis on restoring native upland ecosystems and invasive species management would result in long-term beneficial impacts to tree snails and snail habitat.

Insects

Hypolimnys octocula marianensis | Ababbang (Mariana Eight-spot Butterfly)

Actions in the preferred alternative would result in long-term beneficial impacts to the ababbang because the park would focus resource restoration efforts on endemic and sensitive ecosystems. The impacts to ababbang from the plan would be indirect, as native habitat loss for the ababbang's two host plants, *Procris pedunculata* (no common name) and *Elatostema calcareum* (tapun ayuyu), has been a primary threat to the species. The park would directly target restoration of the two aforementioned host plants for the benefit of the ababbang. Furthermore, no facility development activities are proposed in the preferred alternative in karst limestone forest areas that may be suitable for butterfly habitat.

Flowering Plants and Cycads

Actions in the preferred alternative may result in short-term adverse effects to habitat for flowering plants and cycads; however, these would be reduced by following the mitigation measures and best management practices outlined in appendix D. To reduce the spread of invasive species and impacts to native plants, appendix D lists biosecurity measures that would be followed as individual projects in the preferred alternative are implemented. Before project implementation, the action area would be surveyed for listed plant species and native habitat. Alignment of proposed trails would follow existing roadway alignments and social trails as much as possible and would avoid areas with native plant communities. Formalized trails would reduce impacts from visitors trampling and hiking off-trail within the units, which do not currently provide trail facilities. Trail construction practices would follow the list of best management practices in appendix D to protect threatened and endangered species.

Under the preferred alternative, the park would focus vegetation restoration efforts on endemic and sensitive ecosystems, which would have long-term beneficial effects on listed plant species. Exclusion fencing proposed for the limestone forest areas of the Mt. Alifan Unit would additionally have

a long-term beneficial effect on listed plant species by prohibiting feral ungulate access to high-quality habitat.

Sharks

Sphyrna lewini | Ulon Matiyu na Halu'u (Scalloped Hammerhead Shark)

Actions in the preferred alternative are unlikely to have an adverse effect on sharks or shark habitat. While actions in alternative B have the potential to result in temporary opportunities for increased erosion and turbidity in near-shore areas, these potential impacts would be avoided or mitigated by following the BMPs outlined in appendix D. Similarly, BMPs to avoid waste, discharge, and pollutants in water and measures guiding work in near-shore areas would avoid or minimize any potential effects to sharks or shark habitat. In the long term, the preferred alternative would result in an overall decrease in erosion and sedimentation impacts to marine ecosystems due to increased vegetation along shorelines and upland areas—a beneficial impact.

Indo-Pacific Corals

Acropora globiceps, *Acropora retusa*, and *Seriatopora aculeata* | Kuraling (Coral)

Under the preferred alternative, the park would expand current efforts to select and outplant coral species that are more likely to be adaptable to ocean acidification and temperature increase, thereby supporting the health and resilience of existing corals and associated habitat for as long as it's feasible. This strategy would have long-term beneficial impacts on coral reefs and the multiple marine species that rely on them. Potential adverse effects from the coral restoration project may include short-term increased turbidity and exposure to disease, in addition to direct physical impacts from in-water construction (such as noise, vessel strike, physical contact, pollutant discharge, or entanglement). Additional site- and project-specific consultation would occur for the expansion of coral restoration efforts proposed by the unit management plan. Any adverse impacts associated with related in-water work would be minimized with BMPs and mitigation

measures outlined in appendix D, for implementation during site-specific design.

The preferred alternative's emphasis on enhancing shoreline vegetation and restoring native ecosystems throughout the four units would additionally have long-term beneficial impacts on coral species. While limited development or removal of facilities in the coastal units is proposed, this would result in only temporary opportunities for increased erosion that would be mitigated by the list of best management practices in appendix D. In the long term, as described above, the preferred alternative would result in an overall decrease in erosion and sedimentation impacts to marine ecosystems.

As noted above, the preferred alternative proposes that the park promote near-shore marine activities, such as snorkeling and tidepooling. These activities have the potential to affect corals. The park would follow the same mitigation measures for near-shore activities that are described in the sea turtle section above in order to avoid or minimize impacts to corals.

Proposed Critical Habitat for Indo-Pacific Corals (Kuraling) (*Acropora globiceps*, *Acropora retusa*, and *Seriatopora aculeata*)

Actions within the preferred alternative would not result in long-term destruction or adverse modification of proposed coral critical habitat. NOAA-identified activities that could have adverse effects to coral habitat include channel dredging and beach nourishment, in addition to stormwater runoff, wastewater and sewage outflow discharges, and point- and nonpoint-source contaminants (NOAA 2020a, 76282). Additionally, NOAA identifies that fishery management, aquaculture, and military activities may result in adverse effects to the coral habitat (Ibid.). The actions within the preferred alternative do not include the activities listed above. As noted above, potential adverse effects to coral habitat from the coral restoration project in the preferred alternative may include short-term increased turbidity and exposure to disease, in addition to direct physical impacts from in-water construction. Best management practices and mitigation measures have been identified

based on these potential impacts and are included in appendix D.

As described above, actions in the preferred alternative would result in a long-term decrease in erosion and sedimentation, and near-term opportunities for erosion due to minor construction activities would be temporary and mitigated by the best management practices described in appendix D. The actions included within the preferred alternative therefore fall within the category of effects that are temporary and small-scale, which are not expected to result in a destruction or adverse modification determination.

Conclusion

Alternatives A and B would have a range of localized, temporary adverse impacts on listed species that would be mitigated by the best management practices outlined in appendix D. Alternative B would additionally have a range of beneficial impacts on listed species, due to habitat restoration efforts and additional invasive species management.

Cumulative Impacts

The park has several reasonably foreseeable projects planned within the UMP area, including projects to support invasive species management, natural and cultural resources management, and maintenance. The park would continue current efforts to support threatened and endangered species by controlling invasive species and outplanting rare and endangered plants, including host plants for other endangered species such as the eight-spot butterfly and tree snails. These activities would have long-term beneficial effects on listed plants and animals when combined with the actions in the preferred alternative.

The park's planned coral nursery in Agat Bay would restore coral communities severely damaged by recent bleaching events, using proven methods of selection, cultivation, and outplanting of bleaching-resistant strains of keystone coral species. This would result in long-term beneficial impacts to coral and reef habitats, as well as to the rich diversity

of marine species, such as sea turtles, that rely on them. The park has identified best management practices to avoid or minimize impacts to listed species during implementation of the coral restoration project and has received concurrence from NOAA that the effects of the project are not likely to adversely affect threatened coral species, endangered sea turtles, and the threatened Indo-West Pacific scalloped hammerhead sharks.

A proposed parking lot project at Asan Bay Overlook would repaint two accessible parking areas, 16 standard parking stalls, and five bus parking stalls in the existing paved parking lot at the overlook. In addition, to improve nighttime safety and visibility, six solar-powered, battery-operated lights would be installed. The effects of this proposed project have not yet been identified; however, it is unlikely to result in adverse impacts to listed species because the work would be undertaken in an already disturbed, paved area. Lighting design would follow best management practices to minimize light pollution and impacts to species such as the Mariana fruit bat (as described in appendix D).

The park's ongoing and future work to maintain views and vistas within the cultural landscape, preserve historic structures, and stabilize gun emplacements is similarly unlikely to result in adverse effects to listed species. Vegetation management activities to protect historic structures and views would focus on removal of invasive plants, whose root systems are harming the park's World War II defensive structures and obscuring historic viewsheds. Vegetation removal activities would follow the best management practices outlined in appendix D to protect listed species, such as tree snails and threatened and endangered plants. Stabilizing gun emplacements at Ga'an Point is a small-scale project that would be conducted within a developed area of cultivated lawn and is not expected to result in adverse effects to listed species.



1. [Top left] Mariana fruit bat resting in tree. 2. [Top right] Guam tree snail resting on leaf. 3. [Middle] Guam tree snail relocation after Typhoon Mawar. 4. [Bottom] Visitor snorkels at coral reef within the boundaries of War in the Pacific NHP. Photos: NPS.



1. [Top left] Invasive coconut rhinoceros beetle (*Oryctes rhinoceros*) on coconut frond. Photo: NPS. 2. [Top right] Green anole (*Anolis carolinensis*) rests on ground. Photo: Grayson Smith, USFWS. 3. [Middle] Invasive brown tree snake (*Boiga irregularis*) coiled on tree branch. Photo: NPS. 4. [Bottom] Invasive feral pig in forest on Guam. Photo: NPS.

Although the NPS projects listed above have the potential to contribute cumulatively to adverse effects on listed species when combined with actions in the plan, the implementation of best management practices and mitigation measures mean that these actions would not jeopardize the continued existence of any listed species or result in the adverse modification of proposed critical habitat.

The most prominent future project being carried out by another agency is the proposed shoreline protection project by the US Army Corps of Engineers (USACE) at the Hågat Mayor's Office, adjacent to Ga'an Point. This project could impact coral and turtle species and proposed critical habitat; however, the effects of the project have not yet been identified. The park would continue efforts to support threatened and endangered species by creating coral nurseries and would work with USACE to include appropriate mitigation measures in the project to protect corals and sea turtles within the park boundaries. The preferred alternative would thus not lead to aggregated adverse effects when considered with this USACE project. The plan's beneficial impacts to coral reefs could in fact lessen some of the impacts from the proposed USACE seawall project.

In addition, the preferred alternative would not add appreciably to cumulative effects on listed species from the two future projects along Marine Corps Drive in Asan, planned by the Guam Department of Public Works. The Asan Bridge replacement and pavement hardening are expected to occur primarily within the footprint of the existing road prism and immediate area and would be expected to follow all applicable laws and site-specific mitigation to protect listed species.

Invasive Species Management

AFFECTED ENVIRONMENT

As described above, invasive species threaten terrestrial, aquatic, and marine resources in the park. The species discussed below have been identified as either invasive or introduced and have the potential to

contribute to the extirpation of native species or the instability of park ecosystems.

The passive introduction of invasive species, particularly predators such as the brown tree snake, has contributed to the decline and extirpation of many of Guam's native species, impacting the park and the planning area (GDAWR 2019). "Passive" introduction is defined as accidental introduction, for example species that arrived undetected on Guam via ships or airplane cargo. See the Threatened and Endangered Species section for more information about the brown tree snake's impact to native bird species. The Micronesian gecko (*Perochirus atelese*) and the rock or pelagic gecko (*Nactus pelagicus*) are additional species that have been impacted by the snake. The Micronesian gecko was last collected in 1978, and the rock or pelagic gecko has not been seen for many years and is presumed extinct on Guam (Donaldson et al. 2017). The snake remains a serious threat to Guam's remaining birds, geckos, and skinks.

The little fire ant (*Wasmannia auropunctata*) is another destructive invasive species that has been found at Assan Ridge in the Asan Beach Unit and in the Asan Inland Unit. Little fire ants build large colonies on the ground, in trees, and in other vegetation, and they produce painful stings and welts and may even kill native animals. The coconut rhinoceros beetle (*Oryctes rhinoceros*) is an invasive species that is causing severe damage to coconut palms in prominent areas of the park, such as Asan Beach and Ga'an Point. Amphibians established as invasive species within the park include the cane or marine toad (*Rhinella marina*) and eastern dwarf tree frog (*Litoria fallax*).

Several invasive reptiles have established populations within the planning area. The Indian monitor lizard (*Varanus indicus*) and the Brahminy blind snake (*Ramphotyphlops braminus*) are invasives believed to have been introduced in the precontact period, while the green anole (*Anolis carolinus*) and the island skink (*Carlia ailanpalai*, formerly *C. fusca*) have established themselves more recently in all units of the planning area.

Nine species of mammals have been recorded as invasive or otherwise introduced to Guam. These include a deer (*Cervus mariannus*), a feral pig (*Sus scrofa*), a feral cat (*Felis silvestris*), a feral dog (*Canis familiaris*), three species of rats (*Rattus exulans*, *R. norvegicus*, and *R. tanezumi*), a house mouse (*Mus musculus*), and a house shrew (*Suncus murinus*).

At least 403 species of plants are found within War in the Pacific National Historical Park, of which 175 are native species (43.4%), 222 are nonnative species that are considered invasive (55.1%), and six species are of unknown origin (1.5%) (Donaldson et al. 2017). Invasive plants such as tångantångan (*Leucaena leucocephala*) and the pink tecoma tree (*Tabebuia heterophylla*) pose a serious threat to native ecosystems by degrading terrestrial habitats and competing with endemic plants for resources.

Given the success of nonnative invasive species on Guam, aggressive management or intervention is required by the park into the foreseeable future. Invasive species management includes invasive species prevention and early detection and rapid response (EDRR), in addition to invasive species control. While control is a key component of a comprehensive management program, prevention and EDRR can be more cost-effective tools—especially on islands—to address incipient species and deal with problems before they become too costly or impossible to address.

The impact of invasive species is also exacerbated by several indirect factors. Native plants are impacted by direct competition from invasive plants but are also affected by invasive insects and mammals, wildfires and erosion, habitat destruction, and poaching. Climate change, further disrupts native species populations by altering precipitation patterns and leading to increasingly intense storms. These ecosystem disturbances can damage native plant communities and allow opportunities for nonnative invasive species to encroach and establish themselves within ecological networks.

ENVIRONMENTAL CONSEQUENCES

Impacts from Alternative A: No-Action Alternative

Under the no-action alternative, there would continue to be widespread impacts from the prevalence of invasive species within the park and the surrounding area. The park would continue to manage invasive species to the greatest extent possible based on available funding and staff. The NPS would continue to work with partner agencies, such as the USFWS, and other island and local partners to prevent, reduce, or eliminate invasive species within the planning area. Due to the sensitivity and isolation of Guam's ecosystems, the introduction of new invasive species would remain an ongoing threat.

Impacts from Alternative B: Preferred Alternative

The impacts from alternative B would be similar to alternative A, except that the preferred alternative would include additional efforts to restore native coastal and upland ecosystems. Revegetation efforts would enhance native plant communities while further controlling invasive species within the four park units. Exclusion fencing proposed for areas within the Mt. Alifan Unit would protect the limestone forest from damage by invasive ungulates. These actions would have long-term beneficial impacts on the management of invasive species and the restoration of native species.

Under alternative B, some disturbance of vegetation in the upland units would occur through the development of new trails. However, as noted above, trail alignments would follow existing roads or social trails to the greatest extent possible to minimize impacts on plant communities. All construction activities would follow the biosecurity measures and other BMPs in appendix D to prevent the introduction and avoid the spread of invasive species. Some of the areas where new trails would be built currently experience off-trail use. As a result, formalizing these trails would reduce off-trail impacts on vegetation. Enhanced communication would encourage visitors to stay on trail and minimize their role in

unintentionally introducing or spreading invasive species.

Conclusion

Alternative A would have a range of localized beneficial impacts on invasive species management, due to the park's ongoing efforts to control invasive species. Localized adverse impacts would occur in areas where the park is unable to undertake management activities. Under alternative B, the potential for short-term adverse impacts due to trail construction would be mitigated through implementation of biosecurity best management practices. The additional focus on revegetation, invasive species management, and protection of native plant communities in alternative B would result in long-term beneficial impacts when compared with alternative A.

Cumulative Effects

There would continue to be a range of adverse cumulative effects to invasive species management in the units, due to past actions that have resulted in the unintentional introduction or spread of invasive species. Neither alternative would contribute appreciably to these effects. Past and ongoing efforts at control and eradication have resulted in beneficial impacts, which would be enhanced by the actions proposed in the preferred alternative.

Cultural Resources

To meet NEPA requirements, this section describes the cultural and historic environments within the planning area that could be affected by implementing the alternatives. This section also addresses the National Park Service's responsibilities under the National Historic Preservation Act of 1966 (NHPA) Section 106, which requires the NPS to identify whether the actions in the preferred alternative (or undertaking) would result in an adverse effect to the historic properties of the park.

In accordance with 36 Code of Federal Regulations (CFR) Part 800.8 (c)I (Use of the NEPA process for Section 106 purposes), this draft plan and environmental assessment integrate compliance with

NEPA and Section 106 to allow a more comprehensive consideration of historic properties along with other environmental factors. It is important to note that the park also protects cultural resources that do not meet the definition of historic properties, as defined by 36 CFR § 800.16. To meet NEPA requirements, this analysis of potential effects includes all cultural resources within the planning area that may be affected by the plan's preferred alternative. While cultural resources are analyzed by category, there is significant overlap and interconnection between the types of resources analyzed. The assessment of effects to all historic properties under Section 106 can be found at the end of this section.

The following definitions are provided below to clarify and distinguish terms that are specific to the NEPA and Section 106 processes.

NEPA DEFINITIONS (40 CFR §1508.1)

Effects or impacts: changes to the human environment from the proposed action or alternatives. The NEPA analysis below uses "impacts" to help distinguish from "effects" as defined under Section 106.

SECTION 106 DEFINITIONS (36 CFR § 800)

Historic property: Any precontact or historic district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior (National Park Service). This term includes artifacts, records, and material remains that are related to and located within such properties. Properties of traditional religious and cultural importance to Indigenous or other traditionally associated groups may be determined eligible for inclusion in the National Register.

Area of potential effects (APE): The geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.

No historic properties affected: There are no historic properties in the APE; or there are historic properties in the APE, but the undertaking would have no impact on them.

No adverse effect: The undertaking would affect the historic property, but the effect does not meet the criteria of adverse effect outlined in 36 CFR § 800.5(a)(1) and would not alter characteristics that make it eligible for listing in the National Register. The undertaking is modified, or conditions are imposed to avoid or minimize adverse effects.

Adverse effect: The undertaking would alter, directly or indirectly, the characteristics of the property that qualify it for inclusion in the National Register.

Due to the programmatic nature of the unit management plan and the progression of federal undertakings that would stem from the plan, the NPS cannot assess all specific effects of all future undertakings on historic properties. As implementation of this plan is carried out, the NPS would continue to conduct Section 106 compliance for undertakings and continue to consult with the Guam State Historic Preservation Office (SHPO), the Advisory Council on Historic Preservation, Indigenous CHamoru organizations, and other consulting parties as necessary on the effects of each undertaking on historic properties. An assessment of effects for the development of the management plan itself and its expected outcomes can be found at the end of the Cultural Resources section.

The entire park is listed in the National Register of Historic Places (1978) and is nationally significant under Criterion A for the role it played during America's involvement in World War II (WWII) in the Pacific and Criterion D for the archeological resources associated with the battle. The period of significance is 1941 to 1945, marking the beginning and ending of World War II in the Pacific. The area of potential effects for this unit management plan corresponds to the boundaries of each of the four units in the planning area. See figures F.1 and F.2. There are five properties within the area of potential effects for the UMP that are individually listed

in the National Register as historic sites: the Matgue River Valley Battle Area and Asan Ridge Battle Area in Asan Inland Unit (1975); the Asan Invasion Beach (1979) and Memorial Beach Park (1974) in Asan Beach Unit; and the Agat Invasion Beach in the Agat Unit (1975).

CULTURAL LANDSCAPES

Affected Environment

The area of potential effects for this project encompasses cultural landscapes with contributing features within the boundaries of the four units: Asan Beach, Asan Inland, Agat, and Mt. Alifan. Contributing features are those elements that contribute to the historic integrity of the cultural landscape. The description of contributing, undetermined, and non-contributing features has been adapted from the park's 2013 and 2003 cultural landscapes inventories (NPS 2013 and 2003) and the draft cultural landscape report for Asan Beach Unit and Agat Unit (NPS 2021a).

In addition to cultural landscape features commemorating the period of significance (1941 to 1945), several of the features and places described below hold ongoing cultural importance for CHamoru communities and other traditionally associated people. These features are described in more detail in the Ethnographic Resources section. Other areas and eras of significance within the park have not yet been established.

Many of the park's World War II defensive structures are also contributing features to the cultural landscape: see the Historic Structures section below for additional information and analysis. Likewise, archeological sites and features associated with the Battle of Guam are contributing features: these are discussed in the Archeological Resources section below.

The condition assessment conducted for the 2013 cultural landscapes inventory identified the cultural landscape condition within the four units as poor. This is due to the condition of the historic structures and vegetation that contribute to the significance of the historic property (specifically weathering and plant growth on structures and the loss

of historic viewsheds and impacts to the landscape's spatial organization and native plant communities). In many cases, the negative impacts and deterioration that harm the landscape are caused by activities within private or local government land that is adjacent to NPS-owned and -managed lands.

A climate change vulnerability assessment was also prepared as part of the draft cultural landscape report for the Asan Beach and Agat Units (NPS 2021a). The vulnerability assessment assigned a sensitivity rating to each contributing cultural landscape feature, reflecting the susceptibility of that feature or landscape characteristic to adverse effects from exposure to climate variables. The exposure of each landscape feature was assigned either a low, moderate, or high sensitivity rating, reflecting the type of feature and its ability to withstand exposure. Features with high sensitivity ratings are described in the relevant sections below to further describe resource condition trends.

Natural Systems and Features

The large-scale natural systems and features of Guam exerted a significant influence on the 1944 battle and are character-defining features of the cultural landscape of each unit. Character-defining features are those elements that convey the landscape setting and historic significance of the battle. Most important to the events of the battle were the natural features of the island, including the coral reef, limestone outcroppings, coastal cliffs, beaches, and a steep interior mountain range. The dense vegetation of Guam included coastal marshes, coconut groves, jungle-covered ravines, and savannas of dense sword grass, all of which influenced the movement of troops.

Natural systems and features with high sensitivity to climate change include the coral reefs and the vegetation within the cultural landscape, which are sensitive to changes in temperature and precipitation. The character of vegetation in the inland units is also highly susceptible to impacts from invasive species, particularly *tangantangan* (*Leucaena leucocephala*) and pink tecoma (*Tabebuia*

heterophylla) trees. Natural systems and features have a relatively low sensitivity when it comes to flooding from either coastal or overland flows (NPS 2021b, 54–55).

Asan Beach Unit

At Asan Beach Unit, the character-defining features include the prominent landforms of Punta Adilok (Adelup Point) and Punta Assan (Asan Point), which frame the east and west edges of the Asan invasion beach. These coral outcroppings were used by the Japanese to create camouflaged caves or concrete defensive structures built into the rock to suppress US forces moving across the reef flats to the beaches. The outcropping at Assan Ridge and Punta Assan retains the patches of limestone forest that hid Japanese defensive structures from aerial and ground reconnaissance. While the forest along Assan Ridge was heavily damaged during the battle, the native vegetation is slowly being restored and is a contributing feature. The coral reefs that still exist along the shoreline are character-defining features, as they influenced the battle by slowing the advance of the US military as they approached the heavily fortified coast.

The mouths of the Saddok Assan and Matgue are additional character-defining natural features of the battlefield cultural landscape. Running perpendicular to the beach, the rivers created natural cuts in the terrain that created a disadvantage for American troops because it prevented them from making physical contact with each other, influencing the initial invasion effort. The mouth of the Saddok Matgue, and the river's valley, was the site of a pivotal battle that represented a turning point in the larger Battle of Guam.

Topographic contributing features within the Asan Beach Unit also include features that were created by the US military during the immediate post-war period of construction on the island. The topographic cuts made to Punta Assan by the Seabees in 1944–45, to allow passage of Marine Corps Drive, are a contributing feature, as is the fill that was deposited on the reef flats east of Punta Assan in April 1945, much of which came

from constructing the highway. The fill was used to expand the area available to construct the military motor pool camp and barracks at Camp Asan (NPS 2013, 17).

Asan Inland Unit

The Asan Inland Unit still retains the naturally occurring dense vegetation and steep and rugged slopes that characterized the landscape during the battle. The vegetation in the unit includes mixed savanna-herbaceous woodland, palma brava, and tångantångan semi-natural scrubland. While the density of vegetation is similar to that which existed during the period of significance, the prevalence of nonnative invasive plants (such as tångantångan and pink tecoma) has increased substantially in recent decades.

Character-defining topographic and hydrological features in the Asan Inland Unit are the limestone cliffs and the Saddok Assan and Matgue, which exerted an important influence on the upland advance of the American troops during the battle. The Matgue River Valley, which is predominantly located in the Asan Inland Unit, was listed as a historic site in the National Register in 1975 for its military significance. In addition, the Asan Ridge Battle Area, comprising Assan Ridge, Bundschu Ridge, and Chorrito Cliff, was listed in the National Register the same year for the military significance of the ridges to the trajectory of the battle.

Agat Unit

As at the other units, the character-defining natural systems and features in the Agat Unit are those that influenced the events of the US landing. These include the coral reef; Apaca, Ga'an, and Bangngi' Points, as well as the caves at each point; and the mouth of the Saddok Ñamu south of Apaca Point. The remnant wetland at Apaca Point is also a contributing feature that illustrates the character of this low-lying, wet landscape both before the war and during the battle.

Mt. Alifan Unit

Character-defining natural systems and features at Mt. Alifan Unit include the distinctive ridgeline leading up to the

mountain, as well as the rugged, steep slopes that American troops ascended while under fire from the Japanese. The plant communities still present in the unit, including savanna and limestone forest, still evoke the dense vegetation that characterized the experience of the battle in 1944.

Spatial Organization

The historic spatial organization of the battlefield is evident when viewing each of the park units in an environmental setting and in relationship to the unfolding progression of the Battle of Guam. As the Japanese began to construct defenses, they used the ocean reef, beach cliffs, landforms along the shoreline, and interior mountains flanking Orote Peninsula and Apra Harbor in an effort to defend the island from a sea attack. This large-scale spatial organization encompassing the battlefield is largely intact today and helps to convey the events of the battle.

The 2013 cultural landscape condition assessment identified succession of vegetation communities as a primary threat to the integrity of the cultural landscape. Although the park is working to address the impacts of encroaching vegetation, large portions of the park, especially the upland units with little or no visitor access, have been released to succession. This has impacted the historically open spaces that were used for agriculture before the war and as a battle site during the war (NPS 2013).

Certain elements of the cultural landscape's spatial organization are also highly sensitive to impacts from climate change. These include the spatial organization of the defensive structures and caves at Punta Assan, Apaca and Rizal Points, and Ga'an Point, which are sensitive to damage from sea level rise, storm surge, and typhoon damage. In addition, the steeper slopes within the inland units are considered sensitive and at risk of erosion due to increased storm intensity (NPS 2021b, 56).



1. and 2. [Top left and right] Views of Asan Beach and Asan Inland Units from Asan Bay Overlook. Photos: NPS.
 3. [Bottom] Aerial view of the present-day Asan Beach Unit. As noted in the original caption, "The picture shows the extensive alterations and developments that were made to this section of the northern landing beach since July 1944. The superhighway visible along the coast is Marine Drive," June 1945. Photo: NARA.



1. [Top] Troops of Company B, 305th Infantry, 77th Division of the US Army move up Mt. Alifan, August 1944. Photo: NARA.
2. [Bottom] View toward the peak of Mt. Alifan. Photo: NPS.

Asan Beach Unit

At Asan Beach Unit, the historic spatial organization is demonstrated by the existing coral reefs and defensive structures grouped at the beach points. The spatial organization of Asan Beach Unit is also characterized by dense shoreline, or native strand vegetation, fringing a large central open space. This open character is consistent with the appearance of the coastal plain before World War II, when the Asan Beach area was used for agriculture, including for growing rice. The park is grappling with ongoing impacts from the invasive coconut rhinoceros beetle (*Oryctes rhinoceros*), which has led to the death of coconut palms along the shoreline and has impacted the character of the existing strand vegetation.

Asan Inland Unit

The spatial organization of the battlefield can be discerned at Asan Inland Unit through the arrangement of the Japanese defensive structures along the slopes, overlooking the Asan invasion beach and Apra Harbor below. The cluster arrangement of the structures, and the network of underground tunnels and caves connecting them, are also character-defining features.

Agat Unit

Similar to Asan Beach, character-defining aspects of the spatial organization at Agat include the coral reefs and the defensive structures grouped at the rocky points, as well as the network of caves and tunnels connecting them. The open character of the landscape in the Agat Unit also reflects its historical use for agriculture before the war and the character of the site during the battle. As at Asan Beach, the coconut rhinoceros beetle has resulted in the loss of coconut palms along the shoreline at Ga'an Point, somewhat altering the spatial relationship between the open landscape and fringing strand vegetation.

Mt. Alifan Unit

Similar to Asan Inland, the spatial organization of the battlefield at Mt. Alifan is apparent through the arrangement of

defensive structures and foxholes constructed along the slopes and connected through tunnels and caves. This clustering of defensive structures allowed many Japanese positions to survive the extensive pre-invasion bombing by the United States.

Views and Vistas

Both the Japanese and United States militaries took advantage of the topography and vegetation that created natural view corridors during the battle. There were several views to and from the beaches, coastal plains, inland hills, and the inland mountain ridge that were critical in shaping the actual events of the conflict. These views included short-range views to and from the shoreline and long-range, distant views to and from the ridges. The views help to convey the significance of the site and contribute to the setting of the battle.

Encroachment of vegetation has impacted historic views over the years, especially in the upland units. Adjacent developments on lands not owned or managed by the NPS have also altered historic views (NPS 2013). In addition, certain viewsheds have a high level of sensitivity to climate change-driven drought and the increased risk of wildfire. These include the long-range views to and from the ridges and uplands of the Asan Inland and Mt. Alifan Units.

Asan Beach Unit

At the Asan Beach Unit, the character-defining views are the short-range views from the Punta Assan defensive structures to the sea, the short-range views from Punta Adilok defensive structures to the sea, long-range views from the beach to the Assan uplands, and long-range views from the beach to the ridgelines of Mt. Chachao and Mt. Tenjo across the open coastal plain.

Asan Inland Unit

The character-defining views that remain at Asan Inland Unit are the long-range views to Asan Beach Unit, Apra Harbor, and the sea.

Agat Unit

The character-defining views at Agat Unit include the short-range views from the Apaca Point defense structures to the coastline and the sea, short-range views from Ga'an Point to the sea, short-range views from Bangngi' Point to the sea and coastline, long-range views from the beach to the Mt. Alifan ridgeline, and long-range views from the beach to Orote Peninsula.

Mt. Alifan Unit

At Mt. Alifan, the primary character-defining view is the long-range view to Hågat Beach below.

Circulation

The existing circulation systems in use within the park were developed after the war. Several roads and trails within the units were constructed prior to the war but were destroyed and rebuilt immediately after the Battle of Guam. The NPS has modified and added roads, parking areas, and trails to the Asan Beach, Asan Inland, and Agat Units. Due to the construction of and modification of circulation systems since the war, most of the circulation system does not contribute to the cultural landscape. A majority of the secondary circulation patterns associated with the war and pre-war settlement are either lost or heavily obscured by invasive vegetation (NPS 2013).

Asan Beach Unit

Unlike the rest of the circulation system at Asan Beach Unit, the path along Assan Ridge is considered a contributing feature. Atop the ridge is a wide path that was created through a cut across the ridge, leading out to the point. The path is roughly graded and hemmed in by dense limestone forest vegetation. Although it is undetermined whether the ridgeline path was present during the battle, the cut for the path is evident in historic photos of Punta Assan taken during 1945 construction activities (NPS 2013, 78).

Two unpaved paths leading from the entry road up to Assan Ridge are undetermined features: while the unpaved character of

the surface make it appear that these paths could have been used during the period of significance, there is no documentation to indicate that they were installed by the end of 1945 (NPS 2013, 80)

Asan Inland Unit

There are no circulation system features at Asan Inland that are considered contributing to the cultural landscape. The parking area and walkways at the Asan Bay Overlook and Memorial Wall were constructed by the National Park Service in the 1990s and are considered non-contributing features (NPS 2013, 79).

Agat Unit

Ga'an Point and Apaca Point provide parking areas and paved and unpaved walkways that are modern additions to the landscape. None of the circulation features in the units were present during the period of significance and are therefore considered non-contributing features (NPS 2013, 79).

Mt. Alifan Unit

There are no circulation systems currently in use in the Mt. Alifan Unit. Although historic road alignments or bull-cart trails may be present within the unit, connecting the villages of Hågat and Santa Rita, there is no documentation of the presence of these alignments during the period of significance.

Monuments and Flags

Asan Beach Unit

The Asan Beach Unit protects six monuments, five of which are located along the shoreline and one that is located near the upper parking lot adjacent to Marine Corps Drive. Established on site between 1961 and 1994, these monuments are considered non-contributing elements to the World War II cultural landscape. While they are non-contributing to the cultural landscape because they were installed after the period of significance, they are nonetheless important to many community members today.

Four of the monuments commemorate the 1944 US landing at Asan Beach and include

the Third Marine Division Association Monument, the United States Landing Memorial, and the United States Armed Forces Veteran-Chamorros Memorial (also known as the Liberators' Memorial), which is prominently located at Punta Assan. The War in the Pacific Park Plaque is sited near the parking lot at the park entrance. Two of the monuments are dedicated to the Filipino revolutionary leader Apolinario Mabini and were erected in 1961 and 1964 to memorialize his presence at Asan Beach as a political prisoner between 1901 and 1903. See the Ethnographic Resources section for additional information about the site's history before World War II.

The five monuments along the shoreline are highly exposed to damage from storm surge, and all the monuments are exposed to coastal weathering. This risk of damage is expected to increase with climate change-driven sea level rise. The Liberators' Memorial, constructed in 1994, is located in an area of the park that is already experiencing damage from coastal flooding and was heavily damaged by Typhoon Mawar in May 2023.

Asan Inland Unit

In Asan Inland Unit, the Asan Bay Overlook includes a memorial wall constructed in 1994 to commemorate the 50th anniversary of the battle. The memorial wall is also a non-contributing feature to the cultural landscape.

Agat Unit

Within the Agat Unit, at Ga'an Point, three flags stand to commemorate the war and provide a memorial to peace. The flagpoles displaying the flags of the US, Guam, and Japan were installed in 1980 and are non-contributing features to the cultural landscape. Like the monuments at Asan Beach, the flags at Ga'an Point are an important community feature. Adjacent to the flags are two World War II Japanese defense guns, which were relocated to Ga'an Point in the 1980s. The guns are not considered contributing features because they are no longer in their original locations. As at Asan Beach, the flags and guns are in an area that is critically vulnerable to sea level rise and storm surge.

Environmental Consequences

Impacts from Alternative A: No-Action Alternative

Under the no-action alternative, beneficial impacts would result from the park's ongoing cyclic maintenance activities to preserve historic structures and viewsheds and promote native plants through removal of invasive vegetation. The park would implement the treatment recommendations of the 2021 draft cultural landscape report, once finalized, which would also result in beneficial impacts to the cultural landscape.

Adverse impacts to the spatial organization of the cultural landscape would occur due to the continued presence of non-contributing parking areas and other circulation elements. These features were developed after the period of significance, detract from the integrity of the invasion beaches, and are frequently damaged by storms and coastal flooding. The non-contributing monuments, flags, and guns in the coastal units would also continue to be exposed to damage from coastal flooding and weathering and would remain at risk of total loss in a significant storm event.

Sea level rise and storm surge driven by climate change would continue to affect the historic structures, spatial organization, and views and vistas of the cultural landscape. Under alternative A, these impacts would continue without focused adaptive management efforts to monitor, document, and prioritize preservation activities based on risk of loss. This would result in additional long-term adverse impacts to these character-defining features.

Impacts from Alternative B: Preferred Alternative

Under alternative B, the removal of non-contributing circulation infrastructure (parking areas and access drives) would result in long-term beneficial impacts to the spatial organization of the cultural landscape. The siting of new trails or walkways would follow historic circulation routes where possible and would follow the recommendations for new development outlined in the draft

cultural landscape report, resulting in long-term beneficial impacts. The limited new facility developments under alternative B, including reconfigured parking areas, trails, new restrooms, picnic areas, and interpretive kiosks, would be designed and sited carefully, in conformance with the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes to ensure that additions and modifications would not be incompatible, out of scale, or in great contrast to the character and aesthetic of the cultural landscape and National Register of Historic Places-listed battlefield.

Construction required for facility removal, relocation, and development proposed in alternative B would have a short-term adverse impact to the cultural landscape due to construction activities. These short-term impacts would be caused by the presence of construction equipment and activities, which could temporarily affect historic views and vistas and the spatial organization of the World War II battlefield. Implementation of construction-related best management practices (BMPs) would reduce the temporary impacts of construction activities (see Appendix D: Best Management Practices and Mitigation Measures).

The relocation of monuments, flags, and guns within the coastal units would also have a beneficial impact on the spatial organization and historic views and vistas of the cultural landscape, while protecting the monuments and flags from damage or total loss in the long term. The relocation would have beneficial impacts because these elements were installed in the units after the period of significance (1941–45) and are not considered contributing features to the cultural landscape.

Alternative B would result in long-term beneficial impacts to the cultural landscape through the development of trails in the inland units. Trails would follow historic wartime and pre-war roadway alignments, where possible, which would have beneficial effects on the cultural landscape by restoring historic circulation routes and key viewpoints that help convey the spatial organization and historic

views and vistas of the battlefield. Trail and viewpoint development would also include the removal of invasive species, which would have a beneficial impact on native vegetation, which is a contributing feature, as well as on views and vistas to the invasion beaches and upland terrain. Formalizing trail access and an NPS presence in these areas could additionally reduce impacts to native vegetation and cultural resources that are currently caused by social trails and off-road vehicle use. However, increased visitor access to these areas could also result in increased impacts to the cultural landscape and contributing features. The park would continue to provide Leave No Trace education and training through ranger-led tours, interpretive materials, and signage, emphasizing the importance of staying on the trail and avoiding impacts to resources.

Trail construction would have a short-term adverse impact on the cultural landscape that would be reduced by following the mitigation measures in appendix D. Impacts could include the presence of construction equipment and activities, which could temporarily affect historic views and vistas and the spatial organization of the battlefield. Trail development could also impact native vegetation communities, but adverse impacts would be mitigated by following the best management practices and mitigation measures in appendix D. The use of existing roadway alignments where possible would additionally reduce adverse effects to vegetation and cultural resources. As noted in appendix D, trail development would not occur in areas with high potential for cultural resources or sensitive native species, and trail location and design would be informed by the park's cultural landscape inventories to avoid adverse impacts.

The enhanced vegetation management activities under alternative B—including increased efforts to remove invasive species and replant native species that are more adaptable to climate change—would have a long-term beneficial impact on the cultural landscape's natural systems and features, historic views and vistas, and spatial organization by helping to return the battlefield vegetation to its historic character.

Increasing the use of native vegetation that is resilient to coastal flooding would also result in long-term beneficial impacts, by protecting the shoreline from storm surge and enhancing plant communities that historically existed at the beach sites, such as native strand vegetation and mangroves.

Climate change, especially sea level rise, storm surge, and an increase in storm intensity, is projected to result in long-term adverse impacts to the historic structures in the coastal units, the cultural landscape's spatial organization, and historic views and vistas. Under alternative B the park would implement a more rigorous monitoring, documentation, and stabilization program that would prioritize management activities for the defensive structures most at risk. This adaptive management approach would result in long-term beneficial impacts to historic structures because it would create a strategy to protect structures from sea level rise and storm surge and focus on preserving resources most likely to resist damage. Historic American Buildings Survey (HABS)/Historic American Engineering Record (HAER)/Historic American Landscapes Survey (HALS) documentation of structures, 3-D mapping and modeling, and alternate interpretation formats would convey the original spatial organization of the fortifications within the coastal battlefield, which would be beneficial to documentation, research, and interpretation.

Cumulative Impacts

Overall, past actions have influenced and affected the current condition of the cultural landscape within the project area. The primary circulation systems and visitor-serving facilities within the park were developed after the war and have changed the character of the battlefield landscapes, especially in the coastal units, resulting in adverse cumulative impacts. The rampant growth of vegetation in Guam's climate and the difficulty of adequately managing it with existing staff has also resulted in adverse cumulative impacts on the cultural landscape's spatial organization and historic views and vistas.

Both alternatives would implement the recommendations of the draft cultural landscape report for new development within the landscape, resulting in long-term beneficial impacts.

The Marine Corps Drive improvements proposed by the Guam Department of Public Works would not be expected to have an adverse impact on the park's cultural landscape, since the projects are expected to occur within the existing road prism.

The park's past, present, and foreseeable future projects to remove invasive species, increase native species diversity, and enhance the resilience of species (such as coral) to climate change would have a long-term beneficial impact on the cultural landscape. Combined with the beneficial impacts of these cumulative projects, the preferred alternative would enhance the natural systems and features, spatial organization, and views and vistas that define the character of the cultural landscape.

Ethnographic Resources

AFFECTED ENVIRONMENT

Ethnographic resources are the cultural and natural features of a park that are of traditional significance to traditionally associated peoples. Some ethnographic resources might also be traditional cultural properties. A traditional cultural property is one that is eligible for inclusion in the National Register of Historic Places because of its association with the cultural practices or beliefs of a living community that are (1) rooted in that community's history, and (2) important in maintaining the continuing cultural identity of the community.

The description of ethnographic resources in the planning area is informed by the 2021 *Rapid Ethnographic Assessment Project for the Asan Beach Unit and Agat Unit Management Plan* (NPS 2021a). The rapid ethnographic assessment project (REAP) interviewed residents of Assan and Hågat who shared traditions, practices, and histories connected to the two villages from the 1930s to the

present day. The REAP process additionally included a review of historical documents and earlier ethnographic reports to identify resources of ethnographic importance and recommendations for management. While the REAP focused primarily on the two coastal units, it also identified recommendations for additional ethnographic research and resource management within the Asan Inland and Mt. Alifan Units.

In addition to information provided by the REAP, the description of the affected environment includes information received through civic engagement for the UMP and through the Section 106 consultation process, specifically consultation with Indigenous CHamoru organizations and other traditionally associated groups. See appendix G for a list of Section 106 consulting parties. The NPS recognizes that there may be additional ethnographic resources within the planning area that are unknown to the park and/or are of a sensitive nature and not appropriate as a topic of general public interest. The NPS will continue to work with the groups traditionally associated with the park to identify ethnographic resources in the planning area and assess any identified resources for eligibility for inclusion in the National Register.

Although not specifically addressed in the climate change vulnerability assessment for the cultural landscape (NPS 2021a), several ethnographic resources within the planning area are likely to have a high or moderate sensitivity rating to climate variables. These include plants and animals, both terrestrial and marine, that may be sensitive to changes in precipitation, coastal and overland flooding, ocean warming, and wildfire, among other impacts. The presence of invasive species, such as the brown tree snake, have also impacted the condition of ethnographic resources within the park. Traditional practices including fishing, hunting, and gathering that are tied to specific locations may be highly sensitive to climate variables and invasive species if activities are no longer possible in historically used locations. Additional climate-related impacts to the condition of ethnographic

resources may be identified through further research and consultation.

Asan Beach Unit

Ethnographic resources identified within the Asan Beach Unit include the Punta Assan area, Gâpang (also called Camel Rock), traditional fishing practices and the Sâgua Assan, and precontact burials and occupational deposits (NPS 2021a, 101). In addition to these specific sites and practices, traditional CHamoru place names were identified as an important ethnographic resource through Section 106 consultation.

Punta Assan (Asan Point)

The Punta Assan area, including the beach and open expanse of lawn now managed by the park, is important for its long history of use and community connections both before and after World War II. The point was named “Pte. Acahi-Fanihi” by the 1819 Freycinet expedition to the Marianas, indicating that it was historically a location for hunting fanihi. Freycinet also described Assan as a notable and highly productive agricultural area on the island (NPS 2021a, 101). The village of Assan was located on this site and included a number of small homes clustered along the coastal road.

During the Philippine-American War that followed the Spanish-American War, the United States established a camp near Punta Assan known as the “Presidio of Asan,” where the US government imprisoned nearly 60 Filipino generals, politicians, and others who had been deported from the Philippines for their refusal to swear allegiance to the United States. The Filipino revolutionary leader Apolinario Mabini was one of those held at the Presidio, and his presence at Assan between 1901 and 1903 was commemorated by two monuments installed along the beach in 1961 and 1964 (NPS 2013, 24).

After World War II, the landscape around Punta Assan changed even more dramatically with the development of the Asan Point Civil Service Community. Despite these changes, local villagers, especially children, continued accessing the area to hunt birds on Assan

Ridge or watch movies or other performances in the outdoor theater that was on site (NPS 2021a, 101).

Ga'pan Islet (Camel Rock)

Ga'pan Islet, also called Ga'pang Islet or Camel Rock, is a prominent small rocky islet that is located just to the northwest of Punta Assan. As noted by the rapid ethnographic assessment project, this islet is “the location of an important CHamoru legend related to inter-village warfare and the attempt by two boys to protect Asan from invasion by rival districts.” The area is additionally important ethnographically as a valued historical and contemporary location for collecting marine resources during low tides, in particular octopus and crabs (NPS 2021a, 102).

Fishing and Sāgua Assan

For the communities in and around Assan, fishing is an ongoing traditional practice that holds a great deal of cultural significance. The Sāgua Assan is a break in the reef near the mouth of the Saddok Assan. This area has been an important location for fishing for generations, because it is easily accessible and attracts a wide variety of fish. The REAP notes that fishing, in particular traditional net fishing, allows CHamoru communities the opportunity to continue the custom of pātte, or redistributing food that has been gathered through a collective effort (Tomonari-Tuggle 2021, 102).

Precontact Burials and Occupational Deposits

Very little information is available about precontact archeological resources at the Asan Beach Unit, since no specific archeological studies have been conducted within the unit. Precontact burial and occupational sites throughout the park were also heavily damaged or destroyed during the World War II battle. However, precontact human remains have been uncovered at certain sites in the Assan area by the limited archeological surveys that have occurred. The REAP cites two burials about 5 feet (1.5 meters) below the surface, in the vicinity of the former park visitor center parking lot in Assan, uncovered as part of a culvert replacement project

(Tomonari-Tuggle 2021, 102; Thomas and Price 1979, 7). In addition, in 1918 burials nearly 3 feet (1 meter) below the surface were discovered during construction activities at Punta Assan (NPS 2021a, 102; referencing Wells et al. 1995). Occupational deposits from the pre-latte and latte period have been found within the present-day village of Assan as well (NPS 2021a, 102).

Although little is known archeologically about the prehistory of the Asan Beach Unit, as a coastal area, Assan has a high likelihood of buried precontact deposits that may date to the latte and pre-latte periods (NPS 2021a, 13; NPS 2013, 98). Pre-latte period deposits are likely to be located farther inland than those of the latte period, since sea levels in the pre-latte era were approximately 6 feet (1.8 meters) higher than at present (Hung 2011). Desirable features for habitation sites include fertile soils for agriculture and productive reef-lagoon habitats for fishing (NPS 2003, 2; Hunter-Anderson 1989, 7; Thomas and Price 1979, 6). The site's central location within its watershed and proximity to rich marine resources suggest that it would have supported a thriving community (NPS 2021a, 13). Although it is likely that the destruction caused by the World War II battle eliminated surface deposits of pre-war cultural material (Thomas and Price 1979, 10), future archeological investigations at Asan Beach Unit could yield subsurface information from all precontact and historical periods (NPS 2013, 98).

Asan Inland Unit

Ethnographic resources identified within the Asan Inland Unit include subsistence gathering and the Spanish Road (or El Camino Real). While it is more unlikely that the interior upland units of the park would have archeological deposits associated with the latte or pre-latte periods (NPS 2013, 98), it is possible that archeological remains may exist, especially from the late latte or early historic periods (Thomas and Price 1979, 6, 13). Additional archeological surveys may identify precontact sites of ethnographic importance.

Subsistence Gathering

The area of Oppop, inland of Assan village and Kalākak, has long been used for subsistence cultivation and gathering, according to narrators interviewed for the 2021 REAP. Traditional activities included hunting for birds and fruit bats, collecting breadfruit, and tending a natural beehive (Tomonari-Tuggle 2021, 103). Farming also occurred in the area, through the lāncho system—shared familial lands where CHamorus would cultivate agricultural crops, raise livestock, or gather wild plants. The lāncho was located in the jungle, or along the beaches, and initially served as a means of resisting Spanish colonial rule, providing CHamoru families a refuge and place to continue their cultural practices and rituals (NPS 2021a, 103; Bevacqua 2023).

The Spanish Road (El Camino Real)

The Spanish Road (also called El Camino Real) roughly follows the alignment of Marine Corps Drive and Route 2 and was developed during the Spanish period to connect Hagåtña with villages to the southwest. Completed by the early 19th century (if not earlier), the 16-mile (26-kilometer) road alignment crosses through the Asan Inland Unit. Although most of the road has been destroyed by subsequent development, especially the construction of Marine Corps Drive, the alignment is still visible in a cut across Assan Ridge west of the Saddok Matgue and possibly along Chorrito Cliff on the east side of Assan (NPS 2021a). Assan residents interviewed for the REAP recalled personal and family stories of accessing the Asan Inland area via the old Spanish Road alignment, in the years before World War II (Tomonari-Tuggle 2021, vol. IIa, 128-29).

Agat Unit

Ethnographic resources identified within the Agat Unit include Fuña and the Pelagi Islets at Apaca Point, traditional fishing practices, and precontact burials and occupational deposits (NPS 2021a, 102).

Fuña at Apaca Point

The Agat Unit protects an important place in CHamoru origin myths. As noted by the REAP,

Fuña “is the location of the CHamoru tradition of a rock of creation, i.e., a rock that gave birth to humans.” The site is either on Apaca Point itself or is a small islet located just offshore of the point (Tomonari-Tuggle 2021, 102).

Pelagi Islets at Apaca Point

The Pelagi Islets are also connected to the mythic landscape of Hågat. “Mythic landscapes and seascapes” are defined in the REAP as the land and sea areas that are connected to traditional legends and stories on Guam. As reported by the REAP, their “origin is tied to a story about fishermen who were caught by the strong out-going tide and had to abandon their leaking canoe. The canoe became one of the islets, and jettisoned fishing equipment became another. Fishermen use the sound of slapping water against the canoe-shaped islet as an indicator of impending sea conditions” (Tomonari-Tuggle 2021, 103).

Traditional Fishing Practices

As at Asan Beach Unit, fishing is an important ongoing traditional cultural practice for the Hågat community.

Precontact Burials and Occupational Deposits

The coastal area around the Agat Unit has many of the same characteristics that made the Assan area a desirable habitation site during the pre-latte and latte periods. Archeological surveys along the coast and within the right-of-way of Highway 2, as well as in historical village site of Hågat, have uncovered precontact human remains and occupational deposits from the latte period (NPS 2021a, citing Moore et al. 1995; Hunter-Anderson 2002; and Craft 2013). Notably, the human remains were discovered in areas that had been almost completely destroyed during the 1944 battle and post-war redevelopment (NPS 2021a).

An archeological survey conducted in 1989 for a small boat harbor at Hågat, just south of the park boundary at Bangngi’ Point, found no surface evidence of cultural remains (NPS 2003, citing Hunter-Anderson 1989). However, auger tests performed by a survey in 1986 indicated that pre-latte subsurface

remains might be yielded at Hågat beach: the “coral and sand beach overlie a substantial older intact alluvial clay deposit with localized evidence of prehistoric/early historic cultural remains” (NPS 2003, 2). These remains may be a new site type, offering a model of precontact farming on Guam. The site may also reflect a major geological event on Guam, during precontact human occupation, which caused the massive erosion evident in the deep alluvium at the Hågat beach study site (Hunter-Anderson 1989, 27). Similar subsurface features are possible, if not probable, within the Agat Unit (NPS 2003, part 3a, 2).

Mt. Alifan Unit

While detailed ethnographic research has not been conducted for lands within the Mt. Alifan Unit, it is probable that Mt. Alifan has been a site of traditional subsistence hunting, gathering, and cultivation, similar to Asan Inland Unit (NPS 2021a, 103). Like Asan Inland, there is currently no archeological evidence of pre-latte or latte period activities within Mt. Alifan. However, archeological surveys in the unit may identify precontact sites of ethnographic importance.

ENVIRONMENTAL CONSEQUENCES

Impacts from Alternative A: No-Action Alternative

Under the no-action alternative, beneficial impacts to subsistence gathering and fishing would result from current management activities to control invasive species and restore native ecosystems, in particular from projects such as the brown tree snake removal initiative on Assan Ridge. Additionally, current management efforts to raise more heat-resilient coral would result in a beneficial impact to fishing as a traditional activity, by preserving reef resources and ecosystems supporting native fish.

Under alternative A, there would be fewer opportunities to interpret ethnographic resources through programming, wayside exhibits, CHamoru place names, and immersive experiences such as restored native wetlands. The ongoing lack of archeological

survey work within the park would continue to limit information about important precontact and ethnographic sites within the units. Climate change would continue to impact park sites and ethnographic resources, including precontact burials and occupational deposits.

Alternative A would have no impacts on mythic sites or other culturally significant features such as Ga’pan Islet, Fuña, the Pelagi Islets, or the Spanish Road.

Impacts from Alternative B: Preferred Alternative

Impacts to subsistence gathering and fishing under alternative B are similar to those described under alternative A. In addition, alternative B proposes enhanced strand vegetation along the shoreline and the restoration of mangroves at river mouths as a natural defense to sea level rise and storm surge, which would have long-term beneficial impacts to the native ecosystems that support these ethnographic resources.

Under alternative B, increased interpretation of the long-term history of the sites (both before and after World War II) and traditional uses of native plants and animals would result in long-term beneficial impacts to ethnographic resources. The cultural practitioners program proposed in alternative B would create an ongoing connection between the units and CHamoru residents with familial connections to the park lands, resulting in long-term beneficial effects. The ethnographic research included in alternative B would contribute new knowledge about the ethnographic importance of sites within the units, which would also have long-term beneficial impacts.

Climate change impacts such as sea level rise, erosion, flooding, and wildfire will result in adverse impacts to precontact burials and occupational deposits under any alternative. The archeological documentation proposed under alternative B, including an archeological strategy and archeological overview and assessment, would provide increased information about precontact habitation within the units, which would have a long-

term beneficial impact on these ethnographic resources. Alternative B would have no impacts on mythic sites or other culturally significant features such as Ga'pan Islet, Fuña, the Pelagi Islets, or the Spanish Road.

Cumulative Impacts

Oral histories and ethnographic studies conducted by the park in recent years, such as the 2021 REAP, have increased information about ethnographic resources in the park, resulting in cumulative beneficial impacts when combined with the actions in the preferred alternative. No other past, present, and reasonably foreseeable projects would have any spatial and temporal overlap with actions in alternative B that affect ethnographic resources.

Historic Structures

The description of historic structures below is adapted from the 2013 cultural landscapes inventory for the park. Several defense structures still exist within the park that were constructed by the Japanese during the war and are considered historically significant. Structures that lack individual physical integrity are considered ruins and are documented in the Archeological Resources section below. The commemorative monuments and markers concentrated at the Asan Beach and Agat Units are important for memorializing the events of World War II and other events that took place on site but do not rise to a level of historic importance on their own.

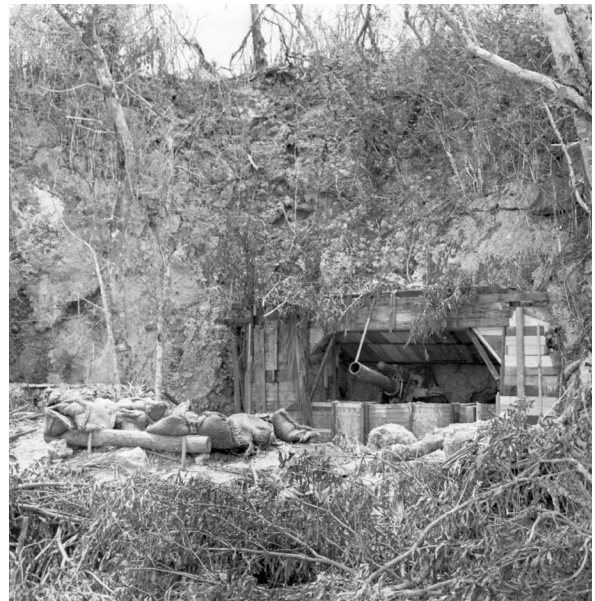
War-related structures remaining in the landscape include features and components of the Japanese defense system constructed in 1944. In general, there were three main types of fortifications constructed during the war: modified natural caves or man-made caves, reinforced concrete structures such as pillboxes, and constructed earthworks such as foxholes. All of these structures were hastily built in the months prior to the invasion, using forced labor and military conscripts. As noted above, defensive structures were built to take advantage of the natural outcroppings and landforms whenever possible for strategic reasons, but also because there were

critical shortages of basic building materials (Gailey 1988, 40).

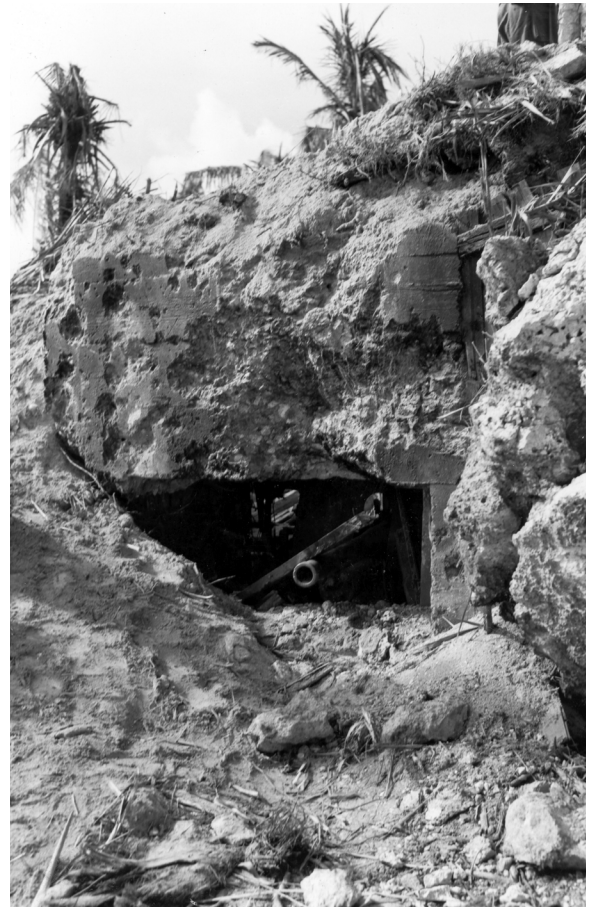
Arguably the most character-defining defense structures remaining on Guam are the concrete pillboxes with associated caves and tunnel systems. These systems allowed the Japanese to stage an attack from a pillbox and then retreat underground to follow a tunnel and emerge to attack from another location. Each park unit has evidence and remains of these defense systems: Asan Beach Unit protects gun emplacements and pillboxes, Agat Unit protects pillboxes and foundations from the war, and the inland units contain pillboxes, gun emplacements, caves, and discernable defensive lines. A list of historic structures by unit is included in appendix F.

The 2013 cultural landscape condition assessment identified the condition of the historic structures in the park as a primary threat to the integrity of the cultural landscape. Over the past couple of decades, efforts have been made to improve the condition of the historic structures and sites within the park. However, because the majority of historic structures were constructed quickly, often using substandard materials, they require a high level of preservation maintenance. Many of the historic Japanese defense structures built in 1944 are in a state of deterioration from various factors, including high humidity, high winds, heavy rains, frequent exposure to salt spray, coastal flooding, vegetation overgrowth, as well as displacement caused by invasive root systems, erosion, and impacts caused by visitor use. One of these issues, vegetation, results in slow yet steady deterioration that will cause the collapse of each structure if not abated. Vandalism of concrete features, including graffiti and fire pits, has also been a problem in the Asan Beach and Agat Units (NPS 2013).

The historic structures with the highest sensitivity to climate variables are the fortifications located on Assan, Apaca, and Rizal Points, along with their connecting tunnels and caves. These historic properties are at risk from coastal flooding due to the rapid deterioration of concrete by water intrusion (NPS 2021b, 55).



1. [Top left] Visitors reading about ethnographic resources at a trail dedication at Assan Ridge, Asan Beach Unit. This sign reads: "The Coconut Palm, called the 'Tree of Life', is traditionally used for food, drink, oil, building material, and animal feed." 2. [Top right] Japanese gun emplacement on Assan Ridge, Asan Beach Unit. 3. [Bottom left] Archeological resources impacted by coastal erosion. Photos: NPS. 4. [Bottom right] Japanese gun emplacement at Punta Assan (Asan Point), Asan Beach Unit, covering the beach south of the point, October 1944. Photo: NARA.



1. [Top left] Japanese bunkers at Ga'an Point in the Agat Unit. 2. [Middle left] Japanese bunker near the coastline at Apaca Point in the Agat Unit. 3. [Right] Japanese gun emplacement on Ga'an point in the Agat Unit, October 1944. 4. [Bottom] Visitors tour the World War II fortifications at Ga'an Point in the Agat Unit. Photos: NPS.

ENVIRONMENTAL CONSEQUENCES

Impacts from Alternative A: No-Action Alternative

As noted above, climate change impacts and deterioration caused by a number of factors has had an adverse effect on the condition of the park's historic structures. Under the no-action alternative, beneficial impacts would result from the park's ongoing cyclic maintenance activities to stabilize and preserve historic structures, as well as the upcoming project to stabilize many of the World War II concrete fortifications in the park. However, under alternative A, climate change effects would continue without focused adaptive management efforts to monitor, document, and prioritize preservation activities based on risk of loss. This would result in additional long-term adverse impacts to these character-defining features.

Impacts from Alternative B: Preferred Alternative

Under alternative B, the park would implement a more rigorous monitoring, documentation, and stabilization program that would prioritize management activities for the defensive structures most at risk of damage or loss due to climate change or other environmental stressors. This adaptive management approach would result in long-term beneficial impacts by strengthening the resistance of some historic structures and increasing their longevity. In the event that a structure becomes flooded and survives under water, the park would pivot maintenance activities and manage it as a submerged resource. For those structures that cannot be protected, HABS/HAER/HALS documentation of structures, 3-D mapping and modeling, and alternate interpretation formats would document their existence and convey the character and experience of the historic fortifications into the future. This documentation would have long-term beneficial effects to interpreting and documenting these resources once they become fully submerged, or in the case of complete loss due to storm damage or the impacts of climate change.

In addition, adaptive management strategies that address the potential impacts of visitor use on cultural resources would also result in long-term beneficial effects to historic structures. As described in Appendix A: Indicators, Thresholds, and Management Strategies, a monitoring protocol to document and report human-caused damage to cultural resources would result in proactive management strategies to reduce or mitigate damage to historic structures.

Cumulative Impacts

There would continue to be a range of adverse cumulative effects to historic structures in the units from past deferred maintenance, in particular the challenge of regularly removing encroaching vegetation. Neither alternative would contribute appreciably to these effects. Past and ongoing stabilization activities have resulted in beneficial impacts, which would be enhanced by the actions proposed in the preferred alternative.

Archeological Resources

The description of archeological resources below is adapted from the 2013 cultural landscapes inventory for the park. Archeological sites and features that contribute to the park's national significance include ruins and traces that are associated with the events of the Battle of Guam. Ethnographic information has also indicated the likely presence of pre-World War II archeological features and sites in the park, as noted in the Ethnographic Resources section above. However, the material remains of these sites have not been located. As future archeological work is conducted and new sites identified, their significance will be evaluated. Locations of ethnographic importance to the community will be a valuable resource to guide future archeological investigations.

World War II-era defense structures and associated ruins exist throughout the park's units. Defense structures in a ruinous state, while not functioning as they were initially intended, are nevertheless significant in understanding the 1944 battle. An initial reconnaissance survey was conducted in 1979, but no additional survey work or

analysis has been conducted other than site condition assessments and limited surveys of fire-affected areas. A systematic archeological survey of all park units is therefore needed.

There are several major types of contributing archeological resources within the Asan Beach, Asan Inland, Agat, and Mt. Alifan Units. Archeological features include defense structures, features that relate to the operation of the defense system that the Japanese constructed, as well as a number of features associated with the US invasion and efforts to secure the island from Japanese control. At the Asan Beach and Agat Units these features include caves, bunkers, tunnels, foxholes, and submerged resources. At the Asan Inland and Mt. Alifan Units, these features include caves, tunnels, foxholes, trenches, foundations, and isolated artifacts that all date to the war. These features have deteriorated rapidly both because they were hastily constructed during the war and as a result of Guam's harsh environment, which includes devastating typhoons, earthquakes, and high salinity due to the proximity of the ocean. A list of contributing archeological resources by unit is included in appendix F.

Impacts from Alternative A: No-Action Alternative

No archeological resources in the planning area that contribute to the National Register-listed battlefield would be affected by actions under alternative A. However, climate change would continue to adversely impact park sites and archeological resources, particularly through flooding and erosion, stronger typhoons, and increased wildfire risk. Under alternative A, these climate change effects would continue without focused adaptive management efforts to monitor, document, and prioritize preservation activities based on risk of loss. This would result in additional long-term adverse impacts to these character-defining features.

Impacts from Alternative B: Preferred Alternative

Under alternative B, the park would implement a more rigorous monitoring, documentation, and stabilization program that would prioritize

management activities for the archeological resources most at risk of damage or loss due to climate change or other environmental stressors. This adaptive management approach would result in long-term beneficial impacts by strengthening the resistance of some resources and increasing their longevity. In the event that an archeological resource becomes flooded and survives under water, the park would pivot maintenance activities and manage it as a submerged resource. For resources at risk of imminent loss, HABS/HAER/HALS documentation, 3-D mapping and modeling, and alternate interpretation formats would document their existence and convey the character and experience of the World War II archeological resources into the future. This documentation would have long-term beneficial effects to interpreting and documenting these resources once they become fully submerged, or in the case of complete loss due to storm damage or impacts from climate change. In addition, the baseline archeological documentation proposed under alternative B, including an archeological strategy and archeological overview and assessment, would provide increased information about archeological resources within the units, which would have a long-term beneficial impact.

The preferred alternative's proposal to formalize trail access in the inland units would reduce impacts to archeological resources that are currently caused by social trails and off-road vehicle use. However, increased visitor access to these areas could also result in increased impacts to archeological resources. The park would continue to provide Leave No Trace education and training through ranger-led tours, interpretive materials, and signage, emphasizing the importance of staying on the trail and avoiding impacts to resources.

Adaptive management strategies that address the potential impacts of visitor use on cultural resources would also result in long-term beneficial effects to archeological resources. As described in Appendix A: Indicators, Thresholds, and Management Strategies, a monitoring protocol to document and report human-caused damage to cultural resources would result in proactive management

strategies to reduce or mitigate damage to archeological features.

Under alternative B, some ground disturbance would be required for the development of limited facilities such as reconfigured parking areas, trails, new restrooms, picnic areas, and interpretive kiosks. Facilities would be sited to avoid known archeological resources, and the discovery potential for buried archeological resources would continue to involve the mitigation measures described in appendix D. As a result, there would be no adverse effect to archeological resources.

Cumulative Impacts

Overall, past actions have influenced and affected the current condition of archeological resources within the project area. Notably, the large-scale construction projects that occurred after World War II in locations such as the Asan Beach Unit created substantial ground disturbance before the units became national park sites and resulted in adverse cumulative impacts. There would continue to be a range of adverse cumulative effects to archeological resources due to the park's ongoing lack of documentation. The proposed action would not contribute appreciably to these adverse effects. Alternative B would add to the limited archeological data that does exist for the units, resulting in cumulative beneficial effects over time as increased information is gathered about archeological resources in the units.

Conclusion

Given the minimization and avoidance measures identified in this plan and in appendix D, and in view of law and NPS policy directives, neither continued management under alternative A nor the proposed actions under alternative B would result in significant impacts to cultural resources within the planning area.

Assessment of Effects Under Section 106

The NPS is required by Section 106 of the NHPA to take into account any effect an undertaking may have on historic properties within the APE. The undertaking being

assessed is the development and issuance of this plan, and the planning-level decisions made therein. The APE is the project planning area, which corresponds to the boundaries of the four units. There are five historic properties currently identified in the four units within the planning area/APE that are individually listed in the National Register; the entire park is also administratively listed on the National Register. The five properties and their character-defining features are listed in appendix F.

Based on the analysis in this section and on Section 106 consultation with the Guam State Historic Preservation Office and other interested parties, the proposed undertaking would result in *no adverse effect* on the historic properties within the APE. The decision to remove non-contributing landscape features, such as parking lots and roadways subject to sea level rise, would not have an adverse effect to the cultural landscapes of the Asan Beach, Asan Inland, Agat, and Mt. Alifan Units, as these features are not historic; for similar reasons, the relocation of non-contributing monuments, guns, and other landscape details would not have an adverse effect. The NPS would site new parking areas, other visitor support facilities, and any relocated non-contributing features in areas that do not have known archeological or ethnographic resources and that are not intrusive to the cultural landscape. The creation of trails for visitor use in the Asan Inland, Agat, and Mt. Alifan Units is not expected to have an adverse effect to the cultural landscape, archeological sites, or ethnographic resources as they would follow historic pathways or be designed to avoid sensitive sites. Staging sites for construction would be placed in locations that will not have an adverse effect on historic properties.

The decisions made in this plan would have *no adverse effect* on the character-defining features of the battlefield sites, including the topographical characteristics and natural systems that shaped the Battle of Guam, historic views and vistas, and the resulting spatial organization of Japanese defensive structures. The undertaking would not alter, directly or indirectly, any of the characteristics

of the historic properties that qualify them for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

While impacts from climate change will continue to result in adverse effects to the park's historic properties, the actions within the undertaking itself, including increased efforts to stabilize, preserve, and document historic properties, would not have an adverse effect. Additional documentation of historic structures and archeological resources would serve to mitigate adverse effects from climate change.

As implementation occurs for the individual actions within this plan, the NPS would continue to conduct Section 106 compliance for undertakings and continue to consult with the Guam SHPO, the Advisory Council on Historic Preservation, Indigenous CHamoru organizations, and other consulting parties as necessary. As more precise designs are developed during implementation, the NPS would evaluate other cultural resources within the area of potential effects for these actions for eligibility to the National Register and will make assessments of effects to historic properties.

Visitor Use and Experience

AFFECTED ENVIRONMENT

Visitors to War in the Pacific National Historical Park come for a variety of reasons and typically fall into two broad categories. One category includes tourists, many coming from off-island, who are visiting the park to commemorate the significance of the sites in World War II. The other category of visitor consists of local community members, who rely on the park as a valuable open space for multiple types of recreation.

This affected environment section analyzes all types of visitor use within the planning area, both from off-island tourists and local residents. The analysis therefore includes tourism (including international tourism) and

local recreational opportunities, as well as general visitor use of the planning area.

The nature of visitor use and experience in the park is not expected to change in the foreseeable future. In general, visitors are expected to continue to visit the park for its historical significance, for recreational use, and for uses associated with traditional practices, as discussed under the Ethnographic Resources section. Climate change impacts may have a detrimental impact on visitor use and experience, in particular the loss of areas for commemoration and recreation due to coastal inundation.

Tourism

Prior to the global COVID-19 pandemic, Guam experienced record visitation. In December of 2018, the island set a monthly visitation record with a total of approximately 146,104 arrivals (GVB 2018a). Guam also set record annual visitation in 2019, with approximately 1,666,665 visitors (GVB 2019). This was part of an overall trend of expanding tourism. From the years 2000 to 2017, tourism increased 16%, from 1,286,087 to 1,545,392 visitors annually (GVB 2017).

However, tourism on Guam has not recovered to pre-pandemic levels (IMF 2021, GVB 2023b). Uneven recovery is expected to continue, despite a general increase in worldwide travel demand expected for 2023 (UNWTO 2023). Recent trends on Guam suggest tourism is still down almost 46% from pre-pandemic levels: in April 2023 the island received approximately 55,354 visitors, whereas it received approximately 120,000 visitors in April 2019 (GVB 2023b).

A shift in visitation by country post-pandemic has occurred as well. Prior to the pandemic, the island was visited predominantly by Japanese tourists. In 2013, almost 70% of all tourists came from Japan (GVB 2013a). However, Japanese tourism on the island has decreased over the last decade. In 2017, 40% of the tourists came from Japan and another 44% were from South Korea. Less than 5% of visitors were from the US. By December 2022, approximately 65% of tourists were from South Korea, with only 11% from Japan.

During this month another 13% of visitors came from the US, and the remainder were from other countries (GVB 2023).

Visitor Use Statistics

Visitor Center

The park collects visitor use data on tourism, via traffic counters and at the visitor center. During 2017, the park received approximately 50,354 visitors at the visitor center (NPS 2017). While the park visitor center is not located within any of the planning units, staff have observed that people who visit the visitor center typically spend time in the various units of the park as well. During fiscal year 2022 (October 1, 2021 to September 30, 2022), the visitor center recorded a total of 6,326 visitors. Approximately half of these visitors were from the continental United States. The second-largest group recorded at the visitor center were local residents: approximately 1,070 visitors. The third-largest group were visitors from South Korea (579), followed by Japan (240). Park visitation trends from Asian countries are similar to the statistics available from the Guam Visitors Bureau (GVB) for the entire island of Guam, as discussed above (GVB 2023a).

Planning Area via Traffic Counts

As noted above, the park collects visitor data at various locations with traffic counters.¹ During the year 2017, the park received 384,868 total visitors within all units (NPS 2017). Within the planning area, for the year 2017 there were 763 visitors at Apaca Point; 41,528 visitors at Asan Bay Overlook; 240,344 visitors at Asan Beach; 50,704 visitors recorded at Ga'an Point; and zero² recorded at Rizal Point (NPS 2017). During the year

2022, the park recorded a total number of 380,578 visitors (NPS Stats 2023). Within the planning area, for the year 2022 there were 29,670 visitors at Apaca Point; 47,458 visitors recorded at the Asan Bay Overlook; 276,204 visitors at Asan Beach; and 19,710 at Ga'an Point (NPS 2022). While tourism on the island is down from pre-pandemic levels, the stability of the park visitor counts can be attributed to regular use of the park by locals, particularly the Asan Beach Unit.

Recreation

The land within the planning area provides a very important recreational amenity to residents of Guam, where open green spaces are comparatively limited (NPS 1983). Guam's tropical setting allows for year-round recreational opportunities, and the Asan Beach Unit in particular is heavily used for walking, jogging, beach activities, family picnics, and other outdoor gatherings (DPR, Government of Guam 2019). The beach and adjacent reefs further provide kite-boarding, fishing, and snorkeling opportunities. The Agat Unit offers similar activities, including picnicking, fishing, food gathering on the reef, boat launching with traditional vessels, snorkeling, and scuba diving (DPR 2019; NPS 1983). Currently there are no formal public access opportunities within the Asan Inland and Mt. Alifan Units, although the Asan Bay Overlook at the top of Asan Inland provides a Memorial Wall honoring those lost in the World War II Battle of Guam.

The planning area is surrounded by several communities. As of 2020, the Agat Census Designated Place (CDP) had a population of 3,292 people, the Asan CDP had a population of 860 people, the Piti CDP had a population of 596, and the Santa Rita CDP had a population of 973 people. Given the small size of Guam, it's reasonable to expect that visitors to the units come from other parts of the island as well. Guam's total population was 153,836 as of 2020 (United States Census Bureau 2020b).

1 The use of this dataset to predict various visitor uses (e.g., type of use, length of visit, etc.) is limited. At Asan Beach Unit for example, the park has seen some vehicles use the entrance to turn around on Marine Corps Drive.

2 The last report for Rizal Point was taken in June of 2010. Since this area of the park is no longer accessible to visitors, the traffic count number reflects that it's no longer in use.

ENVIRONMENTAL CONSEQUENCES

Impacts from Alternative A: No-Action Alternative

Under the no-action alternative, local residents and tourists would continue to visit the park for commemorative as well as recreational visitor experiences. Visitation rates would continue to fluctuate due to natural disasters, public health emergencies, or global economic conditions, as well as other unforeseen situations. The uncertainty of future conditions and external influences would require the park to react to these events as they impact the visitor experience. Projected sea level rise and storm surge would continue to reduce the areas and facilities available for visitor use within the coastal units. Accessibility of visitor facilities would be adversely impacted by flooding, erosion, and storm damage under alternative A. Loss or damage of the park's World War II historic structures could reduce visitation to the coastal units; however, the invasion beaches that had such a pivotal influence on the war's Pacific Theater would remain a fundamental resource of the park and a key attraction for visitors.

Impacts from Alternative B: Preferred Alternative

Several actions under alternative B would result in long-term beneficial impacts to visitor use and experience. While visitor use is likely to be affected by climate change and associated coastal flooding, the preferred alternative identifies measures to minimize these impacts on the visitor's experience of the park and provide access to safe recreational opportunities and facilities for as long as possible. Under this alternative, the NPS would carry out a managed retreat from existing visitor facilities that are at risk of damage, while continuing opportunities for visitor use and recreation by relocating facilities to alternative sites, reconfiguring facilities for greater resilience to coastal flooding, and employing durable and resilient construction techniques and materials. Although facilities or areas of the park may need to close temporarily during construction activities, which has the potential to adversely affect the visitor experience, any facility closures would be communicated early and

proactively by the park, and adverse effects would be short-term.

Adaptive management strategies that address the combined impacts of visitor use and climate change would additionally result in long-term beneficial effects to visitor use. As described in appendix A, a monitoring protocol to document and respond to facility closures would result in proactive messaging and information about weather impacts and redirection of use to areas of the park where facilities are still open.

Alternative B also includes elements not related to climate change that would improve the visitor experience. The preferred alternative would provide an increased NPS presence within the coastal units by establishing a small open-air interpretive shelter at Asan Beach Unit and an interpretive kiosk at Rizal Point in the Agat Unit. A mobile visitor center, rotating between the coastal sites, could serve as a contact station for members of the public to interact with a ranger, resulting in long-term beneficial impacts to visitor use and experience. As part of alternative B, the park would additionally promote marine activities within the coastal units and improve access for those with disability-related access constraints.

The plan also includes proposed trail corridors for future interpretive trails through the inland units to help convey the reef-to-ridge experience of the 1944 battle (see figures 2.3 and 2.8). These trails would have beneficial impacts on visitor use and experience within the planning area, given the increased opportunity for recreation and expanded access into the inland units.

Conclusion

The actions in alternative A would not appreciably impact visitor use and experience within the planning area. Alternative B, because of its focus on maintaining visitor access to park resources, would result in long-term beneficial impacts to visitor use and experience.

Cumulative Impacts

Past and ongoing coastal flooding impacts and associated facility closures have had temporary adverse effects on visitor experience and recreational opportunities within the planning area. These effects are expected to continue and to intensify given projected climate futures. Neither alternative is expected to add appreciably to these adverse effects. Alternative B would result in cumulative beneficial effects over time, as the park would employ strategies to ensure visitor use opportunities for as long as possible in vulnerable areas within the four units.

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CONSULTATION AND COORDINATION





Asan Beach Unit, looking west along the shoreline to the offshore Japanese pillbox. Photo: NPS.

CHAPTER 4: CONSULTATION AND COORDINATION

Civic engagement and consultation efforts were ongoing throughout the process of preparing this unit management plan and environmental assessment (UMP/EA). Public involvement included news releases, public meetings, newsletter distribution, website postings, radio announcements, and social media posts. This chapter summarizes these civic engagement efforts and consultation with other agencies.

CIVIC ENGAGEMENT

The National Park Service (NPS) conducted civic engagement in summer 2022 to seek public comments, concerns, and ideas related to the unit management plan. This report summarizes all public comments received during the civic engagement period, which occurred between August 4 and September 30, 2022.

As part of civic engagement, the park hosted in-person meetings detailed in table 4.1. During the same week of the public meetings, the park also set up informational tables both in the morning and evening at Asan Beach to solicit input on the UMP. Park staff also had an informational table, with an opportunity for the public to ask and provide comments, at the CHamoru Village Wednesday Night Market on August 31, 2022. The planning team shared information with about 90 individuals or small groups as part of these informal tabling efforts.

The project home page on the NPS's Planning, Environment & Public Comment (PEPC) website (<https://parkplanning.nps.gov/wapaump>) provided information about the UMP, a copy of the civic engagement newsletter that was distributed during meetings and other engagements with the public, [an interactive online StoryMap](#), and an opportunity to provide comments directly into PEPC.

Table 4.1: Public Meetings

DATE AND TIME	LOCATION	ATTENDANCE
Monday, August 29, 2022 6:00 – 8:00 pm	Assan Mayor's Office	16
Tuesday, August 30, 2022 5:00 – 7:00 pm	Hågat Community Center	2
Wednesday, August 31, 2022 2:00 – 3:30 pm	Guam Museum, Hågatña	15

Summary of Civic Engagement Comments

The following summary incorporates both the oral comments from the public meetings and the written comments received by the NPS through PEPC, the project e-mail mailbox, and hard copy comment forms. The park received 11 unique comment letters. All comments received were reviewed and considered to inform the preparation of the plan.

INTERPRETATION AND EDUCATION

The NPS received approximately the same number of comments on interpretation and education as on visitor use and facilities (see "Visitor Use and Facilities" section below). One of the main themes reflected in the public comments is a desire for the park to include broader historical perspectives in interpretation. Several commenters noted that the NPS should focus on the natural and cultural histories of the park sites and the familial and cultural connections that community members have held to these resources over time, in addition to the story already told about World War II.

Commenters suggested interpreting additional perspectives, including Indigenous traditional knowledge; changes to the cultural landscape over time; and the stories of CHamoru, Japanese, and Filipino people with connections to the sites. One commenter asked that the NPS consider telling the story of the ancient CHamorus living in Assan, Piti, Sumai, and Hågat, including their relationship to the natural environment (such as plants and animals), cultural practices, life during the Spanish period, and life during the later American period leading up to World War II. The NPS was encouraged to focus interpretation on the local histories of CHamoru people who lived on park lands, rather than presenting a more generalized history of CHamoru culture. In addition, a commenter expressed the importance of explaining differences in cultural values when telling these different stories about World War II and periods of colonization.

The NPS was also asked to tell the story of the refugee camp that was located at Asan Beach Unit during the Vietnam War. One commenter suggested a need for the unmarked graves in the Asan Inland Unit to be commemorated. Other commenters expressed the importance of placing past conflicts in the context of what they mean for the future and highlighting the importance of peace.

There was also public interest in providing more interactive experiences, especially for school-aged children, to teach them about the park sites. A few commenters suggested that the NPS include more opportunities for youth involvement at the park units. Another commenter requested more interpretive opportunities in general. The NPS was also encouraged to continue providing community opportunities at the park for visitors with disabilities. Several commenters requested additional rangers at the park units, to provide more engagement with the public through tours and natural and cultural resource exhibits.

VISITOR USE AND FACILITIES

Climate Change Impacts on Facilities

The NPS received several comments focused on the need to prepare the park for climate change and sea level rise. Respondents offered a variety of comments on this topic. Some participants supported the idea of a living shoreline and promoting native plants to help minimize the impact of storm surge. Many commenters identified the need for improved drainage to reduce flooding, especially in the coastal units including Asan Beach. Flooding from past storms at Asan Beach was an issue mentioned by several individuals. A few participants emphasized the importance of protecting existing coral reefs as much as possible. One commenter suggested that NPS build a sea wall to protect the coastal units. Another commenter suggested that risks posed to facilities could be minimized by using haligui-type architecture for necessary structures in areas prone to flooding.

Visitor-Serving and Interpretive Facilities

A few commenters agreed with the NPS concepts to relocate the restrooms at Asan Beach and Ga'an Point to higher ground, as necessary, to address sea level rise and inundation. The NPS was asked to continue to provide restrooms in the more highly visited units, as they are considered an important community amenity.

Several commenters suggested that the NPS could improve maintenance at the park units, including more regular waste management and additional clean-up of lawns and picnic areas. A few commenters requested additional trash cans and recycling. Others emphasized the importance of continuing to provide benches, picnic facilities, and restrooms, even in the face of climate change impacts. Similarly, a commenter suggested the need for more benches and picnic tables at the Agat Unit. One commenter suggested that the NPS should provide camping opportunities at Asan Beach Unit.

A number of commenters suggested that the NPS should provide additional interpretive facilities, especially at the Asan Beach Unit.

One commenter would like to see the NPS build a small visitor center or visitor contact stations at Asan Beach. Another commenter had a similar request but did not specify the location within the park. Several other commenters supported the idea of providing a mobile visitor center or an open-air interpretive kiosk that could help to educate visitors about the park.

Flags and Monuments

Some members of the public requested that the NPS display the American flag more prominently on park grounds, specifically at the Asan Beach Unit, where a previous flag was recently removed. Another related comment suggested that the park could move the flags currently at Ga'an Point to higher ground on Rizal Point, if the flags are in danger of inundation from sea level rise.

A few people provided comments on the monuments along the shoreline at Asan Beach. One respondent noted the importance of protecting the monuments but did not express a preference for how they should be protected. Another commenter expressed concern regarding the lack of CHamoru monuments in the park. Another member of the public noted that the park's monuments should also commemorate the important role of the US Army in addition to the US Marines during the Battle of Guam.

Trails and Walkways

Trail use was an important topic for a number of commenters. Several respondents supported the NPS preliminary proposal for additional trail opportunities within the four park units. Those commenting on this subject expressed a need for additional safe walking and hiking opportunities on Guam, especially opportunities that offer a connection to nature and history. However, there was also some concern about how the new potential trail networks in the Asan Inland Unit of the park would impact those who live at adjacent residences.

One participant noted that it would be interesting to see what World War II resources could be experienced from trails in the Mt.

Alifan Unit, connecting to Hågat or Santa Rita. Another commenter supported the idea of adding a trail at Rizal Point and suggested providing lighting for safety. Another person suggested that the NPS increase the size of the existing walking trails at Ga'an Point and also provide lighting. One comment stressed the importance of accessible trails, particularly providing access to the beach and along the coastline for people using wheelchairs. The NPS was also encouraged to provide distance markers on the existing trails to help visitors understand how long it might take to reach key destinations. Several commenters requested that more lighting be installed at the units to enhance safety for those visiting the park and using walkways in the early morning and the evening.

Additional Comments on Facilities

A couple of commenters suggested that the NPS include a baseball field at Asan Beach Unit, to replace the baseball field that existed at Assan before it became a national park site. An additional two respondents asked whether food vendors could be permitted in the park units to attract additional visitors to the park, but one of these commenters wondered if there would be a negative impact to food vendors at other sites on the island.

Another commenter encouraged the park to achieve carbon neutrality, using available tools to achieve net zero emissions and pursuing carbon off-sets in the interim. The same commenter further suggested that NPS convert to renewable energy for all NPS energy use.

A few commenters urged the park to ensure that Congressional appropriations are available to fund the preliminary concepts described in the newsletter and also to provide for their long-term maintenance.

RESOURCE MANAGEMENT

Climate Change Impacts to Resources

Resource management includes both natural and cultural resources. The NPS received several comments on resource management, and many of these comments focused on

protecting the park's resources from the impacts of climate change. The climate change impacts discussed included sea level rise, changes in precipitation and storm intensity, loss of coral reefs, and the related adverse issues that would result, including flooding at the beach units and additional habitat loss.

Participants recommended that the NPS should integrate CHamoru traditional ecological knowledge into resource management to help mitigate the impacts of climate change. The NPS was also encouraged to return the Asan Beach Unit to its original pre-development condition to improve its resilience to climate change. The park was additionally asked to consider the character of the cultural landscape at Asan Beach at different periods in history and determine which period of time should be reflected in the experience of the landscape. This commenter noted that at one time Asan Beach was occupied by rice fields and homes.

One commenter supported the NPS preliminary proposal to replant coral reefs and suggested that the park include the local community in this process, including offering trainings on this topic. Another commenter emphasized that protecting biodiversity should continue to be a priority in NPS management.

Natural Resources

A few comments focused on natural resources and traditional uses. Some respondents suggested that the park also consider the importance of native animal species to ecosystem health and climate resilience and encouraged the NPS to address plant and animal symbiosis in the plan. A related comment suggested the park should have more monitoring of animal and plant life. One commenter expressed concern about natural resources, stating that the condition of flora and fauna within the park has deteriorated over time. Another related comment suggested the need to propagate and reintroduce native plant species throughout the four units included in the UMP.

One participant asked the NPS to plant more coconut trees along the shoreline at Asan Beach Unit to mitigate the loss of existing

coconut trees due to infestation from the coconut rhinoceros beetle.

One commenter requested that the park include traditional sustainable fishing at the beach units.

Cultural Resources

Those commenting on cultural resources emphasized the importance of preserving cultural resources including archeological resources, such as pottery and stone artifacts, and historic structures from World War II. Commenters expressed support for monitoring the sites to preserve their integrity. One respondent observed that it is extremely important and urgent for the NPS to preserve the tangible evidence of the World War II conflict, including historic fortifications along the shoreline that are threatened by rising sea levels and storm surge.

Submerged Resources

Some commenters expressed concern regarding underwater resources. Specifically, these respondents requested that the NPS provide a means to protect the submerged amtrac, or Landing Vehicle Tracked, at Asan Beach Unit and conduct necessary surveys of other underwater cultural resources. Another, similar comment expressed the need for the NPS to protect and preserve all underwater archeological resources. One commenter expressed concern about an underwater trail concept proposed during civic engagement, noting that it might have the potential to result in damage to underwater archeological resources. This commenter asked the NPS to consider whether a more formal interpretive program and well-defined underwater trails could reduce the risk of impact to submerged resources.

ENGAGEMENT WITH LOCAL COMMUNITIES AND LOCAL VILLAGE EXPERTS

Several commenters requested that local villages be given more input into the management of park resources and in telling the story of the park sites. Some respondents requested that the NPS

employ CHamoru elders with expertise in traditional knowledge and cultural practices to enhance interpretation and education for visitors. Suggested examples of additional interpretation include sharing traditional knowledge of habitats and ecosystems, using Indigenous place names, and demonstrating traditional practices such as fishing methods, use of medicinal plants, gathering of plants for food, and farming and ranching. Also, it was recommended that the NPS continue to reach out to the local villages and community centers at Hågat, Assan, Santa Rita, and Piti to keep people informed and to engage them in the planning process.

PUBLIC SAFETY

Several commenters expressed concern about public safety within the park units, especially at Asan Beach. Commenters expressed concern regarding both feral and off-leash dogs, crime, drug use, and a lack of law enforcement in the unit. A lack of lighting on the walking paths was a common concern as well. One commenter suggested that the NPS should install gates at the Asan Beach Unit to secure the area at night.

PRIVATE PROPERTY ISSUES

Some commenters were concerned about private property issues for residences located near the park, or for privately owned lands within the boundary of the Asan Inland Unit. Many of the comments submitted on this topic were about issues not related to the UMP, such as requests for private road upgrades and questions about permissible uses of private property.

AGENCY CONSULTATION AND COORDINATION

The following sections document the ongoing consultation and coordination efforts undertaken by the NPS during the preparation of this UMP/EA.

Section 106, National Historic Preservation Act

As described in chapter 3, the NPS is using the process and documentation required for the preparation of an environmental assessment to comply with Section 106 of the National Historic Preservation Act (36 CFR 800.8(c)I). To meet the requirements of Section 106 consultation, the NPS initiated early engagement with the Guam SHPO, the Advisory Council on Historic Preservation (ACHP), and other consulting parties. Historic preservation issues raised during the course of the planning process by the public and consulting parties were considered in the development of the alternatives and impact analysis. A meeting focused on identifying historic properties and integrating traditional knowledge into the UMP was held in April 2023 with the Guam SHPO, representatives of local agencies and organizations, and independent historians and cultural practitioners. See appendix G for a full list of consulting parties to date for the plan.

Electronic copies of this UMP/EA have been distributed to the Guam State Historic Preservation Office (SHPO), the Advisory Council on Historic Preservation (ACHP), and interested parties for review and comment related to compliance with Section 106. The NPS is proposing a finding of *no adverse effect* to historic properties from the decisions made in this plan.

CONSULTATION WITH THE GUAM STATE HISTORIC PRESERVATION OFFICE

In summer 2022, the NPS notified the Guam SHPO of the agency's intent to prepare the UMP/EA and invited participation by representatives of the SHPO. The SHPO initially responded and participated in a meeting focused on the plan in September 2022, and the park is currently still in consultation. During the public review period for this EA, the NPS will continue to consult with the SHPO to meet the remaining requirements of 36 CFR 800.

CONSULTATION WITH INDIGENOUS CHAMORU GROUPS

The park invited consultation with Indigenous CHamoru groups, neighboring villages and residents, historians, and cultural practitioners to inform the preferred alternative presented and analyzed in the plan. Consultation opportunities have been provided during civic engagement in summer 2022, during the April 2023 meeting focused on historic properties and traditional knowledge, and during the public review period for this plan and EA. Appendix G includes a list of CHamoru community leaders who participated as consulting parties.

Section 7, Endangered Species Act

Prior to civic engagement in 2022, the NPS notified the USFWS of the agency's intent to prepare the UMP/EA. In September 2023, the NPS initiated informal consultation with the US Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). During the public review period for this EA, additional consultation with the USFWS and NMFS will occur to affirm concurrence with the determinations of effect on listed or proposed species.

Coastal Zone Management Act

In summer 2022, the NPS notified the Guam Coastal Management Program of the agency's intent to prepare the UMP/EA. The park will be submitting a Federal Coastal Zone Consistency Determination to the Guam Coastal Management Program in advance of public review of the plan and EA.

Floodplain Management

NPS proposed actions that may adversely affect floodplains must comply with Executive Order 11988 and Director's Order #77-2: Floodplain Management, which requires the preparation of a Floodplain Statement of Findings if the action falls within the defined regulatory floodplain. The park's coastal units fall within the tsunami evacuation zone for Guam, which is considered a coastal high-hazard area (NPS 2002). See appendix E for the Floodplain Statement of Findings.

An aerial black and white photograph of a tropical landscape. A dirt road winds through a field of low-lying vegetation. Numerous people are visible walking along the road and standing in small groups. In the lower-left foreground, a group of people is gathered around a structure made of logs. To the right, there is a cluster of vehicles, including cars and trucks, with people nearby. The background features a dense line of palm trees and a beach with several small boats in the water.

APPENDICES



US reinforcements heading uphill from Asan Beach (through the present-day Asan Inland Unit). Photo: NARA.

APPENDIX A: INDICATORS, THRESHOLDS, AND MANAGEMENT STRATEGIES

INDICATORS AND THRESHOLDS

As described in chapter 2 under Adaptive Management for Visitor Use and Climate Change Impacts, indicators, thresholds, monitoring protocols, and management strategies would be implemented as part of the unit management plan in pursuit of achieving and/or maintaining desired conditions. These are described below and would be applied to potential action alternatives in the plan. Indicators measure conditions that are related to visitor use, and monitoring is conducted to track those conditions over time. Thresholds represent the minimum acceptable condition for each indicator and were established by considering desired conditions, data on existing conditions, relevant research studies, and the professional judgment of staff.

The interdisciplinary planning team considered the central issues driving the need for the plan and developed related indicators that would help identify when the level of impact becomes cause for concern and management action may be needed. Given the direct relationship between climate change and visitor opportunities in the park, the NPS has taken an integrated approach to prioritize which resources and visitor experiences are likely to be the most sensitive to impacts from visitor use and climate change. In addition to the phase-based adaptive management approach described in alternative B, the indicators described below were considered the most critical, given the importance and vulnerability of the resource or visitor experience.

The following indicators have been selected for monitoring at the Asan Beach, Asan Inland, Agat, and Mt. Alifan Units:

- Number of times per year a visitor facility needs to close due to flooding, storm damage, wildfire, or other natural impacts.
- Incidences of human-caused damage to cultural resources.

In identifying high-priority indicators, the park also considered the potential future need for an indicator related to trail and adjacent resource conditions, in view of the proposed trail additions within the inland units. Because alignments for trails have not yet been identified (except the trail to Tony's Falls), trail-specific indicators would need to be developed as part of implementation-level design and planning.

The following pages outline associated thresholds, rationale, monitoring, and management strategies for each indicator. Not all strategies related to the indicators and thresholds would be implemented upon completion of the unit management plan, rather some would be implemented as thresholds are approached or exceeded. At this time, these have all been identified as adaptive management actions. The impact analysis for all strategies would be included as needed in future environmental compliance documents for the applicable future planning effort so that the park could employ actions necessary to achieve desired conditions.

Indicator

Number of times per year a visitor facility needs to close due to flooding, storm damage, wildfire, or other natural impacts.

THRESHOLD¹

- Parking lots, walkways, and picnic areas: no more than five times per year.
- Restrooms: no more than two times per year.

¹ Note that the visitor center isn't included in the list of sites monitored, because it is outside of the planning area. Thresholds for closure of the visitor center due to natural impacts would be lower than for other facilities because the visitor center also houses the park's museum collections.

RATIONALE

Desired conditions for the planning area (see chapter 2) describe facilities that are resilient to climate change and other environmental impacts, as well as accessible and welcoming for visitors. Monitoring of this indicator ensures that the park is continuing to support a high-quality visitor experience within the four units in the context of a dynamic environment. This indicator is highly relevant to the purpose and need of the unit management plan because it integrates visitor use and climate change impacts. It is sensitive to change and would alert managers when action is required.

MONITORING

The park typically receives notifications from staff members or visitors when a facility closes and would compile these closures and their frequency in a logbook that would be evaluated regularly.

ADAPTIVE MANAGEMENT STRATEGIES

- Increase messaging and information about weather impacts and closures using the park's website, social media, radio announcements, and other methods.
- Redirect use to alternative areas of the park where facilities are still open.
- In the long term, remove or relocate facilities to more resilient locations, as described under alternative B (see chapter 2).

Indicator

Incidences of human-caused damage to cultural resources.

THRESHOLD

- Graffiti: no more than two incidents per year.
- Removal of historic objects: no more than one incident per year.

RATIONALE

The park's cultural resources, including historic fortifications and defensive features, all contribute to the World War II battlefield landscape that is identified as a fundamental

resource of the park (NPS 2017). Desired conditions for the planning area describe a visitor experience of being immersed in the historic landscape and understanding the significance of the park sites through this power of place. Human-caused damage to National Register-listed historic properties and other cultural resources negatively impacts the experience of all park visitors, in addition to the resources the park is mandated to protect. Monitoring would be prioritized for areas receiving the most visitation but would occur on a rotating schedule for all units in the planning area.

MONITORING

Park maintenance staff are regularly on site in areas receiving visitor traffic and would monitor the condition of historic structures, archeological sites, and tangible artifacts that could be easily accessed. Visitors could also report damage. Incidents would be recorded in a logbook that would be evaluated regularly. In addition, park cultural resources staff conduct annual condition assessments of all the historic fortifications within the units on a rotating schedule, which would provide the opportunity to record any incidences of human-caused damage.

ADAPTIVE MANAGEMENT STRATEGIES

- Incidences of damage will be reported to law enforcement personnel for response, per *NPS Management Policies 2006*.
- If appropriate, law enforcement personnel may close areas of the park, depending on the significance of the damage.
- Graffiti would be removed from historic structures following approved methods.
- Increase messaging and communications about the importance of resource protection, historic preservation, and Leave No Trace principles. This could occur through additional signage, online communications such as the park website and social media, and interpretive programming or other park events.
- Promote regular community volunteer groups and junior ranger programs to instill stewardship and keep "eyes on the park."

APPENDIX B: ALTERNATIVES AND ACTIONS CONSIDERED BUT DISMISSED

The Council on Environmental Quality (CEQ) guidelines for implementing NEPA require federal agencies to analyze all “reasonable” alternatives that substantially meet the purpose and need for the proposed action. Under NEPA, an alternative or alternative element may be eliminated from detailed study for the following reasons:

- Technical or economic infeasibility;
- Inability to meet project objectives or resolve need for the project;
- Duplication of other less environmentally damaging alternatives;
- Conflicts with an up-to-date valid plan, statement of purpose and significance, or other policy; and therefore, would require a major change in that plan or policy to implement; and
- Environmental impacts too great (40 Code of Federal Regulations [CFR] 1504.14(a)).

The planning team considered other potential actions, including those identified through civic engagement, that were determined infeasible and/or not responsive to the purpose and need for action. These actions and the rationale for not carrying them forward for further analysis are summarized below.

NEW VISITOR CENTER WITHIN THE PLANNING AREA

The development of a new visitor center or visitor contact station within the four park units was considered during the unit management planning process. The park’s current T. Stell Newman visitor center is leased from the Navy and located in Santa Rita, approximately 4.5 miles south of the Asan units and 3 miles north of Agat and Mt. Alifan. During civic engagement in August 2022, several members of the public encouraged the NPS to provide a formal visitor contact facility with an onsite ranger

within the park units. Many suggested that this be located at the Asan Beach Unit.

The planning team understands the importance of enhancing interpretation and the NPS presence within the park, especially at Asan Beach. However, building a new facility within the coastal zone of Asan Beach would not be feasible or sustainable in the long term due to projected sea level rise and other coastal hazards such as storm surge and typhoons. In addition, the construction of a new building within the cultural landscape of the invasion beach would have an adverse effect on the spatial organization and historic viewsheds of the site, both character-defining features of the World War II battlefield (NPS 2021). Locations within the other three units of the planning area are similarly constrained by coastal hazards in the case of Agat, or development challenges posed by steep and rugged terrain and lack of public access in the case of the inland units. As with Asan Beach, facility development opportunities in the other three units would also be restricted by the need to preserve character-defining features of the cultural landscape and protect other cultural and natural resources.

Therefore, a new visitor center or visitor contact station within one of the four units was dismissed from further consideration. Instead, alternative B of the UMP proposes a mobile visitor center with a ranger that would be stationed at Asan Beach and the other coastal park sites on a rotating schedule. Together with the small open-air interpretive shelters included in alternative B, the mobile visitor center helps meet the goals of the [NPS Visitor Center Futures project](#), which is reimagining how can parks can deliver essential visitor functions and meet contemporary needs and audiences. If in the future the park needs to revisit the location and/or configuration of the current visitor center, it would be undertaken as a separate project and would evaluate alternative sites within the park or on the island.

INSTALLATION OF A SECURITY GATE AT ASAN BEACH UNIT

Several people requested that the NPS install a security gate at Asan Beach Unit during civic engagement for the plan in August 2022. Those proposing a gate suggested that it be locked at night to prevent illegal activities. The planning team considered incorporating a gate into the site design for Asan Beach Unit but dismissed this idea from further consideration. This is due to the operational challenges faced by the park several years ago when a security gate was installed at Asan Bay Overlook. Additionally, closing the gate at night would reduce current visitor access opportunities. Asan Beach Unit receives heavy visitation before dawn, from recreational visitors exercising before the heat of the day, and after sunset with use from people picnicking as well as exercising.

REPLACEMENT OF BASEBALL FIELD AT ASAN BEACH UNIT

The suggestion to replace the Asan Point baseball field was raised during civic engagement. Replacing the Asan Beach baseball field would not be compatible with the cultural landscape's period of significance, which is 1941 to 1945, marking the beginning and end of World War II in the Pacific. In addition, providing a new baseball field would not respond to the purpose and need for the UMP, nor does it align with the park purpose and significance as articulated in the park's [foundation document](#). Lastly, the [Superintendent's Compendium](#) for the park states that the entire park is closed to the playing of sporting activities by teams in organized sports leagues to protect resources, ensure visitor safety, and not impede the peace, tranquility, and commemorative nature of the park. Therefore, this idea was dismissed from further consideration.

FOOD VENDING AND CAMPING OPPORTUNITIES AT ASAN BEACH UNIT

Additional visitor-serving opportunities at Asan Beach were suggested during civic engagement in 2022. In particular, a small

number of commenters recommended that the NPS consider allowing food vendors and camping at Asan Beach Unit. Food vending and camping at national parks typically fall under the category of commercial visitor services. NPS *Management Policies 2006* offers guidance to ensure that commercial services are necessary and appropriate, financially viable, and addressed in an approved management plan. According to *Management Policies 2006*, a decision to authorize a park concession will among other factors be based on a determination that the facility or service is consistent with the park's enabling legislation, complementary to a park's mission and visitor service objectives, necessary and appropriate for the public use and enjoyment of the park in which it is located, and is not, and cannot be, provided outside park boundaries.

Food vending and camping fall into a category of commercial service that is not consistent with the purpose of the park as described in the enabling legislation to "commemorate the bravery and sacrifices of those participating in the campaigns of the Pacific Theater of World War II and to conserve and interpret the outstanding natural, scenic, and historic values and objects on the island of Guam." In addition, camping is prohibited in all areas of the park in the Superintendent's Compendium, to protect government equipment, protect the public water supply, and to protect the public from hazards. While the park could potentially host traditional food preparation activities associated with a special event, through a special use permit, food vending would not be consistent with NPS policy. Therefore, these ideas have been dismissed from further consideration.

SEAWALL TO PROTECT COASTAL UNITS

Many of the park's most significant planning challenges relate to threats posed by sea level rise and storm surge. See the Planning Challenges and Opportunities section of chapter 1, as well as appendix E for more detail.

The planning team considered a variety of approaches to protect the coastline of the historically significant invasion beaches, including both “hard” and “soft” engineering solutions for coastal protection. “Hard” infrastructure solutions include engineered structures such as seawalls, levees, and breakwaters. “Soft” solutions rely on natural defenses for protection, such as coral reefs, native strand vegetation along the shoreline, and mangroves at the mouth of river drainages. Although seawalls can be a method to reduce flooding and storm damage, they are costly to construct and can cause increased coastal erosion and other damage to ecosystems, exacerbating coastal hazards in the long term. A seawall constructed along the Asan and Agat invasion beaches would additionally pose an adverse effect to the historic viewsheds along the beaches, which are listed in the National Register of Historic Places (NRHP). As a result, the NPS has instead identified a suite of natural defenses in alternative B to increase resilience to coastal inundation, allowing natural systems to continue unimpeded to the greatest extent possible.

MOVING WORLD WAR II FORTIFICATIONS INLAND

As part of the planning process, the NPS considered relocating the World War II defensive structures that are located along the shoreline in the coastal units of the park. These fortifications are at risk of damage or inundation due to sea level rise, storm surge, and other coastal weathering. As described in the Cultural Resources section of chapter 3, the fortifications were intentionally integrated into the rocky outcroppings on which they were built. Their strategic importance to the Japanese military is still visible in their location at the water’s edge, which allowed the defense of the landing beaches and made it possible for the structures to be well-camouflaged. Many of the defenses also consist of natural or modified caves connected to the concrete fortifications.

The relocation of these fortifications would therefore damage their integrity, both

through damaging the structures themselves and through changing their location and arrangement along the shoreline, which are character-defining features of the World War II battlefield. This would result in an adverse effect to these historic properties under Section 106 of the National Historic Preservation Act. Instead, the preferred alternative focuses on a rigorous monitoring, stabilization, and documentation program that would prioritize management activities for the defensive structures most at risk. Documentation of structures through the HABS/HAER/HALS program and 3-D virtual modeling would ensure that information about the structures at highest risk of loss would be preserved and that their arrangement along the coast could still be shared with visitors.

COMMEMORATION OF UNMARKED JAPANESE GRAVES IN ASAN INLAND UNIT

During civic engagement, the NPS was encouraged to memorialize unmarked Japanese graves from World War II as part of the planning concepts proposed for the Asan Inland Unit. Currently the location of these graves is unknown, although the park is working closely with the Defense POW/MIA Accounting Agency (DPAA) and the Japan Association for Recovery and Repatriation of War Casualties (JARRWC) to locate and recover Japanese graves and remains within the park. If a mass burial location were to be discovered within the unit, decisions about how best to commemorate the site would need to be determined in collaboration with the Government of Guam, including the Guam State Historic Preservation Office (SHPO), and other park partners. This action is therefore not analyzed as part of the alternatives in the UMP, although it could be compatible with both alternative A and B if discoveries were to occur in the future.

APPENDIX C: IMPACT TOPICS CONSIDERED BUT NOT CARRIED FORWARD FOR DETAILED ANALYSIS

The NPS followed the criteria from the *National Park Service NEPA Handbook* (NPS 2015) to identify issues to analyze in detail in the environmental assessment. In the context of NEPA reviews, “issues” or “environmental issues” can be problems, concerns, conflicts, obstacles, or benefits that would result if the proposed action or alternatives, including the no-action alternative, are implemented (NPS 2015, 50–51). The handbook identifies the following criteria to determine whether an issue should be considered:

As a general rule, issues should be retained for consideration and discussed in detail if:

- the environmental impacts associated with the issue are central to the proposal or of critical importance;
- a detailed analysis of environmental impacts related to the issue is necessary to make a reasoned choice between alternatives;
- the environmental impacts associated with the issue are a big point of contention among the public or other agencies; or
- there are potentially significant impacts to resources associated with the issue (NPS 2015, 51).

Issues retained for analysis are described in Chapter 3: Affected Environment and Environmental Consequences. The following issues were dismissed from further analysis because they would not trigger any of the criteria described above.

WATER QUALITY

Several of the park’s streams likely receive pollutants, mainly from non-point-source processes, runoff from agricultural areas, and animals (e.g., wild pigs). They are also exposed to elevated levels of turbidity, especially during storms.

The National Park Service Pacific Islands Inventory and Monitoring Network (I&M) conducts stream surveys in the Asan Inland Unit and coral reef surveys offshore at the Asan Beach and Agat Units. Water quality data is collected using sondes for temperature, conductivity, turbidity, and nutrients. The data suggests that the Saddok Assan and Ñāmu (Asan and Namo Rivers) likely receive pollutants because of their proximity to agricultural, commercial, or residential development; well-traveled highways; and/or their exposure to wildfires that produce debris and expose sediment that can enter streams during storms, thus increasing turbidity. A flood control structure on the Saddok Ñāmu that drains an adjacent wetland likely promotes turbidity within the stream as well. Similarly, stream channelization on both rivers also promotes increased turbidity. Litter and debris are often present in both streams (Donaldson et al., 2017).

The plan would not create any new roads or additional stormwater runoff. Drainage and stormwater infiltration along roads, walkways, and near parking areas would be improved by using pervious surfaces where possible and creating bioswales. These features would have minor long-term beneficial impacts to water quality. Measures listed in appendix D would be implemented to minimize short-term adverse impacts to water quality from site-specific construction of trails, facilities, and other actions listed in chapter 2. The preferred alternative would not result in appreciable impacts to water quality; therefore, water quality is dismissed from further analysis.

WETLANDS

Approximately 6 acres (2 hectares) of freshwater forested/scrub wetlands are located within the lower (northern) portion of the Asan Inland Unit and extend along the Saddok Assan to its mouth in the Asan Beach Unit. Two small freshwater/emergent wetlands

(less than 1 acre [0.4 hectares]) are located within this forested/scrub wetland delineation (USFWS 2023a).

Approximately 3.92 acres (1.59 hectares) of freshwater forested/shrub wetland are located within the Agat Unit, near Apaca Point. This area is within the Namo River floodplain wetland, which is designated by the Guam Coastal Management Program and included within the United Nations Protected Area Program (Donaldson et al. 2017, 57). Although the USFWS National Wetlands Inventory does not identify wetlands in the Mt. Alifan Unit (USFWS 2023b), the park's draft natural resources condition assessment indicates that palustrine forested wetland is found along part of the eastern boundary of the unit, connected to an unnamed stream (Donaldson et al. 2017, 57).

For all coastal units in the plan, naturally occurring wetland areas would be enhanced and expanded to absorb additional overland flows. Native mangrove vegetation would be planted along river outfalls to help protect the shoreline and enhance wetland habitat. These actions would result in long-term beneficial impacts to wetlands.

All associated activities within the footprint of identified wetlands (USFWS 2023a, b) would be required to follow best management practices and mitigation measures outlined in appendix D. Prior to any disturbance to existing wetlands, the park would 1) consult with the NPS Water Resources Division to further investigate and map the extent of the wetlands and conduct necessary wetland compliance, and 2) design facilities that minimize all potential impacts to wetlands, including siting trails, pathways, and other infrastructure to avoid wetland areas. These measures would also apply to any other wetlands identified in the planning area and would minimize potential adverse impacts to wetlands during the implementation of project-specific elements of the plan. The proposed action would therefore have comparatively minor impacts on wetlands within the planning area, and these impacts are expected to be beneficial. As a result,

wetlands are dismissed from detailed consideration.

VEGETATION

The vegetation in the planning area is varied in distribution and composed of a complex assortment of plant communities. Plant communities are described in further detail below.

Asan Beach Unit: Vegetation in this unit consists of developed land, mainly lawn with coconut palms (*Cocos nucifera*) maintained as a recreational area, mixed grass-wooded coastal strand, and tangantangan (*Leucaena leucocephala*) semi-natural shrubland. Assan Ridge vegetation includes established limestone forest species and is being managed to restore a limestone forest habitat on the karst substrate.

Asan Inland Unit: The plant communities within this unit are more complex and include mixed savanna-herbaceous woodland, palma brava (*Heterospatha elata*) agat, and tangantangan semi-natural scrubland. There is also some developed land present, belonging to private inholdings within the park boundary.

Agat Unit: Plant communities in this unit include pago (*Hibiscus* spp.) mixed grass and woodland, coastal strand vegetation, and Australian beardgrass (Caucasian bluestem [*Bothriochloa bladhii*]) or Inifuk lawn (pilipiliula [*Chrysopogon aciculatus*]), an invasive weed).

Mt. Alifan Unit: This unit is dominated by mixed savanna herbaceous vegetation, mana (savanna fern [*Dicranopteris linearis*]) herbaceous vegetation, and karriso (wetland reed [*Phragmites* spp.]) herbaceous vegetation.

The UMP would enhance vegetation in the park by proposing revegetation of native strand and riparian vegetation in the coastal units (Asan Beach and Agat) as well as increased protection and enhancement of native plant communities in the inland units (Asan Inland and Mt. Alifan). Ongoing efforts to control invasive plant species would

continue under the no-action and action alternatives. Chapter 3 analyzes in detail the impacts to threatened and endangered plant species and nonnative invasive plant species management, which are of central importance to the proposed action. As a result, vegetation in general is dismissed from further consideration.

NIGHT SKY

Given that the park is located adjacent to several developed communities, light intrusion occurs in all the units of the planning area. This light intrusion affects the night sky. However, the night sky conditions remain good enough for the park to hold stargazing events with the public at the Asan Beach Unit and Asan Bay Overlook in Asan Inland Unit. Most of the visitor use in the park occurs between the early morning and the evening, although the park currently has minimal lighting. The addition of any new lighting associated with the preferred alternative would follow best practices for the installation of lights, as outlined in appendix D. Impacts from lightning on wildlife species, such as endangered sea turtles (haggan betde [*Chelonia mydas*], haggan karai [*Eretmochelys imbricata brissa*]) and the fanihi (Mariana fruit bat [*Pteropus mariannus mariannus*]), are discussed in more detail under the Threatened and Endangered Species section in chapter 3. Night Sky in general is dismissed from further consideration.

PUBLIC HEALTH AND SAFETY

During civic engagement for the unit management plan, several community members expressed concerns about health and safety issues at the park, specifically at Asan Beach. Risks and issues identified include:

- Stray dogs;
- People experiencing homelessness and associated short-term overnight stays;
- Petty crime (breaking into cars, theft of park property);
- Vandalism (destruction of park property, graffiti, etc.);

- Excess harvesting of resources (fish, breadfruit);
- Starting ground fires in the park;
- Public nudity;
- Vehicles not following speed limit signs;
- Illegal dumping of trash, animals, and furniture

Park staff would continue to utilize law enforcement and park ranger presence to address these issues, as staff capacity and resources allow. The proposed action includes provisions to increase public safety through infrastructure improvements, such as increased lighting on walking trails. However, most of these issues are addressed through day-to-day operational activities and would need to be dealt with by park staff, as appropriate. These issues are therefore outside of the purpose and need of the project. Thus, they are dismissed from further analysis.

Another important component of public health and safety at the park is tsunami risk. The National Oceanic and Atmospheric Administration (NOAA) has identified that all of the Asan Beach Unit and parts of the Asan Inland Unit (near the Saddok Matgue) are located within a tsunami hazard zone (NOAA 2023c). Furthermore, the map identifies that all of the Agat Unit is located within the tsunami hazard zone. The plan would not impact public safety risk from a tsunami. All existing exit routes for all locations of the planning area that are located within the tsunami hazard zone would remain open regardless of the plan's implementation. See Appendix E: Floodplain Statement of Findings for additional information about tsunami risk and other coastal hazards.

ENVIRONMENTAL JUSTICE COMMUNITIES

Federal agencies must consider environmental justice in their activities under NEPA, per Executive Order 12898 (February 1994), "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." The executive order directs each federal agency to "make achieving

environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.”

On November 22, 2022, the CEQ released Version 1.0 of the Climate and Economic Justice Screening Tool (CEJST) to further assist in this analysis. The purpose of the tool is to highlight overburdened and underserved census tracts and to identify those that meet the threshold for at least one category of burden. Disadvantaged communities are census tracts that are either:

- at or above the threshold for one or more environmental, climate, or other burdens, and/or
- at or above the threshold for an associated socioeconomic burden.

In addition, a census tract that is completely surrounded by disadvantaged communities and is at or above the 50th percentile for low income is also considered disadvantaged.

Two communities have been located by the CEQ CEJST map as adjacent to the planning area. Tract # 66010954800 is located south of the Agat Unit. Tract # 66010953500 is located northeast of the Asan units. Both have been identified as experiencing economic burdens. Tract # 66010954800 has been identified as experiencing burden for low-medium income, unemployment, poverty, and percent of high school degrees. Tract # 66010953500 has been identified as experiencing burden for exceeding the threshold for low-median income and percent of high school degrees (CEQ CEJST, 2022b).

Research has shown that access to green space for disadvantaged populations can promote several indicators of well-being and mental health (Wolch et al. 2014). On Guam, according to the Department of Land Management (DLM), Government of Guam, 32 percent of land is owned by the US government (mostly for military purposes), another approximately 50 percent is in private

ownership, and another 20 percent is owned by the Government of Guam. Some land is held by local land trusts (DLM 2015).

Asan Beach provides a valuable open space for surrounding communities (DPR 2019). Thus, the park plays an important role in providing recreational opportunities for the community. Specifically, the Asan Beach Unit’s grass fields and beach areas, beach access, and paved pathways for walking and running provide recreational opportunities for residents both adjacent to the unit and farther away from the planning area. The proposed project would preserve existing recreational and green space access and/or use within the planning area, as climate change factors, such as sea level rise, threaten existing recreational opportunities and associated facilities and amenities. The plan would not have any direct impacts to the communities identified by the CEQ CEJST, referenced above. Therefore, environmental justice communities are dismissed from further analysis.

APPENDIX D: BEST MANAGEMENT PRACTICES AND MITIGATION MEASURES

Please note: This list is not final, and all site-specific proposals would be subject to further mitigation measures as additional compliance is conducted for implementation-level projects.

The following conservation measures can be adapted for site-specific and project-specific use to minimize the potential for a project to adversely affect cultural and natural resources. As actions in the plan are implemented, the best management practices (BMPs) listed below would be supplemented by additional site-specific BMPs and mitigation measures necessary under individual project review and related compliance.

WATER QUALITY

- During construction, soil erosion would be minimized by limiting the time soil is left exposed and by applying other erosion control measures such as erosion matting, silt fencing, and sedimentation basins in construction areas to reduce erosion, surface scouring, and discharge to water bodies.
- Fueling of land-based vehicles and equipment would take place at least 50 feet (approximately 15 meters) away from the water, preferably over an impervious surface. Fueling of the vessels would be done at approved fueling facilities. Appropriate materials to contain and clean potential spills would be stored at the work site and be readily available.
- An oil spill pollution prevention plan and/or contingencies to avoid and clean up potential spills would be developed for the project. Discharges of chemicals and other fluids dissimilar from seawater would be prevented from entering the water column through the implementation of these strategies.
- Absorbent pads would be stored on the vessel to facilitate the clean-up of accidental petroleum releases.

- All equipment and materials would be examined and rinsed with fresh water prior to use in marine waters to ensure no organisms are being introduced. Any equipment that enters the water would be clean and free of pollutants, including aquatic invasive species.
- All trash would be disposed of on land in dedicated trash receptacles. No trash would be allowed to enter the water.
- Only reef-safe sunscreen would be used by site personnel.

WETLANDS

- The park shall consult with the NPS Water Resources Division to further investigate and map the extent of the wetlands and conduct necessary wetland compliance prior to any wetland disturbance.
- Facilities such as trails and pathways would be sited to avoid wetland areas to the greatest extent possible.
- If a trail crosses a wetland, the trail would be designed to minimize all potential impacts to wetlands, for example certain materials would be used based on recommendations in the wetland statement of findings.

VEGETATION

- The park would monitor areas used by visitors (such as trails) for signs of native vegetation disturbance and use public education, revegetation of disturbed areas with native plants, erosion control measures, and barriers to control potential impacts on plants from erosion or social trails.
- The park would designate river and stream access/crossing points and use barriers and closures to prevent trampling and loss of riparian vegetation.

- Revegetation plans would be developed for disturbed areas and require the use of genetically appropriate native species. Revegetation plans should specify species to be used, seed/plant source, seed/plant mixes, site-specific restoration conditions, soil preparation, erosion control, ongoing maintenance and monitoring requirements, etc.; salvaged vegetation should be used to the extent possible.
- Revegetation efforts would reconstruct the natural spacing, abundance, and diversity of native plant species in the trail corridor to the extent feasible. Monitoring of revegetated areas following construction would be conducted to ensure successful revegetation, maintain plantings, and replace plants that do not survive.
- The park would investigate and/or conduct surveys for rare plants prior to any ground-disturbing activities. To the greatest extent possible, disturbance to rare or unique vegetation would be avoided. See the Threatened and Endangered Species section below for additional detail.

NIGHT SKY/LIGHTING

Any decisions about lighting in the park would be guided by the NPS [Sustainable Outdoor Lighting Principles](#). In addition, the following lighting specifications would be followed for any proposed new lighting:

- *No Lighting at All:* The park would first consider whether a light is truly necessary for the area or structure/facility. In many cases, reflective tape or other reflective surfaces can be used instead. This is a good option for roadways, parking lots, parking garages, and trails where people would have headlamps, flashlights, and cell phones lights.
- *LEDs in Warm Colors:* For areas that need lighting, the park would use energy-efficient LEDs that have a warm color hue, e.g., yellow and amber instead of blue or white. The target color temperature should be 2700k or below (2700 degrees on the Kelvin scale), with 2200k or below for the most sensitive environments. The highest efficiency LEDs are not preferable because they have a large proportion of blue light, which creates more glare and blind spots, has potential health effects, and isn't considered wildlife-friendly.
- *Recessed and Fully Shielded:* Hockey puck-style lights that would be inserted under a soffit or other architectural features where appropriate. The park would avoid globes or diffusers that hang below the light fixture and would use "full cut off" shielding, which allows excess light to be directed downward and not upward.
- *No Upward-Facing Lights:* Outdoor lighting would be designed and installed to be downward-facing (e.g., park signs and flags often have upward-facing lighting that can be easily made to point downward). The park would also avoid lights that are directed laterally.
- *Fixtures that Include or can Accommodate Timers, Motion Detectors, Hue Adapters, and Dimmers:* The park would use these adaptive technologies to increase energy efficiency and substantially reduce impacts to park natural and cultural resources.
- *Lowest Lumens Possible:* Lumens are the unit of measurement used to specify the intensity or brightness of LED bulbs. The number of lumens needed to safely light an area would be minimized, especially outdoors. LEDs are brighter and more energy-efficient than other types of lighting, so a lower-wattage LED could be used for the same level of brightness. Field-adjustable wattage selectors would be used where appropriate to reduce impacts, increase cost savings, and extend product life.
- *Proper Installation:* Lights would be installed with proper angle and height as designed. LED luminaires allow for very specific control of the beam spread. The size of the lighted area would change depending on the height of the fixture or pole, so the beam spread should be accounted for during installation to avoid lighting a greater area than needed. Proper installation and spread

angle would reduce the number of lights needed in general.

- *Minimize Lighting Impacts to Fanihi:* The park would minimize nighttime lighting in forested areas, and direct temporary lighting away from forest habitat. When installing new or replacing existing permanent lights, the park would use downward-facing, full cut-off lens lights (with the lowest lumens necessary). The park would fully shield all outdoor lights so the bulb can only be seen from below bulb height and only use the lights when necessary. The park would install automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area. When activities must be conducted in forested areas where bats may be roosting or foraging, the park would use red light-filtered flashlights and headlamps.
- *Minimize Lighting Impacts to Sea Turtles:* Nighttime work would be avoided during the nesting and hatching season, which is year-round. The park would minimize the use of lighting and shield all project-related lights so the light is not visible from the shoreline. If lights can't be fully shielded or if headlights must be used, the light source would be fully enclosed with light-filtering tape or filters to use warmer frequencies (red light). The park would incorporate design measures into the operation of buildings adjacent to the beach to prevent ambient outdoor lighting from reaching the shoreline, such as tinting or using automatic window shades for exterior windows that face the beach and reducing the height of exterior lighting to below 3 feet (approximately 1 meter) and pointed downward or away from the beach. In order to minimize light intensity, the park would use low-pressure sodium 18 watts, 35 watts, and lighting sources that produce light of 580 nanometers or longer. When possible, the park would include timers and motion sensors.

INVASIVE AND NONNATIVE SPECIES MANAGEMENT

- A biosecurity plan would be developed before projects are implemented to avoid introduction or spread of new invasive plant or animal species to or from the site.
- All observations of nonnative species of concern (e.g., rodents, snakes, coconut rhinoceros beetles [*Oryctes rhinoceros*], little fire ants, and predatory flatworms) would be reported to the Guam Department of Agriculture and USFWS.
- Recently disturbed areas (e.g., construction sites) would be surveyed for new priority invasive species. If new invasive species are detected, they would be treated immediately.
- Materials, tools, and machinery would be inspected by a trained biologist for signs of flatworm, rodent, or snake activity, and additional biosecurity risks, such as seeds, prior to use of equipment on the project site.
- Staff, contractors, and volunteers would be trained to inspect for seeds, seed heads, plant material, soil, and mud.
- Each personnel entering the project site would come with clean field clothing and footwear, thoroughly cleaned of all potential seeds or spores. Soles of shoes would be sprayed with a diluted bleach solution and scrubbed with a brush prior to entering the site. Any personnel entering the project site from another project site in the same day, where clothing has been subjected to potential biosecurity risks, would maintain a separate set of clean field clothing to use for the project site.
- To the greatest extent possible, equipment would remain on site for the duration of the project to minimize contamination from other sites.
- Prior to entering an uninfested area, vehicle and equipment undercarriages and tires would be washed.
- The park would refer to an inspection checklist to ensure comprehensive inspection.

- Areas where tools, equipment, and vehicles are stored would be inspected for invasive plants. These facilities would be maintained weed-free.
- Staff, contractors, and volunteers would ensure that rental equipment is free of invasive plant material before accepting it.
- The park would procure appropriate equipment for inspections, such as flashlights, portable lighting if night-time inspections are necessary, and under-vehicle mirrors.
- The park would consider the extent of infestation at worksites. Typically, not all areas are infested to the same degree with the same plants, and this may affect the type and degree of inspection needed.
- A weed-free source for project materials would be used when available, including for erosion control and soil stabilization.
- To prevent the spread of the coconut rhinoceros beetle, green waste or soil would not be transported except to designated waste sites. Designated green waste disposal sites would be managed with coconut rhinoceros beetle traps.
 - If green waste is found to be infested, trapping would be used to prevent them from spreading and damaging palm trees.
 - A gill net with a 1-inch mesh measured knot to knot, made from 0.25-mm nylon monofilament, would be laid over piles of green waste.
- Cleaning areas for tools, equipment, and vehicles would be designated. Tools, equipment, and vehicles should be cleaned in areas that are:
 - Easily accessible for monitoring and control,
 - Located away from waterways,
 - Located away from areas of sensitive habitats or species,
 - Near areas already infested with invasive plants,
 - Contained with silt fences or soil berms, and
 - Paved or have sealed surfaces to avoid re-accumulation of soil and plant material on cleaned vehicles and equipment.
- Soils and plant materials from tools, equipment, and vehicles would be cleaned before entering and leaving the worksite with the following methods:
 - Remove soil, seeds, and plant parts from tools, the undercarriage, tires, sideboards, tailgates, and grills of all vehicles and equipment. Wash tires and under carriage if the travel route is muddy.
 - Cleaning methods are divided into two categories:
 - Cleaning without water:
 - Bristle brushes, brooms, scraper, and other hand tools (to remove heavy accumulation of soil and debris prior to washing with other tools)
 - High-pressure air devices
 - Vacuum cleaner
 - Hand removal
 - Cleaning with water:
 - Wash on a paved surface to avoid creating mud. Contain wastewater and splash to prevent invasive plant parts and seed from spreading through runoff. Berms or silt fences installed along perimeters of work areas can aid in preventing the spread of contaminated materials outside the cleaning area.
 - High-pressure washers (preferably with 2,000 psi): wash once for six minutes or two to three times for three minutes for best results.
 - Portable cleaning station with undercarriage washers and

- pressure hoses (useful during maintenance of multiple sites).
- Dispose of propagule-containing water from equipment washing at a waste management facility or incinerator, not at a wastewater treatment plant.
- Clean carpet, rubber, nylon, or plastic materials using:
 - A vacuum cleaner
 - A variety of brushes with bristles of varying length and texture
- Vehicles would be washed frequently, especially after driving off-road or along roads bordered by a high density of invasive plants, and after traveling under wet conditions.
- Cleaning would be included as part of routine maintenance activities for tools, equipment, and vehicles. This is in addition to regular cleaning on site.

THREATENED AND ENDANGERED SPECIES

Standard Site Procedures to Avoid and/or Minimize Effects to ESA-Listed Species

- The NPS would employ techniques to reduce impacts on fish, wildlife, and plant communities near existing and proposed trails, including visitor education programs and media, restrictions on visitor and NPS activities, and law enforcement patrols.
- A wildlife protection program would be implemented including evaluation of project scheduling (season and/or time of day); monitoring; erosion and sediment control, fencing, or other means to protect sensitive resources; disposing of food-related items or rubbish; salvaging topsoil; and revegetating.
- The project's action area would be delineated, including all areas that may be affected directly or indirectly by the action. The areas of the project footprint would be delineated, and buffers would be mapped

around the project footprint that may be affected by various project stressors (such as noise, lighting, human disturbance, dust, vegetation removal, etc.).

- To inform project plans, a qualified biologist would thoroughly survey the various threat zones within the action area to map the locations of all threatened and endangered species and their habitats, including host plant locations. A qualified biologist is an environmental professional with at least a bachelor's degree in biology, ecology, natural resources, environmental science, or similar, with significant experience over multiple years working with ESA-listed species and their habitats in Hawai'i or the Pacific Islands.
- Prior to site entry for site preparation, demolition and construction, or operations, staff and contractors would be trained about proper avoidance measures for protected species, including any pre-disturbance survey requirements, unique flagging used, prohibitions against unauthorized clearing of vegetation, and biosecurity BMPs.
- Pre-impact surveys for listed species, such as tree snails, would be required over the full action area as close as possible to the start of any site preparation or demolition and construction activities that require vegetation clearing.

Measures Related to Construction of Facilities

- Actions involving the use of heavy equipment such as backhoes and cranes or the placement of materials, such as large stones or concrete shapes, removing debris, clearing vegetation, grading, and dredging have the potential to injure or kill threatened and endangered plants and animals. Potential injuries and their severity will depend on the species proximity and the nature of the injury to the plant or animal. Contractors would refer to the species-specific conservation measures (e.g., buffer distances) in Table D.1 to reduce the potential for direct physical impacts to listed species and

require that the project manager ensure the buffer distances are maintained and that all materials and equipment are operated in a controlled manner.

- Temporary or permanent deployment of items such as fencing, wiring, markers, mooring lines, erosion control matting, guy wires, aerial lines, and buoys pose an entanglement or strike risk to flying and swimming wildlife. To minimize the risk, these structures would be situated well away from areas that may be occupied by species that are vulnerable to strike or entanglement risk, designed to minimize entanglement or strike risk, and removed when not in use.
- Visibility markings would be used on fences and fencing lengths would be minimized. Single-line moorings would be well-maintained with minimal slack in both support and mooring lines, thus preventing loops from forming in the lines. The complete removal of mooring systems and fencing would be required at the end of a project's life, along with inspection and maintenance for permanent or long-term deployments, minimizing the risk of entanglement.
- Erosion control products with biodegradable netting and rectangular-shaped or flexible mesh with adequate openings would be used to prevent entanglement from erosion control matting.
- The project area would be cleaned up at the end of each work shift so that tools, materials, debris, and trash are not left out in a manner that could be a hazard to threatened and endangered species.
- Noise and vibrations from tools and equipment would be kept to a minimum when working in the vicinity of a listed threatened and endangered species.
- Hazmat spill prevention protocols would be employed to prevent equipment spills and discharges from an action area.
- Tarps would be used to contain all paint chips and building debris from exterior

surfaces as these can be hazards to listed threatened and endangered species.

- No standing water on tarps or other construction would be allowed as it could be a breeding ground for mosquitoes which can carry Dengue fever, avian malaria, avian flu, and other diseases.
- Loose nails, screws, and fasteners would be prevented from falling on the ground when working on exterior surfaces as they can be a hazard to threatened and endangered species. If they land on the ground, staff would pick them up immediately and dispose of them properly.
- Threatened and endangered plant and animal species are protected by federal law. Workers must obey all park regulations and drivers must obey all traffic laws and watch for animals on or alongside roads or within the project area.

Working in Near-Shore Areas

- Any in-water work would require a qualified biologist on-site to confirm the presence of endangered species (if habitat and seasonal timing of potential for occurrence occur). The biologist would determine steps required prior to in-water work if any such species are identified.
- As practicable, work would be conducted during calm sea states with work stoppages during high surf, winds, and currents.
- Vessel operators would halt or alter course to remain at least 164 feet (approximately 50 m) from ESA-listed marine species. Vessel operators would reduce vessel speed to 10 knots (11.5 mph) or less when piloting vessels in the proximity of marine mammals, and to 5 knots (5.75 mph) or less when piloting vessels in areas of known or suspected turtle activity.
- If approached by an ESA-listed marine species, the vessel operator would put the engine in neutral until the animal is at least 50 feet (approximately 15 m) away, and then slowly move away to 164 feet (approximately 50 m) from the animal.

Table D.1: Buffer Distances for Listed Plants and Butterfly Host Plants

PROPOSED ACTION	BUFFER DISTANCE: HERBS/SHRUBS	BUFFER DISTANCE: TREES
Vegetation removal (hand tools)	1 meter (3 feet)	1 meter (3 feet)
Vegetation removal (mechanical)	1 meter (3 feet), or height of vegetation to be removed, whichever is greater	1 meter (3 feet), or height of vegetation to be removed, whichever is greater
Vegetation removal (heavy equipment)	Two times the width of the equipment, plus the height of the vegetation to be removed	250 meters (820 feet)
Hand application of herbicide	3 meters (10 feet)	Crown diameter
Ground spray of herbicide (e.g., backpack sprayer)	15 meters (50 feet)	76 meters (250 feet)
Ground/soil disturbance (hand tools)	6 meters (20 feet)	Two times crown diameter
Ground/soil disturbance (heavy equipment)	100 meters (328 feet)	250 meters (820 feet)
Surface hardening/soil compaction (roads/utilities/buildings)	100 meters (328 feet)	250 meters (820 feet)
Prescribed burns	Prohibited	Prohibited

- All vessels would operate at ‘no wake/ idle’ speeds while in water depths where the draft of the vessel provides less than a 6-foot (2-meter) clearance. All vessels would follow deep-water routes (e.g., marked channels) whenever possible. If operating in shallow water, all vessels would use a dedicated lookout to assist the pilot with avoiding large coral colonies.
- Anchors, tools, or equipment would not be placed on any organism unless contact with the organism is a necessary component of the project. Anchors would be placed in soft sediment only. Where applicable, divers would check boat anchor deployment and shift anchors to ensure they are not a threat to corals or seagrass.
- Personnel would avoid contact with organisms wherever possible, take measures to avoid kicking the reef with fins, and secure dive and survey equipment in a manner that would prevent that material equipment from being drug across the substrate.

Measures Related to Trail Work

- Surveys by qualified biologists to determine if rare, threatened, or endangered state or federally listed species are present would be conducted before ground disturbance or vegetation clearance to avoid adverse impacts and ensure appropriate locations and design of facilities. The USFWS would be consulted when required for surveys prior to the commencement of construction activities.
- Vegetation clearing would be strictly limited to that which is required for project completion, and indiscriminate clearing would not occur. Development projects would be located in previously developed areas or areas without native vegetation.
- Topsoil would be re-spread in as near to the original location as possible and supplemented with scarification, mulching, seeding, and/or planting with species native to the immediate area. Conserving native topsoil would minimize vegetation impacts and potential compaction and erosion of bare soils. The use of conserved topsoil would help preserve microorganisms and seeds of native plants.
- Construction activities would be scheduled to minimize construction-related impacts on visitation and wildlife behavior (e.g., nesting seasons).
- Care would be taken not to disturb any sensitive wildlife species found nesting, hibernating, foraging, or otherwise living in or immediately nearby the worksites. If nesting or roosting is found, resource management personnel would be consulted, and measures would be identified to avoid impacts. Resource management personnel would be consulted when wildlife would be disturbed by proposed trail construction or maintenance activities.
- If avoidance is infeasible, adverse effects on rare, threatened, and endangered species would be minimized and compensated as appropriate and in consultation with the appropriate resource agencies.
- The park would use temporary or seasonal visitor use restrictions or area closures to protect sensitive wildlife habitat and sensitive wildlife behavior or life stages from trail use.
- Where possible, natural features with obvious high value to wildlife would be preserved.
- If sensitive natural resources are discovered during trail construction, construction would cease, and the area would be surveyed in more detail so that impacts could be avoided or minimized and/or an alternate route established.

Preservation of Natural Features During Construction

For any construction-related work, the contractor would comply with the following work restrictions to preserve natural features:

- Prevent damage to natural surroundings
- Provide temporary barriers to protect existing trees, tree roots, plants, grass areas, and lawns that are directly impacted by construction operations
- Avoid fastening ropes, cables, or guys to existing trees, rock outcrops, or other natural features
- Avoid removing, injuring, or destroying existing trees, tree roots, or plants without approval by the contracting officer or unless it's explicitly required in the contract documents
- Notify the contracting officer immediately for a determination if a tree, tree branch, root, or mass of vegetation is preventing the completion of the work
- Carefully supervise the excavation, grading, filling, equipment movement, and other construction operations near trees and tree branches to prevent damage

Reporting Adverse Effects

- If an ESA-listed species is adversely affected as a result of the project, all work must stop until coordination with the NPS, USFWS, and/or NOAA has been completed.

Measures for All Listed Plants

- Disturbance would be minimized outside of existing developed or otherwise modified areas. When disturbance outside existing developed or modified sites is proposed, a botanical survey of the action area would be conducted for ESA-listed plant species.
- Surveys would be conducted by a botanist with documented experience identifying native plants during an appropriate time period for the potentially occurring

protected species, such as during the wettest part of the year.

- A buffer surrounding rare, threatened, or endangered state or federally listed plant species would be imposed that prohibits physical damage to the identified population during construction activities. The park's Resource Management Division would be consulted when determining the appropriate buffer.
- The boundary of the area occupied by ESA-listed plants would be marked with flagging by the surveyor and the buffer distances in Table D.1 would be implemented. Where project actions will occur within these buffer distances, additional consultation with the Service is required.
- Vegetation and soil disturbance due to project activities would be avoided within the buffer distances detailed in Table D.1.
- Where disturbed areas do not need to be maintained as an open area, disturbed areas would be restored using native plants.

Species-Specific Measures

Fanihi (Mariana Fruit Bat [*Pteropus mariannus mariannus*])

- Activity would not occur within 492 feet (150 meters) of a fanihi day roost. Contractors would avoid exposing fanihi day roosts to any sound in excess of 60 decibels.
- To facilitate project design and section 7 consultation, surveys of all forest habitat would be completed within 492 feet (150 meters) of the project site for the presence of any fanihi day roosts, transiting routes, or feeding areas of the fanihi. During the project, the action area would be monitored for the establishment of a day roost. If a day roost is established within 492 feet (150 meters) of project activity, work would be halted, and the park would coordinate with USFWS.
- To reduce fanihi disturbance, construction operations must be conducted during daylight hours and construction activities

would end at least 30 minutes before sunset. In addition, any exterior light fixtures within the project site would be shielded at bulb height with no light shining from above or to the side.

Puláttat (Mariana Common Moorhen [*Gallinula chloropus guami*])

- For projects occurring within 100 feet (30 meters) of areas where standing water could persist, a biological monitor with experience surveying for puláttat individuals and nests should conduct surveys prior to project initiation.
- Any documented nests within the project vicinity should be reported to the USFWS and Guam DAWR within 48 hours. The USFWS should be notified immediately prior to project initiation and provided with the results of pre-construction waterbird surveys.
- A 100-foot (30-meter) buffer would be established and maintained around all active nests and/or broods until the chicks/ducklings have fledged. No project activities or habitat alteration should occur within this buffer.
- A biological monitor should be present on the project site during all construction or earth-moving activities to ensure that puláttat and nests are not adversely impacted.
- If a puláttat is observed within the project site, or flies into the site while activities are occurring, the biological monitor should halt all activities within 100-foot (30-meter) of the individual(s). Work should not resume until the listed waterbird(s) leave the area on their own accord.

Yáyaguak (Mariana Gray Swiftlet [*Aerodramus vanikorensis bartschi*])

- In areas of known swiftlet presence, a qualified biologist, as defined herein, would survey the action area to map habitat for these species, determine if the action area is occupied by swiftlets, and determine if the action area is within 1,640 feet (500 meters) of a roosting cave.

- Actions that could increase human disturbance or noise within 1,640 ft (500 m) of a limestone cave entrance and within the caves themselves would be avoided.
- Construction of vertical structures that protrude into the forest canopy or above the height of shrub or grass vegetation and use of guy wires (a potential flight hazard to swiftlets) would be avoided.
- Pesticides would not be used within areas of known swiftlet presence.
- Lighting BMPs described above would be followed to minimize impacts from lighting.

Haggan Betde (Green Sea Turtle [*Chelonia mydas*]) and Haggan Karai (Hawksbill Turtle [*Eretmochelys imbricata brissa*])

- If work is to commence in potential sea turtle habitat, daily searches would be conducted by a qualified biologist familiar with sea turtles before work begins. The biologist would conduct a visual survey of the action area to ensure no basking sea turtles are present.
- No vehicle use or modification of the beach or dune environment would be allowed during sea turtle nesting or hatching season (throughout the year on Guam).
- Native shoreline vegetation would not be removed.
- If a basking sea turtle is found within the action area:
 - All mechanical or construction actions within 100 feet (30 meters) would be ceased until the animal voluntarily leaves the action area.
 - All actions between the basking turtle and the ocean would be ceased.
 - Any project-related debris, trash, or equipment would be removed from the beach or dune if not actively being used. Project-related materials would

not be stock-piled in the intertidal zone, reef flats, or stream channels.

- Lighting BMPs described above would be followed to minimize impacts from lighting.

Akaleha' (Tree Snails): Guam Tree Snail (*Partula radiolata*), Humped Tree Snail (*Partula gibba*), Fragile Tree Snail (*Samoana fragilis*)

- Where work must be conducted in shrub or forested areas, proposed project sites would be surveyed for the presence of tree snails. Prior to project implementation, and at a minimum of every three years during project implementation, all areas within 328 feet (100 meters) of any project area where walking or other project activity may occur would be surveyed for tree snails using the standard prioritized search procedure (Fiedler 2019, entire).
- Because tree snails may be downed and moved to new locations by strong winds, project activity that may crush downed tree snails, other than snail survey work, would not be conducted within the 7-day period after typhoon winds in any project site within 328 feet (100 meters) of a tree snail location.
- After any project site within 328 feet (100 meters) of an area occupied by a listed tree snail is affected by typhoon-strength winds, tree snail surveys should be re-done, and buffer protections re-established for new tree snail locations prior to commencing project work.
- Surveys may only be conducted by a qualified biologist experienced in identifying tree snails and their suitable habitat, with specialized training and field experience surveying for threatened or endangered tree snails in the Pacific Islands.
- Vegetation to be removed would be inspected for the presence of federally listed tree snails one week prior and immediately prior to clearing activities. If a snail is observed, work would stop for 72 hours to allow the snail to move out of the area, and no vegetation clearing would

be conducted within 33 feet (10 meters) of a snail. Branches, tree limbs, and vines would be removed manually from areas within 33 feet (10 meters) of snail observation, using hand tools and small powered equipment such as brush cutters.

- Buffer areas would be physically cordoned off, with fencing or netting, for the duration of the project activity, to prevent project personnel from entering buffers of 33 feet (10 meters) from the outermost snail detection. Alternate methods such as visually flagging buffer areas may be used in some types of projects including areas where field crew work will be restricted to designated roads and trails, and heavy equipment will not encroach into the buffer.
- To avoid potential adverse effects to listed tree snails, clearing understory and overstory forest vegetation outside existing developed areas would not be allowed. Intact vegetation is important for maintaining microclimates and air movement conditions that allow snails to survive in a given area.
- Vegetation within 200 feet (61 meters) of the known occurrence would not be cut or removed in order to minimize impacts to the tree snails and their habitat.

Ababbang (Mariana Eight-spot Butterfly [*Hypolimnas octocula marianensis*])

- Where vegetation cutting is necessary, a botanical and listed butterfly survey would be conducted within, and extending 100 feet (30 meters) beyond, the proposed disturbance area.
- A qualified biologist with experience surveying for and identifying the butterfly individuals, chrysalis, caterpillars, eggs, and host plants (*Elatostema calcareum*, *Procris pedunculata*, and *Maytenus thompsonii*) should survey the project action area and visibly mark the area occupied by the butterfly or host plant.
- Surveys should be conducted in the wet season along transects to identify the presence of butterflies (any life stage)

or host plants when the likelihood of observation is greatest.

- In the event of an adult butterfly or butterfly host plant (*P. pedunculata*, *E. calcareum*, and *M. thompsonii*) discovery, focused searches would be conducted for five to thirty minutes to locate and identify any life stage of the listed butterflies. The number and life stage of any observation should be recorded, and location documented. The duration of surveys is relative to the size of host plants and number of individual butterflies found.
- All butterfly host plants in and within 33 feet (10 meters) of the vegetation disturbance site should be marked with flagging to exclude personnel from walking within 33 feet (10 meters) of the plant.
- To minimize potential adverse effects to listed butterflies, cutting or removing vegetation within 100 feet (30 meters) of a butterfly host plant would be avoided. Vegetation clearing would be minimized to widths of 33 feet (10 meters) or less. Where vegetation removal does not need to be maintained, cleared areas would be restored using native plants including specific butterfly host plants.

Operations to Minimize Noise and Disturbance to Soundscape

- For any construction-related work, the contractor would minimize noise levels at the project site to protect the soundscape of the park and minimize noise to staff, visitors, neighbors, and habitat.
- Noise-producing work would be performed during less sensitive hours of the day or week or as directed by the contracting officer. Repetitive and/or intermittent, high-level noise would only be permitted during daytime hours. If the contractor exceeds the thresholds in Tables D.2 or D.3, the contractor may be required to stop work, temporarily relocate to a non-sensitive area, or adjust

the construction means and methods at no additional expense to the Government.

- The maximum permissible construction equipment noise at 50 feet for construction equipment is listed in Table D.2. Table D.3 lists dB(A) limitations that would exist at 50 feet.

Air Quality

For any construction-related activity, the contractor would minimize the negative impacts to air quality through the following operations:

- Minimize emissions from vehicles or heavy equipment
- Minimize fumes, vapors, or gases from products or packaging
- Minimize particulates and dust from outdoor operations
- Control of moisture during operations that may lead to damage, fumes, or mold
- Ensure vehicles and heavy equipment do not idle when not in use
- Install temporary mechanical ventilation where appropriate
- Ensure tools are equipped with the proper guards or particulate catchment devices
- Ensure particulates and debris are collected and disposed of on a regular basis
- Consider water trucks or temporary irrigation devices for dust control
- Ensure products are properly dried or cured prior to advancing the work
- Ensure materials are stored in a dry location
- Ensure wet/damp materials are not installed or covered

Table D.2: Maximum Permissible Construction Equipment Noise at 50 feet

EARTHMOVING	dB(A)	MATERIALS HANDLING	dB(A)
Front Loaders	75	Concrete Mixers	75
Backhoes	75	Concrete Pumps	75
Dozers	75	Cranes	75
Tractors	75	Derricks Impact	75
Scrapers	80	Pile Drivers	95
Graders	75	Jack Hammers	75
Trucks	75	Rock Drills	80
Pavers, Stationary	80	Pneumatic Tools	80
Pumps	75	Saws	75
Generators	75	Vibrators	75
Compressors	75		

Table D.3: dB(A) Limitations at 50 feet

TIME DURATION OF IMPACT NOISE	dB(A)
More than 12 minutes in any hour	70
More than 3 minutes in any hour	80

CULTURAL RESOURCES

Measures Related to Development and Construction

Because this plan involves phased implementation of actions not yet designed to allow full impact analysis, the National Park Service would pursue phased compliance with the Guam State Historic Preservation Office and other consulting parties in accordance with Section 106 of the National Historic Preservation Act. Phased implementation activities concerning cultural resources would include the following best management practices:

- All construction projects and infrastructure would be designed to avoid known cultural resources and areas with high potential for archeological or ethnographic resources.
- Analysis and documentation under Section 106 of the NHPA would be conducted to avoid and/or minimize adverse effects on archeological resources of new undertakings.
- Before any ground-disturbing action by the National Park Service, pedestrian surveys and/or remote sensing of the areas planned for construction or other ground-disturbing development would be conducted in compliance with Archaeological Resources Protection Act of 1979, as amended, and the National Historic Preservation Act. The survey would help determine the presence or absence of archeological deposits in the footprint of disturbance.
- The contractor, or contractor's designee, would observe all ground-disturbing activities. The park may also have an Archeological Monitor at the jobsite who is authorized to stop work upon discovery of archeological resources.
- Should construction unearth previously undiscovered cultural resources, work would be stopped in the area of discovery or relocated to a non-sensitive area and the contracting officer would be notified immediately. In conducting site testing and documentation, emphasize actions that would avoid further disturbance to the site.
- A qualified archeologist would be contacted to assess the artifacts and/or site. The National Park Service would consult with the Guam State Historic Preservation Office and the Advisory Council on Historic Preservation, as necessary, according to 36 CFR 800.13.
- Any archeological resources discovered during these investigations would be evaluated for significance and potential effects in consultation with the Guam State Historic Preservation Office (SHPO).
- The National Park Service would adjust project locations, designs, and/or construction activities to avoid National Register-eligible archeological resources discovered during preconstruction survey as much as possible.
- If cultural resources or adverse effects to those resources could not be avoided, additional consultation would occur to identify how to resolve concerns and mitigate impacts.
- In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, the NPS would halt work and contact the SHPO to determine the appropriate next steps.
- All crew members and volunteers assisting in construction efforts would be educated about the importance of avoiding impacts on sensitive cultural resources that have been flagged for avoidance.
- The contractor would not disrupt known archeological resources or flagged areas during construction activities.
- If necessary, the contractor would erect temporary barriers around the archeological resource to ensure avoidance.
- All project work relating to historic structures and cultural landscapes would be conducted in accordance with Director's Order 28 and the Secretary of

the Interior's Standards for the Treatment of Historic Properties and Guidelines for the Treatment of Cultural Landscapes, including the standards and guidelines for the treatment of historic properties and cultural landscapes.

- For any trail work, known archeological sites would be monitored to assess and document the effects of natural processes and human activities on the resources.
- The siting of new trails would follow historic circulation routes where possible.
- Archeological resources typically found in the park or at the project site would be discussed at the preconstruction meeting.
- All new facilities would follow the recommendations for new development outlined in the park's draft 2021 cultural landscape report.

Cultural Landscapes

- Cultural landscape inventories and cultural landscape reports would be completed as necessary to inform any alterations to cultural landscapes that may impact contributing features.
- Changes to individual features and resources comprising the cultural landscape would be assessed in the larger setting and environmental context to ensure incremental change does not adversely affect the integrity of the historic districts.
- The condition of the cultural landscape would continue to be monitored and any new or emerging threats or treatment measures necessary for its preservation and protection would be identified.
- Consultation with the Guam SHPO, Indigenous CHamoru Organizations, and other traditionally associated groups would continue. As appropriate, under the National Historic Preservation Act, additional consultation would also occur as implementation-level plans and designs are developed.
- If cultural resources or adverse effects to those resources could not be avoided, additional consultation would occur to

identify how to resolve concerns and mitigate impacts.

- Facilities would be designed, located, and rehabilitated using context-sensitive designs to minimize change, visual contrast, and intrusions to historic views and vistas.
- Vegetation would be managed to screen facility or infrastructure intrusions or cleared where encroaching or obstructing historic views.

Ethnographic Resources

- The National Park Service would consult with associated Indigenous CHamoru Organizations to ensure that project actions are conducted in a way that respects the beliefs, traditions, and other cultural values of the people who have ancestral ties to park lands.
- Sensitive, sacred, or traditional use areas would be protected to the greatest extent possible by avoiding areas with ritual features, mitigating adverse impacts to ethnographic resources through resource protection efforts, retaining site confidentiality as appropriate, and continuing to provide tribal access to resources and places of cultural importance.

Historic Structures

- To the extent possible, historic structures under NPS management would be stabilized until a further appropriate preservation treatment can be undertaken.
- Adverse effects on historic properties listed in, determined eligible for listing, or not yet assessed for eligibility to the National Register would be avoided, if possible.
- If adverse effects cannot be avoided, an agreement document would be developed through a consultation process with all interested parties according to Section 106.
- The number of incidents (by complaints, reports to rangers, and ranger observation) of graffiti, ground disturbance, damage to structures, and loss of historic fabric would be tracked to assess resource condition and the level of visitor use impacts on cultural resources.

- HABS/HAER/HALS documentation of historic structures would be pursued, prioritizing those at highest risk of loss.

Archeological Resources

- The park would document and avoid previously unidentified archeological sites and prepare a determination of eligibility for the National Register of Historic Places for potentially eligible sites.
- Known archeological resources would be marked and flagged by the park and left undisturbed and preserved in a stable condition to prevent degradation and loss of research values unless intervention could be justified based on compelling research, interpretation, site protection, or park development needs. Recovered archeological materials and associated records would be treated in accordance with NPS *Management Policies 2006*, NPS Museum Handbook, and 36 CFR Part 79.
- The NPS would employ techniques to reduce potential impacts on archeological resources, including visitor education programs, restrictions on visitor and NPS activities, and law enforcement patrols. The required orientation for all visitors would convey the rules for visitation and protection of resources.
- NPS staff would continue to inform visitors and others of the importance of protecting and not disturbing archeological and historic resources. Visitors would be informed (through NPS educational and interpretive programs and/or interpretive media products, and ranger contacts) of the penalties for illegally collecting artifacts or otherwise causing resource damage.
- The NPS could prohibit travel in certain areas to protect archeological resources.

VISITOR USE AND EXPERIENCE

Trail Development and Construction

- Areas not under construction would remain accessible to visitors as much as is safely possible.

- Staging areas during trail construction would be away from visitor use areas to the extent possible. Parking areas for construction vehicles would be limited to these staging areas, existing roads, and previously disturbed areas.
- A construction zone for installation of any proposed trail system, as well as staging areas and work zones, would be identified and demarcated with construction tape or some similar material prior to any construction activities. The tape would define the zone and confine the activity to the minimum area needed for implementing the project.
- During trail construction, the National Park Service would implement measures to reduce adverse effects of construction on visitor safety and experiences. Measures may include, but are not limited to, noise abatement, visual screening, and directional signs that aid visitors in avoiding construction activities.

Public Safety and Tsunami Hazards

- The NPS would post signs along coastal areas advising about the danger of sneaker waves, undertows, and rip currents and include information about self-rescue techniques.
- The NPS would provide information about tsunami behavior by various means, which may include websites, kiosks, and waysides, to create awareness and reduce the potential risk of injury.
- The NPS would participate in the current tsunami warning system and maintain the evacuation routes, and any other responsibilities the park has outlined with local authorities.
- Overnight facilities would be sited to expedite evacuation or be located outside of the mapped inundation zone.

APPENDIX E: FLOODPLAIN STATEMENT OF FINDINGS

INTRODUCTION

NPS proposed actions that may adversely affect floodplains must comply with Executive Order 11988 and Director's Order #77-2: Floodplain Management, which requires the preparation of a Floodplain Statement of Findings if the action falls within the defined regulatory floodplain. The NPS prepared the Floodplains Statement of Findings for the Asan and Agat Units Management Plan (UMP) to describe proposals in the UMP and to review the UMP in sufficient detail to:

- provide an accurate and complete description of the coastal hazards assumed by implementation of the UMP (without mitigation),
- describe the effects on coastal values associated with the proposed action, and
- provide a thorough description and evaluation of mitigation measures developed to achieve compliance with Executive Orders 13690 (Establishing a Federal Flood Risk Management Standard) and 11988 (Floodplain Management) and the NPS Floodplain Management Guideline (Director's Order 77-2).

Description of the Proposed Action and Flood-Related Elements

The UMP addresses four of the park's seven units. Two of the four units, the Asan Beach and Agat Units, are located within the tsunami evacuation zone for Guam (NOAA 2023c). According to NPS Procedural Manual #77-2: Floodplain Management, the tsunami evacuation zone is considered a coastal high-hazard area (NPS 2002). See figures E.1 and E.2. These two units already experience coastal flooding due to storm surge, which is projected to increase with sea level rise. The units additionally experience overland flooding from storms with intense rainfall. The coastal park units received significant coastal and overland flooding most recently

from Typhoon Mawar in May 2023. The UMP proposed action focuses on enhancing the visitor experience within the Asan Beach and Agat Units, while anticipating and providing guidance for how the park will address climate change impacts to resources and facilities.

The proposed action identifies a two-phased approach for managed retreat from the shoreline. The two phases are based on two sea level rise scenarios: a 0.8-foot (25-centimeter) rise and a 4.9-foot (150-centimeter) rise, each integrated with storm surge associated with one-year, 20-year, and 100-year storms. These scenarios were informed by a sea level rise and storm surge model provided by the USGS Coastal and Marine Hazards and Resources Program: "Forecasting Storm-Induced Coastal Flooding for 21st-Century Sea Level Rise Scenarios in the Hawaiian, Mariana, and American Samoan Islands" (USGS 2023a). The USGS coastal flooding model relies on a mix of oceanographic, coastal engineering, ecological, and geospatial data and methods to map coastal flooding from waves and storm surge at 108-square-feet (10-square-meter) resolution for the one-year, 20-year, and 100-year storm events. These storm events are each modeled for the current sea level plus six sea level rise scenarios: +0.8, +1.6, +3.3, +4.9, +6.6, +9.8 feet (+25, +50, +100, +150, +200, and +300 centimeters respectively) (USGS 2023a).²

The NPS planning team identified the 4.9-foot (150-centimeter) sea level rise as the worst-case scenario within the UMP's planning horizon of approximately 20 to 30 years.

² This USGS model is based on metric measurements. The English conversion is only provided for numbers relevant to the planning scenarios, not for every model measurement.

Figure E.1: Asan Beach and Inland Units | Guam Tsunami Evacuation Zone
 War in the Pacific National Historical Park | Asan + Agat Units Management Plan



Figure E.2: Agat Unit | Guam Tsunami Evacuation Zone
War in the Pacific National Historical Park | Asan + Agat Units Management Plan

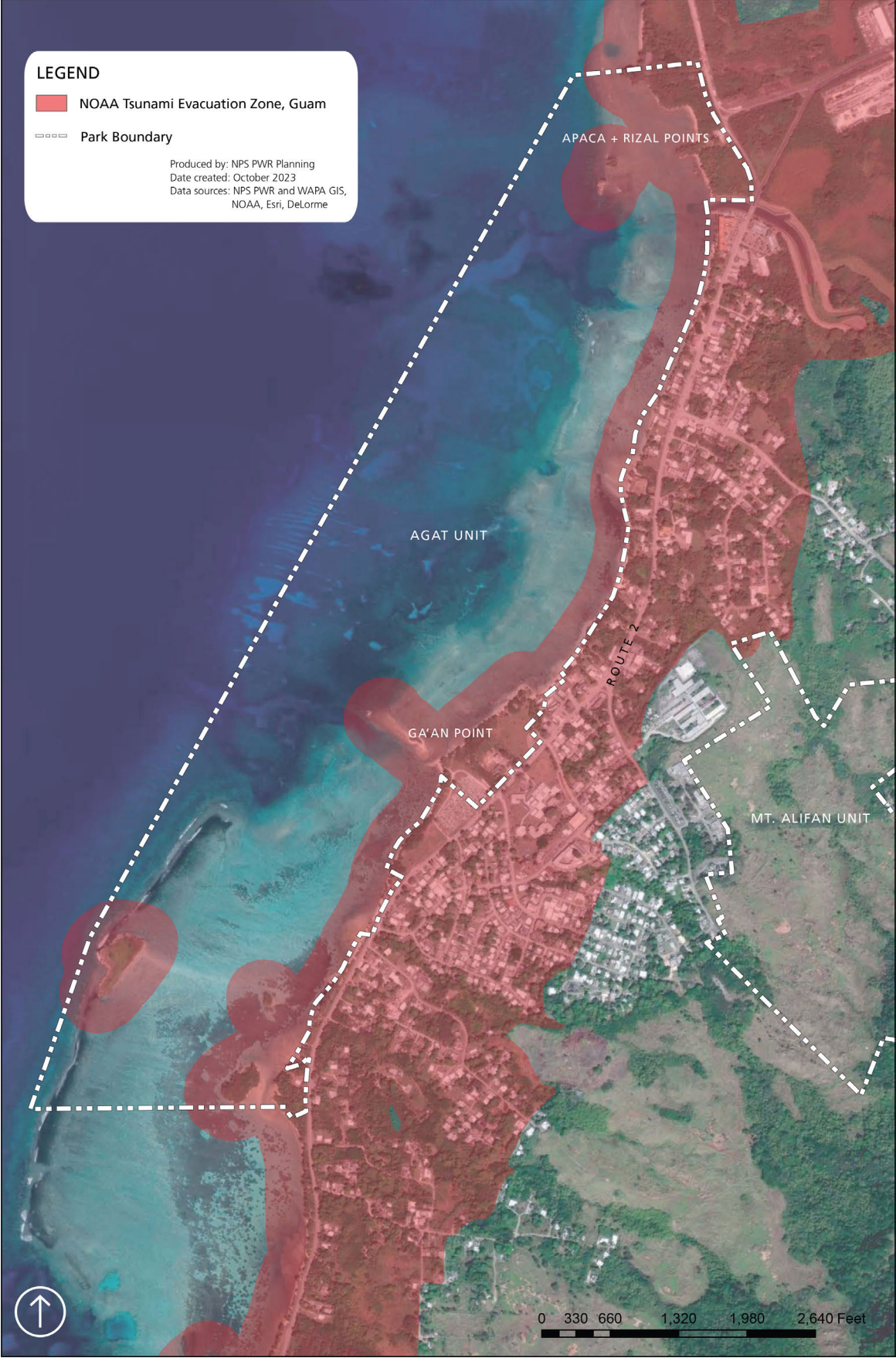


Figure E.3: Asan Beach Unit | 0.8-foot (25-centimeter) Sea Level Rise with Three Storm Surge Scenarios
 War in the Pacific National Historical Park | Asan + Agat Units Management Plan

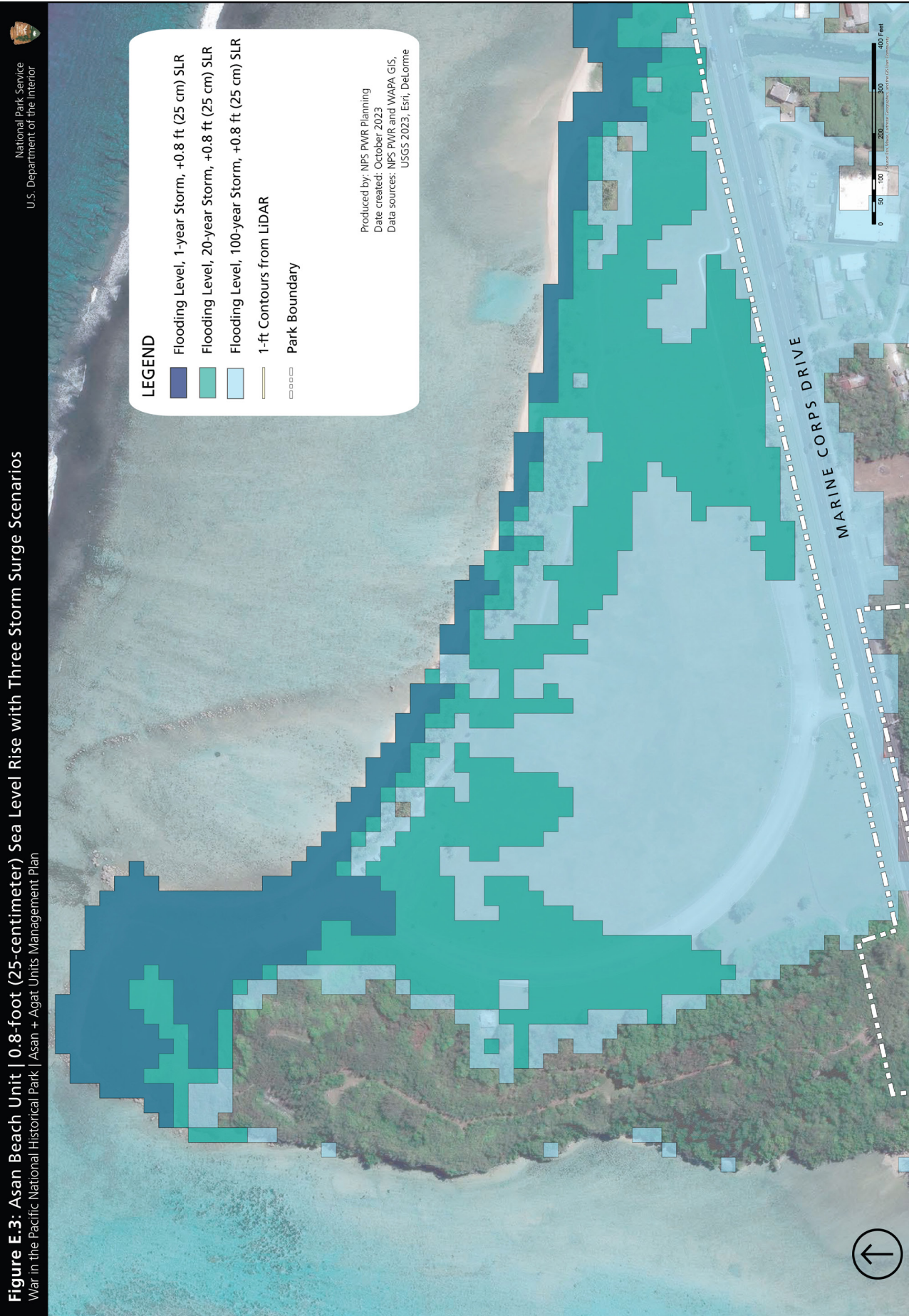


Figure E.4: Asan Beach Unit | 4.9-foot (150-centimeter) Sea Level Rise with Three Storm Surge Scenarios
War in the Pacific National Historical Park | Asan + Agat Units Management Plan

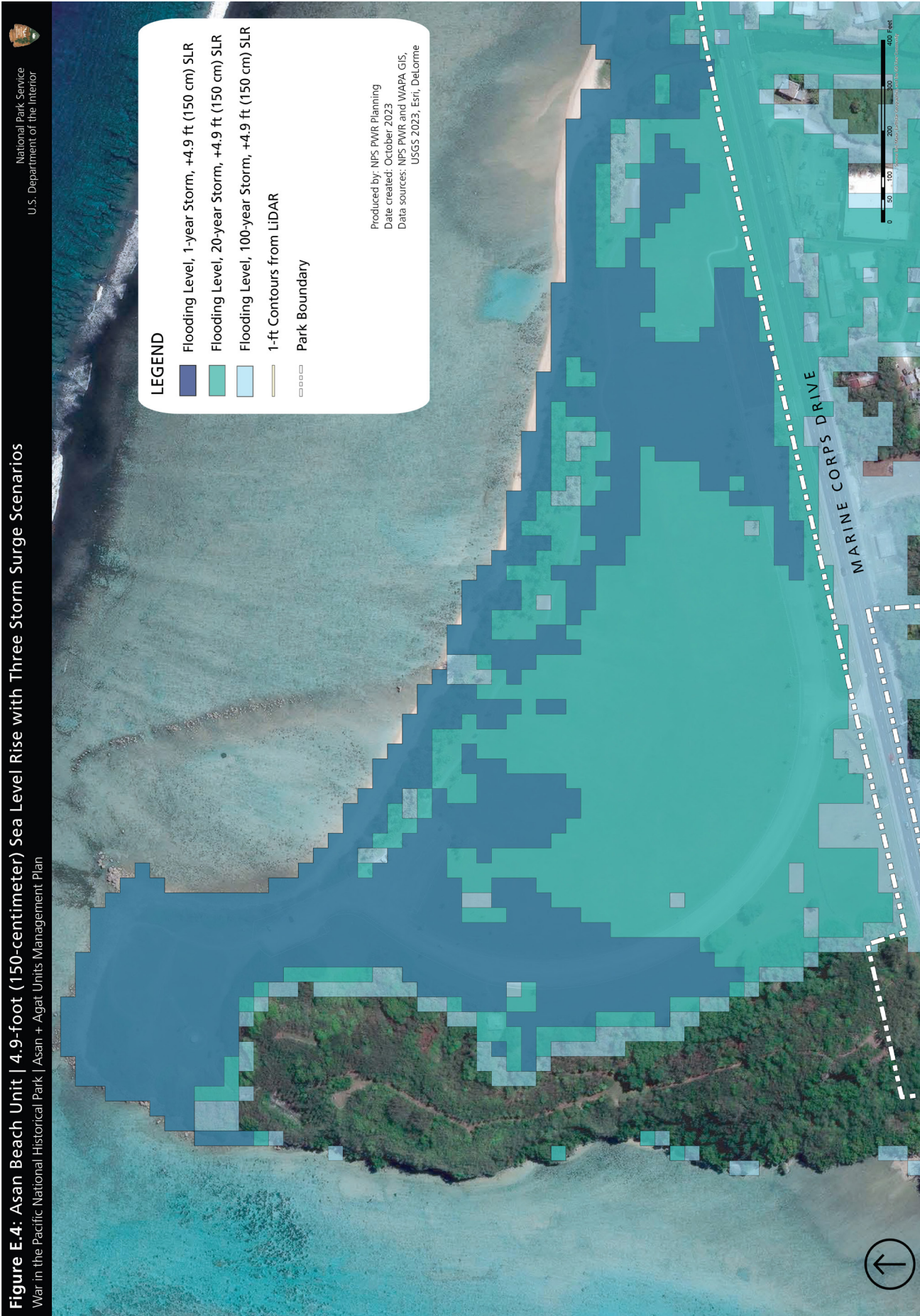


Figure E.5: Apaca and Rizal Points, Agat Unit
0.8-foot (25-centimeter) Sea Level Rise with Three Storm Surge Scenarios
 War in the Pacific National Historical Park | Asan + Agat Units Management Plan

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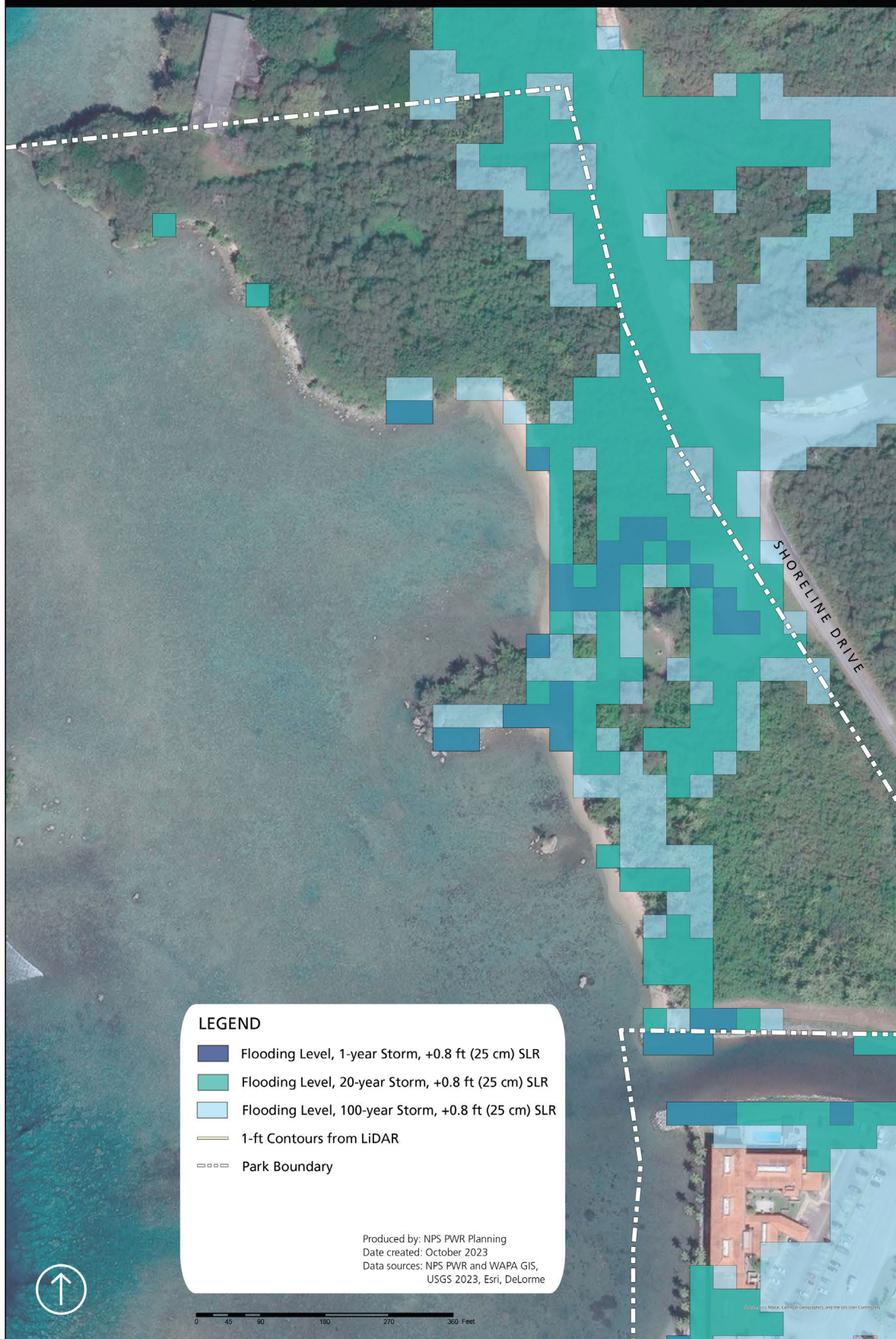


Figure E.6: Apaca and Rizal Points, Agat Unit
4.9-foot (150-centimeter) Sea Level Rise with Three Storm Surge Scenarios
 War in the Pacific National Historical Park | Asan + Agat Units Management Plan

National Park Service
 U.S. Department of the Interior

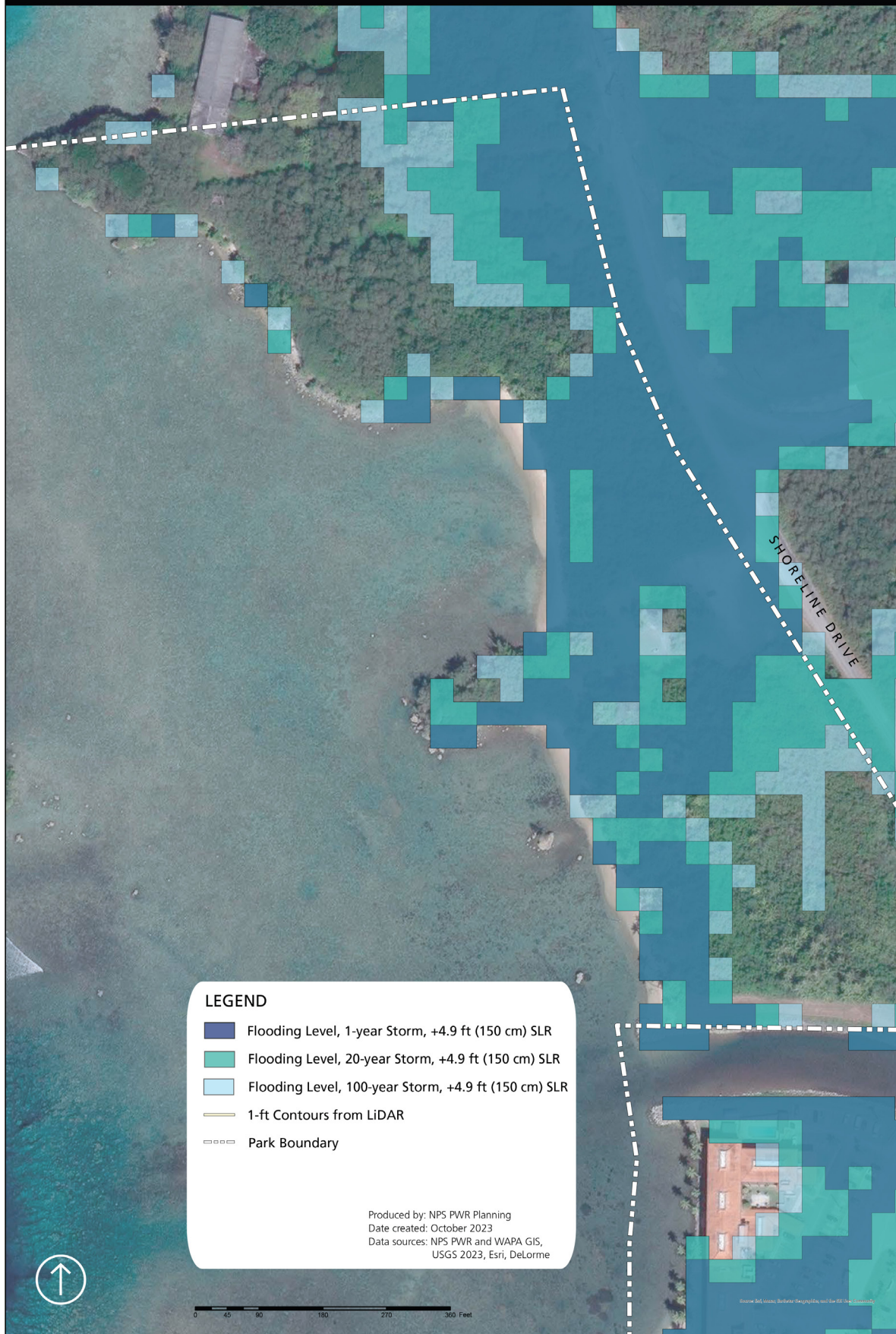


Figure E.7: Ga'an Point, Agat Unit | 0.8-foot (25-centimeter) Sea Level Rise with Three Storm Surge Scenarios
 War in the Pacific National Historical Park | Asan + Agat Units Management Plan

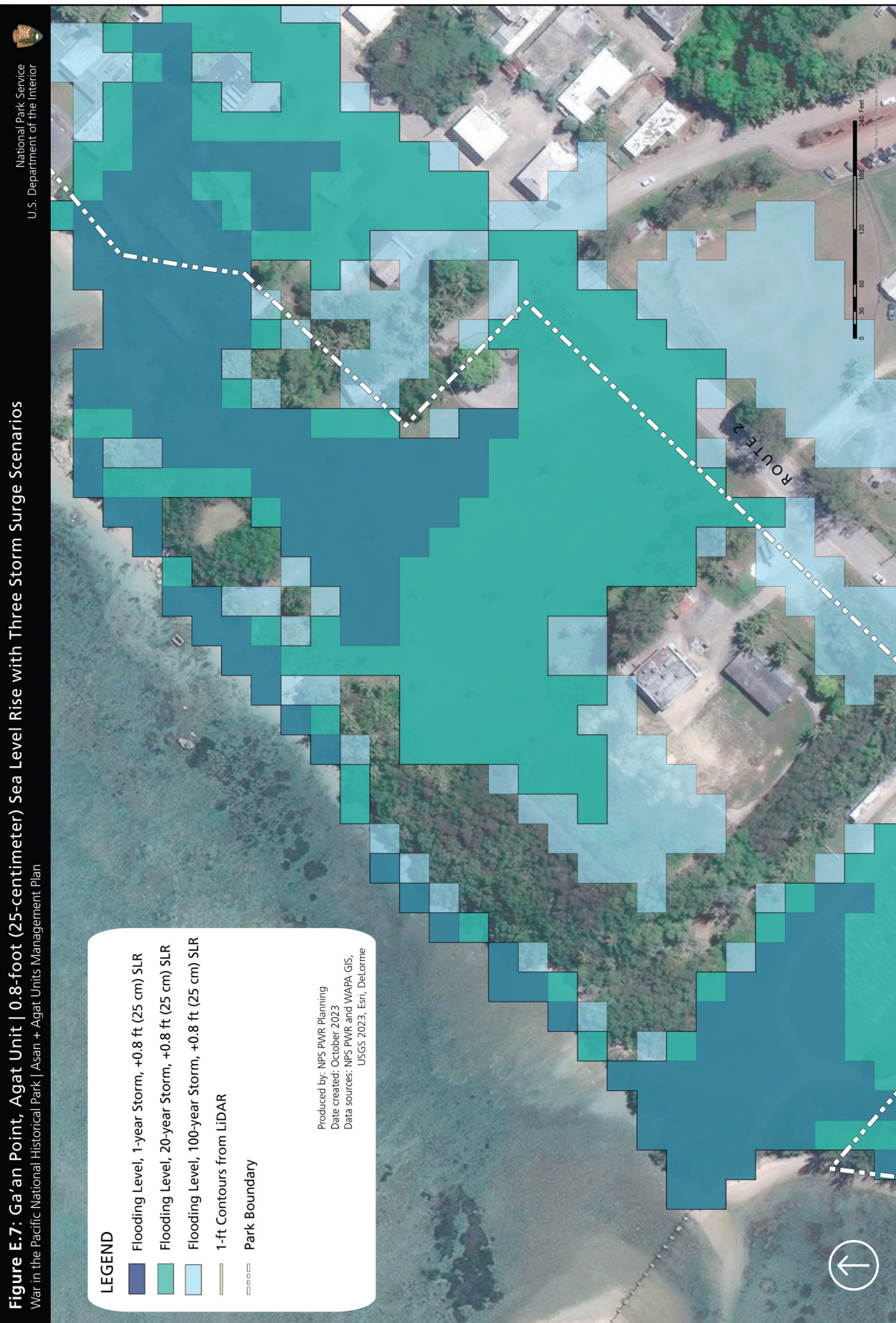
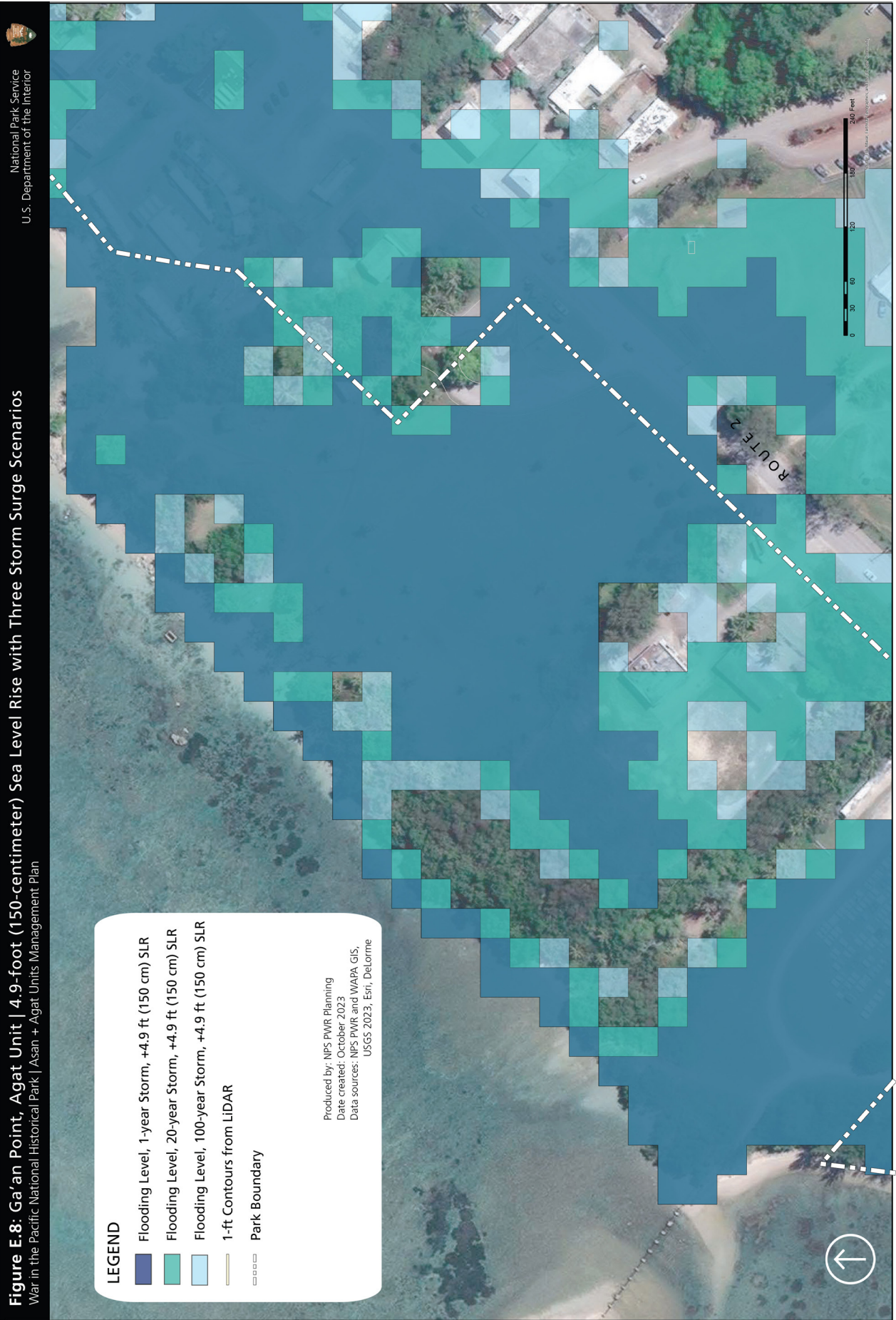


Figure E.8: Ga'an Point, Agat Unit | 4.9-foot (150-centimeter) Sea Level Rise with Three Storm Surge Scenarios
 War in the Pacific National Historical Park | Asan + Agat Units Management Plan



As described in Chapter 1: Introduction, this worst-case scenario was identified by the planning team in consultation with the NPS Climate Change Response Program, based on the global range of sea level rise predicted by the 2020 *Climate Change in Guam* report by the Pacific Islands Regional Climate Assessment (PIRCA 2020). While the report projects a global range of sea level rise between 0.5 and 1.2 feet (15.2 and 36.5 centimeters) by 2050, and a range of 1.0 to 4.3 feet (30.5 to 131.1 centimeters) by 2100, it states that sea level rise on Guam is expected to be higher than the global average (PIRCA 2020, 23). Given the uncertainty of global climate models and emerging science suggesting that sea level rise could occur more quickly than predicted, the NPS has identified the more accelerated scenario of 4.9 feet (150 centimeters) as the worst case for planning purposes of this UMP.

However, the NPS recognizes that lesser sea level rise scenarios will still result in increased coastal flooding. For this reason, as noted above, the removal or relocation of facilities is divided into two phases to illustrate the park's plan for managed retreat. Phase 1 corresponds to sea levels between the current level and 0.8 feet (25 centimeters) in sea level rise. Phase 2 is triggered when the 0.8-foot (25-centimeter) sea level is reached or in the event of a catastrophic event/sudden loss (e.g., a storm event). The 0.8-foot (25-centimeter) threshold was also identified in consultation with the NPS Climate Change Response Program. In view of the uncertainty around the projected rate of sea level rise, these phases are defined by sea level rather than according to a specific window of time. See figures E.3–E.8 for illustrations of the two sea level rise phases. Additional detail regarding the transition from phase 1 to phase 2 can be found in Chapter 2: Alternatives.

The first phase of the proposed action removes facilities that are at imminent risk of flooding or loss. The second phase of the proposed action removes facilities that are likely to be at risk in the future due to rising sea levels, increasing storm intensity, and potential reduction in coastal resiliency due to declining coral reefs that functionally

serve to attenuate wave energy reaching the shoreline, among other ecosystem services. Small scale facility investments are also proposed in the plan under both phases to shift visitor use to areas that are more resilient to coastal flooding. The addition of bioswales near parking areas and circulation routes and expanded stormwater infiltration capacity are proposed at both coastal units to expand their ability to absorb overland water flows. Phase 1 and 2 actions are illustrated in figures 2.3–2.8 in Chapter 2: Alternatives.

At the Asan Beach Unit, phase 1 actions include removing and re-vegetating a portion of the western paved parking lot closest to the point (sometimes called the “lower parking lot”) and the pedestrian walkway along the shoreline around the point. In addition, phase 1 proposes the installation of a new walking path made from pervious materials along the current road and the base of the ridge, which would connect to the Assan Ridge trail system as well as the existing paved shoreline path and would continue to provide direct public beach access. Phase 1 also includes the relocation of the monuments from along the shoreline to higher, more protected ground at the base of Assan Ridge or elsewhere in the park or on the island. The first phase additionally proposes constructing a small open-air shelter for interpretation near the base of Assan Ridge on higher ground.

Phase 2 at Asan Beach involves removing and revegetating the remaining, eastern portion of the lower shoreline parking lot and a portion of the entrance drive that are anticipated to flood regularly. Phase 2 additionally includes removing the current paved shoreline walking path and relocating it further inland using pervious materials, relocating existing shoreline picnic areas further inland, and replacement of the existing restroom with a portable toilet further inland.

In the Agat Unit, phase 1 actions include expanding visitor use to higher ground at Rizal Point, which will be more resilient to sea level rise and coastal flooding in the long term. This would be achieved by constructing a pervious trail (for example using compacted coral) between Apaca and Rizal Points,

providing 4 to 5 new picnic tables along that trail, constructing a small unpaved parking area along Shoreline Drive, and restoring an abandoned driveway to provide an accessible pedestrian path to Rizal Point. Interpretive waysides would also be added at Rizal Point at the overlook area and along the walking path between Rizal and Apaca Points, and an interpretive kiosk would be installed at Rizal Point near the parking area. The abandoned restroom would be replaced by a portable toilet located further inland, also near the parking area.

In phase 2, the parking and picnic areas at Apaca Point would be removed due to projected flooding levels, and the riparian wetland would be expanded to absorb additional stormwater. Visitor use would transition fully to Rizal Point. Additionally, the lower portion of the walking path established between Apaca and Rizal Points could transition to a water-based route.

At Ga'an Point in the Agat Unit, phase 1 actions include removing the restroom that is currently being undermined by the river outfall. The restroom facility would be constructed to better withstand flooding and would likely consist of portable toilets. The restrooms would be relocated to the southwest to more stable and higher ground, though recognizing the USGS modeling still indicates this new location may experience inundation under certain scenarios. Phase 1 actions at Ga'an Point also include reconfiguring the existing parking area to improve its resilience to flooding; constructing an unpaved, compacted pedestrian trail through the site; and providing a few additional picnic tables. Phase 2 actions would include relocating the walking path further inland as needed and relocating the flags and guns to a location further inland. Once water levels rise above 4.9 feet (150 centimeters) or in the event of sudden damage or loss, the NPS would remove the restroom at Ga'an Point and shift formal visitor access opportunities north to Rizal Point.

Site Description

ASAN BEACH UNIT

The Asan Beach Unit (109 land acres [44 hectares], 445 water acres [180 hectares]) stretches from Punta Adilok (Adelup Point) to Punta Assan (Asan Point), and includes Assan Ridge, the landing beaches, and fringing coral reefs. The elevation of the Asan Beach Unit ranges from 0 feet (sea level) to 62 feet (19 meters) at the highest point, along Assan Ridge. This area was where the U.S. 3rd Marine Division came ashore, under heavy fire, to eventually retake Guam from the Japanese on July 21, 1944. It includes several memorials, a network of concealed caves, gun emplacements, and Japanese pillboxes. Past the reefs lie the remains of an American landing craft, called an amtrac, used to transport troops ashore, along with other submerged cultural resources related to WWII. The terrestrial portion of the unit also features developed visitor facilities and parking areas, coconut palms along the shoreline, and a large expanse of lawn. A trail leads along Assan Ridge through an intact remnant of limestone forest, allowing visitors to experience a rich diversity of native, culturally significant plants with views of the invasion beach below. The marine area protects exceptionally diverse aquatic life within the reefs.

Figure E.9: Asan Beach Unit | Current Sea Level with One-Year Storm
 War in the Pacific National Historical Park | Asan + Agat Units Management Plan



Figure E.10: Apaca and Rizal Points, Agat Unit
Current Sea Level with One-Year Storm
War in the Pacific National Historical Park | Asan + Agat Units Management Plan



Figure E.11: Ga'an Point, Agat Unit | Current Sea Level with One-Year Storm
 War in the Pacific National Historical Park | Asan + Agat Units Management Plan

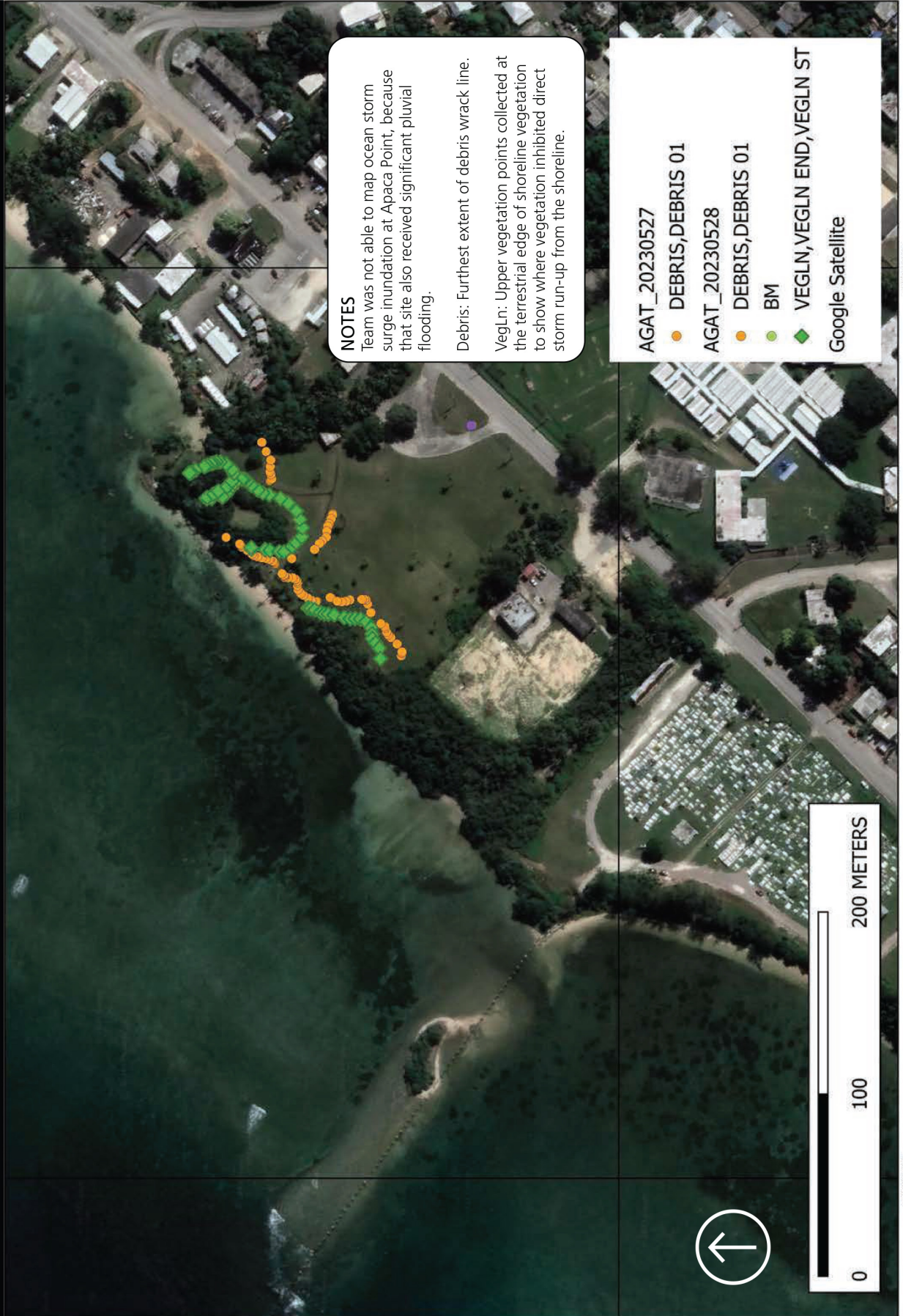


Figure E.12: Asan Beach Unit | Typhoon Mawar Inundation and Debris

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Figure E.13: Ga'an Point, Agat Unit | Typhoon Mawar Inundation and Debris



AGAT UNIT

The Agat Unit (38 land acres [15 hectares], 557 water acres [225 hectares]) includes Apaca Point, Rizal Point, Ga'an Point, Bangi Point, and Bangngi', Alutom, and Pelagi Islands. Apaca, Rizal, and Ga'an Points are the primary visitor use areas in the unit. The elevation of the Apaca and Rizal Point area ranges from 0 feet (sea level) to 22 feet (7 meters) at Rizal Point, 10 feet (3 meters) at Ga'an Point, and 6 feet (2 meters) at Apaca Point. In this area on July 21, 1944, the U.S. 1st Provisional Marine Brigade followed by the 77th Army Infantry landed under heavy Japanese gunfire and took the southern beachhead. The unit features caves, bunkers, Japanese pillboxes, and a World War II latrine foundation. Ga'an Point was the geographic center of Japanese defense of the Agat beachhead and contains a former Japanese bunker, as well as a U.S. naval coastal defense gun and an anti-aircraft machine gun typical of those used in surrounding areas. Another fully intact amtrac is located offshore at Ga'an Point. Apaca Point, at the northernmost end of the unit, has Japanese defensive fortifications from World War II built into its natural ridge. Because of the extensive fortifications, and the difficulty of the ridge's terrain, Apaca Point was avoided during the southern landing of American forces in July of 1944.

Today, the area contains various species of lush mixed grasses as well as woodland and coastal strand vegetation above the high tide line. As with the Asan Unit, the offshore portion of Agat is a rich and diverse fringing coral reef ecosystem and contains an array of WWII-related cultural resources that still remain.

General Nature of Flooding and Associated Floodplain Processes

The coastal units of Asan Beach and Agat receive both coastal and overland, or riverine and pluvial, flooding. The description of floodplain processes below is divided into these two categories, though it is noted that flooding concerns are primarily related to coastal processes.

COASTAL FLOODING AND COASTAL HAZARDS

Sea Level Rise and Storm Surge

The park is already experiencing the impacts of storm surge to coastal facilities, such as parking areas and walkways. The storm surge model provided by the USGS Coastal and Marine Hazards and Resources Program illustrates that even a one-year storm at current sea level results in flooding at the park's coastal units: see figures E.9–E.11 (USGS 2023a). The Punta Assan area at Asan Beach Unit and the eastern area of Ga'an Point are especially susceptible, as illustrated by the impacts of Typhoon Mawar in May 2023: see figures E.12–E.13. The 20- and 100-year storms result in increased flooding to all coastal sites (Asan Beach, Apaca Point, and Ga'an Point).

Projected sea level rise due to climate change will exacerbate flooding from storm surge. In addition, climate change-driven impacts to coral reefs, such as coral reef bleaching, are expected to worsen in the future and could result in reef loss, which could have devastating effects for marine ecosystems and could reduce the natural flooding and storm protection (via wave attenuation) that reefs provide to the shoreline (PIRCA 2020).

Typhoons

Guam is located in the western Pacific Ocean, in an area known as "Typhoon Alley" due to the frequency and intensity of tropical cyclones. The island has been hit by six significant typhoons in the past ten years, including Mawar (2023), Hagibis (2019), Wutip (2019), Yutu (2018), Mangkhut (2018), and Dolphin (2015) (Dobson et al. 2021). Typhoon Mawar in 2023, landing as a category 4 storm, is the most recent severe storm to hit the island, striking with maximum sustained winds of 140 miles (225 kilometers) per hour with peak gusts at 165 miles (266 kilometers) per hour. Typhoons can cause coastal flooding that can result in damage to the reef ecosystem, trees, buildings, roads, and utilities. Climate change projections indicate that while typhoons are expected to decrease in frequency in the future, they are likely to deliver higher wind speeds and increased rainfall (PIRCA 2020).

Typhoons develop over days to weeks and are monitored by the National Weather Service and others. There is sufficient time for officials to warn the public of incoming storms and associated risk, as well as to order evacuation when necessary.

Tsunamis

Tsunamis are a series of waves most commonly caused by large earthquakes below or near the ocean floor on thrust faults associated with subduction zones. Tsunamis can also be caused by undersea landslides. Tsunamis differ from ordinary ocean waves and storm surges in that the entire water column from the sea floor to the ocean surface is displaced, not just the upper few feet of the ocean surface as with ordinary ocean waves. As tsunamis enter shallower coastal waters, the speed of the wave slows down and the height increases. A wave that may be only 3 feet (0.9 meters) high or less in the ocean may climb to more than 60 feet (18 meters) when it hits the coastline.

Tsunamis can cause great loss of life and property damage where they come ashore. The first wave is almost never the largest; successive waves may be spaced tens of minutes apart and continue arriving for many hours. All low-lying areas along the Pacific Coast of the U.S. and in the Pacific Islands are subject to inundation by tsunamis.

Very large earthquakes anywhere around the Pacific Rim may cause a distant source tsunami that could strike the War in the Pacific NHP coastline. The first waves would reach the coastline many hours after the earthquake occurred depending on the distance of the quake from the park. Tsunami Warning Centers will alert local officials, who may order evacuation along the Guam coastline.

The effects of a distant-source tsunami on War in the Pacific NHP may be negligible or severe, depending on the magnitude of the earthquake, the distance of the earthquake from the park units, and the direction of approach. Valley mouths or inlets are more vulnerable than exposed coastlines because the height of the waves may increase as the wave energy becomes concentrated

as it moves through a constricted valley/inlet entrance.

If a large earthquake occurs within the Mariana Islands, this could produce a local source tsunami and the first waves may reach the coast within minutes after the ground-shaking stops. There may be no time for authorities to issue a warning. People on the beach or in low coastal areas would need to move to higher ground as soon as the ground-shaking stops and stay away from low-lying coastal areas until an official “all clear” is broadcast. Locally generated tsunamis constitute the most serious threat because they can strike suddenly, before a tsunami warning system has been activated and sometimes before ground-shaking stops.

Lack of information about how tsunamis behave is widely responsible for loss of human life in many situations. Often the damage from a tsunami is caused not by the water but by large amounts of debris carried in the water. The arrival of a tsunami may be preceded by a withdrawal of water from the coastline. Tsunamis are not breaking waves like those usually seen along a beach, but most often hit the coast as debris-filled turbulent water. Debris entrained in the tsunami strikes whatever is in its path and can cause extensive damage to structures. Strong currents are also a common feature of tsunamis and can cause extensive scour and deposition of debris.

The [tsunami evacuation zone](#) for Guam was modeled in 2009 by the National Oceanic and Atmospheric Administration (NOAA) Pacific Marine Environmental Lab. NOAA modeled five bays vulnerable to tsunami damage, including Apra Harbor, Tumon Bay, Pago Bay, Agana Bay, and Inarajan Bay. This was done by developing digital elevation models (DEM) for the bays and testing them against historical data and preliminary worst-case inundation scenarios. Three different magnitude earthquakes (Mw 7.6, 8.8 and 8.9) were modeled on twelve subduction zones with more than 1,200 scenarios to determine the tsunamigenic (tsunami-generating earthquake) source regions. The results were combined with data from tsunami catalogues and geological information to

determine the scenarios that were used in the final inundation study, where the maximum run-up heights, inundation distances, and numerical wave gauge results were computed with the high-resolution DEM grids for the most dangerous Pacific-wide tsunami scenarios (NOAA 2009).

RIVERINE AND PLUVIAL FLOODING

FEMA Flood Insurance Rate Maps (FIRM) for Guam include areas prone to riverine and pluvial flooding and have an effective date of September 28, 2007 (FEMA 2023). In addition to coastal flood hazard zones, the FEMA maps illustrate a 500-year floodplain (area with a 0.2% chance of flooding annually) within the Asan Beach and Asan Inland Units in the vicinity of the Saddok Assan (Asan River), as well as along the Saddok Matgue (Matgue River) primarily in the Asan Inland Unit. The Saddok Assan is additionally identified as a regulatory floodway within the coastal flood hazard zone. The FEMA FIRM maps do not indicate any other pluvial or riverine flooding zones within the four units.

Most overland flooding zones mapped by FEMA are included within the projected flooding zones from the USGS coastal model (USGS 2023a), with the exception of the Saddok Matgue 500-year floodplain. Although coastal and riverine and pluvial flooding are described separately, this is due to the limitations of current models. In reality, coastal and overland flooding will interact in a storm situation to exacerbate the effects of each. Rising groundwater will also likely occur due to sea level rise and would further increase flooding. Anecdotally, park staff have observed pluvial flooding from strong storm systems occur in lower areas of the park that are also projected to flood in the coastal storm surge model. These include the vulnerable parking areas at Asan Beach Unit, the parking and picnic areas at Apaca Point, and the mouth of the drainage at Ga'an Point.

Site-Specific Floodplain Values

Floodplain values for the park's coastal units include natural and cultural resources as well as important community recreation

opportunities. In terms of natural resources, the shoreline and coastal plain within the park boundary provide habitats for a rich diversity of marine and terrestrial species, as well as natural flood and erosion control in the form of vegetated and "soft" (i.e., non-armored) shorelines.

Coastal vegetation stabilizes the unconsolidated sediment that primarily comprise these units. Additionally, vegetation, along with the offshore coral reefs, provide valuable ecosystem services and enhance coastal resiliency by dissipating storm surge/wave energy, and thereby reduce the velocity of and potentially extent of flooding. This action can minimize bank and bluff erosion, sand overwash, debris, and overall damage, and may offer more time for visitors to evacuate the area if present during a storm.

For cultural resources, the beach, shoreline vegetation, and level open space created by the coastal plain comprise important contributing features to the park's cultural landscape. These topographical and spatial characteristics help convey the trajectory of the 1944 Battle of Guam and are little changed to this day. These coastal landscapes also protect historic structures and archeological resources from World War II and may include archeological resources from other eras. Ethnographic resources associated with these sites are fishing and marine resources, the gathering of traditionally used plants, and locations associated with CHamoru myths and stories.

From a visitor use and recreation perspective, the park's floodplains offer an important opportunity to access the beach and marine environment. Trails and lawn provide spaces for walking, running, picnicking, events, and quiet contemplation.

JUSTIFICATION FOR USE OF THE FLOODPLAIN

The park's primary visitor use locations are along the coast. These sites were the invasion beaches where US troops first landed to re-take Guam from the Japanese in 1944 and contribute significantly to the reason the park

was established in 1978. The coastal units provide an important place to commemorate the lives lost during the War in the Pacific both on Guam and throughout the entire Pacific Theater. There are no alternative sites outside the coastal high-hazard/tsunami evacuation zone where the invasion beaches can be experienced by visitors. These sites additionally serve a highly valued role as an open space for community recreation for the people of Guam, where such green spaces are comparatively limited.

Current uses within the floodplain are limited to existing day-use facilities that are minimal both in scale and impact to floodplain processes. At both units, these include paved and unpaved walkways and parking areas, picnic tables, and signage. In addition, there are two small restroom facilities (one at Asan Beach Unit and the other at Ga'an Point in the Agat Unit) and six commemorative monuments at Asan. As noted above, the plan's proposed action calls for the removal of facilities that are in the most highly vulnerable areas through a process of managed retreat. Some of these facilities will be relocated further inland within the units to allow continued public access for as long as reasonably possible.

The proposed action identifies opportunities to make targeted minor facility investments. Where possible, these investments will take place in locations that are likely to be more resilient to coastal flooding in the long term, based on the sea level rise and storm surge scenarios illustrated by the USGS model, "Forecasting Storm-Induced Coastal Flooding for 21st-Century Sea Level Rise Scenarios in the Hawaiian, Mariana, and American Samoan Islands" (USGS 2023a).

These higher-resilience locations include the Rizal Point area at the Agat Unit, where an existing ridge is expected to provide protection from coastal inundation, as well as the base of the Assan Ridge within the Asan Beach Unit.

Minor investments will take place in areas that may experience flooding based on the USGS model outputs. These actions are

determined to be justified because there are no practicable options outside of the floodplain. The entirety of the Asan and Agat Units are within the tsunami evacuation zone. Additionally, the USGS model outputs indicate that the Asan and Agat Units will experience partial or complete flooding under the most conservative sea level rise (59 inches or 150 centimeters) coupled with three storm (1-, 20-, 100-year) scenarios. The proposed actions support managed retreat by removing current facilities that are at high risk and relocating some of those facilities further inland to reduce potential harm to people and resources. These actions are intended to balance coastal impacts from climate change (e.g., flooding from storms and sea level rise) with providing access to these locations that are recognized to be of significant value to the public.

It should be noted that some facilities are proposed within the modeled flood zone instead of locations outside of it when the impacts/harm to resources are considered to be greater than the potential risk reduction. For example, at the Rizal Point area of the Agat Unit, the proposed parking lot is planned to be located within the floodplain because moving it outside would require substantial clear-cutting of trees and result in additional adverse impacts to natural resources and the cultural landscape.

For all locations, permeable construction materials such as compacted crushed coral and light-footprint approaches such as portable toilets would be utilized to further reduce the impact on floodplain processes. Proposed trail development in the park's inland units of Asan Inland and Mt. Alifan would also serve to relocate visitor access opportunities to alternative sites outside of the coastal high-hazard zone.

For any action, efforts would be taken to minimize activities that could reduce coastal resiliency. For example, vegetation should remain intact (or enhanced) where possible; removing vegetation can destabilize the sediment and increase flooding risk, velocity, and extent. Trails should be constructed a sufficient distance inland from the beach/

bluff-land interface so as not to accelerate erosion and to ensure visitor safety.

DETERMINATION OF ACTION CLASS AND REGULATORY FLOODPLAIN

NPS proposed actions that may adversely affect floodplains must comply with Executive Order 11988 and Director's Order #77-2: Floodplain Management, which requires the preparation of a Floodplain Statement of Findings if the action falls within the defined regulatory floodplain. Actions are grouped into three classes to identify the regulatory floodplain.

The floodplain for class I actions (the location or construction of administration, residential, warehouse, and maintenance buildings, non-excepted parking lots, or other man-made features) is defined as the 100-year floodplain, or base floodplain. This area has a one percent or greater chance of flooding annually. Class II actions are defined as "critical actions" and include schools, hospitals, fuel storage facilities, irreplaceable records, museums, and storage of archeological artifacts. These activities have a regulatory floodplain of 500 years (or locations with a 0.2 percent annual chance of flooding).

Class III actions are any class I and II actions that are located in high-hazard areas, including coastal high-hazard areas and areas subject to flash flooding.

The regulatory floodplain for class III actions is therefore the floodplain associated with the extreme flood, such as the probable maximum flood, which for coastal sites would correspond with the coastal high hazard or tsunami evacuation zone. Because the Asan Beach and Agat Units are located within the tsunami evacuation zone for the island, the actions proposed in the plan for these locations are considered class III actions.

DETERMINATION OF APPLICABILITY OF FEDERAL FLOOD RISK MANAGEMENT STANDARD

Executive Order 13690, Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input, was issued in January 2015 to further improve the nation's resilience to floods and to ensure new federal infrastructure will last as long as intended. Executive Order 13690 establishes a more rigorous federal flood risk management standard (FFRMS) that requires federal agencies to choose one of three methods for establishing a higher vertical flood elevation beyond the guidelines provided in Executive Order 11988. These three methods are defined as:

- Climate Informed Science Approach (CISA): The elevation and flood hazard area that result from using the best-available, actionable hydrologic and hydraulic data and methods that integrate current and future changes in flooding based on climate science;
- Freeboard Value Approach (FVA): The elevation and flood hazard area that result from adding an additional 2 feet to the base flood elevation for non-critical actions and by adding an additional 3 feet to the base flood elevation for critical actions; or
- 500-year floodplain: The area subject to flooding by the 0.2% -annual-chance flood (FEMA 2023).

Proposed actions that include federal funding, such as this unit management plan (UMP), are subject to the additional FFRMS. The UMP is following the Climate Informed Science Approach to establish a higher vertical flood elevation. The CISA-identified vertical flood elevation is determined by the USGS model, "Forecasting Storm-Induced Coastal Flooding for 21st-Century Sea Level Rise Scenarios in the Hawaiian, Mariana, and American Samoan Islands" (USGS 2023a).

As described above, these models provide predicted flooding extents for various scenarios that combine storm surge and sea level rise. The scenarios consider one-year, 20-year, and 100-year storm events integrated with 0 feet, 0.8 feet, 1.6 feet, 3.3 feet, 4.9 feet, 6.6 feet, 9.8 feet (0cm, 25cm, 50cm, 100cm, 150cm, 200cm, and 300cm) of sea level rise. For this analysis, the one-year and 100-year storm events with 4.9 feet (150cm) of sea level rise were primarily considered.

In addition to the USGS model outputs, the [NOAA Sea Level Rise Viewer](#) was also used to assess predicted future conditions. However, this output reports a “mapping confidence” of “low” for Guam, and professional judgement of NPS Water Resources Division staff from on-site experience determined that the output was underpredicting inundation at the Asan and Agat Units. Therefore, the USGS modelling served as the primary data for analysis, as it was determined to provide more conservative and accurate outputs.

Regardless of information provided by the USGS and NOAA data, all proposed actions are considered class III actions because the Asan Beach and Agat Units are located within the tsunami evacuation zone for the island (refer to figures E.1 and E.2).

DESCRIPTION OF SITE-SPECIFIC FLOOD RISK

As noted above, the proposed action within the Asan Beach and Agat Units falls completely within the regulatory floodplain. The primary flood risk is from coastal flooding associated with sea level rise, storm surge from typhoons, and tsunamis. Advanced notice of incoming storms and tsunamis (with the possible exception of a local source tsunami) allows time for officials to issue public warnings and evacuations, which would reduce or eliminate hazards to human life and safety, as well as park resources.

With regard to time required for flooding to occur, sea level rise occurs gradually over time and poses no imminent risk. Flooding from storms is not instantaneous, providing time

for egress from the units in the event they are occupied during a storm event. Flooding from tsunamis poses the greatest risk upon arrival, as these waves tend to be rapidly flowing, debris-filled turbulent waters that would be difficult to avoid.

Conditions of Egress from the Site in the Event of Flooding

The Asan Beach Unit is located adjacent to a major highway on Guam (Marine Corps Drive), which can be easily accessed from the site in the event of sudden inundation. The open character of the unit also makes it possible to move quickly in various directions to escape flooding. Assan Ridge, along the unit’s west side, provides higher terrain that could additionally allow visitors to escape threatening storm surge (although it would not be an advisable location to shelter from a tsunami).

Ga’an Point in the Agat Unit is located immediately adjacent to another large highway, Route 2, which runs north-south along the island and connects to routes heading inland. Like Asan Beach Unit, the open character of Ga’an Point allows movement in various directions to escape flooding.

Rizal and Apaca Points in the Agat Unit have egress locations along Shoreline Drive, which leads to Route 2. Vegetation within this area constricts to a certain degree the free movement across the site, although the additional pedestrian walkways and parking in the proposed action will increase the ease of circulation and egress.

DESCRIPTION AND EXPLANATION OF FLOOD MITIGATION PLANS

Mitigation Plans for Flooding and Coastal Hazards

As described above, the plan’s proposed action calls for the removal of facilities that are in the most highly vulnerable coastal areas through a process of managed retreat.

Enhanced vegetation along the shoreline and at river mouths, and restoration of previously paved areas with vegetation would contribute to greater long-term resilience to flooding and enhance the sites' floodplain values. The park would increase current coral restoration efforts as well, which would similarly increase protection from coastal flooding in the long term via wave attenuation. The addition of bioswales near parking areas and circulation routes and expanded stormwater infiltration capacity will also mitigate riverine and pluvial flooding.

The limited new facility investments that are proposed are still primarily located within the floodplain, but in more resilient (higher-elevation or further inland) areas. Note that facilities are intended for day-use and do not involve overnight occupation. Facilities would be designed to adapt to, withstand, and/or rapidly recover from a flood event, meeting the intent of the standards and criteria of the National Flood Insurance Program (44 CFR Part 60). These new facilities include relocation of small day-use parking lots, foot trails, picnic tables, restrooms, and new interpretive kiosks. In the event of catastrophic loss or sea levels exceeding the thresholds identified in the proposed action, facilities would not be replaced in-kind. Some visitor amenities, such as shoreline pathways, could transition to water-based routes; whereas other infrastructure may be removed completely, as described above under "Description of the Proposed Action and Flood-Related Elements."

In addition to the measures described above, risk to life and property at War in the Pacific NHP would be further minimized by:

- Posting signs at the beach advising about the danger of tsunamis, storm surge, sneaker waves, undertows, and rip currents;
- Encouraging visitors to adopt a vigilant attitude (keep attention focused on the water rather than turning their back to the ocean) and to describe swimming techniques for escaping undertow and rip currents;

- Providing information about tsunami hazards and evacuation procedures;
- Providing information about storm surge and sea level rise; and
- Continuing to maintain a superintendent-approved All-Hazards Emergency Response Plan, which includes an evacuation plan for tsunamis and other extreme coastal hazards.

TSUNAMI EVACUATION PLAN

Current tsunami evacuation maps for Guam are available online from the Guam Homeland Security Office of Civil Defense website (<https://ghs.guam.gov/programs/natural-disasters/tsunamis>). The maps illustrate areas that are within the evacuation zone, areas that are within the safe zone, and assembly areas identified for each region.

The assembly area for Asan Beach is the Top o' the Mar parking lot, as identified in the [Piti/Asan evacuation map](#). The assembly areas for Ga'an Point are illustrated in the [Agat/Santa Rita evacuation map](#) and include Oceanview Middle School and Southern High School. The assembly area for Apaca and Rizal Points is also Southern High School: while the Navy Exchange/Commissary site is depicted on the [Apra Harbor evacuation map](#), this site is only accessible to military personnel.

The NPS would undertake tsunami warning and evacuation procedures consistent with the directions given by local emergency services agencies and would participate in island-wide exercises to prepare for future tsunami events.

SUMMARY

The NPS concludes that the proposed action would not appreciably increase the impacts of coastal hazards associated with tsunamis, storm surge, or riverine and pluvial flooding at War in the Pacific NHP. Rather, the proposed action is intended to facilitate managed retreat and reduce coastal hazards-related risk to human safety and resources. Coastal hazards and overland flooding are expected to occur within the Asan Beach and Agat Units, but precise timing and magnitude is unpredictable.

The NPS will monitor weather and sea conditions during all seasons and will post additional warnings, increase beach patrols, and/or close access to the coastal units during periods of hazardous conditions.

Distant seismic events capable of generating a tsunami typically allow time for warning and evacuation, which would reduce or eliminate hazards to human life and safety, but local seismic events may limit warning times.

There is no mitigation that can be prescribed for the infrastructure and facilities along the coastline. However, the proposed action would reduce the overall facility footprint within the tsunami evacuation zone and minimize any facility loss that may occur. Additionally, the facility investments are minor in recognition that they are located within the floodplain and are susceptible to varying levels of risks.

While adverse impacts to property, safety, and human life could occur from unpredictable seismic events and storm surge over the long term, there is no practicable way to avoid these impacts and continue to provide public access to the landing beaches, which are a fundamental resource and value of the park and contribute to the natural coastal resiliency of the island. Therefore, the National Park Service finds the proposed action to be acceptable under Executive Order 11988 for the protection of floodplains.

APPENDIX F: NATIONAL-REGISTER LISTED HISTORIC PROPERTIES AND LIST OF HISTORIC STRUCTURES AND ARCHEOLOGICAL RESOURCES

**Table F.1: National-Register Listed Historic Properties and
Character-Defining Features within the Area of Potential Effects**

The table below lists the five historic properties within the planning area that are currently individually listed in the National Register of Historic Places. See figures F.1 and F.2 for a map of these historic properties within the Area of Potential Effects.

HISTORIC PROPERTY	DATE LISTED IN THE NATIONAL REGISTER	CHARACTER-DEFINING FEATURES	ASSESSMENT OF ADVERSE EFFECTS
War in the Pacific National Historical Park (all units)	1978	<ul style="list-style-type: none"> • Topographical characteristics of the battlefield, including the shoreline, coastal plain, and rugged upland terrain • Natural systems and features including coral reefs, dense vegetation, and river drainages • World War II Japanese fortifications and archeological resources (see list below) 	No adverse effect
Memorial Beach Park (Asan Beach Unit)	1974	<ul style="list-style-type: none"> • Reef, topography, and spatial organization defining the Asan invasion beach during the war • Mouth of the Saddok Assan (Asan River) • Spatial relationship between beach, coastal plain, and upland terrain and influence on the battle 	No adverse effect

HISTORIC PROPERTY	DATE LISTED IN THE NATIONAL REGISTER	CHARACTER-DEFINING FEATURES	ASSESSMENT OF ADVERSE EFFECTS
Matgue (Nidual) River Valley Battle Area (Asan Inland Unit)	1975	<ul style="list-style-type: none"> • Saddok Matgue (Matgue River) mouth and valley • Topographic characteristics of the Saddok Matgue valley and upland terrain • World War II archeological resources (caves; see list below) 	No adverse effect
Asan Ridge Battle Area (Asan Inland Unit)	1975	<ul style="list-style-type: none"> • Topographic characteristics of Assan Ridge, Bundschu Ridge, Chorrito Cliff and relationship to coastal plain below • Saddok Assan • World War II Japanese fortifications and archeological resources (see list below) 	No adverse effect
Agat Invasion Beach (Agat Unit)	1975	<ul style="list-style-type: none"> • Reef, topography, and spatial organization defining the Agat invasion beach during the war • World War II Japanese fortifications and archeological resources (see list below) 	No adverse effect
Asan Invasion Beach (Asan Beach Unit)	1979	<ul style="list-style-type: none"> • Reef, topography, and spatial organization defining the Asan invasion beach during the war • Mouth of the Saddok Assan • Spatial relationship between beach, coastal plain, and upland terrain and influence on the battle • World War II Japanese fortifications and archeological resources (see list below) 	No adverse effect

The list of historic structures and archeological resources below was developed based on the park's 2013 and 2003 cultural landscapes inventories, and Protocols for Assessment of Vulnerability of Historic Resources to Climate Change (Peterson et al. 2013).

ASAN BEACH UNIT

Historic Structures

- Asan Japanese Emplacement (Park ID 61, LCS ID 21207)
 - *This pillbox was constructed into the rock cliff at Punta Assan (Asan Point). It is located on the beach side of the ridgeline towards Marine Corps Drive. This reinforced concrete structure has one front wall embrasure and two side firing ports.*
- Asan Japanese Emplacement (Park ID 62, LCS ID 21208)
 - *This pillbox is located on the beach side of Assan ridgeline nearest the road. This pillbox uses a reinforced-concrete roof and a concrete wall faced with rock to enclose a natural crevice in the rock escarpment.*
- Asan Point Japanese Gun Emplacement (Park ID 64, LCS ID 21210)
 - *This pillbox is built into the western rock cliff of Punta Assan. It is the first gun emplacement at the bottom of the stairs leading from the ridgeline, and the further emplacement away from Marine Corps Drive. Built into the rock cliff, this pillbox has concrete walls around the front opening.*
- Asan Gun Base (Park ID 69, ASMIS ID WAPA00083.00)
 - *The feature is a gun base constructed of metal and halfway buried in the soil.*
- Asan Japanese Tunnel (Park ID 106, ASMIS ID WAPA00038.00)
 - *This feature is a 7.5-foot-long by 5-foot-wide by 5-foot-tall manmade cave constructed in a limestone cliff. The site*

is located on the east side of the Assan ridgeline near Marine Corps Drive.

- Double Gun Emplacement on Asan Ridge (Park ID 116, LCS ID 56571)
 - *These gun emplacements are located at the top eastern side of the Assan ridgeline; one overlooks Asan Bay and the other overlooks Piti. The two concrete structures are set into the hill.*

Archeological Resources

- Offshore Japanese Pillbox (Park ID 102, ASMIS ID WAPA00045.00)
 - *This feature is a reinforced concrete pillbox that is overturned and is located approximately 40 feet offshore of Asan Beach.*
- Asan Point Stone and Concrete Wall (Park ID 63, other ID TBD)
 - *Coral rock and concrete wall erected by the Japanese for the protection of the crevices which they used for storage or shelter. At the base of the west side of Punta Assan.*
- Camel Rock Ammunition Dump (Park ID TBD, ASMIS ID WAPA00128.00)
 - *The Camel Rock Ammo Dump was identified by Explosive Ordnance Disposal personnel in 1978. It was described as an extensive scatter of ammo ranging in size from .30 caliber to 500 lb. bombs, ranging from 30 to 130 feet in depth.*
- Amphibious Tractor Treads (Park ID TBD, ASMIS ID WAPA00127.00)
 - *Amphibious tractor treads were located during a survey by SRC and park submerged resources team in 1987. Located in 60 feet of water offshore, the remains are likely from LVT-type vehicles.*

Figure F.1: Area of Potential Effects and Historic Properties, Asan Beach + Asan Inland Units

War in the Pacific National Historical Park | Asan + Agat Units Management Plan

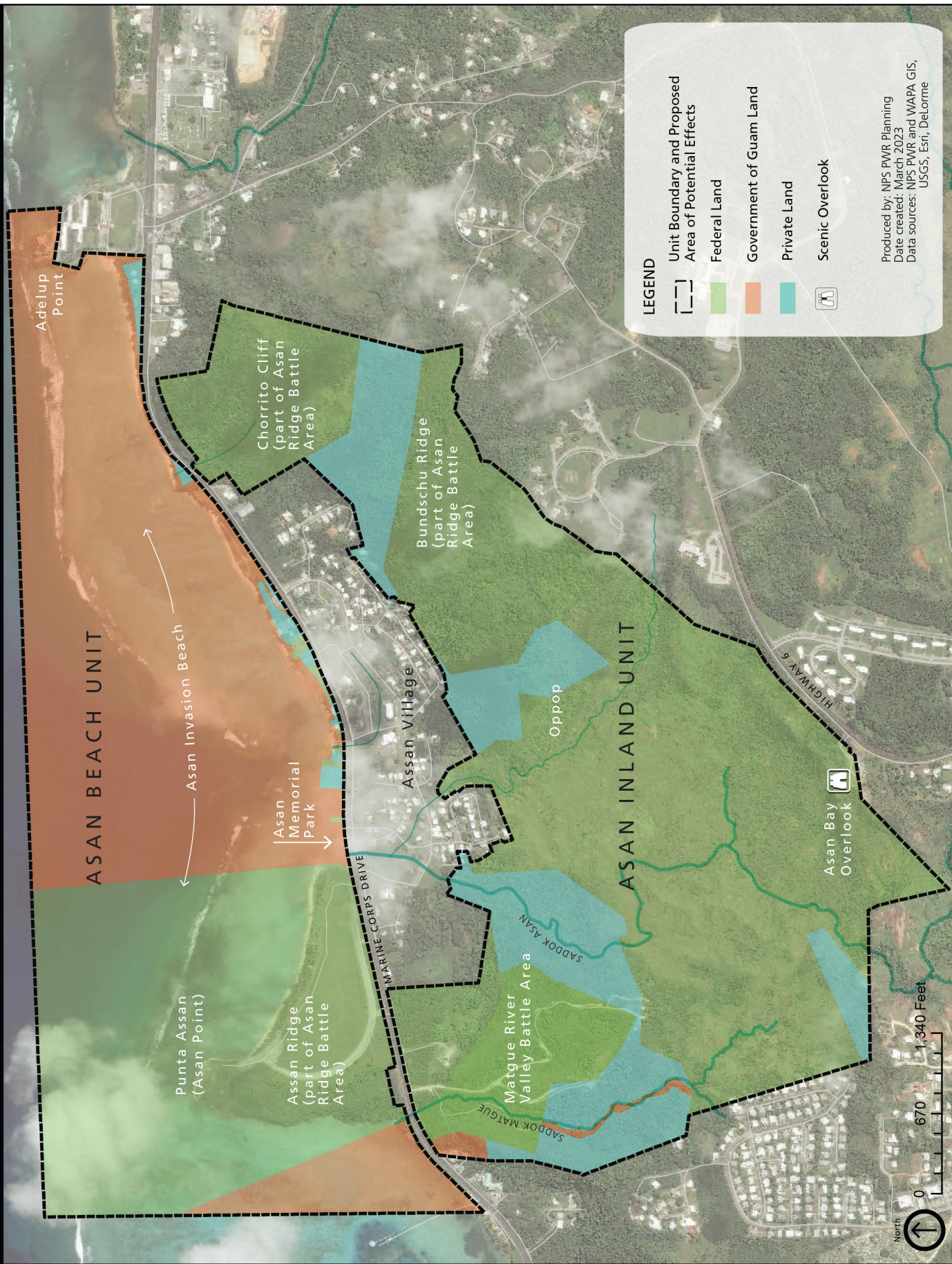
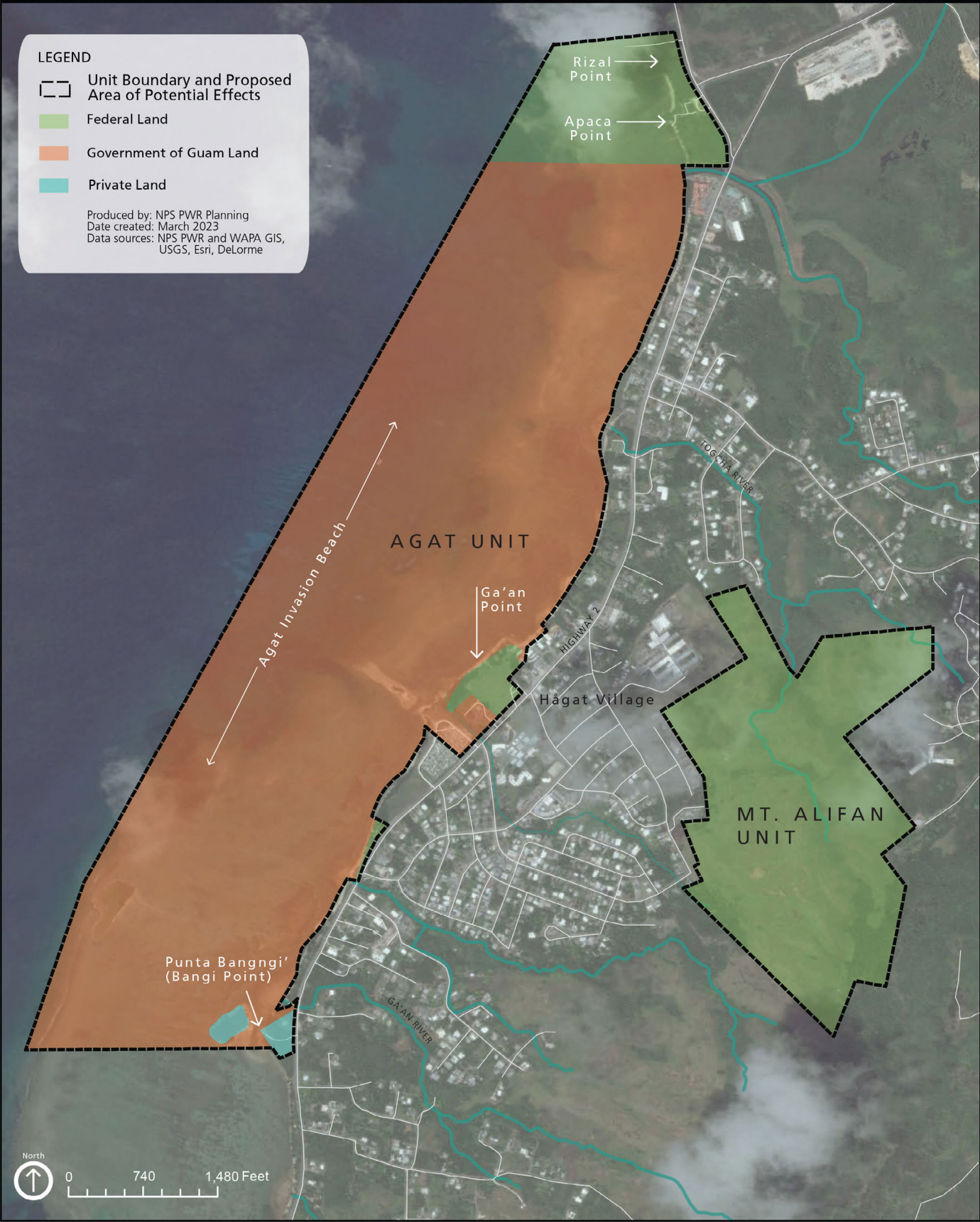


Figure F.2: Area of Potential Effects and Historic Properties, Agat + Mt. Alifan Units
 War in the Pacific National Historical Park | Asan + Agat Units Management Plan

National Park Service
 U.S. Department of the Interior



ASAN INLAND UNIT

Historic Structures

- Cave (Park ID 88, ASMIS ID WAPA00032.00)
 - *This feature is a 6.2-foot-wide by 4.5-foot-high manmade cave constructed on the west side of the road and dug out of the limestone cliff. The floor of the cave is level and the tunnel is uniform in shape.*
- Cave/Shelter (Park ID 97, ASMIS ID WAPA00035.00)
 - *This cave is 4.2-foot-long by 4.2-foot-wide by 5-foot-high and is dug out of a limestone cliff. The cave entrance faces east and is located directly off of the road.*

Archeological Resources

- Cave (Park ID 89, ASMIS ID WAPA00033.00)
 - *This cave may be a natural cave that was enlarged or is a man-made cave. It is right along the roadside. It is a shallow cave with a wide entry and measures approximately 6-foot-high by 10-foot-wide.*
- Japanese Cave (Park ID 94, ASMIS ID WAPA00034.00)
 - *This cave is 6-foot-wide by 5-foot-high and is dug out of the limestone cliff. The cave is one of a set of three caves high up on the cliff facing Asan Bay. It is located behind the maintenance shop.*
- Post WWII Tank Ruins (Park ID 96, ASMIS ID WAPA00112.00)
 - *This feature includes tank ruins that were constructed of metal. Most of it is buried in the ground and covered by soil and vegetation.*
- Bundschu Ridge Foxholes (Park ID TBD, ASMIS ID TBD)
 - *Company A's position, including foxholes, is located inside the park's Asan Inland Unit boundary.*

- Matgue River Area Cave System (Park ID TBD, ASMIS ID TBD)
 - *There are three caves built into a limestone cliff. The cave openings are approximately three feet wide and tall.*

AGAT UNIT

Historic Structures

- Apaca Point Japanese Bunker with Tunnel (Park ID 1, LCS ID 21190)
 - *This pillbox is located on the southeast corner of Apaca Point with the entrance on the land-ward side leading down an 8-foot tunnel to the pillbox that faces south. It is constructed of reinforced concrete built into a rock outcropping with a rubble-in-concrete exterior for camouflage.*
- Apaca Point Japanese Bunker (Park ID 2, LCS ID 21191)
 - *This pillbox has a reinforced concrete wall and roof constructed in a natural rock crevice at the water's edge.*
- Ga'an Point Japanese Bunker (Park ID 23, LCS ID 21194)
 - *Constructed at Ga'an Point, this large reinforced concrete pillbox has a fire control position or additional pillbox constructed above. The structures are built into a limestone escarpment.*
- Ga'an Point Japanese Bunker (Park ID 24, LCS ID 21195)
 - *This is a large Japanese pillbox constructed of an internal metal frame, with metal foundation posts, and a metal ceiling. The exterior of this structure consists of an outer layer of concrete. This feature is built into the side of a limestone hill or mound.*
- Bangi Point Japanese Pillbox (LCS 10)
 - *This reinforced concrete pillbox is located at the water's edge. The pillbox has two firing embrasures and a rifle slit, and the roof is embedded to act as camouflage.*

Archeological Resources

- Japanese Cave (Park ID 4, ASMIS ID WAPA00003.00)
 - *This cave was either man-made or was a natural cave enlarged to accommodate two to three men. The opening is approximately 4-feet-wide.*
- Rizal Point Japanese Bunker (Park ID 5, ASMIS ID WAPA00019.00/WAPA00122.00)
 - *This bunker is located on southeast corner of Rizal Point, on a rock outcropping in between Rizal Beach and Apaca Point in Agat Unit. This defense structure was built as part of the Japanese coastal defense units. Damaged during naval shelling, concrete sections lie on the beach and against the cliff side. The roof is the only part still intact and is leaning against the rock cliff.*
- Ga'an Point Caves (Park ID 23A, B, C, E; ASMIS ID WAPA00006.001, .002, .003, .005)
 - *There are four limestone caves associated concrete pillboxes at Ga'an Point that provided a field of fire over Agat Beach.*
- Apaca Point Japanese Tunnel (Park ID 103, ASMIS ID WAPA00046.00)
 - *Japanese coastal defense system tunnel connecting two pillboxes together at Apaca Point. The tunnel is enclosed by a concrete and rock roof.*
- Submerged LVT (Park ID 108, ASMIS ID WAPA00100.00)
 - *This site consists of a submerged LVT-4 Amtrac that is located in the water off Agat Beach, which was submerged during the U.S. invasion effort to cross the coral reef.*
- Submerged LVT (Park ID 109, ASMIS ID WAPA00101.00)
 - *This submerged LVT is off the coast of Agat. It is possibly an LVT-1 Amtrac.*
- American Pontoon Barge (Park ID TBD, ASMIS ID WAPA00129.00)

- *This site was located during a survey of park submerged resources in 1985. It is located south of Ga'an Point in 70 feet of water. The site consists of portions of a barge with hoist or crane assembly used to transfer fuel-oil drums and other supplies to amphibious vehicles.*

MT. ALIFAN UNIT

Historic Structures

- Pillboxes and Connecting Trenches (Park ID 49, LCS ID 56755)
 - *This site is composed of a pillbox complex with trenches that span approximately 130 feet. The two pillboxes that are connected by trenches are made of concrete.*

Archeological Resources

- Bomb Crater (Park ID 11, ASMIS ID WAPA00052.00)
 - *One crater is approximately 42 feet in diameter and 3-feet-deep.*
- Shell Crater (Park ID 14, ASMIS ID WAPA00055.00)
 - *This shell crater is a shallow depression that is completely inundated with vegetation.*
- Radio Tower (Park ID 16, ASMIS ID TBD)
 - *The ruins of a radio tower consist of a bent metal pipe and rebar in a concrete footing.*
- Gun Emplacements (Park ID 18, ASMIS ID WAPA00058.00)
 - *This site includes a gun emplacement and two caves. Cave Shelter 18a is located on a hill and is dug out facing northeast with a large boulder located at the cave entrance. Cave 18b is located on the other side of the hill and faces north. A trench runs north of the caves. A gun emplacement located at the top of the hill.*
- Japanese Gun Emplacements (Park ID 19, ASMIS ID WAPA000124.00)

- *This gun emplacement site consists of a ridge with a mound and depression. Shrapnel and empty cartridges are found around the site.*
- Bomb Crater (Park ID 19a-b, ASMIS WAPA00126.00)
 - *This site consists of a cave and a bomb crater. Feature 019a is a cave shelter dug out of the red dirt mounds at Mt. Alifan. Feature 019b is a crater that measures 19 feet by 16 feet, by 6.5-feet-deep.*
- Anti-Tank Trench and Gun Emplacement (Park ID 35, ASMIS ID WAPA00015.00)
 - *Located along the ridge is a depression with a gun emplacement located approximately 33 feet from an antitank trench. The trench measures approximately 13-feet-long.*
- Foxholes (Park ID 37, ASMIS ID WAPA00068.00)
 - *This site is a collection of foxholes situated on a high ridge above two ravines (one on either side). Previous surveys revealed that this site had 17 fox holes, but a 2006 six survey was only able to relocate 9 of the 17. Half of these features are inundated by vegetation and are filled with water.*
- Japanese Trenches and Cave (Park ID 38, ASMIS ID WAPA00016.00)
 - *This site consists of a foxhole and trenches with gun remnants. The foxhole is dugout of the side of a dirt clay mound and houses a 4-inch by 4-inch vent that connects with an unknown mound. Above the foxhole is a series of trenches that are inundated by vegetation.*
- Foxholes and Probable Gun Emplacement (Park ID 39, ASMIS WAPA00017.00)
 - *This site consists of a collection of foxholes and trenches. One depression, which appears to be manmade, is located at the base of a mound. There is a trench that runs east to west.*
- Gun Emplacements (Park ID 47, ASMIS ID WAPA00073.00)
 - *This site consists of a network of foxholes and trenches. There are several foxholes in the area as well as a trench that runs north to south for approximately 165 feet. There are three larger dug out areas branching off of this large trench.*
- Cave (Park ID 50, ASMIS ID WAPA00075.00)
 - *This is a man-made tunnel located in a clay hillside. There are entrances on both ends of the tunnel, which connect an upper portion of the hill with a gun emplacement. Both entrances are approximately 3-feet-wide and 6-feet-tall. The tunnel is approximately 26-feet-long. The gun emplacement faces the ridge.*
- Crater (Park ID 51, ASMIS ID WAPA00076.00)
 - *The depression is approximately 5 feet in diameter and is inundated with vegetation.*

APPENDIX G: LIST OF SECTION 106 CONSULTING PARTIES

Preliminary List of Parties Invited to Participate in Section 106 Consultation, July 2022

- Michael J. B. Borja, Director, Guam Department of Land Management
 - CHamoru Land Trust Commission
 - Guam Ancestral Lands Commission
- Hope Cristobal, Guahan Coalition for Peace and Justice
- Helen Grace B. Cuisia, Cultural Officer, Consulate General of the Republic of the Philippines
- Fuetsan Famalao'an
- Jose Garrido, Chairman, Task Force on Free Association—Commission on Decolonization
- Leonard Iriarte, President, Guma'Palu Li'e'; I Fanlalai'an Oral History Project
- Dave Lotz, Historian
- Patrick Lujan, SHPO/Division Supervisor, Guam State Historic Preservation Office
- Rufo Lujan, Ma'gas, Organization of People for Indigenous Rights
- Reid Nelson, Executive Director (Acting), Advisory Council on Historic Preservation
- Debbie Quinata, Maga'haga, Nasion Chamoru
- Joe Quinata, Chief Program Officer, Guam Preservation Trust
- John Salas, Regional Environmental Director, NAVFAC Marianas/Joint Region Marianas
- Frank Schacher, Tribal Chairman, Chamorro Tribe
- Rlene Santos Steffy, Oral Historian
- Speaker Therese M. Terlaje, 36th Guam Legislature
- Trini Torres, Chairperson, Pulong-Mago'haga-I Taotaomona Native Rights
- Melvin Won Pat-Borja, Executive Director, Commission on Decolonization; President, Department of Chamorro Affairs

Additional Groups and Individuals Requesting to Participate as Consulting Parties during Civic Engagement, August–September 2022

- Royce Camacho, Måsu
- Dietrix Jon Ulukoa Duhaylonsod, Adahi I Manaotao-ta Mo'na (AIMM)
- Mana'adahi Coalition, which includes AIMM and Måsu, as well as: Goggue Hila'an, Guahanom, and Hita Litekyan.

List of Parties Invited to Participate in Lujan House Meeting, April 4, 2023

- Dr. David Atienza, Guam Preservation Trust Board of Directors
- Joseph M. Borja, Director, Department of Land Management

- John Burch, Director, Guam Ancestral Lands Commission
- Royce Camacho, Måsu
- Hope Cristobal, Guahan Coalition for Peace and Justice
- Helen Grace B. Cuisia, Cultural Officer, Consulate General of the Republic of the Philippines
- Dietrix Jon Ulukoa Duhaylonsod, Adahi I Manaotao-ta Mo'na (AIMM)
- Pale Eric Forbes, Guam Preservation Trust Board of Directors
- Fuetsan Famalao'an
- Jose Garrido, Chairman, Task Force on Free Association—Commission on Decolonization
- Vince Leon Guerrero, Guam Preservation Trust Board of Directors
- Leonard Iriarte, President, Guma'Palu Li'e'; I Fanlalai'an Oral History Project
- Dave Lotz, Historian and Guam Preservation Trust Board of Directors
- Patrick Lujan, SHPO/Division Supervisor, Guam State Historic Preservation Office
- Michael Blas Makio, Guam Preservation Trust Board of Directors
- Mana'adahi Coalition
- Debbie Quinata, Maga'haga, Nasion Chamoru
- Joe Quinata, Chief Program Officer, Guam Preservation Trust
- Malia Ramirez, Department of Parks and Recreation
- Zina Ruiz, Guam Preservation Trust Board of Directors
- John Salas, Regional Environmental Director, NAVFAC Marianas/Joint Region Marianas
- Dr. Marilyn Salas, Cultural Practitioner
- Frank Schacher, Tribal Chairman, Chamorro Tribe
- Rlene Santos Steffy, Oral Historian
- Alice Taijeron, Director, CHamoru Land Trust Commission
- Speaker Therese M. Terlaje, 37th Guam Legislature
- Trini Torres, Chairperson, Pilog-Mago'haga-I Taotaomona Native Rights
- Christopher Wilson, Program Analyst, Advisory Council on Historic Preservation
- Melvin Won Pat-Borja, Executive Director, Commission on Decolonization; President, Department of Chamorro Affairs

List of Parties Attending the Lujan House Meeting, April 4, 2023

- Antolin Aguilar, Guam Ancestral Lands Commission
- Dr. David Atienza, Professor of Anthropology and Micronesian Studies, University of Guam; Guam Preservation Trust
- Royce Camacho, Måsu
- Helen Grace B. Cuisia, Cultural Officer, Consulate General of the Republic of the Philippines
- Dietrix Jon Ulukoa Duhaylonsod, Adahi I Manaotao-ta Mo'na (AIMM)
- Joe Leon Guerrero, Guam Ancestral Lands Commission

- Dave Lotz, Guam Historic Preservation Board
- Patrick Lujan, Guam State Historic Preservation Officer/Division Supervisor, Guam State Historic Preservation Office
- Speaker Therese M. Terlaje, 37th Guam Legislature
- Joe Quinata, Chief Program Officer, Guam Preservation Trust
- Malia Ramirez, Oral Historian, Guam Department of Parks and Recreation
- Joe Santos, Department of Chamorro Affairs
- Christopher Wilson, Program Analyst, Advisory Council on Historic Preservation

APPENDIX H: LIST OF PREPARERS

War in the Pacific National Historical Park

Barbara Alberti, Superintendent
Tim Clark, Cultural and Natural Resources Manager
Kina-Doreen Lewis, Lead Park Ranger
Charles Wolford, Supervisory Facility Operations Specialist
Rufus Haspalur, Park Guide
Kina-Nicole Lewis, Park Guide
Kelly Carroll, Lead Park Ranger (former)
Theo Chargualaf, Supervisory Facility Operations Specialist (former)
Artak Davtian, Lead Park Ranger (former)
Mike Gawel, Cultural and Natural Resources Manager (former)
Dave Lotz, Cultural Resources Program Manager (former)
Rose Manibusan, Chief of Interpretation (former)
Jim Richardson, Superintendent (former)

National Park Service Pacific West Regional Office (Interior Regions 8, 9, 10, 12)

Betsy Anderson, Landscape Architect, Project Manager
Jean Boscacci, Outdoor Recreation Planner, Project Manager (former)
Martha Crusius, Program Manager, Park Planning & Environmental Compliance
Vida Germano, Cultural Landscapes Program Manager
Scott Henrickson, Civil Engineer
Irina Irvine, Ocean & Coastal Resources Program Manager
Adam Johnson, Cultural Resource Specialist, Pacific Islands
Chris Johnson, Historian, Preservation Partnerships Program
Sarah Killinger, Regional Section 106 Coordinator
Sandy Margriter, GIS Specialist (former)
Allen McCoy, GIS Specialist
Nick Mitrovich, Environmental Protection Specialist
Nina Pulley, Park Planning & Environmental Compliance Fellow (former)
Anna Tamura, Planning Portfolio Manager
Laura Toledo, Park Planning & Environmental Compliance Fellow
John Wooster, Hydrologist

Other NPS Offices

Monique Lafrance Bartley, Marine Ecologist, Water Resources Division
Wylie Carr, Climate Change Planning Specialist, Climate Change Response Program
Susannah Erwin, Hydrologist, Water Resources Division
Marty Hylton, Historic Architect for Climate Change, Climate Change Response Program
Don Wojcik, Program Analyst, Park Planning and Special Studies Division
Jeneva Wright, Archeologist for Climate Change (former), Climate Change Response Program

APPENDIX I: REFERENCES

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[CEQ] Council on Environmental Quality, Executive Office of the President

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NPS/WAPA/474/191582

Printed on recycled paper.



National Park Service
U.S. Department of the Interior

Prepared by: National Park Service
Interior Regions 8, 9, 10, and 12—Seattle Office
Park Planning and Environmental Compliance
909 1st Avenue, #500 | Seattle, WA 98104



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View of Asan Beach and Asan Inland Units from the water. Photo: NPS.