

Papahānaumokuākea

MARINE NATIONAL MONUMENT



Management Plan Midway Atoll Conceptual Site Plan

U.S. FISH AND WILDLIFE SERVICE · NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION · STATE OF HAWAII



VOL. IV



Midway Atoll Conceptual Site Plan

**VOLUME IV
MONUMENT MANAGEMENT PLAN**

**MIDWAY ATOLL NATIONAL WILDLIFE REFUGE
BATTLE OF MIDWAY NATIONAL MEMORIAL
PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT**

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Papahānaumokuākea Marine National Monument Management Board

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Midway Atoll Vision



1. Vision

VISION STATEMENTS

PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT VISION:

To forever protect and perpetuate the ecosystem health and diversity and Native Hawaiian cultural significance of Papahānaumokuākea.

MIDWAY ATOLL NATIONAL WILDLIFE REFUGE / BATTLE OF MIDWAY NATIONAL MEMORIAL VISION:

As part of the Papahānaumokuākea Marine National Monument, Midway Atoll is a unique and peaceful treasury of wildlife and history in the midst of the Pacific where nature rules, and the health of people, wildlife, and ocean are intrinsically connected. Native habitats and species dominate the Midway landscape, while remnants of the historic Battle of Midway are protected along with rehabilitated historic structures that support a cooperative interagency Monument field station. Coordinated management promotes ecological restoration, research, service-based tourism, and education to preserve and enhance this fragile island and coral reef system. Midway Atoll is the “window” to the Monument that offers people a rare opportunity to immerse themselves in the rich history, culture and ecology of the Northwestern Hawaiian Islands, a remote ecosystem of international significance. As a living classroom, Midway provides restoration and sustainability lessons for current and future generations worldwide to apply to their home communities.



Laysan albatross chick with parent

PROTECTED AREA MISSION AND PURPOSES

PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT MISSION:

- Carry out seamless integrated management to ensure ecological integrity and achieve strong, long-term protection and perpetuation of NWHI ecosystems, Native Hawaiian culture, and heritage resources for current and future generations.

MIDWAY ATOLL NATIONAL WILDLIFE REFUGE PURPOSES:

- “...maintaining and restoring natural biological diversity within the refuge;
- providing for the conservation and management of fish and wildlife and their habitats within the refuge;
- fulfilling the international treaty obligations of the United States with respect to fish and wildlife;
- providing opportunities for scientific research, environmental education, and compatible wildlife-dependent recreational activities; and
- in a manner compatible with refuge purposes, ...recognize and maintain the historical significance of the Midway Islands consistent with the policy stated in Executive Order 11593 of May 13, 1971.” (Executive Order 13022, October 31, 1996).

BATTLE OF MIDWAY NATIONAL MEMORIAL PURPOSE:

- “[S]o that the heroic courage and sacrifice of those who fought against overwhelming odds to win an incredible victory will never be forgotten.” (Secretary’s Order 3217, September 13, 2000)

All activities considered in this Conceptual Site Plan will be consistent with this mission and these purposes.



beach at Rusty Bucket

PROTECTIONS AND SIGNIFICANCE OF MIDWAY

On June 15, 2006, President George W. Bush issued Presidential Proclamation 8031, which designated and protected 139,792 square miles of emergent and submerged lands and waters in the Northwestern Hawaiian Islands as a Marine National Monument. It was renamed in 2007 by Proclamation 8112 as the Papahānaumokuākea Marine National Monument. This action significantly enhanced protection for the region's natural, cultural, and historic resources, and established one of the world's largest marine protected areas. Papahānaumokuākea Marine National Monument is administered jointly by three Co-Trustees – the Department of Commerce, Department of the Interior, and the State of Hawai'i – and represents a cooperative conservation approach to protecting the entire ecosystem. Co-Trustee agencies in cooperation with the Office of Hawaiian Affairs manage the Monument through the Monument Management Board. The Monument area includes the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve, Midway Atoll National Wildlife Refuge/ Battle of Midway National Memorial, Hawaiian Islands National Wildlife Refuge, the State Seabird Sanctuary at Kure Atoll, and Northwestern Hawaiian Islands State Marine Refuge.

The Monument designation encompasses and maintains agency management responsibilities for all existing federal and state terrestrial and marine protected areas, including Midway Atoll National Wildlife Refuge (NWR). Midway Atoll NWR is administered by the U.S. Fish and Wildlife Service (FWS) and is part of the Hawaiian and Pacific Islands National Wildlife Refuge Complex, which consists of 19 refuges. The FWS began operating an "overlay refuge" on Midway Naval Air Station in 1988. Administration of Midway Atoll was transferred to the FWS in 1996. In 2000, the lands and waters of Midway Atoll NWR were designated as the Battle of Midway National Memorial.

Midway Atoll plays a key role as a staging ground for multi-agency field operations throughout the Monument and is critical to the operations of the State Seabird Sanctuary at Kure Atoll. Due to its accessibility by airplanes and large vessels, and its existing infrastructure, such as housing, offices, laboratories, and food service, Midway serves as an operational focal point for resource protection, management, research, and education activities in the northern section of the Monument. Additionally, considering Midway's facilities and public interest, the Presidential Proclamation establishes Midway as the only area within the Monument that can support a recreational visitor program. Midway's strategic location and physical assets also make it the ideal location to reinstate dive facilities for conducting shore based marine management in the northern atolls; enhance small boat facilities in support of seasonal enforcement operations; establish a marine research station and short term field school opportunities; and enable a more comprehensive study of maritime heritage resources particularly from World War II.

As one of the Northwestern Hawaiian Islands, Midway Atoll is representative of a remarkably unique and important marine ecosystem. Located near the northern end of one of the highest-latitude coral reef ecosystems in the world, it is bathed in relatively cold water for coral reefs, making it a vital case study in the global incidence of heat-induced coral bleaching. Part of a volcanically created and subsiding island chain, Midway is an example of atoll formation, a poorly understood geological process that can contribute to our understanding of the relationship between climate,



Midway House



Laysan albatross nesting

1. Vision

reef development, and carbon sequestration. Because of its remote location in the middle North Pacific, it is also an important node in the global network of ongoing biogeographical and oceanographic research.

Due to its geographic isolation, Hawai'i in general has a very high percentage of endemism, or occurrence of species that are found nowhere else in the world. Many of these species are threatened or endangered, often as a result of human activity; the isolation of the Monument provides them with a huge refuge habitat. Midway Atoll is host to a wildlife spectacle on land, including the largest colony of nesting albatrosses in the world. More than 20 species of seabirds – as many as 2 million birds – nest or rest at Midway. Finally, the Northwestern Hawaiian Islands are one of the last intact, predator-dominated coral reef marine ecosystems in the United States and the world, making it invaluable to scientists' understanding of marine ecology. It also hosts a high degree of marine endemism, reaching over 50% of fish biomass. The access to this remote ecosystem provided by the infrastructure at Midway enables unparalleled opportunity for studying these isolated marine ecosystems and for providing unique field study and comparative research opportunities.

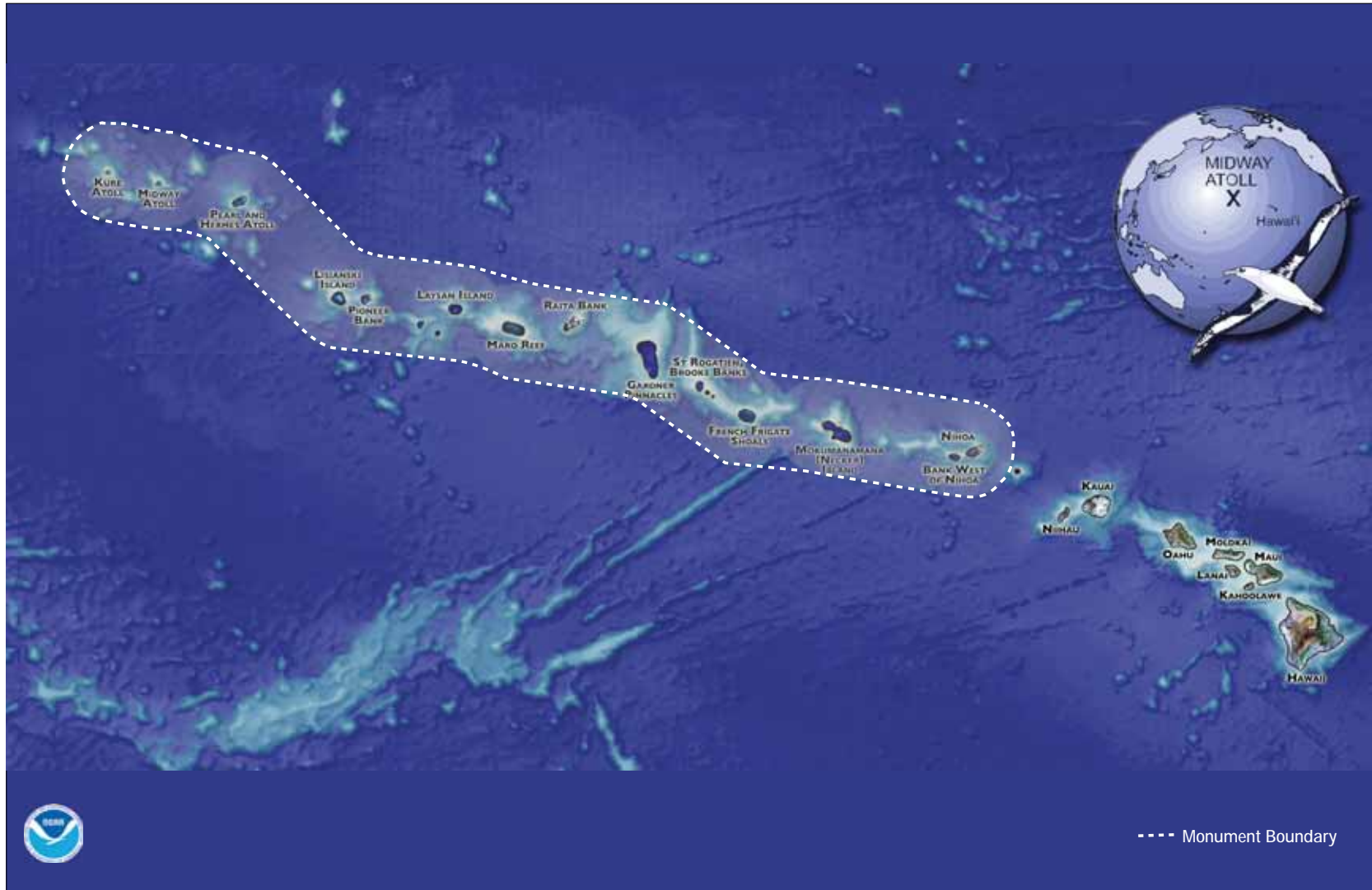
In addition to its rich assemblage of marine life, Midway Atoll contains numerous heritage resources that collectively tell the story of commerce, military, transpacific communication, and human modification of the atoll environment. Despite its small size and remote location, Midway's strategic location in the middle of the Pacific Ocean has drawn great attention over the last 100 years. Notably, Midway's pivotal role in World War II, commonly known as the "Battle of Midway," and the sacrifices of military personnel who fought at Midway, are memorialized in history. Today, Midway contains 63 existing historic properties eligible for the National Register of Historic Places; these include defensive structures, military architecture, both industrial and residential, and architecture from the Commercial Pacific Cable Company period (1903) and World War II period.

The designation of Midway as a special management area of the Monument elevates the atoll's significance regionally and globally. Midway will be a hub of Monument-wide management and operations, and the only atoll where visitors can experience the Northwestern Hawaiian Islands. Bringing people to the place in a way that does not diminish, but rather enhances, the integrity of Midway Atoll is beneficial to the Monument. Equally important is bringing the place to people who cannot visit, so that the valuable lessons and experiences of Midway reach across the world to local communities.

A key question is: How do we tell the amazing story of the natural, cultural, and historic resources of the Northwestern Hawaiian Islands and support Monument operations while preserving the atoll's character and integrity? The Midway Atoll Conceptual Site Plan offers the opportunity to re-envision the island as a powerful case study in how humans can and must live in balance with a delicate ecosystem over a long timeframe. This precept is a vital one where the atoll's remoteness and terrestrial isolation make a model of sustainability essential. In addition, Midway Atoll has a delicate ecosystem and is of a scale where our actions, both positive and negative, quickly have an enormous impact. Midway Atoll can provide a vital biosphere experiment in a natural setting, which if we learn to manage successfully, could become a model of how to take better care of the planet at large, and a great source of environmental public awareness.



Albatrosses and WWII gun battery on Eastern Island





Lumpy rice coral (Montipora turgescens)

Project Mission / Purpose and Process

2

2. Project Mission / Purpose and Process

MONUMENT PLANNING CONTEXT AND MIDWAY ATOLL CONCEPTUAL SITE PLANNING

MANAGEMENT PLANNING

The Monument Management Board recently completed a Monument Management Plan. To aid in development of the Central Operations and Coordinated Field Operations portions of the Monument Management Plan, the Co-Trustee agencies initiated two successive detailed planning processes. The first endeavor was a Papahānaumokuākea Marine National Monument requirements planning process designed to identify the agencies' existing assets and future infrastructure requirements Monument-wide. This present document, the Midway Atoll Conceptual Site Plan, is the result of the second endeavor. With the full range of agency goals, requirements, and constraints articulated for Midway in the Papahānaumokuākea Marine National Monument infrastructure requirements planning process, the Midway Atoll Conceptual Site Plan focuses with increased specificity on the required infrastructural and operational changes, offering a range of redevelopment options and solutions.



Sea turtles resting on beach

PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT REQUIREMENTS ASSESSMENT AND PLANNING

An important first step in effective site planning is the identification of existing assets alongside current and future field operational requirements. A multi-agency infrastructure requirements planning process took place over the course of six months in 2007, providing a general outline of people, programs, assets, and operations associated with the Monument. It summarized the functions and numbers of personnel along with the types of supporting facilities required at each location within the Monument. Those requirements were then combined to define a "Monument level" requirement at each location.

Recommendations from the requirements planning process guided development of this Midway Conceptual Site Plan. Specifically, the process identified the need for two consolidated operational strategies to be developed: one for Midway and one for the remaining locations within the Monument. The operational strategies will identify the needs of each agency, identify resource-sharing opportunities, and include mutually agreeable cost-sharing guidelines. Agencies are working to develop cooperative agreements that meet these needs.

One goal of the site and operational strategies is to promote a sustainable agenda. The Monument Management Board is working to adopt an aggressive, measurable goal to reduce conventional fuel consumption through a combination of conservation, green architecture, and renewable energy.



white tern

SCOPE OF MIDWAY ATOLL CONCEPTUAL SITE PLAN

Midway Atoll is a hub of operations for all State and federal agencies conducting Monument resource protection, management, education, and research activities. It is the only location in the Monument that allows for recreational visitor experiences. All of these activities occur in an environmentally and historically sensitive area. As such, Midway requires careful and thoughtful conceptual site planning and development to ensure that our current vision for the Atoll's use and management over the next 15 years and beyond is aligned with the mission of the Monument, the purposes of the National Wildlife Refuge and the Battle of Midway National Memorial, and the mission of the National Wildlife Refuge System. Since Midway is the primary hub for agency activities and visitor programs within Monument boundaries and contains the most existing infrastructure, it is important that the conceptual site planning begin here. The lessons drawn from the development of this plan will result in a better process to plan for and coordinate all site infrastructure and field operations needs throughout the Monument to ensure that natural, cultural, and historic resources are minimally impacted, and critical resource protection, management, and research needs and requirements are addressed.



FWS Planning Team members on Sand Island

The Midway Atoll Conceptual Site Plan builds on the results of the Monument requirements planning process and the extensive infrastructural repair work that has taken place at Midway over the past 10 years. Since 2003, the Fish and Wildlife Service has implemented recommendations proposed by the Infrastructure Condition Assessment and Modification Report for Midway Atoll National Wildlife Refuge, commonly referred to as the “right-sizing” plan. When the Monument was established in 2006, it was necessary to revisit previous decisions and consider new interests and needs for managing the Northwestern Hawaiian Islands. With the designation, Midway Atoll and the rest of the Northwestern Hawaiian Islands were elevated to a status of national and global significance and public recognition. Under this plan, the Monument Management Board's goal is to protect and enhance the natural, cultural, and historic resources of Midway, while enabling more effective resource management and response to the northern Monument and providing opportunities for the public to experience its lessons and become champions of these special marine ecosystems of the Pacific.



2. Project Mission / Purpose and Process

DESCRIPTION OF MIDWAY CONCEPTUAL SITE PLANNING PROCESS

Midway Atoll conceptual site planning began in Spring 2007 occurring in tandem with the Marine National Monument management planning effort.

Staff and consultants conducted site analysis, document review, workshops, and mapping to identify primary issues and goals specific to Midway design and planning. Key design guidelines and preliminary building programs based upon biological constraints and historic preservation objectives were developed. The team facilitated a workshop in July 2007 to present preliminary concepts and receive input from management partners.

Based on the workshop findings, the Planning Team refined the Midway Atoll alternatives and the preferred site alternative. The draft Midway Atoll Conceptual Site Plan Report was produced and reviewed in three cycles by FWS and the Monument Management Board. The Midway draft report was included within the Draft Monument Management Plan as Volume IV, and distributed for public review. The comments received regarding the draft conceptual site plan and draft management plan (Volume I) regarding Midway were taken into consideration in finalizing this plan.



This Midway Atoll Conceptual Site Plan should be considered as a conceptual document, not as a definitive operational plan or design blueprint. Much more work, including engineering studies, architectural drawings, and specific environmental analyses, will need to be completed prior to construction activities. Even so, this document provides an atoll-wide overview that will guide us into the future. The conceptual plan will be reviewed every five years as part of a review of the overall Monument Management Plan.



Midway Atoll supports the largest colonies of Laysan and Black-footed albatrosses in the world





MIDWAY ATOLL

MIDWAY ATOLL CONCEPTUAL SITE PLANNING



Site Overview



3. Site Overview

SITE ANALYSIS

Located near the far northern end of Papahānaumokuākea Marine National Monument, Midway Atoll is approximately 1,250 miles northwest of Honolulu, Hawai‘i. The second oldest coral atoll in the NWHI, Midway originated as a volcano approximately 27 million years ago. Midway Atoll comprises an elliptical outer reef nearly 5 miles in diameter, 580,392 acres of submerged reef and associated habitats, and three flat coral islands totaling approximately 1,549 acres. Sand Island (1,117 acres) and Eastern Island (366 acres) are the two most prominent coral islands of the Atoll, while Spit Island is only about 15 acres in size. Sand Island contains the highest number of historic resources as well as all visitor facilities.



Midway Atoll is an unincorporated territory of the United States and is the only atoll/island in the Hawaiian archipelago that is not part of the State of Hawai‘i. Midway Atoll National Wildlife Refuge is owned and administered by the U.S. Fish and Wildlife Service (FWS) on behalf of the American people and has international significance for both its historic and natural resources.

Key Midway Atoll site issues are described on the following pages.

BIOLOGICAL

Midway Atoll’s plant and animal species are protected under several Federal laws, including the Endangered Species Act, the Marine Mammal Protection Act, and the Migratory Bird Treaty Act. Twenty-three species of plants and animals listed under the Endangered Species Act are known to occur in the NWHI. These include the Hawaiian monk seal, several turtle species such as the green and loggerhead turtle, whale species, Laysan duck, short-tailed albatross, and a half-dozen native plant species. Midway is also home to several endemic species, found only in Hawai‘i, that merit special protection and management efforts.

Midway Atoll consists of vast expanses of coral reef, sediment beds, and algal substrate that support a wide array of species unique to the Hawaiian Archipelago. The three small, low-lying islands are protected by encircling barrier reefs, and are marine in character: constantly under the influence of ocean weather conditions, susceptible to periodic inundation, and constructed from oceanic materials. The islands support birds and terrestrial wildlife that prey on marine species and contribute to nutrient runoff into the shallows. The interdependence between the land and nearshore waters intrinsically connects the welfare of all Monument wildlife to the health of both terrestrial and marine ecosystems. This simple and profound reality is the underpinning of the integrated approach taken by the Co-Trustees to managing the Monument.

Midway is one of the few remaining predator-dominated coral reef marine ecosystems, an anomaly among modern marine ecosystems, but typical of the Northwestern Hawaiian Islands (DeMartini and Friedlander 2006). Abundant populations of sharks, jacks, grouper, dolphins, and other “top predators” live at Midway Atoll.



endangered Laysan ducks



SAND ISLAND EXISTING CONDITIONS

MIDWAY ATOLL CONCEPTUAL SITE PLANNING

3. Site Overview

SITE ANALYSIS



1940s Officers' Quarters designed by Albert Kahn

Approximately 200 Hawaiian spinner dolphins rest within Midway's lagoon and forage outside its reef. Bottlenosed, striped, spotted, and rough-toothed dolphins may occasionally be seen in the open ocean, as well as beaked, pilot, and endangered humpback whales.



Spinner Dolphins

Almost 2 million breeding seabirds of 19 species make Midway one of the most important breeding areas of seabird conservation in the Pacific. Midway supports the largest nesting colonies of both Laysan and black-footed albatrosses in the world. Midway's breeding populations of white terns, black noddies, and red-tailed tropicbirds constitute the largest colonies in the Hawaiian archipelago.



Male frigatebird

HISTORICAL/CULTURAL

The first visitors to Midway Atoll were likely Polynesians/Hawaiians exploring the Pacific Ocean in deep-sea voyaging canoes. Although no physical evidence of their visits has yet been found, numerous oral histories and chants refer to distant low-lying islands with abundant birds and turtles providing record of Native Hawaiian knowledge and experience gained through these purposeful journeys. One Native Hawaiian name given to the atoll is "Pihemanu," which means "the loud din of birds." Today, Native Hawaiian history and cultural practices are a vital part of the Monument's management, and education and visitor programs at Midway provide important opportunities to feature the cultural significance of the Northwestern Hawaiian Islands alongside the natural and historic components.

Midway Atoll contains the most historic resources within the Monument. Numerous Federal laws, regulations, and policies mandate the protection and management of historic resources, including the National Historic Preservation Act of 1966, the Archaeological Resources Protection Act of 1979, and the Preserve America Executive Order of 2003 (Executive Order 13287). Historic resources at Midway Atoll include several sites, structures, artifacts, and places representative of the historic periods associated with early 20th Century transpacific communications and military operations. At Midway, there are four types of National Register eligible historic resources including:

1. a National Historic Landmark,
2. Cable Station, 3. Albert Kahn



Cable Station Building



Concrete pillbox on Sand Island

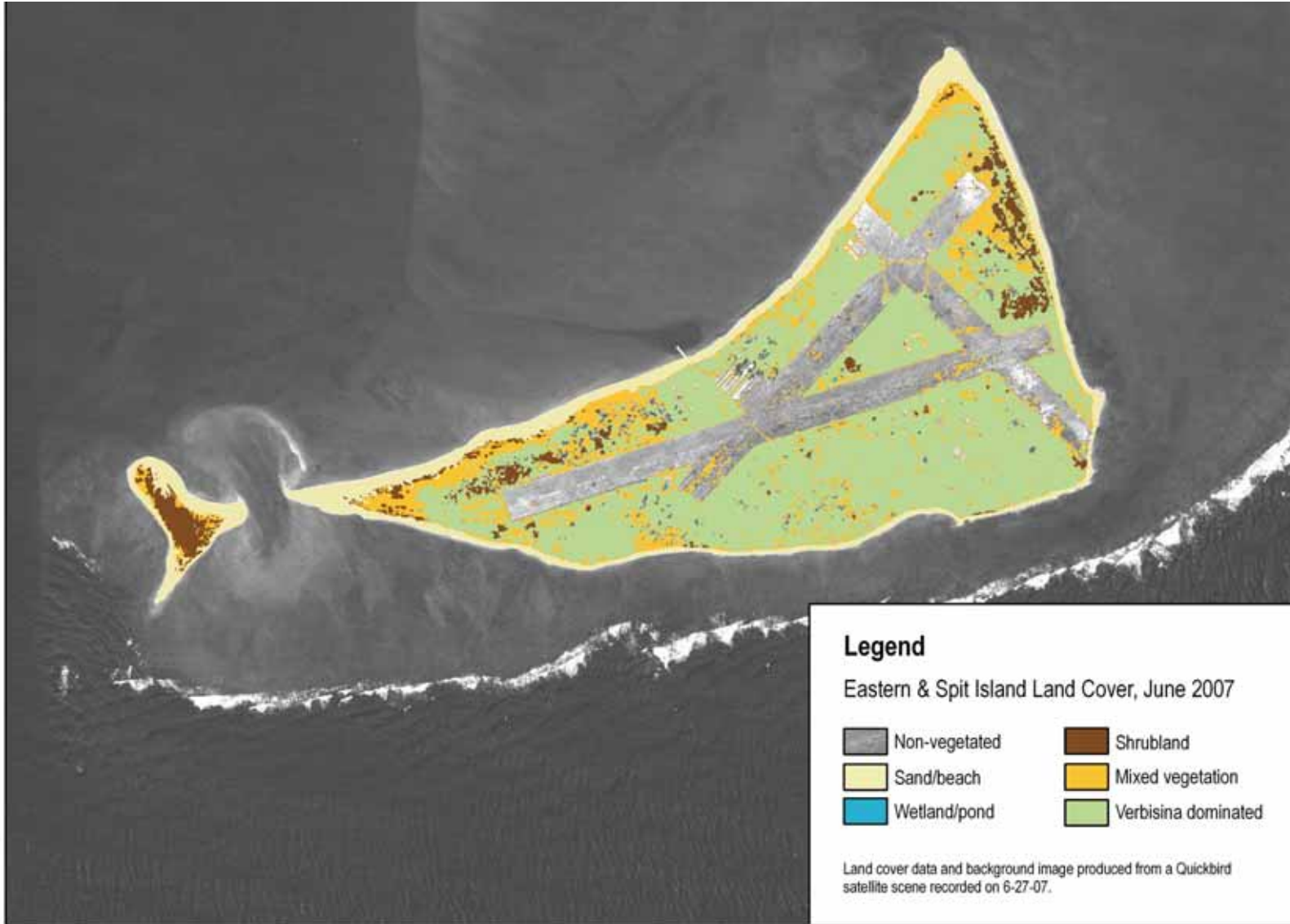
3. Site Overview

SITE ANALYSIS



SAND ISLAND LAND COVER MIDWAY ATOLL CONCEPTUAL SITE PLANNING





EASTERN AND SPIT ISLAND LAND COVER
 MIDWAY ATOLL CONCEPTUAL SITE PLANNING



3. Site Overview

SITE ANALYSIS

residential and industrial architecture, and 4. other historic elements, including Battle of Midway remnants not within the National Historic Landmark.

A Programmatic Agreement (1996) and Historic Preservation Plan (1999) were developed to guide management of the historic properties at Midway Atoll and will be updated to address preservation issues at Midway within the context of the recent Monument designation. The Midway Atoll Historic Preservation Plan focuses on long-term management and treatment for each of the 63 historic properties. It also identifies procedures for treating new discoveries and caring for museum collections, and includes recommendations for interpretation, education, and public outreach.

The Programmatic Agreement and Historic Preservation Plan prescribe one of six different treatment categories to the historic properties. The treatment categories are 1. reuse, 2. secure, 3. leave as-is, 4. fill in, 5. demolish, or 6. relocate. Many factors were used to determine the treatment category to which a historic property was assigned, including historic importance, interpretive value, overall setting, association with key historic themes, and structural integrity. Preservation treatment primarily focuses on adaptive reuse of the historic buildings; reconstruction is generally not viewed as an appropriate treatment.

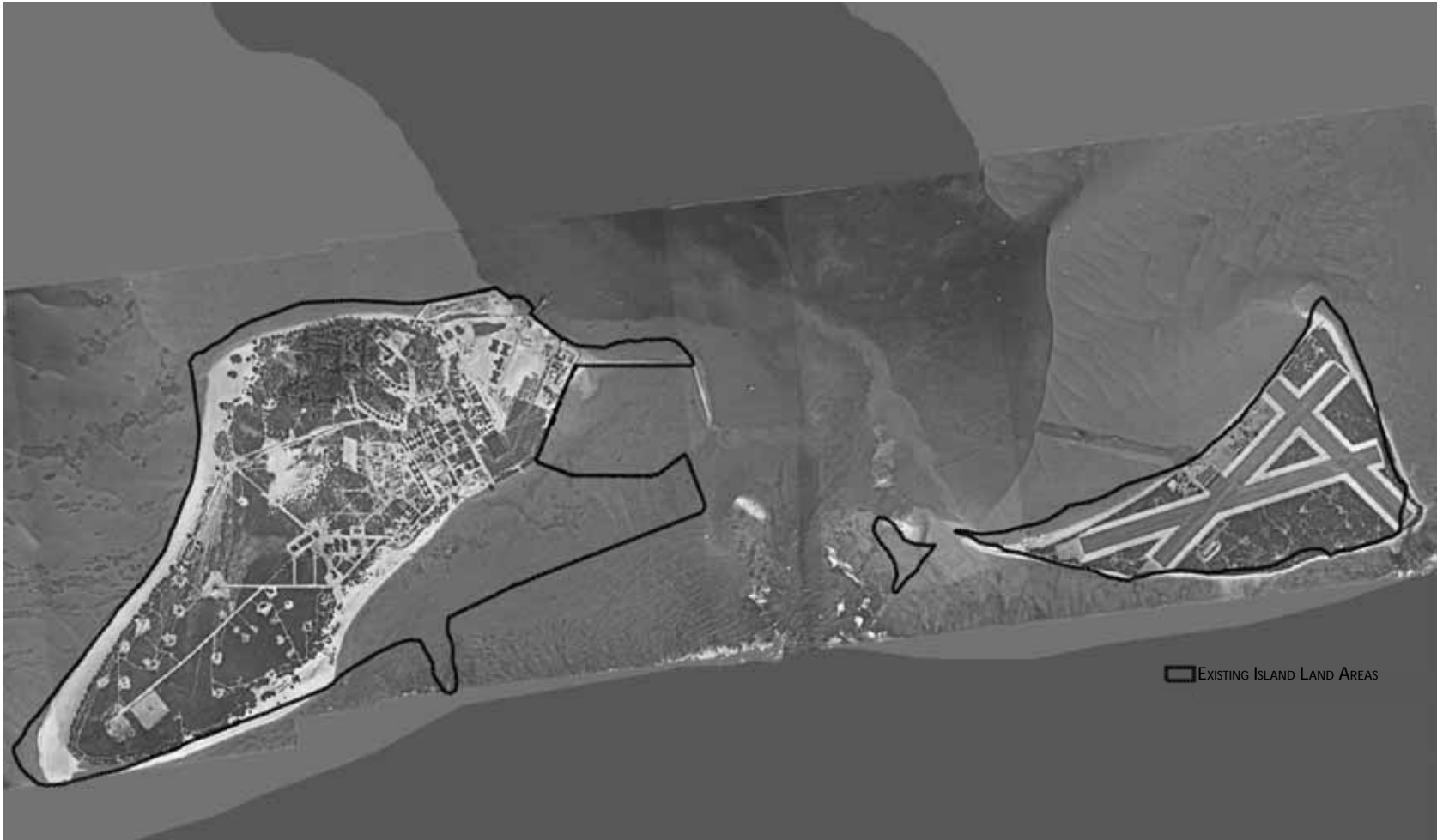


In 2007, a cultural resources team of the FWS Pacific Region conducted further evaluations and provided treatment recommendation for specific buildings. Several buildings are severely deteriorated (e.g., Cable Station) or require significant repair (e.g., Seaplane Hangar). The Cultural Resource Team’s recommendations were incorporated into the Midway Conceptual Site Planning process and are reflected in the Building Program and the Preferred Site Plan. Reuse of historic structures is a primary strategy that meets several goals: 1. repair and preserve historic structures, 2. avoid new development that would degrade historic landscape quality or wildlife habitat value, 3. meet agency operations and visitor needs, and 4. be cost-effective compared to new construction costs.

The historic properties require continual repair and maintenance according to the terms of the Historic Preservation Plan and the Secretary of the Interior’s Standards for the Treatment of Historic Properties. The effects of weathering and erosion by saltwater, salt spray, salty soils, precipitation, plant growth, termites, solar radiation, and wind continue to threaten the integrity of the historic properties at Midway Atoll. Additionally, lead-based paint must be removed from structures to eliminate a hazardous material that is extremely toxic to the albatross populations.

Submerged historic resources around Midway will require additional understanding and warrant further consideration in their management. A careful study of the wrecks in the lagoon and nearshore rim of the atoll will be conducted. The submerged items need to be accurately identified in order to establish their historical association and eligibility to the National Register. Two Midway maritime heritage sites associated with World War II, the USS Macaw and a World War II-era Corsair, have been preliminarily documented.





SAND, SPIT, & EASTERN ISLANDS HISTORIC CONDITIONS

MIDWAY ATOLL CONCEPTUAL SITE PLANNING



3. Site Overview

SITE ANALYSIS

UTILITIES AND OPERATIONS

Midway Atoll is so remote that it must operate independently as a small town. It operates its own power system, water treatment and distribution, facilities maintenance, sewage treatment, waste management systems, communications systems, and all the other operational necessities found in a small municipality.

DRINKING WATER SYSTEM

A new drinking water treatment system and distribution main were placed into service in October 2005.

The old system is no longer treated to drinking water standards and was left in place to provide firefighting water. This took care of the major public health-related concerns, but sections of the water delivery system need to be modified to complete the full system upgrade. The new treatment system is sized for a short-term maximum population of 200 persons at a per capita daily use rate of 100-gallons per day, totaling 20,000 gallons per day. However, the actual efficient operating capacity is much lower. A regular on-island population above 120 people will require added capacity.

Rainwater is collected in a pond, and then pumped to storage tanks. The new electrical grid was not extended to provide power for the rain water pumps. The pumps are grossly oversized for current needs and should be replaced with smaller units. Electrical power can be furnished by extending a new electrical grid, by installing a small generator, or by installing renewable energy systems. These pumps are operated infrequently, following significant rainfall events; thus a small portable generator may be an economical way to provide power.



Caterpillar electric generator

Stored rainwater is conveyed to the treatment plant via gravity flow through an existing pipeline. Gravity flow allows use of only about half the total stored volume of water. The total storage volume, approximately 12 million gallons, is greatly in excess of current use. Using a daily use rate of 20,000-gal, the system has about 300 days of water accessible via gravity flow. However, this same rainwater storage feeds the “old” water system. The old system leaks approximately 10,000-gpd, so that reduces the storage volume to approximately 200 days.

The existing pipeline that conveys untreated water to the plant is asbestos cement. This pipeline should be replaced. In addition, a small pump should be installed to pump stored water to the treatment plant, thus making the entire storage capacity available.

The new water distribution pipeline was connected to existing lateral service pipes at certain buildings through the core area of town (basically, from the FWS Office northward to the Clipper House restaurant). The distribution system would need to be extended to serve any newly constructed or remodeled facilities located outside the vicinity of the new water main.

The Inner Harbor area and the Cargo Pier area near the old fuel tank farm do not currently have drinking water service. Water that is available comes from the old system and is no longer potable. An evaluation will be conducted to determine whether these areas would be best served by new water pipes, new catchment systems, or left dry.

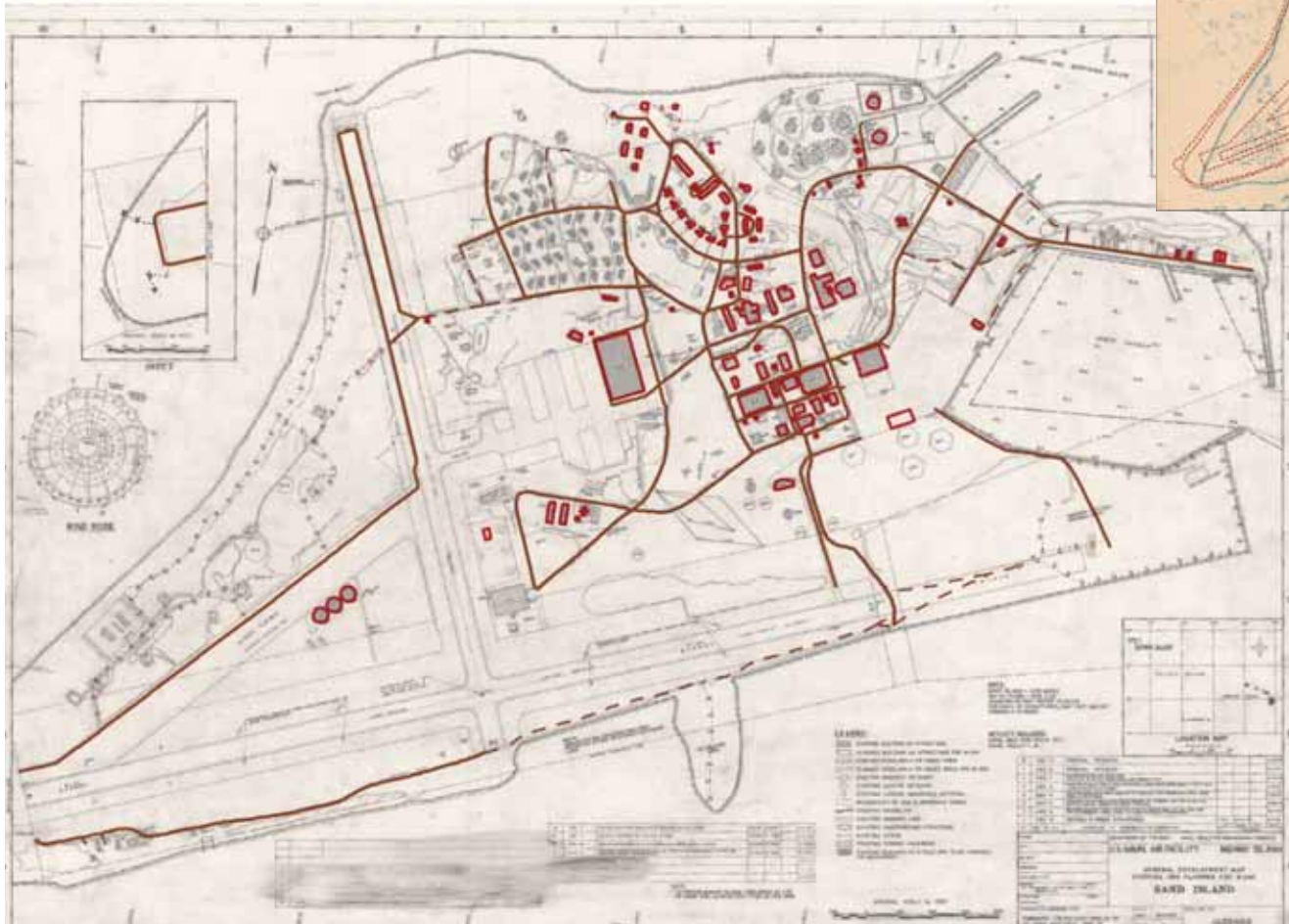


Water collection tanks



Water treatment facility

MAP OF SAND ISLAND C. 1964



MAP OF SAND ISLAND 1935

- Legend**
- Current Building Structures
 - Current Circulation
 - Foot Traffic
 - Foot and Bike Traffic
 - Foot, Bike and Cart Traffic

3. Site Overview

SITE ANALYSIS

ELECTRICAL GENERATION AND DISTRIBUTION

Electricity for the island is provided by combustion of JP-5 fuel in electrical generators. Two new electrical generator sets were installed to operate in an automatic duplex mode and were placed into service in approximately October 2005. These new generators were downsized from existing systems to better match generator capacity to connected load. For the most part, only one generator is needed to satisfy island electrical demand. When load exceeds the capacity of one generator, the second automatically comes on-line, automatically shutting off again when electrical demand reduces.

Maintenance activities can be accomplished on the “down” generator during that time. When the primary generator is due for service, the roles are switched and maintenance is then performed on the second generator. This style of engine-driven generator cannot be run continuously and must be periodically shut down for maintenance. Every few years, depending on operating hours, they must undergo a major engine overhaul. At that time, or whenever both smaller Caterpillar 3456 units are down, the system is run using the older, larger, but fully functional Caterpillar 3516 unit.

Current capacity for electrical generation is sufficient for existing population demand but nears maximum capacity during times of heavy load (summer). Existing and future projects will be evaluated with a goal to increase energy efficiency and transition to sustainable energy systems. The continuous adoption of energy conservation practices may increase the operational capacity of the existing electrical supply. If island population increases or electrical demand grows to require that two generators must run continuously, additional electrical generation would be necessary. This could be accomplished either by operating other existing generators or by installing sustainable energy



Electrical switch gear

generating devices such as solar water heaters, solar electric panels, incinerators, or gasification systems. The latter may also have the added benefit of using marine debris, solid waste, and alien species biomass to generate energy.

A new electrical distribution grid was constructed and placed into service in late 2006. The extent of this new grid was downsized in comparison to the existing old grid. The new grid was designed to supply electricity to only those facilities identified for future use, based on what was foreseeable in early January 2006. Facilities connected to the old grid are currently provided power through a backfeed to the old grid. The materials and equipment of the old grid are aged, in disrepair, and some are obsolete. As long as there are no failures in the old grid, all island facilities will continue to have electricity. When a failure occurs, it most likely will not be able to be repaired and all facilities connected to that portion of the old grid will go “dark.” The new grid does not extend services to the peninsula with the tug pier and finger piers, the old Fuel Farm area, or the large hangar. Either the new grid would have to be extended to serve any new developments or the facilities would be designed to generate their own energy. The same applies for any remodeled facilities that are currently connected to the old grid.

WASTEWATER SYSTEM

The current wastewater treatment and disposal system (central septic tanks with drainfield) is overloaded by storm water intrusion and suspected groundwater infiltration. A new sewer system and treatment and disposal system have been designed to meet a goal of efficiency and water conservation. The design serves only certain facilities located in the core area of town. Some work is being accomplished to eliminate storm water intrusion. Dispersed septic design as opposed to centralized septic is preferable for fitting smaller wastewater treatment clusters around sensitive habitat areas and avoiding bird nesting sites. Estimated construction cost of new wastewater system is approximately \$2 million. Implementation of a graywater utilization system and composting toilets will be considered with a goal of reducing demand on a wastewater system in new construction.

SOLID WASTE DISPOSAL

General waste is collected and burned in an incinerator when adequate waste fuel is available, or in an open air pit when fuel is not available. Ashes are buried in the existing small landfill/dump. Aluminum cans are collected, compacted, and periodically sent (via barge) to a recycling facility in Hawai'i. Glass is collected, crushed, and buried in the landfill/dump. There is no adequate system in place to deal with hazardous waste (asbestos and lead specifically). This issue will be addressed before any planned reuse, renovation, remodeling, or removal of existing structures takes place.



New fuel tanks lead industry in spill protection

An incinerator or gasification system that could burn the waste as fuel to generate power is the type of technology needed on Midway to handle the island's waste long-term. It could also be modified to burn marine debris collected throughout the Monument. Several such machines are under development in the U.S. at this time but none are currently commercially available. Development of such incinerators should be tracked as plans for Midway develop, since burning waste for power would be a powerful cost and carbon-emissions savings.

FUELING FACILITIES

Midway's fuel supply is delivered by barge approximately once a year. It is used to refuel aircraft, ships, and motor vehicles, as well as provide all of Midway's electricity. Roughly 65 percent of Midway's fuel is currently used to generate electricity.

A new modular fuel tank system became operational in October 2007. Storage capacity for fuel is currently 450,000 gal. That amount is anticipated to meet

FWS and Coast Guard annual fuel needs at present consumption levels. An additional tank for gasoline and a new fuels lab are scheduled for completion in late 2009. More fuel storage capacity will be installed to meet NOAA and State needs, largely for the operation of small boats and equipment for land-based marine research and management operations.

TELECOMMUNICATIONS

A new fiber optic distribution system was constructed during 2006/2007. The satellite antenna was relocated and partially refurbished in October 2007. Satellite service is in the process of being upgraded. These upgrades will only moderately improve telecommunications for the existing island population and are not designed to allow expansion of the system to additional customers. Any new offices/programs on Midway will have to invest in additional upgrades/additions to the system in order to meet their telecommunication needs.

In 2008 and in partnership with the Midway Atoll National Wildlife Refuge, NOAA's Office of National Marine Sanctuaries purchased an additional antenna for installation on Midway, including T1 speed communications capacity for education, outreach, and research purposes. In 2009 the link will be used for telepresence to classrooms and schools from Midway Atoll, and will provide capacity for remote wildlife viewing via wildlife cams in the near future. The new equipment will also provide emergency fail-over for existing satellite equipment in case the primary link goes down.

Due to its isolation in the North Pacific, Midway is an important location for many types of data collection. In order to realize its scientific, enforcement, and educational potential, Midway will require additional data transmission capabilities, such as Internet 2 links.



Satellite telecommunications

3. Site Overview

SITE ANALYSIS

AVIATION AND MARINE TRANSPORTATION

Midway Atoll is accessible by two transportation modes: aviation and marine vessel. Currently there is no visitor welcome area at either Henderson Airfield or the Inner Harbor.

Midway is used as a required emergency landing site for extended twin-engine operations (ETOPS) flights across the Pacific Ocean. Under current regulations, twin-engine aircraft must be within a maximum of 180 minutes from a Part 139 certified airfield in case of an emergency. Midway's 7,900-foot runway is capable of handling almost any type of aircraft.

Relatively few flights are conducted in the Monument, and most of them are to and from Midway Atoll. Henderson Airfield on Sand Island handled a total of 86 flights during 2007. Most of these, 51 flights, were by Gulfstream aircraft operated by Maritime Air, the charter company used by FWS/FAA. The next largest user is the U.S. Coast Guard, which had 18 flights to Midway in 2007. The remaining flights were a mix of military and civilian aircraft, most associated with special events held during the year. A new airport operations center was constructed southwest of the current hangar in 2007.



Most visitors arrive by plane to Midway Atoll



Cruise ships occasionally visit Midway Atoll NWR

Marine traffic in the waters around Midway Atoll primarily consists of research ships, merchant ships, and occasionally Coast Guard vessels, recreational boats, and passenger vessels. Midway Atoll receives day visitors mainly via a small number of vessels. Three passenger vessels visited Midway Atoll in 2004. In 2005, 2006, and 2007, one passenger vessel visited the atoll each year (Maxfield 2007 pers. com.). No passenger vessels visited in 2008. Due to port security requirements at Midway, when large passenger vessels do visit they offload passengers 3 to 4 miles outside the lagoon and transport them ashore in small boats.

POLLUTANTS AND TOXIC MATERIALS

Building Materials

All historic buildings on Sand Island contain hazardous materials such as lead-based paint or asbestos. These toxic materials pose health and safety concerns for humans and wildlife. Lead paint flakes are ingested by albatross chicks, causing growth deformities and mortality. Lead-based paint abatement is a high priority action for Sand Island structures.

No Dig/Landfill Areas

"No Dig" areas, found on both Sand and Eastern Islands, are Land Use Controls remaining from the closure of the Navy base. Areas identified for land use restrictions are former landfills or areas where contamination or solid waste was left in place at or below 4 feet from the surface. Restrictions were placed on these sites to avoid future exposure of humans or wildlife to potentially contaminated soil or groundwater. Human activities that expose potentially contaminated soil or groundwater within the site footprints would transfer the responsibility for the site from the Navy to FWS. Although the



Old fuel tanks located in "no-dig" area

contaminants are expected to degrade through time, the amount and rate of degradation are unknown. Therefore, these land use restrictions will remain in place in perpetuity to protect humans and wildlife.

One area on Sand Island that needs continued monitoring and potentially further remediation is known as the Old Bulky Waste Landfill. This site is an uncharacterized landfill that was created by the disposal of scrap metal, used equipment, and unconsolidated waste off the south shore of Sand Island to create a peninsula approximately 1,200 feet long by 450 feet (average) wide by 9 feet high (Navy 1995). It is surrounded on the three seaward sides by an approximately 10-foot-thick band of concrete and stone rip rap. Wastes known to have been deposited in the landfill are metals (lead, cadmium, chromium, and nickel), gasoline, battery acid, batteries, mercury, lead-based paint, solvents, waste oil, PCBs, dioxins, furans, transmission and brake fluids, vehicles, equipment, tires, and miscellaneous debris (BRAC SI 1996 vol. 1). The landfill was covered in approximately 2 to 2.5 feet of soil in an attempt to contain the waste. Currently the Old Bulky Waste Landfill is eroding, and the soil placed on top is sifting into the debris, causing large holes to open up around the edge and in the center of the landfill. Additionally, burrowing birds are bringing up buried soil and nesting below the cover. Over 500 bird burrows have been counted in the landfill.

Marine Debris

Marine debris accumulation on the reefs and beaches of NWHI is a staggering problem, and an estimated 57 tons of new debris enters NWHI on an annual basis (Dameron et al. 2007). Marine debris, especially derelict fishing nets and gear, plastics, and hazardous materials, is a severe chronic threat to shallow ecosystems such as Midway Atoll. It adversely impacts the endangered Hawaiian monk seal, threatened and endangered sea turtles, albatrosses, and other wildlife species which become entangled in or ingest these materials. Large masses of fishing nets degrade coral reef health by shading, abrading, or dislodging fragile corals or by preventing reef regeneration.

Over 15 agencies and partner groups have worked since 1996 to remove large accumulations of marine debris. The total debris removed from 1996 to 2008 in NWHI was 610 tons. Midway staff periodically clean the beaches and reefs to remove entanglement hazards and collect the ongoing accumulation of plastics, glass, and metal for eventual disposal in Honolulu, sent by barge at great expense. As discussed in the **Electrical Generation and Distribution** section, this cost may be defrayed through on-site incineration or gasification, generating electricity as a byproduct.

TERRESTRIAL ALIEN SPECIES

Human occupation and development at Midway Atoll has transformed the atoll since the Commercial Pacific Cable Company established its operation on Sand Island in 1903. The cable company attempted to make the “sand spit” as self-sufficient as possible through the cultivation of gardens and small livestock. Due to the lack of organic soil on the islands, barge loads of soil were brought from O’ahu and Guam, and contained not only the organic matter that made gardening possible, but also all the associated soil organisms such as ants, centipedes, fungi, and other nonnative species.

Additionally, trees and ornamentals were planted on Sand Island, such as ironwoods, eucalyptus, and acacia. So successful were these introductions that, by 1922, an estimated two-thirds of Sand Island was covered with imported vegetation. The black rat (*Rattus rattus*) was successfully exterminated on Midway in 1997; however, mice (*Mus musculus*), along with various species of ants, termites, wasps, ticks, and mosquitoes, continue to infest the island. Mosquitoes are of special concern as they are potential vectors for diseases such as West Nile virus, avian malaria, and avian pox. Termites have compromised most of the historic wooden buildings on Midway.



Tons of marine debris pollute Pacific Ocean and islands

3. Site Overview

SITE ANALYSIS

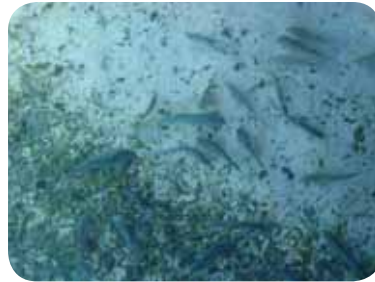
The number of alien land plants in the NWHI varies from only 3 introduced at Nihoa to 249 introduced at Midway Atoll. The level of threat from introduced plants also varies between species. For example, the invasive plant golden crownbeard (*Verbesina encelioides*) displaces all native vegetation in nesting areas, causing entanglement and heat prostration and killing hundreds of albatrosses each year (J. Klavitter, pers. com. 2007).

MARINE ALIEN SPECIES

Several alien species also threaten Midway's waters and reefs. One alien fish species and four alien invertebrate species are known to exist at Midway. One additional alien invertebrate species was found on a ship's hull at Midway and is thought not to be established at Midway. Although the ecological implications are unclear so far, at a minimum these species compete for resources with native species. Two of the invertebrate species have the potential to change the character of coral reefs where they become established.

Several other species have been identified as potential threats to Monument waters including Midway, having been documented in the main Hawaiian Islands or isolated locations in the Northwestern Hawaiian Islands. These include two fish species, one octocoral species, two algae species, and two invertebrate species. In particular the octocoral and algal species have the potential to alter the character of coral reefs where they become established.

Although marine alien species have been found at Midway, they are not believed to currently impact its infrastructure.



Fish school in Eastern Island shallows



Golden crown-beard is a major invasive plant

CLIMATE CHANGE AND SEA LEVEL RISE

Sea level rise is expected to have significant effects on the islands within Papahānaumokuākea Marine National Monument (Baker et al. 2006). Projected terrestrial habitat loss by 2100 among French Frigate Shoals, Pearl and Hermes Atoll, and Lisianski is expected to be 3 to 65% under a median scenario (48 cm rise), and 5 to 75% under the maximum scenario (88 cm rise). Spring tides would probably periodically inundate all land below 89 cm (median scenario) and 129 cm (maximum scenario) in elevation. Although Midway Atoll was not included in this study, Sand and Eastern Islands are more similar to Lisianski Island, which is expected to lose about 5% of its land area by 2100 (Baker et al. 2006). The environmental consequences of island inundation would likely be greater for Midway, with its buried toxic materials.

Changes in sea surface temperatures have been demonstrated to cause coral bleaching. Mass coral bleaching in the NWHI occurred in 2002, and was most severe in the three northernmost atolls, including Kure, Pearl and Hermes, and Midway. The occurrence of coral bleaching in the cool waters of the Northwestern Hawaiian Islands has been interpreted by some as indicative of climate change (Kenyon et al. 2006).

The measured increase of carbon dioxide in the atmosphere has been linked to ocean acidification, which slows the growth of coral reefs, and in some cases is predicted to dissolve them (Fine and Tchernov 2007). This is of great concern for Monument managers.



Shoreline access is restricted to protect wildlife



C5 plane amid gooney birds

CHALLENGES AT MIDWAY ATOLL

Midway Atoll is a highly unique setting that presents tremendous challenges and issues that must be considered in all planning and design efforts. This Conceptual Site Plan, along with ongoing work by Co-Trustee and other agencies, begins to suggest some creative solutions to address these compelling problems. Some of the key challenges specific to Midway include the following points:

- Sand Island and Eastern Islands are highly disturbed landscapes greatly impacted by human use since the early 1900s. Dredging and filling of the land and water environments, nonindigenous plant and animal species introduction, and disruption of native species habitats are some indicators of the tremendous manipulation of the atoll.
- Global impacts adversely affect Midway Atoll's biological health. These adverse effects include marine debris accumulation (several tons of plastic washed up to shore annually), sea level rise, elevated sea surface temperatures, sea water acidification, and the possibility of changing ocean currents and wave patterns.
- Midway Atoll contains both historically and biologically unique features. Preservation and enhancement of the historic and ecological systems must be carefully evaluated from the lens of both perspectives.
- Carrying capacity is very limited on Midway Atoll due to its small land mass, sensitive biological and historic resources, and limited infrastructure. This capacity may be slightly increased, but human activities such as on the ground management and restoration activities, research, education, recreation, etc., must fit within this overarching constraint.
- Creative education and interpretation opportunities such as remote learning offsite, or sustainable tourism onsite, must be developed that help elevate public awareness while not creating impacts.
- Toxicity and hazardous materials cleanup at Midway Atoll is a major priority for ecological health, historic preservation, and public safety.
- Remote location of Midway Atoll creates impediments to transporting goods, materials, and people on- and off-island. Modes of travel to Midway and related logistical constraints are pivotal issues. Disposal and removal of surpluses or damaged items or materials is also problematic as the expense involved in proper disposal is prohibitive.
- High construction costs due to logistics
- Limited construction techniques
- Harsh climate conditions for materials
- Severely deteriorating buildings and infrastructure
- Limited staff and funding
- Development restrictions based on contaminants, historic conditions, and wildlife



Plastics ingested by albatross



Peeling lead-based paint



Deteriorated bulkhead on Inner Harbor



Midway Atoll Improvement Guidelines and Principles

4

4. Midway Atoll Improvement Guidelines and Principles

GOALS

Design and planning goals developed for Midway Atoll are aligned with the Papahānaumokuākea Marine National Monument Management Plan goals.

GOAL 1—Protect, preserve, maintain, and where appropriate restore the physical environment and the natural biological communities and their associated biodiversity, habitats, populations, native species, and ecological integrity.

GOAL 2—Support, promote, and coordinate research, ecosystem characterization, and monitoring that increases understanding of the NWHI, improves management decision-making, and is consistent with conservation and protection.

GOAL 3—Manage and only allow human activities consistent with Proclamation 8031 to maintain ecological integrity and prevent or minimize negative impacts for long-term protection.

GOAL 4—Provide for cooperative conservation including community involvement that achieves effective Midway Atoll operations and ecosystem-based management.

GOAL 5—Enhance public understanding, appreciation, and support for protection of the natural, cultural, and historic resources.

GOAL 6—Support Native Hawaiian practices consistent with long-term conservation and protection.

GOAL 7—Identify, interpret, and protect Monument historic and cultural resources.

GOAL 8—Offer visitors opportunities at Midway Atoll to discover and appreciate the wildlife and beauty of the NWHI, enhance conservation, and honor its unique human history.

DESIGN GUIDELINES AND PRINCIPLES

The Planning Team developed Design Guidelines and Principles that will inform appropriate design and planning efforts at Midway Atoll. These guidelines reinforce the key concept that Midway will become a “model of sustainability.” They provide the framework for preserving and enhancing Midway’s ecological and historic values in the course of implementing the Monument Management Plan at the Midway site-scale.

Several of these principles are mutually reinforcing, with each principle independently pointing to a common solution. For example, removing lead-based paint from historic structures removes a toxic substance that directly impairs wildlife and human health while preserving the historic integrity of these buildings. Adaptively reusing existing historic structures prolongs their life cycle and preserves their historic value while also meeting lodging, operations, research, and visitor services needs, simultaneously reducing the need for new construction that would adversely impact native species and habitat. Generating electricity with localized alternative energy devices to reduce carbon emissions and increase energy efficiency may save the cost of wiring the structure to the existing utility grids. Similarly, installing an incinerator or gasification system in order to avoid the high costs and carbon emissions of burning transported fuel reduces the need to ship much of Midway’s waste to Honolulu. Building new structures on existing concrete pads within the historic core/redevelopment zone helps to meet the “no net habitat loss” principle while also staying in character of Midway’s historic development patterns.

Design solutions such as these which meet several of the stated principles should permeate the Midway Atoll redesign plans. Midway Atoll is sufficiently small that opportunities exist to design ‘closed’ systems, minimizing required inputs, wastes, and operational costs.

Overarching design principles also include compliance with numerous Federal requirements, including those for accessibility such as the Rehabilitation Act of 1973 (as amended), Section 504 and 508; and the Architectural Barriers Act (ABA) of 1968.

PROTECT HISTORIC STRUCTURES & LANDSCAPES

- ✓ Protect, maintain, and interpret historic resources.
- ✓ Follow Secretary of the Interior Standards to protect and maintain buildings that maintain integrity and/or identified as historically significant and eligible for or listed on the National Historic Register.
- ✓ Follow Secretary of the Interior Standards to protect historic landscape features and characteristics
- ✓ Follow National Historic Preservation Act (36 CFR Part 800) to document historic buildings and structures that do not exhibit integrity and will be secured in place (building envelope is sealed) or demolished. Salvage materials and leave footprints or ruins for interpretation that are safe and compatible with wildlife.
- ✓ Explore adaptive re-use of historic buildings

PROTECT HABITAT & BIOLOGICAL RESOURCES

- ✓ Adhere to National Wildlife Refuge System principle "Wildlife comes first"
- ✓ Protect, maintain, enhance habitat and biological resources
- ✓ No net loss of habitat
- ✓ Construct new structures in footprints, building foundations, or pads of non-historic footprints
- ✓ Remove invasive species
- ✓ Protect nest sites
- ✓ Reduce high structures to minimize bird strikes
- ✓ New construction will not interfere with wildlife
- ✓ Remove pollutants (lead based paint, shore debris, toxic substances)
- ✓ Protect shallow water systems and reef sites
- ✓ Restore native habitat where feasible

ALTERNATIVE ENERGY SYSTEMS & WASTE REDUCTION

- ✓ Reduce consumption
- ✓ Use energy efficient strategies and alternative energy systems
- ✓ Consolidate power generators and power sources
- ✓ Construct new structures that are energy-efficient or generate own energy
- ✓ Recycle materials for construction or enhancement projects
- ✓ Evaluate the use of alternative fuels for transportation and equipment

OPERATIONS AND MAINTENANCE

- ✓ Address current and future maintenance needs
- ✓ Communicate management plan to staff, e.g., training in historic resource protection, biological resource protection
- ✓ Consolidate development (utilities, infrastructure, buildings)
- ✓ Appropriate infrastructure matched to current/new development and operations

SUSTAINABLE ARCHITECTURE & LANDSCAPE ARCHITECTURE

- ✓ Re-use existing structures that still have integrity
- ✓ Sustainable design (materials, energy, etc.)
- ✓ Recycle materials, e.g., scrap metal, glass, ropes, etc.)
- ✓ Construct pre-fabricated components off-site
- ✓ Apply Performance Standards for new construction
- ✓ Apply sustainable design standards such as LEED
- ✓ Use termite-resistant building materials

DESIGN AESTHETICS

- ✓ Maintain historic character
- ✓ Build new structures in the historic or tropical vernacular
- ✓ Reduce noise pollution
- ✓ Reduce light pollution

VISITOR USE & EXPERIENCE

- ✓ Limit human presence to appropriate visitation levels
- ✓ Zones of use (direct visitor uses while protecting wildlife and habitat)
- ✓ Regenerative design, e.g. hydroponic gardens
- ✓ Develop facilities to accommodate visitors
- ✓ Eco-tourism focus: wildlife/historic landscape immersion experience; interpretation/education
- ✓ Service and volunteer work opportunities offered to visitors
- ✓ Midway Site will be a demonstration model for sustainability
- ✓ Develop opportunities for people who cannot visit to learn about Midway Atoll (e.g., website, cam, online environmental data)

BUILD PARTNERSHIPS AND MANAGEMENT-DRIVEN RESEARCH

- ✓ Collaborative management and development (FWS/NOAA/State of Hawai'i)
- ✓ Develop new partnerships and alliances
- ✓ Corporate sponsorships
- ✓ Research opportunities



DECEMBER 2008

DESIGN GUIDELINES & PRINCIPLES

MIDWAY ATOLL CONCEPTUAL SITE PLANNING

4. Midway Atoll Improvement Guidelines and Principles

MANAGEMENT ZONES AND SITE ZONES

SAND ISLAND MANAGEMENT ZONES

The Planning Team delineated Management Zones for Midway Atoll, including Sand Island, Eastern Island, and Spit Island. These zones show the physical areas where specific management, planning, and development activities occur.

The zones are as follows:

Marine Protection Zone

Protected shoreline and marine habitat that supports bird, wildlife, and fish species, and their critical life activities such as resting, feeding, nesting, fledging, migrating, etc. No public access is allowed.

Revegetation/Habitat Zone

Midway Atoll is a highly disturbed system that hosts pervasive invasive plant species, toxic materials, and human development remnants that, taken together, have created significant adverse impact on indigenous species and their habitat. Most of the islands within Midway Atoll are designated as the Revegetation/Habitat Zone to focus efforts on restoring atoll habitat and enhancing species populations.

Beach Zone

Shoreline that is open to the public for passive recreation and educational activities such as walking, bird and wildlife watching, and beach viewing. Primarily this zone occurs on the north beach of Sand Island. No beach access is available on Spit Island, and the only access allowed on Eastern Island is via the boat dock.

Inner Harbor Zone

This zone includes the historic Inner Harbor and its associated shoreline, piers, and facilities. One of two approaches to the island (by boat or airplane), the inner harbor zone is critical to visitor arrival, transportation of services and goods, and water-based activities (e.g., ecotourism via passenger vessels, marine research, rescue operations, security).

Airfield Operations Zone

The Airfield Operations Zone on Sand Island comprises the active Henderson Airfield and includes the new operations center, the old hangar, the active runway, and inactive runway portions. One of two approaches to the island (by boat or airplane), the airfield operations zone is critical to visitor arrival, transportation of services and goods, and aviation activities (ecotourism via air travel, research, emergency operations, security).

Freshwater Protection Zone

The Freshwater Protection Zone is a large triangular portion of the runway area from which surface water is collected in the catchment basin and then pumped into the three freshwater storage tanks.

Historic and Primary Development Zone

The Historic and Primary Development Zone designates Sand Island's historic core and redevelopment area. It delineates an area that is highly significant in terms of historic development patterns on Sand Island related to the Cable Company historic period (early 1900s) and World War II historic period (1940s). Several historic structures and features are contained within this zone. Conversely, this zone indicates the primary area where development of new facilities or adaptive reuse of existing or historic structures is an appropriate activity.



Albatrosses and people



BEQ Barracks: replace with "green-designed" multi-plex units



SAND, SPIT & EASTERN ISLANDS MANAGEMENT ZONES

MIDWAY ATOLL CONCEPTUAL SITE PLANNING



4. Midway Atoll Improvement Guidelines and Principles

MANAGEMENT ZONES AND SITE ZONES

No Dig Areas/Landfill Zone

The “No Dig” areas are sites that contain contaminated soils or other materials, and cannot be built upon or otherwise disturbed. These sites include Old Bulky Waste Landfill on the south beach point, and the old fuel farm on the north beach.

The “No Dig” areas were designated in the Base Realignment and Closure process (BRAC) as Land Use Controls where digging below 4 feet is prohibited (or FWS assumes all responsibility). These areas, and several landfills, were determined to not necessitate further cleanup unless the controls were not effective. The Old Bulky Waste Landfill, however, is an example where the control is not sufficient and further remediation needs to be addressed through the BRAC process.

Sand Island Building Treatment and Site Zones

The Planning Team assessed site zones and building treatment opportunities within Sand Island’s Core Historic Zone. Evaluation factors included the following: 1. FWS historic treatment recommendations; 2. current and historic functions as well as potential future uses; 3. architectural and structural integrity; and 4. spatial organization of roads, operations, buildings, and landscape.



BOQ barracks



Cable Station building complex



Termite damage to structural roof members of historic Machine Shop

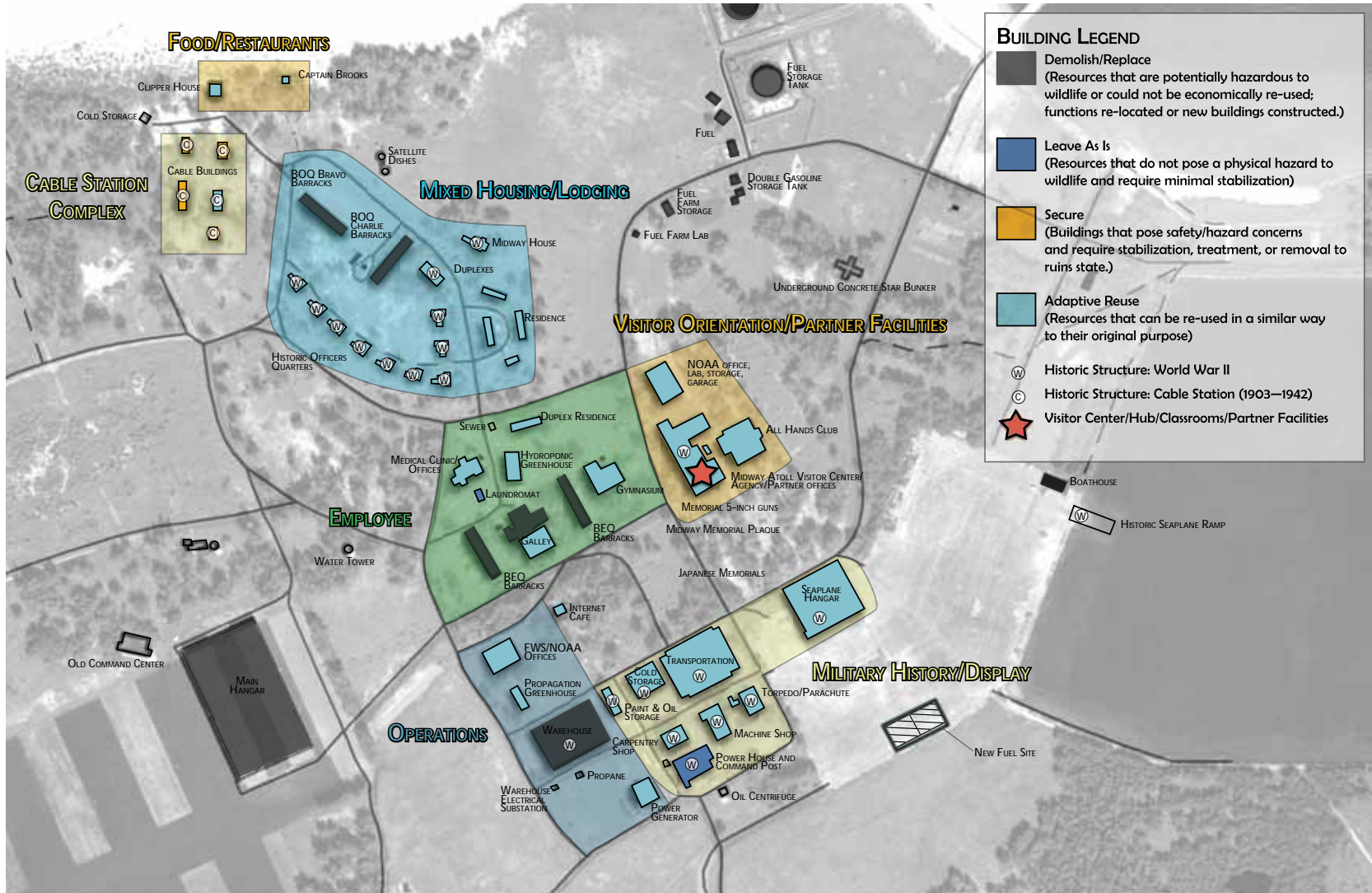
ALTERNATIVES CONSIDERED

In the draft conceptual site plan, three alternatives were considered. Based on that analysis and the public comments received, Alternative B, “Model for Sustainability” was selected for this final plan.

In brief, Alternative A would have maintained current management activities in place at Midway at the time of the Proclamation. Alternative C was focused on accelerated restoration of Midway Atoll habitat and species, as well as on historic preservation efforts. As much onsite treatment as possible would have occurred under Alternative C. Resources, staff, facilities, and programs would have been primarily dedicated to restoring Midway Atoll’s natural habitat and historic landscape to the highest functioning state over the next 15 years. The maximum overnight population would have increased to 180 persons, and ecotourists would have been replaced by volunteer service workers.



Officers' Quarters



4. Midway Atoll Improvement Guidelines and Principles

A "MODEL FOR SUSTAINABILITY:" INTEGRATED BIOLOGICAL, HISTORIC, AND VISITOR PROGRAMS (PREFERRED ALTERNATIVE)

This model, identified in the draft plan as Alternative B and the 'preferred alternative', provides an integrated approach for enhancing protection and understanding of biological and historic resources at Midway Atoll/Sand Island while providing a moderate increase in visitor services and interpretive, educational, and research programs and facilities. It also provides an operational hub for agencies within the Monument.

Resources will be allocated to elevating the programs and facilities in three areas: 1. biological protection, understanding, and restoration; 2. historic resource preservation and adaptive reuse; and 3. visitor education and interpretation.

Short-term overnight visitation will not exceed 50 people, while seasonal or long-term contractors and researchers will not exceed 100 people, thus totaling

no more than 150 people on any given night. The increased island population from the current regular capacity of 120 people will require enhancements in utility systems infrastructure. Up to three large groups of day visitors per year will primarily access the island via passenger vessel or aircraft, and generally no more than 400 people will be on-island at any one time.

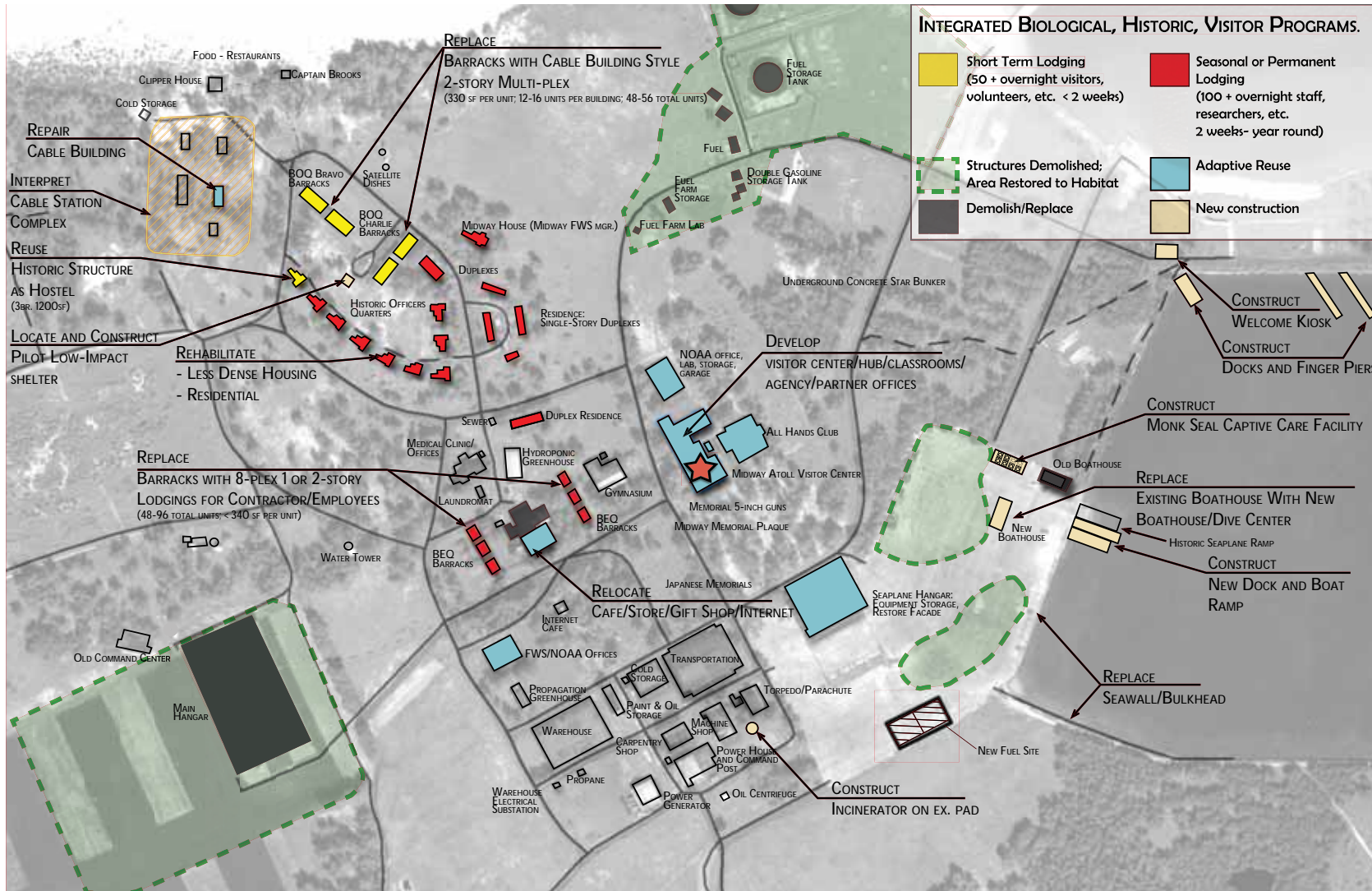
New facilities and systems will utilize green design and energy principles. Midway's physical structures as well as interpretive and education programs will emphasize the atoll's sensitive resources and its role in worldwide resource conservation and human history.

Key activities implemented under this model include the following:

- Treat, stabilize, and clean-up all World War II-era historic buildings (e.g., rehabilitation, lead-based paint removal) to use for lodging, operations, and visitor services (approximately 18 buildings)
- Rehabilitate/repair Cable building #643 for interpretation. Partially dismantle other four Cable Station historic structures to ensure human and wildlife safety, leaving the concrete cores for interpretive purposes. Salvage recyclable materials such as windows and doors for use in Cable building #643
- Demolish B, C, and BEQ Barracks (4 buildings total) and replace in same footprint with smaller scale, energy-efficient multiplex units
- Construct low-impact-style shelters (< 200 sf) on existing concrete pad(s) or demolished building footprints as temporary lodging or ecotourism overnight facilities
- Reuse one Officers Quarters building as a hostel to accommodate overnight visitors
- Rehabilitate historic Midway Mall to serve as the new "Midway Atoll Visitor Center;" facility will be a multi-purpose center containing visitor facilities, multi-agency offices, and classrooms



Green turtle © James Watt



SAND ISLAND BUILDING PROGRAM

MIDWAY ATOLL CONCEPTUAL SITE PLANNING



4. Midway Atoll Improvement Guidelines and Principles

A “MODEL FOR SUSTAINABILITY:” INTEGRATED BIOLOGICAL, HISTORIC, AND VISITOR PROGRAMS (PREFERRED ALTERNATIVE)

- Demolish nonhistoric structures or structures that do not meet the Secretary of the Interior Standards for historic preservation, and create habitat in vacated areas
 - Expand biological enhancement, marine management, and research programs as part of multi-agency and partnership effort
 - Plan, design, and build a marine laboratory/quarantine facility
 - Construct a Hawaiian monk seal captive care facility
 - Remediate all lead-based paint and other toxic materials related to structures, facilities, and soils that are creating exposure hazards to humans and wildlife within 15 years
 - Monitor landfills and, if necessary, enact further remediation within 15 years
 - Construct a new boathouse, dive center, and storage facility to facilitate marine-based activities
 - Expand the new fuel farm to meet Co-Trustee needs
 - Construct new ramp/boat dock near location of historic seaplane ramp
 - Construct two welcome facilities for visitors arriving by ocean vessel and by airplane
 - Replace and upgrade finger piers in the Inner Harbor
 - Expand drinking-water capacity to meet needs for 30 additional people
 - Expand sewage and solid waste disposal capacity
 - Install new satellite antenna for telepresence, remote wildlife viewing, and research use
- Benefits of implementing this model include:
- o Visitation volumes do not exceed Midway Atoll’s carrying capacity
 - o No further net loss of biological and historic resources occurs
 - o Significant improvements are implemented to enhance biological and historic resources
 - o Midway’s exceptional historic resources are preserved and interpreted
 - o Facilities and infrastructure are upgraded to meet projected lodging, operations, visitation, safety, and maintenance needs
 - o Several biological research and habitat initiatives are implemented, e.g., Hawaiian monk seal captive care facility
 - o Educational and interpretive program is greatly enhanced; public outreach and stewardship opportunities are actively promoted at local, onsite scale to global, remote scale
 - o Partnerships and coalitions encouraged under this site plan may attract more funding dedicated to biological and historic preservation activities on Midway and throughout the Monument, e.g., development of a marine lab or research station, programming for field schools and other education programs
 - o Sustainable low-impact development at Midway will serve as a model of sustainability for remote field operations fostering conservation, recycling, and reduction of fossil fuel use
 - o Facilities, whether renovated or new, will incorporate sustainable design principles to enable the reduction of fossil fuel usage
 - o Implementation of priority projects will enable Co-Trustee investment in the atoll, greatly enhancing the field operational capacity of the Monument overall



Midway Atoll provides important habitat for albatrosses