

4. Midway Atoll Improvement Guidelines and Principles

SUMMARY OF MIDWAY ATOLL/SAND ISLAND CONCEPTUAL SITE MODEL

MAXIMUM POPULATION ON MIDWAY ATOLL

As indicated in the following table, the maximum overnight population allowed on Midway Atoll will be 150 people, which at any one time may include transient, short-term, seasonal, and permanent personnel. The average daily population range is expected to be between 100-120 people during the year. Total visitation to Midway is constrained by the existing infrastructure; levels above 120 people will require additional infrastructure support on the island as outlined in Chapter 3 of this document, **Site Overview**. The personnel requirements for Midway were developed through a multiagency requirements planning process. They will be regularly assessed and may be modified in light of evolving agency needs and infrastructural constraints at Midway to ensure that each agency's goals continue to be achieved and mandates satisfied.

At varying times of the year, Midway's overnight population may be comprised of different types of users, which are described below. Although the combined totals of personnel may seem to exceed the daily maximum capacity, proper scheduling will minimize overlap of these various groups to ensure that the overall overnight population does not exceed 150 people.

Transient use. Individuals stay on Midway less than 1 week, and typically include VIPs and agency representatives, such as employees departing or joining a NOAA, Coast Guard, or military vessel stopping at Midway or State personnel en route to Kure Atoll. They may also include agency personnel or contractors with a specific assignment on Midway, such as repairing or installing infrastructure or supporting a large group of day visitors. Since most of the field activities within the Monument occur during the summer and early fall, it is likely transient use will peak during the months of July through October. The maximum number of transients on island will depend upon the availability of housing, but the typical daily maximum will likely be fewer than 15 people.

Short-term use. Individuals stay on Midway from 1 to 4 weeks, and include agency staff and visitors participating in the approved visitor program. The number of people participating in the visitor program may not exceed 50 at any one time, and generally is much lower. The number of visitors usually peaks during albatross season, November through June. Short-term agency staff would likely include researchers, biologists, or marine debris cleanup personnel conducting projects at Midway Atoll; such use is concentrated in the summer and fall months. The maximum number of short-term visitors on island will depend upon the availability of housing, but the typical daily maximum will likely be fewer than 50 people.



Black-footed albatross chick



Green turtle

Seasonal use. Individuals stay on Midway from 1 to 8 months, and include agency staff and volunteers. Agency staff are typically involved in leading the visitor program, habitat restoration, seabird monitoring, or Hawaiian monk seal monitoring and captive care programs, while volunteers assist in these efforts. During major construction projects, seasonal use may also include contractors. The maximum number of seasonal personnel on island will depend upon the availability of housing, but the typical daily maximum will likely be fewer than 30 people.

Permanent use. Individuals stay on Midway more than 8 months during the year, and consist of FWS or NOAA staff (including enforcement personnel) and FWS contractors operating the atoll's infrastructure. The maximum number of permanent staff on island will depend upon the availability of suitable housing, but could be up to 20 agency staff and 65 contractors. Combined, the typical daily maximum will likely be fewer than 80 people.

Day use. In addition to overnight use of Midway, the Co-Trustees have established a limit on the number of day-use-only visitors to the atoll. A maximum of three large groups (50-800 people) of day visitors per year may visit the atoll. These visitors typically stay no more than 4 to 8 hours and arrive via aircraft or large passenger vessel. No more than 400 day visitors may be on the island at one time, unless specific arrangements have been approved for a special event, such as a ceremony commemorating an anniversary of the Battle of Midway.

If in the future the Co-Trustees desire to increase the maximum overnight population level above 150 people or the day visitor limit above 800 people, FWS would first need to determine that such use would be compatible with the purposes of the Refuge and the mission of the National Wildlife Refuge System, as required by the National Wildlife Refuge System Administration Act of 1966, as amended. Such proposals also would require analysis under the National Environmental Policy Act, as well as potentially the Endangered Species Act and other applicable laws.



Coral reef and shallow water protection is a vital activity

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Description/Theme	Integrated Biological, Historic, and Visitor Programs
	Coordinated management and operations program at Midway
Maximum overnight population	150
Average Population Range	100–120
Day Visitors	Up to 3 large groups of <800 annually; <400 ashore at once
UTILITY SYSTEMS	
Drinking Water	Increase capacity for up to 30 added people during regular periods
Electricity	Increase capacity for up to 30 added people during regular periods
Sewage	Increase capacity for up to 30 added people during regular periods
Solid Waste Disposal	Increase capacity for up to 30 added people during regular periods
LODGING FACILITIES	
<i>Officer Quarter Residences</i>	
	Reuse 1 officer quarter structure as hostel for short-term visitors
	Reuse 1 structure for short-term visitors
	Reuse 7 structures for seasonal or permanent staff

Description/Theme	Integrated Biological, Historic, and Visitor Programs
<i>Barracks</i>	
BOQ Bravo	Replace B barracks structure with (2) cable-style multiunit 2-story structures for short-term visitor lodging
BOQ Charlie	Repair C barracks to maximize capacity for interim. Eventually replace barracks structure with (3) multiunit 2-story structures for short-term visitor lodging
BEQ Barracks (1)	Replace barracks structure with (3) 8-plex 1 or 2-story structures for employees
BEQ Barracks (2)	Replace barracks structure with (3) 8-plex 1 or 2-story structures for employees
<i>Duplexes</i>	Maintained as seasonal/permanent staff lodging
<i>Low-Impact Shelters</i>	Up to 12 new primitive shelters constructed
<i>Midway House</i>	Maintained as FWS Midway Manager residence
NUMBER OF HOUSING UNITS	
Hostel style 1200 sf	2
Duplex Style <900 sf	11
2-story 12 x 24 Units 330 sf	48–56
8-plex 1 or 2-story structures <340 sf	48–96
Officers Quarters residences	8
Low impact shelters<200 sf)	3
<i>Total Number of Housing Units</i>	123-179

4. Midway Atoll Improvement Guidelines and Principles

Description/Theme	Integrated Biological, Historic, and Visitor Programs
Cable Station Buildings	Repair one cable station building (#643). Remaining cable structures partially dismantled for safety, historic landscape is interpreted
FOOD SERVICE AND ENTERTAINMENT FACILITIES	
Clipper House	Expand or replace for additional kitchen, and cold storage and dining facilities
Captain Brooks	Maintained as is
Galley Bldg	Reuse as café/store/entertainment center
All Hands Club	Demolished or reused for partner facilities; functions moved to other buildings (e.g., Galley)
AGENCY OFFICES AND VISITOR FACILITIES	
FWS Office Building	Agency offices and visitor services move into Midway Mall Visitor Center; maintain existing office building
Midway Mall	Midway Atoll Visitor Center established with visitor services, agency offices, and classrooms
Contractor Admin Building	Maintained as is
Gymnasium	Repaired and operational; used for emergency shelter

Description/Theme	Integrated Biological, Historic, and Visitor Programs
RESEARCH/LAB/STORAGE	
Old Commissary Building	Reused for agency offices, and shared research facilities e.g., cold storage/lab
Equipment Storage	Expanded in existing structures
Seaplane Hangar	Use for equipment storage; replace roof and restore glass façade for interpretation and/or exhibitory
Educational Classrooms/lab/library/ workroom	Phase I of Midway Mall Visitor Center
Monk Seal Holding Tanks	Yes
Biological Quarantine Facility	Yes
Monk Seal Captive Care Facility	Yes
BOATING FACILITIES	
Large Dock for Barges or Ships	Cargo pier maintained as is; fuel pier abandoned—disposition TBD
Midsized Dock for medium research vessels	Existing tug pier rehabilitated Tug pier replaced and upgraded
Seaplane/boat ramp for small vessels	New dock constructed in Inner Harbor; new dock/ramp built near seaplane ramp
Finger Docks for small vessels	Replace & upgrade finger piers in the Inner Harbor
Boat House	Replaced with new facility combined with dive infrastructure

SUMMARY OF MIDWAY ATOLL/SAND ISLAND CONCEPTUAL SITE MODEL

Description/Theme	Integrated Biological, Historic, and Visitor Programs
AIRPORT FACILITIES	
Runway	North strip removed and restored to habitat within 10 years
Main Hangar	Demolished and restored to habitat within 10 years
Airport Terminal Welcome Building and Staging Area	Constructed
HABITAT ENHANCEMENT	
Old Fuel Tank Area	Demolished and area restored to habitat; new fuel tank area located south of seaplane hangar
Abandoned, derelict, or non-historic structures	Reuse, maintain as is, or demolish
Vegetative Buffer in Inner Harbor Area	Yes
Upland Habitat	Invasive vegetation removed and restored to native habitat (controlled w/in 15 yrs)
Shoreline Edge	Additional protection to direct public access away from sensitive areas
Coral Reef System	Investigate coral reef habitat improvements; metal wreckage removal

Midway Atoll Conceptual Site Plan



5. Midway Atoll Conceptual Site Plan

INTRODUCTION

The Planning Team selected the “Integrated Biological and Historic Preservation and Visitor Services—A Model for Sustainability” for implementation. This model provides an integrated approach for enhancing protection of biological and historic resources at Midway Atoll/Sand Island while providing a moderate increase in visitor services and interpretive and educational programs and facilities. The model meets the Monumentwide vision to “forever protect and perpetuate the ecosystem health and diversity and Native Hawaiian cultural significance of Papahānaumokuākea” by focusing on species and habitat recovery. The concept also recognizes Midway’s special role as a hub of the Monument for resource protection, management and research activities, and as the only atoll open to the public, the touchstone where humans can be immersed in the Northwestern Hawaiian Islands’ rich history, wildlife, and Pacific marine environment.

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

Protection, research, and restoration of atoll systems and species, and protection of historic resources are promoted activities within the appropriate level of human interaction. Consideration is given to the atoll’s carrying capacity—how many people, structures, and facilities the island system can support without adverse impact to its health. Visitation will be increased approximately 16% over the recommended capacity targeted in the Interim Visitors Services Plan. 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 overnight. Day visitors will continue to visit the island with a maximum of three large groups of no more than 800 people per year, and generally no more than 400 visitors on Sand Island at any one time. Maximum overnight population will increase from the current level of 120 people to 150 people.

The focus of management and development of Midway facilities and programs will be on sustainability and sustainable tourism; creating the lowest carbon footprint possible on Midway Atoll is a primary goal. New and adapted facilities and systems will utilize green design and energy principles, and reduce consumption and waste. Midway’s physical structures in combination with its interpretive and education programs will emphasize the atoll’s sensitive resources and its role in worldwide conservation, ecological systems, and human history.

Patterns of uses are grouped into Site Zones:

- Visitor Orientation and Partner Facilities
- Mixed Housing/Lodging
- Employee
- Cable Station
- Food/Restaurants
- Military History and Display
- Operations

Each primary building within the Historic and Primary Development Zone is identified by color code in the map on page 51, in terms of appropriate historic treatment. The treatment categories are: 1. demolish and replace functions to another building, or replace existing structure; 2. leave as is, and stabilize structures that do not pose threats to wildlife or humans; 3. secure structures that pose hazards to wildlife or humans; and 4. adaptive reuse of structures that have sufficient historic or structural integrity to be used as a Midway Atoll facility.

SAND, EASTERN, AND SPIT ISLANDS MANAGEMENT ZONES

As described in Chapter 4, Sand Island is zoned according to the following physical areas where specific management, planning, and development activities are appropriate: Marine Protection Zone, Revegetation/Habitat Zone, Beach Zone, Inner Harbor Zone, Freshwater Protection Zone, Airfield Operations Zone, No Dig/Landfill Zone, and 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 and contains several historic structures and features eligible for listing on the National Register of Historic Sites. This zone indicates the primary area where development of new facilities or adaptive reuse of existing or historic structures should occur. This proposal will not only help preserve the integrity of the historic landscape, but will also protect wildlife and their habitat by limiting development to existing structures or impacted areas.

Specific activities for Sand Island are described in detail in the following section, **Sand Island Conceptual Site Plan**.

EASTERN ISLAND

Eastern Island is primarily zoned in Marine Protection Zone and Revegetation/Habitat Zone. No new major development or structures are proposed for this unoccupied island, which provides critical shoreline and island habitat for birds and marine wildlife. Limited human access is provided via a boat dock and trails. Eastern Island's role during World War II is instrumental in the interpretation of Midway Atoll's incredible history. Numerous historic features remain, including the World War II runway, artillery, bunkers, and sand dune airplane revetments.

Eastern Island has been the focus of successful restoration and wildlife enhancement efforts. Volunteers and staff have removed large areas of the exotic species *Verbesina encelioides* and have planted native bunchgrass (*Eragrostis*) species. Biologists successfully created freshwater wetlands and established a Laysan duck population on Eastern Island.

Ongoing activities will continue to focus on habitat protection and restoration, and the interpretation of historic and biological features. No overnight visitation occurs on Eastern Island, and visitors will arrive for day visits only for the purpose of interpretation, volunteerism, or study of the island's history and ecology.

Activities for Eastern Island include the following:

- Continued restoration of native habitat and species (e.g., remove invasive plants, enhance bird habitat, reintroduce native species, etc.)
- Participatory restoration and research programs
- Build upon Eastern Island historic interpretation and educational program, guided tours, and protection and rehabilitation of historic sites
- Reconstruct sand dune airplane revetment with built-in crew/sleeping area
- Improved trail system linking historic features and memorials
- Determine appropriate treatment of historic runway, e.g., trails, historical interpretation, or partial habitat restoration
- Installation of remote wildlife viewing cameras for monitoring and educational purposes

SPIT ISLAND

Spit Island is primarily zoned in Marine Protection Zone and Revegetation/Habitat Zone. It is important habitat for monk seals, sea turtles, birds, and other wildlife. No public access is allowed, and no development will occur on Spit Island to promote thriving wildlife populations and habitat. Spit Island will continue to support research and biological programs.



WWII airplane revetment on Eastern Island

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SAND ISLAND CONCEPTUAL SITE PLAN

MARINE AND SHORELINE PROTECTION

The Marine Protection Zone designates protected shoreline and fringing marine habitat on Sand Island that supports wildlife and their critical life activities such as resting, feeding, nesting, fledging, migrating, etc. Public access is generally not allowed in these sensitive shoreline areas, and these areas will remain undeveloped. However, biological programs, research, and management activities will continue to occur. Key actions for this zone are as follows:

- Limit human access mainly to the pursuit of biological programs, research, and management
- Install permanent moorings at regularly used anchorages to prevent coral reef damage
- Conduct coral reef rehabilitation projects when and where appropriate, using the best available information about predisturbance conditions.
- Reinforce, repair, or improve limited trail access, viewpoints, and signage, create viewing stations for wildlife watching
- Evaluate the potential for natural beach restoration, particularly along hardened or rip-rapped shorelines such as the South Beach, and the shoreline near Turtle Beach. Further studies are required to determine feasibility.

Reef habitat recommendations from the Monument Management Plan include the following strategies and activities from section 3.2.3, **Habitat Management and Conservation Action Plan** (HMC):

Strategy HMC-1: Within 15 years, develop and implement a strategy for restoring the health and biological diversity of the shallow reefs and shoals where anthropogenic disturbances are known to have changed the ecosystem, using best available information about predisturbance conditions.

Activity HMC-1.1: Identify and prioritize restoration needs in shallow water reef habitats impacted by anthropogenic disturbances within 5 years.

Activity HMC-1.2: Analyze historical and present impacts on reef growth at Midway Atoll and determine factors limiting nearshore patch reef growth to facilitate restoration of natural reef building.

Activity HMC-1.3: Where feasible, implement appropriate restoration activities.

HABITAT RECOVERY

Despite the incredible abundance of terrestrial and aquatic wildlife, wonderful beaches, and crystal clear water, Midway Atoll is a highly disturbed atoll system containing invasive plant and animal species, toxic materials in building materials and soils, and human developments that have created significant adverse impact on indigenous species and their habitat. Most of the Midway Atoll is designated as the Revegetation/Habitat Zone in this Conceptual Site Plan to focus efforts on restoring atoll habitat and enhancing species populations.

The conceptual plan for habitat management and restoration at Midway Atoll over the next 15 years is to increase the amount of habitat available for all species of breeding seabirds, overwintering migratory birds, Laysan ducks, and potential future translocated native birds by removing nonhistoric abandoned structures and pavement installed by the U.S. Navy, controlling and eradicating nonnative vegetation, and planting and seeding appropriate native plants.

As described in the Monument Management Plan's section 3.3.2, **Alien Species Action Plan**, FWS will control or eradicate golden crown-beard (*Verbesina encelioides*), ironwood (*Casuarina* spp.), haole koa (*Leucaena leucocephala*), castor bean (*Ricinus comunus*), Spanish needle (*Bidens* sp.), lantana (*Lantana camara*), pluche (*Pluchea indica*), cheeseweed (*Malva parviflora*), poinsettia (*Euphorbia cyathophora*), Guinea grass (*Panicum maximum*), vervain



Black-footed albatrosses



SAND ISLAND CONCEPTUAL PLAN

MIDWAY ATOLL CONCEPTUAL SITE PLANNING



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(*Verbena litoralis*), umbrella plant (*Cyperus alternifolius*), nonnative morning glory (*Convolvulaceae*), ivy gourd (*Coccinia grandis*), black mustard (*Brassica nigra*), buffel grass (*Cenchrus ciliaris*), New Zealand spinach (*Tetragonia tetragonioides*), Chinese banyan (*Ficus microcarpa*), sand bur (*Cenchrus echinatus*), and spiny pigweed (*Amaranthus spinosus*).

Over the 15-year life of the plan approximately 937 acres of nonnative vegetation (coastal mixed grasses and shrubs) will be restored to a native dominated landscape. Native species used for restoration will be chosen on the basis of historical records at Midway and historical and pollen records from Laysan Island and will include bunchgrass (*Eragrostis variabilis*), naupaka (*Scaevola sericea*), morning glory (*Ipomoea pes caprae*, *I. indica*), *Solanum nelsonii*, *Capparus sandwichiana*, *Chenopodium oahuense*, and *Lepidium bidentatum*.

Approximately 118 acres of abandoned buildings and paved areas will be removed and converted into useable habitat. Demolition costs are estimated at several million dollars, however, so this will likely be a longer-term activity. The refuge will remediate lead-based paint from buildings and the surrounding soil to prevent adverse effects to wildlife.

Additionally, the Monument Management Plan includes the following activities related to habitat recovery in Midway Atoll (for detailed information, see section 3.2.3, **Habitat Management and Conservation Action Plan (HMC)**):

Strategy HMC-4: Within 10 years, restore and maintain coastal mixed grasses and shrubs on all the coralline islands and atolls of the Monument using best available historical information about the original indigenous ecosystem.

Activity HMC-4.1: Propagate and outplant native species chosen on the basis of historical records at Midway and historical and pollen records from Laysan Island in 250 acres of vegetated area at Midway Atoll, focusing on the original footprint of the island and then moving to the dredge spoils section.

Strategy HMC-8: Maintain no more than 150 acres of ironwood woodlands on Sand Island, Midway Atoll, to provide seabird nesting and roosting habitat for the life of the plan.

Activity HMC-8.1: Remove ironwood on Sand Island from 50 acres outside designated woodland and control young ironwood in areas managed for grass and shrubs.

Strategy HMC-2: Within 10 years, investigate, inventory, and map sources of known contamination from historical human uses of the NWHI and, where appropriate, coordinate with responsible parties to develop plans and complete cleanup actions.

Activity HMC-2.7: Conduct ecological risk assessment to determine allowable lead levels in soils at Midway and remove lead from buildings and soils to nonrisk levels.

No Dig Areas/Landfills

The “no dig” areas are sites that contain contaminated soils or other materials that cannot be disturbed. These sites include the 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.



South point at Old Bulky Waste landfill

To the extent feasible, it is recommended that the “No Dig/Land Fill” areas that contain contaminated soils and/or facilities be enhanced for habitat. The largest area is in the vicinity of the old fuel tanks in the northeastern part of Sand Island. It is proposed that the tanks and associated facilities be removed, and nonnative vegetation be replaced with native vegetation. Further plans and procedures for remediation of an area such as the fuel farm are required to ensure that contaminated areas are clean and will not impair wildlife.

Additionally, the Monument Management Plan includes the following activities related to land fills and dumps in Midway Atoll (see section 3.2.3, **Habitat Management and Conservation Action Plan (HMC)**):

Strategy HMC-2: Within 10 years, investigate, inventory, and map sources of known contamination from historical human uses of the NWHI and, where appropriate, coordinate with responsible parties to develop plans and complete cleanup actions.

Activity HMC-2.2: Work with partners and responsible parties to verify the integrity of known landfills and dumps and to conduct additional remediation if necessary.

HISTORIC RESOURCES

Within the Monument Management Plan (see section 3.1.3, **Historic Resources Action Plan (HR)**), five strategies affecting historic resources at Midway Atoll are identified for achieving the desired outcome of identifying, interpreting, and protecting historic resources in the NWHI.

Strategy HR-1: Update the Midway Atoll Historic Preservation Plan to meet the present needs of the Refuge and Monument within 1 year.

Strategy HR-2: Implement, supervise, and monitor the historic preservation treatments identified in the Midway Atoll Historic Preservation Plan at two historic properties each year.

Strategy HR-3: Prepare an updated Battle of Midway National Historic Landmark nomination within 4 years.

Activity HR-3.4: Implement repair and maintenance treatments at National Historic Landmark features within 6 years.

Strategy HR-4: Improve the function and capacity of the Midway museum within 8 years.

Activity HR-4.1: Prepare a Scope of Collections Statement within 5 years.

Activity HR-4.2: Remodel the Midway museum space within 7 years.

Activity HR-4.3: Organize and curate collections within 8 years.



Midway Mall interior: ideal space for offices, classrooms, and visitor services



Native bunchgrass successfully restored on Eastern Island



Midway Atoll offers important historic preservation and interpretation opportunities



Historic WWII Torpedo shop with parachute tower

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Strategy HR-6: Conduct archaeological and historical research on the historical events and structures at Midway Atoll NWR within 15 years.

Activity HR-6.2: Conduct archaeological investigation of the Commercial Pacific Cable Station site within 10 years.

Additional strategies and activities targeted at understanding and protecting Midway Atoll's submerged historic resources are found in the Monument Management Plan in Section 3.1.4, **Maritime Heritage Action Plan (MH)**:

Strategy MH-1: Document and inventory maritime heritage resources throughout the life of the plan.

Activity MH-1.2: Plan and carry out coordinated field mapping surveys of selected sites annually.

COORDINATED FIELD OPERATIONS

As a hub of operations for the Monument, Midway Atoll is the primary focus of the Coordinated Field Operations Action Plan in the Monument Management Plan. The following activities related to an integrated program in Midway Atoll are included (see section 3.6.3, **Coordinated Field Operations Action Plan (CFO)**, for details):

Strategy CFO-1: Conduct necessary site planning and infrastructure improvements to increase safety and enhance Monument field operations capacity over the life of the plan.

Activity CFO-1.1: Initiate and complete necessary planning to implement the Midway Atoll Conceptual Site Plan.

Activity CFO-1.3: Develop alternative energy systems and waste reduction strategies for the Monument within 2 years.

Activity CFO-1.4: Plan for use of sustainable engineering, technology, and landscape architecture for facilities and assets throughout the Monument.

Strategy CFO-3: Maintain and improve housing and field camp safety and operational efficiency using short-, medium-, and long-term approaches to protect Monument resources across the life of the plan.

Activity CFO-3.1: Design and construct pilot low-impact shelter.

Activity CFO-3.2: Utilize the existing footprint of Bravo Barracks for replacement housing at Midway Atoll.

Activity CFO-3.3: Utilize the existing footprint of Charlie Barracks for replacement housing at Midway Atoll.

Activity CFO-3.4: Rehabilitate "Officers Row" Housing at Midway Atoll.

Strategy CFO-4: Meet fuel requirements for aircraft, vessel, utility, and equipment needs at Midway Atoll to support operations to protect and manage Monument resources.

Activity CFO-4.1: Maintain recently replaced fuel farm at Midway Atoll.

Activity CFO-4.2: Develop biodiesel fuel capacity or other sustainable fuel types at Midway Atoll within 2 years.

Strategy CFO-5: Rehabilitate critical utility systems and ailing structures and facilities at Midway Atoll within 5 to 15 years.

Activity CFO-5.1: Rehabilitate water catchment and distribution system.

Activity CFO-5.2: Rehabilitate septic and wastewater systems.

Activity CFO-5.3: Treat all wooden historic structures at Midway Atoll for termites.

Activity CFO-5.4: Evaluate and optimize food services as necessary.

Activity CFO-5.5: Rehabilitate seaplane hangar.

Activity CFO-5.6: Repair inner harbor sea wall.

Strategy CFO-6: Within 5 years, improve the small boat operational capacity to enable quick, reliable access to the region in support of protection and management and continue to enhance the program throughout the life of the plan.

Activity CFO-6.1: Inventory, maintain, and coordinate the use of small boats and related field resources.

Activity CFO-6.2: Within 2 years, station additional vessels at Midway for use during the summer marine research field season.

Activity CFO-6.3: Within 5 to 10 years, station a small research/enforcement vessel at Midway Atoll.

Activity CFO-6.4: Construct new finger piers inside of Midway's inner harbor.

Activity CFO-6.5: Redevelop existing boathouse at Midway into a multiuse facility.

Activity CFO-6.6: Evaluate needed improvements to Pier No. 1 in the ship basin and the Tug Pier at Midway Atoll.

Activity CFO-6.7: Make needed improvements to or replace the pier at Eastern Island.

Strategy CFO-8: Develop a safe and comprehensive dive operations program for Monument management activities within 5 years.

Activity CFO-8.1: Refurbish or replace the dive recompression chamber at Midway.

Activity CFO-8.3: Incorporate a dive operations center into the refurbished boathouse facility at Midway.

Strategy CFO-9: Provide for necessary research, education, visitor, and administrative facilities that will further the protection of Monument resources across the life of the plan.

Activity CFO-9.1: Design a marine laboratory at Midway and develop in phases.

Activity CFO-9.2: Complete planning for and construct a captive care monk seal facility on Sand Island.

Activity CFO-9.4: Complete Phase I rehabilitation of Midway Mall and the commissary building.

Activity CFO-9.5: Construct airport welcome center on Sand Island within 2 years.

SAND ISLAND BUILDING PROGRAM

The four guiding principles of architectural design and construction on Midway are defined as: Sustainability, Historical Integrity, Biological Integrity, and Tropical Aesthetic.

Each construction project at Midway will be considered through the lens of sustainability and a low carbon footprint, taking into account use of nontoxic, durable materials; recycling building materials; natural solar and ventilation techniques; high energy efficiency; shared facilities and infrastructure; low massing of smaller buildings in place of cumbersome 3-story structures; on-site renewable power generation, on-site water catchment, and on-site waste treatment at each building; etc.

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. Several historic structures and features are contained within this zone. This zone indicates the primary area where development of new facilities or adaptive reuse of existing or historic structures is an appropriate activity. Reusing existing historic structures is a very high priority to protect the cultural landscape and historic structures. Reuse of existing structures or the construction of new structures will fit the historic character of Sand Island (1900s Cable House style or 1940s Albert Kahn style), and will have either no impact or a positive impact on wildlife and habitat.

Design of new or renovated buildings will also take into account the tropical building vernacular, including platform construction, peaked roofs, and overhangs.

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Clustering development to reduce the extent of disturbance and create efficiencies in infrastructure and operations is a key recommendation. Reusing existing facilities and keeping the building program within the “Historic Zone” is another sustainability strategy in that it reduces the requirement to extend utilities, roads, equipment, and resources across the island.

With the limited window for construction and the likelihood that any construction will have to be tightly contained with limited areas for staging because of albatross habitat, the need for quality premanufactured, component construction would be desirable. This is not to be confused with mobile trailer type construction, which is contrary to the building guidelines that gained general acceptance with the client group.

Performance Standards for New Construction should be applied, as follows:

1. Energy-Efficiency Measures—Areas for Energy Savings:
 - Conservation through Building Design: Reduce Energy Consumption
 - Insulated building envelope, possibly “green roofs”
 - Weatherproofing
 - Airtight seals at windows and doors
 - Energy-efficient window glazing (Low-E)
 - Optimize daylighting strategies
 - Optimize natural ventilation strategies
 - Economize heating/cooling system
 - Energy-efficient equipment and appliances
 - Energy Star rated
2. Landscape and Site Design
 - Wind protection
 - Native landscape plantings clustered around buildings
 - Earthen berms to provide wind protection
 - Solar orientation

3. Alternative Energy Systems

- Solar hot water heater
- Full photovoltaic system
- Fuel cells
 - Powered by hydrogen generated from electrolysis
 - Only if system does not impact local coral reef ecosystems

STRATEGIES TO ADDRESS SEA LEVEL RISE AND CLIMATE CHANGE

Midway power currently relies entirely on fossil fuel. Alternative energy systems should be explored, such as solar power, hydrogen fuel cells, or water-powered micro-turbines. Further study is required to measure the benefits of these alternative energy methods and their potential impacts to wildlife, birds, and marine systems. A goal for Sand Island is to have a plan in place within 15 years for alternative energy system(s) such as solar to replace the current power generation.

Midway’s islands will be affected by sea level rise through loss of land and higher spring tides, therefore restoration activities should be focused on the highest elevational areas and the original footprints of the islands. One possible mitigation measure to counter the effects of sea level rise in the NWHI may be beach nourishment, whereby sand is strategically deposited onto beaches (Baker et al. 2006).

Selective removal of rip-rap and bulkheads to restore natural beach deposition processes and shoreline habitat is one strategy that has successfully been applied to marine shorelines. It is recommended that a shoreline restoration/stabilization study be performed within the next 5 years. Careful study is required to assess the current condition of seawalls, and to determine which seawalls need to be retained to protect the structures and landfill behind them, and which shoreline sections may be restored to a natural beach condition.

Managing a significant portion of the atoll as native grass and shrublands and a smaller portion of the atoll as ironwood will not only be beneficial to seabirds for breeding and resting habitat but will also demonstrate a commitment for carbon sequestering whenever possible (Conant et al. 2001; Shan et al. 2001).

Acquisition of a new airplane and small research vessel would enable fewer overall trips and increased transportation efficiency. Vessels should also be fueled by appropriately sourced biodiesel or other fuels if possible.

SAND ISLAND BUILDING PROGRAM WITHIN CORE HISTORIC/DEVELOPMENT ZONE Lodging

The Planning Team evaluated visitor capacity, visitor type, and length of stay in considering lodging needs. The maximum total population for any given overnight is set for 150 people. Short-term lodging is required for visitors, researchers, agency staff, and others who stay on Sand Island from 1 night to 2 weeks. Longer-term lodging is required for volunteers, staff, researchers, and others who stay on the island on a seasonal or permanent basis from 2 weeks to year-round. Additionally, emergency overnight lodging may be required due to the island's remoteness and isolation.

Given the varying lodging needs, the Planning Team identified a range in housing facility types to accommodate these diverse visitors while maximizing the existing structures and minimizing development impacts. Refer to Summary Table for details on housing units and visitor capacity. Housing facilities will

comply with accessibility requirements included within the Rehabilitation Act of 1973 (as amended), Section 504 and 508; and the Architectural Barriers Act (ABA) of 1968. The lodging types are as follows:

Officers' Quarters—Reuse eight historic officers' quarters as residences (approximately 1,600 sf each) for visitors, seasonal, or permanent staff. Convert one building into a bunkhouse with limited amenities to accommodate overnight visitors. The bunkhouse could accommodate about 14 people.

Duplexes—Repair and maintain existing duplexes (approximately 900 sf per unit). Duplexes can accommodate about 11 people, generally seasonal or permanent staff.

2-Story Cable-Style Units—Construct module units in place of Charlie and Bravo Barracks. Make structural repairs to Charlie Barracks immediately, and replace within 15 years. Replace Bravo Barracks by year 2010. New module structures will be constructed on existing pads, but designed in smaller units. The possibility of constructing buildings on pilings to allow better flow of wildlife and habitat and higher energy efficiency will be evaluated. These units will primarily house short-term visitors, researchers, and staff, but could easily accommodate seasonal or permanent staff and volunteers as well. Space and capacity: 12' x 24' units at 330 sf will house 48–56 people.

8-plex 1 or 2-story Units—Construct 1- or 2-story 8-plex units in place of BEQ Barracks 1 and 2. New module structures will be constructed on existing pads,



Cable House architectural vernacular may be applied to new lodging design



Energy efficient and smaller scale multiplex units will replace BOQ barracks



Officers' Quarters rehabilitated as residences

5. Midway Atoll Conceptual Site Plan

SAND ISLAND CONCEPTUAL SITE PLAN

but designed in smaller units and potentially on pilings to allow better flow of wildlife and habitat, and higher energy efficiency. These units will primarily house seasonal or permanent staff. Space and capacity: 12' x 25' units at 340 sf will house 48–96 people, depending on whether the structure is a single- or double-story building.

Low-Impact Shelters—As an optional short-term shelter type, construct clusters of low-impact shelters on existing concrete pads or on pads of demolished buildings within the residential district. Potential sites will be evaluated to rule out conflict with wildlife. These shelters will incorporate the design principles of Pacific Island regional architecture, e.g., simple structures, durable, nonpolluting and/or recycled materials, etc. These shelters will not be air-conditioned spaces. Natural ventilation, cooling, and weather protection will be designed into the structures. The footprint of each structure will be <200 square feet. These units will provide lodgings for ecotourists, visitors staying less than 1–2 nights, or emergency guests, and will demonstrate sustainable design principles. A pilot low impact structure/shelter will be developed within 4 years to determine the feasibility of such a design. The pilot will be constructed within the Sand Island housing zone.

Emergency Shelter—The existing gymnasium could be used for emergency shelter. Repairs to the gymnasium are required, e.g., roof replacement.

OTHER SAND ISLAND BUILDINGS

Cable Station Buildings—Most of these early 1900s structures are in extremely derelict condition and pose hazards to birds, wildlife, and humans. However, they are critical to telling the early Midway story related to the Commercial Pacific Cable Company period. FWS Cultural Resources staff has assessed these structures and their recommendations are incorporated into a proposal to the State Historic Preservation Office. All but one structure (#643) would be partially dismantled due to safety issues for people and wildlife. Building materials would be removed and recycled, as well as hazardous paint and materials, yet the structures' remnants would remain in place for the preservation and

interpretation of the historic landscape. Further assessment is required to determine the exact extent and methods for deconstruction. Building #643 would be stabilized and repaired to a level where the structure does not pose safety or toxicity hazards, and could be interpreted.

Seaplane Hangar—Repair of the roof is required to maintain the current structure. The Seaplane Hangar will be rehabilitated to the extent feasible to achieve functions of storage and potential military display. For example, the glass façade may be replaced.

Military Historic Structures—Several World War II-era structures still exist that historically were and still are part of island maintenance and operations. These include, among others, the Paint Shop, the Metal Shop, and the Carpentry Shop. These structures require repair and maintenance to protect the historic integrity of the buildings, and to remove hazardous materials, such as lead-based paint and asbestos, that pose threats to wildlife and humans.

VISITOR SERVICES AND FACILITIES

Midway Atoll Visitor Center—The Midway Mall will be rehabilitated and reused as the hub of Midway Atoll. It will become a multifunctional building, including visitor center, educational facilities and classrooms, museum/library, agency offices, and partner offices. Designed by 1940s industrial architect Albert Kahn, Midway Mall offers a lot of character and interest, and has a large amount of space to accommodate diverse activities. Its strategic location in the core historic/development area and easy access for Sand Island visitors are also positive features.



Midway Atoll Visitor Center: hub of agency offices, educational facilities, and visitor services

Visitor Welcome Centers—Welcome centers are required at the Inner Harbor and at Henderson Airfield, to greet, orient, and stage visitors arriving by boat or airplane. These centers will be modest, possibly open-air structures that would likely include interpretive exhibits.

Additionally, the Monument Management Plan and Visitor Services Action Plan recommend the following strategies and activities (see section 3.4.3, **Midway Atoll Visitor Services Action Plan (VS)**):

Strategy VS-1: Implement the Midway Atoll Visitor Services Plan, providing visitor opportunities for up to 50 overnight guests at any one time.

Activity VS-1.1: Provide visitors with opportunities for wildlife-dependent recreation to enhance their knowledge and appreciation of the Monument’s natural resources.

Activity VS-1.2: Provide visitors with opportunities to learn about and appreciate the Monument’s cultural and historic resources.



Clipper House



Captain Brooks

FOOD SERVICES

Clipper House—The Clipper House presently serves as the primary food service facility for Midway. Overall food services will need to be expanded to accommodate future population increases and enlargement of the Clipper House, reuse of older existing food service facilities, or construction of a new dining facility will be evaluated.

All Hands Club—Structure will be reused for agency operations and management due to its proximity to Midway Mall. Alternatively, the existing structure will be demolished and the area restored for habitat. Current functions will be moved to other facilities, e.g., the Galley building or Captain Brooks.

Captain Brooks—Will be maintained as is.

Galley Building—Galley Building will be reused as gift shop, snack bar, and Internet service for both visitors and staff. The rear half of the structure is in poor condition and will be demolished.

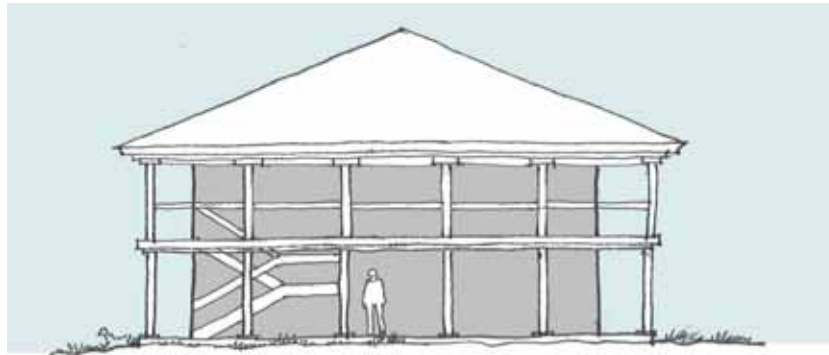
Hydroponic Greenhouse—Hydroponic greenhouse is used for growing produce so that Midway is more self-sufficient in terms of food production.



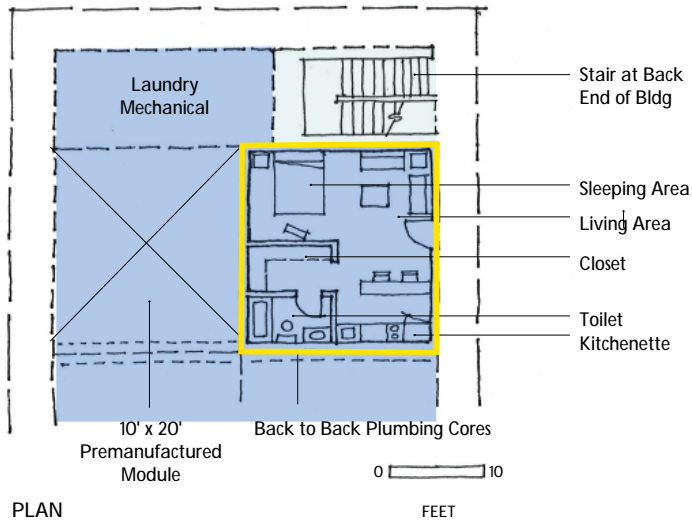
Sand Island transportation: foot, cart, or bicycle

5. Midway Atoll Conceptual Site Plan

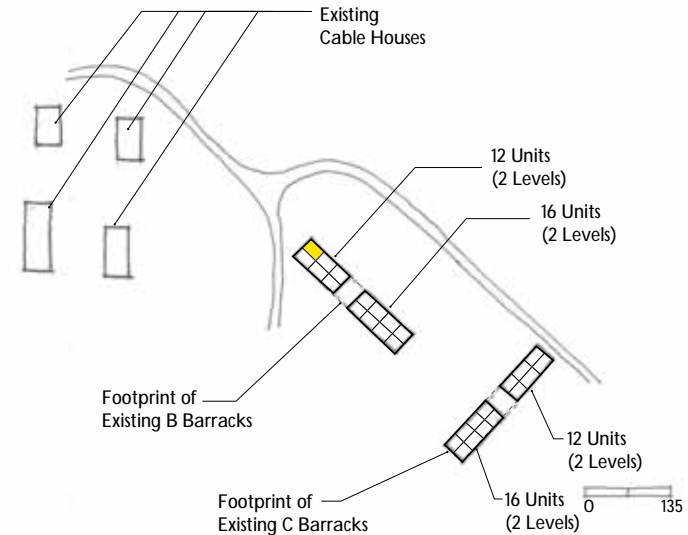
SAND ISLAND CONCEPTUAL SITE PLAN



ELEVATION



PLAN



SITE PLAN

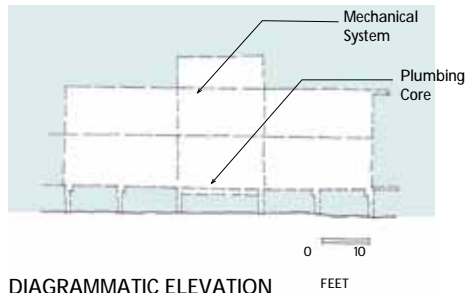
CABLE HOUSE STYLE ~ 1900s

- CONSTRUCT ON EXISTING CONCRETE PADS OR PADS OF DEMOLISHED BUILDINGS
- INCORPORATE DESIGN AESTHETIC OF HISTORIC CABLE STATION BUILDINGS
- SMALLER UNITS ALLOW HIGHER ENERGY EFFICIENCY AND FLOW OF WILDLIFE
- PROVIDE LODGING FOR SHORT-TERM VISITORS, VOLUNTEERS, AND STAFF, OR SEASONAL AND PERMANENT STAFF



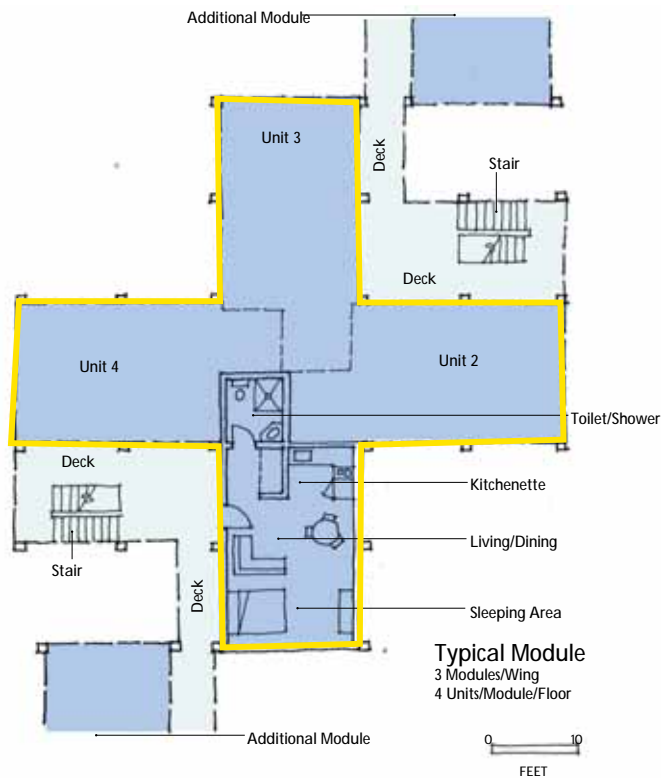
DECEMBER 2008

ARCHITECTURAL CONCEPT FOR NEW LODGING: CABLE HOUSE VERNACULAR MIDWAY ATOLL CONCEPTUAL SITE PLANNING

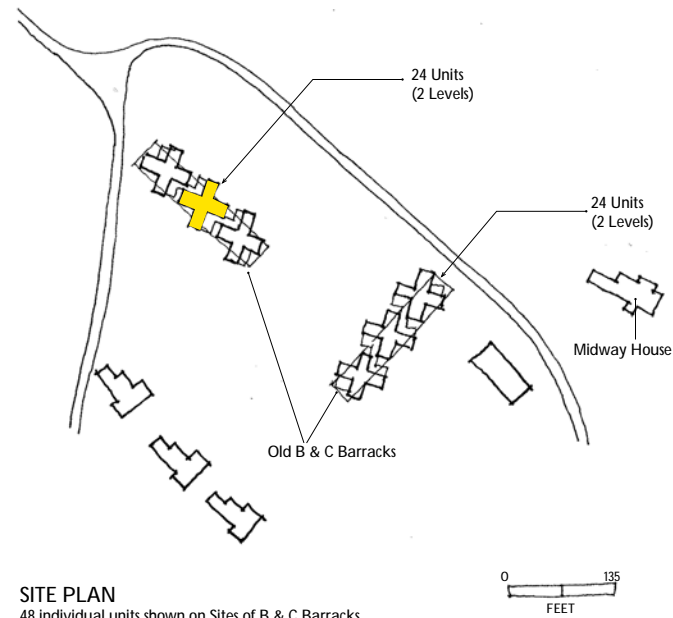


With "piling" design, this could be built in many locations without major disruption of the Albatross. This plan better reflects the Kahn Buildings. No attempt was made to express architectural character.

DIAGRAMMATIC ELEVATION



PLAN



SITE PLAN

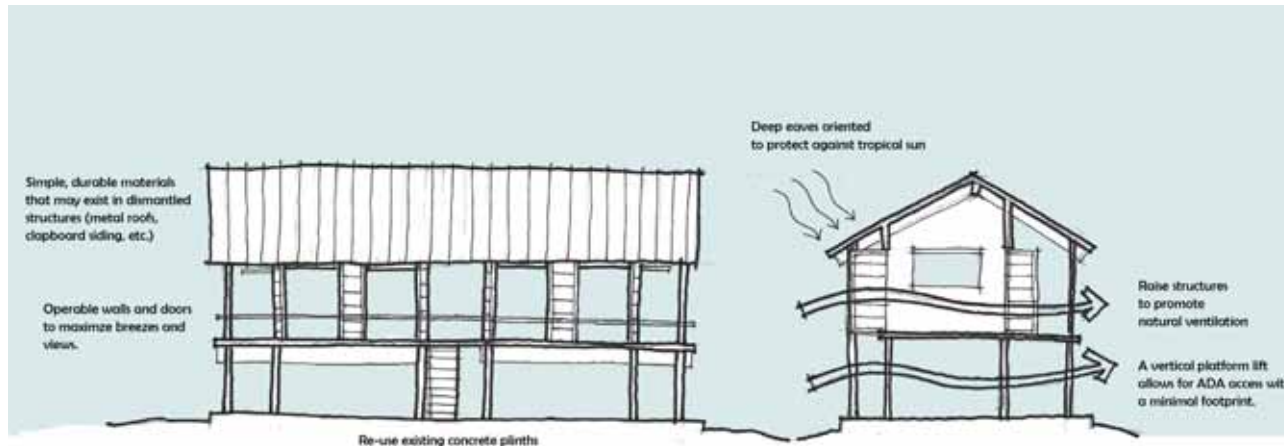
48 individual units shown on Sites of B & C Barracks

KAHN MODULES ~1940s

- CONSTRUCT ON EXISTING CONCRETE PADS OR PADS OF DEMOLISHED BUILDINGS
- INCORPORATE DESIGN AESTHETIC OF ARCHITECT ALBERT KAHN
- SMALLER UNITS ALLOW HIGHER ENERGY EFFICIENCY
- PROVIDE LODGING FOR SEASONAL OR PERMANENT STAFF

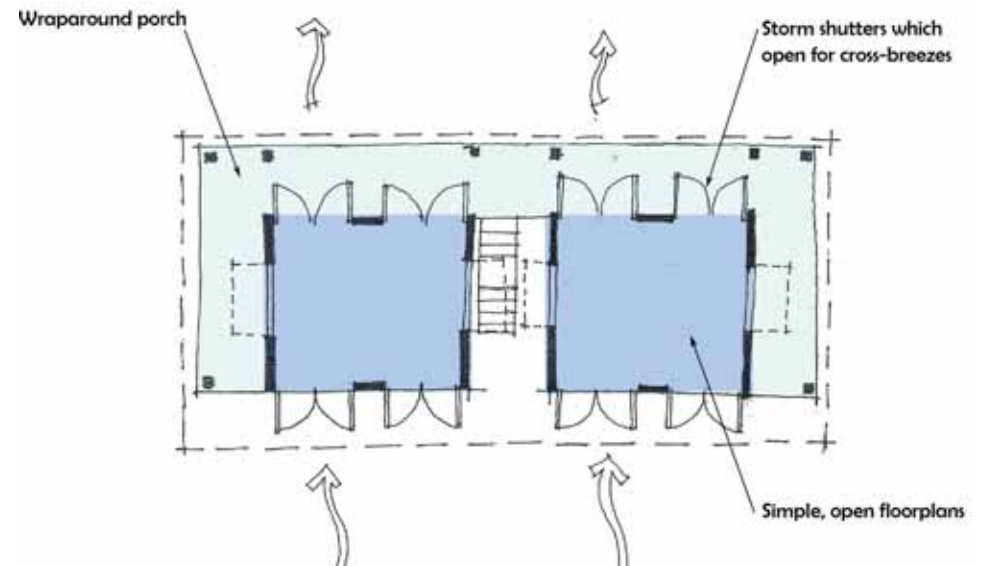
5. Midway Atoll Conceptual Site Plan

SAND ISLAND CONCEPTUAL SITE PLAN



LOW IMPACT SHELTERS

- CONSTRUCT ON EXISTING CONCRETE PADS OR PADS OF DEMOLISHED BUILDINGS
- INCORPORATE DESIGN PRINCIPLES OF PACIFIC ISLAND REGIONAL ARCHITECTURE
- NATURAL VENTILATION, COOLING, AND WEATHER PROTECTION
- DEMONSTRATE SUSTAINABLE DESIGN PRINCIPLES
- PROVIDE LODGING FOR ECO-TOURISTS, VISITORS STAYING FEWER THAN 1-2 NIGHTS, OR EMERGENCY GUESTS



DECEMBER 2008

ARCHITECTURAL CONCEPT FOR NEW LODGING: TROPICAL VERNACULAR MIDWAY ATOLL CONCEPTUAL SITE PLANNING



Albatross chick

5. Midway Atoll Conceptual Site Plan

AGENCY RESEARCH AND OPERATIONS FACILITIES CONCEPT

Midway Mall—Co-Trustee offices and other partner facilities move into Midway Mall, which will also provide visitor services, classrooms, and other functions. Midway Mall is the hub of agency operations on Midway Atoll and field operations in the northern part of Papahānaumokuākea Marine National Monument. The primary hub of operations for NWHI is based in Honolulu FWS, NOAA, and State offices.

Fish and Wildlife Services Office—FWS office retained for additional office facilities.

Marine Laboratory—Wet lab, dry lab, refrigeration, quarantine, and office space will be integrated into a Marine Laboratory building. The Old Commissary Building's proximity to Midway Mall suggests reuse of the building for agency research or biological programs. However, several buildings will be evaluated for this purpose.

Monk Seal Captive Care Facility—NOAA has expressed interest in creating a new Monk Seal Captive Care Facility on Sand Island. A suggested location for this facility is near the Inner Harbor on existing asphalt pad. This location is close to water, transportation, and the agency facilities housed in Midway Mall.

The following are the NMFS monk seal research program facilities needs:

SEAL HOLDING

- For the first 5 years seal holding will consist of pools sufficient to hold 10–12 seals and the potential to isolate individuals. This could be accomplished with four 20' diameter holding tanks each enclosed with dry resting area to a combined foot print of 30' x 30' for each of the four tanks.
- It is anticipated that after 3–5 years, twice that holding would be used.
- The total footprint in the first phase will be about 4,500 sq ft with an addition expandable capacity to approximate total of 8–9,000 sq ft.

WATER

- Source—1000–1200 gpm sea water for 10–12 juvenile seals.
- Semi-open or closed systems could be considered when conducting environmental analysis.

ANCILLARY STRUCTURES

- Fish prep—200 sq ft area will be necessary to support the 10–12 seals
- Freezer—seal food will depend on the potential schedule of resupply.
- Housing for 6 animal care personnel and 2–3 associated seal scientists/biologists

Quarantine Facility—required for biological species protection and recovery programs administered by FWS and/or NOAA.

Holding Tanks—required for biological species protection and recovery programs administered by FWS and/or NOAA.



Midway Mall interior



Midway Mall reused as Midway Atoll Visitor Center



Monk seal



Chugach offices and Medical Clinic



Biological research is a vital Midway Atoll activity



Nursery pen for Laysan duck reintroduction on Sand Island

5. Midway Atoll Conceptual Site Plan

INNER HARBOR CONCEPT

The Inner Harbor area includes the historic Inner Harbor and its associated shoreline, piers, and facilities. One of two approaches to the island (by vessel or aircraft), 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).

Several improvements to the Inner Harbor zone are recommended. The current seawall around the perimeter of the basin is extremely degraded and requires assessment and repair. Additionally, concrete rubble and other materials in-water near the west docking area impede vessel travel and anchoring; these materials need to be removed after determination of toxicity issues.

A new ramp and pier is proposed at or near the vicinity of the historic seaplane ramp in the west Inner Harbor area. The presently used ramp is too shallow to launch or load boats onto trailers without “floating the trailer out” beyond the launching vehicle. Further historic analysis is needed to determine if the seaplane ramp may be redesigned as a ramp suitable for boat launching, or whether it should remain in place and a new ramp and pier be constructed nearby. Additionally, a series of finger piers are needed to accommodate small or mid-sized boats.

If an additional mid-sized pier is required to separate uses (e.g., operations versus visitors), a second pier could potentially be sited in the inner harbor.

Further analysis will be necessary to finalize the location of any new infrastructure in the inner harbor.

The existing boathouse is periodically flooded by surface flows across the large asphalt surface. The structure will be resited further upland and possibly elevated on the existing concrete pad and reconstructed as a new boathouse/dive center to meet interagency needs. The boathouse will include a dive center, storage for marine-associated equipment, and potentially a temporary bunkhouse space for short-term use and limited interim lab space until other facilities are renovated or reconstructed.

A small welcome kiosk may be appropriate onshore in the Inner Harbor in the northwest corner of the Inner Harbor to greet and orient visitors arriving by water. Paths and circulation routes to the Midway Atoll Visitor Center will be clearly delineated along existing or historic routes.



Visitor arrival by boat



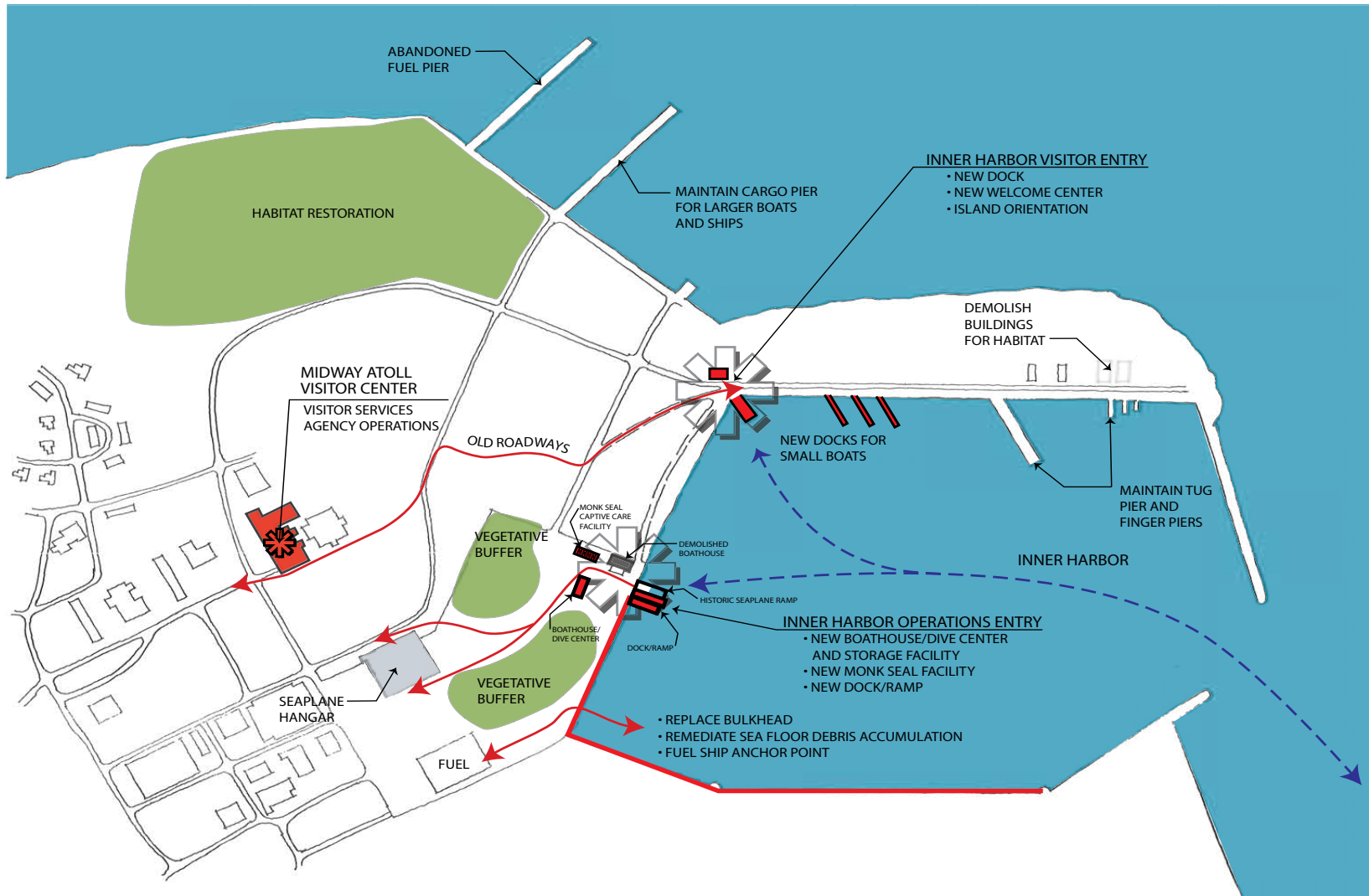
Historic seaplane ramp and existing boathouse



Inner Harbor seawall



new FWS boat



INNER HARBOR CONCEPTUAL PLAN
MIDWAY ATOLL CONCEPTUAL SITE PLANNING

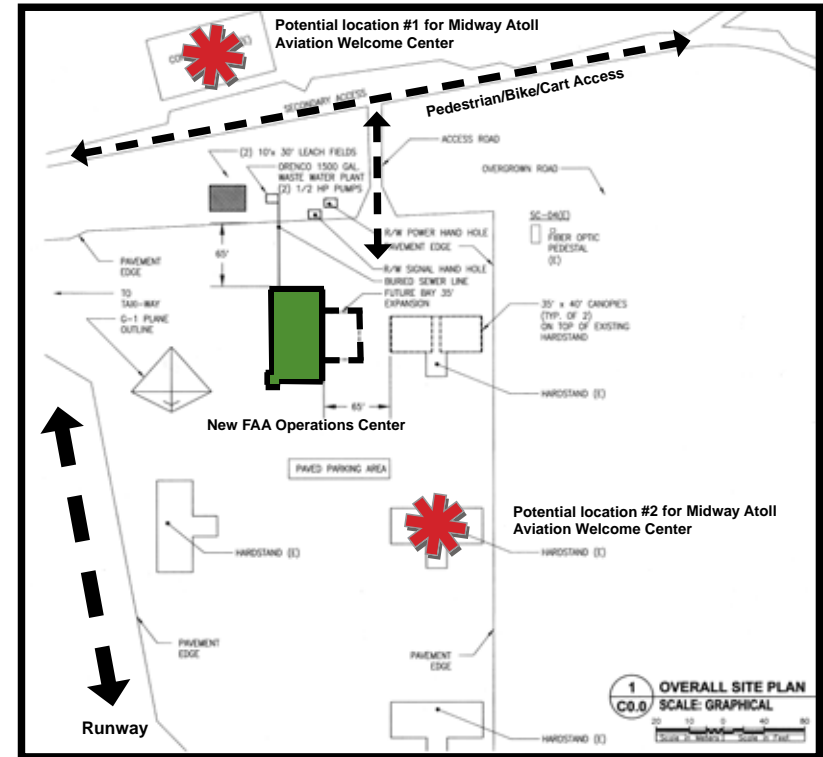


5. Midway Atoll Conceptual Site Plan

AIRPORT WELCOME CENTER CONCEPT

The Airfield Operations Zone on Sand Island includes the runway and the new Henderson Airfield operations center. One of two approaches to the island (by boat or aircraft), 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).

A new small Welcome Center will be appropriate to greet and orient visitors arriving by airplane. While the new operations center is now in place, there is no shelter to gather or greet visitors. Preliminary concepts for a Welcome Center indicate two potential locations that may be appropriate to build this facility. The proposed alternatives locate the structure on existing concrete or asphalt pads that are in close proximity to existing circulation routes but avoid conflict with airplane operations. Further analysis and coordination with FAA and Midway operations will be necessary to finalize the location of the Welcome Center.



Midway Atoll Aviation Node



Visitor arrival on Sand Island is a big event







Priority Actions and Next Steps



6. Priority Actions and Next Steps

PRIORITIZATION AND IMPLEMENTATION

This Plan provides long-term guidance for management decisions at Midway, including best estimates of future needs and project activities. These estimates are substantially above current construction budget allocations, and are included primarily for strategic planning and program prioritization purposes, although they also serve to make the public aware of the costs of possible actions. This plan does not constitute a commitment of funds, or a commitment to request funds, by Federal or State agencies. All funding for actions included here is subject to the budgeting and appropriations processes.



The following narrative provides a preliminary framework for beginning to organize actions in terms of implementation schedule. Agency partners will work together to identify project priorities, roles and responsibilities, potential funding sources, and comply with appropriate environmental assessment requirements. These projects are important to support Monument operations as a whole, benefiting all of the agencies involved with its management.

ANNUAL MAINTENANCE

Through the Base Operations and Support Services (BOSS) contract for operation of Midway, FWS and the Federal Aviation Administration (FAA) fund routine cyclical preventive maintenance and minor repairs of equipment and facilities. Larger maintenance projects, such as roofing replacement, are also routinely completed as an addition to the contract. Both FWS and FAA add funds for routine maintenance projects that are over and above the scope of the BOSS contract.

These two funding sources allow for required maintenance work to be completed over the course of a year to both historic and nonhistoric buildings and facilities. This ongoing program will continue throughout the life of the plan to ensure that Midway's infrastructure is maintained in the best possible condition within available funding.

Larger, more expensive projects are either:

- a) Developed and put into the Service's database for Deferred Maintenance projects for which the Service receives an annual appropriation from Congress. Midway's extensive infrastructure needs have provided justification for those larger Midway projects and their resultant funding. This has allowed the Service to systematically work toward reducing the large maintenance backlog at Midway, and it is anticipated that this level of support will continue throughout the life of this plan.
- b) Funded by the FAA's Airport Capitol Improvement Program. Funding is provided to the FWS to support the design and construction of new airfield infrastructure (Airport Operations Building), or the improvement of existing facilities (resurfacing the runway).

HISTORIC RESOURCES

Maintenance of many of Midway's significant historic buildings and facilities is included in the BOSS contract described above and as such is ongoing. However, it does not include all the historic elements as described in the Historic Preservation Plan, which makes maintenance of those elements outside the scope of the contract and a management challenge for the Service. As outlined in the Monument Management Plan (Section 3.1.3 Historic Resources Action Plan), the Historic Preservation Plan will be rewritten



within the next year to be consistent with this Conceptual Site Plan and reflect the Service's commitment to reuse as many of Midway's historic buildings as possible to meet the Monument's and Refuge's needs at Midway. To maintain those buildings, structures, and facilities, additional funding must be found. The Service will work with other federal agencies, private organizations, veterans' groups, and others to find the support needed to maintain these important aspects of Midway's history.



PRIORITY MAINTENANCE/CONSTRUCTION PROJECTS AT MIDWAY ATOLL

Design and Construct Airport Welcome Center on Sand Island

\$500,000 — 2 years

A small passenger terminal/welcome facility will be constructed at the airport to handle passenger arrival and departures from Midway. This simple facility will offer restrooms, baggage handling, information, and a waiting area for staging passengers out of the weather.

Develop Biodiesel Fuel Capacity or Other Sustainable Fuel Types

\$750,000 — 2 years

In an effort to advance the use of sustainable technologies at Midway, small boats, vehicles, and heavy equipment will be evaluated and, where feasible, transitioned to the use of biodiesel. This fuel could be stored on the existing concrete pad along the north wall of the inner harbor. Alternatively tanks could be located near the newly constructed fuel farm on the southwest corner of the inner harbor.

Utilize Existing Footprint of Bravo Barracks for Replacement Housing

\$10 million — 3 years

Demolition costs for existing building must be included in construction cost. Bravo Barracks replacement is essential in order to provide safe housing for permanent island residents and transients working on future maintenance/construction projects.

Complete Phase I Rehabilitation of the Commissary Building and Midway Mall

\$2 million — 3 years

Collectively the commissary building and the Midway Mall present ideal central locations for Co Trustee and partner office, classroom, storage, and basic laboratory space. Phase I rehabilitation of the commissary will include cleaning and maintenance, construction of office and classroom space, and a feasibility study of how best to incorporate solar power and other sustainable design principles. The Midway Mall will require more substantial design and a preservation plan for renovation to provide basic office and storage space along with visitor information.

Design and Construct a Pilot Low Impact Shelter

\$1.3 million — 4 years

Construct a low impact shelter for short term housing in the housing zone. The housing will be constructed as a sustainable design pilot project intended to showcase the synergistic potential of innovative design on the island. The design may elevate the building off the ground, providing for human habitation while increasing the total amount of available wildlife habitat, and providing environmental security from tsunamis and storm surges. This structure will incorporate



6. Priority Actions and Next Steps

PRIORITIZATION AND IMPLEMENTATION

Pacific Island regional design principles to consider local wind and sunlight patterns, will aim to be nonpolluting, and will incorporate recycled materials. The use of solar power, composting toilets, and, if needed, a small rain catchment system will be explored in an effort to sustain the building off the power grid and minimize wildlife impacts.

Treat All Wooden Historic Structures for Termites

\$2 million — 5 years

By treating all wooden/historic structures immediately we buy ourselves 5–10 more years to find funding for ultimate rehabilitation/restoration. Without treatment these structures either need to be rehabilitated immediately or abandoned forever.



Metal pillbox, Eastern Island

Rehabilitate Water Catchment/Distribution System

\$3 million — 5 years

Reliable water will be required to support any future build-up.

Rehabilitate Septic/Wastewater Systems

\$2 million — 5 years

Reliable septic/wastewater systems will be required to support any future build-up. To reduce the required capacity and cost of the system, on-site composting and waste reduction will be considered.

Redevelop Existing Boathouse into New Boathouse, Dive Center, and Water-based Storage Facilities

\$1.5 million — 5 years

Redevelop the existing boathouse at Midway into a multipurpose boathouse, dive center, and storage facility to support agency operations in the northwestern end of the Monument. The facility will have

maintenance bays and equipment for servicing small boats; a dive locker including a compressor, recompression chamber; and appropriate storage and work areas. The dive center may also support the visitor program. The building will be re-sited or reconstructed and potentially raised to address concerns of flooding on the seaplane pad.

Rehabilitate/Replace Finger Piers along the Inner Harbor

\$450,000 — 5 years

To meet small boat needs, within 5 years construct/rehabilitate three finger piers. These piers may be used for fueling, loading, and short-term in-water storage of vessels. These vessels will be used to support programs at Midway and neighboring atolls in the future.

Design a Marine Laboratory and Develop in Phases

\$2.25 million — 5 years

A variety of needs will be met by a marine laboratory at Midway. An evaluation and planning effort will help determine if the research and educational needs of potential users will be best met by developing several small facilities over time, or by a modular design that allows new requirements to be filled as they arise. Initially the lab would provide basic amenities to augment research and education capacity including field schools, seasonal research, and long-term monitoring. Wet/dry lab infrastructure, quarantine standards, and possibly freezer space will be included in the plan. Several locations are well-suited for a small laboratory, including the old commissary building adjacent to the Midway Mall, as well as several sites on the seaplane apron. The commissary building may be ideal for a first phase location and could help support the Hawaiian monk seal captive care program.



Green turtle on Eastern Island

Complete Full Rehabilitation of Midway Mall

\$8 million — 10 years

Midway Mall would be rehabilitated as the “Midway Atoll Visitor Center” and would be used as Co-trustee office space and for other potential partner personnel, as well as a hub for visitor services, classrooms, and education. Phase I rehabilitation would allow for agency offices and be completed within 3 years.

Rehabilitate Officers’ Row Housing

\$5 million — 10 years

The 10 historic Officers’ row houses serve as examples of historic Albert Kahn architecture and will be restored. This increased housing capacity will accommodate increased agency and partner personnel.

Remodel or Replace Clipper House

\$1.75 million — 10 years

The Clipper House presently serves as the primary food service facility for Midway. Overall food services will need to be expanded to accommodate future population increases and enlargement of the Clipper House, reuse of older existing food service facilities, or construction of a new dining facility will be evaluated.

Rehabilitate Seaplane Hangar

\$2.5 million — 10 years

Due to its size (large enough to hold heavy equipment, boats, workshops, etc.), its location (short distance from inner harbor and boat ramp) and its historic significance (designed by Albert Kahn, still contains scars from the Battle of Midway), this building needs to be utilized and preserved. Rehabilitation work will be guided by a detailed preservation plan.

Utilize Existing Footprint of Charlie Barracks for Replacement Housing

\$10 million — 10 years

Charlie Barracks replacement is essential in order to provide safe housing for island visitors and transient personnel. Demolition costs for the existing building must be included in the construction cost. This replacement is expected to take place within 10 years.

Repair Inner Harbor Sea Wall

\$20 million — 15 years

The harbor is critical to operations at Midway. Any future expansion of docking/pier facilities in the harbor must be preceded by the repair of the existing sea wall.



6. Priority Actions and Next Steps

PRIORITIZATION AND IMPLEMENTATION

REQUIREMENTS PLANNING PROCESS

Many of the priority projects listed above are the result of a Monument-wide field requirements planning process that took place in the fall of 2007. The goals of this process were to outline general infrastructure requirements within the Monument by matching projected field requirements with priority management needs. During this process the Monument Management Board analyzed current and future management needs and projected personnel, infrastructure, and equipment requirements to meet them. In addition, efforts were made to identify areas of overlap that could be consolidated to make field operations as efficient as possible.

The results of this process constitute a detailed vision of the long-term field requirements, primarily for Midway and neighboring atolls, but also for the Monument as a whole. These detailed requirements must have the appropriate infrastructure such as buildings, power, and water; as well as associated means of transportation, such as vessels and aircraft. The priority maintenance and construction projects listed above along with the activities in the Monument Management Plan's section 3.6.3, Coordinated Field Operations Action Plan, will support these requirements over the next 15 years.

Specific field requirements that were identified during the field requirements planning process include increases in visiting and permanently stationed personnel to oversee regular research, education, cultural, historic, management, and protected species work based out of Midway, but servicing neighboring atolls as well. Activities associated with this work will be phased in over time as the attendant infrastructure and modes of transport are developed in a way that is compatible with resource protection. The small boat and diving assets, supply needs, air transport, laboratory facilities, housing, and visitor outreach needs that were coarsely defined during the requirements process have been refined in the Midway Conceptual Site Plan and will be thoroughly evaluated and acted upon based on the strategies and activities found in the Monument Management Plan.

ASSESSMENT OF MIDWAY CONCEPTUAL SITE PLAN DURING THE MANAGEMENT PLAN 5-YEAR REVIEW

The Monument Management Plan will be reviewed every 5 years. The review represents an essential element of the adaptive management process and includes public involvement, characterization of issues, and review and evaluation of action plans. The Midway Atoll Conceptual Site Plan is part of the Monument Management Plan and will be assessed as part of this broader five-year plan review, or as needed, to determine if changes need to be made to this 15-year conceptual plan. This will also provide an opportunity to review the Midway Conceptual Site Plan after other site plans (i.e., Tern Island, Kure Atoll) are developed.

SUMMARY

Several other high-priority projects (habitat, cleanup, and visitor services projects) have been identified for Midway Atoll during the process of developing this Conceptual Site Plan and the larger Monument Management Plan. For detailed information on these projects, please refer to the appropriate Actions Plans contained in the Monument Management Plan.

As the Monument Management Board and partners work toward implementation of the Monument Management Plan, it is important for all parties to find ways to make incremental steps that will lead toward the many larger projects described in this document and the Plan. By working together and combining resources to achieve common goals, agencies and partners can realize the benefits and synergy that come from people working together. This Conceptual Site Plan offers an achievable view of Midway's future considering the resources that already exist and those that hopefully will be available in the future. The vision of Midway as presented in this plan is something that can be completed within the next 15 years—it will be a challenge and an opportunity for all involved to be a part of that transformation.

Resources

PLANNING DOCUMENTS

1991, January. *Natural Resources Management Plan for Naval Air Facility, Midway Island*. U.S. Fish and Wildlife Service Hawaiian Islands National Wildlife Refuge. Honolulu, Hawai'i.

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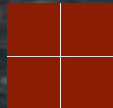
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