

ENVIRONMENTAL ASSESSMENT

Seawall Long-Term Maintenance Project

**Henderson Field Airport
Midway Atoll National Wildlife Refuge/
Battle of Midway National Memorial**



U.S. FISH AND WILDLIFE SERVICE
Midway Atoll National Wildlife Refuge

AND



FEDERAL AVIATION ADMINISTRATION
Western Pacific Region

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ACRONYMS & ABBREVIATIONS

BMP	Best management practice
CE	Categorical Exclusion
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWA	Clean Water Act
DOT	United States Department of Transportation
EA	Environmental Assessment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ETOPS	Extended-range Twin-engine Operational Performance Standards
EO	Executive Order
FAA	Federal Aviation Administration
FR	Federal Register
FWCA	Fish and Wildlife Coordination Act
FWS	United States Fish and Wildlife Service (or Service)
MHW	Mean High Water
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NWR	National Wildlife Refuge (or Refuge)
PIFWO	Pacific Islands Fish and Wildlife Office
PMNM	Papahānaumokuākea Marine National Monument (or Monument)
PND	PND Engineers, Inc.
RSA	Runway Safety Area
SHPO	State Historic Preservation Office
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service (or Service)

1 Purpose and Need for Action

1.1 Underlying Need

The U.S. Fish and Wildlife Service (Service) and the Federal Aviation Administration (FAA) propose to conduct repairs as needed over the next ten years (2017-2027) along a 5,720-foot-long seawall located on Midway Atoll's Sand Island.

The action is needed because the existing seawall, constructed in 1957-58, is aging and failing. The soils behind the seawall consist of unconsolidated fill that has eroded quickly after previous seawall breaches (Figure 1).

The purpose of the action is to control this erosion and to protect Refuge resources, including Henderson Field taxiway, runway, and Runway Safety Area (RSA). The airport at Henderson Field is critical to providing access for government administration and research operations at Midway Atoll National Wildlife Refuge (Refuge) and the western portions of Papahānaumokuākea Marine National Monument (Monument). It also serves a critical role as an FAA-approved emergency landing field that is essential to trans-Pacific airborne transportation.



Figure 1-1 – A portion of failed seawall. This area was repaired in 2014 using an armor rock revetment.

The specific purposes of the proposed action are to:

1. Maintain existing functions of the south seawall, including shoreline erosion control and protection of Henderson Field and runway safety area.
2. Consider the cumulative effects of all past, present and reasonably foreseeable future repairs along the entire south seawall. The current case-by-case approach segments the project and reviews may fail to consider the cumulative effects of multiple repairs conducted over many years.
3. Establish an efficient and effective process by which to respond quickly to future breaches in the south seawall. The current case-by-case approach is slow, inefficient, and costly, and requires reviewing the same issues and completing essentially identical reports and consultations each time a new repair is needed.

The proposed long-term maintenance project also needs to respond to several technical, economic, and environmental planning constraints and contexts, as described in Table 1-1.

Table 1-1 – Construction constraints

Type	Constraint
Technical	Remoteness of the site complicates construction logistics and timing.
	Unconsolidated and unknown materials within fill and along the failing seawall complicate construction.
	Timing restrictions to protect nesting seabirds limits construction to a narrow construction window (August 1 through October 31).
Economic	Remoteness of the site increases costs.
	Refuge maintenance budgets are low and the agency has a high backlog of deferred maintenance needs due to budget constraints (GAO 2016).
Environmental	Work along any marine shoreline requires careful consideration of the physical or biological environment.
	The seawall is part of a National Wildlife Refuge, a National Monument, and a National Memorial, all of which require careful consideration in project planning.
	Several species listed as threatened and endangered are present in the project vicinity, as well as critical habitat.
	Midway Atoll supports the largest albatross colony in the world. During the nesting season, birds nest on virtually every square foot of available land, greatly complicating construction.
	A complex regulatory and environmental review framework involving more than a dozen environmental regulations and associated agency reviewers greatly complicates permitting of individual seawall repair projects.

1.2 Decisions to Be Made

The Service and its co-lead agency, the FAA, need to decide what to do with the failing seawall. They can decide to:

1. Take the proposed action, which is to construct rock revetment repairs – as needed and as funding allows – over the 10-year planning period;
2. Take the proposed action but with modifications (e.g., changes in design, additional mitigation measures); or
3. Take no action, which in this case is to continue to review, plan and permit seawall repairs on a case-by-case basis. Section 4.7 also considers the environmental consequences of taking no action at all and allowing the existing seawall to fail.

1.3 Issues to be Resolved

The Service and the FAA have determined that potential impacts on biological resources are the primary environmental issue associated with the proposed action. The following comment came from the Pacific Islands Fish and Wildlife Office (PIFWO 2016):

Fish and wildlife resources occur immediately within and adjacent to the proposed submerged project areas. Particular attention should be given to potential construction- and vessel-related impacts to endangered and threatened species, including sea turtles, seabirds and migratory birds, as well as coral reefs, macroalgae beds, and rare, native species and habitats. The indirect and cumulative effects of potential impacts over time, along with measures to avoid, minimize and compensate for unavoidable impacts to aquatic resources should be addressed in the Environmental Assessment (EA). Such measures could include the use of silt curtains to contain suspended sediments during construction activities.

As part of the proposed action, the Service and FAA include environmental measures for reducing potential adverse impacts to aquatic resources early in the decision-making process by incorporating an Implementation Plan into the proposed action. The Implementation Plan specifies all agency-recommended environmental measures in one place (Appendix B).

Compensatory mitigation for unavoidable impacts to sensitive aquatic resources is addressed in Section 4.6.4.

2 Alternatives

2.1 Alternatives Development Process

The Service and FAA have been developing strategies to address the failing seawall for several years. In 2011, a shoreline erosional study conducted by PND Engineers, Inc. (PND) found that most of the south seawall was at or near failure (PND 2012). Based on that report, the Service and FAA decided to complete the most critical repair, which was a breach adjacent to RSA of Henderson Field (FWS and FAA 2013). The Service repaired that section with approximately 125 linear feet of armor rock revetment.

The Service and FAA completed environmental review and regulatory compliance for that repair through a categorical exclusion (CE) under the National Environmental Policy Act (NEPA). CEs do not exempt the Federal agency from having to complete NEPA review, but rather exempt it from having to prepare a full environmental impact statement – so long as the agency provides sufficient evidence that the action would not have significant adverse environmental impacts (40 CFR § 1507.3.b.2). The Service and FAA presented this documentation in a CE and associated administrative record (FWS and FAA 2013).

An important part of the record was a Fish & Wildlife Coordination Act (FWCA) 2(b) report prepared by the Ecological Services branch. In that report, the Ecological Services biologist evaluated the impacts on fish and wildlife habitats for that repair and made several recommendations, including the following regarding environmental review of future repairs:

The resource agencies are also aware that this is not the only section of the southern seawall that is in need of repair. Other sections are currently filled with riprap or braced by submerged debris in order to prevent total failure and erosion. Therefore, the cumulative impacts of repairing each section of seawall will have a greater negative impact to fish and wildlife resources than each section individually. We recommend that the entire (area of marine and shoreline habitats) that would be lost to new construction be evaluated during the next repair endeavor in order to accurately and comprehensively evaluate resource loss and compensatory mitigation, and to avoid segmentation.

Based on that recommendation, and on the desire to establish an efficient and effective approach to environmental permitting of expected future seawall repairs, the Service and FAA decided to pursue a 10-year permit from the U.S. Army Corps of Engineers (USACE) that would cover repairing the entire seawall.

Table 2-1 – Alternatives considered

Alternatives Considered	Practicability (logistics, technology, costs)	Ability to Meet Purpose and Need for Action	Environmental Consequences
No Action: Case-by-case repairs, likely rock revetment	<ul style="list-style-type: none"> ● Permitting costs and time would likely be greater than under the proposed 10-year permit. 	<ul style="list-style-type: none"> ● Rock revetment is a viable solution. ● The inefficiencies of case-by-case permitting may hamper the ability of government to respond to new seawall breaches. 	<ul style="list-style-type: none"> ● Inefficiencies may result in longer exposures of trapping hazards and greater amounts of erosion. ● Up to a 6-acre cumulative footprint within marine habitats.

Alternatives Considered	Practicability (logistics, technology, costs)	Ability to Meet Purpose and Need for Action	Environmental Consequences
No repairs	<ul style="list-style-type: none"> ● Impractical to allow seawall to deteriorate. Greater erosion would eventually require larger, more intrusive, and more expensive repairs. 	<ul style="list-style-type: none"> ● Erosion would unacceptably compromise Monument resources and values, including Henderson Field. 	<ul style="list-style-type: none"> ● Endangered seals and turtles would be at risk of becoming trapped in debris. ● Loose fill materials behind the seawall may bury marine habitats in sediments.
Proposed Action: Repair with rock revetment, as needed, over the next ten years	<ul style="list-style-type: none"> ● Cost effective for construction and low-maintenance. ● Relatively simple to install. 	<ul style="list-style-type: none"> ● Rock revetment is a viable solution ● The efficiency of a 10-year permit would improve the ability of the government to respond to new seawall breaches. 	<ul style="list-style-type: none"> ● Likely eliminates significant trapping hazards sooner than under a case-by-case review ● Up to a 6-acre cumulative footprint within marine habitats.
KEY:	● OPTIMAL	● SUB-OPTIMAL	● UNREASONABLE

Table 2-1 summarizes the overall practicality, ability to meet purpose and need, and major environmental consequences of each of the three scenarios considered in this EA: the proposed action, no repair, and the individual permit scenario.

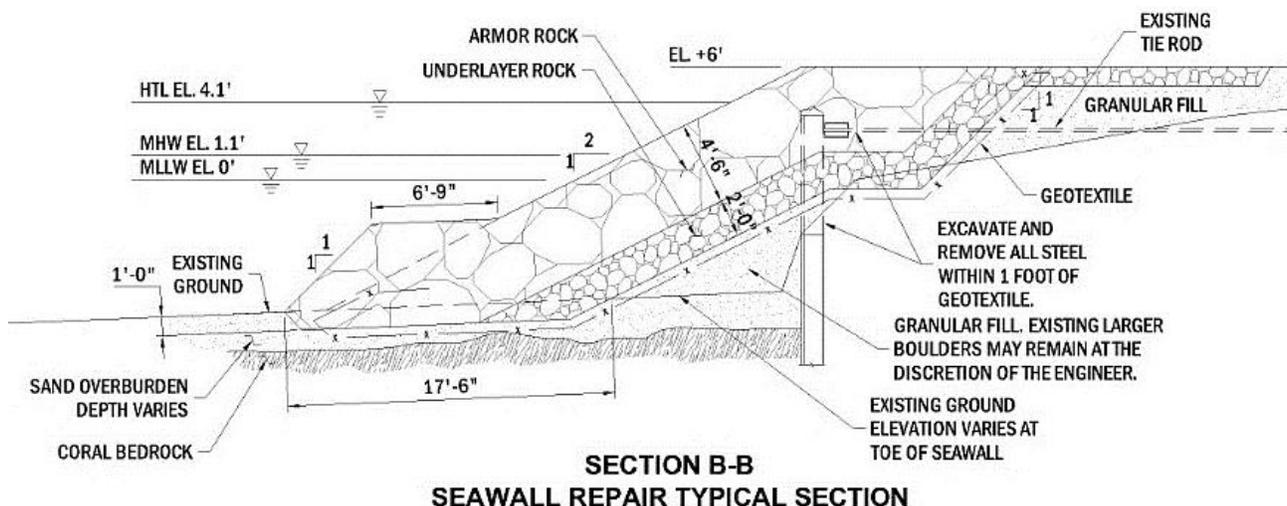


Figure 2-1 – Cross-section view of typical armor rock revetment

2.2 Proposed Action

The Service proposes to replace sections of Sand Island’s approximate 5,720-foot south seawall as needed to protect Henderson Field and to control erosion of wildlife habitat along the southeast side of Sand Island (see Section 3.1 for a map of the project area). For regulatory permitting purposes, including Department of the Army permits under 33 CFR part 325; the Service has established a ten-year planning period for proposed repairs.

Repairs would be made by replacing damaged sheet pile with armor rock revetment. Revetments would consist of large (2- to 3-foot diameter) armor rock placed over smaller underlayer rocks.

An armor rock revetment was installed in 2014 to protect a portion of Henderson Field and has also been successfully installed on Tern Island, another atoll within the Monument. Repairs would take place in an annual cycle following the Implementation Plan (Appendix B). To avoid impacts to breeding birds, construction would generally occur from mid-August through October of any given year, depending on consultations with refuge staff and necessary agencies. Because repairs would be made on an as-needed basis, some years may have little to no active construction while other years may have multiple or large repairs.

The cumulative footprint of the “Maximum Construction Scenario” includes the footprint of all rock revetment that could be installed along the 5,720 linear feet seawall. The total footprint would be approximately 100 feet wide, with approximately 50 feet of rock being placed within marine waters (6.6 acres) and 50-foot construction footprint on uplands adjacent to the seawall (6.6 acres) for a total area of 13.2 acres.

Additional details of the proposed action and mitigation are presented in Appendix A, Project Description. The Service decision notice issued at the close of NEPA review will include the final description of the action to be taken.



Figure 2 3 – Completed armor rock revetment on Tern Island



Figure 2-2 – Area of proposed action

2.3 No Action

NEPA requires that federal agencies compare the effects of their proposed actions with the effects of taking “no action.” The “no action” alternative analysis provides a benchmark level of effect upon which those of the proposed action can be measured and compared.

This EA considers two scenarios that may occur should the proposed action not take place (i.e., “no action”). The first scenario is that no repairs would be conducted and that the existing seawall would be allowed to fail. The second scenario is that FWS and FAA would continue to make repairs on a case-by-

case basis through individual planning and permitting. This individual-permit scenario is the most reasonably likely to occur in absence of the proposed action, since this is a continuation of the existing approach to how FWS and FAA respond to seawall breaches.

Section 4.7 describes the environmental consequences of both the no-repair and the individual-permit scenarios.

2.4 Alternatives Considered but Eliminated from Detailed Study

Table 2-2 – Alternatives considered but eliminated from detailed study

Alternative Considered But Eliminated	Practicality (logistics, technology, costs)	Ability to Meet Purpose and Need for Action	Environmental Consequences
No repairs	<ul style="list-style-type: none"> ● Impractical to allow seawall to deteriorate. Greater erosion would eventually require larger, more intrusive, and more expensive repairs. 	<ul style="list-style-type: none"> ● Erosion would unacceptably compromise Monument resources and values, including Henderson Field. 	<ul style="list-style-type: none"> ● Endangered seals and turtles would be at risk of becoming trapped in debris. ● Loose fill materials behind the seawall may bury marine habitats in sediments.
Pullback seawall and/or restore shoreline	<ul style="list-style-type: none"> ● Prohibitive costs. ● Technically challenging due to harsh ocean environment, presence of contaminated and unknown materials in fill area, and many other unknowns. 	<ul style="list-style-type: none"> ● Runway portion of seawall (area A) cannot be maintained without maintaining/repairing seawall. ● Inner harbor could have reduced protection from weather and/or increased erosion. 	<ul style="list-style-type: none"> ● Improved fish and wildlife habitats gained (submerged/intertidal habitat and seal and turtle haulouts). ● Seabird nesting habitat lost.
Repair entire seawall at once	<ul style="list-style-type: none"> ● While there may be some economies of scale, the overall costs are prohibitive. 	<ul style="list-style-type: none"> ● Replacement of the entire seawall would present a long-term solution to shoreline management. 	<ul style="list-style-type: none"> ● Greater short-term impacts and potentially more repairs than necessary. ● Potential lower long-term impacts
10-year permit, Sheet Pile	<ul style="list-style-type: none"> ● Relatively more expensive materials, but still reasonable costs. ● Relatively simple to install but may require more digging to remove buried debris. 	<ul style="list-style-type: none"> ● Replacement of the existing sheet-pile seawall in-kind is viable solution. 	<ul style="list-style-type: none"> ● Smaller footprint. ● Wildlife and human safety hazards associated with vertical wall.
TABLE KEY	<ul style="list-style-type: none"> ● OPTIMAL OR GOOD 	<ul style="list-style-type: none"> ● SUB-OPTIMAL OR POOR 	<ul style="list-style-type: none"> ● UNREASONABLE

2.4.1 No Repairs

Doing nothing and allowing the seawall to deteriorate was considered but eliminated because widespread failure of the seawall would threaten Monument resources and values, including the safe operation of Henderson Field and potential trapping hazards for threatened and endangered species, including green sea turtles and Hawaiian monk seals.

2.4.2 Pull-Back Alternative

As a possible way of achieving the underlying purpose and need, but with a lower project footprint, the Service considered abandoning a portion of the seawall on the eastern side (Area B). This would include removal of fill and allowing marine waters to reclaim previously filled areas.

However, the Service and FAA determined this alternative was not practical do to prohibitive costs. Such a project would be a major undertaking and would need to be in one action, rather than incrementally as needed to make repairs. Funding is not available for such a major undertaking (GAO 2016).

Another negative consideration related to abandoning a portion of the fill area is the loss of nesting habitat for seabirds. Land is already a limiting factor in seabird nesting productivity, so any reduction in nesting area is likely to reduce nesting productivity.

2.4.3 Replace Entire Seawall at One Time

Another alternative considered but eliminated from detailed study was to replace the entire seawall at once. While there may be some economies of scale in taking this approach, the overall costs are prohibitive for the same reason that restoration costs would be prohibitive. In addition, some sections of the seawall may not require repair for several years. Therefore, this option is not considered practicable.

2.4.4 Sheet pile Alternative

Another alternative considered but eliminated from detailed study was to repair the seawall using the sheet pile method used to construct the original wall. However, the sheet pile alternative was found to be less suitable than rock revetment in terms of cost and engineering and had no redeeming values in terms of environmental benefits. A sheet pile wall would continue to obstruct bird and other wildlife movements between shore and water. Installation of the sheet pile wall would require a crane with a vibratory hammer and possibly an impact hammer as well. This equipment is not currently available on the island. Use of such equipment would result in elevated noise levels to which marine mammals and other wildlife may be sensitive, and would require additional mitigation. Table 2-2 summarizes those alternative considered but eliminated from detailed study.

3 Affected Environment

3.1 Location and History of Project Site

Midway Atoll is located at the northwestern end of the Papahānaumokuākea Marine National Monument, approximately 1,100 miles northwest of Oahu. At 1,535 acres, Midway Atoll is the largest landmass in the Northwest Hawaiian Islands.

Midway Atoll includes three small islands (Sand Island, 1,117 acres (4.52 km²); Eastern Island, 336 acres (1.36 km²); and Spit Island, 15 acres (0.06 km²)), an encircling protective coral reef, and submerged lands and waters out to the 12-nautical mile territorial seas (581,864 acres; 2,355 km²).

Figure 3-1 – Aerial Image showing Sand Island, Spit Island, and Eastern Island within Midway Atoll





Figure 3-2 – Sand Island and project landmarks

The seawall is located along the southeast shoreline of Sand Island, the largest of three islands that make up Midway Atoll National Wildlife Refuge. The Refuge, which is also designated as the Battle of Midway National Memorial, is part of the larger Papahānaumokuākea (pronounced: 'pəpə'ha:nou'moku'a:keə) Marine National Monument.

3.2 Political Jurisdiction and Management Framework

Midway Atoll is an unincorporated territory of the United States and is the only atoll/island in the Hawaiian archipelago not part of the State of Hawai'i.

3.2.1 Henderson Field and FAA Involvement

Henderson Field Airport is an FAA-approved publicly owned non-commercial airport that provides a primary access point to the Refuge and Monument. The runway also serves as a FAA-designated Extended-range Twin-engine Operational Performance Standards (ETOPS) landing area that is critical to trans-Pacific air-traffic safety.

The western portion of the existing seawall protects Henderson Field and its associated RSA, which is an extended clearance area maintained for landing emergencies.

The Service has partnered with the FAA to manage Henderson Field and maintain Midway Atoll's aging infrastructure, including the portion of the seawall that protects Henderson Field.

For planning purposes, the seawall has been divided into two areas: Area A, which is the area that protects Henderson Field and the RSA, and Area B, which is the seawall adjacent to Refuge-owned uplands.

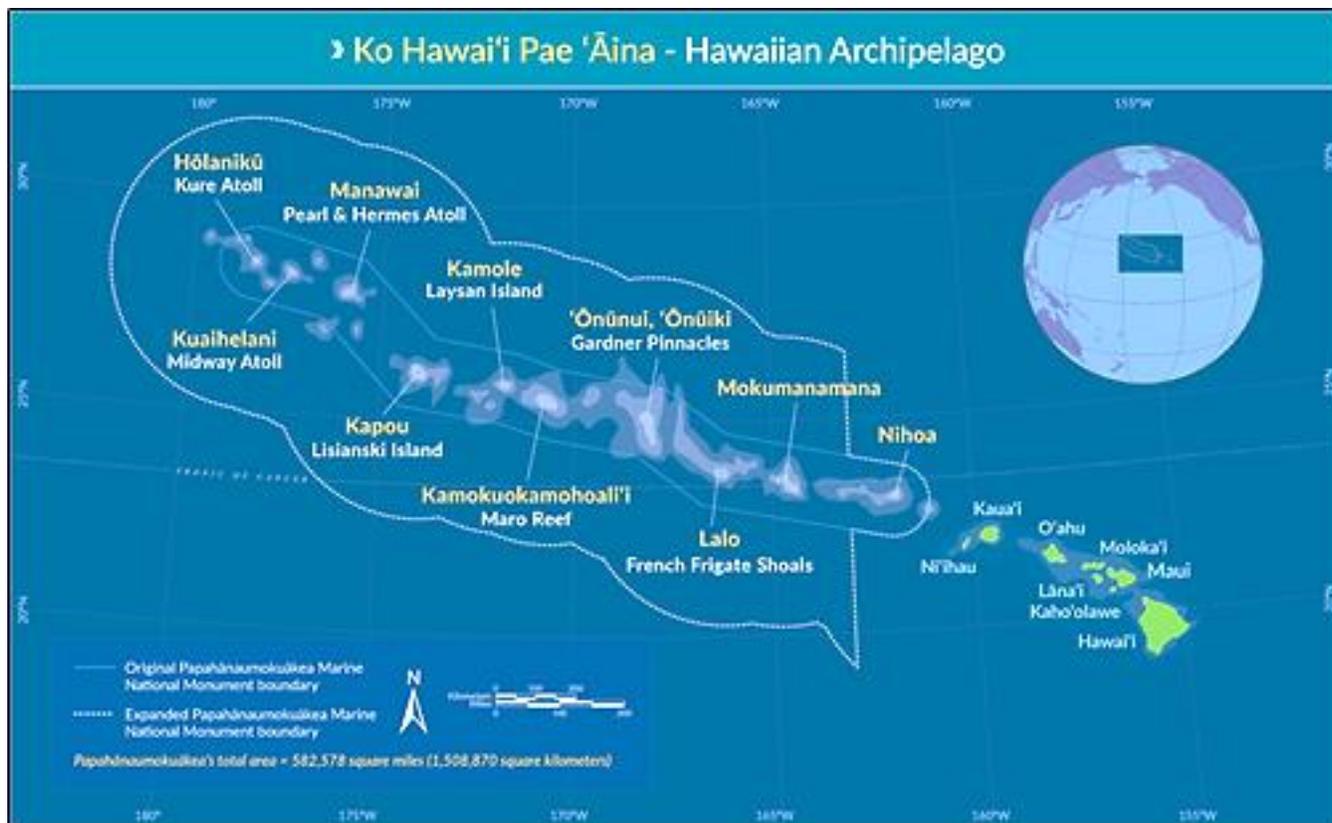


Figure 3-3 – Map of Papahānaumokuākea Marine National Monument within Ko Hawai'i Pae 'Āina

3.2.2 Monument Management Plan

The Refuge is managed by the Service while the Monument is managed cooperatively by three Co-Trustees: the Service, the National Oceanic and Atmospheric Administration (NOAA), and the State of Hawai'i (PMNM 2008).

In 2008, the Co-Trustees approved a Monument Management Plan (PMNM 2008) that defines a management regime and guiding principles of the Monument and that addresses priority management needs over the plan's 15-year planning period (2008-2023).

3.2.3 Midway Atoll Conceptual Site Plan

The 2008 Monument Management Plan included as an appendix the Midway Atoll Conceptual Site Plan (Jones and Jones 2008). Section 4 of the conceptual site plan included "Guidelines and Principles" as well as "Management Zones and Site Zones" to direct the long-term management of Midway Atoll (see Section 3.3, *Existing and Planned Uses*). The plan reinforced the concept of Sand Island serving as an administrative hub for much of the Northwest Hawaiian Islands, utilizing Henderson Field for access to the Refuge and Monument and for an FAA-approved emergency runway.

3.2.4 USACE Permit Area

The term "permit area" as used in 33 CFR Part 325, *Processing of Department of the Army Permits*, means those areas comprising the waters of the United States that will be directly affected by the proposed work or structures and uplands directly affected as a result of authorizing the work or structures.

The following three tests must all be satisfied for an activity undertaken outside the waters of the United States to be included within the permit area:

1. Such activity would not occur but for the authorization of the work or structures within the waters of the United States;

2. Such activity must be integrally related to the work or structures to be authorized within waters of the United States. Or, conversely, the work or structures to be authorized must be essential to the completeness of the overall project or program; and
3. Such activity must be directly associated (first order impact) with the work or structures to be authorized.

Based in this three-part test, the permit area for USACE permit considerations for the proposed seawall long-term maintenance project has been defined as the cumulative footprint of the “Maximum Construction Scenario” in the description of proposed action (Appendix A). This includes the footprint of all rock revetment that could be installed along the 5,720 linear feet seawall (6.6 acres) extending 50 feet into marine waters, as well as a 50-foot construction footprint on uplands adjacent to the seawall (6.6 acres) for a total USACE permit area of 13.2 acres.



Figure 3-4 – Midway Atoll Conceptual Site Plan (Jones and Jones 2008)

3.3 Existing and Planned Uses

Sand Island has been significantly altered from its natural state. In 1871, efforts were begun to clear a channel into the lagoon. In 1903, workers for the Commercial Pacific Cable Company added 9,000 tons of soil from Honolulu and Guam and introduced hundreds of new species of flora and fauna. Infrastructure was built, including fuel depots, an airstrip, and housing for as many as 5,000 military personnel. The base was closed in 1993, and the atoll was put under Department of the Interior jurisdiction in 1996 (FWS 1996). Today, approximately 50 people are stationed at Sand Island, which serves as the administrative hub of the Refuge the entire western edge of the Monument.

The south seawall is located in an area that has no planned future uses other than for airport operations, erosion control and fish and wildlife habitat. Figure 3-4 above identifies major existing developments and the “Primary Development Zone” for future developments and facilities. The south seawall is located away from the “Primary Development Zone,” indicated in orange. The western portion of the south seawall is adjacent to the runway and “Field Operation Zone,” (Jones and Jones 2008).

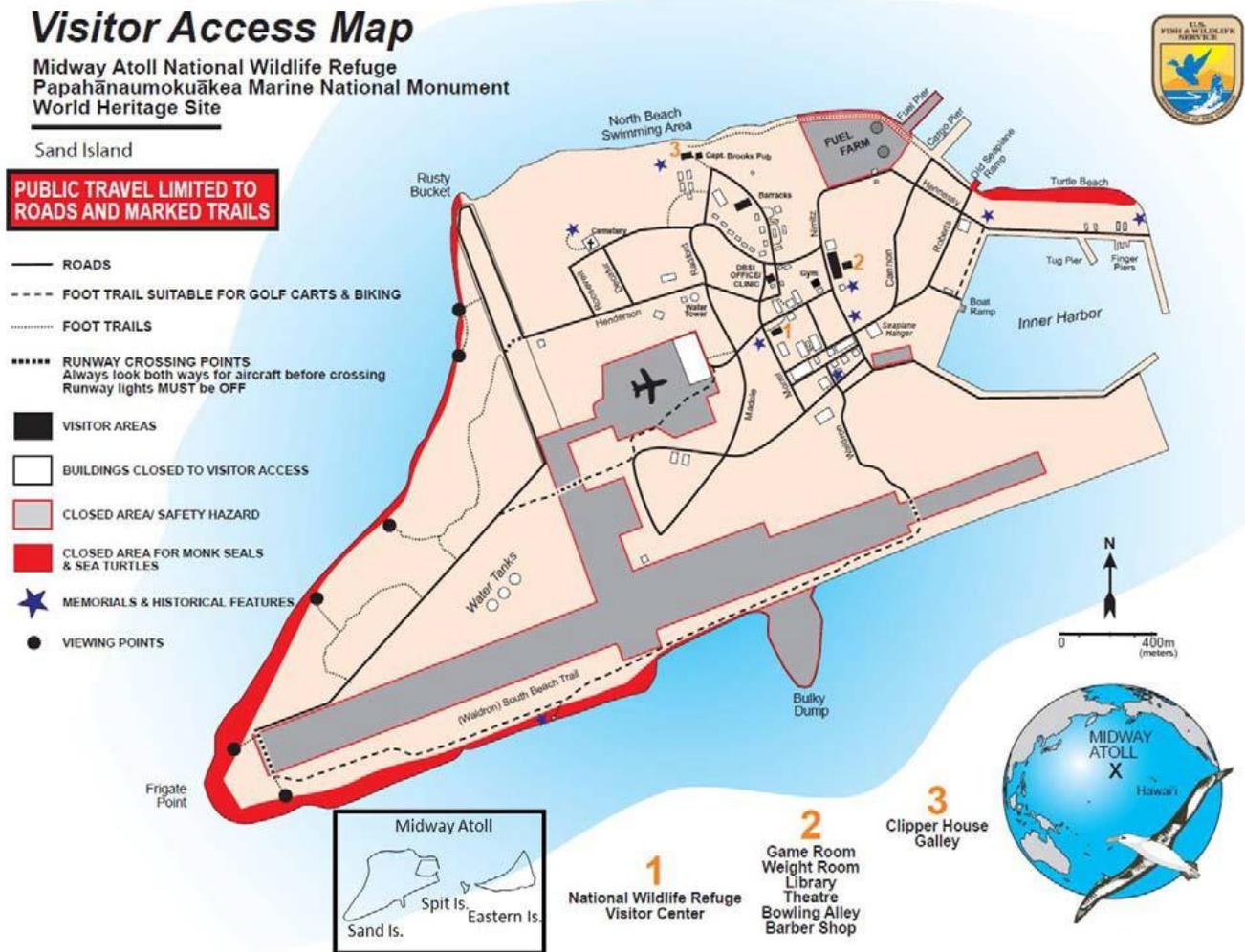


Figure 3-5 – Map of Sand Island showing approximate locations of sensitive resources

3.4 Sensitive Resources

The National Monument and National Wildlife Refuge designations increase the sensitivity of the project area to environmental impacts, particularly impacts on fish and wildlife. The following sensitive wildlife species are present at the Refuge:

- Twenty-one seabird species – nearly 3 million individual birds – that nest on virtually every square foot of available habitat on Midway's three islands;
- Endangered Hawaiian monk seals that pup and rear their young on Midway's beaches and nearshore waters;
- Threatened green turtles that haul out to rest on island shores (nesting has been observed on the north beach of Sand Island on two occasions but is not common) and
- A resident pod of nearly 250 spinner dolphins that spend each day within Midway's protected lagoon waters.

The offshore side of the seawall does support a wide variety of fish and wildlife, including use by endangered turtles and monk seals. However, the area contains no haul-out areas, which are located primarily on the western shoreline of Sand Island (see the project Biological Assessment and ESA Consultation letters for additional details about sensitive resources).



Figure 3-6 – Upland area adjacent to failed seawall section.

While numerous structures on Sand Island are eligible for listing on the National Register of Historic Resources, none are located near the failed section of seawall (see project Section 106 of the National Historic Preservation Act (NHPA) documentation for additional details).

However, most upland areas adjacent to failed sections of seawall, such as the section shown in Figure 3-6, contain eroded fill materials as well as metal sheet pile debris and backfilling by blocks/slabs of concrete and asphalt. These areas provide little food, cover, or shelter for wildlife.

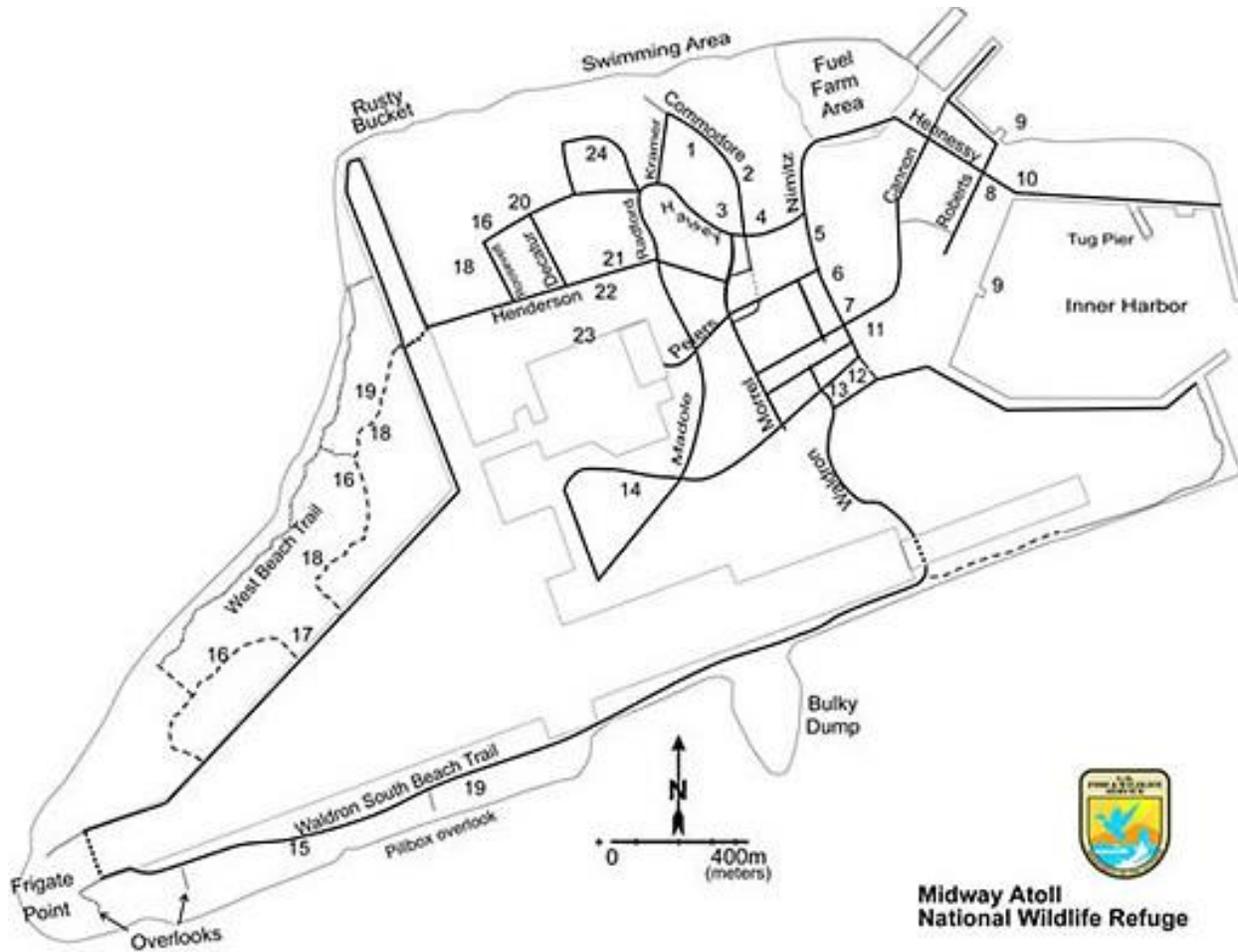


Figure 3-7 – Map of historic sites on Sand Island (numbered locations reference table below)

1 - Bachelor's Officer's Quarters	13 - Command Post/Power Plant
2 - Midway House	14 - Marine Barracks
3 - Senior Officer's Quarters	15 - Underground Shelter/Bunker
4 - Pan Am Hotel	16 - Gun Emplacements
5 - Midway Mall	17 - Ammo Shelter
6 - Navy Memorial	18 - Ammo Hut
7 - Japanese Markers	19 - Pillbox
8 - Submarine Base Power Plant	20 - Cemetery
9 - Seaplane Ramp	21 - Radar Buildings
10 - Instant Pillbox	22 - "New" Command Post
11 - Seaplane Hanger	23 - Old Hangar
12 - Torpedo Overhaul Shop	24 - Commercial Pacific Cable Company Station

4 Environmental Consequences

Many adverse environmental impacts have already been considered and addressed through environmental measures outlined in the Implementation Plan (Appendix B). Therefore, the impacts discussions that follow are focused on determining whether the proposed Implementation Plan is sufficient to address probable significant adverse impacts or whether additional measures are needed.

4.1 FAA Environmental Impact Categories

The following sections evaluate each of the 14 environmental impact categories identified in FAA Order 1050 1F (FAA 2015).

4.1.1 Air quality

Project emissions of dust and engine exhaust would come from barge transport of materials to the island and from heavy equipment used to construct rock revetments. Some additional exhaust and dust emissions could occur during maintenance and mitigation activities.

The project would not alter aircraft traffic to and from the island other than as needed to transport construction teams, so effects on air traffic emissions would be negligible.

Some exhaust and dust emissions could occur later in time, during maintenance and mitigation activities.

Due to the infrequency and low levels of emissions from construction and transport, and considering these low levels within the context of the high-quality air conditions at Midway, project emissions will have de minimis effects on air quality.

4.1.2 Biological Resources

Potential impacts on biological resources are a key issue associated with the proposed action. As described in Section 3.4, Sensitive Resources, the proposed action would occur within a National Monument and a National Wildlife Refuge, which increases the sensitivity of the project area to environmental impacts, particularly impacts on fish and wildlife. Sand Island has an abundance of sensitive biological resources (as described in Section 3.4).

The lead agencies have identified and minimized impacts to these biological resources through consultations conducted under the FWCA, the Endangered Species Act (ESA), and the Magnuson-Stevens Fishery Conservation and Management Act. In summary, these consultations have found that, while the proposed repair project would adversely affect certain biological resources, these effects can be avoided and minimized through environmental measures recommended by NOAA Fisheries and by PIFWO. These measures have been incorporated into the Implementation Plan (Appendix B) and are considered part of the proposed action. In addition, the consultations have found that the proposed action is not likely to adversely affect any threatened or endangered species, including green sea turtles, hawksbill sea turtles, leatherback sea turtles, loggerhead sea turtles, Laysan ducks, short-tailed albatross, Hawaiian monk seals, humpback whales, sperm whales, and pōpolo.

The following sections summarize the major conclusions documented in the FWCA 2(b) Planning Aid Report and ESA Consultation Letters.

4.1.2.1 Cumulative Impact on Marine and Upland Habitats

The proposed action would result in multiple disturbances to the marine environment along the 5,720-foot seawall as individual repairs are made on an as-needed basis. As shown in Appendix A, proposed repairs would typically extend approximately 50 feet horizontally into the existing marine aquatic habitat adjacent to the existing seawall.

The maximum cumulative effect of repairing the entire 5,720 linear feet seawall over a 10-year timeframe would include approximately 6.6 acres of marine habitat being filled by rock and an additional 6.6 acres of upland habitat being directly disturbed by rock or only temporarily disturbed during construction.

All impacts would take place within areas already significantly modified by past human disturbances associated with the seawall and disturbance associated by decades of U.S. military operations in the project location. Adverse effects would be minimized or avoided through environmental measures already incorporated into the proposed action as part of the Implementation Plan (Appendix B). The plan includes measures to protect the most sensitive and highly valued biological resources present in the project vicinity, including corals, sea turtles, Hawaiian monk seal, and Hawaiian seabirds.

4.1.2.2 Impacts on Coral

Based on surveys conducted by PIFWO from April 14 to April 22, 2016, coral colonies (coral grows in patches, called colonies) are growing on the seawall and on debris associated with the seawall. Most colonies (~43%) were less than 10 cm (4 inches) in diameter. Some (~28%) were in the range of 10 to 20 cm diameter (4 to 8 inches). Only 1% (4 colonies) had a diameter greater than 40 cm (16 inches). The largest colony observation had a maximum diameter of 48 cm (19 inches). There are no coral species in this region of the Pacific Ocean listed as endangered under the ESA.

The proposed action would remove existing coral habitat provided by the aging seawall sheet pile and associated debris piles. In addition to direct impacts to coral within the individual breach repair sections, coral adjacent to the proposed construction may be indirectly impacted by sedimentation stirred up during construction.

These impacts would be addressed through proposed environmental measures, including measures recommended by the PIFWO and NOAA Fisheries, summarized in the Implementation Plan (Appendix B).

4.1.2.3 Impacts on Sea Turtles

Four species of turtle may occur within the waters off the south seawall, but only the threatened green sea turtle is regularly present in the project areas (FWS and FAA 2013).

Green sea turtles are known to regularly haul out and “bask” in the sun at an area known as “turtle beach,” located on the northeast corner of Sand Island. While the existing sea wall provides no suitable basking habitat, green sea turtles are expected to forage regularly in the waters adjacent to the seawall.

Construction would generate noise, which may disturb green sea turtles swimming and foraging in nearshore areas adjacent to the seawall. While such disturbance may cause turtles to expend energy to leave the area rather than foraging, the effect would be temporary and is unlikely to be sufficiently severe to interfere with the ability of turtles to feed, breed, rest or seek shelter.

Long-term habitat effects would be negligible, with no gain or loss of basking or nesting habitat. Trapping hazards present within failed sections would be reduced.

Therefore, the proposed action is not likely to significantly adversely affect sea turtles.

4.1.2.4 Impacts on Hawaiian Monk Seal

Hawaiian monk seals breed and haul out on the beaches on the western and northern portions of Sand Island. Critical habitat for Hawaiian monk seals has been established for “all beach areas ...including the seafloor and all subsurface waters and marine habitat within 10 meters (m) of the seafloor, out to the 200-m depth contour line around” Midway Atoll. However, hardened shorelines in existence prior to the rule are not included in the designation, as they do not meet the definition of critical habitat for the seals (80 FR 50925).

Hawaiian monk seals may be present in the waters adjacent to the sea wall and individuals may be at risk of becoming trapped within debris created by the failing sea wall. The proposed project will reduce the risk of entrapment. Observers would be used during construction to reduce the risk of injury through direct contact or noise.

Therefore, the proposed action is not likely to significantly adversely affect Hawaiian monk seals.

4.1.2.5 Impacts on Hawaiian Seabirds

Laysan and Black-footed albatross nest in the area, but as construction would be conducted outside the nesting season and repaired upland sections would become available for nesting, effects on bird nesting would be negligible. Nesting season begins in late November, and chicks will fledge by mid-August. The Implementation Plan would require that seawall repairs be completed after fledging has occurred and before the birds begin nesting in late November (Leary 2013).

Therefore, the proposed action is not likely to significantly adversely affect Hawaiian seabirds.

4.1.3 *Climate*

The proposed repair program would have no effect on climate. Repaired sections of seawall would help protect shorelines from severe storms, which may increase in frequency with expected climate change.

In August 2016, the Council on Environmental Quality (CEQ) issued guidance for federal agencies to consider greenhouse gas emissions and the effects of climate change in NEPA reviews (CEQ 2016). The guidance recommended that Federal agencies evaluate GHC emissions commensurate with the extent of the effects of the proposed action. As described in section 4.1.1, Air Quality, the proposed seawall long-term maintenance project is expected to have a de minimis level of emissions. Therefore, using NEPA's rule of reason, as described in the CEQ guidelines, emission levels of the proposed project would not reach a level meaningful to decisions regarding the proposed action, and a quantified greenhouse gas calculation would be superfluous (CEQ 2016).

4.1.4 *Coastal Resources*

Midway Atoll is not within any state and, therefore, there is no state Coastal Zone Management Plan to be considered for consistency under the Coastal Zone Management Act.

The proposed repairs would have no effect on coastal recreation and would reduce coastal erosion and wildlife entrapment risks, resulting in a moderate beneficial effect on coastal zone resources.

The project would occur within a coral reef ecosystem, as identified in Executive Order (EO) 13089, Coral Reef Protection Act. Due to proposed mitigation measures, impacts on corals would be limited to the site of action, and minimized by relocating those corals that can be moved. For those corals that cannot be moved, compensatory mitigation may be required and will be discussed by the NMFS and the FWS.

Prior to construction, live corals present within repair areas would be salvaged to the extent practicable and relocated to designated mitigation areas, as specified in the Implementation Plan (Appendix B).

4.1.5 *Department of Transportation Act Section 4(f)*

Midway Atoll National Wildlife Refuge is a "Section 4(f)" property, as defined under the Department of Transportation (DOT) Act. According to FAA Order 1050.1F (Section 4-3, *Significance and Significance Thresholds*), FAA must determine if the proposed action would "substantially impair" a 4(f) property, which occurs "when the activities, features, or attributes of the resource that contribute to its significance or enjoyment are substantially diminished" (FAA 2015).

The Service has determined the proposed action is unlikely to substantially diminish Refuge or Monument activities, features, or attributes or otherwise impair the Refuge/Monument for the following reasons.

- The action is needed to repair an existing seawall and to protect Henderson Field, which is an essential feature of the Refuge.
- The Section 106 National Historic Preservation Act Documentation shows the review performed by a Service historic preservation specialist. The review found that no historic properties or resources would be affected by the proposed action, as defined under Section 106 of the National Historic Preservation Act.
- Based on consultations with NOAA and Service biologists, the project is not likely to adversely affect species or critical habitat protected under the Endangered Species Act. Impacts on biological resources would be minimized as specified in the Implementation Plan (Appendix B).
- Project-related noise impacts would be limited to construction and would not substantially impair Refuge resources.
- The failed section of the seawall is adjacent to the runway and, therefore, the proposed repairs would have no effect on public access or recreational use.

4.1.6 Farmlands

No farmlands are present within the project vicinity.

4.1.7 Hazardous Materials, Solid Waste and Pollution Prevention

A Hazardous Materials Inspection Report identified two “no dig” areas inland from the existing seawall (Jones and Jones 2008, shown in Figure 4-1). The proposed action includes no work within this area. The inspection report identified no hazardous materials in the vicinity of the seawall.

However, due to long-term military occupation of the area, there remains many uncertainties regarding the materials located within the fill area behind the seawall, and the potential exists for unknown hazardous materials to existing within areas that would be disturbed during construction. In addition, potential unexploded ordinance is another hazard that cannot be ruled out. The Services will consult with experts to assess the potential for hazards prior to construction, and to develop an appropriate response plan.



Figure 4-1 – “No dig” areas adjacent to the project site (Jones and Jones 2008).

Therefore, the proposed action includes the following measure:

Should significant hazardous wastes or unexploded ordinance be discovered during site preparation, construction teams would be required to contain and/or dispose of such waste according to the Implementation Plan (Appendix B).

The proposed long-term seawall maintenance project would not:

- Violate applicable Federal, state, tribal, or local laws or regulations regarding hazardous materials and/or solid waste management
- Disturb known contaminated sites, nor
- Generate wastes at levels that would adversely affect human health and the environment.

4.1.8 Historical, Architectural, Archeological, and Cultural Resources

A Service historic preservation specialist has reviewed the proposed action and found that no historic properties or resources would be affected by the proposed action. Correspondence regarding this review is included in the Section 106 National Historic Preservation Act Documentation

While Midway Atoll National Wildlife Refuge (NWR) contains several significant historic properties associated with the Battle of Midway National Historic Landmark (as described in Section 3.4), the seawall was completed in 1957-58 as part of the Cold War military activity, not World War II. Cold War

properties on the atoll were reviewed by the U.S. Navy in 1994 and found not to be eligible for listing on the National Register of Historic Places.

4.1.9 Land Use

As described in Section 3.2, land use within the project vicinity is managed under the Monument Management Plan and the associated Midway Atoll Conceptual Site Plan. The proposed action would be consistent with the purposes, values, and management goals of the National Monument or National Wildlife Refuge. A major purpose of the proposed seawall long-term maintenance project is to protect Henderson Field, which is a critical runway of international importance. It is also critical to the management of the western portion of the Monument, including Midway Atoll National Wildlife Refuge. Therefore, the proposed action would complement, rather than conflict with, existing and anticipated future land uses at Midway Atoll NWR.

4.1.10 Natural Resources and Energy Supply

Natural resource and energy use for the proposed action would be limited to shipping of materials and construction activities. Rock and other raw materials would be acquired from an existing source.

4.1.11 Noise and Noise-Compatible Land Use

Project-related noise impacts would be limited to construction and would not substantially impair Refuge resources. Areas adjacent to proposed construction areas are unoccupied by people. Impacts of construction noise on wildlife would be temporary and minimized through avoidance techniques outlined in the proposed Implementation Plan.

4.1.12 Socioeconomics, Environmental Justice, and Children's Environmental Health & Safety Risks

Midway Atoll has no residents other than government-related employees and, therefore, the proposed seawall repair would have no effect on social or economic conditions, including environmental justice.

4.1.13 Visual Effects

Proposed seawall maintenance would be conducted only during daylight hours and would not generate nighttime light.

Replaced sections of seawall would alter the visual character of the area, however, due to the remote location and limited visitor uses in this area, such visual change would not affect the importance, uniqueness, and aesthetic value of Refuge and Monument resources. In addition, proposed armor rock repairs may be a visual improvement over the dilapidated structure of the existing seawall.

4.1.14 Water Resources

The proposed action would have no effect on water supplies. Water use would be limited to construction and would be minimal. Marine water quality would be temporarily affected during construction by increased turbidity. Effects will be minimized through use of a silt containment curtain during placement of material in tidal waters. No long-term effects will occur.

The proposed action would not generate, transport, treat, or store hazardous materials that could pollute marine or fresh waters. Fuel needed for construction would be stored and transported using standard, approved containers and procedures, including measures required by the Sand Island Spill Prevention, Control, and Countermeasure Plan (SPCC) (GeoEngineers, Inc. 2009).

Construction contracts will include a requirement to adhere to the protocol set forth in the SPCC. Additional environmental measures, as presented in Appendix B, would be implemented to protect water resources.



Figure 4-2 – Silt curtain in use during 2014 repair.

4.2 Council on Environmental Quality Regulatory Considerations (per §1508.27)

The central question addressed in this EA is whether the proposed seawall long-term maintenance project would have a “significant effect on the human environment,” as defined by CEQ NEPA regulations (40 CFR § 1508.27 – *Significantly*).

This section directly addresses each of the indicators of significantly adverse impacts, as defined by the CEQ regulations. Note that the EA is intended to “provide sufficient evidence and analysis” for determining whether the proposed project would have significant effects. Formal determinations regarding significance will be made by the Service, FAA, and USACE decision-makers will be made in either a “Finding of No Significant Adverse Impact” or Notice of Intent to prepare an environmental impact statement.

4.2.1 Context

The CEQ indicators of significance explain that the “significance” of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action.

The context of the planning area is clearly of global significance. Henderson Field is a runway of critical importance to international commercial, military, government, and private air traffic. It is also critical to management of the western portion of the Monument and Refuge. Midway Atoll itself is of global significance for both its natural and cultural/historic resources.

However, for the specific action at hand, significance is probably most relevant within the context of the Midway Atoll ecosystem, including any long-term net loss in productivity, diversity or functioning of the marine physical or biological environment.

The proposed action is not likely to result in significant adverse impacts within the context of Midway Atoll. Impacts are expected to be localized and limited to the footprint of all rock revetment that could be installed along the 5,720 linear feet seawall (6.6 acres) as well as a 50-foot construction footprint on uplands adjacent to the seawall (6.6 acres). Following short-term construction impacts, repaired sections

of seawall are expected to provide equal or improved habitat productivity, diversity, and functioning when compared to existing conditions along the failing seawall.

4.2.2 Intensity

The CEQ regulations define ten measures of “intensity” that may indicate significant adverse impacts on the human environment. Each of these measures is addressed below.

1. Would any adverse impacts be significant, even if – overall – the net project impacts would not be significant?

None of the adverse impacts identified in Section 0 appear to have significant adverse impacts, either individually or collectively, based on FAA and Service criteria (FAA 2015 and U.S. Department of Interior 2008) and on CEQ criteria (40 CFR § 1508.27). Formal determinations regarding significance will be made by the Service, FAA, and USACE decision-makers based on the information presented in this EA.

2. Would alternatives have significant impacts on public health or safety?

The proposed action is needed to correct an existing public safety hazard caused by the failed seawall and debris entering the Runway Safety Area. Taking no action would have adverse effects on public safety by compromising runway safety. The proposed repairs would have no adverse effect on public health or safety.

3. Would alternatives have significant impacts on natural resources and unique geographic characteristics?

This impact category has several subcategories, as presented in Table 4-1. Based on these considerations, the proposed action would not result in any of these impacts. Other categories, including Wilderness Areas, Wild and Scenic Rivers, National Natural Landmarks, Sole or Principal Drinking Water Aquifers, Prime Farmlands, Wetlands (EO 11990) and Floodplains (EO 11988) are not present within the project area.

Table 4-1 – Evaluation of natural resources and unique geographic characteristics

Characteristic	Project Effects
Historic or Cultural Resources	As discussed in the Section 106 National Historic Preservation Act Documentation, the proposed action would have no adverse effect on historic or cultural properties.
Park, Recreation or Refuge Lands	As discussed in Section 4.1.5, the proposed action would have no adverse effect on 4(f) properties.
National Monuments	The proposed action is needed to maintain Henderson Field as an essential function of the Monument.
Endangered Species	As documented in the Biological Assessment and ESA Consultations Letters, the proposed action may affect, but is not likely to adversely affect, short-tailed albatross, Laysan duck, green sea turtle, Hawaiian monk seal, and pōpolo.
Critical Habitat	The proposed action may affect, but is not likely to adversely modify, critical habitat of endangered Hawaiian monk seal.
Migratory Birds	As addressed in the Implementation Plan (Appendix B), impacts on migratory birds can be minimized through seasonal timing and other mitigation measures.
Other Ecologically Significant or Critical Areas	As documented in the FWCA 2(b) Planning Aid Report, Category 2 Coral Reef Habitat (a Special Aquatic Site under the Clean Water Act) and Coral Reef Ecosystem (Essential Fish Habitat under the Magnuson-Stevens Act) will be impacted by the project, but significant impacts would be avoided through the measures described in the Implementation Plan (Appendix B).

4. Would alternatives have highly controversial environmental effects or involve unresolved conflicts concerning alternative uses of available resources?

The project site is remote and has no public access or use. No substantial dispute is known to exist as to the size, nature, or effect of the proposed action.

The effects are not considered highly controversial because there are no unresolved conflicts concerning alternative uses of available resources as described in Section 102(2)(E) of NEPA, nor are there any substantive disagreements over the project's risks of causing environmental harm. The proposed action has not been opposed by any Federal, State, or local government agency, by Native Hawaiians, nor by any other group or individuals.

5. Would alternatives have highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks?

The proposed rock revetment repair is a well-known and proven technique for erosion control (PND 2011).

6. Would alternatives establish a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects?

This question is a major reason the Service and FAA are considering the effects of potentially repairing the entire seawall, rather than considering impacts of repairing one section at a time. Based on the engineering study commissioned by the Service (PND 2011), the aging seawall is near the end of its operational life and will need additional repairs or complete replacement or removal sometime within the next several years. The proposed action, the seawall long-term maintenance project, is a “decision in principle” (40 CFR § 1508.27 – *Significantly*) to replace the entire failing seawall with rock revetment.

However, the proposed action is limited to the south seawall and would not influence future actions anywhere else on Sand Island, Midway Atoll NWR or on other islands/atolls within the National Monument.

7. Would alternatives have a direct relationship to other actions with individually insignificant but cumulatively significant environmental effects?

The proposed action is not connected to other actions that would result in significant adverse impacts. Additional information related to cumulative effects is presented in Section 4.4.

8. Significant Scientific, Cultural, or Historical Resources

The proposed action would have no effect on Native Hawaiian practices or access to Traditional Cultural Properties. The proposed action would also have no adverse effect on historic properties, as documented in the Section 106 National Historic Preservation Act Documentation.

9. Would alternatives have significant impacts on species listed, or proposed to be listed, on the List of Endangered or Threatened Species or have significant impacts on designated Critical Habitat for these species?

Based on previous consultations with NOAA and Service biologists, the project may affect, but is not likely adversely affect listed species and critical habitat. Significant impacts on biological resources would be avoided through biological monitoring during construction and other measures (see Appendix B).

Conclusions regarding ESA compliance will need to be confirmed through Section 7 informal consultations being conducted subsequent to this EA.

10. Would alternatives violate a Federal law, or a state, local, or tribal law or requirement imposed for the protection of the environment?

No violations of policy or law have been identified. The Service, FAA and USACE will be making final determinations regarding consistency with Federal policies and law.

4.3 Indirect Effects

Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. (40 CFR § 1508.8)

However, based on the analysis presented in Sections 0 - 4.2, effects of the proposed long-term repairs would be limited primarily to the site of action. Impacts on wildlife from noise may occur for some distance, but as evaluated in Section 4.1.11, the effects of construction noise on wildlife are not expected to be significant.

4.4 Cumulative Effects

Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. As described in Section 1.3, Issues to be Resolved, the consideration of cumulative effects is a major reason the Service and FAA are considering the effects of potentially repairing the entire seawall, rather than considering impacts of repairs one section at a time. This EA considers the cumulative effect of repairing the entire 5,720 linear feet seawall (6.6 acres) over a 10-year timeframe, including impacts within the 50-foot construction footprint on uplands adjacent to the seawall (6.6 acres) for a total USACE permit area of 13.2 acres.

Therefore, the primary concern for significant cumulative effects is whether the incremental impact of replacing the entire seawall with rock revetment would be significant when considered collectively with other past, present, and reasonably foreseeable future actions.

4.4.1 Past Actions

The cumulative effects of human occupation at Midway Atoll have undoubtedly resulted in significant adverse environmental impacts. From 1871, when the lagoon was dredged to create a navigation channel, to 1903, when nine thousand tons of soil from Honolulu and Guam were delivered to the island (together with hundreds of new species of flora and fauna), to the decades-long military occupation and development, Midway Atoll has been significantly altered from its natural condition.

However, this question of cumulative effects, as posed by the CEQ measures of intensity, focuses on whether the proposed action would significantly contribute to these effects. The key to answering this question is that NEPA is forward-looking. The proposed action is intended to address, efficiently and effectively, an immediate threat to Refuge and Monument resources. The proposed seawall long-term maintenance project would improve overall conditions over the existing situation and would not significantly add to past adverse effects.

4.4.2 Future Actions

The 2008 Conceptual Site Plan identified the following potential future actions at Midway Atoll National Wildlife Refuge, some of which have been completed or are currently underway, while others may occur in the future, as needed and as funding allows. Future actions include actions that are reasonably foreseeable in the future, and that could contribute to the cumulative impacts from the proposed action.

- Expand biological enhancement, marine management, and research programs as part of multi-agency and partnership effort.
- Demolish non-historic structures or structures that do not meet the Secretary of the Interior Standards for historic preservation, and create habitat in vacated areas.
- 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.

However, based on the overall planning context of Sand Island, the proposed action is not expected to contribute significantly to adverse effects from these actions.

In addition to the projects listed above, the U. S. Fish and Wildlife Service is proposing to implement a Seabird Protection Project in 2019 or 2020. The Preferred Alternative, as described in the Seabird Protection Project Final EA, consists of the island-wide distribution of bait pellets containing rodenticide. The toxicant to be employed as part of the Preferred Alternative would be Brodifacoum-25D Conservation, a pelleted rodenticide bait intended for conservation purposes for the control or eradication of invasive rodents on islands or vessels. For the highest possibility of success, the rodenticide bait must be applied across the entire land area of the island, into every potential mouse territory; because of this, the Preferred Alternative will incorporate multiple distribution methods. Bait will be broadcast from hoppers suspended under helicopters at a rate dictated by the product label. Three bait drops are planned on Sand Island using 1-2 helicopters to maximize the chance of completing each drop in a single day. The portion of the airfield within the Foreign Object Debris management area, portions of the coastal fringe where retaining structures and eroding sand create undercut areas, piers, buffer zones around fresh water ponds, and indoor commensal areas which are not appropriate for aerial distribution will be addressed with a combination of hand broadcast and bait stations.

The proposed Midway Seabird Protection Project, which is currently being planned would not contribute to additional, cumulative impacts when considered in combination with the proposed Midway Seawall Repair Project. There is not expected to be any persisting effects of the Midway Seabird Protection Project at the time that the seawall project is implemented and whatever impacts result from the seabird project will not “accumulate” with any impacts of the Midway Seawall Repair Project.

4.5 Irreversible and Irrecoverable Commitment of Resources

An irreversible commitment of resources means that once the agency takes the action, the resource would be permanently removed. An example of an irreversible commitment of natural resources would be removing mineral resources or harvesting old-growth timber.

In many ways, the underlying need for proposed repairs stems from past irreversible commitments made by the U.S. military to expand Sand Island by filling marine waters and to contain this fill with a sheet pile seawall. As discussed in Section 2.4, Alternatives Considered but Eliminated from Detailed Study, removal of the seawall is not practical due to engineering and environmental complications and the associated high cost of such an undertaking.

In addition to this past irreversible impact, each rock revetment repair that would be occur under the proposed long-term maintenance project of the seawall would result in further irreversible loss of marine waters. Construction of rock revetments to repair sections of the failing south seawall should be considered permanent and irreversible, with a cumulative impact of up to 6.6 acres of marine waters.

4.6 Conclusions

4.6.1 *Adverse Impacts*

As evaluated in Section 0, the proposed action would have no effect on farmlands and negligible effects on air quality, climate, historic and cultural resources, land use, energy, and natural resource uses, social and economic conditions, visual resources, noise levels, and water resources.

The proposed action would result in unavoidable adverse impacts on fish and wildlife habitats and species, including multiple disturbances to the marine environment along the 5,720-foot seawall as individual repairs are made on an as-needed basis. As shown in the Project Description (Appendix A), proposed repairs would extend approximately 50 feet horizontally into the existing marine aquatic habitat located adjacent to the existing seawall.

The maximum cumulative effect of repairing the entire 5,720 linear feet seawall over a 10-year timeframe would include approximately 6.6 acres of marine habitat being filled by rock and an additional 6.6 acres of upland habitat being presently disturbed by rock or only temporarily disturbed during construction.

Impacts on biological resources would take place within habitats already significantly modified by past human disturbances associated with the seawall and disturbance by decades of U.S. military operations in the project location. Adverse effects would be minimized or avoided through environmental measures already incorporated into the proposed action as part of the Implementation Plan (Appendix B). The plan includes measures to protect the most sensitive and highly valued biological resources present in the project vicinity, including corals, sea turtles, Hawaiian monk seal, and Hawaiian seabirds.

4.6.2 *Environmental Measures*

As previously described, the proposed action includes an Implementation Plan (Appendix B) that specifies numerous environmental measures to avoid and minimize potential adverse impacts, including sensitive biological resources locate in the project area.

4.6.3 *Unavoidable Impacts*

Temporary disturbance of the areas wildlife and habitats during construction would be unavoidable. These impacts would occur within the project footprint spanning approximate 100 feet, centered on the existing seawall, extending 50 feet into existing marine waters and 50 feet shoreward of the existing seawall.

All repairs would unavoidably result in permanent fill of marine waters with rock, where needed to repair breeches in the seawall, up to a maximum of 6.6 acres of marine habitat being filled by rock and an additional 6.6 acres of upland habitat being presently disturbed by rock or only temporarily disturbed during construction.

4.6.4 *Mitigation*

The Service's PIFWO and NOAA Fisheries recommended in the FWCA 2(b) Planning Aid Report that post-construction marine biological surveys be conducted after the construction of each seawall breach repair segment to determine the actual project-related impact and the need for compensatory mitigation.

In addition, compensatory mitigation may also be required consistent with the Environmental Protection Agency and Department of the Army, Corps of Engineers Final Rule on Compensatory Mitigation for Losses of Aquatic Resources (73 FR 19594, April 10 2008).

Specific compensatory mitigation needs, including proposals for permittee-responsible mitigation, for each project would be developed as needed, as described in the Implementation Plan (Appendix B).

4.7 Effects of No Action

Taking no action and allowing the seawall to fail would result in several adverse impacts, including some that may be considered significant. Breaches in the seawall would likely increase trapping hazards for endangered seals, turtles, and seabirds (particularly young seabirds). In addition, once exposed to the sea

due to a breach, loose fill materials located behind the existing seawall are likely to erode and be washed into the marine environment, resulting in loss of seabird nesting habitat and potential burying of coral and other marine organisms. Perhaps most importantly, not acting to repair seawall breaches would have adverse effects on public safety by compromising runway safety.

Due to these unacceptable results of making no repairs, should the proposed action not be taken, the most reasonably likely result would be a continuation of the existing approach to how FWS and FAA respond to seawall breaches, which is to conduct repairs on an individual, case-by-case basis.

Overall effects of the current case-by-case approach would be very similar to the effect described for the proposed action in Sections 4.1-4.6, with one notable exception: repairs would likely take much longer to plan and implement due to the additional time needed to go through the full permitting process for each repair. Due to the complicated logistics of conducting repairs, including a narrow construction window and remote project location for which materials must be shipped; permitting delays could result in seawall breaches remaining unrepaired for a year or more. This could in turn result in greater adverse impacts by increasing the area that needs to be repaired (due to ongoing erosion following initial breach) and by increasing the risks associated with failed sections of the sheet pile seawall, including risks to wildlife and to the safe operation of Henderson Field.

5 Literature Cited

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6 List of Preparers

Table 6-1 – EA document preparers and reviewers

Association	Name and title	Office
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	Nadiera McCarthy, Aquatic Ecosystem Conservation Program	Pacific Islands Fish and Wildlife Office Honolulu, HI
National Oceanic and Atmospheric Administration	Richard Hall, Fishery Policy Analyst	Pacific Islands Regional Office Protected Resources Division Honolulu, HI
Federal Aviation Administration	Gordon Wong, Lead Program Manager	Airports – Western Pacific Region Honolulu Airports District Office
Contract Team	Bill Martz, Defense Base Services, Inc., Project Manager	Defense Base Services, Inc., Anchorage, AK
	Doug Kenley, PND Engineers, Inc., Project Manager	PND Engineers, Inc., Anchorage, AK
	Steve Hall, PND Engineers, Inc., Environmental Analysis	PND Engineers, Inc., Seattle, WA
	Brenna Hughes, PND Engineers, Inc., Environmental Analysis	PND Engineers, Inc., Anchorage, AK

7 List of Agencies, Tribes, Individuals, and Organizations Consulted

Table 7-1 – Consultation contacts

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U. S. Fish and Wildlife Service	Nadiera McCarthy, Aquatic Ecosystem Conservation Program	Pacific Islands Fish and Wildlife Office Honolulu, HI
	Anan Raymond, Regional Archeologist / Regional Historic Preservation Officer	Cultural Resources Team, Region 1 Sherwood, OR
	Lou Ann Speulda-Drews, Historian/Historical Archaeologist	Reno, NV
State of Hawai'i, Department of Land and Natural Resources	Dr. Alan Downer, Deputy State Historic Preservation Officer	State Historic Preservation Division Kapolei, HI
Office of Hawaiian Affairs	Mr. Keola Lindsey	Honolulu, HI
International Midway Memorial Foundation	Dr. James D'Angelo, Chairman and Founder	Bradenton, FL
Historic Hawaii Foundation	Ms. Kiersten Faulkner, Executive Director	Honolulu, HI
National Oceanic and Atmospheric Administration	Richard Hall, Fishery Policy Analyst	Pacific Islands Regional Office Protected Resources Division Honolulu, HI

Association	Name and Title	Office
		Office of Protected Resources Permits and Conservation Division
U.S. Army Corps of Engineers	Tunis McElwain, Acting District Chief	Honolulu District Regulatory Office Honolulu, HI
Federal Aviation Administration	Gordon Wong, Lead Program Manager	Airports – Western Pacific Region Honolulu, HI
Environmental Protection Agency	Elizabeth Goldman, Physical Scientist	Region 9 San Francisco, CA

8 Federal Permits Required

Table 8-1 – Permit summary

Agency	Unit/Office	Statutory Authority
Papahānaumokuākea Marine National Monument	Permit Coordinator Honolulu	Monument Regulations (50 CFR Part 404.11)
U. S. Fish and Wildlife Service	Pacific Islands Fish and Wildlife Office Endangered Species Honolulu, HI	Endangered Species Act (ESA), Section 7
	Pacific Islands Fish and Wildlife Office Aquatic Ecosystem Conservation Program Honolulu, HI	Fish and Wildlife Coordination Act (FWCA) 2(b)
		Clean Water Act (CWA)
		Coral Reef Executive Order 13089
Region 1 Regional Archeologist Portland, OR	National Invasive Species Act	
National Oceanic and Atmospheric Administration	Pacific Islands Regional Office Habitat Conservation Division Honolulu, HI	National Historic Preservation Act (NHPA), Section 106
	Pacific Islands Regional Office Protected Resources Division Honolulu, HI	Essential Fish Habitat (EFH) provision of the Magnuson-Stevens Fishery Conservation and Management Act Fish and Wildlife Coordination Act Coral Reef, Executive Order 13089 Clean Water Act
	Office of Protected Resources Permits and Conservation Division	ESA Section 7
Department of the Army	U.S. Army Corps of Engineers Honolulu District Regulatory Office	Marine Mammal Protection Act (MMPA)
	Airports; Western Pacific Region Honolulu Airports District Office	Rivers and Harbors Act, Section 10 CWA Section 404
Federal Aviation Administration	Airports; Western Pacific Region Honolulu Airports District Office	Department of Transportation Section 4(f) – Paragraph 304b
Environmental Protection Agency	Region IX San Francisco	CWA Section 401 Water Quality Certification

APPENDIX A

DESCRIPTION OF PROPOSED ACTION

Seawall Long-Term Maintenance Project

**Henderson Field Airport
Midway Atoll National Wildlife Refuge/
Battle of Midway National Memorial**



U.S. FISH AND WILDLIFE SERVICE
Midway Atoll National Wildlife Refuge
AND

FEDERAL AVIATION ADMINISTRATION
Western Pacific Region

DECEMBER 2018

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1 Description of Proposed Action

The U.S. Fish and Wildlife Service (Service), Midway Atoll National Wildlife Refuge (Refuge), proposes to repair and replace sections of Sand Island’s approximately 5,720-foot south seawall as needed to protect Henderson Airfield and to control erosion along the southeast side of Sand Island. This description accompanies the Environmental Assessment (EA), which describes the purpose and need for the project as well as the action area, potential impacts, and proposed mitigation in detail.



Figure 1-1 – Project area

1.1 Site-Specific Implementation Planning and Timing

For regulatory permitting purposes, including a U. S. Army Corps of Engineers (USACE) Department of the Army Permit (issued pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act), the Service has established a ten-year planning period for these proposed repairs.

Repairs would take place on an annual cycle. To avoid impacts to breeding birds, construction would generally occur between mid-August and October of any given year, depending on consultations with Refuge staff and necessary agencies. Because repairs would be made on an as-needed basis, some years may have little to no active construction while other years may have multiple or larger repairs.

Project-specific repairs would be conducted following the annual implementation process outlined in Appendix B, Implementation Plan. The implementation process includes additional site-specific planning steps and environmental procedures that would take place before, during, and after each action. The Implementation Plan is organized into the seven overall implementation steps that each site-specific repair project would go through:

1. Design
2. Construction Material Acquisition
3. Shipping
4. Staging
5. Pre-Construction
6. Construction
7. Post-Construction

The plan lists (in table format) the specific environmental measures to be implemented during each step. The Service will use these tables as a checklist for each repair action conducted over the 10-year planning period, as established in the USACE permit.

Section 3, Repair-Specific Planning and Regulatory Review, describes the implementation process in more detail.

1.2 Project Area

The project area is divided into two areas. Area A is the approximately 2,350 linear-foot portion of the seawall that protects Henderson Airfield and the Runway Service Area (RSA). Area B is the eastern 3,370 linear feet of seawall that protects the fill area that creates the inner harbor.

1.3 Method of Repairs

The proposed action is to repair the breaches in the seawall by removing damaged sheet pile and replacing it with an armor rock revetment. The armor rock revetment method consists of placing large (2-foot square) rock over smaller rocks forming an interlocking, continuous sloping surface that dissipates and breaks wave energy.

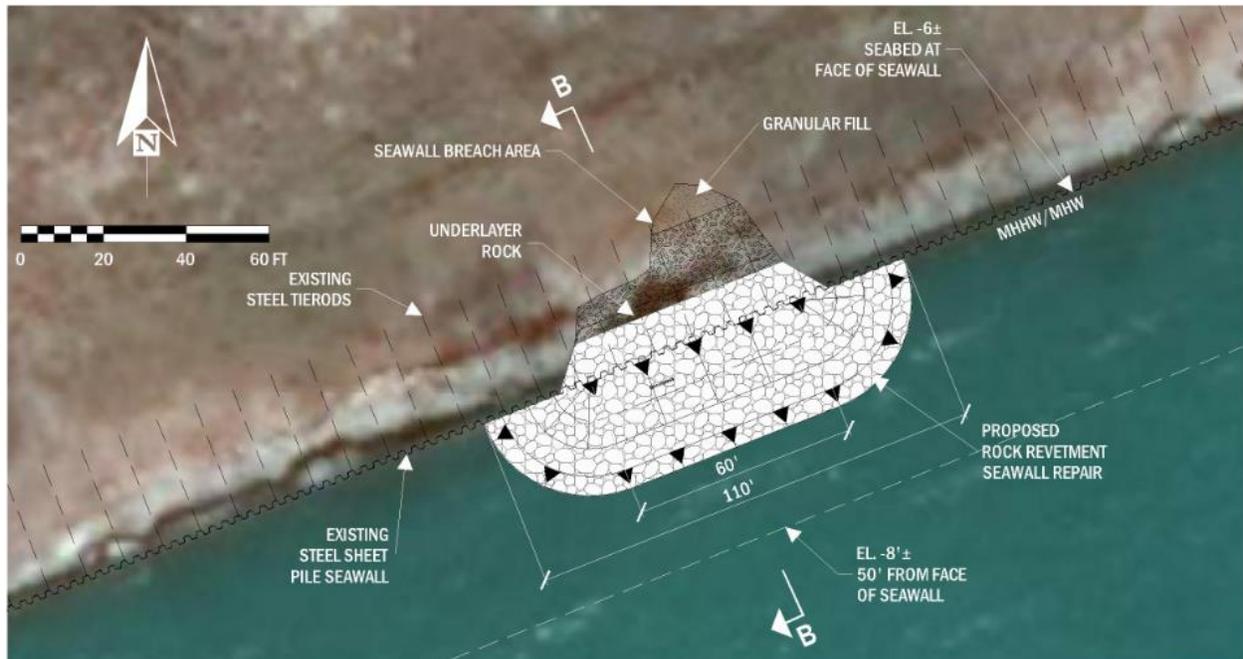


Figure 1-2 – Overhead view of typical rock revetment

Revetment repairs would require removal of the damaged section of sheet pile wall. The actual revetment would consist of large rocks placed over smaller rocks, forming an interlocking, continuous sloping surface that dissipates and breaks wave energy. Generally, rock revetment repairs would be constructed using the same methods and materials previously used to repair a breached section of the seawall in 2014, as described below.

Each revetment repair would consist of three layers:

- A toe would be “keyed in,” consisting of a shallow trench excavated to 1-foot depth and filled with granular fill. Geotextile fabric may be placed over the base layer and the entire footprint of the revetment to keep the finer materials in place.
- An approximately 2-foot-thick layer of under-layer medium-sized rock (about 150 pounds each) would be placed directly on the geotextile fabric.
- An approximately 4-foot-thick layer of larger armor rock (about 1,500 pounds each and roughly two feet square) would be placed over the medium-sized rock layer.

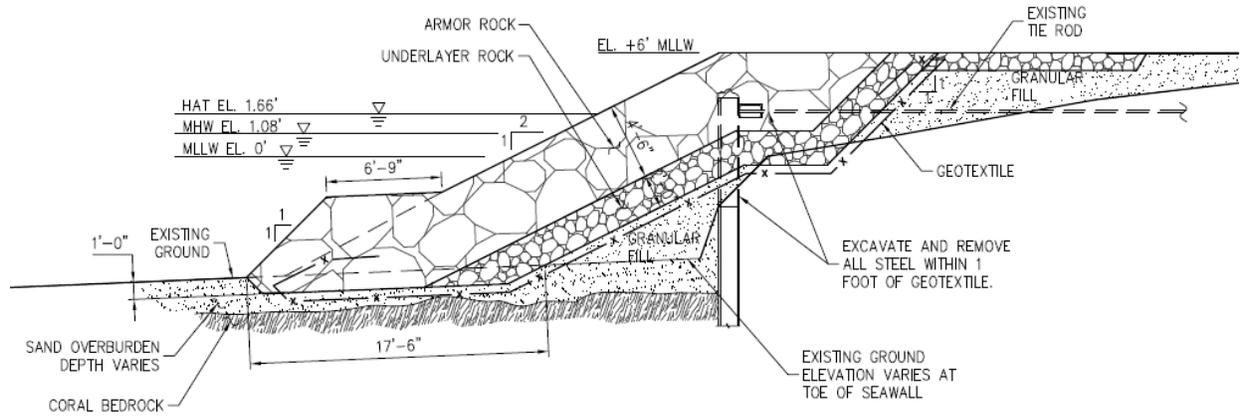


Figure 1-3 – Cross-Section View of Typical Rock Revetment

Each repair revetment would have a design-life of approximately 50 years, with some maintenance required approximately every 10 years or after major storm and tsunami events. Regular inspection of the wall would be conducted to evaluate the condition of both repaired and unrepaired sections.

1.4 Material Transport and Staging

Due to the remote location and lack of local resources, construction materials would be brought to the Refuge from existing quarries on the Pacific Coast, Alaska and/or Hawaii. As part of the proposed action, construction materials may be brought to the island well in advance of proposed repair actions to ensure that materials are on hand when needed. Shipments to the Refuge for the project would follow all pertinent Papahānaumokuākea Marine National Monument (Monument) best management practices (BMPs). Barges and auxiliary vessels would stage in Honolulu, HI to undergo required cleaning and eradication to prevent transport of invasive species. All vessels would comply with Vessel Monitoring System (VMS) protocols. Additional BMPs will be included in the Implementation Plan

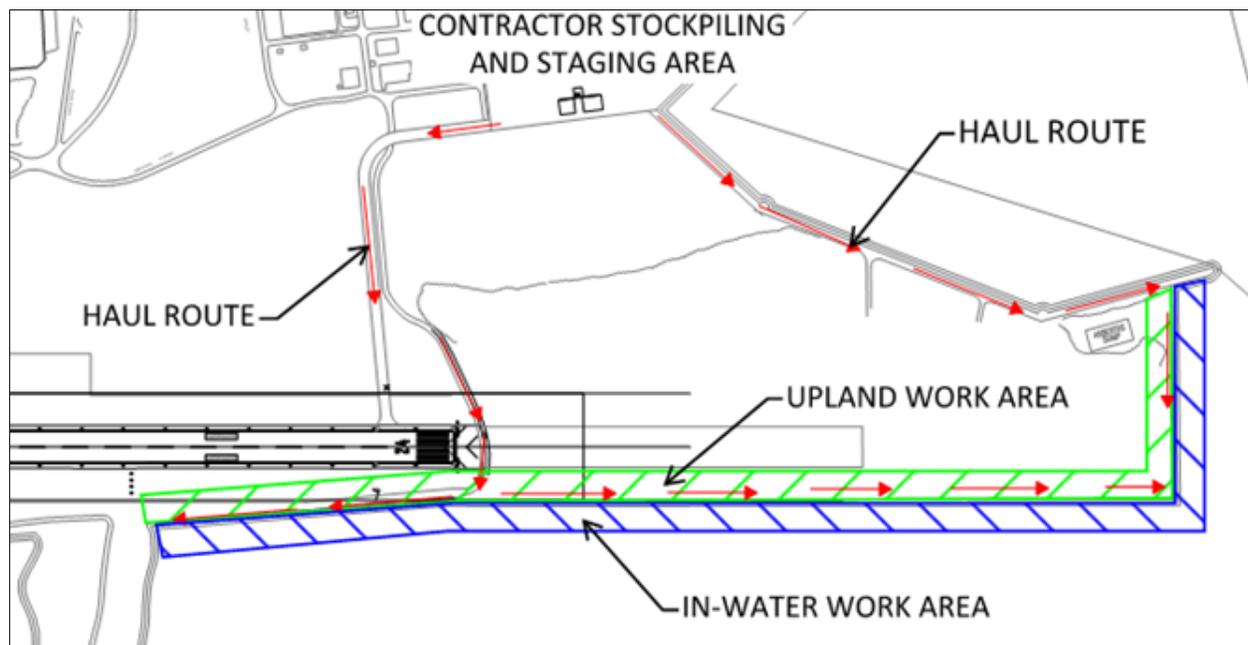


Figure 1-4 – Proposed staging area and haul route

Materials would be offloaded from the barge by excavator or front-end loader and moved by truck to a designated stockpile area near the work site via routes specified by Refuge staff. All stockpile areas would

be on existing paved surfaces. All haul routes would be on existing roads, runway access routes, or previously cleared/disturbed areas along the seawall.



Figure 1-5 – Armor Rock Revetment being installed at Sand Island in 2014

1.5 Construction Equipment

Repairs to the seawall would be made using conventional construction equipment such as backhoe loaders and excavators (Figure 1-5). Current plans are to utilize equipment already on the island; however, additional equipment may need to be barged for larger repairs. Equipment would access individual repair sites via the area upland of the existing seawall (Figure 1-4). There is sufficient access upland of the seawall, and no road construction or tree removal is proposed, although access routes may need to be cleared, stabilized, or repaired. Any such repairs would be described in the project-specific work plans the Service would prepare for each annual repair cycle.

1.6 Site Identification and Monitoring

Work would start with defining and marking specific staging, access, and work areas in coordination with Refuge staff. The site would be assessed to ensure that no new conditions have arisen and all appropriate pre-work mitigation measures have been implemented. Prior to and during work, designated personnel would monitor the site during project activities to ensure that mitigation measures are followed and to observe for the presence of protected species.

1.7 Installation and In-Water Work

A silt curtain would be installed sufficient to enclose debris and siltation generated during in-water construction. The Service would consult with the design-engineering consultant to determine the correct silt curtain for the project location and needs. The silt curtain would be installed during periods of low wave action using a Refuge boat located at Sand Island. The silt curtain would be removed during severe weather events to reduce the risk of damage.

Material placement would be performed entirely from onshore to minimize disturbance to the marine environment. Existing seawall structure and materials would be removed no more than to the extent shown

on Figure 1-3. When it is deemed feasible by the on-site engineer, existing rock, concrete rubble and sheet pile debris may be left in-place with new armor rock material being placed over it, rather than excavating to remove all remnants of the old seawall. Rock would be placed with a long reach excavator arm or crane bucket. Care will be taken to place the new armor material such that there is a minimum of three points of contact with other stones. All material will be placed to the lines and grades shown on Figure 1-3.

1.8 Demobilization

Following each repair, remains of the failed seawall and other obstructing debris would be transported to an existing disposal site on-island or barged off-island to an approved disposal location. Some rock, rubble, and/or sand currently available on-site may be reused as backfill. Demobilization would involve additional truck traffic to remove debris from the seawall area.

Any crew or equipment brought to the island solely to support the seawall repair would demobilize via typical Refuge protocols.

1.9 Duration

Construction duration would depend on the size of the repair, equipment available, and crew size. The 2014 repair, roughly 100 feet in length, required approximately one month to complete with on-island equipment and a crew of four.

2 Project Footprint

One of the reasons the Service is considering the entire seawall repair as the proposed action is to identify and disclose the cumulative effects of its actions over time. Therefore, under the proposed action, it is assumed that the Service would eventually replace the entire seawall. However, because repairs would be made only as needed, the exact amount of shoreline construction that would take place under the proposed action within the ten-year planning period cannot be predicted. Therefore, the Service has developed two construction scenarios for the ten-year planning period:

- (1) A maximum construction scenario; where the entire seawall would be rebuilt over the 10-year planning period. The maximum construction scenario is considered for the purposes of environmental permitting and National Environmental Policy Act (NEPA) compliance. Agencies with jurisdiction will consider the maximum construction scenario as the reasonably foreseeable outcome for the purposes of issuing permits; and
- (2) The likely construction scenario; where less than 1,000 feet of shoreline would be rebuilt. The likely construction scenario defines the expected outcome of the proposed repair program. This scenario takes into account that repairs may not be needed and funds may not be available to make repairs, particularly in areas where the seawall is not needed to protect Henderson Airfield.

2.1 Maximum Construction Scenario

Under the maximum construction scenario, the Service would repair the entire seawall, approximately 5,720 linear feet, over the ten-year planning period. Removed materials would include the existing sheet piles and any debris discovered near the seawall or previously incorporated into its fill. Replacing the entire seawall with a rock revetment would result in a total cumulative footprint of 6.89 acres (300,000 square feet) within marine waters. The tables below describe the impacts of the maximum construction scenario.

Table 2-1 – Maximum construction scenario total removal dimensions

DESCRIPTION	REMOVAL DIMENSIONS				DURATION OF IMPACT
	LENGTH (FT.)	WIDTH (FT.)	AREA (SQ. FT. OR AC.)	VOLUME (C.Y.)	
Total Removed Materials	5,720	N/A	N/A	N/A (Cannot be assessed at this time)	1 month

Table 2-2 – Maximum construction scenario total and incremental fill dimensions

DESCRIPTION	FILL DIMENSIONS				DURATION OF IMPACT
	LENGTH (FT.)	WIDTH (FT.)	AREA (SQ. FT. OR AC.)	VOLUME (C.Y.)	
Total Project Materials	5,720	50	6.89 acres	115,000	Designed for 50 yrs.
Armor Rock				100,000	
Underlayer Rock				8,500	
Granular Fill				6,500	
Fill Below High Tide Line	5,720	50	6.63 acres	101,100	Designed for 50 yrs.
Armor Rock				87,000	
Underlayer Rock				7,600	
Granular Fill				6,500	
Fill Below Mean High Water	5,720	50	6.27 acres	77,800	Designed for 50 yrs.
Armor Rock				65,000	
Underlayer Rock				6,300	
Granular Fill				6,500	

2.2 Likely Construction Scenario

Repairs would be made as needed to protect Refuge resources, with particular emphasis on protecting the Henderson Airfield and the RSA (Area A). The Service would likely only repair 1,000 linear feet of seawall within the ten-year period. This assumes the Service would construct rock revetment repairs similar to the 2014 repair for each repair of the ten-year planning horizon. The anticipated repair scenario would result in a total footprint of approximately 1.15 acres (50,100 square feet). Incremental volumes of materials would be similarly reduced under the likely construction scenario. If additional funds become available, additional repairs could be completed.

3 Repair-Specific Planning and Regulatory Review

The following sections describe the process the Service would follow to complete specific repairs under the proposed 10-year seawall maintenance program.

3.1 Notices to Agencies with Jurisdiction

Prior to initiating any repair work, the Service would notify all agencies with jurisdiction to request comments and to ensure compliance with permit requirements. In addition, the Service would make a determination if any “significant new circumstances or information” had arisen, as described Section 3.2.

3.2 Significant New Circumstances or Information Criteria

Under NEPA, a federal agency has a continuing duty to ensure that new information about the environmental impact of its proposed actions is taken into account, and that the NEPA review is supplemented when significant new circumstances or information arise that are relevant to environmental concerns and bear on the proposed action or its impacts. [40 CFR 1502.9(c)].

For this review, significant new information is considered to include:

- (1) An increase in scope or scale of repairs or change in construction methods, including any increase in proposed amounts of fill into marine waters;
- (2) New species listing or designated critical habitat within the project vicinity;
- (3) Discovery of any significant natural resources not previously identified, such as cultural artifacts or endangered species use; and
- (4) Other development or previously unknown facts regarding potentially significant adverse impacts of repairs.

The Implementation Plan (discussed in the next section) outlines how the Service, in cooperation with the Federal Aviation Administration (FAA) and USACE, would consider new information and circumstances when planning repairs.

3.3 Implementation Plan

The intent of this programmatic assessment of the planned yearly repair effort is to make as many decisions that can be made strategically for the entire program now, rather than making these decisions incrementally. Some of the most important decisions that can be made now are those associated with environmental regulations, permits and associated BMPs.

Toward this end, the Service has developed an implementation plan under which all proposed repairs would be conducted. The plan would be amended, as needed, to include any additional measures established through ongoing consultations and permitting, including those recommended by USACE. The Implementation Plan follows this description as Appendix B to the Environmental Assessment.

3.4 Mitigation

Previous permitting efforts of seawall repairs required the completion of a coral transplantation project in order to mitigate for unavoidable impacts. The success of previous and future transplantation project would be analyzed by the Service during surveys of the site. Pending these analyses and consultations with Pacific Islands Fish and Wildlife Office (PIFWO) and National Oceanic and Atmospheric Administration (NOAA) Fisheries, additional mitigation measures may be incorporated into the project.

3.4.1 Coral Translocation

The Habitat Conservation Division of NOAA Fisheries recommended via letter on October 9, 2013, that the Service relocate coral and macroinvertebrates that would be damaged by the project footprint prior to construction. The Service is developing a plan for coral translocation and monitoring.

3.4.2 Additional Mitigation

Macroinvertebrates and fish found within the project area during the pre-construction survey for corals will also be removed & relocated outside of the project footprint, or chased away by divers to prevent injury during construction.

APPENDIX B IMPLEMENTATION PLAN

**Seawall Long-Term Maintenance Program
Henderson Field Airport
Midway Atoll National Wildlife Refuge/
Battle of Midway National Memorial**

DECEMBER 2018

US FISH AND WILDLIFE SERVICE
Midway Island National Wildlife Refuge
AND

FEDERAL AVIATION ADMINISTRATION
Western-Pacific Region



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INTRODUCTION

This plan specifies measures the Service will implement to mitigate impacts from maintenance and repair of the failing seawall at Midway Atoll National Wildlife Refuge (NWR). Multiple federal agencies and departments have regulatory jurisdiction over the seawall repairs. This plan provides a single, unified list of all environmental protection measures recommended, required, and approved by all agencies with jurisdiction, as identified in the following table.

AGENCY/DEPARTMENT	JURISDICTION
FWS, MIDWAY ATOLL NWR	Lead NEPA agency
FAA, WESTERN PACIFIC REGION	Co-Lead NEPA agency
USACE, HONOLULU DISTRICT, REGULATORY OFFICE	Rivers and Harbors Act, Section 10 Clean Water Act (CWA), Section 404
PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT (PMNM)	Monument Regulations (50 CFR Part 404.11)
FWS, PIFWO AQUATIC ECOSYSTEM CONSERVATION	Fish and Wildlife Coordination Act
FWS, PIFWO ENDANGERED SPECIES PROGRAM	Endangered Species Act, Section 7
NOAA, PIRO, PROTECTED RESOURCES DIVISION	Endangered Species Act, Section 7, Marine Mammal Protection Act
NOAA, PIRO, HABITAT CONSERVATION DIVISION	Magnuson-Stevens Fishery Conservation and Management Act, Essential Fish Habitat (EFH)
EPA, REGION IX	Clean Water Act, Section 401

SOURCES OF ENVIRONMENTAL MEASURES

The measures listed in this plan have been developed based on the analysis in the EA and on consultations with the jurisdictional agencies. Many of the measures are based environmental review and permitting for repairs the Service completed in 2014 (FWS and FAA 2013). The 2014 armor rock revetment was typical of the types of repairs that the Service would continue as part of its seawall repair and maintenance program. Measures identified during this process and 2016 - 2018 consultations have been incorporated as fully as possible, but additional measures may need to be added as consultations progress.

All project staff should be familiar with the protocols and Best management practices (BMPs) summarized in this Implementation Plan. Project staff should be notified as additional measures are identified or recommended through consultation.

MEASURES ORGANIZED BY IMPLEMENTATION STEPS

Environmental protection measures have been organized into the seven overall implementation steps identified during the EA preparation for the seawall maintenance program:

1. Design
2. Construction Material Acquisition
3. Shipping
4. Staging
5. Pre-Construction
6. Construction
7. Post-Construction

This plan lists (in table format) the specific environmental measures to be implemented during each step. The Service will use these tables as a checklist for each repair action conducted over the 10-year planning period, as established in the USACE permit.

The tables organize “Measures” for each stage of the project. Each Measure is identified with an “ID” for future reference. The “source” field refers to the originating document for each measure by abbreviated form. They are as follows:

ABBREVIATED REFERENCE	SOURCE
FWCA 2013	Final FWCA 2(b) Report for the Henderson Airfield Breach Repair, Midway Atoll NWR. September 27, 2013
ESA 2013	Letter of Concurrence from NOAA PIRO dated September 25, 2013 in response to Request for Consultation dated August 19, 2013.
HAWAII SHPO	Response dated December 11, 2015 to FWS Section 106 request for consultation dated October 29, 2015.
CATEX 2013	May 13, 2014 extension of USACE Permit File Number POH-2013-00173. Originally authorized October 11, 2013.
PMNM BMP	PNMN Standard BMPs as referenced at http://www.papahānaumokuākea.gov/permit/bestmanagement.html
PMNM 2016	Memo-to-File dated August 22, 2016 permitting Henderson Field Runway Safety Area Seawall Repairs [2016-2020] pursuant to the Co-Trustee PMNM Permit.
2016 EA	Environmental Assessment to which this Implementation Plan is an Appendix. Includes suggested measures identified during project NEPA review.
ESA 2018	Letter of Concurrence from NOAA PIRO dated January 12, 2018 in response to Request for Consultation dated May 17, 2017.

Explanation of table headers:

- *Measure*: Mitigation measure or BMP
- *ID*: Identifier for ease of reference

- *Source*: Source document or regulatory agency recommending measure.
- *Description*: Description of mitigation measure
- *Responsible Agency/Person*: Actor responsible to ensure measure is carried out
- *Required Action*: Description of mitigation measure

PLANNING PROCESS

The Service will conduct repairs as sections of the seawall fails over the ten-year planning period (2016-2026). Because specific locations and extent of repairs needed along the approximately 1-mile long seawall are unknown, the Service established an implementation process that begins when a new failed section of seawall is discovered. This process includes four main phases:

1. Assess the situation, where the Service will determine the extent of needed repairs and whether any “significant new circumstance or information” requires additional environmental review, revised permits, or environmental measures.
2. Design, where the Service will determine appropriate designs for repair and notify jurisdictional agencies.
3. Implement, where the Service will fund and issue contracts for construction. This phase contains the construction steps and associated environmental measures contained in this plan.
4. Learn/Improve where the Service will identify any “lesson learned” and revise this Implementation Plan, as needed.

The chart on the following page illustrates the seawall repair implementation process and indicates the steps that include the environmental measures identified in this plan. As shown on the chart, the Service will document each of the four main phases in a NEPA administrative record it will maintain for its actions related to the seawall maintenance and repairs.

DESIGNED ENVIRONMENTAL MEASURES

Avoidance is the first and preferred step to mitigate environmental impacts (per Council of Environmental Quality (CEQ) regulations, 40 CFR 1508.20).

For the seawall maintenance program, the Service will avoid impacts on the marine environment by minimizing the project footprint and by conducting all work from land, rather than from barges and vessels. Table 1 provides the specific environmental measures that will be included in each repair design.



Land-based construction during 2014 repair

TABLE 1. ENVIRONMENTAL MEASURES FOR ENGINEERING DESIGN						
MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
MINIMIZE FOOTPRINT	D-1	CatEx 2013, FWCA 2013	Minimize project footprint and in-water work to protect the marine environment.	Design team	Conducted as part of design	
MINIMIZE DISTURBANCE	D-2	CatEx 2013	Construction will be conducted entirely from land-based equipment to minimize disturbance of the marine environment. A barge will not be present at the project site in order to avoid further disturbance to marine species.			
	D-3		Pile installation was eliminated from the design in order to avoid noise impacts to wildlife, including fish, marine mammals, sea turtles and birds			

CONSTRUCTION MATERIAL AND INVASIVE SPECIES

Due to the critical need to prevent the introduction of invasive species, rock used to repair the seawall needs to be clean. The Service will specify the requirements listed in Table 2 as part of contracts issued for all seawall repairs.



Protocols prevent reintroduction of invasive species such as *Verbena encelioides*, or golden crownbeard

TABLE 2. ENVIRONMENTAL MEASURES FOR CONSTRUCTION MATERIALS

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
REPORTING	M-1	CatEx 2013, ESA 2018	Contractor ¹ shall provide the Refuge with information of types and quantities of materials being imported and location of obtaining these materials to Service staff prior to departure from Honolulu.	Contractor	Notify refuge	
SOURCING	M-2		Contractor will source armor rocks directly from a quarry that is free from insects and seeds. If this is not possible, the contractor will pressure wash armor rocks on a concrete surface prior to loading them onto the barges.			
STORAGE	M-3		Contractor will limit the amount of time that rocks are stored before being shipped. Contractor will ensure that materials, rocks, aggregate, etc. are packed and stored on clean concrete/asphalt.			
STEAM CLEANING	M-4		Before leaving Honolulu, Contractor will steam clean or pressure wash all machinery, equipment, shipping containers, vessel decks and holds, and all water-resistant construction materials to ensure the removal of all dirt, insects, and seeds.			

¹ Refers to entire construction team, including contractor and any subcontractors

SHIPPING AND INVASIVE SPECIES

Shipping issues relate primarily to invasive species, which is a major concern at Midway Atoll and throughout the larger Papahānaumokuākea Marine National Monument. The Management Monument permit required for the seawall maintenance program includes several requirements for ensuring ships do not transport invasive species into the monument.

Table 3 lists these measures as well as similar measures identified by the USACE of Engineers as part of its Nationwide Permit issued for the 2014 repair.



Rock used for repairs would be barged to the Refuge, likely from existing sources in Hawaii or Alaska.

TABLE 3. SHIPPING ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
PREVENTION	SH-1	CatEx 2013,	Contractor will develop and implement a program to insure that non-native species have been eradicated from imported materials prior to offloading at the refuge.	Contractor		
	SH-2	CatEx 2013, ESA 2018	Contractor will develop and implement a construction-worker education program that informs workers of the damage that can be done by unwanted introductions of non-native species.	Contractor		
	SH-3	PMNM BMP	Contractor will follow Marine Alien Species Inspection Standards for Maritime Vessels (PMNM BMP #001)	Contractor		

TABLE 3. SHIPPING ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
ADVANCE NOTICE	SH-4	CatEx 2013, PMNM 2016	The Service’s Honolulu POC must be notified two days prior to departure of shipments from Honolulu. All personnel must be identified and information provided to PMNM permit coordinators prior to each entry into the Monument. PMNM Compliance Information Sheet	Contractor and Refuge Manager	Document notification for administrative record	
SCHEDULING	SH-5	PMNM 2016	Up to two deployments [up to 20 days each] per year may be made to deliver specialized heavy equipment and gear to support the project, and to resupply the project and Refuge within dates approved by the Refuge Manager for each project year.	Contractor and Refuge Manager		
RODENT CONTROL	SH-6	CatEx 2013, PMNM 2016, ESA 2018	Shipping containers must have a rat station inside with a baited sticky trap. Cargo inside containers shall be fumigated with a bug bomb. Vessels must be inspected for rats and have a “rat-free certification.” The contractor must install rat guards on vessel and barge lines at Midway Island to prevent rodents from reaching land.	Contractor	Document De-Rat Certification for administrative record	
	SH-7	ESA 2018	Refuge personnel will place rodent bait stations and traps containing rodenticide on the boat and barge decks, around the dock, and in areas where shipping containers are stored on the island.	Refuge Manager		
INSPECTION	SH-8	FWCA 2013, CatEx 2013, and PMNM 2016, ESA 2018	The Service’s Honolulu POC must be notified two days prior to departure of shipments from Honolulu in order to complete an inspection of all cargo, equipment, construction materials, and vessels for satisfaction of conditions, including absence of invasive species. Any vessel found to have a fouled hull will be required to have the entire hull cleared and re-inspected.	Contractor and Service’s Honolulu POC	Document results of hull inspections to administrative record	
	SH-9	ESA 2018	Additional inspection, except for hull invasive species, shall be conducted upon arrival at the Refuge. In the event of a failure to pass inspection, the vessel shall not be allowed to leave for or unload cargo at the Refuge. Specimen of non-native species that are found by these inspections would be collected and destroyed. Containers that are too heavily infested to permit complete cleaning would be returned undelivered.	Contractor and Refuge Manager		

TABLE 3. SHIPPING ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
ANIMAL AVOIDANCE	SH-10	NMFS Viewing Guide-lines	Remain at least 100 yards from humpback whales, and at least 50 yards from other marine mammals (dolphins, other whale species, and Hawaiian monk seals).	Contractor		
	SH-11		Marine mammals and sea turtles should not be encircled or trapped between boats or shore.			
	SH-12		If approached by a marine mammal or turtle while on a boat, put the engine in neutral and allow the animal to pass. Boat movement should be from the rear of the animal.			
VESSEL OPERATIONS	SH-13	PMNM 2016, ESA 2018	Vessels will be anchored on sandy substrate only, and all anchors must be lowered into place	Contractor		
	SH-14		Gray water may only be discharged outside of all Special Preservation Areas and the Midway Atoll Special Management Area. Biodegradable solid waste associated with galley operations may only be discharged 3 nautical miles (if ground to 1 inch in diameter) or 12 nautical miles (if unground) outside of all Special Preservation Areas and the Midway Atoll Special Management Area.			
VESSEL TRACKING	SH-15	PMNM 2016, CatEx 2013	Vessels must have a Vessel Management System (VMS) device as they travel through the Monument. This system will be verified by NOAA Office of Law Enforcement (OLE)	Contractor	Document VMS Verification by NOAA OLE	
ARRIVAL	SH-16	PMNM 2016, CatEx 2013	All personnel will receive PMNM Pre-Access Briefings, and the Midway Atoll NWR and Battle of Midway National Memorial Briefings before commencing work on the project	Refuge Manager	Document PMNM Pre-Access Briefings	
	SH-17		Upon arrival to the Sand Island, shipping contractor shall submit documentation to the Service to support that all shipping environmental measures requirements have been met.	Contractor and Refuge Manager		

TABLE 3. SHIPPING ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
BALLAST WATER	SH-18	PMNM 2016, ESA 2018	Barges may utilize ballast water within the Midway Harbor, and discharge this water in the same location, in order to manipulate the trim and stability of the barge to execute offloading and loading of cargo, equipment, and supplies. The activity must be approved by the PMNM hull inspector. Ballast water will not be discharged within any Special Preservation Areas or the Midway Atoll Special Management Area.	Contractor		
RETURN SHIPMENT	SH-19	PMNM 2016	Each deployment above may include returning household trash, recycling materials, collected marine debris, hazmat waste, and other industrial waste to Honolulu, Hawaii or other designated areas within the United States.	Contractor and Refuge Manager		

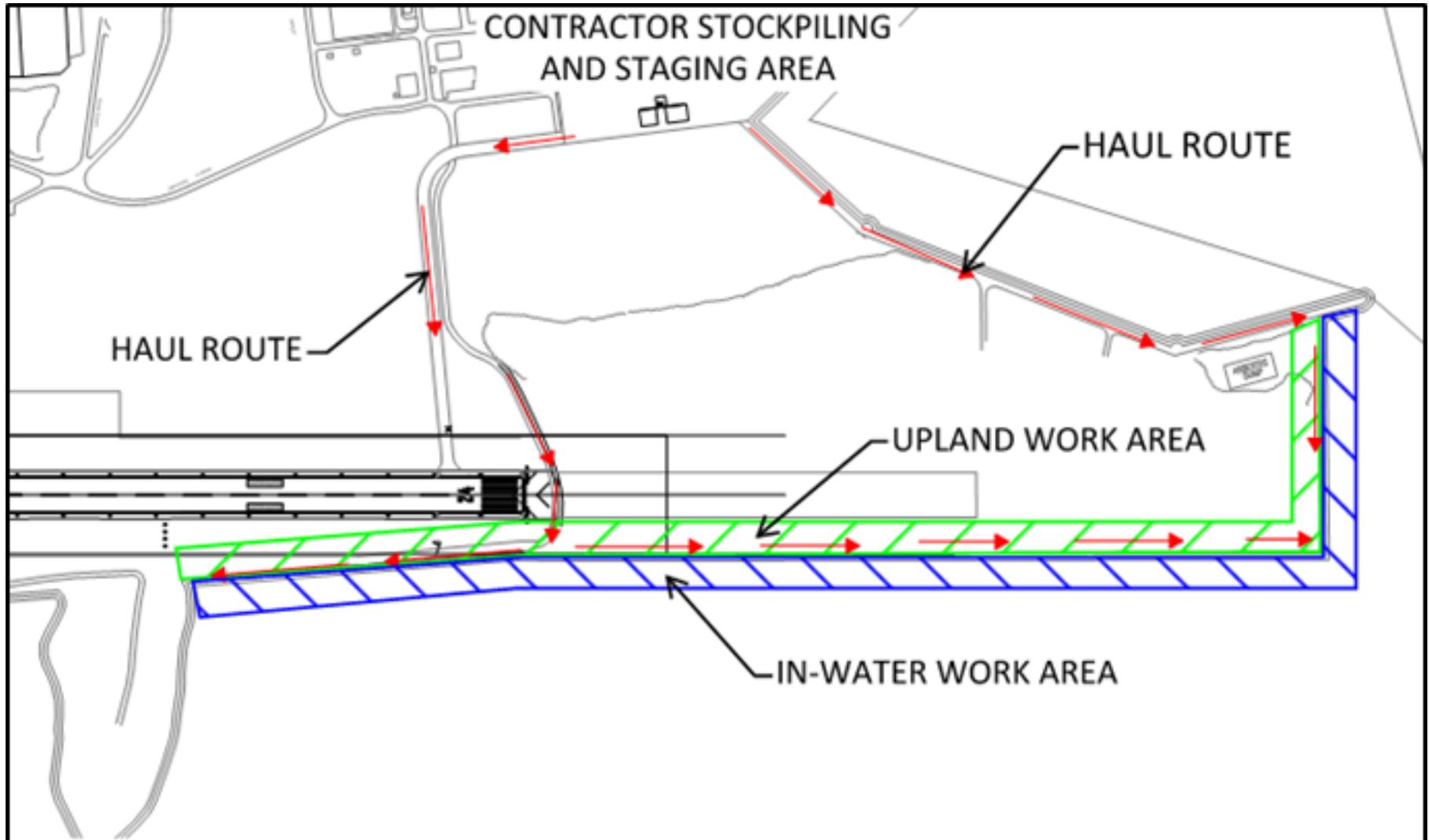
STAGING

Construction materials may require storage on Sand Island for several weeks or even months prior to construction, depending on construction windows established to protect birds and on the logistics of getting materials and crews to the island. If barged early, the rock and other construction materials would be loaded onto trucks and

driven to a temporary stockpile area void of any environmental concerns, as confirmed and approved by Refuge staff.

TABLE 5. STAGING ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
WORK WINDOW	SP-1	FWCA 2013, PMNM 2016, ESA 2018	Transport of construction materials across the island and project construction shall avoid the Hawaiian seabird nesting season, with the peak at approximately mid- November to mid-December.	Contractor and Refuge Manager		
STOCKPILING	SP-2	CatEx 2013, ESA 2018	Stockpiling of materials will occur only in the authorized stockpile location on existing paved surfaces. Transportation of materials to and from stockpiles will occur on existing travels roads and runway access routes.	Contractor and Refuge Manager		
	SP-3	NMFS ESA 2017	Construction-related materials should be placed or stored in ways to avoid or minimize disturbance to marine resources.	Contractor and Refuge Manager		
ANIMAL AVOIDANCE	SP-4	CatEx 2013, ESA 2018	Prior to construction or material stockpiling, any sensitive areas near sites would be clearly marked to contain disturbance areas to the minimum amount needed to work safely.	Refuge Manager		
	SP-5	FWCA 2013, ESA 2018	If there are protected species in the area prior to performing any component of the permitted activity, that activity should not commence until the animal(s) voluntarily departs the area. If the protected species enters the area when that activity is already underway, that activity should cease until the animal voluntarily departs the area	Construction Monitor		
	SP-6	ESA 2018	Contractors and project participants will not approach or feed Laysan ducks	Contractor and Refuge Manager		



Proposed staging area and haul route

PRE-CONSTRUCTION

Several measures will be taken prior to construction to identify and protect sensitive biological resources, including biological surveys, coral translocation, and environmental training for construction crews.



Coral translocation efforts prior to 2014 repairs

TABLE 5. PRE-CONSTRUCTION ENVIRONMENTAL MEASURES						
MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
LOGISTICS	PRE-1	PMNM 2016	Personnel approved by the Refuge Manager may access the Refuge via Service-chartered aircraft and complete the project directly on the refuge between August 1 and October 30.	Contractor and Refuge Manager		
CREW TRAINING	PRE-2	ESA 2013, ESA 2018	All personnel will receive PMNM Pre-Access Briefings, and the Midway Atoll NWR and Battle of Midway National Memorial Briefings before commencing work on the project.	Refuge Manager	Conduct and document PMNM Pre-Access Briefings	
	PRE-3	PMNM BMP, ESA 2018	All project staff should be familiar with Precautions for Minimizing Human Impacts on Endangered Land Birds (PMNM BMP #012) or receive sufficient briefing to comply with its requirements, which generally consist of housekeeping BMPs that prevent bird mortality.	Refuge Manager		
	PRE-4	PMNM BMP, ESA 2018	All project staff should be familiar with Human Hazards to Seabirds in Papahānaumokuākea Marine National Monument (PMNM BMP #003) or receive sufficient briefing to comply with its requirements.	Refuge Manager		

TABLE 5. PRE-CONSTRUCTION ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
	PRE-5	PMNM 2016, ESA 2018	All project staff will be informed of the potential presence of protected species and be given species information by the biological monitor.	Refuge Manager		
PRE-CONSTRUCTION SURVEYS	PRE-6	NMFS ESA 2017	Prior to specific repairs, surveys would be performed of all areas contained within the proposed project area for the presence/absence of corals, seals, turtles and marine mammals, as well as habitat suitability for these species (for potential relocation). Survey results would be considered valid for three years.	Refuge Manager	Document in administrative record	
	PRE-7	2016 EA	Prior to construction or material stockpiling, any sensitive areas near sites would be clearly marked to contain disturbance areas to the minimum amount needed to work safely.			
	PRE-8	2016 EA, ESA 2018	The site would be assessed to ensure that no new conditions have arisen and all appropriate pre-work mitigation measures have been implemented			
CORAL RELOCATION	PRE-9	NMFS ESA 2017	Relocate, prior to the start of construction, the coral and macroinvertebrates present within the project area that would be damaged by construction (both in the direct fill footprint and adjacent to this, if appropriate) to an area that would not be disturbed (i.e., not alongside unrepaired sections of the seawall or other areas likely to be disturbed at some point in the future).	Refuge Manager		
	PRE-10	PMNM BMP	Coral team will follow General Storage and Transport Protocols for Collected Samples (PMNM BMP #006)	Refuge Manager		
	PRE-11	PMNM BMP	Coral team will follow Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment Pāpāhānaumokuākea Marine National Monument (PMNM BMP #011) for specific protocols for the proper management of coral sampling equipment, coral samples, and dive equipment.	Refuge Manager		

TABLE 5. PRE-CONSTRUCTION ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
INVASIVE SPECIES	PRE-12	CatEx 2013, ESA 2018	All personnel entering the Refuge must comply with the general rules for alien species control to minimize the risk of alien species introductions to the Refuge. All personnel shall ensure that boots, clothing and personal effects are free of dirt, seeds, and insects.	Refuge Manager		
	PRE-13	PMNM BMP, ESA 2018	All project staff will be familiar with the requirements of Special Conditions & Rules For Moving Between Islands & Atolls And Packing For Field Camps (PMNM BMP #007) prior to entering the Monument.	Refuge Manager		
	PRE-14	PMNM BMP	Contractor will follow Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment PMNM	Contractor		
SPILL PREVENTION, CONTROL AND COUNTERMEASURES	PRE-15	FWCA 2013, ESA 2018	A plan to control the accidental spills of petroleum products at the construction site shall be developed. Absorbent pads and containment booms will be stored on-site to facilitate the cleanup of petroleum spills.	Refuge Manager	Prepare hazardous materials/contingency plan	
	PRE-16	NMFS ESA 2017	All construction-related materials and equipment to be placed in the water should be cleaned of pollutants prior to use. When in service, if pollutants are found to be leaking from any equipment, that piece of equipment should be removed from service until the cause of the leak has been fixed.	Contractor		
HAZARDOUS MATERIALS	PRE-17	2016 EA, ESA 2018	A plan to respond to previously unknown hazardous materials discovered during construction shall be developed. The plan shall include specific chain of communication and steps to contain and/or remove and dispose of hazardous materials.	Refuge Manager	Prepare hazardous materials/contingency plan	
	PRE-18	2016 EA, ESA 2018	Construction crews shall include members trained/experience in hazardous waste identification to monitor all disturbed areas for the potential of contaminated soils or other hazardous materials. Monitors shall immediately notify Refuge staff of any suspected hazardous materials, who shall then implement hazardous material plan.	Contractor		

TABLE 5. PRE-CONSTRUCTION ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
	PRE-19	2016 EA, ESA 2018	Coordinate with U.S. Navy explosives experts to determine appropriate steps needed to avoid unintended disturbance of unexploded ordnance (UXO's).	Refuge Manager		

CONSTRUCTION

The majority of environmental measures would take place during each specific construction effort. Construction environmental measures would be directed by Refuge staff or their designated representatives.



TABLE 6. CONSTRUCTION ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
CLOSED AREAS	C-1	ESA 2013, ESA 2018	The southern and western beaches on Sand Island as well as the beaches on Spit and Eastern Island will be closed to all contractor personnel. Closed beaches will be avoided at all times.	Contractor		
SUPERVISION AND CREW TRAINING	C-2	EA 2016, ESA 2018	Prior to and during work, designated personnel (biological monitor) will monitor the site during project activities to ensure that mitigation measures are followed and to observe for the presence of protected species.	Contractor and Refuge Manager	Document in monitoring report	

TABLE 6. CONSTRUCTION ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
	C-3	PMNM BMP, ESA 2018	<p>Contractor and staff will comply with the following BMPs:</p> <ul style="list-style-type: none"> • Nonnative Species Inspection Requirements at Midway Atoll (PMNM BMP #015). • Human Hazards to Seabirds Briefing (PMNM BMP #003) • Boat Operations and Diving Activities (PMNM BMP #004) • Marine Wildlife Viewing Guidelines (PMNM BMP #010) • Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment (PMNM BMP #011) • Precautions for Minimizing Human Impacts on Endangered Land Birds (PMNM BMP #012) 	Contractor and Refuge staff.		
CULTURAL DISCOVERIES	C-4	Hawaii State Historic Preservation Division	In the event that historic resources – including human skeletal remains, cultural layers, cultural deposits, features, and artifacts – are identified during construction activities, all work should cease in the immediate vicinity of the find, the find should be protected from additional disturbance, and the Service Regional Archaeologist shall be notified immediately.	Contractor and Refuge Manager		
DEBRIS DISPOSAL	C-5	CatEx 2013, FWCA 2013, ESA 2018	All manmade construction debris or debris removed from the seawall will be collected and not allowed to enter waters of the U.S. All debris removed from the seawall construction site will be disposed of at an approved upland site. Any project-related debris trash, or equipment will be removed from the beach or dune if not actively being used.	Contractor and Refuge Manager		
ENTRAPMENT PREVENTION	C-6	FWCA 2013, ESA 2018	Armor rocks and fill materials shall be placed in a manner that will not pose an entrapment hazard to fish and wildlife.	Contractor and Refuge Manager		
	C-7	ESA 2013, ESA 2018	At the end of each day of work at the seawall repair site, the biological monitor will inspect the area to determine if it may pose a hazard for seals or turtles to be trapped and the monitor will direct project staff to alter armor rocks to ensure no entrapment can occur.	Contractor and Refuge Manager		

TABLE 6. CONSTRUCTION ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
	C-8	CatEx 2013	As the silt containment boom (curtain) is deployed, and prior to closing it off, protocol will be followed to prevent entrapment of significant animal species within the boom.	Contractor and Construction Monitor		
INSPECTION	C-9	CatEx 2013, ESA 2018	All equipment shall be checked daily for leaks and any necessary repairs made prior to commencement of work.	Contractor		
LIGHTING	C-10	CatEx 2013, ESA 2018	Artificial nighttime lighting will not be employed in order to avoid disorientating seabirds.	Contractor		
	C-11	PMNM BMP, ESA 2018	Contractor will comply with: Minimizing the Impact of Artificial Light on Sea Turtles (PMNM BMP #009) . To avoid project impacts to sea turtles from lighting, no construction activities will occur at night.	Contractor and Construction Monitor		
SHUTDOWNS	C-12	ESA 2013, FWCA 2013	A biological monitor will be on-site during all work activities and will conduct pre-work surveys to determine the presence of species of concern in the seawall repair area. Work will not commence until the monitor confirms to the construction foreman that all sensitive species have left the area of their own accord. The biological monitor will have the authority and responsibility to shut down disturbance-causing construction activities if a protected species is present within 150 feet of the seawall repair area.	Contractor and Construction Monitor		

TABLE 6. CONSTRUCTION ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
SILT CONTAINMENT	C-13	CatEx 2013, FWCA 2013, ESA 2018	A silt curtain will be deployed prior to placing fill in the water and during removal of sheet pile to contain turbidity and siltation. The Service will consult with the design-engineering consultant to determine the correct silt curtain for the project location and needs. The silt curtain would be installed during periods of low wave action using a Refuge boat located at Sand Island. The silt curtain would be removed during severe weather events to reduce the risk of damage. Refer to measure C-8 and C-27 for additional measures regarding silt curtain management.	Contractor and Construction Monitor		
SPILL PREVENTION, CONTROL AND COUNTERMEASURES PLAN	C-26	FWCA 2013, CatEx 2013, ESA 2018	Fueling of construction related equipment shall occur away from the seawall construction site at a designated location with the ability to handle and accidental spill on Sand Island.	Contractor and Construction Monitor		
	C-27	FWCA 2013, ESA 2018	All construction-related materials and equipment (e.g., silt curtains, dredges, barges, pilings, cranes, etc.) to be placed in the water shall be cleaned of pollutants prior to use.	Contractor and Construction Monitor		
	C-28	CatEx 2013, ESA 2018	Contractor will follow protocol in the existing Spill Prevention, Control and Countermeasures Plan for FWS, prepared in 2004 and last updated in 2009 (GeoEngineers, Inc).	Contractor and Construction Monitor		
	C-29	NMFS ESA 2017	If debris or spill material accidentally enters the waterway, immediate actions would be taken to remove the material and proper entities notified.			
STOCKPILING	C-30	CatEx 2013	No construction material will be stockpiled in the marine environment.	Contractor and Construction Monitor		

TABLE 6. CONSTRUCTION ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
WORK WINDOW	C-31	CatEx 2013, ESA 2018	Construction will only occur during agency allowed work windows relative to protected species.	Contractor and Construction Monitor		
	C-32	PMNM Permit 2016, ESA 2018	Contractors and subcontractors will be approved by the Refuge Manager to access and complete the project directly on the refuge between August 1 and October 30.	Contractor and Construction Monitor		

POST-CONSTRUCTION

Post-construction follow-up is an important element of the overall environmental measures strategy for the seawall maintenance program, which includes post-construction reviews to support learning and continual improvement. Through this work, the Service will gain valuable lessons learned and be able to implement changes as needed to ensure that environmental measures goals are met.



A coral transplanted as part of the 2014 seawall repair is numbered as part of ongoing post-construction monitoring

TABLE 7. POST-CONSTRUCTION ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
CORAL RE-LOCATION	POC-1	EFH 2013	Post-construction, provide information on the species, size and the total amount of any corals impacted from the salvage operations. Offset this resource loss, including the loss of EFH bottom habitat. If the overall unavoidable loss is minimal, NMFS would support environmental measures offset involving removal of long-standing uncolonized debris in areas adjacent to the project fill footprint to future damage to the corals and marine resources in the area. Other compensatory environmental measures alternatives may also be appropriate.	Refuge Manager and Post-construction team	Document in monitoring report,	

TABLE 7. POST-CONSTRUCTION ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
POST-CONSTRUCTION SURVEY	POC-2	EA 2016	Conduct a post-construction marine biological survey to determine the actual project-related impact and the need for compensatory environmental measures. Lost ecological function associated with any project impact must be mitigated through compensatory environmental measures.			
	POC-3	EA 2016	A post-construction environmental compliance inspection will be completed that identifies any environmental concerns or lessons learned that can be applied to subsequent repairs.		Document in monitoring report,	
	POC-4	NFMS ESA 2017	Information on the species, size and the total amount of any corals impacted from the repairs would be provided to NMFS within 30 days of the completion of repairs. Post-construction marine biological surveys would be conducted to determine the actual project-related impact and the need for compensatory Environmental Measures. Lost ecological function associated with any project impact must be mitigated through mutually agreed conditions.		Document in monitoring report,	