

APPENDIX B IMPLEMENTATION PLAN

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

APRIL 2018

**US FISH AND WILDLIFE SERVICE
Midway Island National Wildlife Refuge
AND
FEDERAL AVIATION ADMINISTRATION
Western-Pacific Region**



CONTENTS

Introduction.....	1
Designed Environmental Measures.....	4
Construction Material and Invasive Species.....	5
Shipping and Invasive Species.....	6
Staging.....	9
Pre-Construction.....	11
Construction.....	14
Post-Construction.....	18

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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
PAPAĀNAUMOKUĀKEA 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.

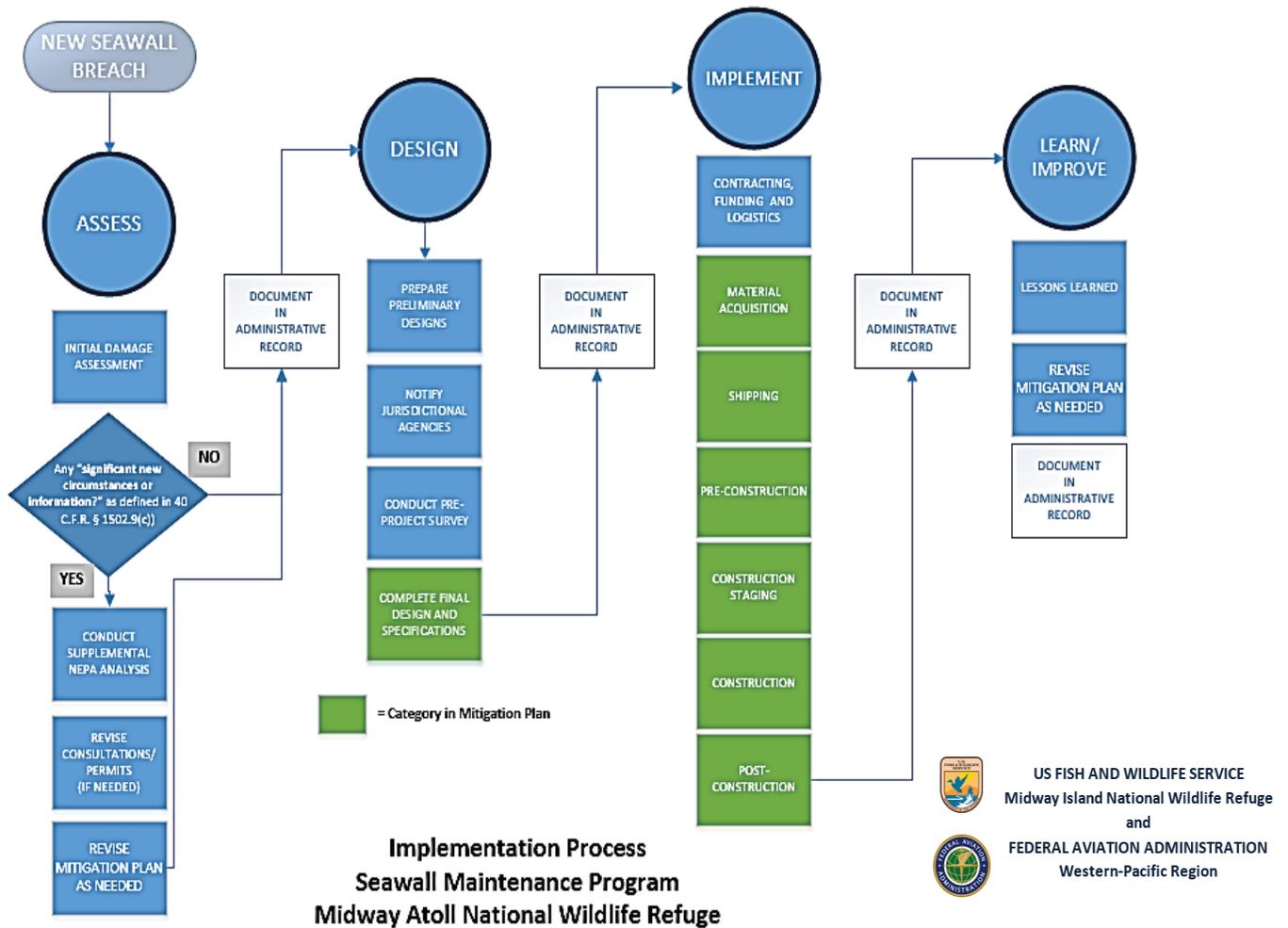
- *Description*: Description of mitigation measure
- *Responsible Agency/Person*: Actor responsible to ensure measure is carried out
- *Required Action*: Description of mitigation measure

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 *Verbesina 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		
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	

TABLE 3. SHIPPING ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
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	PMNM 2016, 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		
ANIMAL AVOIDANCE	SH-10	NMFS Viewing Guidelines	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.			

TABLE 3. SHIPPING ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
	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		
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		

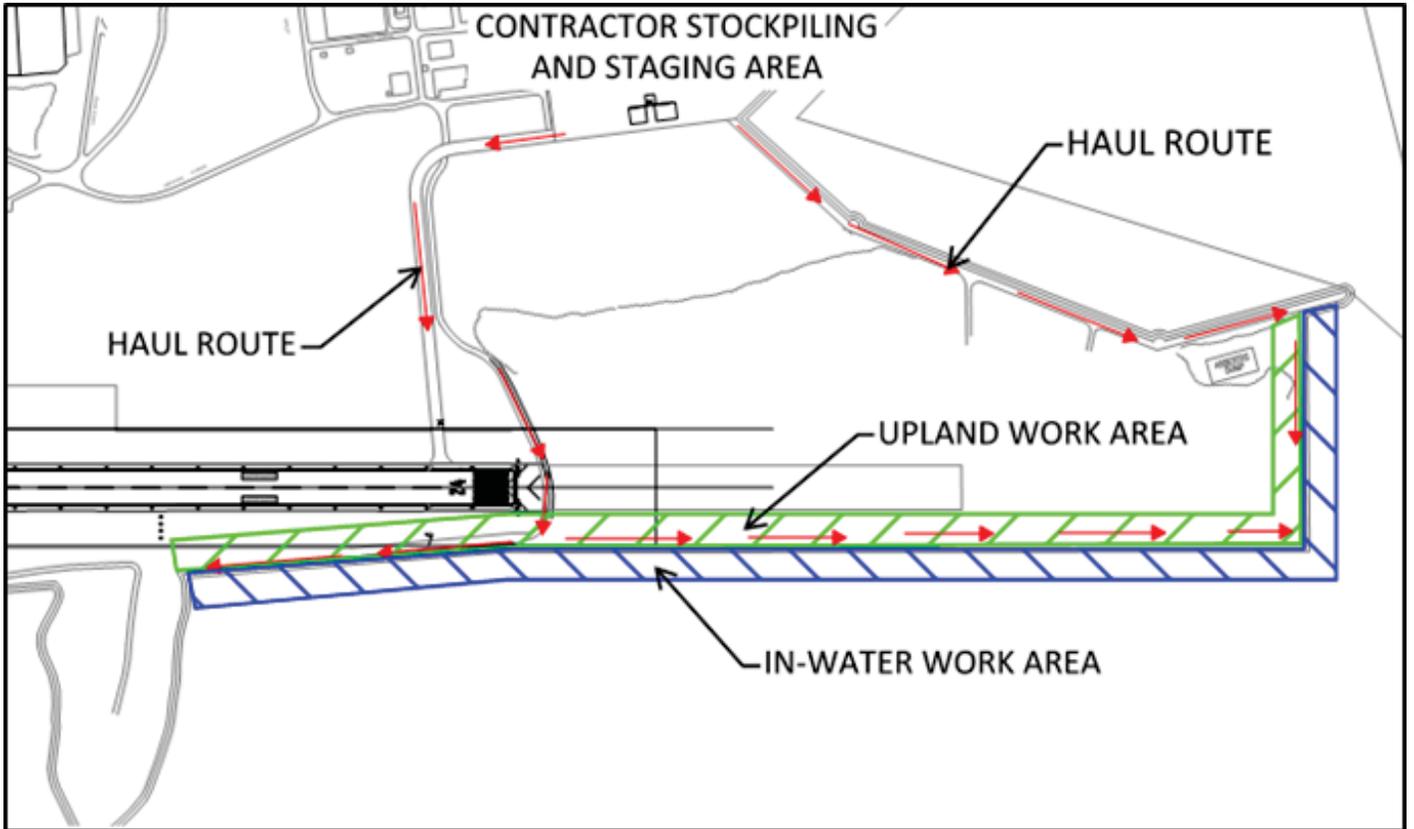
STAGING

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		
	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	
CREW TRAINING	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		
	PRE-19	2016 EA, ESA 2018	Coordinate with U.S. Navy explosives experts to determine appropriate steps needed to avoid unintended disturbance of unexploded ordinance (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	
	C-3	PMNM BMP, ESA 2018	Contractor and staff will comply with the following BMPs: <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.		

TABLE 6. CONSTRUCTION ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
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		
	C-8	CatEx 2013	As the silt containment boom 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		

TABLE 6. CONSTRUCTION ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
	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		
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 ID C-8 and ??? 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		

TABLE 6. CONSTRUCTION ENVIRONMENTAL MEASURES

MEASURE	ID	SOURCE	DESCRIPTION	RESPONSIBLE AGENCY/ROLE	REQUIRED ACTION	DATE COMPLETED AND INITIAL
STOCKPILING	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.			
	C-30	CatEx 2013	No construction material will be stockpiled in the marine environment.	Contractor and Construction Monitor		
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 RELOCATION	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,	