Draft

ACTION PLAN TO ADDRESS EROSION AT STORM DRAIN SYSTEM OUTLETS

Storm Water Management Plan

Marine Corps Base Hawaii

NPDES Permit No. HI 000007

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Marine Corps Base Hawaii

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List of Acronyms and Abbreviations

BMP	Best Management Practice
CFR	Code of Federal Regulations
CWA	Clean Water Act
DOH	State of Hawaii Department of Health
ECE	Environmental Compliance Evaluation
ENV	Marine Corps Base Hawaii Environmental Department
EPA	United States Environmental Protection Agency
GIS	Geographic Information System
HDPE	High Density Polyethylene
ID	Identification
INRMP	Integrated Natural Resources Management Plan
MCB Hawaii	Marine Corps Base Hawaii
MCDC	Mokapu Central Drainage Channel
MS4	Municipal Separate Storm Sewer System
MS4 Permit	Marine Corps Base Hawaii's NPDES Permit No. HI S000007
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
SWMP	Storm Water Management Plan

1 Introduction

As of the effective date, October 15, 2014, the Marine Corps Base Hawaii (MCB Hawaii) is required to comply with the conditions of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HIS000007 (referred to hereinafter as the "MS4 Permit"). The MS4 Permit includes authorized storm water and specified non-storm water discharges into Kaneohe Bay, Nuupia Ponds, Kailua Bay, and the Mokapu Central Drainage Channel (MCDC). Per the MS4 Permit, Part D.1.f.(3).(iv), MCB Hawaii is required to provide an Action Plan to Address Erosion at Storm Drain System Outlets (Outfalls). The MS4 Permit states:

> *Permit Requirements, Part D.1.f.(3).(iv):*
>
> *"Provide the DOH with an Action Plan to address erosion at its storm drain system outlets with significant potential for water quality impacts to be completed within one (1) year from the effective date of this permit, which shall identify outfalls to be addressed, explanation on the basis of their selection and an implementation schedule. The implementation schedule shall cover a five (5) year period. A status report on implementation of the plan shall be included in the Annual Report. The Permittee shall install velocity dissipators or other BMPs to reduce erosion at locations identified by periodic required inspections."*

The goal of this Action Plan is to continue to reduce erosion at MCB Hawaii outfalls posing a significant risk for impacting the water quality of receiving waters, through monitoring and implementation of effective and feasible Best Management Practices (BMPs).

2 Identification of Erosional Outfalls

2.1 Completed Erosion Control Studies and Projects

The MCB Hawaii Environmental Department (ENV) has conducted several ongoing studies and projects to identify and address its highest priority erosion issues on a watershed level. A continued focal point for erosion concerns within MCB Hawaii has been the landfill and Ulupau Crater area. The following three studies are useful references for measures that have been taken to address erosion at prioritized outfalls within these areas and others throughout MCB Hawaii:

1. *Final Marine Corps Base Hawaii Integrated Natural Resources Management Plan (INRMP), Update, 2012-2016* (2011). Prepared for MCB Hawaii, by the Environmental Compliance and Protection Department MCB Hawaii and Sustainable Resources Group Int'l Inc.
2. *Erosion Assessment with Recommendations: Outer Slopes and Southeast Shoreline, Ulupau Crater, Marine Corps Base Hawaii* (2007). Prepared for the ENV, by Sustainable Resource Group Int'l Inc.
3. *Landfill and Northeast Crater Catchment Erosion Assessment Report with Recommendations* (2004). Prepared for the ENV, by Sustainable Resource Group Int'l Inc.

The INRMP provides an extensive look at base wide ecosystem conservation plans. This goal-driven and active document is reviewed annually and necessary revisions/updates are made at least once every five years. The two erosion assessment studies conducted for the landfill and Ulupau contain detailed information and recommendations for MCB Hawaii's erosion project focus areas, which have since been addressed, and are also referred to in the INRMP.

A list of projects completed in the previous INRMP are available in the updated 2011 INRMP, in Tables E2-1 and E2-5. For the purpose of this report, completed projects related to erosion control are summarized in Table 1.

Table 1: Erosion Related Projects Completed from the Previous INRMP

Project Number	Project Description	Project Status
HI0920013M	Install Erosion BMPs - Southeast Crater Shoreline: The project addressed recommendations made in the erosion assessment for outer slope and southeast shoreline of Ulupau Crater. An unlined dirt ditch was lined with corrugated high density polyethylene (HDPE), and eroding slopes along southern shoreline cliffs were stabilized with waddles. Drainage features at the Weapons Range Parking Lot were also improved.	Completed
HI0920014M	Install Erosion BMPs - North-Facing Crater Slopes: The project addressed recommendations made in the erosion assessment for the outer slope and southeast shoreline of Ulupau Crater. An unlined dirt ditch was lined with corrugated HDPE, and eroding slopes along the north-facing side of Ulupau Crater cliffs were stabilized with waddles.	Completed
HI60834	Evaluation Study - Percolation Ditch Wetland Improvements: Initial project was completed in 2007. Continued issues with encroachment of the invasive California grass and water lilies into the wetland.	Completed 2010
HI20012	Sustain Weapons Range-Install Erosion Control BMPs: Work included access road improvements, improving drainage, and installing erosion BMPs.	Completed 2008
HI20010	Design/Construct Improved MCDC: This project included replacement of three acres of weed-choked land along the west bank, with a meandering, re-sloped corridor to increase flood storage capacity.	Completed 2008
HI20013	Environmental Compliance Evaluation (ECE)-Mandated Erosion Assessment of MCB Hawaii Properties	Completed 2004

Featured structural erosion/sediment control measures that are in place at MCB Hawaii to improve water quality at priority outfalls are summarized below:

Debris/Sediment Collection

- Wetlands:
  1. Nuupia Pond Complex (Sediment Basin/Storm Water Storage)
  2. Hale Koa (Sediment Basin/Storm Water Storage)
  3. Temporary Lodging Facility Wetland (Sediment Basin/Storm Water Storage)
  4. Salvage Yard Wetland (Sediment Basin/Storm Water Storage)
  5. Motor Pool (Filter Runoff)
  6. Percolation Ditch (Sediment Basin/Storm Water Storage)
- Concrete debris collector & sediment basin installed at inlet to sediment basin installed along the restored portion of MCDC
- Two debris/sediment collectors have been installed at inlets to the lined drainage channel starting at Uli Street along Daly Road
- Sediment trap (near Buildings 6002 & 6003) and retention basin located before discharge point to Nuupia Ponds

Erosion Controls

- To address erosion on the southeast shoreline, the earthen drainage channel ending at Middaugh Street, adjacent to Daly Road has been lined with corrugated HDPE to act as a velocity dissipator and prevent erosion.
- To address erosion on the north –facing Ulupau Crater slopes, the earthen drainage channel starting at Uli Street along Daly Road has been lined with corrugated HDPE to act as a velocity dissipator and prevent erosion.
- Golf Course drainage channel perpendicular to Manning St. has been flattened enough to allow access for maintenance, allowing vegetation to grow back.

Ulupau Crater continues to be a priority area for erosion concerns. Post-project evaluations are in place, as listed in Section 2.2, to consistently evaluate effectiveness of existing erosion control measures and provide adaptive management, as needed.

2.2 Active/Planned Erosion Control Projects (2012-2016)

Projects that were active or planned during the INRMP (2012-2016) Five Year Implementation Plan, related to erosion control at MCB Hawaii, are listed in Table 2.

Table 2: Active or Planned Erosion Related Projects in the INRMP Update 2012-2016

INRMP Objective No.	Project Description
7.2.1	Maintain current wetland GIS boundary layers.
7.2.4	• Ensure assigned personnel obtain appropriate training on wetland delineation, regulations, and/or monitoring protocols. • Explore interagency cooperative projects to implement regional wetland enhancement and monitoring opportunities.
7.3.1	• Initiate systematic monitoring of ambient erosion conditions and implement appropriate follow-on actions. • Conduct follow-on monitoring of erosion control project results and adaptive management. • HI0920013M Install Erosion BMPs: Southeast Crater Shoreline (Post-Project Evaluation Study). • HI0920014M Install Erosion BMPs: North-Facing Crater Slopes (Post-Project Evaluation Study)
7.3.2	HI20010 Watershed Repair/Restore, MCDC (Post-Project Evaluation Study)
7.3.3	• Review and update all relevant plans and projects to integrate watershed BMPs • Identify and assist appropriate personnel to incorporate BMPs into operational guidelines and SOPs.
7.3.4	• Ensure relevant personnel obtain appropriate training on watershed BMPs. • Display/distribute *available* presentation materials on watershed health, assessment and BMPs. • Develop/distribute *additional* presentation materials on watershed health, assessment and BMPs.

2.3 Action Plan for Identification of Erosion Areas

As part of its continued commitment to reduce erosion at priority outfalls, MCB Hawaii's on-going identification and selection of erosional hot spots will be based on:

- Preliminary verification of existing priority erosional outfalls.
- Follow-up evaluations, included as part of active or planned erosion related projects, during which any new potential erosional hot spots will be identified.
    - The *Erosion Assessment with Recommendations: Outer Slopes and Southeast Shoreline, Ulupau Crater, Marine Corps Base Hawaii (2007)* identified potential areas of concern that were located outside of the completed corrective action project focus areas (see attached Figure 1). General site inspections for erosion will be conducted at these locations during the first year of inspections to be completed.
- Potential erosional hot spots brought to the attention of the ENV by the Base Inspector or MCB Hawaii residents.

Field inspections will be conducted using the attached "Erosional Area Inspection Checklist" and will be used to classify sites as low, medium, or high priority.

New high priority erosional hot spots will be ranked based on the following criteria:

- Immediate threat to public safety or risk of property damage;
- Proximity to and potential impact on receiving surface water;
- Level of onsite usage; and
- Constructability of the recommended erosion control measure.

A summary of these efforts will be included in the Annual Report.

SOURCE: SUSTAINABLE RESOURCES GROUP INTERNATIONAL, INC. ,2007. FIGURE 13 MCBH–KB: EROSION AND RUNOFF AREAS OF CONCERN. EROSION ASSESSMENT WITH RECOMMENDATIONS FOR OUTER SLOPES AND SOUTHEAST SHORELINE OF ULUPAU CRATER, MARINE CORPS BASE HAWAII, FINAL REPORT, MAY 2007.

	DATE: AUG 2015	PROJECT TITLE: MCB HAWAII STORM WATER MANAGEMENT PLAN - ACTION PLAN TO ADDRESS EROSION AT STORM DRAIN SYSTEM OUTLETS
	FIGURE TITLE: POTENTIAL EROSIONAL AREAS	FIGURE NO.: 1

3 Proposed Actions

Moving forward, MCB Hawaii's program for erosion control at storm water outfalls will be based on the following activities:

- The MCB Hawaii Facilities Department's Geographic Information System (GIS) database will be updated to create an inventory of existing erosional outfalls and erosion control BMPs. Existing internal databases will be used to track inspection and maintenance frequency.
- MCB Hawaii will implement design of permanent erosion control measures for high priority sites, to address both sediment accumulation and velocity of flow.
    - If a permanent solution for a high priority erosion hot spot cannot be constructed immediately, the site will be addressed with temporary erosion controls, such as silt fences, bio-filter socks, geotextiles, etc., within 18 months of the EDOP.
- Following preliminary investigations, inspection frequency will be based on the outcome of previous inspections. If appropriate BMPs have been installed to address erosion concerns or if there are no reported high priority erosion concerns after two consecutive rainfall events, a site will be downgraded to a reduced inspection frequency:
    - Low priority sites shall be inspected at least once every five (5) years.
    - Medium priority sites shall be inspected at least biannually.
    - High priority sites shall be inspected at least annually.
- Training will be provided to designers, contractors, and maintenance staff on optimizing use of BMPs, and to ensure the use of appropriate BMPs during all stages of the implementation of temporary and permanent BMPs.
- All applicable documents and field manuals, provided with MCB Hawaii's SWMP update, will be used to guide implementation, inspection, and maintenance of new and existing erosion control measures.

Annual status reports will be used to evaluate and revise the Action Plan to Address Erosion at Storm Drain System Outlets, as needed.

4 Proposed Implementation Schedule

Based on the outcome of preliminary verification inspections and the number of high priority sites identified, if any, the following implementation schedule is proposed. The implementation year is the year in which the proposed repair is scheduled to be completed; however, this schedule is subject to change due to funding availability, permitting delays, or other unforeseen circumstances. Changes to the implementation schedule will be provided in the Annual Report.

Table 3: Implementation Schedule

Task	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
• Conduct Preliminary Verification Inspections	X				
• Update GIS Database	X	X	X	X	X
• Outline Ranking of High Priority Erosional Hot Spots, if any	X				
• Setup Maintenance and Field Inspection Plan		X			
• Implementation of Temporary Erosion Control Measures at High Priority Sites, as needed	X	X	X	X	X
• Implementation of Maintenance and Field Inspection Plan		X	X	X	X
• Design and Appropriation of Funding for Permanent Erosion Controls: o Priority #1 o Priority #2 o Priority #3		 X	 X	 X	
• Implementation of Permanent Erosion Controls: o Priority #1 o Priority #2 o Priority #3			 X	 X	 X
• Update Internal Database for Tracking of Maintenance and Inspections, as needed		X	X	X	X
• Erosion Control BMP Program Status Updates (in Annual Report) – Evaluation		X	X	X	X

5 References

1. *Final Marine Corps Base Hawaii Integrated Natural Resources Management Plan (INRMP), Update 2012-2016* (2011). Prepared for MCB Hawaii, by the Environmental Compliance and Protection Department MCB Hawaii and Sustainable Resources Group Int'l Inc. November 2011.
2. *Erosion Assessment with Recommendations: Outer Slopes and Southeast Shoreline, Ulupau Crater, Marine Corps Base Hawaii* (2007). Prepared for the ENV, by Sustainable Resource Group Int'l Inc. May 2007.
3. *Landfill and Northeast Crater Catchment Erosion Assessment Report with Recommendations* (2004). Prepared for the ENV, by Sustainable Resource Group Int'l Inc. June 2004.

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Attachment

Erosional Area Inspection Checklist

Erosional Area Field Inspection Checklist

Inspection Date:		Name and phone # of those present during inspection:	
Time:			

Site Information

Site name:	Location/ watershed:

Facility Description:

Point of Contact Name/Position: _____

Phone Number: _____ Email: _____

Inspection: ☐ Announced ☐ Unannounced	Approximate size of site (acres)?

Type of Inspection: ☐ Preliminary Investigation ☐ Construction Site ☐ Post-project Monitoring

Weather during inspection:	Amount of Rainfall in past 24 hrs (inches): _____

Site Drainage Description:

General Discharge Observation *(if inspection performed during a rain event)* and Location(s):

(For Follow-up Inspections) Date of last inspection: _____

Deficiencies Noted in Last Inspection:

Erosion Controls/Concerns

(*Identify existing measures observed on site and provide general comment/deficiencies where applicable*)

Are potential sources of sediment protected? Yes ☐ No ☐

Is there storm water discharge to unprotected areas? Yes ☐ No ☐

Deteriorating or unmaintained vegetation? Yes ☐ No ☐

Steep/unprotected slopes? Yes ☐ No ☐

Are appropriate BMPs in place to prevent erosion due to activities associated with construction (such as wash-down areas, silt fences, bio-filter socks, inlet protection, etc.)? Yes ☐ No ☐

Are structural BMPs installed correctly and in good condition? Yes ☐ No ☐

Is there evidence of deficiencies in the storm drain system? *(such as overflow of inlets, basins, etc.)* Yes ☐ No ☐

Do existing structures appear to have adequate maintenance? Yes ☐ No ☐
(Less than ½ full of sediment and debris, vegetated channels/basins are not overgrown, etc.)

Is there evidence of erosion onsite? *(gullies, rills, exposed soil, steep/eroded slopes, etc.)*	**Is there evidence of sediment leaving the site?** *(sediment accumulation/plumes, stained pavement, etc.)*
Yes ☐ No ☐	Yes ☐ No ☐

If any of the above questions are answered 'yes', describe below:

_____

_____

Have past deficiencies been addressed: Yes ☐ No ☐ *(if no, describe below)*

_____

_____

Describe structural BMPs in place? Permanent ☐ Temporary ☐ Both ☐ N/A ☐

☐ Inlet Protection
☐ Sediment Basin
☐ Bio-filter Sock
☐ Silt Fence
☐ Vegetated Swale
☐ Sediment/Debris Collecting Inlet
☐ Energy Dissipator
☐ Erosion Control Mats/Geotextiles
☐ Mechanical Separator
☐ Filter berm
☐ Slope Stabilization

☐ Lined Drainage Channel
☐ Outlet Protection(Headwall)
☐ Removable Inlet Filter
☐ Other *(describe)*: _____

Describe Condition and Observed Structural/Maintenance Deficiencies *(if any)*:

_____

_____

_____

_____

_____

(If there is no observed erosion and no deficiencies noted in existing BMPs)

Are existing BMPs consistent with applicable plans, field manuals and SWMPP requirements? Yes ☐ No ☐
If no, describe:

Photos Taken: Yes ☐ No ☐
Photo Reference IDs:

Erosional Area Priority Level

Does any deficiency pose a potential risk to public safety or of property damage? Yes ☐ No ☐
(if yes, site is high priority)

Do deficiencies impair current usage of the site? Yes ☐ No ☐

Does runoff from this site impact other areas? Yes ☐ No ☐

What is the name and proximity to receiving surface water? _____

Is there an observable impact on the receiving water quality? Yes ☐ No ☐

Based on findings, this site is:

☐ Does not pose an erosion concern

☐ LOW PRIORITY – No observable erosion concerns. Condition of vegetation or structural BMPs poses a potential for an erosion concern to develop.

☐ MEDIUM PRIORITY – Observed erosion concerns and evidence of sediment leaving the site or affecting locations downstream.

☐ HIGH PRIORITY – Immediate risk for impacts to water quality, nearby/downstream property, and/or public safety.

Recommendations/Additional Notes:

_____

_____

_____

_____

_____

Inspector Information

Inspector Name:	Inspector Title:
Signature:	Date: