Hawaii State Department of Transportation
Highways Division, Oahu District
Storm Water Management Program
NPDES Permit No. HI S000001
April 2015

Action Plan to Address Erosional Outfalls

PROTECT OUR WATER
MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION
www.stormwaterhawaii.com
Action Plan to Address Erosional Outfalls

State of Hawaii Department of Transportation
Highways Division, Oahu District

April 2015
Version: Final
This page intentionally left blank.
## Record of Revision

<table>
<thead>
<tr>
<th>Revision No.</th>
<th>Revision Date</th>
<th>Description</th>
<th>Sections Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original Document</td>
<td>October 2014</td>
<td>Original</td>
<td>N/A</td>
</tr>
<tr>
<td>1</td>
<td>February 2015</td>
<td>Formatting</td>
<td>All</td>
</tr>
<tr>
<td>2</td>
<td>April 2015</td>
<td>Draft Finalized. Date changed</td>
<td>All</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF APPENDICES</td>
<td>v</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vi</td>
</tr>
<tr>
<td>ACRONYMS AND ABBREVIATIONS</td>
<td>vii</td>
</tr>
<tr>
<td>1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>2. SELECTION OF EROSIONAL OUTFALL REPAIR SITES</td>
<td>1</td>
</tr>
<tr>
<td>3. SUMMARY OF EROSIONAL OUTFALL REPAIR SITES</td>
<td>2</td>
</tr>
</tbody>
</table>
### LIST OF APPENDICES

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Proposed Retrofit Site Summaries</td>
</tr>
</tbody>
</table>
### LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1</td>
<td>Proposed Erosional Outfall Repair Sites and Implementation Schedule</td>
<td>3</td>
</tr>
</tbody>
</table>
### ACRONYMS AND ABBREVIATIONS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMP</td>
<td>Best Management Practice</td>
</tr>
<tr>
<td>CDF</td>
<td>Control Density Fill</td>
</tr>
<tr>
<td>CMP</td>
<td>Corrugated Metal Pipe</td>
</tr>
<tr>
<td>CRM</td>
<td>Concrete Rubble Masonry</td>
</tr>
<tr>
<td>DOH</td>
<td>State of Hawaii Department of Health</td>
</tr>
<tr>
<td>DOT-HWYS</td>
<td>State of Hawaii Department of Transportation, Highways Division, Oahu District</td>
</tr>
<tr>
<td>MP</td>
<td>Mile Post</td>
</tr>
<tr>
<td>MS4</td>
<td>Municipal Separate Storm Sewer System</td>
</tr>
<tr>
<td>MS4 Permit</td>
<td>DOT-HWYS’ NPDES Permit No. HI S000001</td>
</tr>
<tr>
<td>NPDES</td>
<td>National Pollutant Discharge Elimination System</td>
</tr>
<tr>
<td>PID</td>
<td>Point Identification Number</td>
</tr>
<tr>
<td>ROW</td>
<td>Right-of-Way</td>
</tr>
<tr>
<td>TMDL</td>
<td>Total Maximum Daily Load</td>
</tr>
</tbody>
</table>
1. INTRODUCTION

As required by Part D.1.f.(3).(iv) of the State of Hawaii Department of Transportation Highways Division, Oahu District’s (DOT-HWYS’) National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000001, (hereinafter referred to as “MS4 Permit”), DOT-HWYS has developed the following Action Plan to Address Erosion at its Storm Drain System Outlets (Erosional Outfalls). The MS4 Permit requirements are as follows:

Permit Requirements - Erosion Control 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 of the effective date of this permit, which shall identify outfalls to be addressed, explanation on the basis for 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 the Islandwide Retrofit Study or through its periodic required inspections. The Action Plan may include, but not be limited to projects in compliance with any TMDL I&M Plan.”

2. SELECTION OF EROSIONAL OUTFALL REPAIR SITES

The purpose of the Action Plan to address Erosional Outfalls is to reduce erosion at DOT-HWYS’ MS4 outfalls on the island of Oahu that have the significant potential for water quality impacts by implementing appropriate and cost-effective outfall repairs. Potential erosional outfall repair sites were selected through the review of previous MS4 studies and from data collected during routine MS4 monitoring and maintenance activities. The following criteria were used to determine final site selections for the action plan’s five year implementation schedule:

1. Confirmed as an outfall from DOT-HWYS’ MS4;
2. Classified as having significant potential for water quality impacts:
   - Erosion issues caused by discharge at outfall,
   - Evidence of sediment transport to downstream receiving waters,
   - Inadequate natural or man-made storm water treatment in flow path to receiving water.
3. Located within DOT-HWYS’ ROW, or known to have an access easement, and have readily available construction and maintenance access.

Sites that are located in a TMDL, Consent Decree or CWA Section 303(d) watershed were given priority; however, this was not a required criterion.
3. SUMMARY OF EROSIONAL OUTFALL REPAIR SITES

Five erosional outfalls were identified for proposed remediation and/or reconstruction within the required five year implementation period. The selected outfalls include three corrugated metal pipes (CMPs), ranging from 24 to 42 inches in diameter, a concrete rubble masonry (CRM) spillway, and an open channel concrete spillway. Table 1 provides a summary of proposed outfall repair sites along with their five-year implementation schedule. The implementation year is the year in which the proposed outfall 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. A detailed description of each proposed erosional outfall repair site is provided in Appendix A.

Table 1. Proposed Erosional Outfall Repair Sites and Implementation Schedule

<table>
<thead>
<tr>
<th>Erosional Outfall Site</th>
<th>Outfall PID</th>
<th>Outfall Type</th>
<th>Receiving Waterbody</th>
<th>Watershed</th>
<th>Implementation Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>300350</td>
<td>36” CMP</td>
<td>Kawainui Stream</td>
<td>Kawainui</td>
<td>2014</td>
</tr>
<tr>
<td>2</td>
<td>302311</td>
<td>42” CMP</td>
<td>Aiea Stream</td>
<td>Aiea</td>
<td>2015</td>
</tr>
<tr>
<td>3</td>
<td>302481</td>
<td>CRM Spillway</td>
<td>Halawa Stream</td>
<td>Halawa</td>
<td>2016</td>
</tr>
<tr>
<td>4</td>
<td>301161</td>
<td>24” CMP</td>
<td>Kalaepulu Stream</td>
<td>Kawainui</td>
<td>2017</td>
</tr>
<tr>
<td>5</td>
<td>301782</td>
<td>Concrete Open Channel</td>
<td>Waimalu Stream</td>
<td>Waimalu</td>
<td>2018</td>
</tr>
</tbody>
</table>
Action Plan to Address Erosional Outfalls

APPENDIX A: PROPOSED EROSIONAL OUTFALL REPAIR SITES
This page intentionally left blank.
Erosional Outfall Site 1

Associated PID: 300350

Receiving Water Body: Kawainui Stream

Outfall Type: 36" CMP (Corrugated Metal Pipe)

Outfall Description:
PID 300350 is an outfall for several catch basins that collect storm water along the H-3 Freeway near Kaneohe. The existing CRM headwall and apron is severely undercut and there are significant signs of erosion and sediment transport downstream of the outfall location.

Proposed Remediation/Repair:
New concrete headwall and riprap apron.

Location Map

Photo 1: Undercut headwall and apron

Photo 2: Outfall erosion
Erosional Outfall Site 2

**Associated PID:** 302311

**Receiving Water Body:** Aiea Stream

**Outfall Type:** 42" CMP

**Outfall Description:**
PID 302311 is an outfall that drains a network of several catch basins that collect storm water from the H-1 Freeway in Aiea. The CMP is corroded and there is significant erosion below the outfall, which is located directly on the bank of Aiea Stream.

**Proposed Remediation/Repair:**
CMP pipe repair and new riprap apron.

Location Map

Photo 1: Corroded CMP outfall

Photo 2: Outfall stream bank erosion
**Erosional Outfall Site 3**

**Associated PID:** 302481

**Receiving Water Body:** Halawa Stream

**Outfall Type:** Concrete Rubble Masonry (CRM) Spillway

**Outfall Description:**
PID 302481 is a CRM spillway outfall that drains the shoulder of the H-1 Freeway directly onto the concrete lined stream bank of Halawa Stream. A gap has formed between the end of the spillway and the stream bank allowing storm water to erode sediment from the area behind the concrete stream channel liner.

**Proposed Remediation/Repair:**
Control Density Fill (CDF) or epoxy behind eroded concrete lined stream bank and re-connect outfall apron to concrete stream bank.

---

**Photo 1:** CRM spillway to concrete lined channel

**Photo 2:** Eroded area behind concrete liner

---

**Location Map**
**Erosional Outfall Site 4**

**associated PID:** 301161

**Receiving Water Body:** Kalaepulu Stream

**Outfall Type:** 24” CMP

**Outfall Description:**
PID 301161 is a 24” CMP outfall that receives storm water flow from open channels and catch basins located along Kalanianaole Highway near Kailua. The CMP is severely undermined and collapsing and there is significant erosion downstream of the outfall.

**Proposed Remediation/Repair:**
New concrete headwall and riprap apron.

---

**Photo 1:** Pipe undermined due to erosion

**Photo 2:** Outfall erosion
Erosional Outfall Site 5

**Associated PID:** 301782

**Receiving Water Body:** Waimalu Stream

**Outfall Type:** Concrete Open Channel

**Outfall Description:**
PID 301782 is a concrete open channel outfall that receives storm water runoff from catch basins and open channels located along the H-1 Freeway near Moanalua Road. The concrete channel is breaking apart in several locations and there is significant erosion at the outfall with sedimentation downstream of the outfall.

**Proposed Remediation/Repair:**
Repair of concrete channel and outfall stabilization.

---

**Location Map**

![Location Map](image)

**Photo 1:** Failing concrete liner at outfall

**Photo 2:** Erosion at outfall