City and County of Honolulu
Department of Facility Maintenance

Stream Maintenance Manual

Prepared by:

City and County of Honolulu
Department of Facility Maintenance
Kapolei, Hawaii

July 2018
FINAL

Revised September 2019

DAVID Y. IGE
GOVERNOR OF HAWAII

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STATE OF HAWAII
DEPARTMENT OF HEALTH
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In reply, please refer to:
EMD/CWB

01007CGH.19

January 4, 2019

Mr. Ross Sasamura
Director and Chief Engineer
Department of Facility Maintenance
City and County of Honolulu
1000 Uluohia Street, Suite 215
Kapolei, Hawaii 96707

Dear Mr. Sasamura:

Subject: Approval of Standard Operating Procedures (SOPs) for Streamlined Section 401 Water Quality Certification (WQC) Process WQC SOP File No. 20190104.CCHDFM

The Department of Health (DOH), Clean Water Branch (CWB) acknowledges receipt of the City and County of Honolulu (CCH), Department of Facilities Maintenance (DFM) SOPs submitted for use in the streamlined Section 401 WQC process. The SOPs are entitled: *City and County of Honolulu, Department of Facility Maintenance, Stream Maintenance Manual*, dated October 2018. **This letter is to inform you that the CCH-DFM SOPs have been approved for use in the streamlined Section 401 WQC process.**

CCH-DFM may utilize these provisionally approved SOPs when submitting an individual Section 401 WQC application or blanket Section 401 WQC notification form for any project covered under Army Corps of Engineers permit as long as the project activities were included in the SOPs. Projects covered under these approved SOPs do not require water quality monitoring; Best Management Practices Plan submittals; Applicable Monitoring and Assessment Plan submittals; or antidegradation analysis submittals.

WQC SOP File No. 20190104.CCHDFM has been assigned to the CCH-DFM SOPs.

The DOH-CWB understands that water pollution control for in-water project construction and operation activities is an iterative process and that new technologies/methods may be incorporated as they become available. As such, your SOPs are considered living documents. Revisions and/or modifications shall be submitted to the DOH-CWB for review and acceptance.

If you have any questions, please contact Mr. Matthew Kurano of the Enforcement Section or Mr. Darryl Lum of the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

for

BRUCE S. ANDERSON, Ph.D.
Director of Health

c: Regulatory Office, POH, COE [via e-mail cepoh-ro@usace.army.mil only]
Mr. John Nakagawa, CZM Program, Office of Planning, DBEDT
[via e-mail john.d.nakagawa@hawaii.gov only]
Mr. Tunis McElwain, POH [via e-mail Tunis.W.McElwain@usace.army.mil only]
Ms. Courtney Cacace, AECOM [via e-mail Courtney.Cacace@aecom.com only]
Mr. Thomas Takeuchi, CCH-DFM [via e-mail ttakeuchi@honolulu.gov only]
Mr. Randall Wakumoto, CCH-DFM [via e-mail rwakumoto@honolulu.gov only]

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List of Acronyms

AMAP	Applicable Monitoring and Assessment Plan
BMP	Best Management Practice
CCH	City and County of Honolulu
CFR	Code of Federal Regulation
CWA	Clean Water Act
CWB	State of Hawaii, Department of Health, Clean Water Branch
DFM	City and County of Honolulu, Department of Facility Maintenance
DRM	City and County of Honolulu, Department of Facility Maintenance, Division of Road Maintenance
DOH	State of Hawaii, Department of Health
EFH	Essential Fish Habitat
HAR	Hawaii Administrative Rules
HRS	Hawaii Revised Statutes
HEER	State of Hawaii, Department of Health, Hazard Evaluation and Emergency Response
NMFS	National Marine Fisheries Service
ROH	Revised Ordinances of Honolulu
SOPs	Standard Operation Procedures
SHWB	State of Hawaii, Department of Health, Solid and Hazardous Waste Branch
State	State of Hawaii
TSS	Total Suspended Solids
U.S.	United States
USACE	United States Army Corps of Engineers

USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
WQC	Water Quality Certification

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1 Introduction

1.1 Purpose

Streams maintained by the City and County of Honolulu (CCH), Department of Facility Maintenance (DFM) meet the definition of waters of the United States (U.S.) under the Clean Water Act (CWA) (33 Code of Federal Regulation [CFR] 328); therefore, DFM's stream maintenance activities are subject to permits and approvals from various agencies including the United States Army Corps of Engineers (USACE) and the State of Hawaii (State) Department of Health (DOH).

DFM is working closely with USACE, Honolulu District, Regulatory Office (CEPOH-RO) and DOH Clean Water Branch (CWB) to improve storm water management and the implementation of Best Management Practices (BMPs) and Standard Operation Procedures (SOPs) for DFM's stream maintenance activities.

The purpose of this manual is to provide guidance on BMPs and SOPs used in protecting water quality and other resources during stream maintenance activities on the island of Oahu that are managed or conducted by DFM in compliance with correlated regulatory requirements.

1.2 Regulatory Program

The USACE derives its regulatory authority over waters of the U.S. from two (2) federal laws: Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the CWA of 1972.

Section 10 of the Rivers and Harbors Act of 1899 prevents unauthorized obstruction or alteration of navigable waters of the U.S. Navigable waters are defined as "subject to the ebb and flow of the tide and/or presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce" (33 CFR 322.2(a)). A Section 10 permit is required for non-fill discharging activities that would place any structure below, within, or over navigable waters of the U.S., or would involve excavation, dredging, or deposition of material or any obstruction or alteration in navigable waters of the U.S.

The CWA defines waters of the U.S. subject to agency jurisdiction in 40 CFR 230.3 and 33 CFR 328.3. Under Section 404 of the CWA, dredged and fill material may not be discharged into jurisdictional waters of the U.S. (including wetlands) without a permit. Wetlands are a subset of jurisdictional waters of the U.S. and are jointly defined by the USACE (33 CFR 328.3(b)) and the U.S. Environmental Protection Agency (USEPA) (40 CFR 230.3(t)) as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

The USACE issues two (2) types of 404 permits: General and Standard permits. There are two (2) types of General permits: Regional permits and Nationwide permits. Regional permits are issued for a general category of activities when they are similar in nature and cause minimal environmental effect. Nationwide permits are issued to allow a variety of minor project activities with no more than minimal effects.

Projects that do not meet the criteria for a Nationwide Permit may be permitted under one (1) of the USACE's Standard permits. There are two (2) types of Standard permits: Individual permits and Letters of Permission. For Standard permits, the USACE decision to approve is based on compliance with USEPA's Section 404 (b)(l) Guidelines (USEPA CFR 40 Part 230), and whether the permit approval is in the public interest. The Section 404(b)(l) Guidelines (Guidelines) were developed by the USEPA in

conjunction with the USACE, and allow the discharge of dredged or fill material into the aquatic system (waters of the U.S.) only if there is no practicable alternative that would have less adverse effects. The Guidelines state that the USACE may not issue a permit if there is a least environmentally damaging practicable alternative to the proposed discharge that would have lesser effects on waters of the U.S. and not have any other significant adverse environmental consequences. According to the Guidelines, documentation is needed that a sequence of avoidance, minimization, and compensation measures has been followed, in that order. The Guidelines also restrict permitting activities that violate water quality or toxic effluent standards, jeopardize the continued existence of listed species, violate marine sanctuary protections, or cause "significant degradation" to waters of the U.S. In addition, every permit from the USACE, even if not subject to the Section 404(b)(l) Guidelines, must meet general requirements. See 33 CFR 320.4.

Under Section 401 of the CWA, any project requiring a federal license or permit that may result in a discharge to a water of the U. S. must obtain a 401 Certification. According to HAR, 11-54-9.1 "water quality certification" or "certification" means a statement which asserts that a proposed discharge resulting from an activity will not violate applicable water quality standards and the applicable provisions of sections 301, 302, 303, 306 and 307 of the Act. [see CWA, 404(a)(1)]

The most common federal permits triggering 401 Certification are CWA Section 404 permits issued by the USACE. The 401 permit certifications are obtained from the DOH-CWB, dependent on the project location, and are required before the USACE issues a 404 permit.

In some cases, the DOH-CWB may have specific concerns with discharges associated with a project. As a result, the DOH-CWB may issue a set of requirements that define activities, such as the inclusion of specific features, effluent limitations, monitoring, and plan submittals that are to be implemented for protecting or benefiting water quality. These requirements can be issued to address both permanent and temporary discharges associated with a project.

1.3 DFM Organization

The DFM Director and Chief Engineer oversee the operations of the Division of Road Maintenance (DRM). Three baseyards – Halawa, Sand Island, and College Walk – service the Honolulu District. Rural baseyards located in Ewa, Waialua, Kailua, Kaneohe, Laie, Wahiawa, and Waianae service the remainder of the island (see **Figure 1-1**). The superintendent of each maintenance district reports to the DRM Chief and is responsible for the allocation of resources within their respective district. Refer to Table 1-1 for contact information.

For stream maintenance activities, heavy equipment (refer to Table 2-2) is located out of the Halawa baseyard and is delivered to each district, as needed, depending on stream maintenance activities required. Each yard may also maintain its own inventory of stream maintenance equipment for specific activities or if equipment from Halawa Yard is not available.

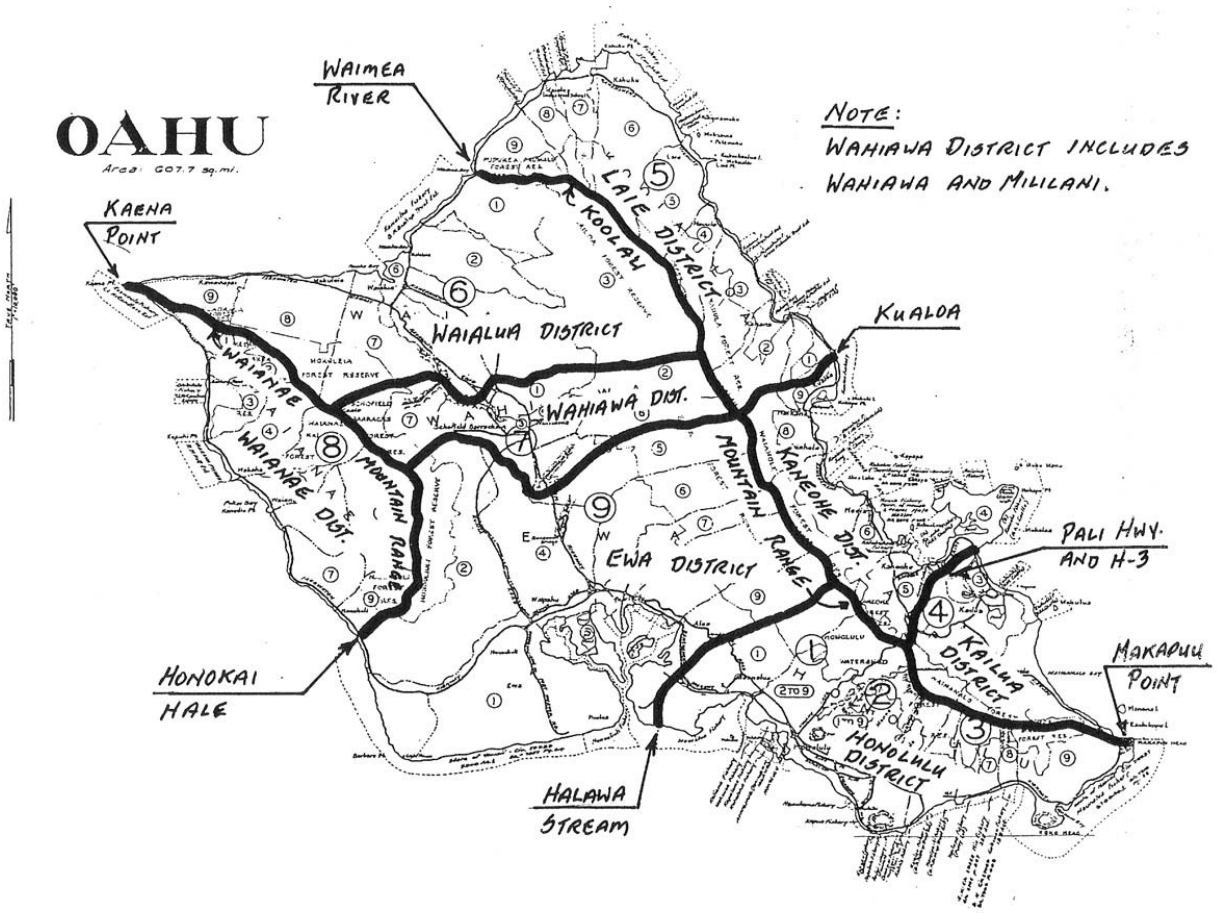


Figure 1-1 DFM District Boundaries

Contact information for the DRM administration and each of the district baseyards with stream maintenance activities covered under this manual, is provided in **Table 1-1** below:

Table 1-1 DFM DRM Contact Information

Title	Name	Contact Phone	Contact Email
Chief of Road Maintenance	Tyler Sugihara	768-3600	tsugihara@honolulu.gov
Assistant Chief of Road Maintenance	Lan Yoneda	768-3600	lyoneda@honolulu.gov
Drainage Engineer	Thomas Takeuchi	768-3608	ttakeuchi@honolulu.gov
District Superintendent:			
Pearl City (Ewa)	George Rapisora	768-9180	grapisora@honolulu.gov
Halawa (Honolulu)	Raoul Self	768-3632	rself@honolulu.gov
Kailua- Waimanalo	Mike Pundyke	768-3581	mpundike@honolulu.gov
Kaneohe (Koolaupoko)	Chadman Maio	768-3669	cmaio@honolulu.gov

Title	Name	Contact Phone	Contact Email
Laie (Koolauloa)	Lani Brown	768-9748	lbrown@honolulu.gov
Waialua	Brian Hookala	768-9750	bhookala@honolulu.gov
Waianae	Tom Lenchanko	768-4310	tlenchanko@honolulu.gov

1.4 Document Organization

This document contains information concerning the CCH DFM stream maintenance operations to support the application for coverage under the Department of the Army Individual Permit and 401 WQC from the DOH.

Sections 1 through 6 contain general information regarding the City's stream maintenance responsibilities, departmental organization, and general BMPs and SOPs that have been adopted by the CCH for stream maintenance activities.

Section 7 contains site-specific stream maintenance packages with maps and additional information including limits of work, equipment, and procedures and BMPs for each location and activity. The packages also contain site-specific information to support the Department of the Army Individual Permit and 401 WQC from the DOH that were necessary to show on a diagram rather than in a narrative format. These site-specific packages are organized by DFM maintenance district and are intended for use by the DFM operators.

Appendix A contains the CCH Stream Maintenance Inventory, in a tabular format, and other reference tables. The Stream Maintenance Inventory is divided by maintenance district and contains the following information for each stream maintenance site:

1. Stream Number
2. Stream Name
3. DFM Site Number
4. Location Coordinates
5. Location Description
6. Down Stream Water Body
7. Stream Flow (intermittent or perennial)
8. Stream Type (unlined, lined, or partially lined
9. Maintenance Category
10. TMK(s)
11. Equipment Access
12. Description of Access

Appendix A contains the following reference tables:

Table 1: Streams with Heavy Equipment Use in Stream

Table 2: Unlined Streams with Heavy Equipment Use in Stream

Table 3: Streams with Temporary Access Ramps

Table 4: Streams with Turbidity Curtains

Table 5: Streams with Onsite Dewatering

Table 6: Streams with Bulk Sandbags

Table 7: Streams with Oil Absorbing Filter Socks

Appendix B contains applicable forms and templates for notification of agencies

2 Stream Maintenance General Information

2.1 Purpose of Stream Maintenance

Section 46-11.5 of the State Hawaii Revised Statutes (HRS) requires each county to provide for the maintenance of channels, streambeds, streambanks, and drainage ways, whether natural or improved. On Oahu, the DRM has been tasked with the removal of debris, vegetation, silt, or other item or material of any nature from channels, streambeds, streambanks, and drainage ways which is likely to create an unsanitary condition, blockage, or otherwise become a public nuisance to the health, safety, and welfare of the residents of the county.

2.2 Stream Types

The streams maintained by DFM range from natural streams with limited improvements (unlined streams), partially lined streams (streams with concrete sidewalls), and fully lined streams/channels. The DFM also maintains stream mouths, drainage culverts, and boulder and debris basins. The channels, streambeds, streambanks, and drainage ways that the DFM maintains are City owned; non-City owned are required to be maintained by the owner.

Accumulated sediment from upland areas, embankment erosion, vegetation overgrowth, as well as trash from illegal dumping and homeless camps found in the streams not only increase likelihood of flooding, but also create an unsanitary conditions resulting in major health, safety, and welfare concerns.

2.3 Stream Maintenance Activities

Stream maintenance activities generally include trash removal, vegetation overgrowth control, and sediment removal, as described below.

2.3.1 Trash Removal

Trash/debris is generally removed by hand within dry stream channels and along the sides of streams. Floatable trash/debris is removed with fishing/pool cleaning nests on long poles, and/or with large fishing nets (i.e., seine nets). Large trash/debris from illegal dumping and homeless encampment areas, as well as trash/debris that have mixed with the sediment will be removed by crane, backhoe, and bulldozer either from within the stream channel or from the sides of the channel where equipment can be staged. Equipment will only operate in the stream channel if there is no other practical way to perform the maintenance activity. Equipment will only enter the stream channel if the water level is low enough to insure the axles and all oil and grease containing parts remain above the water level. Equipment will be cleaned at the baseyard prior to mobilization to the site. The removed trash/debris will be disposed of at either H-power or the Waimanalo Gulch Sanitary Landfill. Public outreach and education programs will be conducted to reduce/minimize the illegal dumping. CCH is performing a trash reduction pilot program and prevention measures, such as tall fencing, are being considered to deter the illegal dumping.

2.3.2 Vegetation Overgrowth Control

Vegetation overgrowth is a major concern for stream flooding and is a source of nutrient pollution. Typically, DFM uses manual cutting equipment to remove vegetation. DFM may also use a crane, excavator, backhoe, skid steer, dump trucks, wheel loader, tractor mower, track loader, and/or aerial trucks to remove vegetation from within the stream channels. The root systems of vegetation ground

along the stream banks and outside the stream channel will not be disturbed. Herbicides are not used to kill vegetation. Vegetation is disposed of at a local green waste recycling facility.

2.3.3 Sediment Removal

Sediment from upland areas, embankment erosion, and adjacent roadways may contain pollutants and pose a potential flooding hazard. Sediment will be removed by crane, excavator, backhoe, bulldozer, skid steer loader, or track loader either from within the stream channel or on the sides of channel where equipment can be staged. In general, wet sediment will be trucked to DFM dewatering facilities. On-site dewatering of dredged material will be performed at select sites listed in **Appendix A, Table 5**. Dry sediment removed from stream maintenance sites and dewatering facilities will be disposal of at a landfill. See SOP for sediment removal and disposal in **Section 6.3**.

2.4 Maintenance Categories

The stream maintenance activities, described above, are generally performed at all stream maintenance sites. The means and methods for performing these activities and additional required maintenance activities vary between sites, but generally fit within the categories defined in **Table 2-1**.

Table 2-1 Maintenance Categories

Type A Stream Maintenance	Remove trash, debris, and bulky objects (if any) first, and then remove vegetation, silt/sediments with long reach excavator or crane, no equipment in stream. Off-site dewater and disposal of waste.
Type B Stream Maintenance	Remove trash, debris, and bulky objects (if any) first, and then remove vegetation, silt/sediments with small dozer and/or small loader in stream. May cut and drop vegetation on the top of bank and collect at floor. Off-site dewater and disposal of waste.
Type C Stream Maintenance	Remove trash, debris, and bulky objects (if any) first, and then remove vegetation, silt/sediments with dozer and/or loader in stream. May cut and drop vegetation on the top of bank and collect at floor. Restore steam bank with bulldozer and/or loader as needed, if damaged by storm. Off-site dewater and disposal of waste.
Stream Debris Catcher Maintenance	Remove trash, debris, and bulky objects (if any) first, and then remove vegetation, silt/sediments with long reach excavator, crane, small dozer, and/or loader. Off-site dewater and disposal of waste.
Stream Boulder Basin Maintenance	Remove trash, debris, and bulky objects (if any) first, and then remove vegetation, silt/sediments with tractor mower, bulldozer, excavator, and/or track loader. Off-site dewater and disposal of waste.
Stream Mouth Breach Opening	Remove trash, debris, and bulky objects (if any) first, and then breach the stream mouth 1 to 2 feet wide with excavator and/or loader, to allow the running water further open the steam by itself. Off-site dewater and disposal of waste (if any). Smaller equipment will be used to open a small portion of sand plugs in Laie District during rain events and stream water will then open and remove the sand plugs naturally.

Site specific BMPs and dewatering areas are described in each package, see **Section 7**.

2.5 Equipment Used in Stream Maintenance

Stream Maintenance equipment is located at the Halawa Baseyard and is allocated to each district as needed depending on stream maintenance activities required, with the exception of the Laie District. The Laie District maintains its own stream maintenance equipment because most of the stream maintenance is performed under emergency storm conditions. Each yard may also maintain its own inventory of stream maintenance equipment for specific activities or if equipment from Halawa Yard is not available.

Table 2-2 Equipment used During Stream Maintenance

Equipment Type	Description	Photo
Backhoe	Excavating equipment mounted on the back of a tractor or front loader. Typically a bucket is installed at the end of a two-part articulated arm that is used for digging.	
Boom Truck	Vehicle with an extendable boom mounted to the bed or roof. Sometimes called a *cherry picker or aerial truck.* A bucket boom may be used to lift workers or materials during maintenance activities.	
Bulldozer	Crawler equipment with a metal plate/blade that is used to push soil, sand, rocks and other materials. Standard bulldozers are typically used for very wide streams/ stream mouths to push material to another type of equipment (i.e. excavator) for removal. Small dozers are commonly used inside stream channels to move material that cannot be accessed from outside the channel.	

Equipment Type	Description	Photo
Crane	Machine that lifts and lowers material to move material horizontally using hoist ropes, wire ropes/chains and sheaves. Cranes may also be used to lower other equipment into channels from adjacent bridges and roadways.	
Excavator	Heavy construction equipment used for digging, moving or transporting materials. Typically consists of a boom, dipper, bucket and cab that sit on a rotating platform. Excavators can have either wheels or tracks.	
Skid Steer Loader	Heavy equipment machine used to move aside or load materials into another type of equipment/machinery. Typically consists of a lift arm where different tools can be attached to.	
Tire Loader	Standard tire loaders are typically used in very wide streams/ stream mouths to move aside or load materials into another type of equipment/machinery. Small tire loaders are commonly used inside stream channels to move material that cannot be accessed from outside the channel.	

Equipment Type	Description	Photo
Track Loader	Heavy equipment machine on tracks used to move aside or load materials into another type of equipment/machinery.	

2.6 Water Quality Concerns

2.6.1 Sediment Resuspension

Sediment includes the loose sand, clay, silt, and other soil particles that settle at the bottom of a body of water. Sediment can come from soil erosion or from the decomposition of plants and animals. The major source of sediment at DFM maintenance sites is upland streambank and streambed erosion. Prolonged suspension of sediment in the water column can be detrimental to aquatic life (primary producers, benthic invertebrates, coral reefs and fish) by interfering with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies. Suspended sediment can transport other pollutants that are attached to it including nutrients, trace metals, and hydrocarbons. Sediment is the primary component of total suspended solids (TSS) and turbidity, both common water quality analytical parameters.

2.6.2 Vehicle and Equipment Leaks

Vehicles and equipment used during stream maintenance activities can become a source of pollutants including oil and grease. BMPs for equipment use are described in **Section 4.2.5**. Equipment will be cleaned at the base yard prior to mobilization to the site. Equipment will be inspected and frequently checked prior to and during stream maintenance operations to ensure it is free of leaking fluids. Oil absorption pads will be available on site prior to commencing stream maintenance work. Oil absorbent booms will be used downstream of maintenance activities while working in dry channels. Equipment will only be operated in the stream channel if there is no other practical way to perform the maintenance activity. Equipment will only enter the stream channel if the water level is low enough to insure the axles and all oil and grease containing parts remain above the water level. Equipment substitutions may be made to prevent the use leaking equipment.

2.6.3 Trash

Trash in surface waters can inhibit the growth of aquatic vegetation, harm aquatic organisms by ingestion or entanglement, convey other pollutants such as toxic substances, and cause aesthetic problems on shorelines. The sources of trash at DFM maintenance sites include littering, illegal dumping and homeless encampment areas.

As defined in the CCH's Trash Reduction Plan, trash will be considered analogous to litter as defined below, with the clarification that trash does not include non-man made materials (such as branches, leaves, and other vegetation) deposited in the waterbodies naturally.

As defined in Revised Ordinances of Honolulu (ROH) Section 29-4.1:

"Litter" means rubbish, waste material, garbage, trash, offal or any debris of whatever kind or description, whether or not it is of value, and include improperly discarded paper, metal, plastic, glass or solid waste. Litter also includes "refuse" as defined in Section 29-1.1. Litter may include derelict vehicles.

ROH Section 29-1.1 specifies:

"Refuse" means all putrescible (or capable of decaying) and nonputrescible solid wastes, including animal body wastes, garbage, rubbish, ashes, street cleanings, dead animals, abandoned automobiles, and solid market and industrial wastes.

2.6.4 Nutrients

Phosphorus and nitrogen are the primary nutrients that cause water pollution. Waters polluted with these nutrients develop large numbers of algae and bacteria that deplete available oxygen, causing fish and other beneficial organisms to die (hypoxic and anoxic conditions). Primary sources of nutrients at DFM maintenance sites include decaying vegetation, mineralized organic materials, septic tank seepage, sewage overflow, animal waste, dead animals, and fertilizers from agricultural and residential runoff. Street and highway runoff contributes to the nutrient load as well.

2.6.5 Hazardous and Contaminated Substances

DFM maintenance activities mainly include removing the debris/trash, sediment and vegetation accumulated in the stream beds or lined channels, and removing sand plugs in the stream mouth to relieve the potential for flooding. Removal of some hazardous or contaminated materials is anticipated, especially in areas with illegal dumping. Hazardous Waste Management BMPs, described in **Section 4.2.8** and Waste Material Handling and Disposal SOPs, described in **Section 6**, as well as, applicable federal, state, and local regulations will be followed for handling and disposing of hazardous materials.

2.6.6 Waterborne Pathogens

Pathogenic microorganisms including viruses, bacteria, protozoans, roundworms, tapeworms, and flatworms are concerns in receiving waters. Sources of total and fecal coliforms in storm water and receiving waters are ubiquitous (e.g., soil particles, dropping of wild and domestic animals, etc.). Human sources include illicit sewer connections and seepage from septic tanks. Pathogens are the primary concern at stream mouths with sand plugs. The coliform group of organisms is commonly used as an indicator of the potential presence of pathogens of fecal origin.

2.7 Biological and Historic Resource Concerns during Stream Maintenance

2.7.1 Threatened and Endangered Species

Species protected under both the federal Endangered Species Act and State of Hawaii endangered species law, HRS Chapter 195D, may be present at stream maintenance sites. Stream maintenance activities could

result in the incidental take of protected species, if appropriate measures are not taken to avoid take. Under the federal Endangered Species Act "take" means to "*harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct*". Under Hawaii endangered species law "take" means to "*harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect endangered or threatened species of aquatic life or wildlife, or to cut, collect, uproot, destroy, injure, or possess endangered or threatened species of aquatic life or land plants, or to attempt to engage in any such conduct.*" The following threatened and endangered species may be present at stream maintenance and stream mouth opening sites:

Wildlife:

- Hawaiian hoary bat (federally and state endangered)
- Hawaiian stilt (federally and state endangered)
- Hawaiian coot (federally and state endangered)
- Hawaiian moorhen (federally and state endangered)
- Hawaiian duck (federally and state endangered)
- Green sea turtle (federally and state threatened)
- Hawksbill sea turtle (federally and state endangered)
- Hawaiian monk seal (federally and state endangered)
- Hawaiian short-eared owl (state endangered)

Plants:

- Dwarf naupaka (*Scaevola coriacea*) (federally and state endangered)
- 'Ihi 'ihi (*Marsilea villosa*) (federally and state endangered)
- Kuahiwi laukahi (*Plantago princeps var. princeps*) (federally and state endangered)
- Round-leaved chaff-flower (*Achyranthes splendens var. rotundata*) (federally and state endangered)

Section 4.4.1 provides additional information on threatened and endangered species, including measures that will be taken to avoid take and minimize potential impacts.

2.7.2 Essential Fish Habitat

Essential fish habitat (EFH) is protected under Magnuson-Stevens Fishery Conservation and Management Act. EFH is those waters and substrates necessary to fish for spawning, breading or growth to maturity. Stream mouth opening activities could result in adverse effects to EFH, if appropriate measures are not taken to avoid adverse effects. Specific concerns are associated with the release of stagnant, fresh, warm, low oxygen water, with high levels of TSS, turbidity, chlorophyll a, nutrients, other pollutants, and pathogenic and harmful bacteria into the marine environment when sand plugs are opened. This could affect the health of coral reefs, seagrass bed, other nearshore benthic habitats, as well as coral spawning and recruitment. There is also concern for long-term cumulative adverse effects to EFH from the ongoing stream mouth opening, particularly if there is an increase in the frequency of these activities. **Section 4.4.2** provides additional information on EFH, including measures that shall be taken to avoid and minimize adverse effects.

2.7.3 Historic and Cultural Properties

Historic and cultural properties have been identified within and adjacent to stream maintenance sites. These include, but are not limited to historic bridges, masonry work, burial sites, former fishpond sites, and adjacent historic properties, such as Liliuokalani Botanical Garden, and in some cases the stream itself is culturally significant. These properties and resources are protected under the National Historic Preservation Act and the State of Hawaii Historic Preservation Program, HRS Chapter 6E. In addition to identified historic and cultural properties there is the potential for the inadvertent discovery of subsurface historic and cultural resources, such as artifacts, cultural layers and burials. **Section 4.5** provides additional information on historic and cultural properties, including measures that shall be taken to avoid adverse effects.

3 DFM Stream Maintenance Program

3.1 Notification of Stream Maintenance Operations

Each month a schedule for stream maintenance will be prepared by the DRM and submitted to the USACE and DOH at least two (2) weeks in advance of the work via email. In addition to the submittal of the monthly schedule, the DFM will contact the USACE and DOH by email at least 72 hours prior to the start of work at a given stream maintenance site and within 72 hours of the completion or termination of work at that site.

All correspondence, including emails, sent to the DOH will include "**File No. WQC0928**" and "**CCH DFM Stream Maintenance Activities**" in the subject line. All correspondence sent to the USACE will include "**File No. POH-2017-00198**" and "**CCH DFM Stream Maintenance Activities**" in the subject line. A summary of the notification requirements and contact information for each resource agency are provided below in **Table 3-1**.

Table 3-1 Notification Contacts for Stream Maintenance Activities

Agency	Notification timeline	Contact Information
DOH CWB and USACE	Provide written schedule for upcoming month, 2 weeks in advance of the work.*	cleanwaterbranch@doh.hawaii.gov and CEPOH-RO@usace.army.mil
DOH CWB and USACE	Contact 72 hours prior to starting work. Notify within 72 hours of completion or termination.*	cleanwaterbranch@doh.hawaii.gov and CEPOH-RO@usace.army.mil / (808) 835-4303
National Marine Fisheries Service (NMFS)	Notify 24 hours prior to starting work at stream mouth opening sites in the Honolulu, Laie, Waianae, Waialua, or Pearl City Districts. Provide location and schedule for work. So NMFS may provide wildlife monitors, if available.*	david.schofield@noaa.gov; or aliza.milette@noaa.gov; and (808) 220-7802
U.S. Fish and Wildlife Service (USFWS)	Notify within 48 hours of the discovery of an endangered Hawaiian waterbird nest or brood (chicks/ducklings)	johnathon_kraska@fws.com; and (808) 792-9400
Division of Forestry and Wildlife (DOFAW)	Discovery of a Hawaiian short-eared owl nest.	(808) 973-9778
USACE and NMFS	Report observations of monk seals or sea turtles within 150 feet of work sites. Report any observed adverse effects to monk seals or sea turtles.	CEPOH-RO@usace.army.mil / (808) 835-4303 and david.schofield@noaa.gov; or aliza.milette@noaa.gov; and (808) 220-7802
State Historic Preservation	Contact immediately if subsurface	

Agency	Notification timeline	Contact Information
Division	historic resources are discovered	(808) 692-8015
DOH Hazard Evaluation and Emergency Response Office (HEER)	Contact immediately if any amount of oil which when released into the environment causes a sheen to appear on the surface water, or any navigable water of the State.	(808) 586-4249
U.S. Coast Guard (USCG)	Contact immediately if any amount of oil, which when released into the environment causes a sheen to appear on the surface water, or any navigable water of the State.	(808) 535-3230
DOH Solid and Hazardous Waste Branch (SHWB)	Contact if there are any questions regarding handling or disposal of solid or potentially hazardous waste encountered at stream sites.	(808) 586-4226

* These notification requirements do not apply to notification of emergency activities. In the event of emergency activities follow notification requirements described in Section 3.2 Notification of Emergency Activities.

3.2 Notification of Emergency Activities

Notification for emergency removal of stream blockages where there is imminent threat to life or property will be done by telephone and email, as soon as practicable, immediately after the CCH determines that such action is warranted. If the determination of imminent threat to life or property is made during State nonworking hours, the notification will be made the next working day.

3.3 Water Quality Applicable Monitoring and Assessment Plan for Stream Maintenance Activities

3.3.1 Visual Monitoring

Water quality monitoring for stream maintenance activities involves visual monitoring of the stream and the receiving waters by the DRM drainage engineer or agent. DOH requires that monitoring be performed daily by trained and qualified inspectors using an inspection template. The City will perform awareness training for DFM staff. The following guidelines will be adhered to for each stream maintenance activity.

1. Drainage Engineer, a Qualified Representative, or Agent will be onsite during clearing operations.
2. Visual inspections and photographs will be taken before, during, and after clearing operations.
3. Based on visual inspection, the Drainage Engineer or Agent may suspend work to modify BMPs or to consult with USACE, DOH, or other resource agencies. See **Section 4** for more information on BMPs and stop work procedures.
4. Report all results to USACE and DOH weekly.

4 Best Management Practices

DFM stream maintenance program will include the implementation of the following types of BMPs:

1. Construction BMPs, **Sections 4.1and 4.2**
2. Scheduling BMPs, **Section 4.3**
3. Biological Resource BMPs, **Section 4.4**
4. Historic and Cultural Resource BMPs, **Section 4.5**
5. Stop Work Procedures, **Section 4.6**
6. Stream Maintenance SOPs, **Section 5**, and
7. Waste Material Handling and Disposal SOPs, **Section 6.**

The BMPs described below are approved for use by the CCH for construction activities taking place on land and in or near water. Each site-specific plan in **Section 7** of this document references the applicable BMPs to be used at each site.

4.1 Construction BMP Evaluation and Selection

BMP selection for DFM maintenance activities is based on site conditions, the type of maintenance activity to be performed, and pollutants of concern. The need for a construction BMP was determined based on a specific concern (e.g., minimizing turbidity downstream from the work area) and what BMPs have, and have not been, effective in addressing these concerns under similar conditions on previous projects. These concerns and selected BMPs are discussed in **Table 4-1**.

BMPs which have the potential to be a source of pollution themselves were rejected during the BMP section process. These include, but are not limited to: (1) compost biosocks in stream, which are a source of nutrients; and (2) soil berms, as soil particles erode and contribute to pollutants within the streams. To the extent practical BMPs that inhibit movement of aquatic life were also avoided.

Table 4-1 Construction BMP Selected and Rationale

Concern	BMP Selected	Rationale for Selection
Erosion	**Preservation of Existing Vegetation**	To avoid and minimize erosion and sediment run-off, removal and disturbance of vegetation will be minimized to what is necessary for stream maintenance. No grading or disturbance of upland vegetation will be performed. Stream maintenance activities will include removal of vegetation within the stream channel and the cutting and mowing of vegetation along the stream banks. The root systems of vegetation growing along the banks will not be disturbed.

Concern	BMP Selected	Rationale for Selection
Elevated turbidity downstream of the work area	**Turbidity Curtains**	Turbidity curtains have been shown to be effective in confining suspended sediment to the work area, and minimizing the downstream release of turbid water and TSS, in lakes, ponds, and very slow moving streams. Turbidity curtains are generally not effective in fast flowing water or the marine environment where the movement of the turbidity curtain with the flowing water and/or wave action can disturb the underlying sediment generating turbidity. Therefore, turbidity curtains will not be used in the nearshore ocean environment. Additionally, turbidity curtains should not be installed in a manner that inhibits movement of aquatic life.
Return flow to surface waters from dredged material stockpiles	**Stockpile Management and Perimeter Controls**	Filter socks and/or sandbag perimeter barriers around dredged material dewatering stockpiles reduce the potential for return flow to surface waters. Proper stockpile management and covering of stockpiles prior to rain events also reduces the potential for runoff and return flow to surface waters.
Human exposure to contaminated sediment and construction equipment	**Temporary High Visibility Construction Fencing**	Temporary high visibility construction fencing effectively demarcates a public exclusion zone around dredged material dewatering stockpiles and equipment left on-site overnight.
Equipment leaks during in-stream work	**Equipment Use In Streams and Near Water (Leak Control and Clean-up)**	Vehicle inspection and cleaning reduces the potential for leaks in the field. Equipment operation in streams occurs only if there is no other practical alternative. Oil absorbent filter sock and oil absorbing pads are effective in containing and absorbing oil and grease that could leak from equipment during stream maintenance. The material in oil absorbent filter socks would not introduce nutrients or other pollutants into the stream. Compost biofilter socks could introduce nutrients into the stream and therefore were not selected for us in stream.
Rising water level during work in tidal streams	**Bulk Bag Isolation Barriers**	Bulk bags, sandbags, and gravel bags have been shown to be effective in isolating in-stream work areas from inundation. Because of the volume and depth of water that can move into tidal stream channels bulk bag isolation barriers were selected as the preferred BMP to isolate the work area from tides. This BMP would temporarily inhibit the movement of aquatic life; however, there is no other practical alternative for controlling the water level in the work area.

Concern	BMP Selected	Rationale for Selection
Improper management and disposal of solid waste	**Solid Waste Management**	Solid waste including trash, litter, refuse, and vegetation debris will be collected during stream maintenance activities and will need to be properly managed and disposed of.
Improper management and disposal of hazardous waste	**Hazardous Waste Management**	Removal of some hazardous or contaminated materials is anticipated, especially in areas with illegal dumping.
Improper management and disposal of contaminated soil	**Contaminated Soil Management**	Soil/sediment dredged from stream maintenance sites may be contaminated and will need to be properly managed and disposed of.

There are a number of BMPs that are commonly used in construction that are not applicable to DFM stream maintenance activities. These commonly used BMPs were considered and dismissed as described in **Table 4-2**.

Table 4-2 Common Construction BMPs Considered and Dismissed

BMP	Rationale for Dismissal
Temporary Soil Stabilization - hydraulic mulch - hydroseeding - soil binders - straw mulch - erosion control blankets and mulch	No grading or disturbance of upland vegetation will be performed. All excavation (i.e., dredging) will be restricted to the stream channel. Vegetation along the stream banks will be cut and/or mowed. The root systems of vegetation growing along the banks will not be disturbed. These BMPs are only suitable for temporary stabilization of disturbed uplands and therefore were dismissed.
Temporary Sediment Control - silt fence - desilting basin - sediment traps - check dams - storm drain inlet protection	No grading or disturbance of upland vegetation will be performed. All excavation (i.e., dredging) will be restricted to the stream channel. Vegetation along the stream banks will be cut and/or mowed. The root systems of vegetation growing along the banks will not be disturbed. These BMPs are intended contain sediment runoff in uplands. No sediment runoff from upland areas would be expected given the nature of stream maintenance activities.

BMP	Rationale for Dismissal
Tracking Control - Stabilized Construction Entrances/Exits	The disturbance of upland areas will be avoided; therefore, the tracking of sediment onto roadways is not anticipated. Stream maintenance activities are short in duration (a few days) relative to construction projects that use construction entrances/exits for extended periods of time (months). Placement of aggregate or shaker plates would cause greater disturbance.
Material Delivery and Storage **Material Use**	These BMPs are suitable for use at sites with delivery, use, and storage of the following materials: soil stabilizers and binders, pesticides and herbicides, fertilizers, plasters, petroleum products, asphalt and concrete components, hazardous chemicals and concrete compounds. None of these materials will be delivered to, used, or stored at stream maintenance sites.

4.2 Construction Site BMPs

The following BMPs may be used during stream maintenance activities.

4.2.1 Preservation of Existing Vegetation

To avoid and minimize erosion and sediment run-off, removal and disturbance of vegetation will be minimized to what is necessary for stream maintenance. No grading or disturbance of upland vegetation will be performed. Stream maintenance activities will include removal of vegetation within the stream channel and the cutting and/or mowing of vegetation along the stream banks. The root systems of vegetation growing along the banks will not be intentionally disturbed.

4.2.2 Turbidity Curtains

DFM uses turbidity curtains for two purposes: (1) to contain turbid water and (2) to aid in the collection of floatable trash/debris. If the purpose of the curtain is to contain turbid water, the curtain will be installed downstream of the work area. If the purpose of the curtain is to aid in the collection of floatable trash/debris it may be installed upstream or downstream of the work area, as practical for accessing and collecting floatable trash/debris that has collected behind the curtain. For example, a turbidity curtain maybe installed at a bridge crossing upstream of a stream mouth opening site because the bridge would provide convenient access for the collection of floatable trash/debris with fishing/pool cleaning nets or similar equipment.

DFM currently uses two types of turbidity curtains: 3-foot skirt and no-skirt (Figure 4-1 Types of Turbidity Curtains Used by DFM**Figure 4-1**). Turbidity curtains with 3-foot skirts are used in streams where the water depth is greater than 3-feet 6-inches deep. This avoids the curtain dragging along the bottom of the stream (potentially generating turbidity) and reduces the potential for sediment to settle on the curtain, which could later be re-suspended during removal. The primary application of turbidity

curtains with 3-foot skirts is to contain turbid water within the work area until the suspended sediment has naturally settled out behind the curtain. Some turbid water may escape the through the gap between the bottom of the curtain and the bottom of the channel; however, this suspended sediment would already be near the bottom the water column and would settle quickly. Should DFM use turbidity curtains with other length skirts the purposes and application would be the same as described above.

The no-skirt curtain is primarily used to aid in the collection of floatable debris. The no-skirt curtain may also be used to minimize the movement of suspended sediment near the top of the water column in streams that are less than 3-feet 6-inches deep.

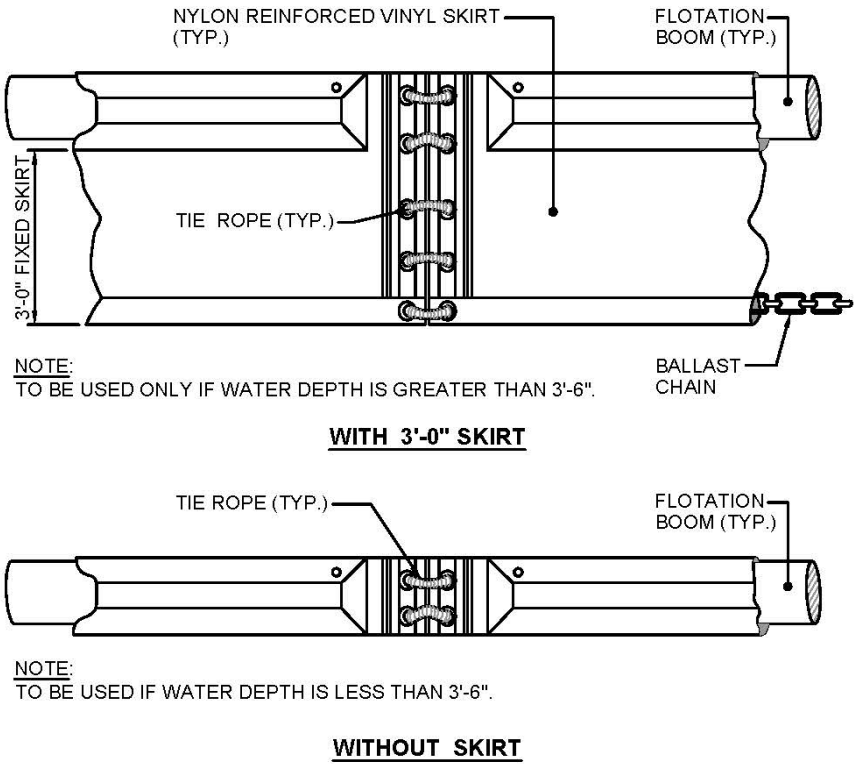


Figure 4-1 Types of Turbidity Curtains Used by DFM

Turbidity curtains should never completely block the flow of the stream and should not inhibit the movement of aquatic life. Turbidity curtains may be installed in one of the following three ways, all of which would not completely block the flow of the stream and would not inhibit the movement of aquatic life:

1. If work takes place across the full width of the stream, turbidity curtains may be run perpendicular across the stream channel (**Figure 4-2**) with a gap between the base of the curtain and the channel bottom (**Figure 4-3**).
2. If work only takes place on one side of the stream, turbidity curtains may be run at an angle across the stream channel. The curtain would be secured to the streambank or channel wall, downstream of the work area, on the side of the stream work is taking place. The upstream side of

the curtain would be connected to rope or similar material with a gap between the curtain and the streambank or channel wall (**Figure 4-4**).

3. If work only takes place on one side of the stream, turbidity curtain may be secured to the same side of the streambank or channel wall, upstream and downstream of the work area (**Figure 4-5**).

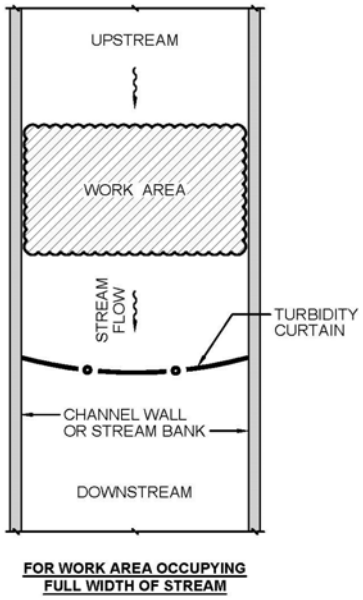


Figure 4-2 Turbidity Curtain Run Perpendicular across the Stream Channel, for Work Area Occupying Full Width of the Stream

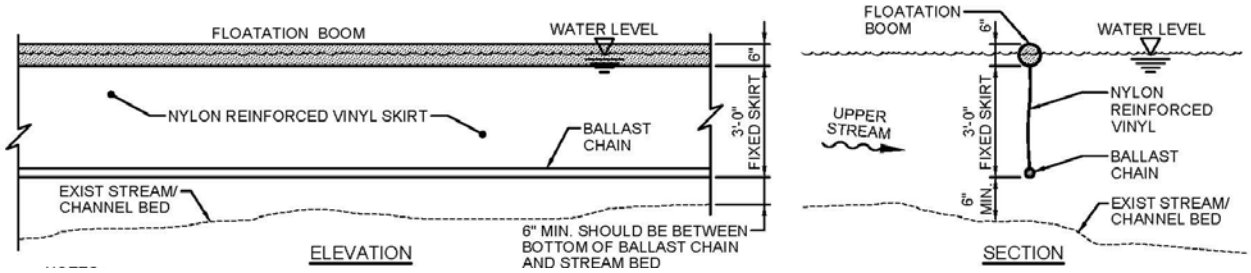


Figure 4-3 Gap between the Bottom of the Turbidity Curtain and the Existing Stream Bed/Channel Bottom

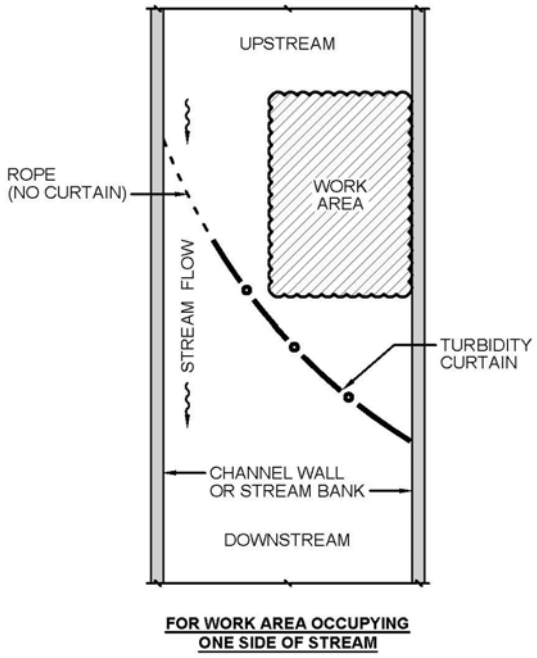


Figure 4-4 Turbidity Curtain Run at an Angle with a Gap on One Side, for Work Area Occupying One Side of the Stream

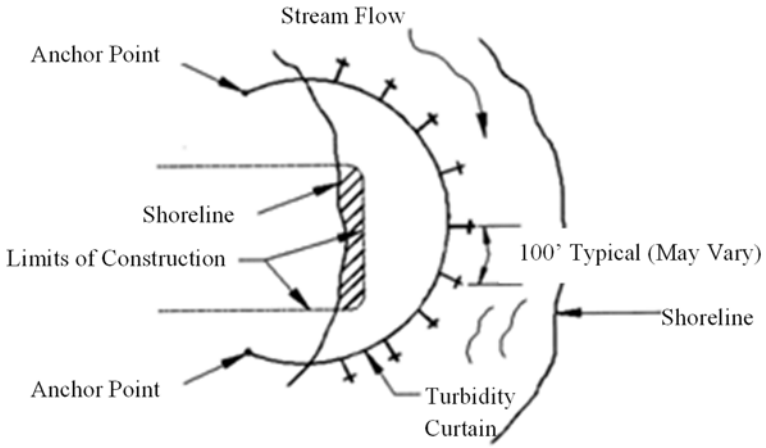


Figure 4-5 Turbidity Curtain Anchored to the Same Side of the Stream, Upstream and Downstream of the Work Area for Work Area Occupying One Side of the Stream

Turbidity curtains shall be cleaned and inspected for damage prior to mobilization and installation at the stream site. Should damage be observed the curtain shall be repaired or replaced prior to use.

Turbidity curtains should be relocated as needed to ensure there is a turbidity curtain located within 1,000 feet of the active work area. Should turbid water be observed outside the work area, downstream of the turbidity curtain, additional turbidity curtains should be installed further downstream to contain the turbid water, as practical. Turbidity curtains should only be removed after suspended sediment contained by the curtain has settled or another turbidity curtain has been installed further downstream. Turbidity curtains should only be removed in a manner that does not generate additional turbidity. If removal of the turbidity curtain has the potential to generate turbidity, an additional turbidity curtain should be installed downstream to contain the turbid water, as practical.

DFM does not work in streams during storm events, except for the emergency removal of stream blockages where there is imminent threat to life or property or to minimize damage to resources. In such an emergency storm situation BMPs, such as turbidity curtains would not be deployed. During such an event the turbidity levels throughout the stream would likely exceed water quality standards, rendering the turbidity curtains ineffective and putting the curtain at risk of breaking free. Temporary in-stream BMPs, including turbidity curtains should be removed prior to storm events. In general, turbidity curtains should be removed at the end of the work day. However, if suspended sediment has not settled out behind the curtain by the end of the work day, the curtain may be left in place overnight, provided no rain or storms are forecasted. The turbidity curtain should be removed the next workday.

Streams where the use of turbidity curtains is recommend are listed in **Appendix A, Table 4** and shown on the site-specific site plans in **Section 7**. Details for the installation and use of turbidity curtains are provided in site-specific BMP details in **Section 7**.

4.2.3 Stockpile Management and Perimeter Controls

In general trash/debris, vegetation and sediment removed from stream maintenance will be loaded directly into dumpsters or dump trucks. Stockpiling is a very temporary measure. Any trash/debris and vegetation stockpiles are removed daily, and at most sites sediment dredged from streams is also removed daily. Use of Geotextile fabric or plastic sheeting is a good housekeeping BMP and may be used for temporary

trash/debris, vegetation, and sediment stockpiles. This practice will generally be used when collecting material by hand or with hand tools, to gather and bundle collected material for disposal as the work progresses.

Most dredged material dewatering will be performed at DFM dewatering facilities. Wet materials will be trucked to DFM dewatering facilities. Stream maintenance sites with on-site dredged material dewatering are listed **Appendix A, Table 5**. The locations of dredged material dewatering areas for sites with on-site dewatering are shown on site-specific site plans in **Section 7**.

Temporary filter sock or sandbag perimeter barriers shall be installed around dredged material dewatering stockpiles, as shown in **Figure 4-6**.[1] The perimeter barrier shall be effective in avoiding return flow to surface waters. Filter socks should be replaced and/or additional rows of filter socks and/or sandbags added, as needed, to avoid return flow to surface waters. Filter socks should either be anchored with stakes or sandbags, as shown on site-specific BMP details in **Section 7**.

Compost biofilter socks may be used in uplands as perimeter barriers for dredged material dewatering stockpiles. Compost biofilter socks shall not be used in streams.

With the exception of stockpiling of dredged material for dewatering at select-sites listed in **Appendix A, Table 5**, no other stockpile of material is anticipated. Stockpile shall be covered with plastic sheeting prior to rain events.

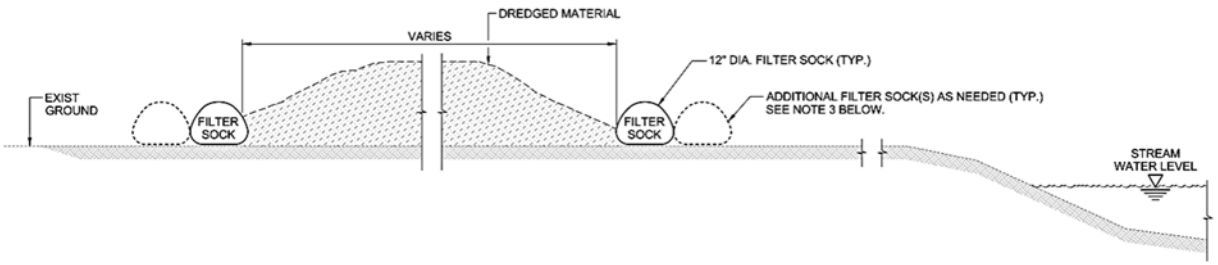


Figure 4-6 Perimeter Barrier to be Installed Around Dredge Material Stockpiles

4.2.4 Temporary High Visibility Construction Fencing

To avoid the public coming into contact with materials that has been dredged from streams, all trash/debris and vegetation removed from streams will be removed from the site and disposed of daily. Most dredged sediment will be removed from the site daily for dewatering at DFM dewatering facilities. On-site dewatering of dredged material will be performed at select sites listed in **Appendix A, Table 5.** Temporary high visibility construction fencing will be installed around all material stockpiles left on-site overnight.

[1] This does not apply to stream mouth dredge opening sand dewatering areas. Stream mouth dredged opening and the sand dewatering and placement will be addressed in a separate manual specific to those activities.

4.2.5 Equipment Use in Streams and Near Water (Leak Control and Clean-up)

To the extent practical the operation of heavy equipment within streams will be minimized. Equipment will only be operated in the stream channel if there is no other practical way to perform the maintenance activity. Due to access limitations, such as, fences, private and residential properties abutting the stream, streams that are too wide for equipment to reach, and the need to access culverts and areas under bridges it is necessary for equipment to work within the stream at most sites. Stream sites where it has been determined that heavy equipment will need to work within the stream are listed in **Appendix A, Table 1**. Unlined (natural) stream maintenance sites where heavy equipment will be operated within the stream are listed in **Appendix A, Table 2**. The site conditions and equipment access options at the different stream sites are variable. The locations where equipment may enter the stream are shown on the site-specific site plans in **Section 7**; and the location and method by which equipment may enter the stream is described in **Appendix A**, for each of the stream maintenance sites. At most maintenance sites equipment will enter the stream by driving down an existing access ramp or by being lowered into the stream with a crane. Maintenance sites were equipment may be driven down natural embankments or sites where new temporary gravel equipment access ramps may be installed are listed and described in **Appendix A, Table 3**. Should the banks of an unlined stream be disturbed as a result of equipment access any material that has slumped off the banks will be put back in place.

Equipment will only enter the stream channel if the water level is low enough to insure the axles and all oil and grease containing parts remain above the water level. Equipment will be cleaned and inspected for leaks at the baseyard prior to mobilization to the site.

As a contingency measure for an unlikely equipment leak or malfunction, oil absorbent filter socks will be installed downstream of work area for dry streams with little to no water. Details for the installation and use of oil absorbing filter socks are provided in site-specific BMP details in **Section 7**. Oil absorbing filter socks will be removed from the stream at the completion of work. Compost biofilter socks will not be used in streams.

Drip pans, absorbent materials or plastic sheeting will be placed under equipment and vehicles expected to be idle for more than 4 hours.

Should an equipment leak be discovered in the field, the leaking equipment will be immediately removed from the site and any fluids that have been released will be contained and cleaned up. Oil absorbing pads or other similar materials will be available for clean-up of any leaks/spills.

4.2.6 Bulk Bag Isolation Barriers

In select tidal stream channels, located on the west side of Oahu, bulk bags (approximately 4-foot by 4-foot sandbags) will be placed in the stream channel at low tide, on the downstream side of the work area, to isolate the channel from the incoming tide (**Figure 4-7**). Stream sites where bulk bag isolation barriers will be used are listed **Appendix A, Table 6**. Bulk bags will be filled with clean material that will not introduce pollutants into the stream. The bags will be inspected prior to use to insure there is no damage to the integrity of the bag. Details for the installation and use of bulk bag isolation barriers are provided in

site-specific BMP details in **Section 7**. The bulk bags will be removed from the stream at the completion of work.

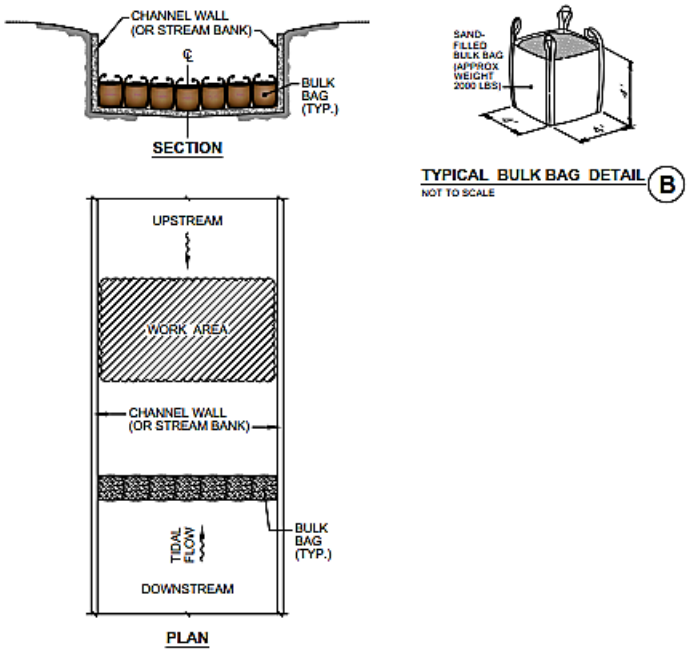


Figure 4-7 Bulk Bag Isolation Barrier used to isolate the Work Area from Incoming Tide

4.2.7 Solid Waste Management

Solid waste is to be collected, stored, and disposed of using practices that minimize contact with stormwater, surface waters, and the public. Solid waste includes trash/debris, green waste, and bulk objects that are none hazardous. SOPs for the collection, handling and disposal of solid waste are described in **Section 6**. Disposal of waste will be reported to DOH SHWB using the form in **Appendix B**.

4.2.8 Hazardous Waste Management

Hazardous waste, as defined by the EPA, is a waste with properties that make it dangerous or capable of having a harmful effect on human health or the environment. Stream maintenance activities will not generate hazardous waste, nor will the activities involve the use of hazardous materials. However, removal of some hazardous or contaminated materials is anticipated, especially in areas with illegal dumping. Should hazardous waste be encountered, it shall be collected, stored, and disposed of using practices that minimize contact with maintenance workers, stormwater, surface waters, and the public. Hazardous waste that could potentially be encountered at the stream maintenance sites includes petroleum products; animal and human waste or feces, bio-hazardous needles medical waste and sharps, animal carcasses. Other hazardous substances include paints, pesticides, concrete curing compounds, acids, solvents, and other hazardous products and chemicals, these substances are not anticipated to be present at maintenance sites.

Worker safety should be prioritized when dealing with hazardous waste and appropriate protocol shall be followed.

Hazardous waste disposal shall follow guidelines set forth by the DOH SHWB and other federal regulations. All hazardous waste shall be immediately disposed of at an appropriate facility at the end of each work day. If there are any questions regarding the handling or disposal of the hazardous waste, contact the SHWB. Contact information is listed in Table 3-1. Disposal of waste will be reported to DOH SHWB using the form in **Appendix B.**

4.2.9 Contaminated Soil Management

Contaminated soil may be present in highly urbanized, industrial and agricultural areas where soil contamination may have occurred from spills, past use and leaks of underground storage tanks, illicit discharges, use of pesticides and fertilizers, and/or aerial deposition. Soil may become contaminated if petroleum products leak or spill onto the ground during maintenance operations (See **Section 4.2.4** for appropriate leak and spill prevention measures). Contaminated soil is to be collected, stored and disposed of using practices that minimize contact with stormwater, surface waters, maintenance workers, and the public. Contaminated soils that are hazardous and cannot be treated onsite must be disposed of offsite by a DOH approved hazardous waste transporter approved by SHWB. If contaminated soil is suspected to be present, coordination between DFM and the appropriate State and Federal agencies shall occur prior to further action. Contact the DOH SHWB for more information, contact information is listed in Table 3-1. Report disposal to DOH SHWB using the form in **Appendix B.**

4.3 Stream Maintenance Scheduling BMPs

Stream maintenance activities are scheduled based on need (e.g., accumulation of sediment and debris, vegetation overgrowth, threat of flooding, and unsanitary conditions), weather conditions, seasonal work windows to avoid impacts to wildlife, and minimizing human exposure to affected areas. The anticipated frequency for each activity is presented in each site specific package.

In general, scheduled stream mouth opening operations will be performed between Monday and Wednesday. Scheduled work will not be performed during short school recesses or if there is a holiday during that week. The intention of this scheduling is to avoid times when the adjacent beach would have the greatest usage. This will reduce public contact within the affected work area and allow the operations to proceed efficiently with minimal delays.

While stream maintenance will take place throughout the year, as needed, the majority of stream maintenance activities will be scheduled for the dry season, April through October, to minimize water in the work area and delays from more frequent winter storms.

Stream maintenance activities will not be performed during storm events or projected storm events, unless necessary to protect public health and safety and resources. Stream mouth breach opening is generally performed on a falling (ebb) tide, to allow the natural flow of the stream to help open the sand plug.

The frequency of stream mouth opening activities will be minimized during the peak coral spawning period of June 1 – September 30, as practical.

Established trees greater than 15 feet tall shall not be disturbed, removed, or trimmed during the bat birthing and pup rearing season of June 1 through September 15. Only woody ruderal vegetation, such as haole koa and mangroves can be removed or trimmed during this season.

The M-1 Channel maintenance site in the Waianae District is used for nesting by a colony of Hawaiian stilts. To avoid impacts to nesting stilts, work shall only be performed at this site during the period from October to April, outside the stilt nesting season.

4.4 Biological Resource BMPs

4.4.1 Threatened and Endangered Species

The following threatened and endangered species may be present at stream maintenance and stream mouth opening sites:

Wildlife

- Hawaiian hoary bat (federally and state endangered)
- Hawaiian stilt (federally and state endangered)
- Hawaiian coot (federally and state endangered)
- Hawaiian moorhen (federally and state endangered)
- Hawaiian duck (federally and state endangered)
- Green sea turtle (federally and state threatened)
- Hawksbill sea turtle (federally and state endangered)
- Hawaiian monk seal (federally and state endangered)
- Hawaiian short-eared owl (state endangered)

Plants

- Dwarf naupaka (*Scaevola coriacea*) (federally and state endangered)
- ʻIhi ʻihi (*Marsilea villosa*) (federally and state endangered)
- Kuahiwi laukahi (*Plantago princeps var. princeps*) (federally and state endangered)
- Round-leaved chaff-flower (*Achyranthes splendens var. rotundata*) (federally and state endangered)

The following measures shall be taken to avoid potential impacts to threatened and endangered species:

1. Worker awareness training shall be provided to all DFM maintenance personnel. Training shall be provided by an environmental professional (e.g., biologist, engineer, environmental scientist). Training shall include identification of listed species, biological and monitoring survey procedures, stop work procedures, notification procedures, and buffer zone establishment.
2. All work must stop under unusual conditions, such as large tidal events and high surf conditions, unless the action undertaken is to avoid or minimize damage to resources.

Hawaiian Hoary Bat

1. Established trees greater than 15 feet tall shall not be disturbed, removed, or trimmed during the bat birthing and pup rearing season of June 1 through September 15.

Hawaiian Short-Eared Owl

1. If Hawaiian short-eared owl (also known as Pueo) nests are present, a buffer zone will be established. No clearing shall occur within the buffer zone until nesting ceases. DOFAW staff will also be notified of such event.

Hawaiian Waterbirds

Hawaiian stilts, coots, and moorhen are collectively referred to as Hawaiian waterbirds.

1. Hawaiian waterbird and nest surveys shall be performed by dedicated staff who has been trained in the identification of Hawaiian waterbirds and nest survey procedures. This staff's sole responsibility will be to monitor and survey for wildlife. Hawaiian waterbird and nest surveys shall be performed no more than 3-days prior to initiating stream maintenance activities.
2. Any documented nests or broods within the project vicinity shall be reported to the USFWS within 48 hours.
3. A trained monitor shall be present during stream maintenance activities at all sites that have Hawaiian waterbirds and/or nests, as identified during pre-construction surveys.
4. A 100-foot buffer shall be established and maintained around all active nests and/or broods until the chicks have fledged.
5. Should a Hawaiian waterbird be observed within the stream site, or flies into the site all work within 100 feet of the individual(s) shall stop. Work shall not resume until the Hawaiian waterbird(s) leave the area on their own accord.
6. An annual report providing the results of Hawaiian waterbird nest surveys and monitoring shall be submitted to the USFWS.
7. The M-1 Channel maintenance site in the Waianae District is used for nesting by a colony of Hawaiian stilts. To avoid impacts to nesting stilts, work shall only be performed at this site during the period from October to April, outside the stilt nesting season.

Hawaiian Monk Seal and Sea Turtles

1. Twenty-four hours prior to initiating work at stream mouth opening sites in the Laie District notify the NMFS Hawaiian monk seal responders of the location and schedule for the activities; so that they may provide a responder to monitor the site for monk seals and sea turtles, if available. NMFS Hawaiian monk seal responders can be reached at (808) 220-7802 or by email at david.schofield@noaa.com and aliza.milette@noaa.gov.
2. Prior to initiating work at stream mouth opening sites the NMFS Hawaiian monk seal responder or other designated competent observer shall survey the work site and beach areas within 150 feet of the work site for monk seals and sea turtles. These surveys shall be performed prior the start of work each day and prior to resumption of work following any break of 30 minutes or more.
3. During work the NMFS Hawaiian monk seal responder or other designated competent observer shall keep constant vigilance for the presence of monk seals and sea turtles.
4. Should a monk seal or sea turtle be observed within or near the stream mouth opening site all work within 150 feet of the individual(s) shall stop. Work shall not resume until the individual(s) leaves the area on its own accord.
5. Any observations of monk seals or sea turtles within 150 feet of work sites shall be documented and reported to the USACE and NMFS.
6. Should a monk seal or sea turtle be adversely affected, all work must stop at all stream mouth sites pending re-initiation and completion of consultation between the USACE and NMFS.
7. Project-related personnel shall not attempt to disturb, touch, ride, feed, or otherwise intentionally interact with any monk seals or sea turtles.
8. Any identified sea turtle nests must be flagged to identify and avoid impacts.

Plants

1. Minimize vegetation removal and disturbance to what is necessary for stream maintenance.

4.4.2 Essential Fish Habitat

EFH includes all waters and substrates necessary to fish for spawning, breading or growth to maturity. The following measures shall be taken to avoid potential adverse effects to EFH:

1. Stream mouth opening activities shall be scheduled to follow upstream maintenance activities, as practical.
2. Stream mouth opening shall be scheduled to precede anticipated storm events to prevent flooding and minimize the volume of potentially impacted freshwater released into the marine environment during stream mouth opening. In some incidences it may be necessary to open stream mouths during or following storm events to control flooding. Stream mouth opening shall not be scheduled immediately following rain events, unless required to control/prevent flooding.
3. The frequency of stream mouth opening activities shall be minimized during the peak coral spawning period of June 1 – September 30, if practical.

4.5 Historic and Cultural Resource BMPs

Cultural and historic properties have been identified within or adjacent to stream maintenance sites, as summarized in **Table 4-3**.

Table 4-3 Historic Properties Within or Adjacent to Stream Maintenance Sites

Stream Site No.	Stream	Historic Property	
		Name	Listing IDs and Status
01-001	Ala Naio Stream	Ala Wai Canal	SIHP # 50-80-14-09757 NRHP Nominated
		Loko Puapuanienie	SIHP # 50-80-14-04583
		Loko Kaheana (in Papakilo database it is spelled “Kaheina”)	SIHP # 50-80-14-04582
01-002	Kalihi Stream (a)	North King Street Bridge-Kalihi Stream (1933)	Bridge #003062081400037 NRHP Eligible
01-009	Lunalilo Terrace Ditch	Keahupua-o Maunalua Fishpond (Hawaii Kai)	SIHP # 50-80-15-00049
01-010	Makiki Ditch (From Philip Street to Ferm Street	Fern St. Bridge - Makiki Stream (1931)	Bridge #003209001100001 NRHP Eligible
	Makiki Ditch (From Fern Street to Ala Wai Canal)	Kapiolani Blvd. Bridge No.1- Makiki Stream (1931)	Bridge #003062021400052 NRHP Eligible

Stream Site No.	Stream	Historic Property	
		Name	**Listing IDs and Status**
		Ala Wai Canal	SIHP # 50-80-14-09757 NRHP Nominated
01-012	Manoa Palolo Stream	Date St. Bridge - Manoa Palolo Drainage Canal (1937)	Bridge #003083041400055 NRHP Eligible
01-013	Manoa Stream	Kahaloa Dr. Extension Bridge - Manoa Stream (1954)	Bridge #003211001200001 NRHP Eligible
		East Manoa Road Bridge No. 1 -Manoa Stream (1938)	Bridge #003208001200001 NRHP Eligible
01-015	Muliwai Ditch	Kahala Ave. Bridge No. 1 - Muliwai Ditch (1947)	Bridge #003311001200001 NRHP Eligible
01-016a	Nuuanu Stream (a)	Laimi Road Bridge - Nuuanu Stream (1920)	Bridge #003261001200001 NRHP Eligible
01-016c	Nuuanu Stream (c)	N Kuakini St. Bridge No. 1 - Nuuanu Stream (1934)	Bridge # 003083321400031 NRHP Eligible
		N School Street Bridge - Nuuanu Stream (1932)	Bridge # 003083631400271 NRHP Eligible
		Nuuanu Ave Arch Bridge - Nuuanu Stream (1904)	Bridge # 003083471400113 NRHP High Preservation Value
		Foster Botanical Garden (Liliuokalani Botanical Garden)	SIHP # 50-80-14-01389 NRHP Ref # 93000377
01-016d	Nuuanu Stream (d)	Nuuanu Stream Bridge at Vineyard Blvd. (1959)	Bridge #003098001400077 NRHP Eligible
		N School Street Bridge - Nuuanu Stream (1932)	Bridge # 003083631400271 NRHP Eligible
		North Beretania Street Bridge- Nuuanu Stream (1967)	Bridge #003062091400213 NRHP Potentially Eligible
		Foster Botanical Garden (Liliuokalani Botanical Garden)	SIHP # 50-80-14-01389 NRHP Ref # 93000377
		N. King St. Bridge No. 1- Nuuanu Stream (1922)	Bridge #003062081400218 NRHP High Preservation Value (Outside Project Area)
		Chinatown Historic District	NRIS Ref.# 73000658 SIHP # 50-80-14-09986
		N. Hotel Street Bridge (1936)	Bridge #003083981400003 NRHP Eligible
01-017	Palolo Stream	Saint Louis Drive Bridge- Palolo Stream (1929)	Bridge #003083061400136 NRHP High Preservation Value

Stream Site No.	Stream	Historic Property	
		Name	Listing IDs and Status
01-018	Pauoa Stream	Lusitana St. Bridge-Pauoa Stream (1932)	Bridge #003083381400047 NRHP Eligible
		Pauoa Stream Culvert (1925)	Bridge #003000610400044 NRHP Potentially Eligible
		Uluhaimalama (a.k.a. The Royal Flower Garden of Queen Liliuokalani)	SIHP #80-14-9042
03-008	Kawa Stream - East Branch	Kawa Stream Bridge (1939)	Bridge #003063001400065 NRHP High Preservation Value
03-009	McDougal Ditch	Pokole Pond	SIHP # 50-80-10-00322
04-002	Hauula Stream Mouth	Hauula Stream Bridge (1932)	Bridge #003000830302169 NHRP Eligible
04-004	Kaaawa Stream Mouth	Kaaawa Stream Bridge (1927)	Bridge #003000830302903 NRHP Eligible
04-005	Laie Stream Mouth	Kahawainui Stream-Laiewai Bridge (1933)	Bridge #003000830301785 NRHP Eligible
04-006	Laie Maloo Stream Mouth	Pounders Beach Occupation Site	SIHP # 50-80-02-04049
		Koloa Stream-Laiemaloo Bridge (1933)	Bridge #003000830301970 NRHP Eligible
04-007	Laieloa Stream Mouth	Laieloa Stream Bridge (1932)	Bridge #003000830301851 NRHP Eligible
04-009	Maakua Stream Mouth	Maakua Stream-Muliwai Bridge (1932)	Bridge #003000830302151 NRHP Eligible
04-010	Meheiwi Stream Mouth	Maheiwi Stream Bridge (1926)	Bridge #003000830302196 NRHP Eligible
04-011	Punaluu Stream NB Mouth	North Punaluu Stream Bridge (1926)	Bridge #003000830302412 NRHP Eligible
04-013	Waimea Stream Mouth	Waimea Stream Bridge (1930)	Bridge #003000830300573 NRHP Eligible
04-014	Waipilopilo Stream Mouth	Waipilopilo Stream Bridge (1932)	Bridge #003000830302112 NRHP Eligible
04-015	Waipuhi Stream Mouth	Papau Stream-Waipuhi Bridge (1932)	Bridge #003000830302186 NRHP Eligible
05-006	Navy Bike Path	Loko Pa'aiau	SIHP #50-80-09-00108
05-009	Honouliuli Stream	Buried Fishpond	SIHP #50-80-12-03322
		Historic Fish Pond	SIHP #50-80-12-03323
		Pearl Harbor National Historic Landmark	SIHP #50-80-13-09992
07-001	Lokoea Stream	Loko'ea Pond	SIHP # 50-80-04-00233

The following measures shall be taken to avoid potential adverse effects to cultural and historic properties:

1. Worker awareness training shall be provided to all DFM maintenance personnel. Training shall include information on all known historic properties with the given maintenance district, measure to be taken to avoid potential adverse effects, and what to do in the event of an inadvertent discovery of historic resources.
2. Care shall be taken to avoid removing sediment beyond the limits of what has recently deposited, since the previous maintenance event.
3. Physical damage to historic structures, including historic bridges, stream channels, and masonry work will be avoided. Care shall be taken when working with heavy equipment near historic structures.
4. Anchoring to historic bridges or structures shall not be allowed. Sandbag anchors shall be used to secure turbidity barrier, if applicable.
5. Should subsurface historic resources, including human skeletal remains, structural remains, cultural deposits, artifacts, sand deposits, or sink holes be discovered during work, stop work in the immediate vicinity of the find, protect the find from additional disturbance, and contact the State Historic Preservation Division, at (808) 692-8015.

4.6 Stop Work Procedures

The following stop work procedures shall be followed to avoid impacts to biological, historic, and water resources:

1. Should a Hawaiian waterbird be observed within the stream site, or flies into the site all work within 100 feet of the individual(s) shall stop. Work shall not resume until the Hawaiian waterbird(s) leave the area on their own accord.
2. Should a Hawaiian monk seal or sea turtle be observed within or near the stream mouth opening site all work within 150 feet of the individual(s) shall stop. Work shall not resume until the individual(s) leaves the area on its own accord.
3. Should a monk seal or sea turtle be adversely affected (injured or killed), all work must stop at ALL stream mouth sites pending re-initiation and completion of consultation between the USACE and NMFS.
4. Should subsurface historic resources, including human skeletal remains, structural remains, cultural deposits, artifacts, sand deposits, or sink holes be discovered during work, stop work in the immediate vicinity of the find, protect the find from additional disturbance, and contact the State Historic Preservation Division, at (808) 692-8015.
5. If any petroleum contamination is detected, attempt to identify the sources of contamination, cease operations, and notify the USACE, DOH and the USCG. Remove floating petroleum products as directed by these agencies.
6. All work must stop under unusual conditions, such as large tidal events and high surf conditions, unless the action undertaken is to avoid or minimize damage to resources.

5 Stream Maintenance Standard Operating Procedures

This section describes the SOP for various types of maintenance activities:

- Boulder Basin Maintenance
- Debris Catcher Maintenance
- Stream Road Crossing Maintenance
- Stream Maintenance of Fully Lined Channels
- Stream Maintenance of Partially Lined Channels
- Stream Maintenance of Unlined Streams (Natural Streams)
- Stream Mouth Openings (breaches)

These SOPs should be used in conjunction with each site-specific stream maintenance plan in **Section 7**.

5.1 Boulder Basin Maintenance

The following SOP applies to Boulder Basin Maintenance.

Mobilization / Site Setup

1. Inspect all equipment and materials from pollutants (e.g., oil, grease, sediment) and leaks prior to mobilization to the site; clean and repair equipment and materials at the baseyard prior to mobilization, as needed.
2. Survey and monitor the site for protected wildlife as described in **Section 4.4**.
3. Take photographs of the work area before, during and following the maintenance operation.
4. Follow applicable BMPs described in **Section 4.2**. Install BMPs as specified on site-specific site plans and BMP details in **Section 7**.
5. Prepare staging areas - Install drip pans, oil absorbent pads, or plastic sheeting under equipment and vehicles expected to be idle for more than 4 hours. Reserve oil absorbent pads and drip pans onsite for contingency. Site-specific staging areas are shown on site plans in **Section 7**.
6. Prepare stockpiling areas, if applicable – Geotextile fabric or plastic sheeting are a good housekeeping BMP and may be used to underlie temporary trash/debris, vegetation, and sediment stockpiles. Stockpiling is a very temporary measure; all stockpiles are to be removed at the end of the work day.
7. Throughout the course of work, inspect the work area for petroleum contamination. If detected, attempt to identify the sources of contamination, cease operations, and notify the USACE, DOH HEER, DOH CWB, and the USCG. Remove floating petroleum products as directed by these agencies. Contact information is provided in **Table 3-1.**

Debris Removal

1. Remove litter, floatable debris, and other visible debris from boulder basin and surrounding area.
2. Keep collected waste in a dry place, not within the stream or any receiving water.
3. Dispose of collected waste offsite daily.

Vegetation Overgrowth Removal

1. Trim high grass, bushes, and trees, with a weed trimmer, mower, or chainsaw.
2. Collect green waste as the operation proceeds.
3. Keep green waste in a dry place outside the stream until disposal. Never stockpile green waste in streams. Green waste shall not be disposed of within any receiving waters.
4. Deliver green waste directly into a dump truck for disposal or use loader, crane bucket or long reach excavator to carry collected green waste and place it into a dump truck for off-site dewatering and disposal.
5. Dispose of green waste offsite daily.

Sediment Removal

1. Use bulldozer/excavator to push/collect sediment.
2. Use loader, crane bucket, or long reach excavator to carry collected sediment and directly place it into a dump truck for off-site dewatering and disposal.

Waste Handling and Disposal

1. All the debris, green waste, dredged material, and wastes collected during the operation will be transported offsite for dewatering and disposal on a daily basis, unless specified otherwise in the site-specific stream maintenance plan in **Section 7**.
2. Follow the SOPs in **Section 6** of this manual for handling and disposal of various types of wastes.

Demobilization

1. Clean up staging areas and remove all BMPs according to the progress of demobilization.
2. Install high visibility construction fencing around any stockpiles or equipment that will be left on-site overnight.

5.2 Debris Catcher Maintenance

The following SOP applies to Debris Catcher Maintenance.

Mobilization / Site Setup

1. Inspect all equipment and materials from pollutants (e.g., oil, grease, sediment) and leaks prior to mobilization to the site; clean and repair equipment and materials at the baseyard prior to mobilization, as needed.
2. Survey and monitor the site for protected wildlife as described in **Section 4.4**.
3. Take photographs of the work area before, during and following the maintenance operation.
4. Follow BMPs described in **Section 4.2**. Install BMPs as specified on site-specific site plans and BMP details in **Section 7**.
5. Prepare staging areas – Install drip pans, oil absorbent pads, or plastic sheeting under equipment and vehicles expected to be idle for more than 4 hours. Reserve oil absorbent pads and drip pans onsite for contingency. Site-specific staging areas are shown on site plans in **Section 7**.
6. Prepare stockpiling areas, if applicable – Geotextile fabric or plastic sheeting are a good housekeeping BMP and may be used underlie temporary trash/debris, vegetation, and sediment stockpiles. Stockpiling is a very temporary measure; all stockpiles are to be removed at the end of the work day.

7. Throughout the course of work, inspect the work area for petroleum contamination. If detected, attempt to identify the sources of contamination, cease operations, and notify the USACE, DOH HEER, DOH CWB, and the USCG. Remove floating petroleum products as directed by these agencies. Contact information is provided in **Table 3-1**.

Debris Removal

1. Remove litter, floatable debris, and other visible debris from debris catcher and surrounding area.
2. Keep collected waste at dry place, never stockpile waste in the stream.
3. Dispose of collected waste offsite daily.

Overgrowth Vegetation Removal

1. Trim high grass, bushes, and trees, with a weed trimmer, mower, or chainsaw.
2. Collect green waste as the operation proceeds.
3. Keep green waste at dry place until disposal. Never stockpile green waste in streams.
4. Deliver green directly into a dump truck for disposal or use loader, crane bucket, or long reach excavator to carry collected green waste and directly place it into a dump truck for disposal.
5. Dispose of green waste offsite daily.

Sediment Removal

1. Use bulldozer/excavator to push/collect sediment.
2. Use loader, crane bucket, or long reach excavator to carry collected sediment and directly place it into a dump truck for off-site dewatering and disposal.

Waste Handling and Disposal

1. All the debris, green waste, dredged material, and wastes collected during the operation will be transported offsite for dewatering and disposal on a daily basis, unless specified otherwise in the site-specific stream maintenance plan in **Section 7**.
2. Follow the SOPs in **Section 6** of this manual for handling and disposal of various types of wastes.

Demobilization

1. Clean up staging areas and remove all BMPs according to the progress of demobilization.
2. Install high visibility construction fencing around any stockpiles or equipment that will be left on-site overnight.

5.3 Stream Road Crossing Maintenance

The following SOP applies to Stream Road Crossing Maintenance.

Mobilization / Site Setup

1. Inspect all equipment and materials from pollutants (e.g., oil, grease, sediment) and leaks prior to mobilization to the site; clean and repair equipment and materials at the baseyard prior to mobilization, as needed.
2. Survey and monitor the site for protected wildlife as described in **Section 4.4**.

3. Take photographs of the work area before, during and following the maintenance operation.
4. Follow BMPs described in **Section 4.2**. Install BMPs as specified on site-specific site plans and BMP details in **Section 7**.
5. Prepare staging areas - Install drip pans, oil absorbent pads, or plastic sheeting under equipment and vehicles expected to be idle for more than 4 hours. Reserve oil absorbent pads and drip pans onsite for contingency. Site-specific staging areas are shown on site plans in **Section 7**.
6. Prepare stockpiling areas, if applicable – Geotextile fabric or plastic sheeting are a good housekeeping BMP and may be used to underlie trash/debris, vegetation, and sediment stockpiles. Stockpiling is a very temporary measure; all stockpiles are to be removed at the end of the work day.
7. Throughout the course of work, inspect the work area for petroleum contamination. If detected, attempt to identify the sources of contamination, cease operations, and notify the USACE, DOH HEER, DOH CWB, and the USCG. Remove floating petroleum products as directed by these agencies. Contact information is provided in **Table 3-1**.

Debris Removal

1. Remove litter, floatable debris, and other visible debris from stream bank area adjacent to bridge prior to any dredging and vegetation removal work.
2. Keep collected waste in a dry place. Never stockpile waste in the stream.
3. Dispose of collected waste offsite daily.

Overgrowth Vegetation Removal

1. Trim high grass, bushes, and trees, with a weed trimmer, mower, or chainsaw.
2. Collect green waste as the operation proceeds.
3. Keep green waste in a dry place until disposal. Never stockpile green waste in streams.
4. Deliver green waste directly into a dump truck for disposal or use loader, crane bucket long reach excavator to carry collected green waste and directly place it into dump truck for off-site dewatering and disposal.
5. Dispose of green waste offsite daily.

Sediment Removal

1. Use crane bucket or small loader to push/collect sediment, and directly place it into a dump truck for off-site dewatering and disposal.

Waste Handling and Disposal

1. All the debris, green waste, dredged material, and wastes collected during the operation shall be transported offsite for dewatering and disposal on a daily basis, unless specified otherwise on site-specific site plans in **Section 7**.
2. Follow the SOPs in **Section 6** of this manual for handling and disposal of various types of wastes.

Demobilization

1. Clean up staging areas and remove BMPs according to the progress of demobilization.
2. Install high visibility construction fencing around any stockpiles or equipment that will be left on-site overnight.

5.4 Stream Maintenance at Fully Lined Channels

The following SOP applies to stream dredging and other maintenance works conducted at fully lined streams.

Mobilization / Site Setup

1. Inspect all equipment and materials from pollutants (e.g., oil, grease, sediment) and leaks prior to mobilization to the site; clean and repair equipment and materials at the baseyard prior to mobilization, as needed.
2. Survey and monitor the site for protected wildlife as described in **Section 4.4**.
3. Prior to mobilizing equipment into the stream, visually inspect the invert of the concrete lined channel for signs of damage. If damage, such as significant cracks in the concrete are observed immediately notify the DFM Drainage Engineer. Maintenance activities with heavy equipment in the stream shall be delayed or stopped until the channel has been inspected by an engineer. Maintenance of the channel with heavy equipment may proceed if needed to facilitate access for inspection and/or repairs.
4. Take photographs of the work area before, during and following the maintenance operation.
5. Follow BMPs described in **Section 4.2**. Install BMPs as specified on site-specific site plans and BMP details in **Section 7**.
6. Prepare staging areas – Install drip pans, oil absorbent pads, or plastic sheeting under equipment and vehicles expected to be idle for more than 4 hours. Reserve oil absorbent pads and drip pans onsite for contingency. Site-specific staging areas are shown on site plans in **Section 7**.
7. Prepare stockpiling areas, if applicable – Geotextile fabric or plastic sheeting are a good housekeeping BMP and may be used to underlie trash/debris, vegetation, and sediment stockpiles. Stockpiling is a very temporary measure; all stockpiles are to be removed at the end of the work day.
8. Throughout the course of work, inspect the work area for petroleum contamination. If detected, attempt to identify the sources of contamination, cease operations, and notify the USACE, DOH HEER, DOH CWB, and the USCG. Remove floating petroleum products as directed by these agencies. Contact information is provided in **Table 3-1**.

Debris Removal

1. Remove litter, floatable debris, and other visible debris from stream and adjacent stream bank area prior to any dredging and vegetation removal work.
2. Keep collected waste in a dry place. Never stockpile waste in the stream.
3. Dispose of collected waste offsite daily.

Overgrowth Vegetation Removal

1. Trim high grass, bushes, and trees, with a weed trimmer, mower, or chainsaw.
2. Collect green waste as the operation proceeds.
3. Keep green waste in a dry place until disposal. Never stockpile green waste in streams.
4. Deliver green waste directly into a dump truck for disposal or use loader, crane bucket, or long reach excavator to carry collected green waste and directly place it into dump truck for off-site dewatering and disposal.
5. Dispose of green waste offsite daily.

Sediment Removal

1. Commence dredging work from upstream to downstream, unless it is instructed differently in the site plan notes.
2. Use small dozer, bulldozer, or excavator to push and collect sediment.
3. Use small tractor, small loader, crane with bucket, or long reach excavator to remove collected sediment and directly place it into a dump truck for off-site dewatering and disposal.
4. Relocate turbidity curtains in need as the dredging operation proceeding.
5. Allow suspended sediment to settle before relocating turbidity curtains.

Waste Handling and Disposal

1. All the debris, green waste, dredged material, and wastes collected during the operation shall be transported offsite for dewatering and disposal on a daily basis, unless specified otherwise on site-specific site plans in **Section 7**.
2. Follow the SOPs in **Section 6** of this manual for handling and disposal of various types of wastes.

Demobilization

1. Allow suspended sediment to settle before removing turbidity curtains.
2. Remove turbidity curtains in a manner that does not generate additional turbidity.
3. Clean up staging areas and remove BMPs according to the progress of demobilization.
4. Install high visibility construction fencing around any stockpiles or equipment that will be left on-site overnight.

5.5 Stream Maintenance at Partially Lined Channels

The following SOP applies to stream dredging and other maintenance works conducted at partially lined streams (streams with concrete sidewalls and unlined bottoms).

Mobilization / Site Setup

1. Inspect all equipment and materials from pollutants (e.g., oil, grease, sediment) and leaks prior to mobilization to the site; clean and repair equipment and materials at the baseyard prior to mobilization, as needed.
2. Survey and monitor the site for protected wildlife as described in **Section 4.4**.
3. Take photographs of the work area before, during and following the maintenance operation.
4. Follow BMPs described in **Section 4.2**. Install BMPs as specified on site-specific site plans and BMP details in **Section 7**.
5. Prepare staging areas – Install drip pans, oil absorbent pads, or plastic sheeting under equipment and vehicles expected to be idle for more than 4 hours; reserve oil absorbent pads and drip pans onsite for contingency. Site-specific staging areas are shown on site plans in **Section 7**.
6. Prepare stockpiling areas, if applicable – Geotextile fabric or plastic sheeting are a good housekeeping BMP and may be used for trash/debris, vegetation, and sediment stockpiles. Stockpiling is a very temporary measure; all stockpiles are to be removed at the end of the work day.
7. Throughout the course of work, inspect the work area for petroleum contamination. If detected, attempt to identify the sources of contamination, cease operations, and notify the USACE, DOH

HEER, DOH CWB, and the USCG. Remove floating petroleum products as directed by these agencies. Contact information is provided in **Table 3-1**.

Debris Removal

1. Remove litter, floatable debris, and other visible debris from the stream and adjacent stream bank area prior to any dredging and vegetation removal work.
2. Keep collected waste in a dry place. Never stockpile waste in the stream.
3. Dispose of collected waste offsite daily.

Overgrowth Vegetation Removal

1. Trim high grass, bushes, and trees, with a weed trimmer, mower, or chainsaw.
2. Collect green waste as the operation proceeds.
3. Keep green waste in a dry place until disposal. Never stockpile green waste in streams.
4. Deliver directly into a dump truck for disposal or use loader, crane bucket, or long reach excavator to remove collected green waste and directly place it into dump truck for off-site dewatering and disposal.
5. Dispose of green waste offsite daily.

Sediment Removal

1. Commence dredging work from upstream to downstream, unless it is instructed differently in the site plan notes.
2. Remove recently accumulated surface sediment and silts only, do not disturb the stream bed.
3. Use small dozer, bulldozer, or excavator to push and collect sediment.
4. Use small tractor, small loader, crane with bucket, or long reach excavator to remove collected sediment and directly place it into a dump truck for off-site dewatering and disposal.
5. Relocate turbidity curtains as needed during dredging operation.
6. Allow suspended sediment to settle before relocating turbidity curtains.

Waste Handling and Disposal

1. All the debris, green waste, dredged materials, and wastes collected during the operation shall be transported offsite for dewatering and disposal on a daily basis, unless specified otherwise in the site-specific stream maintenance plan.
2. Follow the SOPs in **Section 6** of this manual for handling and disposal of various types of wastes.

Demobilization

1. Allow suspended sediment to settle before removing turbidity curtains.
2. Remove turbidity curtains in a manner that does not generate additional turbidity.
3. Clean up staging areas and remove BMPs according to the progress of demobilization.
4. Install high visibility construction fencing around any stockpiles or equipment that will be left on-site overnight.

5.6 Stream Maintenance at Unlined Streams

The following SOP applies to stream dredging and other maintenance work conducted at unlined stream segments.

Mobilization / Site Setup

1. Inspect all equipment and materials from pollutants (e.g., oil, grease, sediment) and leaks prior to mobilization to the site; clean and repair equipment and materials at the baseyard prior to mobilization, as needed.
2. Survey and monitor the site for protected wildlife as described in **Section 4.4**.
3. Take photographs of the work area before, during and following the maintenance operation.
4. Follow BMPs described in **Section 4.2**. Install BMPs as specified on site-specific site plans and BMP details in **Section 7**.
5. Prepare staging areas - Install drip pans, oil absorbent pads, or plastic sheeting under equipment and vehicles expected to be idle for more than 4 hours. Reserve oil absorbent pads and drip pans onsite for contingency. Site-specific staging areas are shown on site plans in **Section 7**.
6. Prepare stockpiling areas, if applicable – Geotextile fabric or plastic sheeting are a good housekeeping BMP and may be used for trash/debris, vegetation, and sediment stockpiles. Stockpiling is a very temporary measure; all stockpiles are to be removed at the end of the work day.
7. Throughout the course of work, inspect the work area for petroleum contamination. If detected, attempt to identify the sources of contamination, cease operations, and notify the USACE, DOH HEER, DOH CWB, and the USCG. Remove floating petroleum products as directed by these agencies. Contact information is provided in **Table 3-1**.
8. Install temporary maintenance access ramp, if the use and location of such is specified for the given maintenance site in **Appendix A, Table 3** and on the site-specific site plans in **Section 7**.

Debris Removal

1. Remove litter, floatable debris, and other visible debris from stream and adjacent stream bank area prior to any dredging and vegetation removal work.
2. Keep collected waste in a dry place. Never stockpile waste in the stream.
3. Dispose collected waste offsite daily.

Overgrowth Vegetation Removal

1. Trim high grass, bushes, and trees with a weed trimmer, mower, or chainsaw.
2. Collect green waste as the operation proceeds.
3. Keep green waste in a dry place until disposal. Never stockpile green waste in streams.
4. Deliver green waster directly into a dump truck for disposal or use loader, crane bucket, or long reach excavator to carry collected green waste and directly place it into a dump truck for off-site dewatering and disposal.
5. Dispose of green waste offsite daily.

Sediment Removal

1. Commence dredging work from upstream to downstream, unless it is instructed differently in the site plan notes.
2. Remove sediment and silts only, do not disturb the stream bed.
3. Use small dozer, bulldozer, or excavator to push and collect sediment.
4. Use small tractor, small loader, crane with bucket, or long reach excavator to remove collected sediment and directly place it into a dump truck for off-site dewatering and disposal.
5. Relocate turbidity curtains in need as the dredging operation proceeding
6. Allow suspended sediment to settle before relocating turbidity curtains.

Waste Handling and Disposal

1. All the debris, green waste, dredged materials, and wastes collected during the operation shall be transported offsite for dewatering and disposal on a daily basis, unless specified otherwise on the site-specific site plans in **Section 7**.
2. Follow the SOPs in **Section 6** of this manual for handling and disposal of various types of wastes.

Demobilization

1. Allow suspended sediment to settle before removing turbidity curtains.
2. Remove turbidity curtains in a manner that does not generate additional turbidity.
3. Remove temporary access ramps, if applicable, and restore site to pre-maintenance conditions.
4. Clean up staging areas and remove BMPs according to the progress of demobilization.
5. Install high visibility construction fencing around any stockpiles or equipment that will be left on-site overnight.

5.7 Stream Mouth Maintenance – Breach Open

A stream mouth is where the stream meets the sea or beach. Streams mouths may be clogged or blocked by an accumulation of sand from nearby beaches due to wind and ocean movement. For streams with high flow rates and relatively narrow stream mouth, once the stream mouth is plugged, water levels can build up in a short time, especially during rain events leading to flooding. Persistently clogged stream mouths result in stream stagnation and decreased stream water quality.

For flood control, a quick operation will be required to breach the sand plug open. Normally, the stream will then scour a wider opening as plug water is released. These operations are usually short term and are completed within a few hours. The following SOPs describe detailed procedures for this type of stream maintenance work.

Pre-Breaching

1. Inspect all equipment and materials from pollutants (e.g., oil, grease, sediment) and leaks prior to mobilization to the site; clean and repair equipment and materials at the baseyard prior to mobilization, as needed.
2. Survey and monitor the site for protected wildlife as described in **Section 4.4**.
3. Take daily photographs of the work areas during the stream mouth opening operation.
4. Post signage warning the public of potential health hazards along both sides of the stream with signs alternately facing towards and away from the ocean. The signage should include “Keep Out of Water, Stream Maintenance in Progress, Harmful Bacteria May Cause Illness” or similar

statements. Signage locations are shown on site plans in **Section 7**. Water quality signage will be displayed along beaches and at beach access points. In general, signs will be installed for a two hundred foot long stretch on both sides of the stream mouth, with signs spaced every 50-feet.

5. Remove litter, floatable debris, and other visible debris from stream and adjacent beach area prior to any breaching work and dispose of debris offsite daily. Adjacent beach area includes the area of the beach where the stream water could reach during and immediately after breach mouth opening activities.
6. Inspect work area for petroleum contamination. If detected, attempt to identify the sources of contamination, cease operations, and notify the USACE, DOH and the USCG. Remove floating petroleum products as directed by these agencies. Contact information is listed in **Table 3-1.**

During Breaching Operation

1. Use a backhoe, small bulldozer, tire loader, or manual shovel to create an approximately 2 to 3 foot wide opening in the sand plug, as shown on BMP details, for stream mouth breach opening sites, in **Section 7**. Type of equipment used at each stream breach site is listed on site plans in **Section 7**.

Post-Breaching

1. Remove signs two days after the stream mouth opening or when the test results showed the water quality meets the requirements.
2. Clean up staging areas.

6 Waste Material Handling and Disposal SOPs

The following SOPs describe disposal of each type of waste. Disposal locations and methods are described in each site-specific plan in **Section 7**.

6.1 Debris/Trash Handling and Disposal

1. Remove trash/debris including bulky items from stream and adjacent beach area.
2. Trash/debris may be removed by hand within dry stream channels and along the sides of streams. Floatable trash/debris may be removed with fishing/pool cleaning nests on long poles, and/or with large fishing nets (i.e., seine nets). Large trash/debris from illegal dumping and homeless encampment areas, as well as trash/debris which have mixed in with the sediment to be dredged may be removed by crane, backhoe, and bulldozer either from within the stream or channel bottom or from the sides of the stream or channel where equipment can be staged.
3. Deliver the trash/debris directly to dump truck for offsite disposal.
4. Report disposal to DOH Solid and Hazardous Branch (SHWB) using the form in Appendix B.

6.2 Green-waste Handling and Disposal

1. Trim high grass, bushes, and trees with a weed trimmer, mower, or chainsaw.
2. Collect green waste as the operation proceeds.
3. Keep green waste at dry place until disposal, if applicable; never stockpile green waste in streams.
4. Deliver green waste directly into a dump truck for disposal or deliver green waste to a loader, crane bucket or long reach excavator to carry the green waste to a dump truck for off-site dewatering and disposal.
5. Dispose green waste offsite daily at green waste recycling facility.
6. Report disposal to DOH SHWB using the form in **Appendix B**.

6.3 Dredged Sediment/Spoil Dewatering and Disposal

1. Use equipment to remove and place the sediment at a designated dewatering area or into dump truck for delivery to offsite dewatering facility.
2. Use equipment to load the dewatered sediment into dump truck and disposal of at landfill.
3. Report disposal to DOH SHWB using the form in **Appendix B.**

6.4 Dredged Boulders Reuse

For Kaupuni Stream in Waianae district, DFM will use boulders or cobbles removed from stream maintenance to restore the stream embankment.

1. Use excavator or backhoe to remove and store the boulders collected from stream.
2. Use loader or cranes to push the boulders to restore the stream embankment eroded from flooding. Boulders will be placed as directed by the Drainage Engineer or their qualified representative. Boulders will be placed in the approximate location where boulders have been

previously dislodged. Placement areas are not prepared to accept boulders. Boulder placement will be as close to pre-existing conditions as possible.

7 Site –Specific Stream Maintenance Plans

The Site-Specific Stream maintenance plans are prepared for each site and organized by DFM districts presented in the following sections.

The following figures are provided to show overall and district-wide site locations.

Figure 7.1 shows the overall locations of DFM stream maintenance sites.

Figure 7.2 shows the district-wide maintenance site location of Honolulu district.

Figure 7.3 shows the district-wide maintenance site location of Kailua-Waimanalo district.

Figure 7.4 shows the district-wide maintenance site location of Kaneohe (Koolaupoko) district.

Figure 7.5 shows the district-wide maintenance site location of Laie (Koolauloa) district.

Figure 7.6 shows the district-wide maintenance site location of Pearl City (Ewa) district.

Figure 7.7 shows the district-wide maintenance site location of Wahiawa district.

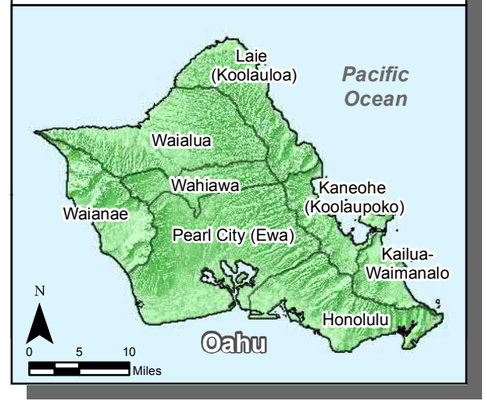
Figure 7.8 shows the district-wide maintenance site location of Waialua district.

Figure 7.9 shows the district-wide maintenance site location of Waianae district.

7.1 Oahu Districts

E:\Projects_Legacy\USIG\Storm Water Dept\60344779 CCH SWMP - Program Management\0320 Review and Revise\DFM Manual\900-Work\920 GIS\02_Maps\00_Figures\Figure 7.1 - DFM Oahu Districts (Ver03b).mxd

Key Map



Legend

- Proposed Stream Mouth Opening Site
- Proposed Stream Maintenance Site
- Stream/Channel
- DFM District

Notes

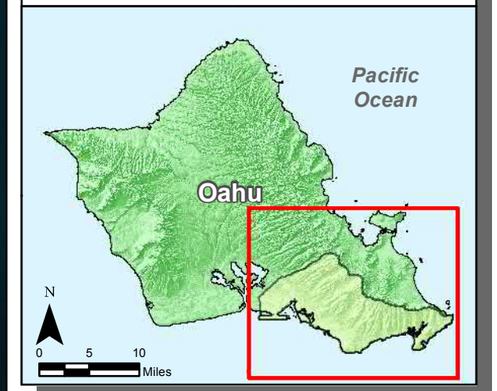
1. Base Map Source: Esri World Imagery
2. Map Projection: NAD83 HARN StatePlane Hawaii 3.
3. Stream/Channel: National Hydrography Dataset features for Hawaii as of December, 2012.

Figure 7.1
DFM Oahu Districts
Site Location Map
City and County of Honolulu
DFM Stream Mantenance

7.2 Honolulu District

E:\Projects_Legacy\USIG\Storm Water Dept\60344779 CCH SWMP - Program Management\0320 Review and Revise\DFM Manual\900-Work\920 GIS\02_Maps\00_Figures\Figure 7.2 - DFM Honolulu District (Ver03b).mxd

Key Map



Legend

- Proposed Stream Maintenence Site
- Stream/Channel
- DFM Honolulu District

Notes

1. Base Map Source: Esri World Imagery
2. Map Projection: NAD83 HARN StatePlane Hawaii 3.
3. Stream/Channel: National Hydrography Dataset features for Hawaii as of December, 2012.

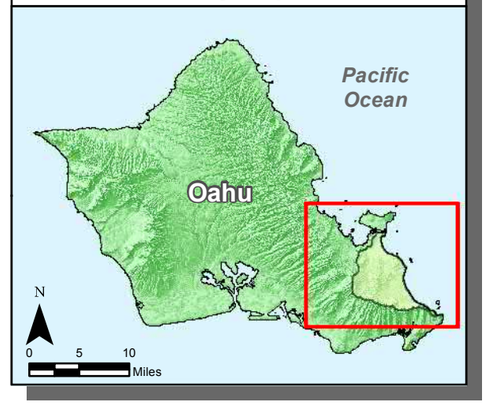
N

0 1 2 3 4 Miles

Figure 7.2
DFM Honolulu District
District-Wide Site Location Map
City and County of Honolulu
DFM Stream Mantenance

7.3 Kailua-Waimanalo District

Key Map



Legend

- Proposed Stream Maintenence Site
- Stream/Channel
- DFM Selected District

Notes

1. Base Map Source: Esri World Imagery
2. Map Projection: NAD83 HARN StatePlane Hawaii 3.
3. Stream/Channel: National Hydrography Dataset features for Hawaii as of December, 2012.

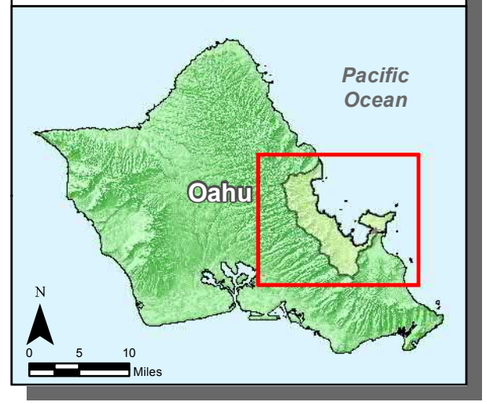
N

0 1 2 3 Miles

Figure 7.3
DFM Kailua-Waimanalo District
District-Wide Site Location Map
City and County of Honolulu
DFM Stream Mantenance

7.4 Kaneohe (Koolaupoko) District

Key Map



Legend

- Proposed Stream Maintenence Site
- Stream/Channel
- DFM Selected District

Notes

1. Base Map Source: Esri World Imagery
2. Map Projection: NAD83 HARN StatePlane Hawaii 3.
3. Stream/Channel: National Hydrography Dataset features for Hawaii as of December, 2012.

N

0 1 2 3 Miles

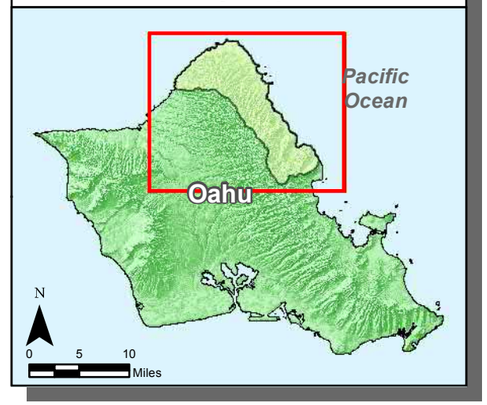
Figure 7.4
DFM Kaneohe (Koolaupoko) District
District-Wide Site Location Map
City and County of Honolulu
DFM Stream Mantenance

7.5 Laie (Koolauloa) District

Waimea Stream
Laie Wai Stream
Laieloa Stream
Laie Maloo Stream
Waipilopilo Stream
Maakua Stream
Hauula Stream
Meheiwi Stream
Waipuhi Stream
Hanohano Stream
Punaluu Stream North Branch
Punaluu Valley Road Ditch
Lau Place Outlet
Kaaawa Park Ditch
Kalaeoio Ditch
Kaaawa Stream

N
0 1 2 3 4
Miles

Key Map



Legend

- Stream Mouth Opening
- Stream/Channel
- DFM Laie (Koolauloa) District

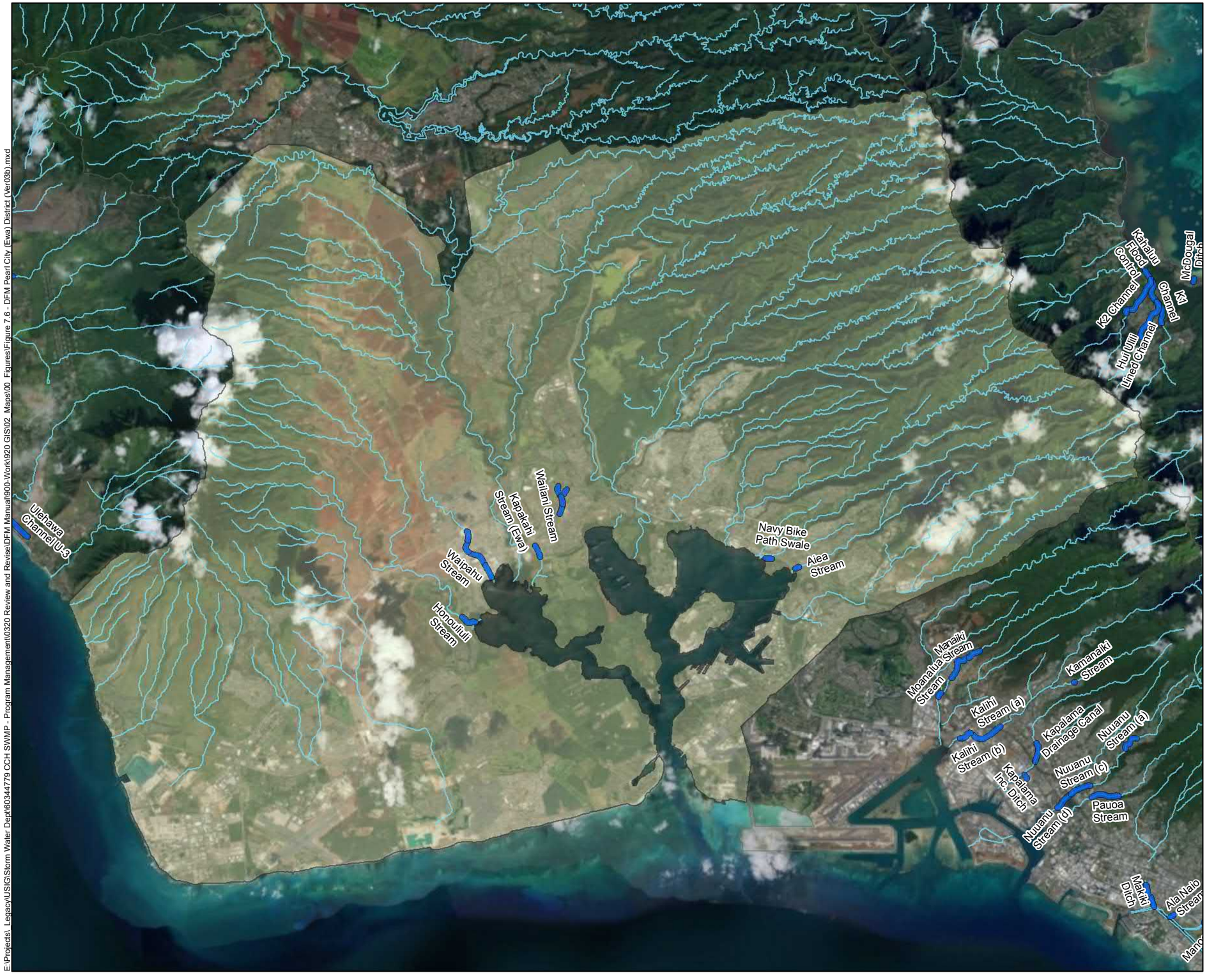
Notes

1. Base Map Source: Esri World Imagery
2. Map Projection: NAD83 HARN StatePlane Hawaii 3.
3. Stream/Channel: National Hydrography Dataset features for Hawaii as of December, 2012.

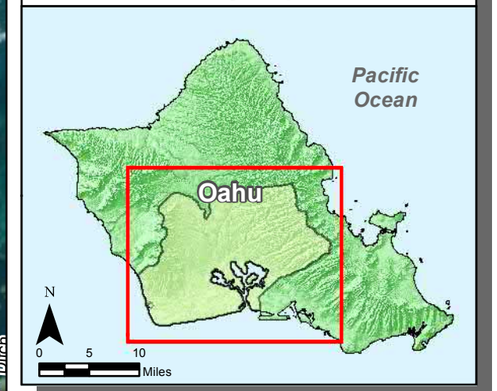
Figure 7.5
DFM Laie (Koolauloa) District
District-Wide Site Location Map
City and County of Honolulu
DFM Stream Mantenance

E:\Projects_Legacy\USIG\Storm Water Dept\60344779 CCH SWMP - Program Management\0320 Review and Revise\DFM Manual\900-Work\920 GIS\02_Maps\00_Figures\Figure 7.5 - DFM Laie (Koolauloa) District (Ver03b).mxd

7.6 Pearl City (Ewa) District



Key Map



Legend

- Proposed Stream Maintenence Site
- Stream/Channel
- DFM Selected District

Notes

1. Base Map Source: Esri World Imagery
2. Map Projection: NAD83 HARN StatePlane Hawaii 3.
3. Stream/Channel: National Hydrography Dataset features for Hawaii as of December, 2012.

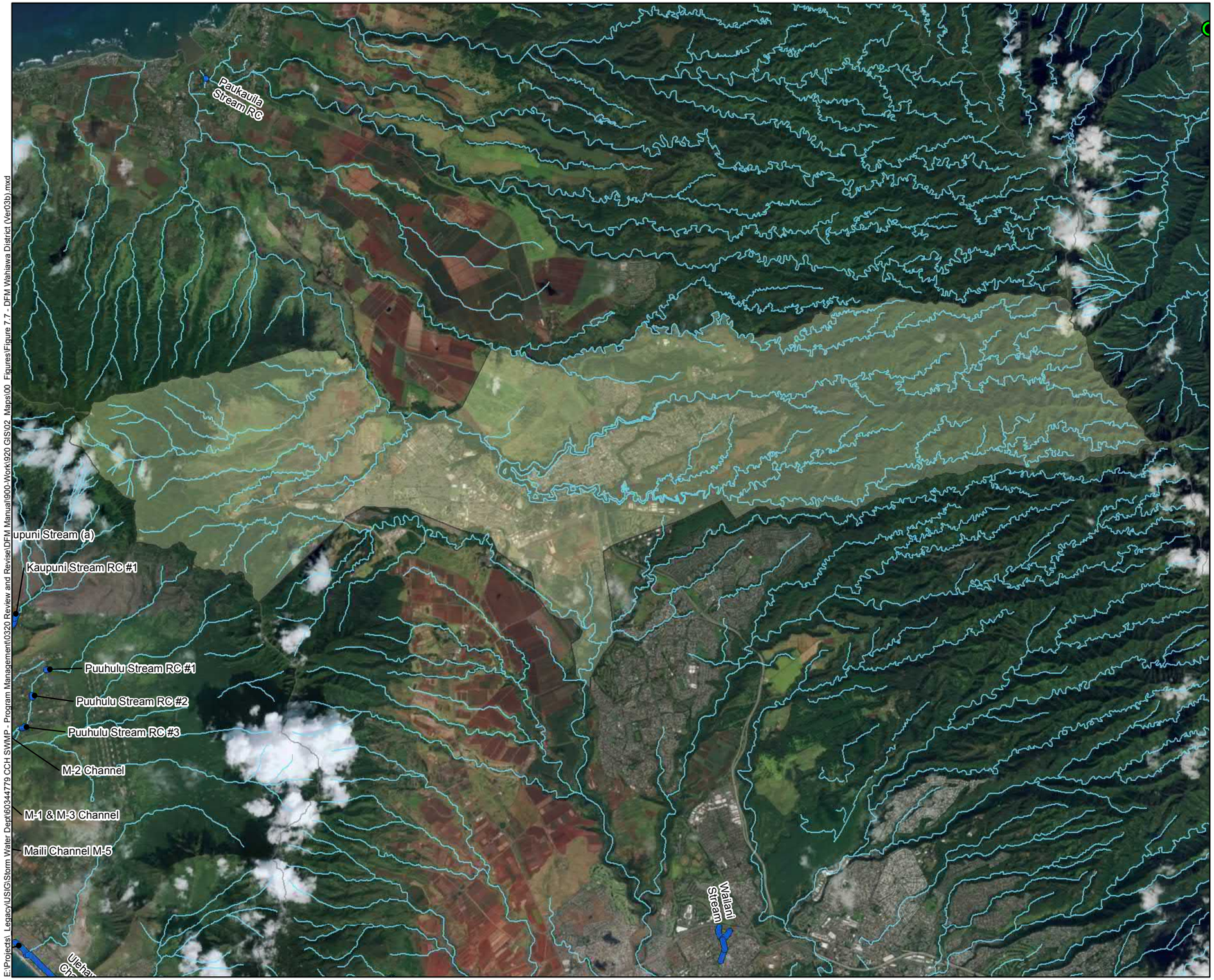
N

0 1 2 3 4 Miles

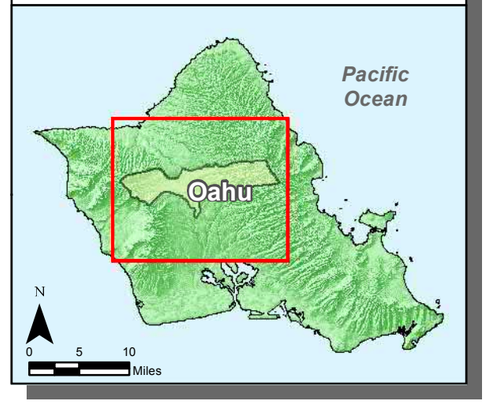
Figure 7.6
DFM Pearl City (Ewa) District
District-Wide Site Location Map
City and County of Honolulu
DFM Stream Mantenance

7.7 Wahiawa District

No stream maintenance sites or activities requiring CWA Section 404 or 401 approvals have been identified in the Wahiawa District, at this time.



Key Map



Legend

- Stream Mouth Opening
- Proposed Stream Maintenence Site
- Stream/Channel
- DFM Selected District

Notes

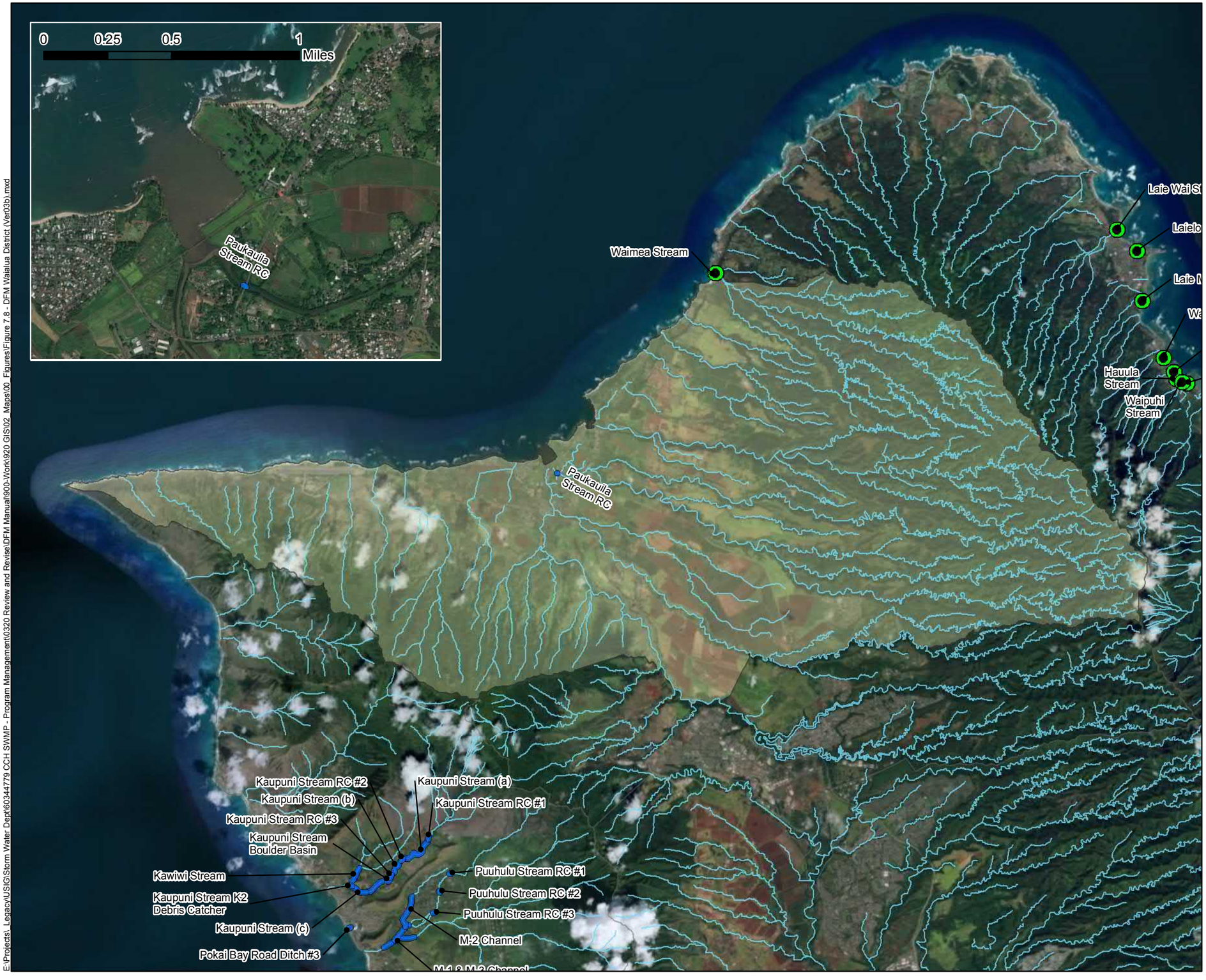
1. Base Map Source: Esri World Imagery
2. Map Projection: NAD83 HARN StatePlane Hawaii 3.
3. Stream/Channel: National Hydrography Dataset features for Hawaii as of December, 2012.

N

0 1 2 3 4 Miles

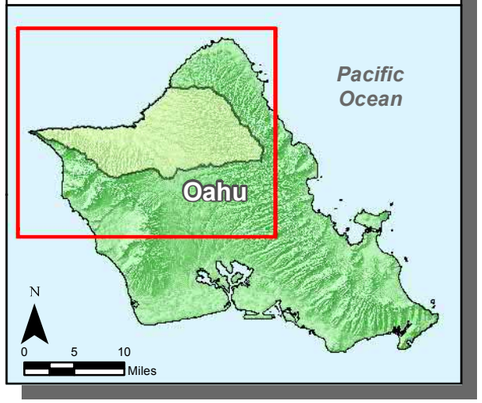
Figure 7.7
DFM Wahiawa District
District-Wide Site Location Map
City and County of Honolulu
DFM Stream Mantenance

7.8 Waialua District



E:\Projects_Legacy\USIG\Storm Water Dept\60344779 CCH SWMP - Program Management\0320 Review and Revise\DFM Manual\900-Work\920 GIS\02_Maps\00_Figures\Figure 7.8 - DFM Waialua District (Ver03b).mxd

Key Map



Legend

- Stream Mouth Opening
- Proposed Stream Maintenence Site
- Stream/Channel
- DFM Waialua District

Notes

1. Base Map Source: Esri World Imagery
2. Map Projection: NAD83 HARN StatePlane Hawaii 3.
3. Stream/Channel: National Hydrography Dataset features for Hawaii as of December, 2012.

N

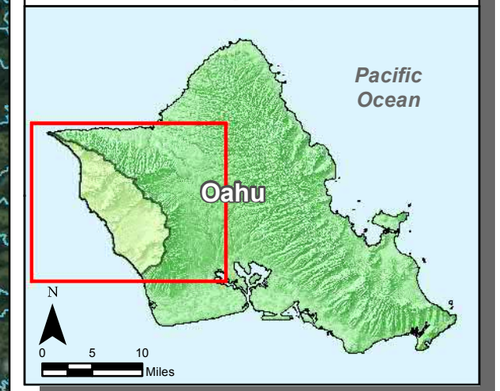
0 1 2 3 4 Miles

Figure 7.8
DFM Waialua District
District-Wide Site Location Map
City and County of Honolulu
DFM Stream Mantenance

7.9 Waianae District

E:\Projects\ Legacy\USIG\Storm Water Dept\60344779 CCH SWMP - Program Management\0320 Review and Revise\DFM Manual\900-Work\920 GIS\02_Maps\00_Figures\Figure 7.9 - DFM Waianae District (Ver03b).mxd

Key Map



Legend

- Proposed Stream Maintenence Site
- Stream/Channel
- DFM Selected District

Notes

1. Base Map Source: Esri World Imagery
2. Map Projection: NAD83 HARN StatePlane Hawaii 3.
3. Stream/Channel: National Hydrography Dataset features for Hawaii as of December, 2012.

Figure 7.9
DFM Waianae District
District-Wide Site Location Map
City and County of Honolulu
DFM Stream Mantenance

8 References

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Appendix A: Stream Maintenance Inventory

Appendix A: CCH Stream Maintenance Inventory - Sites of Honolulu District

NO.	Name	DFM #	Location Coordinates		Location Description	Down Stream Water Body	Stream Flow	Stream Type	Maintenance Category	TMKs	Equipment Access	Description of Access
			Upstream	Downstream								
01-001	Ala Naio Stream	9423 a	21°17'13.8"N 157°49'43.8"W	21°17'10.8"N 157°49'47.7"W	From Marco Polo Condo to Ala Wai Canal	Ala Wai Canal	perennial	stream walls only	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 2-7-036:001	Beach/park route + Lower equipment at stream bank	Access through Ala Wai Park. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream.
01-002	Kalihi Stream (a)	9433 a	21°20'10.2"N 157°52'37.3"W	21°20'04.0"N 157°53'06.5"W	From Kalihi Waena School to Umi Street	Pacific Ocean /Keehi Lagoon	perennial	stream walls only	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 1-2-014:100, 102 & 103; (1) 1-2-017:011; (1) 1-2-999:999; (1) 1-3-002:044; and (1) 1-3-008:005	Lower equipment at street	Access through Kuhio Park Terrace (Richard Lane). Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream.
01-003	Kalihi Stream (b)	9433 b	21°20'04.0"N 157°53'06.5"W	21°19'58.9"N 157°53'17.0"W	From Umi Street to Kam Highway	Pacific Ocean /Keehi Lagoon	perennial	unlined	Type A Stream Maintenance (no equipment in stream)	(1) 1-2-018:012 to 016	no equipment in stream	Access through Kalihi Transit Center. Use long reach excavator to remove sediment and material from the stream at stream bank. No equipment in the stream.
01-004	Kamanaiki Stream	9435 b	21°20'51.9"N 157°51'22.6"W	21°20'51.5"N 157°51'23.4"W	From 2834 Nihi Street to 2828 Nihi Street	Pacific Ocean /Kalihi Stream	intermittent	stream walls only	Type A Stream Maintenance (no equipment in stream)	(1) 1-4-003:001 & 073	no equipment in stream	No access for heavy equipment in the stream.
01-005	Kapakahi Stream	9438 b	21°16'40.1"N 157°46'57.0"W, 21°16'39.9"N 157°46'51.4"W	21°16'13.0"N 157°46'41.3"W	From Kam Hwy to Kahala Avenue	Pacific Ocean /Kahala shoreline	perennial	stream walls only	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 3-5-008:025 to 027, and (1) 3-5-023:001	Lower equipment at stream bank	Access through city and county easement areas. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream. Work from upstream to downstream.
01-007	Kapalama Drainage Canal	9439 a	21°19'54.0"N 157°52'00.8"W	21°19'37.1"N 157°52'02.4"W	From Houghtailing Street to Halona Street	Pacific Ocean /Honolulu Harbor	intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 1-6-000:000	Lower equipment at street	Access through Kohou street. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream.
01-008	Kapalama Inc. Ditch	9440	21°19'21.1"N 157°52'10.7"W	21°19'24.8"N 157°52'13.0"W	From Hikina Ln to Kokea Street	Kapalama Drainage Canal	intermittent	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 1-5-018:002 to 004	Existing ramp	Access through Kokea street.
01-009	Lunalilo Terrace Ditch	9457	21°16'39.2"N 157°41'47.6"W	21°16'49.4"N 157°42'14.6"W	From Anapalau St, Kaumakani St to Kuapa Pond	Kuapa Pond	intermittent	lined channel	Type A Stream Maintenance (no equipment in stream)	(1) 3-9-012:002; (1) 3-9-042:142 & 143; and (1) 3-9-048:002 & 029	no equipment in stream	There is no access for heavy equipment. A crane will be used to remove the trimmed vegetation and collected debris from street level at the bridges.
01-010	Makiki Ditch	9460 h	21°17'42.3"N 157°50'11.7"W		From Philip Street to Fern Street	Ala Wai canal	intermittent	stream walls only	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 2-3-023:010 & 023; (1) 2-3-024:031, 032 & 037; (1) 2-3-032:048; and (1) 2-3-034:036	Lower equipment at street	Access through city and county easement areas. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream.
		9460 i		21°17'21.1"N 157°50'03.2"W	From Fern Street to Ala Wai Canal	Ala Wai canal	intermittent	stream walls only				

Appendix A: CCH Stream Maintenance Inventory - Sites of Honolulu District

NO.	Name	DFM #	Location Coordinates		Location Description	Down Stream Water Body	Stream Flow	Stream Type	Maintenance Category	TMKs	Equipment Access	Description of Access
			Upstream	Downstream								
01-011	Manaiki Stream	9464 a	21°21'21.1"N 157°52'58.5"W		From Debris Catcher at mauka of Ala Mahamoe Street	Moanalua Stream	intermittent	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 1-1-032:001 & 061; (1) 1-1-033:074; (1) 1-1-034:043 & 044; and (1) 1-1-047:064	Surge ramp	Access through Onipaa St. At temporary gravel access ramp or lower the construction vehicles and equipment into the stream with crane at the bridge. The crane will also be used to remove collected waste and dredged material from the stream.
		9464 y		21°20'55.8"N 157°53'26.1"W	to mauka of Moanalua Gardens	Moanalua Stream	intermittent	lined & unlined channel				
01-012	Manoa Palolo Stream	9467	21°17'26.9"N 157°48'53.3"W	21°17'05.4"N 157°49'13.9"W	From Manoa Palolo Stream Interceptor to Date Street	Ala Wai Canal	perennial	stream walls only	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 2-7-024:000	Existing ramp	Access through concrete ramp at Koali Road where Manoa and Palolo meet.
01-013	Manoa Stream	9468 c	21°18'55.5"N 157°48'19.0"W		From Napuaa Pl	Ala Wai Canal	perennial	stream walls only & unlined	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 2-9-021:002, 040, 041, 049, 050 & 054; (1) 2-9-026:001, 002, 003, 014, 043 & 046; (1) 2-9-029:036 & 053; (1) 2-9-036:003 & 024; (1) 2-9-037:012, 025 & 064; and (1) 2-9-065:011 & 013	Surge ramp + Lower equipment at bridge	Access through Kahaloa Drive, east Manoa Road, Lowry Avenue, Woodlawn Drive, and Pawaina Street. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste from the stream. May also access with track loader at east Manoa Road and Kahaloa Road locations by driving track loader down natural embankment. Embankment will be restored after maintenance activities are complete.
		9468 d			Manoa Valley Distirct Park	Ala Wai Canal	perennial	unlined				
		9468 e		21°18'36.7"N 157°48'34.5"W	to E. Manoa Road	Ala Wai Canal	perennial	lined channel				
		9468 f		21°18'28.6"N 157°48'32.8"W	Clean Headwalls - 50' two sides of Woodlawn Dr	Ala Wai Canal	perennial	stream walls only				
01-014	Moanalua Stream	9472 c	21°20'50.6"N 157°53'38.7"W	21°20'38.8"N 157°53'39.0"W		Pacific Ocean /Keehi Lagoon	intermittent	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 1-1-035:010	Surge ramp + Lower equipment at bridge	Access through Paa Street at temporary gravel access ramp or lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream.
		9472 y	21°20'38.8"N 157°53'39.0"W	21°20'06.5"N 157°53'36.8"W	From Moanalua Highway to Kikowaena Street	Pacific Ocean /Keehi Lagoon	perennial	stream walls only				
01-015	Muliwai Ditch	9474 b	21°16'42.7"N 157°47'18.0"W	21°16'04.2"N 157°46'48.3"W	From Lunalilo Fwy to Kahala Avenue	Pacific Ocean /Kahala shoreline	intermittent	lined channel	Type B Stream Maintenance	(1) 1-1-035:010	Lower equipment at bridge	Access through various streets. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste from the stream.
01-016a	Nuuanu Stream (a)	9482 a	21°19'59.0"N 157°50'20.4"W	21°19'48.8"N 157°50'31.7"W	From Laimi Road to Klebahn Place	Pacific Ocean /Honolulu Harbor	intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 3-5-006:033	Lower equipment at street	Access through Moanawai Place. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste from the stream.
01-016c	Nuuanu Stream (c)	9482 c	21°19'15.5"N 157°51'06.4"W	21°19'06.6"N 157°51'26.4"W	from Nuuanu - N. School to DPR-Liliuokalani Gardens	Pacific Ocean /Honolulu Harbor	perennial	stream walls only		(1) 2-2-031:053; (1) 2-2-032:001, 002, 003 & 084; and (1) 2-2-033:073	Existing ramp	Access through concrete ramp at the park at Mc Grew Lane, mauka of School Street.

Appendix A: CCH Stream Maintenance Inventory - Sites of Honolulu District

NO.	Name	DFM #	Location Coordinates		Location Description	Down Stream Water Body	Stream Flow	Stream Type	Maintenance Category	TMKs	Equipment Access	Description of Access
			Upstream	Downstream								
01-016d	Nuuanu Stream (d)	9482 d	21°18'59.6"N 157°51'35.0"W	21°18'53.6"N 157°51'40.4"W	from North School Street to footbridge	Pacific Ocean /Honolulu Harbor	perennial	stream walls only		(1) 1-7-010:001; (1) 1-7-011:001, 002 & 018; (1) 1-7-014:044; and (1) 1-7-020:001	Existing ramp	Access through concrete ramp at the park at Mc Grew Lane, mauka of School Street.
01-017	Palolo Stream	9486 a	21°18'00.3"N 157°47'36.2"W	21°17'26.6"N 157°48'53.1"W	From Mauka Kiwila Street to Keanu Street	Manoa Stream	intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	N/A	Existing ramp	Access through gated concrete ramp at Kalua Road. A crane will be used to remove collected waste from the stream at Pakui Street, St. Louis Drive, Palolo Avenue, Paalea Avenue, Kalua Road, and Kiwila Street.
01-018	Pauoa Stream	9488 d	21°19'05.5"N 157°50'40.1"W	21°19'03.6"N 157°51'05.8"W	From Liko Lane to Pali hwy.	Waolani Stream	perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 2-8-028, (1) 3-3-001, (1) 3-3-002, (1) 3-3-038, (1) 3-3-040, (1) 3-3-041, (1) 3-3-042, (1) 3-3-044, (1) 3-3-045, (1) 3-4-001, (1) 3-4-002 and (1) 3-4-007	Lower equipment at street	Access through Liko Lane. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste from the stream.
01-019	Waialii Stream	9490	21°16'56.7"N 157°45'38.1"W	21°16'36.5"N 157°45'38.8"W	From Poola Street to Debris Catcher	Pacific Ocean /Wailupe shoreline	intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 3-5-046:012, (1) 3-5-046:028 and (1) 3-6-023:018	Lower equipment at bridge	Access through Kiai Place and Poola Place. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste from the stream.
01-020	Wailupe Stream	9505 b	21°17'57"N 157°45'22"W	21°16'42.8"N 157°45'03.1"W	From Boulder Basin to Kalanianaole Highway	Pacific Ocean	intermittent	unlined channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 3-6-005:093, (1) 3-6-013:120, (1) 3-6-015:125, (1) 3-6-017:077, (1) 3-6-019:037, (1) 3-6-021:071 and (1) 3-6-024:002	Existing ramp	Access through existing ramp at Hind Place. A crane will also be used to remove collected waste from the stream at various locations where streets across the stream.
01-021	Wawamalu Stream	9519	21°17'44.8"N 157°40'24.0"W	21°17'50.0"N 157°39'45.3"W	From Hawaii Kai Drive to Kalanianaole Highway (at Queen's Beach)	Pacific Ocean	intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 3-9-010:028	Lower equipment at stream bank	Access through ramp on Kealahou Street. The crane will also be used remove collected waste and dredged material from the channel.

Appendix A: CCH Stream Maintenance Inventory - Sites of Kailua-Waimanalo District

NO.	Name	DFM #	Location Coordinate		Location Description	Down Stream Water Body	Stream Flow	Stream Type	Maintenance Category	TMKs	Equipment Access	Description of Access
			Upstream	Downstream								
02-001	Alahaki Ditch	9325	21°22'28"N 157°44'02"W	21°22'35"N 157°43'54"W	From 1080 Alahaki Street to Kahili Street	Kaelepulu Pond	intermittent	(lined) Trapezoidal Channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 4-2-056:063	Surge ramp	Access through city and county easement along Alahaki Street. Lay down surge rock for track loader access. Remove surge rock when done.
02-002	Hele Drainage Ditch	9326	21°22'35.0"N 157°43'29.2"W	21°22'43.4"N 157°43'44.9"W	From Liku Street to Ben franklin / gas station	Pacific Ocean /Kailua Bay	perennial	unlined / lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 4-2-021:027 TO 34; (1) 4-2-024:002, 017 & 018; AND (1) 4-2-050:001 & 009	Lower equipment at bridge	Access from Liku Street. Drop skidsteer into stream using crane. The crane will also be used to remove collected material from the stream and place into dump trucks for disposal.

Appendix A: CCH Stream Maintenance Inventory - Sites of Kaneohe (Koolaupoko) District

NO.	Name	DFM #	Location Coordinate		Location Description	Down Stream Water Body	Stream Flow	Stream Type	Maintenance Category	TMKs	Equipment Access	Description of Access
			Upstream	Downstream								
03-001	Anolani Stream	9253 b	21°24'13.8"N 157°48'20.9"W 21°24'15.8"N 157°48'24.9"W	21°24'39.8"N 157°48'02.0"W	From Likelike Hwy. to Kapunahala Stream	Kapunahala Stream	Perennial	Rectangular channel, fully improved concrete lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 4-7-052:088, 118 & 119; (1) 4-7-054:044; (1) 4-7-065:078 & 080; (1) 4-7-066:083; AND (1) 4-7-067:043	Existing ramp	
03-002	Hui Ulili Lined Channel	9260 a	21°26'14.9"N 157°50'16.3"W		From end of lined channel	ʻĀhuimanu Stream	Perennial	Trapezoidal and Rectangular lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 4-7-004:040; (1) 4-7-025:039 & 040; (1) 4-7-028:003; (1) 4-7-037:020 & 032; AND (1) 4-7-039:012 & 023	Existing ramp	
		9260 b		21°26'47.5"N 157°49'59.6"W	to KA-1 Channel	ʻĀhuimanu Stream	Perennial	Rectangular lined channel				
03-003	KA-1 Channel	9611	21°26'29.0"N 157°49'55.6"W	21°27'09.9"N 157°50'06.8"W	Mauka of Sewer Treatment Plant to Flood Control	ʻĀhuimanu Stream	Perennial	Rectangular lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 4-7-004:040; (1) 4-7-025:039 & 040; (1) 4-7-028:003; (1) 4-7-037:020 & 032; AND (1) 4-7-039:012 & 023	Existing ramp	
03-004	KA-2 Channel Boulder Basin	9612 y	21°26'37.9"N 157°50'31.1"W	21°26'41.1"N 157°50'30.2"W	Hio Place Boulder Basin	Kahaluu Stream	Perennial	lined	Stream Boulder Basin Maintenance	(1) 4-7-029:034	Existing ramp	
03-005	KA-2 Channel	9612	21°26'41.1"N 157°50'30.2"W	21°27'09.9"N 157°50'06.8"W	From Hio Place Boulder Basin to KA-1 Channel	Kahaluu Stream	Perennial	concrete channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 4-7-025:040; (1) 4-7-028:003 & 041; (1) 4-7-029:034; AND (1) 4-7-050:046	Existing ramp	
03-006	Kahaluu Flood Control	9268	21°27'09.9"N 157°50'06.8"W	21°27'17.4"N 157°50'12.2"W	Ahaolelo Road to Kam. Hwy.	Kaneohe Bay	Perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 4-7-028:003 & 040	Existing ramp	
03-007a	Kaneohe Stream (a)	9270 a	21°24'43.0"N 157°47'42.2"W	21°24'39.4"N 157°47'19.9"W	From Foot Bridge at Wena St to Puohala St	Kaneohe Bay	Perennial	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 4-5-030:001, 041 & 049	Existing (rock) ramp	The site can be accessed at Puohala Street, using a natural ramp made of rocks, see site plan for location. A crane and dump trucks may also be used from Waikalua Place.

Appendix A: CCH Stream Maintenance Inventory - Sites of Kaneohe (Koolaupoko) District

NO.	Name	DFM #	Location Coordinate		Location Description	Down Stream Water Body	Stream Flow	Stream Type	Maintenance Category	TMKs	Equipment Access	Description of Access
			Upstream	Downstream								
03-007c	Kaneohe Stream (c)	9270 c	21°24'39.0"N 157°48'02.9"W	21°24'42.3"N 157°47'54.6"W	Falls to behind librart	Kaneohe Bay	Perennial	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 4-5-020:036; (1) 4-5-028:040; AND (1) 4-5-072:074	Existing ramp	
03-007d	Kaneohe Stream (d)	9270 d	21°24'13.1"N 157°48'07.5"W	21°24'39.0"N 157°48'02.9"W	Likelike Viaduct to Falls	Kaneohe Bay	Perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 4-5-072:074 & 075	Existing ramp	
03-007e	Kaneohe Stream (e)	9270 e	21°23'58.4"N 157°48'09.7"W	21°24'13.1"N 157°48'07.5"W	Luluku Road Bridge to Likelike Viaduct	Kaneohe Bay	Perennial	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 4-5-085:049 & 050	Existing ramp	
03-007f	Kaneohe Stream (f)	9270 f	21°23'33.6"N 157°48'15.2"W	21°23'58.4"N 157°48'09.7"W	Kaneohe Dam (Basin) to Luluku Road Bridge	Kaneohe Bay	Perennial	concrete swale	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 4-5-037:063; (1) 4-5-040:028; (1) 4-5-085:049; (1) 4-5-087:036; AND (1) 4-5-099:077	Existing ramp	
03-008	Kawa Stream	9294 a	21°23'45.0"N 157°47'35.4"W 21°24'03.2"N 157°47'18.6"W	21°24'20.6"N 157°47'25.7"W	Mokulele Bridge to Kaneohe Bay Drive	Kaneohe Bay	Perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 4-5-066:063; (1) 4-5-067:065; (1) 4-5-070:049; (1) 4-5-084:058; (1) 4-5-084:059 AND (1) 4-5-103:006	Existing ramp + Natural bank access at fork	
03-009	McDougal Ditch	9286	21°27'06.5"N 157°49'23.3"W	21°27'10.1"N 157°49'23.0"W	Mauka side of Kam. Hwy. to Kaneohe Bay	Kaneohe Bay	intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 4-7-030:007 AND (1) 4-7-034:001 & 002	Lower equipment at street	

Appendix A: CCH Stream Maintenance Inventory - Sites of Laie (Koolauloa) District

NO.	Name	DFM #	Location Coordinate		Location Description	Down Stream Water Body	Stream Flow	Stream Type	Maintenance Category	TMKs	Equipment Access	Description of Access
			Upstream	Downstream								
04-001	Hanohano Stream Mouth	9222 m		21°35'21.11"N 157°53'19.87"W	Open mouth (private stream)	Hauula shoreline	intermittent	unlined	Stream Mouth Breach Opening (at strom event)	(1) 5-3-006:027 AND (1) 5-3-008:001	Beach/park route	Drive hoptoe through parking lot onto the beach. Dozer drive up sand from further away at Haleaha road. Access during low tide.
04-002	Hauula Stream Mouth	9201 m		2121°36'30.08"N 157°54'31.85"W	Open mouth (private stream)	Hauula shoreline	intermittent	unlined	Stream Mouth Breach Opening (at strom event)	(1) 5-4-001:038 & 045	Beach/park route	Access during low tide.
04-003	Kaaawa Park Ditch Mouth			21°32'59.20"N 157°50'49.30"W	Open mouth	Kaaawa shoreline	perennial	unlined	Stream Mouth Breach Opening	(1) 5-1-002:025	Beach/park route	
04-004	Kaaawa Stream Mouth			21°32'40.29"N 157°50'44.42"W	Open mouth	Kaaawa shoreline	perennial	unlined	Stream Mouth Breach Opening	(1) 5-1-001:001 & 009	Beach/park route	
04-004a	Kalaeoio Ditch Mouth			21°32'43.1"N 157°50'45.9"W	Open mouth	Kaaawa shoreline	perennial	lined with stone walls on both sides	Stream Mouth Breach Opening	(1) 5-1-009:009 & 027	Beach/park route	
04-005	Laie Wai Stream Mouth			21°39'18"N 157°55'44"W	Open mouth	Laie shoreline	perennial	unlined	Stream Mouth Breach Opening	(1) 5-5-009:011	Beach/park route	Access during low tide.
04-006	Laie Maloo Stream Mouth	9207 m		21°37'57.88"N 157°55'13.75"W	Open mouth (private stream)	Laie shoreline	perennial	unlined	Stream Mouth Breach Opening (at strom event)	(1) 5-5-001:018, 048 AND (1) 5-5-006:010	Beach/park route	
04-007	Laieloa Stream Mouth	9227 m		21°38'53.76"N 157°55'19.56"W	Open mouth (private stream)	Laie Bay	perennial	lined with concrete walls on both sides	Stream Mouth Breach Opening (at strom event)	(1) 5-5-011:067, 068 & 070	Beach/park route	Access during low tide.
04-008	Lau Place Outlet			21°33'28.5"N 157°51'28.2"W	Open mouth	Kaaawa shoreline	perennial	unlined	Stream Mouth Breach Opening	(1) 5-1-003:014	Beach/park route	
04-009	Maakua Stream Mouth	9211 m		21°36'37.74"N 157°54'34.35"W	Open mouth (private stream)	Hauula shoreline	intermittent	lined with stone wall on one side	Stream Mouth Breach Opening (at strom event)	(1) 5-4-001:032 AND (1) 5-4-002:022	Beach/park route	
04-010	Meheiwi Stream Mouth	9208 m		21°36'25.14"N 157°54'19.20"W	Open mouth (private stream)	Hauula shoreline	intermittent	unlined	Stream Mouth Breach Opening (at strom event)	(1) 5-3-016:001, 002 AND (1) 5-4-010:001	Beach/park route	
04-011	Punaluu Stream NB Mouth			21°34'56.99"N 157°53'12.45"W	Open mouth	Puanluu shoreline	perennial	unlined	Stream Mouth Breach Opening	N/A	Beach/park route	
04-012	Punaluu Valley Road Ditch			21°34'48.57"N 157°53'9.15"W	Open mouth	Puanluu shoreline	perennial	unlined	Stream Mouth Breach Opening	N/A	Beach/park route	
04-013	Waimea Stream Mouth	9217 m		21°38'29"N 158°03'47"W	Open mouth (private stream)	Waimea Bay	perennial	unlined	Stream Mouth Breach Opening (at strom event)	(1) 6-1-001:003	Beach/park route	
04-014	Waipilopilo Stream Mouth			21°36'53.78"N 157°54'47.24"W	Open mouth			lined with stone wall on one side	Stream Mouth Breach Opening	(1) 5-4-002:022 AND (1) 5-4-017:021	Beach/park route	
04-015	Waipuhi Stream Mouth			21°36'26.05"N 157°54'24.61"W	Open mouth (private stream)	Hauula shoreline	perennial	lined with stone walls on both sides	Stream Mouth Breach Opening (at strom event)	(1) 5-4-010:018	Beach/park route	

Appendix A: CCH Stream Maintenance Inventory - Sites of Pearl City District

NO.	Name	DFM #	Location Coordinate		Location Description	Down Stream Water Body	Stream Flow	Stream Type	Maintenance Category	TMKs	Equipment Access	Description of Access
			Upstream	Downstream								
05-001	Aiea Stream	9000 a	21°22'39.2"N 157°55'58.4"W	21°22'37.8"N 157°56'02.8"W	Foot bridge to Kam Hwy	Pearl Harbor	Perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 9-9-044:070	Lower equipment at bridge / street	
05-005	Kapakahi Stream (Ewa)	9011	21°23'00.3"N 158°00'23.6"W	21°22'48.8"N 158°00'17.9"W	Farrington Hwy. Waipahu Dump (foot bridge)	Pearl Harbor	Intermittent	unlined	Type A Stream Maintenance (no equipment in stream)	(1) 9-4-011:011 AND 027	no equipment in stream	Access from Waipahu Depot Road. Use long reach excavator from the road to remove material from the stream.
05-006	Navy Bike Path Swale	9040	21°22'47.8"N 157°56'32.5"W	21°22'46.7"N 157°56'24.0"W	Aiea Kai Place, along bikepath	(Percolation) Pearl Harbor	Intermittent	unlined	Type A Stream Maintenance (no equipment in stream)	(1) 9-8-015:047	no equipment in stream	Access directly from Aiea Kai Way, along Pearl Harbor bike path.
05-007	Wailani Stream	9023 a	21°23'56.4"N 157°59'59.9"W		Queen-Liliuokalani (H1) Freeway	Pearl Harbor	Intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 9-4-009:004; (1) 9-4-058:023 & 130 AND (1) 9-4-060:049 & 050	Lower equipment at bridge	Access from Waipahu Street extension. Lower the equipment into the channel with the crane. The crane will also be used to remove collected material from the channel and place into dump trucks for disposal.
			21°23'53.8"N 157°59'50.8"W			Wailani Stream	Intermittent	lined channel				
		9023 b				Pearl Harbor	Intermittent	unlined				
		9023 c		21°23'30.0"N 157°59'58.5"W	to Peke Ln	Pearl Harbor	Intermittent	unlined				
05-008	Waipahu Stream	9024 a	21°23'13.6"N 158°01'31.4"W		Freeway	Pearl Harbor	Intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	(1) 9-4-032:100; (1) 9-4-047:003; (1) 9-4-049:003, 013 & 028 AND (1) 9-4-052:005 & 074	Existing ramp + Lower equipment at bridge	The crane will also be used to remove collected material from the channel and place into dump trucks for disposal.
		9024 b			Waipahu Street	Pearl Harbor	Intermittent	lined channel				
		9024 c			Leonui Street	Pearl Harbor	Intermittent	lined channel				
		9024		21°22'29.9"N 158°01'06.3"W	gas lines	Pearl Harbor	Intermittent	lined channel				
05-009	Honouliuli Stream			21°21'48.0"N 158°01'22.0"W	Fort Weaver Road	Pearl Harbor	Perennial	unlined	Type A Stream Maintenance (no equipment in stream)	(1) 9-1-017:006	no equipment in stream	Access from West Lock golf course, along the stream banks.

Appendix A: CCH Stream Maintenance Inventory - Sites of Waialua District

NO.	Name	DFM #	Location Coordinate		Location Description	Down Stream Water Body	Stream Flow	Stream Type	Maintenance Category	TMKs	Equipment Access	Description of Access
			Upstream	Downstream								
07-002	Paukauila Stream	9104		21°34'43.7"N 158°06'58.3"W	30' both sides of Haleiwa Bridge	Waialua Bay	perennial	unlined	Type A Stream Maintenance (no equipment in stream)	N/A	no equipment in stream	just vegetation removal on stream bank at road side

Appendix A: CCH Stream Maintenance Inventory - Sites of Waianae District

NO.	Name	DFM #	Location Coordinate		Location Description	Down Stream Water Body	Stream Flow	Stream Type	Maintenance Category	TMKs	Equipment Access	Description of Access
			Upstream	Downstream								
08-001rc1	Kaupuni Stream RC1	9051	21°27'52.6"N 158°09'33.1"W		From road Crossing #1 include 100 ft. upstream /downstream of Haleahi Road	Pokai Bay	perennial	30" x 1 pipe culvert without head walls	Type C Stream Maintenance at road crossing include culvert cleaning	(1) 8-5-004:057, 075 AND (1) 8-5-005:029	Existing (natural) ramp	Direct access from road side, drive equipment into stream.
08-001a	Kaupuni Stream (a)		21°27'52.6"N 158°09'33.1"W	21°27'27.6"N 158°10'05.3"W			perennial	unlined	Type C Stream Maintenance (restore steam bank in need)	(1) 8-5-004:004, 041, 057, 071 TO 075, 093 AND (1) 8-5-029:002	Restore/Create (gravel) ramp	Direct access from road side, drive equipment into stream. Or use existing rocky material to restore/create access to drive equipment into stream.
08-001rc2	Kaupuni Stream RC2	9051	21°27'27.6"N 158°10'05.3"W		road Crossing #2 of Waianae Valley Road	Pokai Bay	perennial	box culvert with concrete head walls and lined extention on both sides	Type C Stream Maintenance at road crossing include culvert cleaning	(1) 8-5-029:002, 011, 020 AND (1) 8-5-032:040	Restore/Create (gravel) ramp	Direct access from road side, drive equipment into stream. Or use existing rocky material to restore/create access to drive equipment into stream.
08-001b	Kaupuni Stream (b)		21°27'27.6"N 158°10'05.3"W	21°27'09.1"N 158°10'18.4"W			perennial	unlined	Type C Stream Maintenance (restore steam bank in need)	(1) 8-5-004:042 & 053; (1) 8-5-019:021 AND (1) 8-5-029:011 & 019	Restore/Create (gravel) ramp	Direct access from road side, drive equipment into stream. Or use existing rocky material to restore/create access to drive equipment into stream.
08-001rc3	Kaupuni Stream RC3	9051	21°27'09.1"N 158°10'18.4"W		Road Crossing #3, Boulder basin	Pokai Bay	perennial	30" x 3 pipe culvert with concrete head walls and lined extention on both sides	Type C Stream Maintenance at road crossing include culvert cleaning	(1) 8-5-004:053 AND (1) 8-5-019:002 & 071	Restore/Create (gravel) ramp	Direct access from road side, drive equipment into stream. Or use existing rocky material to restore/create access to drive equipment into stream.
08-001bb	Kaupuni Stream BB	9051	21°27'04.3"N 158°10'20.6"W		Boulder basin	Pokai Bay	perennial	partially lined with concrete	Type C Stream Maintenance + Stream Boulder Basin Maintenance	(1) 8-5-019:071	Existing ramp	Direct access from road side, drive equipment into stream.
08-001c	Kaupuni Stream (c)	9051	21°27'03.5"N 158°10'23.0"W	21°26'58.5"N 158°11'06.5"W	Boulder basin to K2 Debris Catcher	Pokai Bay	perennial	concrete lined rectangular channel	Type B Stream Maintenance	(1) 8-5-003:038, (1) 8-5-019:071 AND 073	Existing ramp	Direct access from road side, drive equipment into stream.
08-001dc	Kaupuni Stream DC	9051	21°26'58.5"N 158°11'06.5"W		K2 Debris Catcher	Pokai Bay	perennial	fully lined with concrete	Stream Debris Catcher Maintenance	(1) 8-5-003:038	Lower equipment at stream bank	
08-002	Kawiwi Stream	9052	21°27'19.1"N 158°10'56.1"W	21°27'03.3"N 158°11'05.7"W	Lined portion of Kawiwi Stream	Kaupuni Stream	intermittent	lined channel	Type B Stream Maintenance	(1) 8-5-003:038	Existing (natural) ramp	Direct access from road side, drive equipment into stream.

Appendix A: CCH Stream Maintenance Inventory - Sites of Waianae District

NO.	Name	DFM #	Location Coordinate		Location Description	Down Stream Water Body	Stream Flow	Stream Type	Maintenance Category	TMKs	Equipment Access	Description of Access
			Upstream	Downstream								
08-003	M-1 & M-3 Channel	9055	21°26'13.5"N 158°09'57.9"W	21°25'48.2"N 158°10'26.8"W	From farrington hwy to Naval fence line.	Maili shoreline /Pacific Ocean	intermittent	lined channel	Type B Stream Maintenance	(1) 8-6-002:001 TO 003, (1) 8-6-003:051, (1) 8-6-013:009 AND (1) 8-7-003:061	Existing (natural) ramp	Direct access from road side, drive equipment into stream.
		9056	21°25'57.8"N 158°09'59.8"W		Lualualei reservoir end to M-1	Maili shoreline /Pacific Ocean	intermittent	lined channel				
08-005	Mailiili Stream M-2	9053 a	21°26'45.7"N 158°09'53.1"W		From 86-439 Puuhulu Rd	Maili shoreline /Pacific Ocean	intermittent	lined channel	Type B Stream Maintenance	(1) 8-6-011:012, (1) 8-6-012:021, (1) 8-6-013:009 AND (1) 8-6-024:008	Existing (concrete) ramp	
		9053 b	21°26'29.0"N 158°09'58.3"W			Maili shoreline /Pacific Ocean	intermittent	lined channel				
		9053 c		21°26'11.7"N 158°10'01.2"W	to Mailiili M-3 Channel	Maili shoreline /Pacific Ocean	intermittent	lined channel				
08-008	Pokai Bay Road Ditch #3	9071 m		21°26'09.7"N 158°11'08.9"W	Farrington Highway to Ocean	Pokai Bay	intermittent	lined	Type A Stream Maintenance	(1) 8-6-001:006, 007 AND (1) 8-6-016:003	Beach/park route	Direct access from road side, drive equipment into the site on beach.
08-009rc1	Puuhulu Stream RC1		21°27'12.1"N 158°09'07.7"W		100 ft. either side of uhawai Road	Maili shoreline /Pacific Ocean	intermittent	unlined	Type B Stream Maintenance at road crossing include culvert cleaning	(1) 8-6-004:003 AND (1) 8-6-009:001	Lower equipment at bridge	
08-009rc2	Puuhulu Stream RC2		21°26'51.9"N 158°09'19.9"W		100 ft. either side of Puuhulu Road	Maili shoreline /Pacific Ocean	intermittent	unlined	Type B Stream Maintenance at road crossing include culvert cleaning	(1) 8-6-007:014 AND (1) 8-6-008:016	Existing (natural) ramp	
08-009rc3	Puuhulu Stream RC3		21°26'28.1"N 158°09'26.7"W		100 ft. either side Kuwale Road	Maili shoreline /Pacific Ocean	intermittent	unlined	Type B Stream Maintenance at road crossing include culvert cleaning	(1) 8-6-003:007 AND (1) 8-6-006:003	Existing (natural) ramp	
08-010a	Ulehawa Channel U-2	9064 b	21°23'34.19"N 158°09'25.22"W	21°23'43.84"N 158°09'33.97"W	U-2 and U-1 confluence to the terminus at Princess Kahanu Avenue	Ulehawa Stream	perennial	lined channel	Type B Stream Maintenance	(1) 8-7-033:001 AND 027		Direct access from road side, drive equipment into the site on beach.
08-010b	Ulehawa Channel U-3	9064 c	21°23'34.18"N 158°09'23.78"W	21°23'07.70"N 158°08'51.90"W	U-3 and U-1 confluence to the terminus at Nanakuli DHHL property	Ulehawa Stream	perennial	lined channel	Type B Stream Maintenance	(1) 8-7-026:009 & 127, (1) 8-7-031:020 & 061, AND (1) 8-7-033:001	Existing ramp	Direct access from road side, drive equipment into the site on beach.
08-011	Maili Channel M-5	9057 b	21°24'52.70"N 158°10'24.90"W		End to 200 ft. Mauka	Maili shoreline	intermittent	lined channel	Type B Stream Maintenance	(1) 8-7-005:013 AND (1) 8-7-010:013	Beach/park route + Lower equipment at bridge	
		9057		21°24'46.34"N 158°09'58.06"W	200 ft. Mauka to Mamoalii Way	Maili shoreline	intermittent	lined channel	Type B Stream Maintenance			

Appendix A Reference Table 1: Streams with Heavy Equipment Use in Stream

NO.	Name	DFM #	Location Description	Stream Flow	Stream Type	Maintenance Category	Equipment Access	Description of Access
01-002	Kalihi Stream (a)	9433 a	From Kalihi Waena School to Umi Street	perennial	stream walls only	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at street	Access through Kuhio Park Terrace (Richard Lane). Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream.
01-005	Kapakahi Stream	9438 b	From Kam Hwy to Kahala Avenue	perennial	stream walls only	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at stream bank	Access through city and county easement areas. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream. Work from upstream to downstream.
01-007	Kapalama Drainage Canal	9439 a	From Houghtailing Street to Halona Street	perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at street	Access through Kohou street. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream.
01-008	Kapalama Inc. Ditch	9440	From Hikina Ln to Kokea Street	intermittent	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	Access through Kokea street.
01-010	Makiki Ditch	9460 h	From Philip Street to Fern Street	intermittent	stream walls only	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at street	Access through city and county easement areas. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream.
		9460 i	From Fern Street to Ala Wai Canal	intermittent	stream walls only			
01-011	Manaiki Stream	9464 a	From Debris Catcher at mauka of Ala Mahamoe Street	intermittent	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Surge ramp	Access through Onipaa St. At temporary gravel access ramp or lower the construction vehicles and equipment into the stream with crane at the bridge. The crane will also be used to remove collected waste and dredged material from the stream.
		9464 y	to mauka of Moanalua Gardens	intermittent	lined & unlined channel			
01-012	Manoa Palolo Stream	9467	From Manoa Palolo Stream Interceptor to Date Street	perennial	stream walls only	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	Access through concrete ramp at Koali Road where Manoa and Palolo meet.
01-013	Manoa Stream	9468 c	From Napuaa Pl	perennial	stream walls only & unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Surge ramp + Lower equipment at bridge	Access through Kahaloa Drive, east Manoa Road, Lowry Avenue, Woodlawn Drive, and Pawaina Street. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste from the stream. May also access with track loader at east Manoa Road and Kahaloa Road locations by driving track loader down natural embankment. Embankment will be restored after maintenance activities are complete.
		9468 d	Manoa Valley District Park	perennial	unlined			
		9468 e	to E. Manoa Road	perennial	lined channel			
		9468 f	Clean Headwalls - 50' two sides of Woodlawn Dr	perennial	stream walls only			
01-014	Moanalua Stream	9472 c		intermittent	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Surge ramp + Lower equipment at bridge	Access through Paa Street at temporary gravel access ramp or lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream.
		9472 y	From Moanalua Highway to Kikowaena Street	perennial	stream walls only			
01-015	Muliwai Ditch	9474 b	From Lunalilo Fwy to Kahala Avenue	intermittent	lined channel	Type B Stream Maintenance	Lower equipment at bridge	Access through various streets. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste from the stream.
01-016a	Nuuanu Stream (a)	9482 a	From Laimi Road to Klebahn Place	perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at street	Access through Moanawai Place. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste from the stream.
01-017	Palolo Stream	9486 a	From Mauka Kiwila Street to Keanu Street	perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	Access through gated concrete ramp at Kalua Road. A crane will be used to remove collected waste from the stream at Pakui Street, St. Louis Drive, Palolo Avenue, Paalea Avenue, Kalua Road, and Kiwila Street.
01-018	Pauoa Stream	9488 d	From Liko Lane to Pali hwy.	perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at street	Access through Liko Lane. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste from the stream.
01-019	Waialii Stream	9490	From Poola Street to Debris Catcher	intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at bridge	Access through Kiai Place and Poola Place. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste from the stream.
01-020	Wailupe Stream	9505 b	From Boulder Basin to Kalanianaole Highway	intermittent	unlined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	Access through existing ramp at Hind Place. A crane will also be used to remove collected waste from the stream at various locations where streets across the stream.
01-021	Wawamalu Stream	9519	From Hawaii Kai Drive to Kalanianaole Highway (at Queen's Beach)	intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at stream bank	Access through ramp on Kealahou Street. The crane will also be used remove collected waste and dredged material from the channel.

Appendix A Reference Table 1: Streams with Heavy Equipment Use in Stream

NO.	Name	DFM #	Location Description	Stream Flow	Stream Type	Maintenance Category	Equipment Access	Description of Access
02-001	Alahaki Ditch	9325	From 1080 Alahaki Street to Kahili Street	intermittent	(lined) Trapezoidal Channel	Type B Stream Maintenance (with small dozer and/or small loader)	Surge ramp	Access through city and county easement along Alahaki Street. Lay down surge rock for track loader access. Remove surge rock when done.
02-002	Hele Drainage Ditch	9326	From Liku Street to Ben franklin / gas station	perennial	unlined / lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at bridge	Access from Liku Street. Drop skidsteer into stream using crane. The crane will also be used to remove collected material from the stream and place into dump trucks for disposal.
03-001	Anolani Stream	9253 b	From Likelike Hwy. to Kapunahala Stream	Perennial	Rectangular channel, fully improved concrete lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
03-002	Hui Ulili Lined Channel	9260 a	From end of lined channel	Perennial	Trapezoidal and Rectangular lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
		9260 b	to KA-1 Channel	Perennial	Rectangular lined channel			
03-003	KA-1 Channel	9611	Mauka of Sewer Treatment Plant to Flood Control	Perennial	Rectangular lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
03-004	KA-2 Channel Boulder Basin	9612 y	Hio Place Boulder Basin	Perennial	lined	Stream Boulder Basin Maintenance	Existing ramp	
03-005	KA-2 Channel	9612	From Hio Place Boulder Basin to KA-1 Channel	Perennial	concrete channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
03-006	Kahaluu Flood Control	9268	Ahaolelo Road to Kam. Hwy.	Perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
03-007a	Kaneohe Stream (a)	9270 a	From Foot Bridge at Wena St to Puohala St	Perennial	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Existing (rock) ramp	The site can be accessed at Puohala Street, using a natural ramp made of rocks, see site plan for location. A crane and dump trucks may also be used from Waikalua Place.
03-007c	Kaneohe Stream (c)	9270 c	Falls to behind librart	Perennial	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
03-007d	Kaneohe Stream (d)	9270 d	Likelike Viaduct to Falls	Perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
03-007e	Kaneohe Stream (e)	9270 e	Luluku Road Bridge to Likelike Viaduct	Perennial	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
03-007f	Kaneohe Stream (f)	9270 f	Kaneohe Dam (Basin) to Luluku Road Bridge	Perennial	concrete swale	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
03-008	Kawa Stream	9294 a	Mokulele Bridge to Kaneohe Bay Drive	Perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp + Natural bank access at fork	
03-009	McDougal Ditch	9286	Mauka side of Kam. Hwy. to Kaneohe Bay	intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at street	
05-001	Aiea Stream	9000 a	Foot bridge to Kam Hwy	perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at bridge / street	
05-007	Wailani Stream	9023 a	Queen-Liliuokalani (H1) Freeway	Intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at bridge	Access from Waipahu Street extension. Lower the equipment into the channel with the crane. The crane will also be used to remove collected material from the channel and place into dump trucks for disposal.
				Intermittent	lined channel			
		9023 b		Intermittent	unlined			
		9023 c	to Peke Ln	Intermittent	unlined			
05-008	Waipahu Stream	9024 a	Freeway	Intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp + Lower equipment at bridge	The crane will also be used to remove collected material from the channel and place into dump trucks for disposal.
		9024 b	Waipahu Street	Intermittent	lined channel			
		9024 c	Leonui Street	Intermittent	lined channel			
		9024	gas lines	Intermittent	lined channel			
08-001rc1	Kaupuni Stream RC1	9051	From road Crossing #1 include 100 ft. upstream /downstream of Haleahi Road	perennial	30" x 1 pipe culvert without head walls	Type C Stream Maintenance at road crossing include culvert cleaning	Existing (natural) ramp	Direct access from road side, drive equipment into stream.
08-001a	Kaupuni Stream (a)			perennial	unlined	Type C Stream Maintenance (restore steam bank in need)	Restore/Create (gravel) ramp	Direct access from road side, drive equipment into stream. Or use existing rocky material to restore/create access to drive equipment into stream.
08-001rc2	Kaupuni Stream RC2	9051	road Crossing #2 of Waianae Valley Road	perennial	box culvert with concrete head walls and lined extention on both sides	Type C Stream Maintenance at road crossing include culvert cleaning	Restore/Create (gravel) ramp	Direct access from road side, drive equipment into stream. Or use existing rocky material to restore/create access to drive equipment into stream.
08-001b	Kaupuni Stream (b)			perennial	unlined	Type C Stream Maintenance (restore steam bank in need)	Restore/Create (gravel) ramp	Direct access from road side, drive equipment into stream. Or use existing rocky material to restore/create access to drive equipment into stream.
08-001rc3	Kaupuni Stream RC3	9051	Road Crossing #3, Boulder basin	perennial	30" x 3 pipe culvert with concrete head walls and lined extention on both sides	Type C Stream Maintenance at road crossing include culvert cleaning	Restore/Create (gravel) ramp	Direct access from road side, drive equipment into stream. Or use existing rocky material to restore/create access to drive equipment into stream.

Appendix A Reference Table 1: Streams with Heavy Equipment Use in Stream

NO.	Name	DFM #	Location Description	Stream Flow	Stream Type	Maintenance Category	Equipment Access	Description of Access
08-001bb	Kaupuni Stream BB	9051	Boulder basin	perennial	partially lined with concrete	Type C Stream Maintenance + Stream Boulder Basin Maintenance	Existing ramp	Direct access from road side, drive equipment into stream.
08-001c	Kaupuni Stream (c)	9051	Boulder basin to K2 Debris Catcher	perennial	concrete lined rectangular channel	Type B Stream Maintenance	Existing ramp	Direct access from road side, drive equipment into stream.
08-001dc	Kaupuni Stream DC	9051	K2 Debris Catcher	perennial	fully lined with concrete	Stream Debris Catcher Maintenance	Lower equipment at stream bank	
08-002	Kawiwi Stream	9052	Lined portion of Kawiwi Stream	intermittent	lined channel	Type B Stream Maintenance	Existing (natural) ramp	Direct access from road side, drive equipment into stream.
08-003	M-1 & M-3 Channel	9055	From farrington hwy to Naval fence line.	intermittent	lined channel	Type B Stream Maintenance	Existing (natural) ramp	Direct access from road side, drive equipment into stream.
		9056	Lualualei reservoir end to M-1	intermittent	lined channel			
08-005	Mailiili Stream M-2	9053 a	From 86-439 Puuhulu Rd	intermittent	lined channel	Type B Stream Maintenance	Existing (concrete) ramp	
		9053 b		intermittent	lined channel			
		9053 c	to Mailiili M-3 Channel	intermittent	lined channel			
08-009rc1	Puuhulu Stream RC1		100 ft. either side of uhawai Road	intermittent	unlined	Type B Stream Maintenance at road crossing include culvert cleaning	Lower equipment at bridge	
08-009rc2	Puuhulu Stream RC2		100 ft. either side of Puuhulu Road	intermittent	unlined	Type B Stream Maintenance at road crossing include culvert cleaning	Existing (natural) ramp	
08-009rc3	Puuhulu Stream RC3		100 ft. either side Kuwale Road	intermittent	unlined	Type B Stream Maintenance at road crossing include culvert cleaning	Existing (natural) ramp	
08-010a	Ulehawa Channel U-2	9064 b	U-2 and U-1 confluence to the terminus at Princess Kahanu Avenue	perennial	lined channel	Type B Stream Maintenance		Direct access from road side, drive equipment into the site on beach.
08-010b	Ulehawa Channel U-3	9064 c	U-3 and U-1 confluence to the terminus at Nanakuli DHHL property	perennial	lined channel	Type B Stream Maintenance	Existing ramp	Direct access from road side, drive equipment into the site on beach.
08-011	Maili Channel M-5	9057 b	End to 200 ft. Mauka	intermittent	lined channel	Type B Stream Maintenance	Beach/park route + Lower equipment at bridge	
		9057	200 ft. Mauka to Mamoalii Way	intermittent	lined channel	Type B Stream Maintenance		
04-001	Hanohano Stream Mouth	9222 m	Open mouth (private stream)	intermittent	unlined	Stream Mouth Breach Opening (at strom event)	Beach/park route	Drive hoptoe through parking lot onto the beach. Dozer drive up sand from further away at Haleaha road. Access during low tide.
04-002	Hauula Stream Mouth	9201 m	Open mouth (private stream)	intermittent	unlined	Stream Mouth Breach Opening (at strom event)	Beach/park route	Access during low tide.
04-003	Kaaawa Park Ditch Mouth		Open mouth	perennial	unlined	Stream Mouth Breach Opening	Beach/park route	
04-004	Kaaawa Stream Mouth		Open mouth	perennial	unlined	Stream Mouth Breach Opening	Beach/park route	
04-004a	Kalaeoio Ditch Mouth		Open mouth	perennial	lined with stone walls on both sides	Stream Mouth Breach Opening	Beach/park route	
04-005	Laie Stream Mouth		Open mouth	perennial	unlined	Stream Mouth Breach Opening	Beach/park route	Access during low tide.
04-006	Laie Maloo Stream Mouth	9207 m	Open mouth (private stream)	perennial	unlined	Stream Mouth Breach Opening (at strom event)	Beach/park route	
04-007	Laieloa Stream Mouth	9227 m	Open mouth (private stream)	perennial	lined with concrete walls on both sides	Stream Mouth Breach Opening (at strom event)	Beach/park route	Access during low tide.
04-008	Lau Place Outlet		Open mouth	perennial	unlined	Stream Mouth Breach Opening	Beach/park route	
04-009	Maakua Stream Mouth	9211 m	Open mouth (private stream)	intermittent	lined with stone wall on one side	Stream Mouth Breach Opening (at strom event)	Beach/park route	
04-010	Meheiwi Stream Mouth	9208 m	Open mouth (private stream)	intermittent	unlined	Stream Mouth Breach Opening (at strom event)	Beach/park route	
04-011	Punaluu Stream NB Mouth		Open mouth	perennial	unlined	Stream Mouth Breach Opening	Beach/park route	
04-012	Punaluu Valley Road Ditch		Open mouth	perennial	unlined	Stream Mouth Breach Opening	Beach/park route	
04-013	Waimea Stream Mouth	9217 m	Open mouth (private stream)	perennial	unlined	Stream Mouth Breach Opening (at strom event)	Beach/park route	
04-014	Waipilopilo Stream Mouth		Open mouth		lined with stone wall on one side	Stream Mouth Breach Opening	Beach/park route	
04-015	Waipuhi Stream Mouth		Open mouth (private stream)	perennial	lined with stone walls on both sides	Stream Mouth Breach Opening (at strom event)	Beach/park route	

Appendix A Reference Table 2: Unlined Streams with Heavy Equipment Use in Stream

NO.	Name	DFM #	Location Description	Stream Flow	Stream Type	Maintenance Category	Equipment Access	Description of Access
01-008	Kapalama Inc. Ditch	9440	From Hikina Ln to Kokea Street	intermittent	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	Access through Kokea street.
01-011	Manaiki Stream	9464 a	From Debris Catcher at mauka of Ala Mahamoe Street	intermittent	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Surge ramp	Access through Onipaa St. At temporary gravel access ramp or lower the construction vehicles and equipment into the stream with crane at the bridge. The crane will also be used to remove collected waste and dredged material from the stream.
		9464 y	to mauka of Moanalua Gardens	intermittent	lined & unlined channel			
01-013	Manoa Stream	9468 c	From Napuaa Pl	perennial	stream walls only & unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Surge ramp + Lower equipment at bridge	Access through Kahaloa Drive, east Manoa Road, Lowry Avenue, Woodlawn Drive, and Pawaina Street. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste from the stream. May also access with track loader at east Manoa Road and Kahaloa Road locations by driving track loader down natural embankment. Embankment will be restored after maintenance activities are complete.
		9468 d	Manoa Valley Distirct Park	perennial	unlined			
01-014	Moanalua Stream	9472 c		intermittent	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Surge ramp + Lower equipment at bridge	Access through Paa Street at temporary gravel access ramp or lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream.
01-020	Wailupe Stream	9505 b	From Boulder Basin to Kalanianaole Highway	intermittent	unlined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	Access through existing ramp at Hind Place. A crane will also be used to remove collected waste from the stream at various locations where streets across the stream.
02-002	Hele Drainage Ditch	9326	From Liku Street to Ben franklin / gas station	perennial	unlined / lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at bridge	Access from Liku Street. Drop skidsteer into stream using crane. The crane will also be used to remove collected material from the stream and place into dump trucks for disposal.
03-007a	Kaneohe Stream (a)	9270 a	From Foot Bridge at Wena St to Puohala St	perennial	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Existing (rock) ramp	The site can be accessed at Puohala Street, using a natural ramp made of rocks, see site plan for location. A crane and dump trucks may also be used from Waikalua Place.
03-007c	Kaneohe Stream (c)	9270 c	Falls to behind librart	perennial	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
03-007e	Kaneohe Stream (e)	9270 e	Lululku Road Bridge to Likelike Viaduct	perennial	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
05-007	Wailani Stream	9023 b		Intermittent	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at bridge	Access from Waipahu Street extension. Lower the equipment into the channel with the crane. The crane will also be used to remove collected material from the channel and place into dump trucks for disposal.
		9023 c	to Peke Ln	Intermittent	unlined			
08-001a	Kaupuni Stream (a)			perennial	unlined	Type C Stream Maintenance (restore steam bank in need)	Restore/Create (gravel) ramp	Direct access from road side, drive equipment into stream. Or use existing rocky material to restore/create access to drive equipment into stream.
08-001b	Kaupuni Stream (b)			perennial	unlined	Type C Stream Maintenance (restore steam bank in need)	Restore/Create (gravel) ramp	Direct access from road side, drive equipment into stream. Or use existing rocky material to restore/create access to drive equipment into stream.
08-009rc2	Puuhulu Stream RC2		100 ft. either side of Puuhulu Road	intermittent	unlined	Type B Stream Maintenance at road crossing include culvert cleaning	Existing (natural) ramp	
08-009rc3	Puuhulu Stream RC3		100 ft. either side Kuwale Road	intermittent	unlined	Type B Stream Maintenance at road crossing include culvert cleaning	Existing (natural) ramp	
04-001	Hanohano Stream Mouth	9222 m	Open mouth (private stream)	intermittent	unlined	Stream Mouth Breach Opening (at strom event)	Beach/park route	Drive hoptoe through parking lot onto the beach. Dozer drive up sand from further away at Haleaha road. Access during low tide.
04-002	Hauula Stream Mouth	9201 m	Open mouth (private stream)	intermittent	unlined	Stream Mouth Breach Opening (at strom event)	Beach/park route	Access during low tide.
04-003	Kaaawa Park Ditch Mouth		Open mouth	perennial	unlined	Stream Mouth Breach Opening	Beach/park route	
04-004	Kaaawa Stream Mouth		Open mouth	perennial	unlined	Stream Mouth Breach Opening	Beach/park route	
04-005	Laie Stream Mouth		Open mouth	perennial	unlined	Stream Mouth Breach Opening	Beach/park route	Access during low tide.
04-006	Laie Maloo Stream Mouth	9207 m	Open mouth (private stream)	perennial	unlined	Stream Mouth Breach Opening (at strom event)	Beach/park route	
04-008	Lau Place Outlet		Open mouth	perennial	unlined	Stream Mouth Breach Opening	Beach/park route	
04-010	Meheiwi Stream Mouth	9208 m	Open mouth (private stream)	intermittent	unlined	Stream Mouth Breach Opening (at strom event)	Beach/park route	
04-011	Punaluu Stream NB Mouth		Open mouth	perennial	unlined	Stream Mouth Breach Opening	Beach/park route	
04-012	Punaluu Valley Road Ditch		Open mouth	perennial	unlined	Stream Mouth Breach Opening	Beach/park route	
04-013	Waimea Stream Mouth	9217 m	Open mouth (private stream)	perennial	unlined	Stream Mouth Breach Opening (at strom event)	Beach/park route	

Appendix A Reference Table 3: Streams with Temporary Access Ramps

NO.	Name	DFM #	Location Description	Stream Flow	Stream Type	Maintenance Category	Equipment Access	Description of Access
01-011	Manaiki Stream	9464 a	From Debris Catcher at mauka of Ala Mahamoe Street	intermittent	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Surge ramp	Access through Onipaa St. At temporary gravel access ramp or lower the construction vehicles and equipment into the stream with crane at the bridge. The crane will also be used to remove collected waste and dredged material from the stream.
		9464 y	to mauka of Moanalua Gardens	intermittent	lined & unlined channel			
01-013	Manoa Stream	9468 c	From Napuaa Pl	perennial	stream walls only & unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Surge ramp + Lower equipment at bridge	Access through Kahaloa Drive, east Manoa Road, Lowry Avenue, Woodlawn Drive, and Pawaina Street. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste from the stream. May also access with track loader at east Manoa Road and Kahaloa Road locations by driving track loader down natural embankment. Embankment will be restored after maintenance activities are complete.
		9468 d	Manoa Valley Distirct Park	perennial	unlined			
		9468 e	to E. Manoa Road	perennial	lined channel			
		9468 f	Clean Headwalls - 50' two sides of Woodlawn Dr	perennial	stream walls only			
01-014	Moanalua Stream	9472 c		intermittent	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Surge ramp + Lower equipment at bridge	Access through Paa Street at temporary gravel access ramp or lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream.
02-001	Alahaki Ditch	9325	From 1080 Alahaki Street to Kahili Street	intermittent	(lined) Trapezoidal Channel	Type B Stream Maintenance (with small dozer and/or small loader)	Surge ramp	Access through city and county easement along Alahaki Street. Lay down surge rock for track loader access. Remove surge rock when done.
08-001a	Kaupuni Stream (a)			perennial	unlined	Type C Stream Maintenance (restore steam bank in need)	Restore/Create (gravel) ramp	Direct access from road side, drive equipment into stream. Or use existing rocky material to restore/create access to drive equipment into stream.
08-001rc2	Kaupuni Stream RC2	9051	road Crossing #2 of Waianae Valley Road	perennial	box culvert with concrete head walls and lined extention on both sides	Type C Stream Maintenance at road crossing include culvert cleaning	Restore/Create (gravel) ramp	Direct access from road side, drive equipment into stream. Or use existing rocky material to restore/create access to drive equipment into stream.
08-001b	Kaupuni Stream (b)			perennial	unlined	Type C Stream Maintenance (restore steam bank in need)	Restore/Create (gravel) ramp	Direct access from road side, drive equipment into stream. Or use existing rocky material to restore/create access to drive equipment into stream.
08-001rc3	Kaupuni Stream RC3	9051	Road Crossing #3, Boulder basin	perennial	30" x 3 pipe culvert with concrete head walls and lined extention on both sides	Type C Stream Maintenance at road crossing include culvert cleaning	Restore/Create (gravel) ramp	Direct access from road side, drive equipment into stream. Or use existing rocky material to restore/create access to drive equipment into stream.

Appendix A Reference Table 4: Streams with Turbidity Curtains

NO.	Name	DFM #	Location Description	Stream Flow	Stream Type	Maintenance Category	Equipment Access	Description of Access
01-001	Ala Naio Stream	9423 a	From Marco Polo Condo to Ala Wai Canal	perennial	stream walls only	Type B Stream Maintenance (with small dozer and/or small loader)	Beach/park route + Lower equipment at stream bank	Access through Ala Wai Park. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream.
01-002	Kalihi Stream (a)	9433 a	From Kalihi Waena School to Umi Street	perennial	stream walls only	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at street	Access through Kuhio Park Terrace (Richard Lane). Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream.
01-003	Kalihi Stream (b)	9433 b	From Umi Street to Kam Highway	perennial	unlined	Type A Stream Maintenance (no equipment in stream)	no equipment in stream	Access through Kalihi Transit Center. Use long reach excavator to remove sediment and material from the stream at stream bank. No equipment in the stream.
01-005	Kapakahi Stream	9438 b	From Kam Hwy to Kahala Avenue	perennial	stream walls only	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at stream bank	Access through city and county easement areas. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream. Work from upstream to downstream.
01-010	Makiki Ditch	9460 h	From Philip Street to Fern Street	intermittent	stream walls only	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at street	Access through city and county easement areas. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream.
		9460 i	From Fern Street to Ala Wai Canal	intermittent	stream walls only			
01-011	Manaiki Stream	9464 a	From Debris Catcher	intermittent	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Surge ramp	Access through Onipaa St. At temporary gravel access ramp or lower the construction vehicles and equipment into the stream with crane at the bridge. The crane will also be used to remove collected waste and dredged material from the stream.
		9464 y	to mauka of Moanalua Gardens	intermittent	lined & unlined channel			
01-012	Manoa Palolo Stream	9467	From Manoa Palolo Stream Interceptor to Date Street	perennial	stream walls only	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	Access through concrete ramp at Koali Road where Manoa and Palolo meet.
01-013	Manoa Stream	9468 c	From Napuaa Pl	perennial	stream walls only & unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Surge ramp + Lower equipment at bridge	Access through Kahaloa Drive, east Manoa Road, Lowry Avenue, Woodlawn Drive, and Pawaina Street. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste from the stream. May also access with track loader at east Manoa Road and Kahaloa Road locations by driving track loader down natural embankment. Embankment will be restored after maintenance activities are complete.
		9468 d	Manoa Valley Distirct Park	perennial	unlined			
		9468 e	to E. Manoa Road	perennial	lined channel			
		9468 f	Clean Headwalls - 50' two sides of Woodlawn Dr	perennial	stream walls only			
01-014	Moanalua Stream	9472 c		intermittent	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Surge ramp + Lower equipment at bridge	Access through Paa Street at temporary gravel access ramp or lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream.
		9472 y	From Moanalua Highway to Kikowaena Street	perennial	stream walls only			
01-015	Muliwai Ditch	9474 b	From Lunalilo Fwy to Kahala Avenue	intermittent	lined channel	Type B Stream Maintenance	Lower equipment at bridge	Access through various streets. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste from the stream.
01-016c	Nuuanu Stream (c)	9482 c	from Nuuanu - N. School to DPR-Liliuokalani Gardens	perennial	stream walls only		Existing ramp	Access through concrete ramp at the park at Mc Grew Lane, mauka of School Street.
01-016d	Nuuanu Stream (d)	9482 d	from North School Street to footbridge	perennial	stream walls only		Existing ramp	Access through concrete ramp at the park at Mc Grew Lane, mauka of School Street.
01-020	Wailupe Stream	9505 b	From Boulder Basin to Kalanianaole Highway	intermittent	unlined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	Access through existing ramp at Hind Place. A crane will also be used to remove collected waste from the stream at various locations where streets across the stream.

Appendix A Reference Table 4: Streams with Turbidity Curtains

NO.	Name	DFM #	Location Description	Stream Flow	Stream Type	Maintenance Category	Equipment Access	Description of Access
02-001	Alahaki Ditch	9325	From 1080 Alahaki Street to Kahili Street	intermittent	(lined) Trapezoidal Channel	Type B Stream Maintenance (with small dozer and/or small loader)	Surge ramp	Access through city and county easement along Alahaki Street. Lay down surge rock for track loader access. Remove surge rock when done.
02-002	Hele Drainage Ditch	9326	From Liku Street to Ben franklin / gas station	perennial	unlined / lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at bridge	Access from Liku Street. Drop skidsteer into stream using crane. The crane will also be used to remove collected material from the stream and place into dump trucks for disposal.
03-007a	Kaneohe Stream (a)	9270 a	From Foot Bridge at Wena St to Puohala St	Perennial	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Existing (rock) ramp	The site can be accessed at Puohala Street, using a natural ramp made of rocks, see site plan for location. A crane and dump trucks may also be used from Waikalua Place.
03-007c	Kaneohe Stream (c)	9270 c	Falls to behind librart	Perennial	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
03-007d	Kaneohe Stream (d)	9270 d	Likelike Viaduct to Falls	Perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
03-007e	Kaneohe Stream (e)	9270 e	Luluku Road Bridge to Likelike Viaduct	Perennial	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
03-007f	Kaneohe Stream (f)	9270 f	Kaneohe Dam (Basin) to Luluku Road Bridge	Perennial	concrete swale	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
03-008	Kawa Stream	9294 a	Mokulele Bridge to Kaneohe Bay Drive	Perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp + Natural bank access at fork	
03-009	McDougal Ditch	9286	Mauka side of Kam. Hwy. to Kaneohe Bay	intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at street	
05-001	Aiea Stream	9000 a	Foot bridge to Kam Hwy	Perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at bridge / street	
05-005	Kapakahi Stream (Ewa)	9011	Farrington Hwy. Waipahu Dump (foot bridge)	Intermittent	unlined	Type A Stream Maintenance (no equipment in stream)	no equipment in stream	Access from Waipahu Depot Road. Use long reach excavator from the road to remove material from the stream.
05-007	Wailani Stream	9023 a	Queen-Liliuokalani (H1) Freeway	Intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at bridge	Access from Waipahu Street extension. Lower the equipment into the channel with the crane. The crane will also be used to remove collected material from the channel and place into dump trucks for disposal.
				Intermittent	lined channel			
		9023 b		Intermittent	unlined			
		9023 c	to Peke Ln	Intermittent	unlined			
05-009	Honouliuli Stream		Fort Weaver Road	Perennial	unlined	Type A Stream Maintenance (no equipment in stream)	no equipment in stream	Access from West Lock golf course, along the stream banks.
07-002	Paukauila Stream	9104	30' both sides of Haleiwa Bridge	perennial	unlined	Type A Stream Maintenance (no equipment in stream)	no equipment in stream	just vegetation removal on stream bank at road side

Appendix A Reference Table 5: Streams with Onsite Dewatering

NO.	Name	DFM #	Location Description	Stream Flow	Stream Type	Maintenance Category	Equipment Access	Description of Access
08-001a	Kaupuni Stream (a)			perennial	unlined	Type C Stream Maintenance (restore steam bank in need)	Restore/Create (gravel) ramp	Direct access from road side, drive equipment into stream. Or use existing rocky material to restore/create access to drive equipment into stream.
08-001b	Kaupuni Stream (b)			perennial	unlined	Type C Stream Maintenance (restore steam bank in need)	Restore/Create (gravel) ramp	Direct access from road side, drive equipment into stream. Or use existing rocky material to restore/create access to drive equipment into stream.
08-002	Kawiwi Stream	9052	Lined portion of Kawiwi Stream	intermittent	lined channel	Type B Stream Maintenance	Existing (natural) ramp	Direct access from road side, drive equipment into stream.
08-003	M-1 & M-3 Channel	9055	From farrington hwy to Naval fence line.	intermittent	lined channel	Type B Stream Maintenance	Existing (natural) ramp	Direct access from road side, drive equipment into stream.
		9056	Lualualei reservoir end to M-1	intermittent	lined channel			
08-011	Maili Channel M-5	9057 b	End to 200 ft. Mauka	intermittent	lined channel	Type B Stream Maintenance	Beach/park route + Lower equipment at bridge	
		9057	200 ft. Mauka to Mamoalii Way	intermittent	lined channel	Type B Stream Maintenance		

Reference Table 6: Streams with Bulk Sandbags

NO.	Name	DFM #	Location Description	Stream Flow	Stream Type	Maintenance Category	Equipment Access	Description of Access
08-001dc	Kaupuni Stream DC	9051	K2 Debris Catcher	perennial	fully lined with concrete	Stream Debris Catcher Maintenance	Lower equipment at stream bank	
08-003	M-1 & M-3 Channel	9055	From farrington hwy to Naval fence line.	intermittent	lined channel	Type B Stream Maintenance	Existing (natural) ramp	Direct access from road side, drive equipment into stream.
		9056	Lualualei reservoir end to M-1	intermittent	lined channel			
08-010a	Ulehawa Channel U-2	9064 b	U-2 and U-1 confluence to the terminus at Princess Kahanu Avenue	perennial	lined channel	Type B Stream Maintenance		Direct access from road side, drive equipment into the site on beach.
08-010b	Ulehawa Channel U-3	9064 c	U-3 and U-1 confluence to the terminus at Nanakuli DHHL property	perennial	lined channel	Type B Stream Maintenance	Existing ramp	Direct access from road side, drive equipment into the site on beach.
08-011	Maili Channel M-5	9057 b	End to 200 ft. Mauka	intermittent	lined channel	Type B Stream Maintenance	Beach/park route + Lower equipment at bridge	
		9057	200 ft. Mauka to Mamoalii Way	intermittent	lined channel	Type B Stream Maintenance		

Appendix A Reference Table 7: Streams with Oil Absorbent Filter Socks

NO.	Name	DFM #	Location Description	Stream Flow	Stream Type	Maintenance Category	Equipment Access	Description of Access
01-004	Kamanaiki Stream	9435 b	From 2834 Nihi Street to 2828 Nihi Street	intermittent	stream walls only	Type A Stream Maintenance (no equipment in stream)	no equipment in stream	No access for heavy equipment in the stream.
01-007	Kapalama Drainage Canal	9439 a	From Houghtailing Street to Halona Street	Intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at street	Access through Kohou street. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste and dredged material from the stream.
01-008	Kapalama Inc. Ditch	9440	From Hikina Ln to Kokea Street	Intermittent	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	Access through Kokea street.
01-008	Kapalama Inc. Ditch	9440	From Hikina Ln to Kokea Street	Intermittent	unlined	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	Access through Kokea street.
01-009	Lunalilo Terrace Ditch	9457	From Anapalau St, Kaumakani St to Kuapa Pond	intermittent	lined channel	Type A Stream Maintenance (no equipment in stream)	no equipment in stream	There is no access for heavy equipment. A crane will be used to remove the trimmed vegetation and collected debris from street level at the bridges.
01-016a	Nuuanu Stream (a)	9482 a	From Laimi Road to Klebahn Place	Intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at street	Access through Moanawai Place. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste from the stream.
01-017	Palolo Stream	9486 a	From Mauka Kiwila Street to Keanu Street	Intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	Access through gated concrete ramp at Kalua Road. A crane will be used to remove collected waste from the stream at Pakui Street, St. Louis Drive, Palolo Avenue, Paalea Avenue, Kalua Road, and Kiwila Street.
01-018	Pauoa Stream	9488 d	From Liko Lane to Pali hwy.	perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at street	Access through Liko Lane. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste from the stream.
01-019	Waialii Stream	9490	From Poola Street to Debris Catcher	Intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at bridge	Access through Kiai Place and Poola Place. Lower the construction vehicles and equipment into the stream with crane. The crane will also be used remove collected waste from the stream.
01-021	Wawamalu Stream	9519	From Hawaii Kai Drive to Kalanianaole Highway (at Queen's Beach)	Intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at stream bank	Access through ramp on Kealahou Street. The crane will also be used remove collected waste and dredged material from the channel.
03-001	Anolani Stream	9253 b	From Likelike Hwy. to Kapunahala Stream	Perennial	Rectangular channel, fully improved concrete lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	

Appendix A Reference Table 7: Streams with Oil Absorbent Filter Socks

NO.	Name	DFM #	Location Description	Stream Flow	Stream Type	Maintenance Category	Equipment Access	Description of Access
03-002	Hui Ulili Lined Channel	9260 a	From end of lined channel	Perennial	Trapezoidal and Rectangular lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
		9260 b	to KA-1 Channel	Perennial	Rectangular lined channel			
03-003	KA-1 Channel	9611	Mauka of Sewer Treatment Plant to Flood Control	Perennial	Rectangular lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
03-004	KA-2 Channel Boulder Basin	9612 y	Hio Place Boulder Basin	Perennial	lined	Stream Boulder Basin Maintenance	Existing ramp	
03-005	KA-2 Channel	9612	From Hio Place Boulder Basin to KA-1 Channel	Perennial	concrete channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
03-006	Kahaluu Flood Control	9268	Ahaolelo Road to Kam. Hwy.	Perennial	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp	
05-007	Wailani Stream	9023 a	Queen-Liliuokalani (H1) Freeway	Intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Lower equipment at bridge	Access from Waipahu Street extension. Lower the equipment into the channel with the crane. The crane will also be used to remove collected material from the channel and place into dump trucks for disposal.
				Intermittent	lined channel			
		9023 b		Intermittent	unlined			
		9023 c	to Peke Ln	Intermittent	unlined			
05-008	Waipahu Stream	9024 a	Freeway	Intermittent	lined channel	Type B Stream Maintenance (with small dozer and/or small loader)	Existing ramp + Lower equipment at bridge	The crane will also be used to remove collected material from the channel and place into dump trucks for disposal.
		9024 b	Waipahu Street	Intermittent	lined channel			
		9024 c	Leonui Street	Intermittent	lined channel			
		9024	gas lines	Intermittent	lined channel			
08-001bb	Kaupuni Stream BB	9051	Boulder basin	Perennial	partially lined with concrete	Type C Stream Maintenance + Stream Boulder Basin Maintenance	Existing ramp	Direct access from road side, drive equipment into stream.
08-001c	Kaupuni Stream (c)	9051	Boulder basin to K2 Debris Catcher	Perennial	concrete lined rectangular channel	Type B Stream Maintenance	Existing ramp	Direct access from road side, drive equipment into stream.
08-005	Mailiili Stream M-2	9053 a	From 86-439 Puuhulu Rd	Intermittent	lined channel	Type B Stream Maintenance	Existing (concrete) ramp	
		9053 b		Intermittent	lined channel			
		9053 c	to Mailiili M-3 Channel	Intermittent	lined channel			

Appendix B: Forms and Templates

Clear Form

STATE OF HAWAII
DEPARTMENT OF HEALTH
SOLID WASTE SECTION

Solid Waste Disclosure Form for Construction Sites

The following form shall be filled out for construction projects either identified as under 40 CFR 122.26(b)(14)(x) or produces (or will produce) dredged spoils. A response must be provided for each item. If an item is not relevant to the activity, indicate by "Not Applicable" (N/A), with a short comment.

This form helps the Department of Health, Solid Waste Section (SWS) to identify sources of construction/demolition waste and site clearing debris. Property owners, developers, operators and contractors are responsible for ensuring the proper disposal of such solid waste. Violators of Chapter 11-58.1, HAR, "Solid Waste Management Control," are subject to enforcement, corrective actions, and fines.

Mail completed forms to the Department of Health, Solid Waste Section, P.O. Box 3378, Honolulu, Hawaii 96801-3378. Any questions regarding this form should call (808) 586-4226.

I. Site Information

A. Site Address:_____
B. Name of Owner:_____
C. Owner address:_____
D. Owner phone number:_____
E. Tax Map Key (TMK):_____
F. Size of Site (acres):_____

II. County Permit Information

A. Issuing County Agency:_____
B. Grading permit no.:_____
C. Demolition permit no.:_____
D. Grubbing/Stockpiling permit no.:_____

III. Site Activity Information

A. State the kinds of site clearing activities to be completed. State final use of site:_____
_____
_____
_____

B. Describe structures on site (if none, indicate N/A):
_____
_____
If structures exist, are they to be demolished or removed?
☐ yes ☐ no. If yes, submit copy of building assessment.

IV. Contractor Information

A. General Contractor:_____
Contact:_____ Phone:_____

B. Site Clearing/Demolition Contractor:_____
Contact:_____ Phone:_____

C. Hauling Contractor:_____
Contact:_____ Phone:_____

D. Asbestos/Lead Abatement Contractor:_____
Contact:_____ Phone:_____

E. Destination of Waste Materials:

1. Building demolition materials:
To landfill (name):_____

☐ concrete (specify)_____
☐ scrap metal (specify)_____
☐ non-ferrous metals (specify)_____
☐ roofing materials (specify)_____
☐ other (specify)_____

To permitted recycling facility (name):_____
_____

☐ concrete (specify)_____
☐ green waste (specify)_____
☐ non-ferrous metals (specify)_____
☐ scrap metal (specify)_____
☐ other (specify)_____

For re-use. State what wastes are to be reused and where:_____
_____

2. Dredged spoils:
To landfill (name):_____

To permitted recycling facility (name):_____
_____

For re-use (list address and TMK No.):_____
_____

I declare that I have read and examined the foregoing summary and that the facts stated in it are true.

Sign Here:_____ Title:_____
Print Name:_____ Date:_____
Employer:_____ Phone:_____

NOTE: The person who completed this form must be a representative of either the owner or contractor. Furthermore, if the destination of waste material(s) change or will change, then the owner, contractor or the representative of the owner or contractor shall submit a revised Solid Waste Disclosure Form with updated information to the Department of Health, Solid Waste Section, P.O. Box 3378, Honolulu, Hawaii 96801-3378.