

# Debris Cleaning Assessment Plan



## PROTECT OUR WATER

MĀLAMA I KA WAI

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

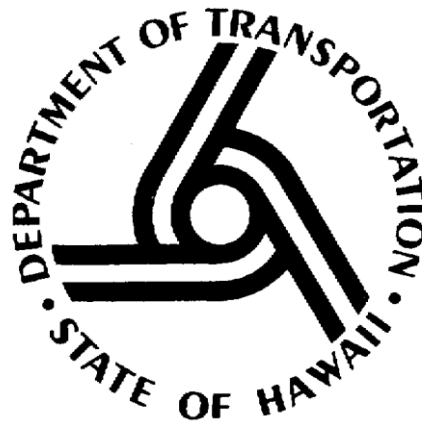
[www.stormwaterhawaii.com](http://www.stormwaterhawaii.com)

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

**This page intentionally left blank.**

# Debris Cleaning Assessment Plan

**State of Hawaii Department of Transportation  
Highways Division, Oahu District**



**PROTECT  
OUR WATER**

**MĀLAMA I KA WAI**

*STATE OF HAWAII DEPARTMENT OF TRANSPORTATION*

[www.stormwaterhawaii.com](http://www.stormwaterhawaii.com)

April 2015  
Version: Final

**This page intentionally left blank.**

Record of Revision

Revision No.	Revision Date	Description	Sections Affected
Original Document	April 2014	Original	N/A
1	February 2015	Formatting	All
2	April 2015	Draft Finalized. Date changed.	All

**This page intentionally left blank.**

## TABLE OF CONTENTS

<b>LIST OF FIGURES .....</b>	<b><i>v</i></b>
<b>LIST OF TABLES .....</b>	<b><i>vi</i></b>
<b>ACRONYMS AND ABBREVIATIONS.....</b>	<b><i>vii</i></b>
<b>REFERENCES.....</b>	<b><i>viii</i></b>
<b>1. INTRODUCTION AND PURPOSE .....</b>	<b>1</b>
<b>2. PROPOSED METHODOLOGY.....</b>	<b>2</b>
2.1    Sweeping Frequency .....	2
2.2    Data Collection .....	3
2.3    Concentrations of Pollutants of Concern .....	3
<b>3. HEALTH AND SAFETY .....</b>	<b>4</b>
<b>4. PROPOSED DELIVERABLES .....</b>	<b>4</b>

**LIST OF FIGURES**

<u>Figure</u>	<u>Title</u>	<u>Page</u>
Figure 1.	Group C Segments .....	3



**LIST OF TABLES**

<u>Table</u>	<u>Title</u>	<u>Page</u>
Table 1.	DCA Milestone/Deliverable Dates .....	1

## ACRONYMS AND ABBREVIATIONS

DCA	Debris Cleaning Assessment
DOH-CWB	State of Hawaii Department of Health Clean Water Branch
DOT-HWYS	State of Hawaii Department of Transportation, Highways Division
EDOP	Effective Date of Permit
HWY-OU/OR	State of Hawaii Department of Transportation, Highways Division, Oahu District Construction Section
HWY-D	State of Hawaii Department of Transportation, Highways Division, Design Branch
HWY-OM	State of Hawaii Department of Transportation, Highways Division, Oahu District Maintenance Section
HWY-OW	State of Hawaii Department of Transportation, Highways Division, Oahu District Environmental Management Section
MS4	Municipal Separate Storm Sewer System
NO <sub>3</sub> -NO <sub>2</sub>	Nitrate-nitrite nitrogen
NPDES	National Pollutant Discharge Elimination System
TKN	Total Kjeldahl nitrogen
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
WLA	Waste Load Allocation

## REFERENCES

Berretta, C., S. Raje and J.J. Sansalone (2011). Quantifying nutrient loads associated with urban particulate matter (PM) and biogenic/litter recovery through current MS4 source control and maintenance practices. Final Report to Florida Stormwater Association Educational Foundation. Online at  
<[http://waterquality.ifas.ufl.edu/NNC/pubs/uf\\_fsa\\_final\\_report\\_31may2011.pdf](http://waterquality.ifas.ufl.edu/NNC/pubs/uf_fsa_final_report_31may2011.pdf)>.

**This page intentionally left blank.**

## 1. INTRODUCTION AND PURPOSE

The State of Hawaii Department of Transportation Highways Division (DOT-HWYS) owns and operates a Municipal Separate Storm Sewer System (MS4) as part of its highway system on Oahu. DOT-HWYS has responsibilities associated with the MS4 as follows:

- Design Branch (HWY-D) – responsible for preparing construction plans, specifications, and construction cost estimates for design projects associated with the MS4.
- Oahu District Construction Section (HWY-OU/OR) – responsible for construction of the highway system, including the MS4 on Oahu.
- Oahu District Maintenance Section (HWY-OM) – responsible for operation and maintenance of the highway system, including the MS4, and for maintenance-related construction projects and landscaping maintenance within DOT-HWYS' rights-of-way on Oahu.
- Oahu District Environmental Management Section (HWY-OW) – responsible for coordinating compliance efforts pertaining to the MS4 on Oahu.

DOT-HWYS' National Pollutant Discharge Elimination System (NPDES) Permit No. HI S000001 (effective October 28<sup>th</sup>, 2013) (hereinafter referred to as the "MS4 Permit") incorporates schedules of compliance for waste load allocation (WLA) reductions from the total maximum daily loads (TMDLs) established for the Ala Wai Canal, Kawa Stream, Kaneohe Stream, Kapaa Stream, and Waimanalo Stream. These schedules, presented in Part F.3.c of the MS4 Permit, require submittal of a Debris Cleaning Assessment (DCA) Plan (hereinafter referred to as the "DCA Plan") to the Hawaii Department of Health Clean Water Branch (DOH-CWB) within six months of the effective date of the permit (EDOP). DCA-specific milestones and deliverables are summarized below in Table 1. Milestones/deliverables are common to all five TMDL watersheds and as such, only one deliverable will be submitted, which documents plans/activities in all five TMDL watersheds.

**Table 1. DCA Milestone/Deliverable Dates**

<b>Due No Later Than:</b>	<b>Milestone/Deliverable</b>
0.5 Years After Effective Date of Permit (EDOP)	Finalize DCA Plan
1 Year After EDOP	Commence DCA Data Collection
2 Years After EDOP	Interim DCA Data Collection Report
3 Years After EDOP	Complete DCA Data Collection
4 Years After EDOP	Complete Analysis of DCA Data

This DCA Plan documents DOT-HWYS' approach to better understand the role of debris cleaning in the attainment of stipulated pollutant load reduction in TMDL watersheds. Street sweeping has been identified as one the most cost-effective removal practice for achieving DOT-HWYS' pollution reduction goals. To date, several years of data have been collected in order to track the volume of debris removed from roadways; however, numerous questions remain regarding the efficacy of debris cleaning in meeting quantitative pollutant reduction goals. DOT-HWYS has identified three major goals of the DCA, detailed below:

**Goal #1** - Understand the impact of increasing street sweeping frequency on the amount of debris and associated pollutants removed from DOT-HWYS' roadways

**Goal # 2** - Critically examine DOT-HWYS' current methods of collecting, recording and reporting debris cleaning data and assess whether improvements can be made in these processes

**Goal # 3** - Assess whether the concentrations of pollutants of concern in debris collected from DOT-HWYS' roadways correspond with other, more extensive studies completed nationally

The following Sections 2.1 - 2.3 present DOT-HWYS' proposed methodology to achieve Goals #1-3, respectively.

## **2. PROPOSED METHODOLOGY**

### **2.1 SWEEPING FREQUENCY**

Currently, interstate routes on Oahu are swept on a monthly schedule by HWY-OM. All other State highways are swept on a 5- or 15-week schedule by a DOT-HWYS' contractor. Highway routes are split into smaller segments to facilitate data tracking and reporting. While DOT-HWYS has quantified the average debris removed based on this schedule, it is not known how increasing that frequency may impact the amount of debris removed. For example, if the frequency of sweeping were to be doubled in an area where additional pollution reduction needs were identified, what would be the increase in the amount of debris removed?

To better understand the relationship between sweeping frequency and the quantity of debris removed, street sweeping frequency on targeted route segments ("Group C") will be increased from once every 5 weeks to twice every 5 weeks. These nine targeted highway segments are presented in Figure 1.

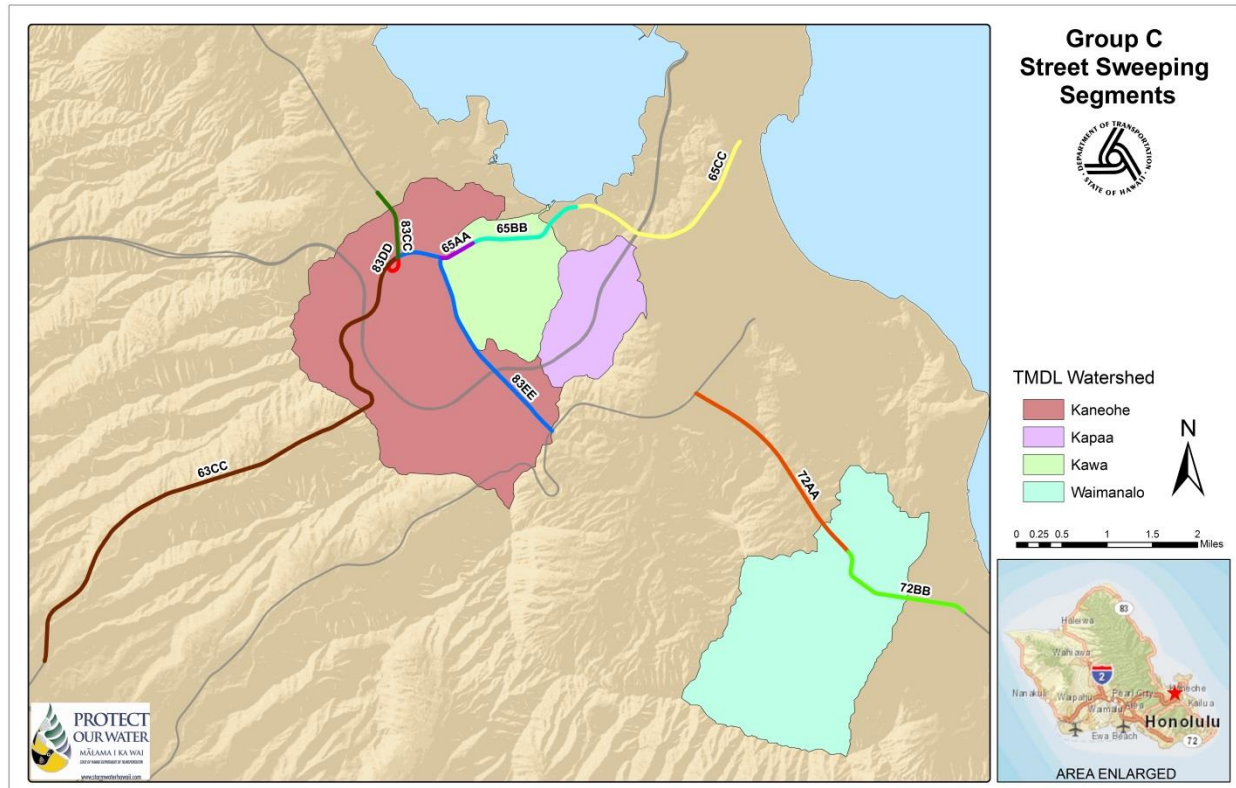


Figure 1. Group C Segments

## 2.2 DATA COLLECTION

Street sweeping debris removal is tracked by an inspector who accompanies the DOT-HWYS' contractor and estimates the volume (cubic yards) of debris removed for each segment. Standard factors (average bulk density and moisture content) are used to convert this volume into weight of debris, which is required for TMDL compliance tracking. To assess this approach, DOT-HWYS will compare estimated weight (as described above) with the weight recorded on tipping receipts provided when the contractor delivers the debris to a landfill.

## 2.3 .CONCENTRATIONS OF POLLUTANTS OF CONCERN

DOT-HWYS has identified a 2011 study in Florida that summarized results from 14 MS4s and 459 individual samples to establish concentrations of nutrients per kilogram of debris recovered in street sweeping and catch basin cleaning (Berretta et al., 2011). DOT-HWYS is using the Berretta et al. (2011) study data to calculate mass of pollutants removed from total debris mass. These data are specific to highway land use and unique concentrations are presented for street sweeping and catch basin cleaning, respectively. DOT-HWYS intends to carry out a limited sampling effort to confirm that results from the Berretta et al. (2011) study are applicable to conditions in Hawaii.

Samples will be collected from sweeping events in the Ala Wai Canal Watershed and the Waimanalo Stream Watershed and will be delivered to a certified laboratory for analysis.

Samples will be composited to be representative of the sweeper load or debris pile being sampled. Samples will be analyzed by a certified laboratory for:

- Grain size distribution, for analysis of total suspended solids (TSS)
- Bulk density (unit: g/cm<sup>3</sup>)
- Moisture content (unit: %)
- Total nitrogen (TN) content, including total Kjeldahl nitrogen (TKN) & nitrate-nitrite (NO<sub>3</sub>-NO<sub>2</sub>) (unit: kg TN / kg debris)
- Total phosphorus (TP) content (unit: kg TP / kg debris)

DOT-HWYS will compare the results of these samples with more extensive national studies such as Berretta et al. (2011) and use the results to verify pollutant removal rates used in assessing WLA reductions.

### **3. HEALTH AND SAFETY**

Sampling personnel will wear appropriate Person Protective Equipment (PPE) and follow DOT-HWYS' requirements for highway safety during sampling.

### **4. PROPOSED DELIVERABLES**

Several DCA milestones have been stipulated in DOT-HWYS' schedules of compliance for TMDL watersheds (Table 1). This section provides a brief description of the proposed milestone deliverables to DOH-CWB.

#### **Commence DCA Data Collection**

- Due October 28<sup>th</sup>, 2014
- Deliverable will confirm that DOT-HWYS has begun increasing street sweeping frequency on targeted routes (Section 2.1) and sampling/data collection (Sections 2.2 and 2.3)

#### **Interim DCA Data Collection Report**

- Due October 28<sup>th</sup>, 2015
- Deliverable will provide initial summary of sampling efforts to date.

#### **Complete DCA Data Collection**

- Due October 28<sup>th</sup>, 2016
- Deliverable will confirm that DOT-HWYS has completed the data collection proposed in this DCA Plan.



**Complete Analysis of DCA Data**

- Due October 28<sup>th</sup>, 2017
- Deliverable will provide final results of data collected.