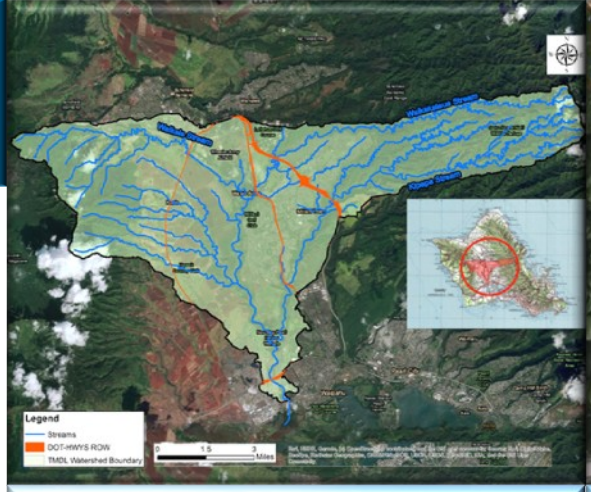

Implementation and Monitoring Plan
Waikele Watershed

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Hawaii State Department of Transportation
Highways Division, Oahu District
Storm Water Management Program
NPDES Permit No. HI S000001
May 2020

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION, OAHU DISTRICT

TOTAL MAXIMUM DAILY LOAD IMPLEMENTATION AND MONITORING PLAN WAIKELE WATERSHED WASTE LOAD ALLOCATIONS

MS4 NPDES Permit No. HI S000001

State of Hawaii Department of Transportation
Highways Division, Oahu District
727 Kakoi Street, Honolulu, Hawaii 96819

May 2020
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Record of Revision

Revision No.	Revision Date	Description	Sections Affected
Original Document	May 2020	Original	N/A

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BMP	Best Management Practice
C	Cover Factor
cy	Cubic yard
CM	Curb Miles
DCA	Debris Cleaning Assessment
DOH	State of Hawaii Department of Health
DOT-HWYS	State of Hawaii Department of Transportation, Highways Division, Oahu District
EPA	United States Environmental Protection Agency
GM	Geometric Mean
HAR	Hawaii Administrative Rules
HSPF	Hydrologic Simulation Program – Fortran
HWY-OM	DOT-HWYS Oahu District Maintenance Section
I&M	Implementation and Monitoring
K	Soil Erodibility Factor
kg	Kilograms
L	Slope Length Factor
MEP	Maximum Extent Practicable
MOS	Margin of Safety
MS4	DOT-HWYS Municipal Separate Storm Sewer System
NOAA	National Oceanic and Atmospheric Administrations
NO_2/NO_3	Nitrite-Nitrate
NPDES	National Pollutant Discharge Elimination System
NTE	Not-to-Exceed
OCM	Office of Coastal Management
P	Support Practice Factor
PID	Point Identification Number
PS&E	Plans, Specifications & Estimates
R	Rainfall Erosivity Factor
ROW	Right-of-Way
RUSLE	Revised Universal Soil Loss Equation
S	Slope Steepness Factor
SWMP	Storm Water Management Program
SWMPP	Storm Water Management Program Plan
TMDL	Total Maximum Daily Load
TMK	Tax Map Key
TN	Total Nitrogen
TSS	Total Suspended Solids
WLA	Waste Load Allocation
WQBEL	Water Quality-Based Effluent Limits

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EXECUTIVE SUMMARY

On May 9, 2019, the United States Environmental Protection Agency (EPA) approved a total maximum daily load (TMDL) for Waikele Stream that includes waste load allocations (WLAs) for the State of Hawaii Department of Transportation, Highways Division, Oahu District (DOT-HWYS) municipal separate storm sewer system (hereinafter MS4). Part F.4 of the MS4 Permit requires that DOT-HWYS develop Implementation and Monitoring (I&M) Plans for TMDLs that are adopted by State of Hawaii Department of Health (DOH) and approved by the EPA, which identify DOT-HWYS as a source, within one year of the approval date of the TMDL.

The Waikele I&M Plan (hereinafter *I&M Plan*) provides a compliance schedule with a final deadline to demonstrate consistency with the WLAs consistent with the assumption of the associated TMDL document. To demonstrate consistency with its WLAs, DOT-HWYS has taken a comprehensive approach by using established best management practices (BMPs), including street sweeping, cleaning of MS4 structures, post-construction BMPs, erosional area repairs, construction site runoff management, illicit discharge detection and elimination, industrial and commercial discharge management, and public education and outreach, to reduce total nitrogen (TN) and total suspended solids (TSS) discharges to Waikele Stream.

Based on historical data, DOT-HWYS projects that its current BMP programs in the Waikele Watershed will achieve the required nutrient load reductions for dry and wet season TN. However, in order to achieve the wet season TSS load reduction requirement an additional 22,730 kilograms of TSS will need to be captured through enhanced BMPs. It is anticipated that this additional load reduction will be achieved with increased street sweeping, and the repair of two additional erosion sites located in the Waikele Watershed. Table ES-1 provides a summary of the existing and additional BMPs to be implemented, and the estimated annual reductions from each BMP that is necessary to demonstrate consistency with the WLAs consistent with the assumption of the associated TMDL document.

The following is a summary of each chapter included in this *I&M Plan*.

- **Chapter 1 —** Provides a summary of the TMDL document for Waikele Watershed and the WLA reductions assigned to DOT-HWYS.
- **Chapter 2 —** Broadly describes the BMPs currently implemented by DOT-HWYS.
- **Chapter 3 —** Presents a quantitative analysis, where appropriate, of how specific DOT-HWYS programs reduce seasonal loads of TN and TSS in Waikele Watershed. Table 3-10 (reproduced below as Table ES-1) presents an overview of the seasonal pollutant load reductions calculated in Chapter 3.
- **Chapter 4 —** Documents how DOT-HWYS will monitor and report progress towards demonstrating consistency with the WLA reductions consistent with the assumptions in the Waikele Stream TMDL.

Table ES-1 provides a summary of the existing and additional BMPs to be implemented, and the estimated annual reductions from each BMP program needed to meet the anticipated seasonal pollutant load reduction.

Table ES-1. Anticipated Seasonal Pollutant Load Reduction.

BEST MANAGEMENT PRACTICE (BMP) PROGRAM	ANTICIPATED TOTAL SUSPENDED SOLIDS (TSS) REDUCTION (kg/season)		ANTICIPATED TOTAL NITROGEN (TN) REDUCTION (kg/season)	
	DRY SEASON	WET SEASON	DRY SEASON	WET SEASON
Street Sweeping *(Existing)*	20,850	21,880	182.7	169.9
Street Sweeping *(Additional)*	20,867	19,144	159.7	148.6
Cleaning of MS4 Structures	440	650	3.9	5.5
Post-Construction BMPs	–[a]	–[a]	–[a]	–[a]
Erosion Control Program *(Existing)*	8,490	69,760	23.0	31.7
Erosion Control Program *(Additional)*	8,860	72,890	24.1	33.2
Construction Site Runoff Control	–[b]	–[b]	–[b]	–[b]
IC Program and IDDE Program	–[b]	–[b]	–[b]	–[b]
Public Education and Outreach	–[b]	–[b]	–[b]	–[b]
TOTAL ANTICIPATED REDUCTION	62,507	184,324	393.4	388.9
REDUCTION REQUIRED w/ MOS [c]	N/A	115,020	71	91

Notes:

[a] *No post-construction BMPs are currently constructed in the Waikele Watershed.*

[b] *These programs have resulted in pollutant load reductions in the Waikele Watershed. These reductions have not been quantified at this time and are therefore considered qualitatively in this I&M Plan.*

[c] *Includes a 25% explicit margin of safety.*

Wet Season = 181 days (November 1 – April 30).

Dry Season = 184 days (May 1 – October 31).

CHAPTER 1

SUMMARY OF TOTAL MAXIMUM DAILY LOAD AND WASTE LOAD ALLOCATION REDUCTIONS ASSIGNED

The Waikele Implementation and Monitoring Plan (hereinafter *I&M Plan*) is submitted to satisfy Part F.4 of the State of Hawaii Department of Transportation, Highways Division, Oahu District (DOT-HWYS) National Pollutant Discharge Elimination System (NPDES) Permit No. HI S000001 (hereinafter MS4 Permit). The MS4 Permit effective on October 28, 2013, and modified on April 1, 2016, expired on September 26, 2018, and is currently under administrative extension.

On May 9, 2019, the United States Environmental Protection Agency (EPA) approved total maximum daily loads (TMDLs) for the Waikele Watershed as described in the *Turbidity, Sediment, and Nutrient Total Maximum Daily Loads for the Waikele Watershed, Oahu, Hawaii* (Tetra Tech, Inc. 2019) report (hereinafter TMDL document). The TMDL document assigns waste load allocations (WLAs) for DOT-HWYS municipal separate storm sewer system (hereinafter MS4). The MS4 Permit Part F.4 requires that DOT-HWYS develop I&M Plans for TMDLs that are adopted by State of Hawaii Department of Health (DOH) and approved by the EPA, which identify DOT-HWYS as a source, within one year of the TMDL approval date. Therefore, DOT-HWYS is required to submit this *I&M Plan*, including a compliance schedule with a final deadline to demonstrate consistency with the WLAs consistent with the assumption of the associated TMDL document in the Waikele Watershed by May 8, 2020.

The MS4 Permit Part F.3 provides specific requirements for the development of I&M Plans for five watersheds on Oahu for which finalized TMDLs were established at the time that the MS4 Permit was issued. The MS4 Permit Part F.4 provides a summary of the contents that are required to be included in the I&M Plans of additional TMDLs. However, in order to maintain consistency with previous I&M Plans developed under this permit, this *I&M Plan* is organized according to Part F.3 requirements, meeting all of the Part F.4 requirements and providing additional information to assist DOT-HWYS in demonstrating consistency with the WLAs consistent with the assumption of the associated TMDL document. The required elements of Part F.3 of the permit and the corresponding chapters where they are discussed in this *I&M Plan* are provided in Table 1-1.

A TMDL is a calculation of the maximum amount of pollutant that a water body can receive from point and non-point sources, including a margin of safety (MOS), and still meet applicable water quality standards. The TMDL document provides an allocation of that maximum pollutant amount divided among the water body's pollutant point sources, which are then assigned as WLAs. The Clean Water Act Section 303 requires that States, territories, and tribes identify specific designated uses (e.g., drinking water, contact recreation, and aquatic life support) for each water body in their jurisdiction, and identify the water quality standards to support those uses. TMDLs are established for water bodies that fail to meet existing water quality standards

for pollutants of concern and generally assign WLAs, which are the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution.

As described in the Fact Sheet accompanying the MS4 Permit:

> *[The State of Hawaii Department of Health] is directly implementing the TMDL waste load allocations (WLAs) applicable to the MS4 as water quality-based effluent limits (WQBELs). To demonstrate consistency with the assumptions and requirements of applicable WLAs, it is expected that DOT-HWYS will quantify pollutants removed from DOT-HWYS MS4. The quantity of a given pollutant removed on an annual or seasonal basis in a given watershed can then be compared to the WLA reductions required in that watershed. [As such, compliance with WLAs will be demonstrated] through meeting the WLA reductions on an annual or seasonal basis as specified in the permit.*

Table 1-1. MS4 Permit Reference and Corresponding I&M Plan Chapters.

MS4 PERMIT REFERENCE	I&M PLAN CHAPTERS
Part F.3.a.(1) *Detailed information on the activities proposed to be implemented.*	Chapter 2
Part F.3.a.(2) *Actual or literature documentation of the estimated effectiveness of the activities targeted to reduce the pollutants of concern such as total nitrogen, total phosphorus, total suspended solids, and turbidity in the watershed, as applicable, to demonstrate consistency with the annual or seasonal WLA reductions consistent with the assumption of the associated TMDL document.*	Chapter 3
Part F.3.a.(3) *A detailed and quantitative analysis which demonstrates that the proposed activities would ensure consistency with the annual or seasonal WLA reductions consistent with the assumption of the associated TMDL document.*	Chapter 3
Part F.3.a.(4) *Information from pre and post monitoring activities to quantitatively demonstrate consistency with the annual or seasonal WLA reductions consistent with the assumption of the associated TMDL document.*	Chapter 4
Part F.3.a.(5) *A monitoring plan which shall identify activities to demonstrate consistency with the annual or seasonal WLA reductions consistent with the assumption of the associated TMDL document.*	Chapter 4

1.1 TMDL FOR WAIKELE WATERSHED

The Waikele Watershed (Figure 1-1) covers a 45 square-mile area between the Koolau and Waianae mountains, and it drains into the West Loch area of Pearl Harbor (Izuka 2012). The watershed includes Waikele Stream and its main tributaries, Waikakalaua Stream and Kipapa Stream. The Waikele Stream and its tributaries confluence on the Schofield Plateau, and then the Waikele Stream flows southward into Pearl Harbor. Both Waikakalaua Stream and Kipapa Stream originate atop the Koolau Mountains, and they run parallel until Waikakalaua Stream joins Waikele Stream toward the lower end of Wheeler Army Airfield (Oceanit 2007).

DOT-HWYS is responsible for a total of 370 acres, or approximately 1% of the Waikele Watershed. DOT-HWYS owns and operates approximately 15 miles of highways in the Waikele Watershed, including portions of Interstates H-1 and H-2, and State Routes 99 (Kamehameha Highway), and 750 (Kunia Road) (Figure 1-1). A portion of the runoff from the right-of-way (ROW) for these highway segments drains to the MS4.

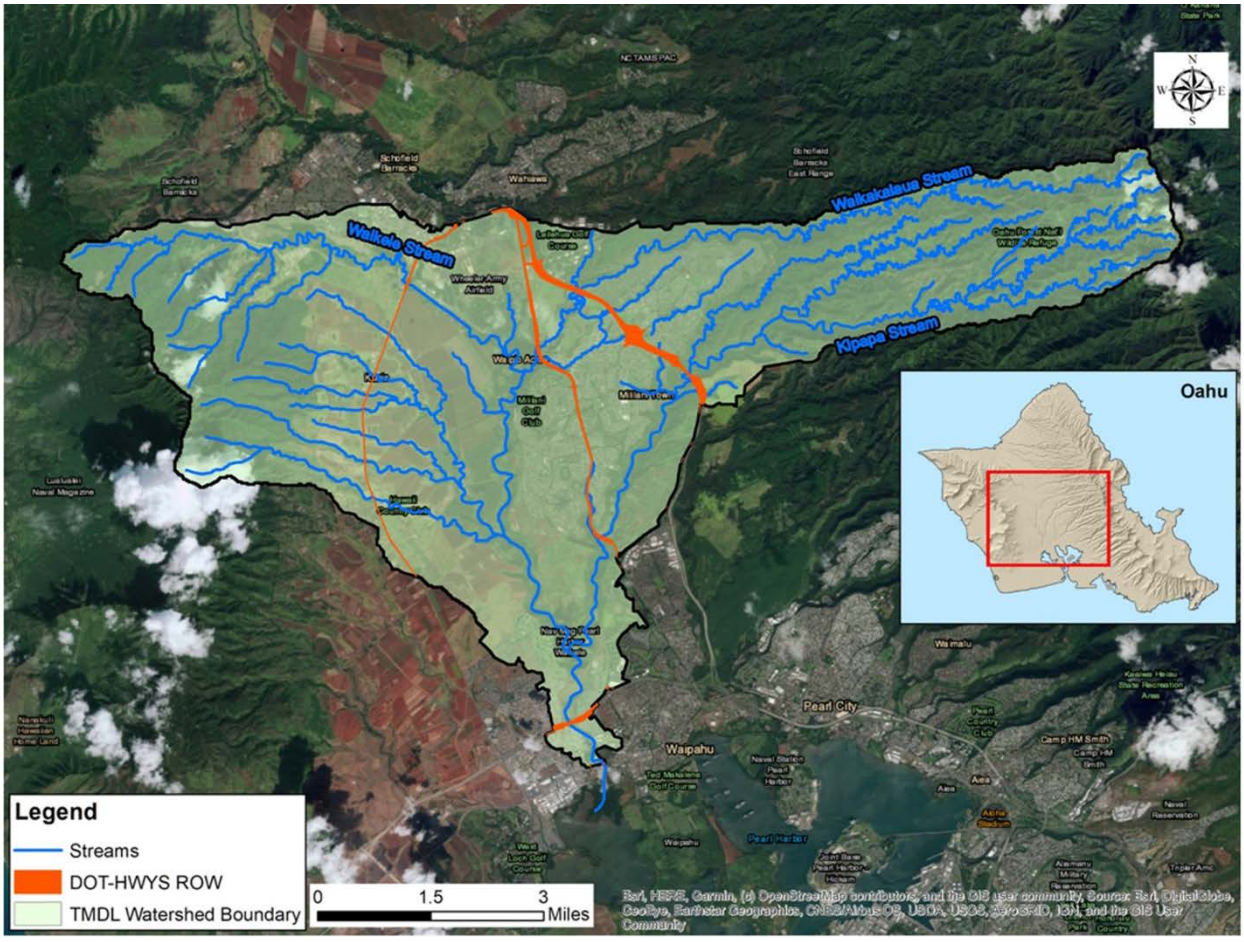

Figure 1-1. Waikele Watershed map.

1.2 DOT-HWYS WLA REDUCTIONS FOR WAIKELE STREAM

The approved TMDL document includes WLAs for total suspended solids (TSS), total nitrogen (TN), and nitrite-nitrate (NO_2/NO_3) that were developed using rainfall data in the geometric mean, as well as the high 10% and 2% storm events during the wet and dry seasons. However, the TMDL document specified that "*Due to the high variability in modeled nitrite-nitrate loadings, the allocations for nitrite-nitrate will be assumed to be met, provided that the TN allocations are met*". Therefore, WLAs for TSS and TN are provided in the TMDL document, but NO_2/NO_3 was excluded. Each WLA was divided among the NPDES-regulated MS4 permit holders in the Waikele Watershed. These permit holders include:

- City and County of Honolulu
- U.S. Army Garrison Hawaii
- State of Hawaii Department of Transportation

A modeling framework using the Hydrologic Simulation Program – Fortran (HSPF) watershed model (Bicknell et al. 1997) was developed to calculate existing loads. Historical rainfall data from October 1997 to September 2011 was used to estimate wet and dry season and annual average pollutant loading from each land use and land ownership. The water quality standards geometric mean (GM) and 10% and 2% not-to-exceed (NTE) numeric targets from Hawaii Administrative Rule (HAR), Title 11, Chapter 54 were established as TMDLs. The TMDL document states:

> *The TMDL allocations were calculated using the most stringent of the three criteria (geometric mean, 10% and 2% NTE) that were in exceedance. [Accordingly], TMDL compliance will be based on the GM criteria for TN, and the 10 percent [NTE] wet season criteria for TSS.*

Table 1-2 provides the load-based reductions for DOT-HWYS from the TMDL document.

Table 1-2. Daily Load-Based Reductions Required to Achieve TMDLs in Waikele Watershed.

POLLUTANT	WASTE LOAD ALLOCATION (kgd)		MODELED EXISTING LOAD (kgd)		REDUCTION REQUIRED (kgd)	
	DRY SEASON	WET SEASON	DRY SEASON	WET SEASON	DRY SEASON	WET SEASON
Total Nitrogen [a]	0.07	0.16	0.69	0.96	0.62	0.80
Total Suspended Solids [b]	N/A	269.8	N/A	5,353.4	N/A	5,083.6

Notes:
[a] Based on geometric mean criteria.
[b] Based on 10% NTE standard, applicable to wet season only.
Wet Season = 181 days (November 1 – April 30)
Dry Season = 184 days (May 1 – October 31)

Consistent with the assumptions of the Waikele Watershed TMDL, DOT-HWYS is required to comply with the seasonal reductions. Therefore, the daily load-based reductions were multiplied by the number of events per season to determine the WLA reductions per season, provided in Table 1-3.

Table 1-3 provides the seasonal WLA reductions in the Waikele Watershed.

Table 1-3. Seasonal WLA Reductions in Waikele Watershed.

POLLUTANT	REDUCTION REQUIRED DRY SEASON (kg)	REDUCTION REQUIRED WET SEASON (kg)
Total Nitrogen [a]	57	72
Total Suspended Solids [b]	N/A	92,013

Notes:
*[a] Dry season no. of events (184 days) * 50% = 92 days. Wet season no. of events (181 days) * 50% = 90.5 days.*
*[b] Wet season no. of events (181 days) * 10% = 18.1 days.*
Wet Season = 181 days (November 1 – April 30).
Dry Season =184 days (May 1 – October 31).

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CHAPTER 2
DOT-HWYS STORM WATER MANAGEMENT PROGRAM ACTIVITIES

To meet its WLA reduction goals, DOT-HWYS intends to take a comprehensive approach by using established best management practices (BMPs). As used in this document, the term BMP refers to operational activities or physical controls applied to storm water and other runoff to reduce pollution. BMP programs currently implemented by DOT-HWYS include:

- Street sweeping
- Cleaning of MS4 structures
- Post-construction BMPs
- Erosional area repairs
- Construction site runoff management
- Illicit discharge detection and elimination
- Industrial and commercial activities discharge management
- Public education and outreach

Each of these BMP programs continues to reduce TN and TSS discharges from DOT-HWYS ROW to the Waikele Watershed. These BMP programs are discussed below, and more detail about each program can be found in the comprehensive DOT-HWYS Storm Water Management Program (SWMP) Plan, which is located at https://www.stormwaterhawaii.com.

2.1 STREET SWEEPING

Street sweeping has been identified as one of the most cost-effective methods of removing particulate debris and associated nutrients from streets and roadways. Street sweeping removes particulate pollutants on roads before they are mobilized to the MS4 by storm water runoff events. The removal of fine particulates also removes pollutants and nutrients that are associated with particulates (Schueler and Holland 2000).

DOT-HWYS Oahu District Maintenance Section (HWY-OM) and service contractors are responsible for sweeping all roadways owned by DOT-HWYS on a regular schedule. The volume and composition of debris collected during street sweeping activities are tracked and documented for both HWY-OM and service contractor swept routes. Pollutants typically found on roadways that could enter the MS4 include:

- Material from illegal dumping
- Runoff from construction activities within and adjacent to DOT-HWYS ROW
- Litter from motorists and pedestrians

- Debris from vehicles
- Loose paving materials and aggregate from cracked pavements and potholes
- Vegetative debris
- Sediment accumulation

Pollutant reductions from street sweeping for DOT-HWYS were not taken into account in the HSPF model of existing loads. Per the TMDL document, "*It is appropriate for permittees (specifically the State of Hawaii DOT and the U.S. Army Garrison), to include reductions from sweeping activities in the required Waikele Implementation and Monitoring Plan to be developed under the MS4 NPDES permits.*" Therefore, current and future enhanced street sweeping will be credited towards pollutant reductions to comply with assigned WLAs.

2.2 CLEANING OF MS4 STRUCTURES

Catch basins typically include an inlet grate and drop structure that is connected to a drainage outfall. Manholes are structures where drainage pipes meet or change direction, and often have a sump that accumulates solids and sediment. The cleaning of these structures has proven to be a cost-effective method to capture and remove gross pollutants in the MS4. Removing debris from storm drainage structures reduces the amount of pollutant material flushed into receiving surface waters by storm water runoff.

DOT-HWYS clears debris and other materials that accumulate in drainage structures through mechanical (e.g., vacuuming) or manual means. High priority inlets and their associated catch basins are inspected at least once every six months. Portions of selected DOT-HWYS routes have been classified as low priority due to their relatively low traffic volume and their location in a Non-High Priority Watershed. These low priority drains are inspected once per year and cleaned if necessary. Similar to the street sweeping schedule, the inspection schedule of drainage infrastructure is evaluated annually for possible changes. Large debris (e.g., wood or trash) accumulating on top of or blocking drainage structures is promptly removed. Cleaning activities are observed by an inspector who records the amount of material removed from the drainage structure, including the percentage of organic matter, trash, and sediment.

2.3 POST-CONSTRUCTION BMPS

The Post-Construction Storm Water Management in New Development and Redevelopment Program (hereinafter Post-Construction Program) institutes procedures to incorporate the installation of appropriate post-construction BMPs for certain new development and significant redevelopment projects that DOT-HWYS undertakes (e.g., contract projects), as well as certain types of encroachment projects. Post-construction BMPs are designed to be installed and remain in place as part of a project to provide for long-term storm water quality or quantity control. New development and significant redevelopment projects include, but are not limited to, new roadways and roadway and intersection improvements or modifications, such as widening.

Specific elements of the Post-Construction Program include:

- Revising DOT-HWYS standards for addressing post-construction BMPs to include Low Impact Development requirements.
- Instituting post-construction BMP considerations throughout the lifecycles of both DOT-HWYS and encroachment projects.
- Implementing an Asset Management System to track the frequency of inspections and maintenance of post-construction BMPs that are owned and operated by DOT-HWYS.
- Supporting a training program and providing outreach materials so that people involved in DOT-HWYS-related new developments or significant redevelopments (e.g., DOT-HWYS and utility company personnel, design consultants, contractors, etc.) are familiar with post-construction BMP criteria, methods, specifications, and permitting requirements.

2.4 EROSION CONTROL PROGRAM

The purpose of the Erosion Control Program is to identify erosional areas within DOT-HWYS ROW with the potential for significant water quality impact and to implement erosion control measures to address these areas.

The Erosion Control Program is responsible for implementing the following BMPs.

- Identify erosional areas with the potential for significant water quality impact for the purpose of implementing erosion control improvements.
- Submit to DOH a list of projects with an implementation schedule for permanent erosion control improvements.
- Implement temporary erosion control measures on erosional areas (i.e., highway-adjacent eroded slopes) within DOT-HWYS ROW with the potential for significant water quality impact, if a permanent solution is not immediately possible.
- Provide DOH with an Action Plan to address erosion at DOT-HWYS storm drain system outlets with significant potential for water quality impacts.
- Develop a maintenance plan for vegetated portions of the drainage system used for erosion and sediment control.

2.5 CONSTRUCTION SITE RUNOFF CONTROL PROGRAM

The objective of the Construction Site Runoff Control Program (hereinafter Construction Program) is to reduce, to the maximum extent practicable (MEP), the discharge of pollutants from both private and public construction projects. The program includes the following components.

- Plan review and approval process, which includes reviewing site-specific BMP plans and storm water pollution prevention plans.
- An inspection program to ensure that construction BMPs are properly installed for contract, in-house, maintenance, and encroachment permit projects.
- A program to provide annual training on elements of the Construction Program to DOT-HWYS staff with construction storm water responsibilities.

2.6 INDUSTRIAL AND COMMERCIAL ACTIVITIES DISCHARGE MANAGEMENT & ILLICIT DISCHARGE DETECTION AND ELIMINATION

Storm water flowing from industrial and commercial areas may be a significant source of pollutants that enter the MS4. Therefore, the Industrial and Commercial Activities Discharge Management Program (hereinafter IC Program) is designed to reduce, to the MEP, the discharge of pollutants from industrial and commercial facilities and activities that initially discharge into the MS4. While listed as separate programs in the SWMPP, in practice, this program is related to the Illicit Discharge Detection and Elimination Program (hereinafter IDDE Program), because industrial and commercial facilities activities are susceptible to causing illicit discharges.

DOT-HWYS takes a proactive approach in reducing illicit discharges by identifying industrial and commercial areas that drain into the MS4 for priority inspections.

The IC Program consists of:

- Developing a comprehensive database to track industrial and commercial facilities and activities whose storm water runoff initially discharges into the MS4.
- Developing prioritized areas for inspection of industrial and commercial facilities and activities.
- Ranking the commercial facilities and activities according to the relative risk of discharge of contaminated runoff to the MS4.
- Conducting inspections or investigations of industrial and highly ranked commercial facilities and parcels within the designated prioritized areas.
- Supporting a training program so that those involved in this program have the necessary knowledge and skills to conduct investigations.

DOT-HWYS requires a connection permit for all properties that physically conneect in order to discharge storm water into the MS4. If unpermitted connections are discovered during routine field investigations, property owners are required to obtain a connection permit. Additionally, any new construction that involves private connections to the MS4 requires a connection permit. To obtain a connection permit, property owners are required to describe the size of connection, type of discharge and flow rate, as well as other characteristics of the property (e.g., industrial land uses) which may require further review by DOT-HWYS.

DOT-HWYS developed a *Prioritized Area Plan* that designates priority areas for industrial and commercial facility and activity inspections according to the relative risk that any discharge may be contaminated with pollutants. The *Prioritized Area Plan* includes an inspection schedule that establishes inspection frequencies for industrial and commercial facilities and activities. All highly ranked commercial facilities are inspected at least once every five years. Industrial facilities or activities without NPDES permit coverage, but that are required to do so per Title 40, Code of Federal Regulations, Part 122.26(b)(14), are inspected at least twice every five years. Industrial facilities that have NPDES permit coverage are inspected at least once every five years.

The IDDE Program screens for and addresses any illicit discharge that drains into the MS4 within the watershed, including discharges sourced from industrial, commercial, and residential land uses. In addition to administering a connection and discharge permitting program, the IDDE Program conducts investigations of parcels suspected of illicit discharges or illegal connections identified through:

- Routine inspections of parcels designated by the industrial and commercial database and inventory list.
- Field screening of major and minor outfalls.
- Public complaints.
- Complaints from DOH.

2.7 PUBLIC EDUCATION AND OUTREACH PROGRAM

The Public Education and Outreach Program addresses the need to inform the general public about how their daily activities may affect the quality of storm water runoff. The Public Education and Outreach Program is a community involvement program that focuses on informing the public about MS4 pollution issues, and provides citizens with the tools and ideas to help eliminate the causes of pollution.

The purpose of the Public Education and Outreach Program is to engage the community and control pollution at the source by increasing public awareness of storm water pollution issues. By educating the public on methods to reduce the generation of pollutants, public participation can reduce the quantity of pollutants introduced into the MS4.

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CHAPTER 3
QUANTITATIVE ANALYSIS OF PROPOSED ACTIVITIES IN WAIKELE WATERSHED

This chapter describes the quantitative analysis of specific DOT-HWYS programs to document consistency with the required WLA reductions. The anticipated seasonal pollutant reductions for specific programs are quantitatively analyzed and aggregated to provide the total anticipated seasonal pollutant reduction for each pollutant. This total anticipated seasonal mass reduction is then compared to the seasonal reductions required in Table 1-3 to assess consistency with the WLA reductions assigned to DOT-HWYS.

The TMDL document assessed DOT-HWYS existing pollutant loads based on storm runoff concentrations in samples collected from 1997 to 2011. To be consistent with the assumptions and data used in the TMDL document, DOT-HWYS will use the mid-point of the data collection, 2004, as the baseline condition for DOT-HWYS quantitative analyses.

The following sections present a quantitative analysis, where appropriate, of how the specific DOT-HWYS programs reduce seasonal loads of TN and TSS in Waikele Watershed, and summarizes the average anticipated seasonal reductions of TN and TSS in kilograms (kg). While some of the programs and activities lend themselves to direct measurement and estimation of pollutant reduction, pollutant reductions from the Construction Program, IDDE Program, IC Program, and Public Education and Outreach Program have not been quantified in this *I&M Plan*. These programs continue to provide substantial pollutant reductions in discharges from the MS4 and are considered qualitatively in this *I&M Plan*.

3.1 STREET SWEEPING IN WAIKELE WATERSHED

This section discusses the Baseline Activities and Quantifying Anticipated Pollutant Removal for street sweeping.

3.1.1 Baseline Activities

The TMDL document stated that *"It is appropriate for permittees (specifically the State of Hawaii DOT and the U.S. Army Garrison), to include reductions from sweeping activities in the required Waikele Implementation and Monitoring Plan to be developed under the MS4 NPDES permits."* Therefore, the baseline condition assumes no pollutant removal by street sweeping, and any pollutant removal by DOT-HWYS street sweeping in Waikele Watershed will be credited towards WLA reductions to comply with assigned WLAs.

3.1.2 Quantifying Anticipated Pollutant Removal

Anticipated seasonal reductions in TN and TSS loads due to street sweeping were calculated by assessing data from DOT-HWYS 2015-2017 street sweeping operations in Waikele Watershed, in conjunction with the results from the Debris Cleaning Assessment (DCA) DOT-HWYS completed in 2017, and literature data on concentrations of nutrients per kilogram of debris collected. This data will serve as a basis for projecting future seasonal reductions.

DOT-HWYS tracks debris removed through street sweeping operations for all DOT-HWYS routes intersecting the Waikele Watershed. At the end of each street sweeping event, inspectors record the total cubic yards (cy) of debris removed and estimate a percentage of sediment, organic matter, and trash found in the street sweeping hopper. DOT-HWYS chose to average data from 2015-2017 to provide a representative estimate of debris removal to use on a seasonal basis for Waikele Watershed.

A summary of these data is provided in Figures 3-1 and 3-2. Averaging data from these years yields an average anticipated dry season removal of 66.48 cubic yards of sediment and 41.50 cubic yards of organic matter, and an average anticipated wet season removal of 60.99 cubic yards of sediment and 39.99 cubic yards of organic matter.

Figure 3-1 shows the street sweeping debris collected in Waikele Watershed during 2015-2017 dry seasons.

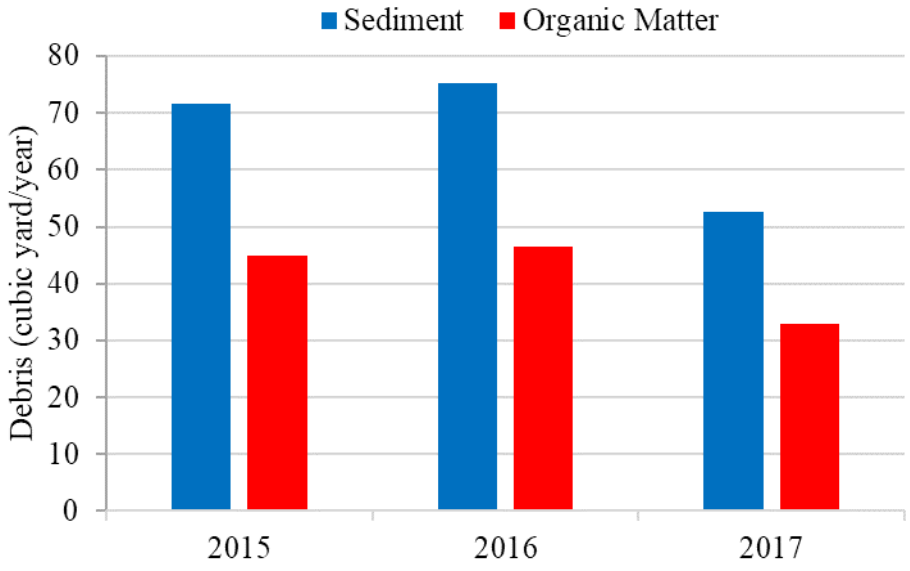

Figure 3-1. Cubic yards of street sweeping debris collected in Waikele Watershed, 2015-2017 Dry Seasons.

Figure 3-2 shows the street sweeping debris collected in Waikele Watershed during 2015-2017 wet seasons.

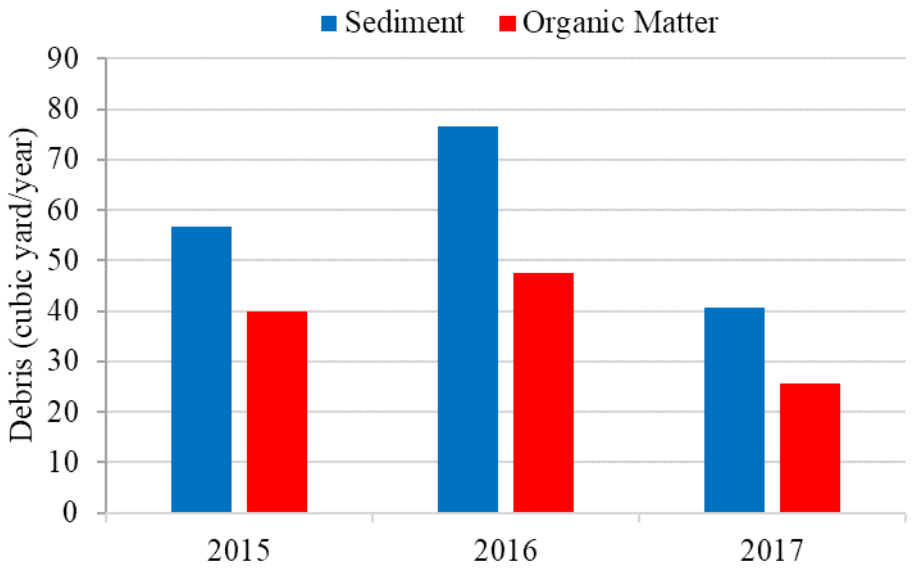

Figure 3-2. Cubic yards of street sweeping debris collected in Waikele Watershed, 2015-2017 Wet Seasons.

Tables 3-1 and 3-2 present the conversion from an average anticipated seasonal wet-weight volume of debris removed to a dry mass of TN and TSS removed from Waikele Watershed through street sweeping on a seasonal basis. In these tables, the wet-weight volume of debris is multiplied by three constants (bulk density, moisture content, and nutrient content) to calculate the dry mass of TN and TSS. Values of bulk density, moisture content, and nutrient conversion factor were derived from the DCA (2017).

Table 3-1. Conversion Calculations for TN Removal through Street Sweeping Operations.

TN	DRY SEASON			WET SEASON		
	SEDIMENT	ORGANIC MATTER	**TOTAL**	SEDIMENT	ORGANIC MATTER	**TOTAL**
Average anticipated seasonal debris removed (cy)	66.48	41.50		60.99	39.99	
Bulk density (kg/cy)	837.78 [a]	497 [b]		837.78 [a]	497 [b]	
Moisture content conversion factor for street sweeping debris (%)	0.87380 [a]	0.87380 [a]		0.87380 [a]	0.87380 [a]	
TN conversion factor for street sweeping debris (kg TN/kg dry mass)	0.002739 [a]	0.002739 [a]		0.002739 [a]	0.002739 [a]	
Average anticipated seasonal TN removed through street sweeping (kg)	133.3	49.4	**182.7**	122.3	47.6	**169.9**

[a] *Source: DCA (2017).*
[b] *Source: Government of Saskatchewan Ministry of Agriculture (2008) presented as wet bulk density of compost.*

Table 3-2. Conversion Calculations for TSS Removal through Street Sweeping Operations.

TSS	DRY SEASON			WET SEASON		
	SEDIMENT	ORGANIC MATTER	**TOTAL**	SEDIMENT	ORGANIC MATTER	**TOTAL**
Average anticipated seasonal debris removed (cy)	66.48	41.50		60.99	39.99	
Bulk density (kg/cy)	837.78 [a]	497 [b]		837.78 [a]	497 [b]	
Moisture content conversion factor for street sweeping debris (%)	0.87380 [a]	0.87380 [a]		0.87380 [a]	0.87380 [a]	
TSS conversion factor for street sweeping debris (kg TSS/kg dry mass)	0.490042 [a]	N/A		0.490042 [a]	N/A	
Average seasonal TSS removed through street sweeping (kg)	23,850	N/A	**23,850**	21,880	N/A	**21,880**

[a] *Source: DCA (2017).*
[b] *Source: Government of Saskatchewan Ministry of Agriculture (2008) presented as wet bulk density of compost.*

3.2 CLEANING OF MS4 STRUCTURES IN WAIKELE WATERSHED

This section discusses Baseline Activities and Quantifying Anticipated Pollutant Removal for the cleaning of MS4 structures.

3.2.1 Baseline Activities

In 2004, DOT-HWYS conducted MS4 structure cleaning only in response to emergency flooding conditions. Debris removal in Waikele Watershed during these emergency actions was not quantified, but is assumed to be minimal in comparison to the removal from current MS4 structure cleaning activities. Therefore, the baseline condition assumes no pollutant removal by MS4 structure cleaning, and any pollutant removal by DOT-HWYS MS4 structure cleaning in Waikele Watershed will be credited towards WLA reductions to comply with assigned WLAs.

3.2.2 Quantifying Anticipated Pollutant Removal

DOT-HWYS quantifies debris removed through the cleaning of MS4 structures for all routes intersecting Waikele Watershed. At the end of each cleaning event, inspectors record the total cubic yards of debris removed and estimate a percentage of sediment, organic matter, and trash removed. DOT-HWYS averaged data from 2015-2017 to provide a representative estimate of

debris removal to use on a seasonal basis for Waikele Watershed. This data will serve as a basis for projecting future seasonal reductions.

A summary of these data is provided in Figures 3-3 and 3-4. Averaging data from these years yields an average anticipated dry season removal of 1.79 cubic yards of sediment and 1.41 cubic yards of organic matter, and an average anticipated wet season removal of 2.63 cubic yards of sediment and 1.65 cubic yards of organic matter.

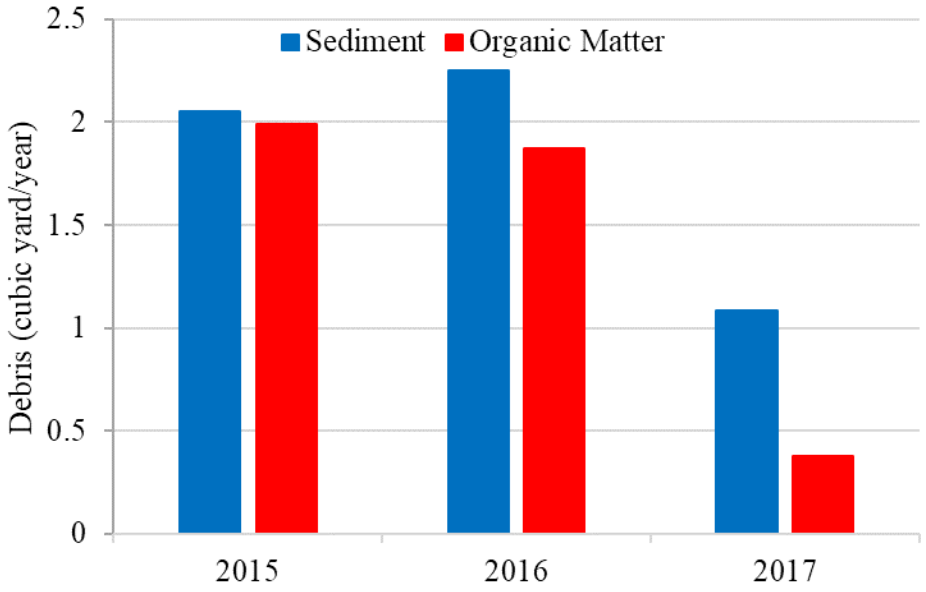

Figure 3-3. Cubic yards of debris removed from inlets and manholes in Waikele Watershed, 2015-2017 Dry Seasons.

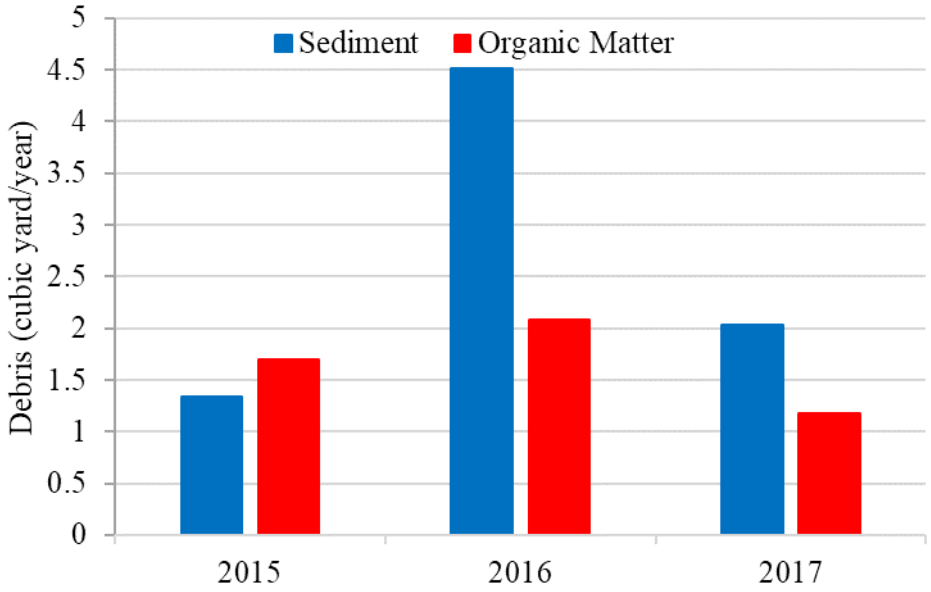

Figure 3-4. Cubic yards of debris removed from inlets and manholes in Waikele Watershed, 2015-2017 Wet Seasons.

Tables 3-3 and 3-4 present the conversion from an average anticipated seasonal wet-weight volume of debris removed to a dry mass of TN and TSS removed from Waikele Watershed through cleaning of MS4 structures.

Table 3-3 presents the conversion calculations for TN removal through cleaning of inlets and manholes.

Table 3-3. Conversion Calculations for TN Removal through Cleaning of Inlets and Manholes.

TN	DRY SEASON			WET SEASON		
	SEDIMENT	ORGANIC MATTER	TOTAL	SEDIMENT	ORGANIC MATTER	TOTAL
Average anticipated seasonal debris removed (cy)	1.79	1.41		2.63	1.65	
Bulk density (kg/cy)	1039 [a]	497 [b]		1039 [a]	497 [b]	
Moisture content conversion factor for catch basin debris (%)	0.79 [a]	0.79 [a]		0.79 [a]	0.79 [a]	
TN conversion factor for catch basin debris (kg TN/kg dry mass)	0.0019263 [a]	0.0019263 [a]		0.0019263 [a]	0.0019263 [a]	
Average anticipated seasonal TN removed through MS4 cleaning (kg)	2.8	1.1	**3.9**	4.2	1.3	**5.5**

[a] *Source: Berretta et al. (2011).*

[b] *Source: Government of Saskatchewan Ministry of Agriculture (2008) presented as wet bulk density of compost.*

Table 3-4. Conversion Calculations for TSS Removal through Cleaning of Inlets and Manholes.

TSS	DRY SEASON			WET SEASON		
	SEDIMENT	ORGANIC MATTER	**TOTAL**	SEDIMENT	ORGANIC MATTER	**TOTAL**
Average anticipated seasonal debris removed (cy)	1.79	1.41		2.63	1.65	
Bulk density (kg/cy)	1039 [a]	497 [b]		1039 [a]	497 [b]	
Moisture content conversion factor for catch basin debris (%)	0.79 [a]	0.79 [a]		0.79 [a]	0.79 [a]	
TSS conversion factor for catch basin debris (kg TSS/kg dry mass)	0.30 [c]	NA		0.30 [c]	NA	
Average anticipated seasonal TSS removed through MS4 cleaning (kg)	440		**440**	650		**650**

[a] *Source: Berretta et al. (2011).*
[b] *Source: Government of Saskatchewan Ministry of Agriculture (2008) presented as wet bulk density of compost.*
[c] *Source: Chesapeake Stormwater Network (2011).*

3.3 POST-CONSTRUCTION STORM WATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT IN WAIKELE WATERSHED

This section discusses Baseline Activities and Quantifying Anticipated Pollutant Removal for post-construction storm water management.

3.3.1 Baseline Activities

In 2004, DOT-HWYS had not constructed post-construction BMPs in Waikele Watershed. Therefore, the baseline condition assumes no pollutant removal by post-construction BMPs, and any pollutant removal through the implementation of post-construction BMPs in Waikele Watershed will be credited towards WLA reductions to comply with assigned WLAs.

3.3.2 Quantifying Anticipated Pollutant Removal

Currently, DOT-HWYS does not plan to construct post-construction BMPs to comply with assigned WLAs.

3.4 EROSION CONTROL PROGRAM IN WAIKELE WATERSHED

This section discusses Baseline Activities and Quantifying Anticipated Pollutant Removal for erosion control.

3.4.1 Baseline Activities

In 2004, DOT-HWYS conducted repair of erosion sites in the DOT-HWYS ROW only in response to emergency conditions or potential impact to adjacent property owners. The quantity of pollutants removed in Waikele Watershed during these emergency actions was not calculated, but is assumed to be minimal. Therefore, the baseline condition assumes no pollutant removal by erosion control mitigation, and any pollutant removal through the repair of eroded slopes in Waikele Watershed will be credited towards WLA reductions to comply with assigned WLAs.

3.4.2 Quantifying Anticipated Pollutant Removal

The *2007 Islandwide Assessment of Erosional Areas on the Island of Oahu* (hereinafter *Islandwide Assessment*) identified several erosional areas of concern in Waikele Watershed. Implementing control measures on these erosional areas of concern has resulted in reductions in loadings of TN and TSS within Waikele Watershed.

Where the *Islandwide Assessment* utilized the Universal Soil Loss Equation, the *I&M Plan* uses an improved method called, the Revised Universal Soil Loss Equation (RUSLE) (Renard G. 1997). RUSLE has improvements in the computation of input parameters and utilizes isoerodent maps by the National Oceanic and Atmospheric Administrations (NOAA) Office for Coastal Management (OCM 2013) to calculate more realistic rainfall-runoff erosivity factor (R) values. Slope steepness factors are also refined in RUSLE, using the entire length from the origin of overland flow to the end of erosion control site, running perpendicular to the slope contours. Cover-management factor values are based on five sub-factors of soil loss ratios with specific cover properties from before and after the application of BMPs.

Input parameters for RUSLE are based on the *Islandwide Assessment* and recent site inspections (Table 3-5).

Table 3-5 RUSLE Equation Parameters for the Identified Erosion Sites in Waikele Watershed.

PID	R	K	L	S	C *(Before)*	C *(After)*	P *(Before)*	P *(After)*
21	223.70	0.375	0.223	3.55	0.354	0.005	1.000	0.814
47	166.29	0.330	0.645	11.38	0.029	0.005	1.000	0.596
48	162.53	0.330	1.171	11.38	0.015	0.005	1.000	0.596
109	161.34	0.330	0.645	11.38	0.029	0.005	1.000	0.596
149	211.47	0.353	0.754	16.22	0.354	0.005	1.000	0.814
150	211.42	0.353	0.810	16.22	0.050	0.005	1.000	0.814
510	270.62	0.437	0.456	11.38	0.050	0.005	1.000	0.596

Notes:
PID = Point Identification Number
R = Rainfall Erosivity Factor, K = Soil Erodibility Factor, L = Slope Length Factor, S = Slope Steepness Factor,
C = Cover Factor (before and after BMP application), P = Support Practice Factor (before and after BMP application)

Pollutant reductions from all addressed sites within the Waikele Watershed were calculated and further divided into seasonal reductions by using ratios based on existing seasonal loads from the TMDL. Table 3-6 identifies the status and pollutant reduction achieved from each site, which are included in the summary table (Table 3-10).

Table 3-6 Status and Removal of TN and TSS from Identified Erosion Sites in Waikele Watershed.

PID	ROUTE	AREA (SQUARE METER)	COMPLETED PROJECTS	UNDER DESIGN/ CONSTRUCTION	TN REDUCTION (KG/SEASON)		TSS REDUCTION (KG/SEASON)	
					DRY SEASON [a]	WET SEASON [b]	DRY SEASON [c]	WET SEASON [d]
21	750	720		X	*See* Section 3.8		*See* Section 3.8	
47	H-1	4,199	X		2.9	4.0	1,080	8,840
48	H-1	10,159	X		5.8	8.0	2,130	17,510
109	H-1	3,976	X		2.7	3.7	990	8,130
149	99	1,092		X	*See* Section 3.8		*See* Section 3.8	
150	99	1,584	X		4.7	6.5	1,740	14,310
510	99	3,612	X		6.9	9.5	2,550	20,970
TOTAL					**23.0**	**31.7**	**8,490**	**760**

Notes:
Seasonal ratio = Seasonal WLA/Annual WLA.
*Season reduction = annual load * seasonal ratio.*
[a] *TN dry season ratio = 42%. TN dry season reduction = annual load * 42%.*
[b] *TN wet season ratio = 58%. TN wet season reduction = annual load * 58%.*
[c] *TSS dry season ratio = 11%. TSS dry season reduction = annual load * 11%.*
[d] *TN wet season ratio = 89%. TSS wet season reduction = annual load * 89%.*

DOT-HWYS routinely inspects these erosion sites to ensure that stabilization methods are functioning properly, and that erosion is minimized.

3.5 CONSTRUCTION SITE RUNOFF CONTROL PROGRAM ACTIVITIES IN WAIKELE WATERSHED

This section discusses Baseline Activities and Quantifying Anticipated Pollutant Removal for construction site runoff control.

3.5.1 Baseline Activities

Reductions from the Construction Program will be considered qualitatively and therefore establishing baseline level of activities is not applicable at this time.

3.5.2 Quantifying Anticipated Pollutant Removal

DOT-HWYS will continue to verify that site-specific BMPs have been installed in accordance with their approved site-specific BMP plans prior to the commencement of any ground-disturbing activities. Additionally, independent inspections will continue to be conducted as required in the MS4 Permit to ensure BMPs are installed and maintained per approved plan. DOT-HWYS has developed checklists, inspection forms, and corrective action and reporting procedures for construction projects and has conducted numerous annual construction BMP training events for its staff and contractors. Should any new construction take place along DOT-HWYS ROW within Waikele Watershed, DOT-HWYS will follow their MS4 Permit requirements to implement appropriate construction site runoff control BMPs.

Substantial pollutant reductions in discharges to the MS4 from the 2004 baseline are attributed to the Construction Program, but these reductions have not been quantified at this time and are therefore considered qualitatively in this *I&M Plan*.

3.6 IC PROGRAM AND IDDE PROGRAM IN WAIKELE WATERSHED

This section discusses Baseline Activities and Quantifying Anticipated Pollutant Removal for the IC Program and IDDE Program.

3.6.1 Baseline Activities

Reductions from the IC Program and IDDE Program will be considered qualitatively and therefore establishing baseline level of activities is not applicable at this time.

3.6.2 Quantifying Anticipated Pollutant Removal

As of March 2020, there are 2 industrial facilities and 27 high priority commercial facilities located adjacent to DOT-HWYS ROW within Waikele Watershed. These facilities include shopping complexes, self-storage facilities, and gas stations. Only 11 of these facilities hold permits to connect to the MS4.

The IC Program and IDDE Program have identified deficiencies that are potential sources of pollution to the MS4 in Waikele Watershed. Owners of the sites or facilities have been required

to correct these deficiencies and have been provided educational material to encourage better practices in the future. Furthermore, previous deficiencies are considered in the prioritization of inspection schedules for industrial and commercial facilities. Substantial pollutant reductions in discharges from the MS4 are attributed to the IC Program and IDDE Program, but these reductions have not been quantified at this time and are therefore considered qualitatively in this *I&M Plan*.

3.7 PUBLIC EDUCATION AND OUTREACH IN WAIKELE WATERSHED

This section discusses Baseline Activities and Quantifying Anticipated Pollutant Removal for public education and outreach.

3.7.1 Baseline Activities

Reductions from the Public Education and Outreach Program will be considered qualitatively and therefore establishing baseline level of activities is not applicable at this time.

3.7.2 Quantifying Anticipated Pollutant Removal

DOT-HWYS will continue to evaluate potential partnerships with agencies and other stakeholders to more effectively promote storm water awareness and affect behavioral change within the watershed.

In addition, DOT-HWYS sponsors an Adopt-A-Highway program that allows volunteers from any organization to pick up litter along Hawaii State Highways. Adopt-A-Highway groups agree to adopt a portion of State Highway for a minimum of two years, pick up litter on that highway at least four times a year, and provide safety training for their volunteers before each cleanup. DOT-HWYS provides all safety materials and trash bags, schedules trash pick-ups, and erects highway signs to recognize the sponsoring groups' cleaning efforts. Twelve Adopt-A-Highway groups are responsible for over 29 miles of highway within Waikele Watershed.

Substantial pollutant reductions in discharges from the DOT-HWYS MS4 are attributed to the Public Education and Outreach Program, but these reductions have not been quantified at this time and are therefore considered qualitatively in this *I&M Plan*.

3.8 SUMMARY OF ANTICIPATED SEASONAL LOAD REDUCTIONS IN WAIKELE WATERSHED

Based on historical data, DOT-HWYS projects that its current BMP programs in the Waikele Watershed will achieve the required nutrient load reductions for dry and wet season TN. However, in order to achieve the wet season TSS load reduction requirement an additional 22,730 kg of TSS will need to be captured through enhanced BMPs, based on the projected current load reduction of 92,290 kg and a required reduction of 115,020 kg. It is anticipated that this additional nutrient load reduction will be achieved with increased street sweeping, and the repair of two erosion sites in the Waikele Watershed, as presented in Tables 3-7 through 3-9 below.

Table 3-7. Calculation of Additional Pollutant Removal Due to Increased Dry Season Street Sweeping in Waikele Watershed.

DRY SEASON	CURRENT SWEEPING OPERATIONS	CHANGE	PROPOSED SWEEPING OPERATIONS	ADDITIONAL REMOVAL
Dry Season Curb Miles Swept	29.35	2.50	73.37	
Average Sediment Removal Efficiency (cy/CM)	2.27	0.75	1.70	
Average Sediment Removed (cy)	66.48	–	124.64	
Average Organic Matter Removal Efficiency (cy/CM)	1.41	0.75	1.06	
Average Organic Matter Removed (cy)	41.50	–	77.81	
Average **TN** Removed in Dry Season (kg) [1]	182.7	–	342.4	**159.7**
Average **TSS** Removed in Dry Season (kg) [2]	23,847	–	44,714	**20,867**

Notes:
[1] This calculation uses the same conversion factor shown in Table 3.1.
[2] This calculation uses the same conversion factor shown in Table 3.2.
CM = Curb Miles

Table 3-8. Calculation of Additional Pollutant Removal Due to Increased Wet Season Street Sweeping in Waikele Watershed.

WET SEASON	CURRENT SWEEPING OPERATIONS	CHANGE	PROPOSED SWEEPING OPERATIONS	ADDITIONAL REMOVAL
Wet Season Curb Miles Swept	29.35	2.50	73.37	
Average Sediment Removal Efficiency (cy/CM)	2.08	0.75	1.56	
Average Sediment Removed (cy)	60.99	–	114.35	
Average Organic Matter Removal Efficiency (cy/CM)	1.36	0.75	1.02	
Average Organic Matter Removed (cy)	39.99	–	74.98	
Average **TN** Removed in Wet Season (kg) [1]	169.9	–	318.5	**148.6**
Average **TSS** Removed in Wet Season (kg) [2]	21,878	–	41,022	**19,144**

Notes:
[1] This calculation uses the same conversion factor shown in Table 3.1.
[2] This calculation uses the same conversion factor shown in Table 3.2.
CM = Curb Miles

Table 3-9. Status and Removal of TN and TSS from Identified Additional Erosion Sites in Waikele Watershed.

PID	ROUTE	AREA (SQUARE METER)	COMPLETED PROJECTS	UNDER DESIGN/ CONSTRUC-TION	TN REDUCTION (KG/SEASON)		TSS REDUCTION (KG/SEASON)	
					DRY SEASON [a]	WET SEASON [b]	DRY SEASON [c]	WET SEASON [d]
21	750	720		X	1.1	1.5	400	3,330
149	99	1,092		X	23.0	31.7	8,460	69,560
TOTAL					**24.1**	**33.2**	**8,860**	**72,890**

Notes:
Seasonal ratio = Seasonal WLA/Annual WLA.
*Season reduction = annual load * seasonal ratio.*
*[a] TN dry season ratio = 42%. TN dry season reduction = annual load * 42%.*
*[b] TN wet season ratio = 58%. TN wet season reduction = annual load * 58%.*
*[c] TSS dry season ratio = 11%. TSS dry season reduction = annual load * 11%.*
*[d] TN wet season ratio = 89%. TSS wet season reduction = annual load * 89%.*

A summary of the anticipated seasonal pollutant load reductions calculated in Sections 3.1 to 3.7 is provided in Table 3-10. An explicit MOS of 25% has been added to the total load reduction requirements to ensure that activities demonstrate consistency with the WLAs consistent with the assumption of the associated TMDL document.

Table 3-10. Anticipated Seasonal Pollutant Load Reduction.

BEST MANAGEMENT PRACTICE (BMP) PROGRAM	ANTICIPATED TOTAL SUSPENDED SOLIDS (TSS) REDUCTION (kg/season)		ANTICIPATED TOTAL NITROGEN (TN) REDUCTION (kg/season)	
	DRY SEASON	WET SEASON	DRY SEASON	WET SEASON
Street Sweeping (Existing)	23,850	21,880	182.7	169.9
Street Sweeping (Additional)	20,867	19,144	159.7	148.6
Cleaning of MS4 Structures	440	650	3.9	5.5
Post-Construction BMPs	– [a]	– [a]	– [a]	– [a]
Erosion Control Program (Existing)	8,490	69,760	23.0	31.7
Erosion Control Program (Additional)	8,860	72,890	24.1	33.2
Construction Site Runoff Control	– [b]	– [b]	– [b]	– [b]
IC Program and IDDE Program	– [b]	– [b]	– [b]	– [b]
Public Education and Outreach	– [b]	– [b]	– [b]	– [b]
TOTAL ANTICIPATED REDUCTION	62,507	184,324	393.4	388.9
REDUCTION REQUIRED w/ MOS [c]	N/A	115,020	71	91

Notes:

a No post-construction BMPs are currently constructed in the Waikele Watershed.

b These programs have resulted in pollutant load reductions in the Waikele Watershed. These reductions have not been quantified at this time and are therefore considered qualitatively in this I&M Plan.

c Includes a 25% explicit margin of safety.

Wet Season = 181 days (November 1 – April 30).

Dry Season = 184 days (May 1 – October 31).

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CHAPTER 4
MONITORING PLAN

DOT-HWYS has a well-established system to measure and document pollutant removal activities, and store this information in a geospatial database. This system will be the primary method of documenting consistency with the WLA reductions provided in the Waikele TMDL document. The following sections document how DOT-HWYS will monitor and report consistency with assigned WLA reductions in the Waikele Watershed for each of the SWMP programs described in this *I&M Plan*.

There are natural variables, such as the timing, intensity, and duration of precipitation, which influence TN and TSS removals and are fully outside the control of DOT-HWYS. As such DOT-HWYS intends to demonstrate consistency with WLA reductions based on a three-year running average of TN and TSS reductions.

4.1 STREET SWEEPING AND MS4 CLEANING

DOT-HWYS will continue to track removals from street sweeping and MS4 structure cleaning, as described in Sections 3.1 and 3.2, respectively, and in the SWMPP.

4.2 POST-CONSTRUCTION BMPS

Should post-construction BMPs be installed to comply with assigned WLA reductions, a detailed Annual Monitoring Plan will discuss any TMDL-related monitoring planned for that year. Monitoring of seasonal reductions resulting from post-construction BMPs may be achieved either by measuring the amount of debris removed during maintenance for structural post-construction BMPs such as continuous deflection separator units, or through modeling (e.g., the Simple Method) for non-structural post-construction BMPs such as bioswales.

4.3 EROSION CONTROL PROGRAM

Erosional areas that have been remediated are annually inspected to ensure that erosion control methods are effective. As the state of the erosional sites change, the RUSLE inputs will be revised and recalculated to reflect the reduction effectiveness of erosion control measures.

4.4 OTHER BMP PROGRAMS

Other BMP programs whose associated reductions have not been quantified in this report will continue to be documented in the Annual Report.

4.5 COMPLIANCE SCHEDULE

As required in Part F.4, DOT-HWYS developed a compliance schedule with a final deadline to demonstrate consistency with the WLAs consistent with the assumption of the associated TMDL document.

Table 4-1 shows the compliance schedule for Waikele Watershed.

Table 4-1. Compliance Schedule for Waikele Watershed.

DUE NO LATER THAN:	MILESTONE/DELIVERABLE
May 8, 2020	Finalize Implementation & Monitoring Plan Increase Street Sweeping Frequency
May 8, 2021	**Erosion Control, PID 149:** Complete Construction
May 8, 2022	**Erosion Control, PID 21:** Complete 100% PS&E
May 8, 2023	**Erosion Control, PID 21:** Advertise / Bid opening / Award
May 8, 2024	**Erosion Control, PID 21:** Commence Construction
May 8, 2025	**Erosion Control, PID 21:** Complete Construction
May 8, 2026	Street sweeping and erosion control performance monitoring
May 8, 2027	Finalize WLA Completion Report

Following the WLA Completion Report (no later than 8 years after EPA approval date of the TMDL), the results of this monitoring will be reported annually in the SWMP Annual Report.