Implementation Plan for Stormwater Trash Reduction and Approach to Demonstrating Trash Full Capture Equivalency

DATE

Submitted by:

[PERMITTEE]

Submitted in Compliance With:
Water Code Section 13383 Order to Submit a Method to Comply with Statewide Trash Provisions; Requirements for Traditional Small Municipal Separate Storm Sewer System (MS4) Permittees

PREFACE

The State Water Resources Control Board issued requirements to [Permittee] requiring trash reductions from stormwater discharges. On June 2, 2017, the State Water Board issued Orders to Permittees under California Water Code section 13383. The 13383 Order initiated implementation of the statewide Trash Amendments for Phase II Permittees with regulatory authority over Priority Land Use areas.

Phase II Permittees were required to select Track 1 or Track 2 implementation and submit their choice to the Water Board by September 2, 2017. Track 1 implementation is the option to install full trash capture systems to capture trash in runoff from PLUs. Track 2 is the option to meet the requirements with a combination of full trash capture devices, multi-benefit projects, other treatment controls, and/or institutional controls. Permittees who choose Track 2 are required to submit an implementation plan which identifies the controls the Permittees will implement and how they will achieve Full Capture System Equivalency (FCE), how FCE will be demonstrated. This Implementation Plan is intended to achieve this requirement.

This Plan's content is based on the [PERMITTEE's] current understanding of trash problems within their jurisdiction and the effectiveness of control measures designed to reduce trash impacts associated with Municipal Separate Storm Sewer (MS4) discharges. This Plan is intended to be iterative and may be modified in the future based on information gained through the implementation of trash control measures. [PERMITTEE] therefore reserves the right to revise or amend this Plan at their discretion. If significant revisions or amendments are made to the Plan, then revisions will be documented through the annual reporting process.

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Section 1. Introduction

Background

In response to the growing challenges with trash levels in receiving waters (e.g., creeks, rivers, lakes, and shorelines), the State Water Resources Control Board (State Water Board) adopted the *Trash Amendments* in April 2015. This action amended two statewide water quality control plans to include trash control requirements for owners/operators of municipal separate storm sewer systems (MS4s), including the [Permittee]. The Amendments are not self-implementing, and therefore the State Water Board issued Orders to Permittees under California Water Code section 13383 June 2017 requesting that they choose their compliance strategy for addressing the Trash Amendments; and 2) Include trash reduction requirements consistent with the Amendments in the Phase II Statewide NDPES Permit when it is reissued in the next few years (reissuance schedule to be determined). Based on the compliance schedule outlined in the Order, Phase II Permittees will be required to significantly reduce the amount of trash discharged from their MS4 to local water bodies over the next decade. On average, municipalities will need to demonstrate a 10% reduction per year in the amount of trash discharged from MS4s. The Amendments define trash as follows:

> *All improperly discarded solid material from any production, manufacturing, or processing operation including, but not limited to, products, product packaging, or containers constructed of plastic, steel, aluminum, glass, paper, or other synthetic or natural materials.*

Non-compliance with the requirements could result in monetary fines from the State or litigation from third-parties, which is allowed under the Federal Clean Water Act.

Trash Sources and Pathways

Trash in creeks, lakes and shorelines originates from a variety of sources including pedestrian litter, inadequate waste container management, on-land dumping, and litter from vehicles (Figure 1). Pedestrian litter is found frequently in high-traffic areas such as commercial districts, transit centers, and around special events. Waste containers may be overflowing or dispersing trash before during or after collection. Litter from vehicles can include litter from uncovered loads. On-land dumping may also be a significant source of trash generation.

As illustrated in Figure 1, trash is transported to receiving waters through three main pathways: 1) Stormwater Conveyances; 2) Wind; and, 3) Direct Dumping. Stormwater or urban runoff conveyance systems (e.g., MS4s) consist of curbs/gutters, and pipes and channels that discharge to urban creeks, lakes and shorelines. This Implementation Plan and associated trash control measures described within are focused on reducing trash from the stormwater conveyance pathway.

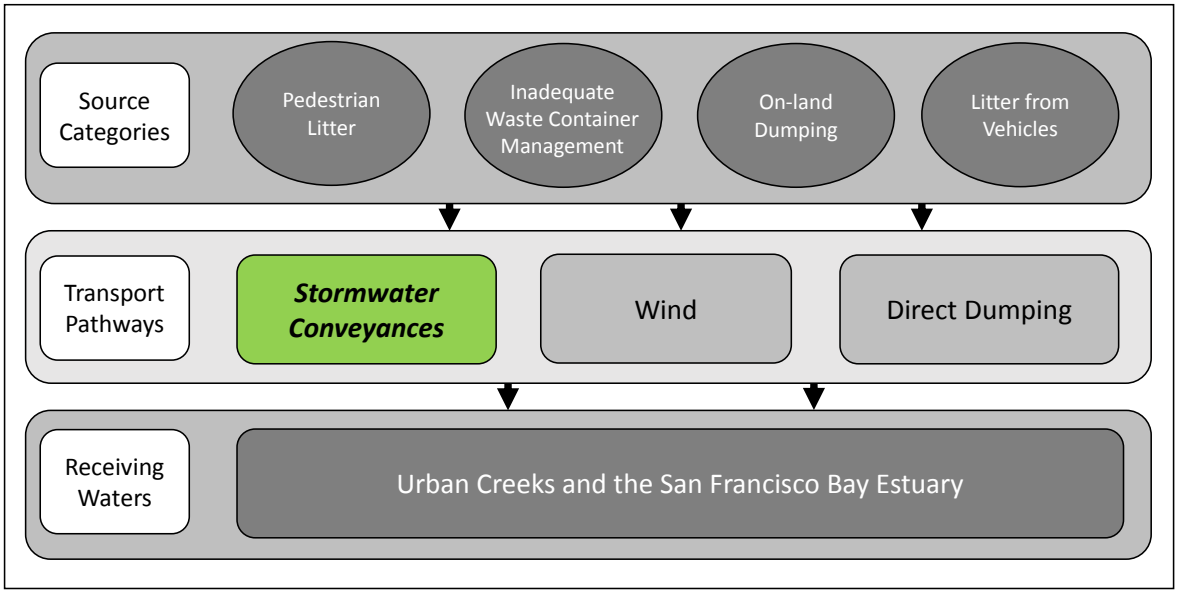

Figure 1. Trash sources categories and transport pathways to urban creeks.[1]

Applicable Land Areas (PLUs and Alternative Equivalent Land Areas)

A central element of the statewide Trash Amendments is the designation of land areas where cities, counties and other applicable public agencies will need to implement trash controls to reduce the levels of trash discharged from stormwater conveyances. Applicable land areas are based on land uses currently developed (i.e., not simply zoned) and presumed to generate high levels of trash. These areas are referred to as "Priority Land Uses, or PLUs" in the Trash Amendments. PLUs include all land areas currently developed as high density residential, industrial, commercial, mixed urban, and public transportation stations.

[1] This Implementation Plan is only focused on reducing trash from the stormwater conveyances pathway, consistent with the scope of the State Water Board's Trash Amendments.

Because not all PLUs generate significant levels of trash and not all trash is generated solely from PLUs, the Amendments allow Permittees to propose alternative equivalent land uses that better represent high trash generation in their jurisdictional areas. Permittees can substitute one or more PLUs with alternate land uses that generate trash at rates equivalent to or greater than, the PLU being substituted. Substituting PLUs for land areas that generate trash allows Permittees the flexibility to focus enhanced controls on trash-prone areas within their communities, as opposed to treating areas just because they fall into one of the PLUs.[2] Additional information on PLU areas in the [Permittee] are included in Section 2.

Compliance Options and Related Considerations

The Trash Amendments provide Permittees with two options (i.e., tracks) to demonstrate compliance with trash reduction requirements in PLU areas of equivalent land areas:

- **Track 1 – Full Capture Systems:** Install, operate and maintain State Water Board certified/approved trash full capture systems in the storm drain system that drains all PLUs or equivalent alternative land areas. Full Capture Systems are those that trap all particles that are 5 millimeter (mm) or greater, and have a design treatment capacity that is either: a) not less than the peak flow rate resulting from a one-year, one-hour storm in the subdrainage area, or b) appropriately sized and designed to carry at least the same flows as the corresponding storm drain. The 5 mm size limit corresponds with the diameter of a cigarette butt. Roughly 25 types of full capture systems have been approved by the Los Angeles and/or San Francisco Bay Regional Water Boards over the past 10+ years. Permittees will need to not only address trash from PLUs draining the public right-of-way, but PLUs draining to storm drain inlets located on private property and are connected to the Permittee's MS4.

- **Track 2 - Full Capture Equivalent (FCE):** Implement a combination of full capture systems, multi-benefit projects, institutional controls, and/or other treatment controls to achieve full capture system equivalency, or the same performance results as Track 1. Example controls mentioned in the Trash Amendments include partial capture devices, street sweeping, and green infrastructure and Low Impact Development (LID) controls. If choosing Track 2, cities/counties will need to show equivalency to Track 1 performance using an approach that is acceptable by the State Water

[2] A description of the process that the [Permittee] will follow, should it choose to propose the substitution of PLU areas for equivalent alternative land areas, is included in Appendix B.

Board. Additionally, cities, towns and counties that opt to comply with the requirements via Track 2 will be required to submit an implementation plan and map illustrating: (a) the combination of trash controls selected and the rationale for the selection, (b) how the combination of selected controls is designed to achieve Track 1 equivalency, and (c) how Track 1 equivalency will be demonstrated.

Purpose

This Implementation Plan (Plan) details how the [Permittee] will address the Track 2 requirements and how the [Permittee] will demonstrate Full Capture Equivalency (FCE). The rationale for selecting the combination of trash controls included in the Plan and descriptions of how the controls are designed to achieve Track 1 equivalency are included. Lastly, the Plan fully describes the FCE method that will be used to demonstrate equivalency with Track 1.

Section 2 of the Plan describes the scope of trash issues in the [Permittee's] jurisdictional area, including the methods used to determine and document the baseline trash generation levels in PLU and equivalent alternative land areas. Section 3 describes control measures that are currently being implemented, and additional control measures that will be implemented. A schedule implementing additional control measures is also included in Section 3. Section 4 provides the rationale behind the FCE approach and how FCE will be demonstrated through On-Land Visual Trash Assessments (OVTAs).

Section 2. Scope of Trash Issues

[Permittee] Characteristics

[Include a description of permittee location, area (square miles/acres) of jurisdiction, watershed and/or waterways and receiving waters, and land use]

The [Permittee] is located in the XXXX portion of XXXX County and is roughly XX square miles in area. The [Permittee] is comprised of mostly XXXX and XXXX land uses.

Priority Land Uses

Priority Land Use (PLU) areas are defined by the State Water Board as those areas currently developed (i.e., not simply zoned) and presumed to generate high levels of trash. These areas are categorized as high density residential, industrial, commercial, mixed urban or public transportation stations.

The [Permittee] identified and mapped land parcels that were identified as PLU areas within its jurisdictional boundaries using currently available Geographical Information System (GIS) land use data layers. Nonconforming land uses were reconciled by comparing the definitions of PLU areas included in the Trash Amendments and the land use classes included in available GIS data layers. Land use classes that that appear to meet the PLU definitions are presented in Table 1.

Municipal staff familiar with the local jurisdiction's land uses reviewed the land use classes included in the GIS data layers and identified parcels that were incorrectly categorized as PLU areas and parcels that should be defined as PLU areas, but were not identified in GIS. This resulted in the identification of PLU areas by the [Permittee] within in its jurisdiction. A preliminary version of the jurisdictional map that identifies PLU areas was submitted by the [Permittee] on September 2, 2017 to the State Water Board. A final version was submitted on December 1, 2018 and is included as Figure 2. The PLU areas identified on the final jurisdictional map are the land areas subject to the requirements associated with the Trash Amendments. Priority and non-priority land uses within the [Permittee] jurisdictional area are listed in Table 2.

Table 1: Priority land use categories and the classes included in each.

Priority Land Use Categories	Definition in Trash Amendments	Land Use Classes Included in Each Category
High-Density Residential	Residential land uses with at least ten (10) developed dwelling units (DU) per acre	• Single family residential parcels < 0.1 acre in size[a] • Multi-family residential parcels identified as >10 DUs per acre or < 0.1 acre, including applicable apartments, townhomes, condominiums and trailer parks
Industrial	Land uses where the primary activities on the developed parcels involve product manufacture, storage, or distribution	• Heavy industrial buildings/facilities • Warehouses and equipment storage lots • Junkyards, landfills and waste recycling centers and transfer stations • Wholesale businesses and distribution centers • Building material sales yards • Other light industrial facilities
Commercial	Land uses where the primary activities on the developed parcels involve the sale or transfer of goods or services to consumers	• Retail establishments, including restaurants, theaters, shops, convenience stores, gas stations and grocery stores • Business or professional buildings • Community centers • Vehicle repair shops • Motels and hotels • Government buildings • Parking lots
Mixed Urban	Land uses where high-density residential, industrial, and/or commercial land uses predominate collectively	• Mixed use land areas that have a combination of two or more classes above
Public Transportation Stations	Facilities or sites where public transit agencies' vehicles load or unload passengers or goods	• Bus stations and stops • Park and ride lots • Rail stations and ferry terminals • Associated parking lots

[a] Single Family Residential parcels that are greater than 0.1 acres in size but are isolated from other PLUs may have been defined as non-PLUs.

Table 2. Priority and non-priority land uses within the [PERMITTEE's] jurisdictional boundaries. (Complete the table below)

Land Use Category	Jurisdictional Area[a] (Acres)	% of Jurisdictional Area[a]
Priority Land Uses (PLUs)		
Commercial/Retail		
Industrial		
High Density Residential		
Public Transportation[b]		
Mixed Urban		
Totals		
Non-priority Land Uses		
Totals		

[a] Jurisdictional Area is defined as the land area within a Permittee's jurisdiction that is part of the designated Regulated Small MS4 as specified by the SWRCB in WQO No. 2013-0001-DWQ.

[b] The area for each public transit stop was standardized to 200ft^2 (20ft x 10 ft) to facilitate tracking and reporting.

[Insert Final Jurisdictional Map]

Figure 2. The [PERMITTEE's] jurisdictional map illustrating Priority Land Use (PLU) Areas subject to trash reduction requirements.

Baseline Trash Generation

Baseline trash generation is the level of trash discharged from a stormwater conveyance over the course of a year. Consistent with the 13383 Order, the [Permittee] developed baseline trash generation levels for all PLU areas in the City/County/Town in an effort to illustrate the varying levels of trash generated in PLU areas. Trash generation levels were developed using the following *On-land Visual Trash Assessment* (OVTA) protocols:

- A – Street and Sidewalk Survey (EOA 2017)
- B – Driving Survey (EOA 2018)
- C – Area Based Survey (EOA and Keish Environmental 2018)

These protocols provide a method for visually observing the level of trash present on the roadway, curb and gutter, sidewalk, and other areas adjacent to the street or on a parcel that could potentially contribute trash to the municipal separate storm sewer system (MS4).

Two OVTAs were conducted at each PLU area. One assessment was conducted during the wet season (October – March) and one during the dry season (April – September). Assessments were conducted by trained personnel and prior to street sweeping so that generation levels would not be underestimated.

Based on the level of trash observed during each OVTA, the adjacent PLU area was placed into one of the four trash generation categories that are summarized in Table 3. For each PLU area, the worst OVTA score observed during the two assessments was used as the final baseline trash generation level for that area. Selecting the worst generation level ensures that the [Permittee] is not underestimating the trash generation levels currently observed.

Levels of trash generation in PLU areas in [Permittee] are depicted on a baseline trash generation map using four trash generation rates (gallons/acre/year) that are symbolized by the four colors illustrated in Table 4. The [Permittee's] Final Baseline Trash Generation Map is included as Figure 3. Summary statistics of trash generation levels in PLU areas are presented in Table 5 along with non-PLU areas that the [Permittee] may select as equivalent alternative land areas, consistent with the Trash Amendments.

Table 3. Definitions of on-land trash assessment condition categories.

OVTA Category	Summary Definition
A (Low)	• Effectively no trash is observed in the assessment area. • There may be some trash in the area, but it is not obvious at first glance. • One individual could easily clean up all the trash observed while walking at normal pace. • No additional trash reduction measures are needed in the assessment area.
B (Moderate)	• Predominantly free of trash, except for a few littered areas. • Some trash is noticeable at first glance. • The trash observed could be collected by one or two individuals, but would require walking at a slower than normal pace. • Additional trash reduction measures are needed in the assessment area.
C (High)	• Predominantly littered, except for a few clean areas. • Trash is widely/evenly distributed and/or small accumulations are noticeable on the streets and sidewalks. • It would take multiple people to remove all trash from the area, frequently requiring individuals to stop walking to remove the trash. • Roughly 4 times as much trash as a "B" level.
D (Very High)	• Trash is continuously seen throughout the assessment area and there is a strong impression of lack of concern for litter. • Large piles of trash may be observed. • It would take a large number of people during an organized effort to remove all trash from the area, consistently requiring individuals to stop to remove the trash. • Roughly 3 times as much trash as a "C" level.

Table 4. Trash Generation Categories and Associated Generation Rates (Gallons/Acre/Year).

Category (Color)	Very High (Purple)	High (Red)	Moderate (Yellow)	Low (Green)
Generation Rate (Gallons/Acre/Year)	**> 50**	**10-50**	**5-10**	**< 5**

Table 5. Percentage of PLU areas and non-PLU areas assigned to each Trash Generation Category. (Complete the table below)

Land Area Category		Baseline Trash Generation				Total
		Low	Mod	High	Very High	
Priority Land Use (PLU) Areas	Acres					
	%					
Equivalent Alternative Land Areas (Optional)	Acres					
	%					
Undefined Trash Generation(Optional)	Acres					
	%					

[INSERT BASELINE TRASH GENERATION MAP]

Figure 3. Final Baseline Trash Generation Map.

Section 3. Existing & Planned Trash Control Measures

The [Permittee] is currently conducting stormwater planning projects to identify the most cost-effective and technically feasible trash control measures to address the Trash Amendments and subsequent requirements. Planning projects that are currently underway are described in this section. Additionally, controls that the [Permittee] is currently implementing and controls that the [Permittee] plans to implement to address trash reduction requirements are summarized in this section. This section is organized by the type of trash control measure that has/will be implemented.

Trash Full Capture Systems

There are currently __ trash full capture systems located in the [Permittee] treating runoff from a total of XX acres of land area. The types of systems currently operational in the City/Town/County and the trash generation areas treated by each system or group of systems are listed in Table 6. The locations of the systems and the associated treatment areas are illustrated in Figure 4.

Table 6. Trash full capture systems currently operational in the [Permittee]. (Complete the table below)

Type of Trash Full Capture System	# of Systems	Acres Treated			
		Very High	High	Moderate	Low

Trash full capture systems are certified by the State Water Board and maintained by the [Permittee] consistent with its *Full Capture System Operation and Maintenance Verification Program Plan*, included as **Appendix A** to this Implementation Plan.

[INSERT TRASH FULL CAPTURE SYSTEM MAP]

Figure 4. Trash Full Capture System Map.

Street Sweeping

Include a description of existing street sweeping activities and any enhancements or new actions the Permittee plans to implement after 2018. Identify portions of the Permittees jurisdictional area where enhanced street sweeping (i.e., increased sweeping frequency) and parking enforcement will be implemented. Reference Table 7.

On-Land Cleanups

Include a description of existing on-land cleanup activities and any enhancements or new actions the Permittee plans to implement after 2018. Describe if these actions are Permittee or volunteer-led. Reference Table 7.

Illegal Dumping Prevention/Abatement

Include a description of existing on-land cleanup activities and any enhancements or new actions the Permittee plans to implement after 2018. Include any new or redirected enforcement efforts to increase the focus towards new or enhanced actions. Describe if these actions are Permittee or volunteer-led. Reference Table 7.

Storm Drain Inlet Cleaning

Describe existing storm drain inlet maintenance and any enhancements or new maintenance activities that will be implemented after 2018. For new/enhanced actions, include the number of inlets where enhanced maintenance will occur and the increased frequency of maintenance. Reference Table 7.

Uncovered Loads

Describe existing activities designed to reduce trash from uncovered loads and any enhancements or new actions that will be implemented after December 2018. Describe the types of actions that will implemented including new or redirected enforcement efforts. Reference Table 7.

Improved Trash Bin/Container Management

Describe existing activities designed to improve trash bin/container management and any enhancements or new actions that will be implemented after December 2018. Include any new or redirected efforts to increase the focus towards these new or enhanced actions. Reference Table 7.

Other Types of On-land Actions

Describe any other trash control activities designed to reduce trash in PLU areas or equivalent alternative land areas. Reference Table 7.

Table 7. Other Planned New/Enhanced Trash Control Measures in the [Permittee]. (Complete the table below)

Control Measure Type	Description	Acres Addressed			
		Very High	High	Moderate	Low
Street Sweeping					
On-Land Cleanups					
Illegal Dumping Prevention/Abatement					
Storm Drain Inlet Cleaning					
Uncovered Loads					
Improved Trash Bin/Container Management					
Other Types of On-land Actions					

Trash Cleanups in Receiving Waters (Reduction Offset)

Trash that is observed in creeks, rivers, lakes, lagoons and Bay shorelines can originate from MS4s and other pathways (i.e., direct dumping, wind and homeless encampments). Cleanup events conducted in these receiving waters to remove trash, improve water quality at the site, prevent trash from moving to downstream water bodies (e.g., SF Bay), and can create additional public outreach and participation benefits. Describe existing activities and any enhancements or new actions that will be implemented after December 2018.

Control Measure Implementation Schedule

The [Permittee] is committed to addressing the levels of trash discharged from their MS4 in a timely and cost-effective manner. The tentative implementation schedule for the installation of full capture systems and the implementation of other trash control measures in the [Permittee] is included in Table 8. Implementation levels are dependent upon available funding and are subject to change.

Table 8. Tentative schedule for implementing trash control measures to achieve load reduction deadlines.

Trash Control Type	Summary Description	Implementation Date (Fiscal Year) for Planned New/Enhanced Trash Control Measures									
		2019-20	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2030-31
Full Capture Systems											
Street Sweeping											
On-Land Cleanups											
Illegal Dumping Prevention/Abatement											
Storm Drain Inlet Cleaning											
Uncovered Loads											
Improved Trash Bin/Container Management											
Other Types of Actions											
Offset – Additional Creek and Shoreline Cleanups											

Section 4. Full Trash Capture Equivalency Approach

The Full Trash Capture Equivalency (FCE) approach selected by the [Permittee] includes methods to evaluate the progress made in addressing the trash load reduction requirements in the Trash Amendments. Methods described include those designed to assess reductions associated with trash full capture systems, other trash control measures including institutional and source controls, and trash reduction offsets (i.e., creek and shoreline cleanups).

Full Capture Systems

- **Delineation of Areas Treated by Full Trash Capture Systems** – All areas draining to trash full capture systems installed by the [Permittee] or private land owner that will be used to demonstrate trash load reductions will be delineated using a combination of desktop and field techniques. Delineation of areas treated by these systems are [Describe method used such as: georeferenced in the Permittees' Geographical Information Systems (GIS) database. These areas are overlaid onto the baseline trash generation map to identify the both the area treated and the trash generated from this area that is now addressed by the full capture system. This GIS database is updated as new full capture systems are installed.]

- **Full Capture Operation and Maintenance Program** – The [Permittee] currently oversees the maintenance of all full capture systems, consistent with its *Full Capture System Operation and Maintenance Verification Program Plan*, included as **Appendix A** to this Implementation Plan. Systems are inspected and cleaned consistent with the schedule included in Appendix A. Maintenance records are kept by the [Permittee] and any issues that have arisen are reported in the annual report to the Water Board.

Other Trash Controls

Definition of Full Capture Equivalency

Trash full capture equivalency is defined in the Trash Amendments as the trash load that would be reduced if full capture systems were installed, operated, and maintained for all storm drains that capture runoff from the relevant areas of land (e.g., PLU Areas). For the purposes of defining full capture equivalency, this amount of trash is termed the "Intercepted Trash Load." Because full capture systems are only designed to intercept trash that is transported via stormwater runoff from relatively moderate-sized storms (i.e., 1-year, 1-hour) a portion of the trash that is mobilized into the stormwater system during larger storm events is typically not intercepted by full capture systems (i.e., trash bypasses or overflows the system). This trash is termed the "Acceptable Trash Load." The sum of the

Intercepted and Acceptable Trash Loads equal the trash load discharged by an MS4.

Establishing that the load of trash that enters a stormwater conveyance system is equivalent to or less than the Acceptable Trash Load from an area provides an alternative definition of FCE, consistent with the intent of definition included in the Trash Amendments. To compare the volumes of trash entering stormwater conveyances to the Acceptable Trash Load, On-land Visual Assessments (OVTAs) were conducted multiple times in areas draining to 154 storm drain inlets that were monitored for trash as part of the Bay Area Stormwater Management Agencies Association's (BASMAA) *Trash Generation Rates Study for the San Francisco Bay Area* (BASMAA 2014). Descriptive statistics for the annual trash generation rates calculated via this study are presented in Table 9 in comparison to the OVTA scores (A, B, C & D) observed in the adjacent areas.

Table 9. Descriptive statistics for trash generation rates (Gallons/Acre/Year) monitored at 154 storm drain inlets in the SF Bay Area (BASMAA 2014).

	A	B	C	D
Maximum	8.3	24.4	94.7	252.8
90th %	5.0	14.0	48.1	145.4
75th %	2.9	9.7	38.6	129.0
Median	1.4	6.5	23.0	88.0
Mean	2.2	7.6	26.9	100.3
25th %	0.8	4.2	15.3	69.8
10th%	0.4	2.8	11.2	42.2
Minimum	0.2	2.0	6.3	27.1
n	*38*	*54*	*46*	*16*

Based on the results of the BASMAA (2014) study, on average 2.2 gallons of trash per acre of land annually enters a storm drain inlet for areas that received an OVTA score "A".

Based on the results of recent trash full capture system performance studies (Allison et al. 1998; Caltrans 2004; DeCarlo 2004; Lee et al. 2006; City of Los Angeles 2006; City of San Diego 2012), the acceptable trash load that bypasses or overflows a certified trash full capture device that treats moderate, high or very high trash generating areas and is well maintained, is greater than 2.5 gallons of trash per acre of land treated. Comparing this acceptable trash load to the average trash generation rate of 2.2 gallons/acre (i.e., an "A" OVTA score) indicates that the volume of trash that enters a stormwater conveyance

system in an area with consistent "A" OVTA scores is equal to or less than the volume that bypasses a full capture system in a moderate, high or very high trash generating area. Therefore, FCE is defined as:

The consistent achievement of
Low Trash Generation
as demonstrated by "A" OVTA scores

Establishment of a Baseline Trash Load

The estimated baseline trash load (volume) generated from PLU areas in the [Permittee] was calculated using the: 1) final baseline trash generation map depicting areas (acres) generating levels of trash greater than FCE (i.e., low trash generation); and 2) annual average trash generation rates developed for the SF Bay Area via the *Baseline Trash Generation Rates for the San Francisco Bay Area* project (BASMAA 2014). Annual trash generation rates are expressed as the volume (gallons) of trash generated per acre of land. Average rates developed by BASMAA for very high, high and moderate trash generation categories are listed in Table 10. As described previously, rates associated with the low trash generating category are equivalent to full capture systems and therefore for the purposes of calculating trash reductions, are assumed to be zero.

Table 10. Trash generation categories and associated average rates and On-land Visual Trash Assessment (OVTA) scores.

Trash Generation Category	Low	Moderate	High	Very High
Average Trash Generation Rates (gallons/acres yr^{-1})	NA	7.5	30	100
On-land Visual Assessment Score	A	B	C	D

The recent evaluation of OVTAs conducted by BASMAA (2017a) as part of the *Tracking California's Trash* (TCT) project concluded that average generation rates correspond well to OVTA scoring categories (A/B/C/D). Based on these findings, average rates were assigned to all PLU areas depicted on baseline trash generation maps. By multiplying these rates by the corresponding acres within each PLU area, the "Baseline Trash Levels" (i.e., volumes of trash that enters the MS4) are calculated. The volume represents the amount of trash that enters the MS4 prior to the implementation of new or enhanced controls. This baseline volume will be compare against "current" trash levels calculated in

future years to evaluate improvements in the levels of trash in stormwater. Baseline Trash Levels for the [Permittee] are presented in Table 11.

Table 11. Estimated baseline level of trash generated (gallons) from PLU areas annually in the [Permittee].

Category	Low	Moderate	High	Very High	Totals
Average Trash Generation Rate *(gallons/acre yr^{-1})*	*NA*	*7.5*	*30*	*100*	**-**
PLU Area (Acres)					
Estimated Annual Trash Generation Level (gallons)	**NA**				

On-Land Visual Trash Assessment Program

OVTAs have been identified by the State Water Board as a leading indicator of trash load reductions in stormwater discharges from MS4s. There are three OVTA protocols. Protocol A is for OVTAs conducted on streets with sidewalks, Protocol B is for driving surveys on streets without sidewalks or that are otherwise unsafe for pedestrians, and Protocol C is for area-based assessments where there are no streets. Protocol A will be used by the [Permittee] to assess progress toward trash reduction goals required by the Trash Amendments.

The methods used to develop the OVTA Program for the [Permittee], including the random selection of assessment sites that will ensure that they accurately represent trash levels in each PLU area, are documented in this section. The selection of representative assessment sites where future OVTAs will be conducted provides the confidence necessary to accurately report trash load reductions to the State Water Board. Assessment results from the OVTA Program will represent on-going trash levels on streets and sidewalks and provide a comparison to baseline levels. The levels of trash present in these public rights-of-way correlate well with the amount of trash observed in MS4s (BASMAA 2016).

Creating the Assessment Frame

An assessment (or sampling) frame is a list or set of information that defines a population of interest where a sampling site can be selected from. The assessment frame for studying trash levels in the [Jurisdiction] is all the streets and sidewalks that are in applicable land areas within the jurisdictional boundaries. Streets and sidewalks are represented in GIS by a curb line network, which was created using the road centerline dataset for the [Jurisdiction] and buffering

that line by a radius based on the road type (local, arterial, collector, etc.). The outline of the buffer represents the assessment frame for the [Permittee]. Based on the extent of full capture systems that were installed in the City at the time the assessment frame was developed, the assessment frame for [Permittee] is of roughly ____ miles of curb.

Once the assessment frame was developed, each segment of the curb line was assigned a baseline trash generation category (i.e., low, moderate, high, or very high). Assignments were based on the trash generation level depicted on the baseline trash generation map. Applicable curb miles within each trash generation category are listed in Table 12.

Table 12. Assessment frame lengths (curb miles) associated with each trash generation category. Lengths are based on the Baseline Trash Generation and Trash Full Capture Map.

Assessment Frame Lengths (Curb Miles) in each Baseline Trash Generation Category			
Moderate	**High**	**Very High**	**Total**

Identifying Assessment Needs

Once the assessment frame was completed, the assessment needs were identified prior to selecting OVTA sites. Assessment needs were based on Amendment requirements and the baseline trash generation map. The OVTA Protocol recommends that Permittees assess "at least 10% of the curb miles that are representative of each PLU where a trash load reduction is being claimed." To ensure that the 10% of curb miles selected are representative of the all applicable areas in each PLU, the trash generation levels in all applicable land areas (i.e., acres) in each PLU and the proportion of these areas that are within each baseline trash generation category were calculated (Table 13).

Table 13. PLU areas associated with on-land visual assessments. Based on the Baseline Trash Generation and Trash Full Capture Map.

PLU Area (acres)	Proportions of PLU Areas in Each Baseline Trash Generation Category		
	Moderate	**High**	**Very High**

For each PLU, the proportions of land areas that fall within each baseline trash generation category (as illustrated in Table 10) serve as a guide for establishing

the assessment needs for each PLU and ensuring the sites that are ultimately selected are representative of the trash levels in the entire [Jurisdiction]. To identify the assessment needs for each PLU, the proportions in Table 8 for each trash generation category were multiplied by 10% of the curb lengths presented Table 7 for the corresponding generation category. This resulted in the minimum curb lengths that the [Permittee] assessed. This set of curb lengths is intended to adequately represent the trash levels in the applicable areas within each PLU. These curb lengths for each of the [Permittees'] PLU areas are presented in Table 14.

Table 14. Minimum curb lengths in each PLU where OVTAs will need to be conducted. Curb lengths are based on the Baseline Trash Generation map and the level of trash full capture implemented by December 2018.

Minimum Curb Lengths (miles) for On-land Visual Assessments			
Moderate	**High**	**Very High**	**Total**

Selecting and Drawing Assessment Sites

OVTA sites are typically 1,000 feet (0.19 miles) in length, on average. Considering this, potential site locations were identified at every 500-foot interval along the assessment frame, beginning with a randomly selected starting point. This resulted in approximately ___ potential assessment sites. These potential sites were then placed in a random order to form a list of randomly selected assessment sites that were evaluated to avoid biasing the site selection process, which allows the sites that are eventually selected to be representative of broader applicable areas within the entire [Jurisdiction].

Beginning at the top of the assessment site list, potential sites were evaluated and compared to the assessment needs listed in Table 10. A site was rejected from the list if [describe any reasons for rejecting a site] or the site did not assist the City/Town/County in achieving its assessment needs.

OVTA sites representing ___ miles of curb were selected using the process described above. Table 15 shows the total curb miles selected for assessments in each PLU and the percentage of curb length in each PLU that the assessment sites represent. Assessment site locations are illustrated in Figure 5. This set of sites is intended to provide a reasonable representation of trash levels in each PLU and achieves the 10% of curb mile guideline.

Table 15. Summary of OVTA sites (curb miles) selected in comparison to the goal of 10% curb miles.

Applicable Curb Miles Available for Assessments	% of All Available Curb Miles that will be Assessed	Minimum Curb Miles that will be Assessed

Assessment Frequency and Averaging Period

Based on the findings of the *Tracking California's Trash* project that evaluated the results of over 3,000 OVTAs, the frequency of assessments needed confidently demonstrate an improvement in trash levels is highly dependent on the degree of improvement that one wishes to assert with statistical confidence (BASMAA 2016). For demonstrating compliance with trash load reductions required by the MRP, the study recommended conducting a minimum of 3 assessments per year at each OVTA site. Additionally, the study indicated that decisions on whether "on-going" trash generation levels, which are compared to baseline levels to demonstrate trash reductions, are best depicted by assessments conducted in one or more years should be made based on: 1) the required reporting cycle, 2) the variability in OVTA scores at the set of sites, and 3) the timing of the anticipated improvement in trash generation levels. For [Permittee], averaging the __ most recent years of data (i.e., ~ __OVTA results) when reporting trash load reductions to the Water Board should provide an acceptable level of confidence in depicting the "on-going" levels of trash associated its stormwater conveyance system.

Modifications to the OVTA Program Over Time

The OVTA program described in this document is designed to address Amendment requirements and represent on-going levels of trash in areas that are not treated by trash full capture systems, and are generating moderate, high, or very high levels of trash. Should the [Permittee] elect to install additional trash full capture systems, then the OVTA program should be modified to remove sites within areas now treated by full capture systems. Additionally, as new full capture systems are installed, new assessment sites may need to be established to allow the set of OVTA sites to remain representative of the broader areas within each PLU for which trash load reductions are being reported. It is recommended that an evaluation of the OVTA program occur annually, prior to assessments beginning each fiscal year, and modifications be documented in the [Permittee's] corresponding annual report to the Water Board.

[INSERT ASSESSMENT SITE MAP]

Figure 5. OVTA assessment sites.

Trash Reduction Offsets – Creek and Shoreline Cleanups

Trash cleanups events that occur in receiving water bodies provide important and direct water quality benefits. Additionally, these events engage citizens and provide valuable entry points to educate volunteers on the impacts of trash and the importance environmental stewardship. These events are supported and/or actively coordinated by local public agencies. Trash removed during these cleanup events can originate from multiple sources and pathways, including those not directly associated with MS4 discharges.

In addition to implementing trash full capture systems and other trash controls designed to prevent or reduce trash discharges, the [Permittee] may also chose to offset part of its trash load reduction requirements by conducting cleanups of trash from creek and shoreline areas. Each year, the [Permittee] may claim up to a10% trash load reduction for conducting trash cleanups in local receiving water bodies. This offset will recognize the value of these cleanup events and account for the short-term benefit of cleanups compared to ongoing trash generation levels associated with the [Permittee's] MS4.

Because the trash removed during the receiving water cleanup event(s) has already impacted the water body, an offset ratio of three to one will be used when comparing the volumes of trash removed during the event(s) to the trash volume depicted by the [Permittee's] baseline trash generation map. The following formula will be used to generate each percent trash load reduction demonstrated by the [Permittee] for these actions:

$$\textbf{Percent Trash Offset} = \frac{\text{Trash Removed} \,/\, 3}{\text{Baseline Trash Load}} \text{ x } 100$$

where:

Trash Removed	*= Volume of Trash Removed from all creek and/or shoreline events during a given fiscal year*
3	*= Trash Reduction Offset (3:1 ratio)*
Baseline Trash Load	*= Volume of Trash Represented by Baseline Trash Generation Map*

Regardless of the percent trash offset calculated using the formula above, the maximum offset the [Permittee] will claim is ten percent.

Section 5. References

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Appendix A

State Water Resource Control Board Certified Trash Full Capture Systems

https://www.waterboards.ca.gov/water_issues/programs/stormwater/trash_implementation.html

Appendix B

Method Used to Substitute PLU Areas with Non-PLU Areas

A central element of the statewide Trash Amendments is the designation of land areas where cities, counties and other applicable public agencies will need to implement trash controls to reduce the levels of trash discharged from stormwater conveyances. Applicable land areas are based on land uses currently developed (i.e., not simply zoned) and presumed to generate high levels of trash. These areas are referred to as "Priority Land Uses, or PLUs" in the Trash Amendments. PLUs include all land areas currently developed as high density residential, industrial, commercial, mixed urban, and public transportation stations.

Because not all PLUs generate significant levels of trash and not all trash is generated solely from PLUs, the Amendments allow Permittees to propose alternative equivalent land uses that better represent high trash generation in their jurisdictional areas. Permittees can substitute one or more PLUs with alternate land uses that generate trash at rates equivalent to or greater than, the PLU being substituted. Substituting PLUs for land areas that generate trash allows Permittees the flexibility to focus enhanced controls on trash-prone areas within their communities, as opposed to treating areas just because they fall into one of the PLUs. The method that will be used by the [Permittee] to substitute PLU areas is described below and an example of the substitution process is presented.

PLU Substitution Method

Should PLU areas (or portions of areas) be substituted for Non-PLU areas, the [Permittee] will use the following method:

1. Establish a baseline trash generation category for the Non-PLU area by conducting On-land Visual Trash Assessments (OVTAs), consistent with the method used to establish baseline for the PLU area being substituted.
2. Estimate the baseline volume of trash being generated by the Non-PLU area using the methods described in this Implementation Plan.
3. Compare the baseline volume of trash being generated by the Non-PLU area to the PLU area being substituted. If the volume from the Non-PLU area is greater or equal to the volume from the PLU area, then the substitution is allowed. If not, the substitution is not allowed.

All substitutions will be tracked and documented through updates to this Implementation Plan and/or through annual compliance reporting.

Example PLU Substitution Scenario

A city is interested in substituting 40 acres of moderate trash generating PLU area with 10 acres of high trash generating Non-PLU area. Given that the estimated volumes (gallons) of trash generated from the two areas (i.e., 300 gallons) are equal, the substitution would be allowed.

Category	Baseline Trash Generation Level				
	Low	**Moderate**	**High**	**Very High**	**Total**
Annual Trash Generation Rate (gallons/acre)	*NA*	*7.5*	*30*	*100*	-
PLU Area (Substituting for)					
Acres	-	40	-	-	40
Gallons	**-**	**300** (7.5 x 40)	**-**	**-**	**300**
Non-PLU Area (Substituting with)					
Acres	-	-	10	-	10
Gallons	**-**	**-**	**300** (30 x 10)	**-**	**300**