Monitoring Plan to Develop Regional Trash Generation Rates for Priority Land Uses in San Diego County

Developed by:

San Diego County Trash Generation Rate Special Study Participants

County of San Diego, San Diego Unified Port District and Airport Authority, Cities of Carlsbad, Chula Vista, Coronado, Del Mar, El Cajon, Escondido, Imperial Beach, La Mesa, National City, Oceanside, Poway, San Diego, Solana Beach, and Vista

August 2016

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Background

The State Water Resources Control Board (SWRCB) has recognized the widespread problem of impairments due to trash, as well as the administrative burden of developing and implementing TMDLs. In an effort to streamline and provide consistency in the elimination of trash from MS4 discharges, the SWRCB developed the Trash Amendments, which took effect beginning in December 2016. These amendments to the Inland Surface Waters and Ocean Plans include six primary elements:

1. A water quality objective
2. Applicability
3. Prohibition of discharge
4. Implementation provisions
5. A time schedule
6. Monitoring and reporting requirements.

The Trash Amendments' requirements identify five priority land use (PLU) areas: high-density residential, commercial, industrial, public transportation, and mixed urban. These are land use areas that are recognized by the State Board as having the potential to generate significant amounts of trash. The mixed urban priority land use is defined as an area where high-density residential, industrial, and/or commercial land uses predominate collectively (i.e., are intermixed) (Trash Amendments Final Staff Report, D-12).

The Trash Amendments provide for two 'tracks' that a Permittee may select from to pursue compliance. Track 1 requires that Permittees install "full capture devices at MS4 outfalls or in MS4 systems that convey runoff from priority land uses." Such controls are required to be in place within 10 years from incorporation into a National Pollutant Discharge Elimination System (NPDES) Stormwater Permit or within 15 years of the effective date of the Trash Amendments. Compliance with Track 1 is achieved when the Permittee can, "Demonstrate installation, operation, and maintenance of full capture systems and provide mapped locations and drainage areas served by full capture systems." (Trash Amendments Final Staff Report, C-7, Table 2)

The second track, Track 2, allows the Permittee to, "Implement a plan with a combination of full capture systems, multi-benefit projects, institutional controls, and/or other treatment controls to achieve full capture system equivalency." This track has a compliance schedule identical to Track 1. Demonstration of compliance with Track 2 requirements is achieved when the Permittee has, "Develop[ed] and implement[ed] a set of monitoring objectives that demonstrate mandated performance results, effectiveness of the selected combination of treatment and institutional controls, and compliance with full capture system equivalency" (Trash Amendments Final Staff Report, C-7, Table 2).

Permittees that pursue the Track 2 compliance pathway must, "…submit implementation plans to their permitting authority... The implementation plans must: (a) describe the combination of controls selected by each MS4 Permittee, and the rationale for the selection, (b) describe how the combination of selected controls is designed to achieve full capture system equivalency (FCSE), and (c) how the full capture system equivalency will be demonstrated. The implementation plans are subject to the approval by the permitting authority" (Trash Amendments Final Staff Report, page 14).

The Trash Amendments define Full Capture System Equivalency as, "…t*he 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… The full capture system equivalency is a Trash load reduction target that the permittee quantifies by using an approach, and technically acceptable and defensible assumptions and methods for applying the approach, subject to the approval of permitting authority". (Trash Amendments Final Staff Report, page D-10)

The Trash Amendments describe two primary methods that a Permittee may employ to demonstrate full capture system equivalency; a 'Trash Capture Rate Approach,' and a 'Reference Approach.' Full capture equivalency can also be estimated using trash capture rates obtained from a review of existing quantitative studies if the literature data was collected from comparable land use areas. The literature values could then be subject to verification and refinement under a limited quantitative monitoring program.

The County completed a literature review (Michael Baker, 2015) that summarized trash generation studies completed in California and the United States from various land uses. Some of the studies attempted to correlate variables such as land use, discharge rate, population density etc., with unit trash discharge values, usually expressed as a volume (or in some instances weight) of trash per acre of land per year (County of Los Angeles Department of Public Works, 2004; and EOA, Inc., June 20, 2014).

In general, the studies demonstrate that trash generation rates correlate with land use and population density. Generation rates also correlate with average household income (EOA, Inc., June 20, 2014). Rainfall depth and intensity show modest correlation with trash generation in some studies (Maryland Department of the Environment, December 2014), although there is sufficient disagreement on the importance of these parameters (EOA, Inc., June 20, 2014) that they have not been considered further in the development of this work plan.

Study Objectives

This Monitoring Plan (MP) and the associated Quality Assurance Project Plan (QAPP) presented in Appendix A, describe the methods to be employed to determine FCSE for commercial, high-density residential, industrial, and transportation PLUs within San Diego County.

Data collected during this study will be combined with data from a similar study being conducted by the County of San Diego (County) measuring trash generation from areas that are unique or over-represented in the County's jurisdiction. The data collected from the two studies may be used to develop baseline trash generation rates for each PLU and determine FCSE, the MS4 permittees' trash load reduction target that must be achieved in approximately 10 percent annual increments over the 10-year compliance period. The trash capture studies described here do not target mixed urban areas, as trash generation in these areas can be determined by calculation using known rates from each of the PLUs.

The objectives of this study are as follows:

1. Quantify trash generation rates and determine a FCSE for PLUs in numerous jurisdictions within San Diego County.
2. Evaluate use of visual monitoring protocols, which may be considered for continuing use to demonstrate program progress during the 10-year trash reduction period.
3. Monitor the performance of full capture systems including ease of maintenance, durability, and susceptibility to flooding to inform future operations and maintenance efforts.

Monitoring Approach

The quantitative monitoring approach will be based on the physical removal of trash from full capture systems at monitoring sites (catch basins) with known catchment attributes (population, land use, catchment area). The study will be implemented for a period of one year, which is consistent with the County's trash generation rate study. Detailed monitoring procedures are outlined in the project QAPP (Appendix A).

The quantitative monitoring program will be supplemented by a visual monitoring program. The visual monitoring program will be considered for future use in evaluating whether trash reduction targets are achieved during the 10-year compliance period. The visual monitoring program will be calibrated to the results of the quantitative monitoring study using the approach described in the project QAPP. Visual monitoring programs have been implemented in the Los Angeles area as components of trash reduction monitoring and similar programs are under development in the San Francisco Bay area as a surrogate to continuous quantification of trash collected in full capture systems for demonstrating removal effectiveness. If applicable, the visual monitoring approach will be continued indefinitely as a tool to verify the effectiveness of the individual MS4 permittees' trash reduction programs for track 2.

Site Selection

The San Diego County Copermittee Ad Hoc Committee recommended twenty-five (25) sites across San Diego County as part of this study with the number of sites in each PLU to be roughly proportional to the area of each type of PLU within San Diego County. The City of San Diego proposed to have eight (8) monitoring sites within its jurisdiction including three (3) in commercial land use areas, one (1) in an industrial land use area, three (3) in high-density residential land use areas, and one (1) in a transportation land use area. The remaining seventeen (17) sites were assigned to the PLUs based on percentage of total PLU area (Table 1) in San Diego County. In addition, the specific sites were selected using the following criteria, if possible:

- Feasibility of full capture system installation (can a full capture system actually be installed)
- Catchment area greater than one acre
- Homogenous priority land use (90 percent or greater) within the catchment or a combination of only priority land uses
- Consistent trash management actions in place within the catchments
- Representative population density and median household income across catchments
- Transportation areas within participating agencies' jurisdictions that are not bus stops if available/appropriate (e.g., Park-n-Ride)

Table 1. Estimated* Priority Land Uses and Trash Monitoring Sites for San Diego County

Priority Land Use	Percent of Total PLUs	City of San Diego Sites	Recommended Regional Sites	Total Sites
Commercial	37%	3	5	7
Industrial	23%	1	4	8
High-Density Residential	39%	3	6	9
Transportation	1%	1	2	1

	>>>Total	100%	8	17	25

*priority land use estimations based on SANDAG data, SANGIS.LANDUSE_CURRENT

Monitoring Sites

The monitoring sites in this MP include catch basins where a full capture system or systems can be installed. Detailed information for the monitoring sites, including the agency, site name, coordinates, land use category, catchment area, and watershed management area for each monitoring site covered by this MP, are presented in Table 2. A list of comparable alternate sites, outlined in Table 5, was also developed in order to account for unexpected environmental conditions that may alter or invalidate data taken from the monitoring sites. Environmental conditions that may alter results include weather events that lead to local flooding, etc. A map depicting the monitoring locations can be found in Attachment 2 of the QAPP.

Table 2. Regional Trash Generation Rate Study Monitoring Sites

Agency	Monitoring ID	Site Name	Latitude	Longitude	Location Description	PLU	Catchment Area (Ac)	Watershed Management Area
City of Chula Vista	COMM-2	COM-CV-2009	32.602840	-117.083890	Palomar Trolley Shopping Center, S of Starbucks parking lot catch basin	COMM	1.5	910.2
City of Del Mar	COMM-3	COM-DM-1	32.959530	-117.265170	1435 Camino Del Mar, on Camino Del Mar at the SE corner of 15th St.	COMM	2.1	905.1
City of Solana Beach	COMM-9	Commercial-SB-2	32.992210	-117.270510	At the NE corner of N. Cedros Ave. and Lomas Santa Fe Dr.	COMM	5.9	905.1
City of Vista	COMM-11	COM-VI-1	33.164860	-117.245940	SW corner of S. Melrose Dr. and Longhorn Dr.	COMM	13.5	904.31
City of San Diego	COMM-16	Com-CiSD-1	32.899750	-117.197580	10151 Barnes Canyon Rd., 92121	COMM	2	906.1
City of San Diego	COMM-18	Com-CiSD-3	32.837130	-117.124440	9475 Chesapeake Dr., 92123	COMM	1.1	907.11
City of San Diego	COMM-22	Com-CiSD-6	32.81811	-117.15505	3311-3375 Sports Arena Blvd, 92110	COMM	4.5	908.21
City of Carlsbad	IND-1	37B-68	33.120984	-117.27378	6241 Yarrow Dr., west side Yarrow Dr.	IND	23.29	904.4
City of Chula Vista	IND-2	IND-CV-2015	32.600830	-117.083260	In between 675 and 680 Marsat Court, end of cul de sac	IND	4.8	910.2
City of El Cajon	IND-4	BRA-EC-2	32.816738	-116.975132	1017-1025 Bradley Ave, 92020	IND	13.5	907.13
City of Vista	IND-8	IND-VI-1	33.154590	-117.220980	SW corner of Grand Ave and Birch St intersection	IND	23.2	904.32
San Diego Unified Port District	IND-11	IND-SDUPD-2554	32.651186	-117.113866	Western End of 32nd Street 91950	IND	>1	908.32
City of San Diego	IND-14	Ind-CiSD-2	32.550980	-116.951560	8898-8974 Kerns St. 92154	IND	1.5	911.12

Agency	Monitoring ID	Site Name	Latitude	Longitude	Location Description	PLU	Catchment Area (Ac)	Watershed Management Area
County of San Diego	IND-16	SWT5-101	32.74205	-117.00135	9146 Olive Dr., 91977	IND	9	909.12
County of San Diego	IND-17	SWT2-112	32.72916	-116.96814	2746 Via Orange Way 91978.	IND	7	909.21
City of Carlsbad	HDR-1	55A-205	33.091524	-117.242458	3029-3047 Venado St.	HDR	37.04	904.51
City of Chula Vista	HDR-2	HDR-CV-1757	32.630700	-117.092770	401 Oaklawn - Apartments, west side of Oaklawn St near access driveway	HDR	2.6	909.1
City of Vista	HDR-12	HDR-VI-1	33.220390	-117.221770	1475 Oak Drive	HDR	10.0	904.22
County of San Diego	HDR-13	CAR2-37	33.125320	-117.206260	NE corner of San Marino Dr. and La Fiesta Way	HDR	11.9	904.52
County of San Diego	HDR-14	SLR1-32	33.294110	-117.209410	On E side of Del Cielo Oeste at the intersection with Cam Del Cielo	HDR	8.2	903.1
City of San Diego	HDR-18	Res-CiSD-1	32.564611	-117.055820	1725-1755 Del Sur Blvd, 92173 at the corner of Caithness Dr.	HDR	1.9	911.11
City of San Diego	HDR-20	Res-CiSD-3	32.827030	-117.102650	5229-5259 Fino Dr. 92124	HDR	3.8	907.11
City of San Diego	HDR-23	Res-CiSD-6	32.902690	-117.123760	94010-9419 Carroll Canyon Rd. 92126	HDR	1.9	906.1
County of San Diego	HDR-27	SWT2-125	32.7318	-116.96157	Calavo Road midway between Del Rio Road and Jamacha BLVD	HDR	5.5	909.21
City of San Diego	TR-7	Tran-CiSD-2	32.710360	-117.086080	5003-5055 Market St. 92102	TRANS	4.0	908.22

Methods Summary

This section provides a summary of the monitoring methods to be used for the study; detailed monitoring methods are presented in the QAPP (Appendix A).

The San Diego Copermittees will implement this MP and QAPP through a regional agreement to install 25 State Board-certified trash full capture systems (StormTek Connector Pipe Screens) based on site location information provided by the participating Copermittees. The full capture systems will be installed by the manufacturer in the locations listed in Table 2. The quantitative monitoring frequency will be quarterly for a period of one year with visual monitoring conducted monthly for a period of one year. For quantitative monitoring, trash and debris will be removed from the monitoring site (catch basin) by hand, or any other feasible means depending on the amount of accumulated material, access, and safety considerations. Trash is defined in the Statewide Trash Policies Final Staff Report, Appendix D, page D-12:

"Trash means 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."

Trash and debris will be transported to a suitable location for storage and material characterization, which will involve drying the collected materials; separating trash from debris such as organic, inorganic (natural sediment/dirt), and vegetative material; and measuring the trash by volume and weight. If desired, trash may be sorted into specific types of trash.

Data will be recorded on Chain-of-Custody, Material Characterization, and Visual Monitoring forms (Appendix A, Attachments 4-6) and stored onsite at the material characterization facility.

Additional supplemental visual inspections may be performed to identify any occurrences of device clogging or malfunction under scenarios of unusually intense, frequent, or prolonged rainfall.

Schedule

A tentative schedule for the study is provided in Table 3**.** This schedule is subject to modification based on unforeseen issues with funding availability, permitting, contractor work schedule, weather, etc.

Table 3. Tentative Study Schedule

Task	Date
Device Installation	July 2016 - onward
Visual Monitoring #1	July 2016
Visual Monitoring #2	August 2016
Visual Monitoring #3	September 2016
First Quarter Quantitative Monitoring #1	Before September 31, 2016
Visual Monitoring #4	October 2016
Visual Monitoring #5	November 2016
Visual Monitoring #6	December 2016
Second Quarter Quantitative Monitoring #2	Before December 31, 2016
Visual Monitoring #7	January 2017
Visual Monitoring #8	February 2017
Visual Monitoring #9	March 2017
Third Quarter Quantitative Monitoring #3	Before March 31 2017
Visual Monitoring #10	April 2017
Visual Monitoring #11	May 2017
Visual Monitoring #12	June 2017
Fourth Quarter Quantitative Monitoring #4	Before June 30, 2017
Analysis and Reporting	September - October 2017

Summary

Data collected during this study will be combined with data from a similar study being conducted by the County measuring trash generation from areas that are unique or over-represented in the County's jurisdiction. The data collected during these studies may be used to develop baseline trash generation rates for each PLU and determine FCSE, the MS4 permittees' trash load reduction target that must be achieved in approximately 10 percent annual increments over the 10-year compliance period.

References

California Water Resources Control Board. **(**2015). Final Staff Report and Final Trash Amendments including all appendices (April 7, 2015). Retrieved from

http://www.waterboards.ca.gov/water_issues/programs/trash_control/docs/trash_app_d_121015.pdf

County of Los Angeles Department of Public Works, Watershed Management Division. (May 3, 2004). *Trash Baseline Monitoring Results: Los Angeles River and Ballona Creek Watersheds.* Retrieved from http://ladpw.org/wmd/TrashBaseline/Trash%20Baseline%20Monitoring%20Results%20(Supplemental%20Report).pdf

EOA, Inc. (April 30, 2013). *Visual On-land Trash Assessmetn Protocol for Stormwater, Verion 1.0, Draft.*

EOA, Inc. (June 20, 2014). *San Francisco Bay Area Stormwater Trash Generation Rates Final Technical Report.*

Maryland Department of the Environment. (December 2014). *Total Maximum Daily Loads of Trash and Debris for the Middle Branch and Northwest Branch Portions of the Patapsco River Mesohaline Tidal Chesapeake Bay Segment, Baltimore City and County, Maryland.* Retrieved from http://www.mde.state.md.us/programs/Water/TMDL/ApprovedFinalTMDLs/Documents/Baltimore_Harbor_Trash/Harbor_Trash_120314_final.pdf

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Appendix A

Quality Assurance Project Plan (QAPP)

QUALITY ASSURANCE PROJECT PLAN

For the

Monitoring Plan to Develop Regional Trash Generation Rates for Priority Land Uses in San Diego County

Developed by:

San Diego County Trash Generation Rate Special Study Participants

County of San Diego, San Diego Unified Port District and Airport Authority, Cities of Carlsbad, Chula Vista, Coronado, Del Mar, El Cajon, Escondido, Imperial Beach, La Mesa, National City, Oceanside, Poway, San Diego, Solana Beach, and Vista

August 2016

SECTION A - PROJECT MANAGEMENT

A.1 Title of Plan and Approval

Quality Assurance Project Plan

Monitoring Plan to Develop Regional Trash Generation Rates for Priority Land Uses in San Diego County

_____ Date: _____

Name, Agency Title

_____ Date: _____

Name, Agency Title

_____ Date: _____

Name, Agency Title

_____ Date: _____

Name, Agency Title

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Attachments

1. Monitoring Site Overview Map
2. Alternate Monitoring Location Maps
3. Chain of Custody Form
4. Material Characterization Form
5. Visual Monitoring Form

A.3: Distribution List

The following list includes the individuals and their organizations requiring copies of the approved QAPP and any subsequent revisions.

Name	Organization
Richard Gilb	Airport Authority
Elaine Lukey	City of Carlsbad
Boushra Salem	City of Chula Vista
Kim Godby	City of Coronado
Kathleen Garcia	City of Del Mar
Jamie Campos	City of El Cajon
Helen Davies	City of Escondido
Chris Helmer	City of Imperial Beach
Joe Kuhn	City of La Mesa
John Quenzer	City of National City
Cynthia Mallet	City of Oceanside
Stephanie Bauer	San Diego Unified Port District
Steven Strapac	City of Poway
Clem Brown	City of San Diego
Ron Borromeo	City of Solana Beach
Cheryl Filar	City of Vista
Jo Ann Weber	County of San Diego

A.4: Project/Task Organization

Table 1. provides a summary of the key project participants and their specific roles and responsibilities and an organizational chart showing the relationships among all project participants is provided on the following page.

Table 1. Key Project Participants

Individual(s) Assigned	Title:	Responsible for:	Organization:
Jo Ann Weber	DPW Program Manager	Program Management	County of San Diego
Tracy Cline	DPW Project Manager	Project Management	County of San Diego
Stephanie Gaines	DPW Project Manager	Project Management	County of San Diego
Richard Lucera	Project Manager	Project Management	Michael Baker Int.
Michael Trapp	QA Manager	Project QA	Michael Baker Int.
Jeff Crump	Project Engineer	Database Entry	Michael Baker Int.
Jay Sullivan	Visual Assessment Manager	Visual Monitoring	Michael Baker Int.
Octavio Lugo	Inlet Device Vendor	Inlet Device Installation	StormTek
Andrea Crumpacker	Weston Field Activities Manager	Field Work and Trash Removal	Weston Solutions
Andrea Crumpacker	Material Characterization Manager	Material Characterization	Weston Solutions
*For coordinating copermittees, please see above distribution list.			

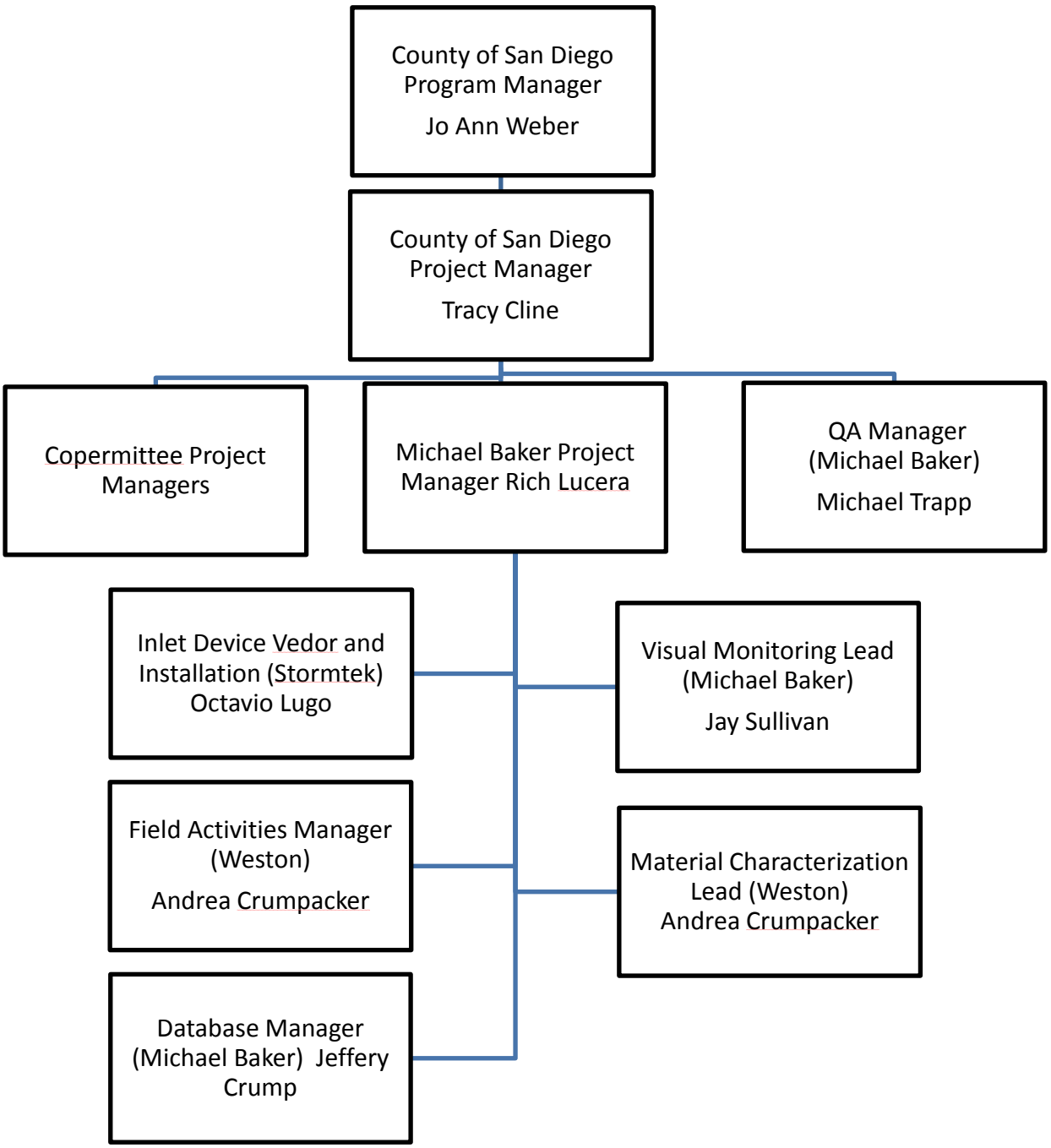

Figure 1. Organizational Chart

The responsibilities for each individual on the organization chart are as follows:

Program Manager—Responsible for overall program management and oversight and final approval of all documents.

Copermittee Project Manager—Responsible for day-to-day management of the project for each copermittee within their jurisdiction.

Project Manager—Responsible for day-to-day management of project including supervision of sub-consultants, including collection of data and preparation of final report

Copermittee Field Activities Manager—Responsible for as-needed field reconnaissance, supplemental DPW inspections, and liaison with consultants conducting field operations

Project QA Manager—Responsible for overall Quality Assurance of the project. The QA Manager is independent from data collection and generation and has the responsibility to enforce and monitor the data collection efforts

Visual Assessment Manager—Responsible for visual monitoring assessments at each monitoring location

Inlet Device Vendor—Responsible for design, manufacture, and installation of full-capture devices in the selected storm drain inlets

Field Activities Manager—Responsible for removal of trash from catch basin inlets and transport to sorting and characterization facility

Material Characterization Manager—Responsible for sorting and characterization of collected materials per the requirements of this QAPP

Database Manager—Responsible for input and organization of collected data as well as maintaining and updating the official approved QAPP

A.5: Problem Definition/Background

The State Water Resources Control Board (SWRCB) has recognized the widespread problem of impairments due to trash, as well as the administrative burden of developing and implementing total maximum daily loads (TMDLs). In an effort to streamline and provide consistency in the elimination of trash from municipal separate storm sewer system (MS4) discharges, the SWRCB developed the Trash Amendments. These amendments to the Inland Surface Waters and Ocean Plans include six primary elements:

1. A water quality objective
2. Applicability
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Permittees that pursue the Track 2 compliance pathway must, "…submit implementation plans to their permitting authority... The implementation plans must: (a) describe the combination of controls selected by each MS4 Permittee, and the rationale for the selection, (b) describe how the combination of selected controls is designed to achieve FCSE, and (c) how the FCSE will be demonstrated. The implementation plans are subject to the approval by the permitting authority" (Trash Amendments Final Staff Report, page 14).

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The County completed a literature review (Michael Baker, 2015) that summarized trash generation studies completed in California and the United States from various land uses. Some of the studies attempted to correlate variables such as land use, discharge rate, population density etc., with unit trash discharge values, usually expressed as a volume (or in some instances weight) of trash per acre of land per year (County of Los Angeles Department of Public Works, 2004; and EOA, Inc., June 20, 2014).

In general, the studies demonstrate that trash generation rates correlate with land use and population density. Generation rates also correlate with average household income (EOA, Inc., June 20, 2014); however, a review of 2010 US Census data indicates that the average household income does not vary sufficiently across the County's study area to make this a significant variable (Michael Baker, 2015). Rainfall depth and intensity show modest correlation with trash generation in some studies (Maryland Department of the Environment, December 2014), although there is sufficient disagreement on the importance of these parameters (EOA, Inc., June 20, 2014) that they have not been considered further in the development of this work plan.

In general, none of the trash generation studies reviewed was sufficiently comparable to unincorporated San Diego County to warrant the use of literature values as the primary basis of defining full capture equivalency. The County has a lower population density and several unique land uses that are not well-represented in other studies. For the County's purposes, the trash generation rates reported in these studies can be viewed as estimates that will be supplemented and evaluated in the context of locally collected, representative data.

A.6: Project/Task Description

The study to develop trash generation rates from PLUs will include both quantitative and visual monitoring performed quarterly and monthly, respectively, at 25 selected monitoring sites. A list of locations to be monitored is found in Table 2. A list of comparable alternate sites, outlined in Table 5, was also developed in order to account for unexpected environmental conditions that may alter or invalidate data taken from the monitoring sites. Environmental conditions that may alter results include weather events that lead to local flooding, etc. The quantitative monitoring program will require measurement of both the weight and volume of trash collected from monitoring sites located in commercial, high density residential, industrial, and transportation PLUs. The quantitative monitoring program will be implemented quarterly for a period of one year and the visual monitoring program will be implemented monthly for a period of one year. A tentative project schedule is outlined in Table 3.

Table 2. Regional Trash Generation Rate Study Monitoring Sites

Agency	Monitoring ID	Site Name	Latitude	Longitude	Location Description	PLU	Catchment Area (Ac)	Watershed Management Area
City of Chula Vista	COMM-2	COM-CV-2009	32.602840	-117.083890	Palomar Trolley Shopping Center, S of Starbucks parking lot catch basin	COMM	1.5	910.2
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City of Vista	IND-8	IND-VI-1	33.154590	-117.220980	SW corner of Grand Ave and Birch St intersection	IND	23.2	904.32
San Diego Unified Port District	IND-11	IND-SDUPD-2554	32.651186	-117.113866	Western end of 32nd Street, 91950	IND	16.5	908.3
City of San Diego	IND-14	Ind-CiSD-2	32.550980	-116.951560	8898-8974 Kerns St. 92154	IND	1.5	911.12

Agency	Monitoring ID	Site Name	Latitude	Longitude	Location Description	PLU	Catchment Area (Ac)	Watershed Management Area
County of San Diego	IND-16	SWT5-101	32.74205	-117.00135	9146 Olive Dr. 91977	IND	9	909.12
County of San Diego	IND-17	SWT2-112	32.72916	-116.96814	2746 Via Orange Way 91978	IND	7	909.21
City of Carlsbad	HDR-1	55A-205	33.091524	-117.242458	3029-3047 Venado St.	HDR	37.04	904.51
City of Chula Vista	HDR-2	HDR-CV-1757	32.630700	-117.092770	401 Oaklawn - Apartments, west side of Oaklawn St near access driveway	HDR	2.6	909.1
City of Vista	HDR-12	HDR-VI-1	33.220390	-117.221770	1475 Oak Drive	HDR	10.0	904.22
County of San Diego	HDR-13	CAR2-37	33.125320	-117.206260	NE corner of San Marino Dr. and La Fiesta Way	HDR	11.9	904.52
County of San Diego	HDR-14	SLR1-32	33.294110	-117.209410	On E side of Del Cielo Oeste at the intersection with Cam Del Cielo	HDR	8.2	903.1
City of San Diego	HDR-18	Res-CiSD-1	32.564611	-117.055820	1725-1755 Del Sur Blvd, 92173 at the corner of Caithness Dr.	HDR	1.9	911.11
City of San Diego	HDR-20	Res-CiSD-3	32.827030	-117.102650	5229-5259 Fino Dr. 92124	HDR	3.8	907.11
City of San Diego	HDR-23	Res-CiSD-6	32.902690	-117.123760	94010-9419 Carroll Canyon Rd. 92126	HDR	1.9	906.1
County of San Diego	HDR-27	SWT2-125	32.7318	-116.96157	Calavo Road midway between Del Rio Road and Jamacha Blvd	HDR	5.5	909.21
City of San Diego	TR-7	Tran-CiSD-2	32.710360	-117.086080	5003-5055 Market St. 92102	TRANS	4.0	908.22

Table 3. Tentative Pilot Study Schedule

Task	Date
Device Installation	July 2016 - onward
Visual Monitoring #1	July 2016
Visual Monitoring #2	August 2016
Visual Monitoring #3	September 2016
First Quarter Quantitative Monitoring #1	Before September 31, 2016
Visual Monitoring #4	October 2016
Visual Monitoring #5	November 2016
Visual Monitoring #6	December 2016
Second Quarter Quantitative Monitoring #2	Before December 31, 2016
Visual Monitoring #7	January 2017
Visual Monitoring #8	February 2017
Visual Monitoring #9	March 2017
Third Quarter Quantitative Monitoring #3	Before March 31, 2017
Visual Monitoring #10	April 2017
Visual Monitoring #11	May 2017
Visual Monitoring #12	June 2017
Fourth Quarter Quantitative Monitoring #4	Before June 30, 2017
Analysis and Reporting	September - October 2017

Quantitative Monitoring

A summary of the work to be performed as part of the Quantitative Monitoring Program is as follows:

1. Full capture system **installation** using StormTek Connector Pipe Screens, which are deemed full capture by the Trash Amendments, by the manufacturer. It is anticipated that work done to install full capture systems will require issuance of a right-of-way encroachment permit. ***The location where the full capture system is to be installed will be thoroughly cleaned of all trash and debris at the time of initial installation.***

   The Trash Amendments[1] define a full capture system as: A treatment control, or series of controls, including, but not limited to, a multi-benefit project or a low impact development control that traps all particles that are 5mm or greater, and has a design treatment capacity that is either: a) not less than the peak flow rate, Q, resulting from a one-year, one-hour storm in the subdrainage area, or b) appropriately sized to, and designed to carry at least the same flow as the corresponding storm drain.

2. **Quarterly removal** of trash and debris with transport to a facility for material storage and

[1] State Water Resources Control Board. 2015. Amendment to the Water Quality Control Plan for Ocean Waters of California (Ocean Plan) to Control Trash and Part 1 Trash Provision of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries (ISWEBE Plan).

characterization. Appropriate steps (**Section B.2**) must be taken such that material removed from each full capture system is delivered intact, and is isolated from other samples. The personnel performing this step will be required to complete and document certain steps (**Section B.2**) to ensure quality control and establish a chain-of-custody.

3. **Supplemental inspection** to confirm that full capture systems are not subject to bypass, failure, damage, or overflow.

4. **Material characterization** will be conducted at a suitable facility. The collected material will be dried, the trash separated from debris such as organic, inorganic (natural sediment/dirt), and vegetative material, and the trash will be measured for weight and volume. Computations will be performed to establish the actual trash generation rate (gallons/acre/year) that considers the duration of the collection period, the contributing drainage area, and the land use. The personnel completing this step will follow a documented series of procedures (**Section B.4**) that will be duplicated to independently ensure quality control. Data will be recorded on Chain-of-Custody forms, Material Characterization Forms and stored onsite at the material characterization facility. The forms will be transferred to the Consultant Project Manager for review, data entry, and analysis on a quarterly basis.

5. **Post monitoring data analysis and final documentation** will entail reviewing the data/results for scientific validity, and baseline trash generation rates and FCSE are finalized and documented with appropriate backup from the field data.

   The scientific validity of the data will be reviewed by computing the statistical significance of the sample results using the actual results from the monitoring phase (see **Visual Monitoring** below). Each set of samples for a given PLU will be combined and then analyzed to determine the trash generation rate for that PLU. The total volume collected from a given monitoring will be used to compute the generation rate using the tributary area to produce a rate in gallons per acre per year. For samples from the same PLU, the trash generation rate will be averaged from the total at each monitoring site. If samples produce trash generation rates that are significantly different than previously documented rates, then the data will be reviewed to determine if the sampling and characterization was done according to correct procedure or if there is a scientific or technical explanation for the result variation.

Visual Monitoring

The purpose of the visual monitoring program will be to provide a method to ensure that the trash abatement and removal practices established in the PLU areas continue to meet the trash reduction objectives of the Statewide Trash Policies without expensive quantitative monitoring. The visual monitoring program will be calibrated to the results of the year-long quantitative monitoring study. However, it is anticipated that no specific measurements of trash weight or volume will be collected during the visual monitoring program during this time.

A summary of the work to be performed as part of the Visual Monitoring Program is as follows:

1. **Conduct initial visual monitoring** at the same locations as quantitative monitoring. Visual monitoring will employ qualitative, well defined criteria and will be performed monthly. An example visual monitoring form and photographs are found in the **Attachment 5**. A Condition Category on a letter scale from A to D will be assigned based on the observed accumulation of trash in the area around the monitoring site. The potential categories and their descriptions are found below in Table 4 with example photographs in **Attachment 5**.

Table 4. Visual Monitoring Assessment Condition Categories and Descriptions[1]

Condition Category	Definition
A	Effectively no trash is observed in the assessment area. There may be some small pieces in the area, but they are not obvious at first glance.
B	Predominantly free of trash except for a few pieces that are easily observed in the assessment area.
C	Trash is widely/evenly distributed and/or small accumulations are visible on the street, sidewalks, or inlets.
D	Trash is continuously seen throughout the assessment area, with large piles. There is often significant litter along gutters.

1. Based on the *Visual On-land Trash Assessment Protocol for Stormwater Version 1.0* developed by EOA, Inc., April 30, 2013.

Two field personnel will simultaneously and independently perform visual monitoring at each visual monitoring location. As the catchment areas for the quantitative monitoring sites vary in size there are not a set minimum number of visual assessment sites per drainage area. Rather, the number will depend on the size of the catchment area. . With currently available trash data in San Diego County, it is difficult to account for all trash generation factors (variability), though this study is intended to better quantify this variability. With information gained through this study, identification of critical factors can be better understood to design future targeted studies to evaluate trends and quantify factor effects. For each visual monitoring location, the site will be approximately 1,000 linear feet along a public street and include an area from the back of sidewalk to the crown of the street and will represent conditions within the drainage area. If it is not possible to achieve 1,000 linear feet, then the largest stretch of street possible in the drainage area will be used. Once demarcated during the first site visit, the assessment area will remain same for subsequent assessment events. To the extent practical, team members will also evaluate trash levels in land areas adjacent to the street that appear to be directly connected to the stormwater drainage system via a storm drain on the adjacent property, or contribute trash to the storm drain in the public right-of-way. A more detailed description of the visual assessment procedures is provided in Section B.2 of this QAPP.

If there is a discrepancy between the ratings from the two independent visual assessments, a mixed letter (A/B, B/C, or C/D) can be assigned on the visual monitoring form. Other observations such as the source of trash (if visually apparent) should also be recorded on the form as well as additional notes and observations regarding the condition, type, and general characterization of the trash. It is not the intent of the visual assessment to review each piece of trash individually; rather, it is a general assessment of the area in the vicinity of the monitoring site.

During the planning of visual monitoring, the street sweeping schedule should be obtained to identify the optimal time(s) to perform visual monitoring. If possible, visual monitoring should not be performed within one week of a street sweeping event. This step will be completed by personnel following specific documented protocol, with repetitive measures taken to independently ensure quality control.

2. **Conduct post monitoring data analysis and final documentation** by comparing visual monitoring results to measured trash capture rates to calibrate the visual assessment program. Calibration of visual monitoring results to the quantitative material characterization volumes will

be performed by comparing the median of the three visual monitoring results (A through D) to the associated trash generation rates measured at the same location (in gallons per acre per year). The results will be compared and correlated so that a range of trash generation rates correspond to a letter in the visual monitoring program based on visual monitoring categories and associated notes, as well as trash generation rates derived from quantitative material characterization. The procedure for matching the trash generation rates to the quantitative categories (A through D) is described in the steps below, which includes examples of potential adjustments in the trash generation ranges based on field-measured trash generation rates. The Tukey method for creating box plots or box and whisker plots will be used and is described below:

Step 1: Identify the minimum, maximum, 1st quartile (Q1), and 3rd quartile (Q3) of measured trash generation rates by PLU, grouped by the visual observation category (A through D). For example, trash generation rates and five sites that scored an "A" category may be measured as 1, 2, 1, 4, and 5 gallon/acre/year. In cases where a combination visual assessment was recorded (e.g., "A/B"), the higher result shall be assumed. This result can be interactively moved later depending on the outcome of the following steps. These statistics would be calculated for this set of data. The interquartile range (IQR) will also be calculated as Q3-Q1. Outlier points may be excluded as defined by 1.5 times the IQR as is consistent with the Tukey method.

Step 2: Create box plots to visualize the data ranges for each visual observation category. In Example 1, for a given PLU, the data could produce results that would be correlated as follows:

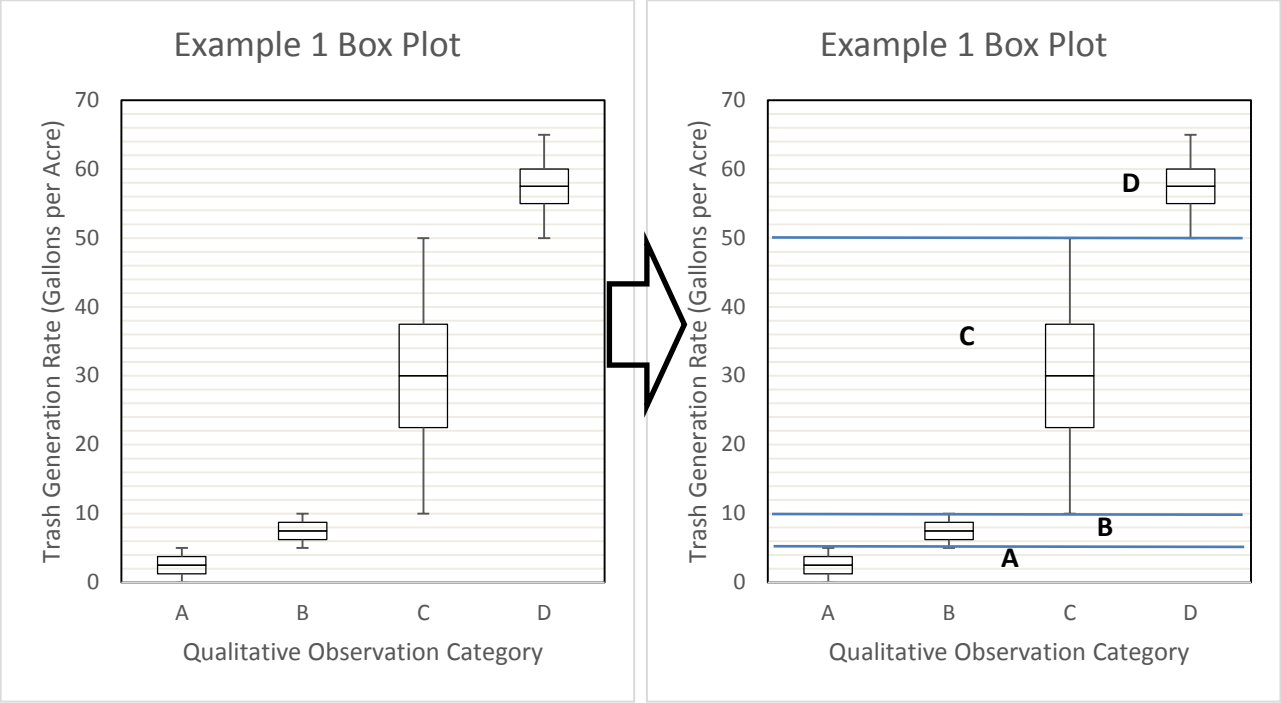
A = 0 to 5 gallon/acre/year

B = 5 to10 gallon/acre/year

C = 10 to 50 gallon/acre/year

D = 50+ gallon/acre/year

The plots below illustrate the quantile categories and the final assignment of qualitative observation category.



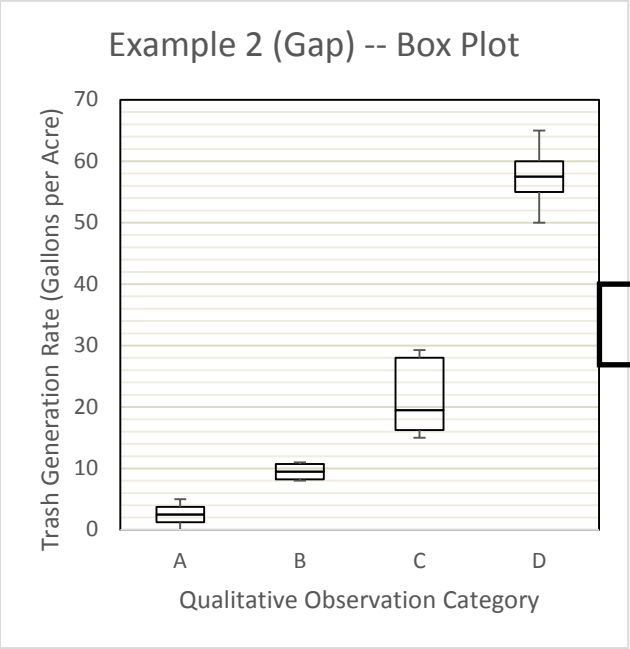
Step 3: If the data produce box plots with gaps between the maximum of a higher qualitative observation category and the minimum of the next qualitative observation category, then a gap will be seen. These discontinuities need to be removed to establish a continuous set of categorical data. The categorical limits will be adjusted by increasing the maximum of the upper category down to eliminate gaps. Example 2 below depicts this scenario. For a given PLU, the data could produce results that would be correlated as follows (including adjustments to remove gaps):

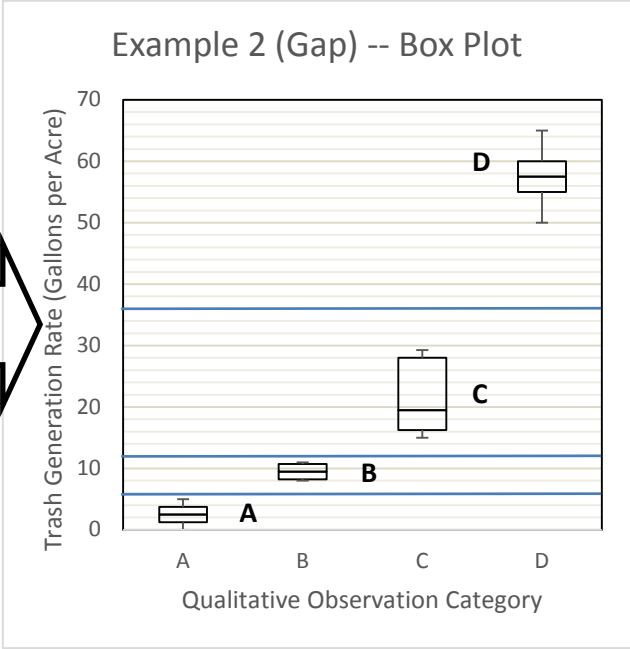
A = 0 to 5 gallon/acre/year

B = 8 to 12 gallon/acre/year (adjusted to 5 to 12 gallon/acre/year)

C = 15 to 34 gallon/acre/year (adjusted to 12 to 34 gallon/acre/year)

D = 50+ gallon/acre/year (adjusted to 34+ gallon/acre/year)





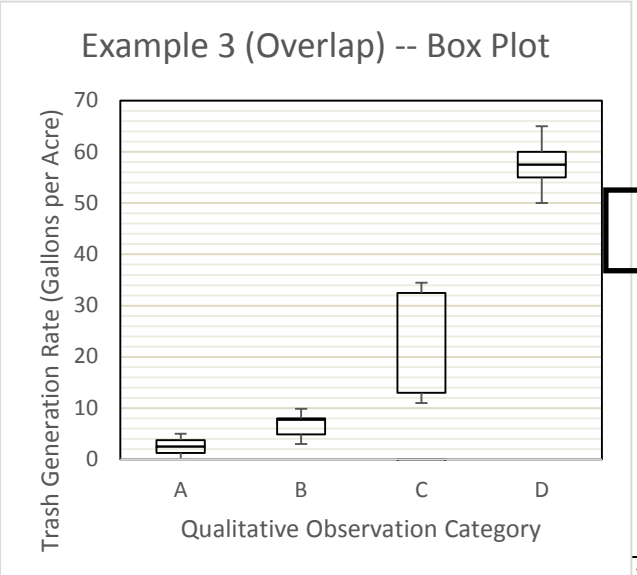
Step 4: If data produce ranges that overlap so that ranges are not exclusive of one another, then the lower qualitative category will be adjusted down to eliminate overlaps as shown Example 3 below. For a given PLU, the data could produce results that would be correlated as follows:

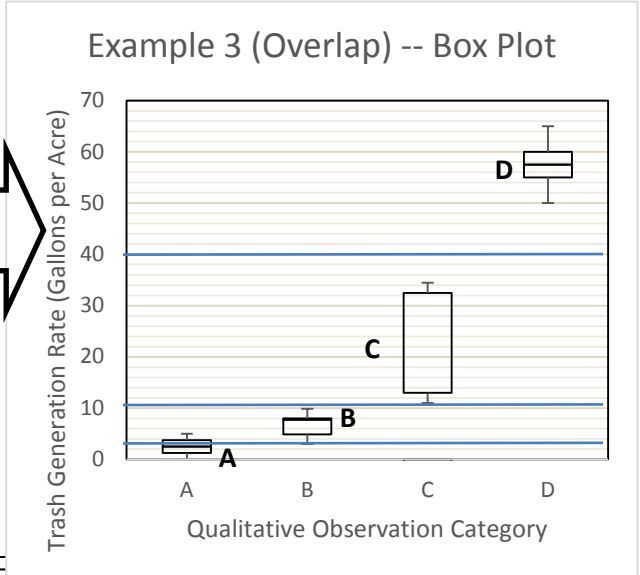
A = 0 to 7 gallon/acre/year (adjusted to 0 to 3 gallon/acre/year)

B = 3 to 11 gallon/acre/year (remains at 3 to 11 gallon/acre/year)

C = 11 to 40 gallon/acre/year (remains at 11 to 40 gallon/acre/year)

D = 50+ gallon/acre/year (adjusted to 40+ gallon/acre/year)





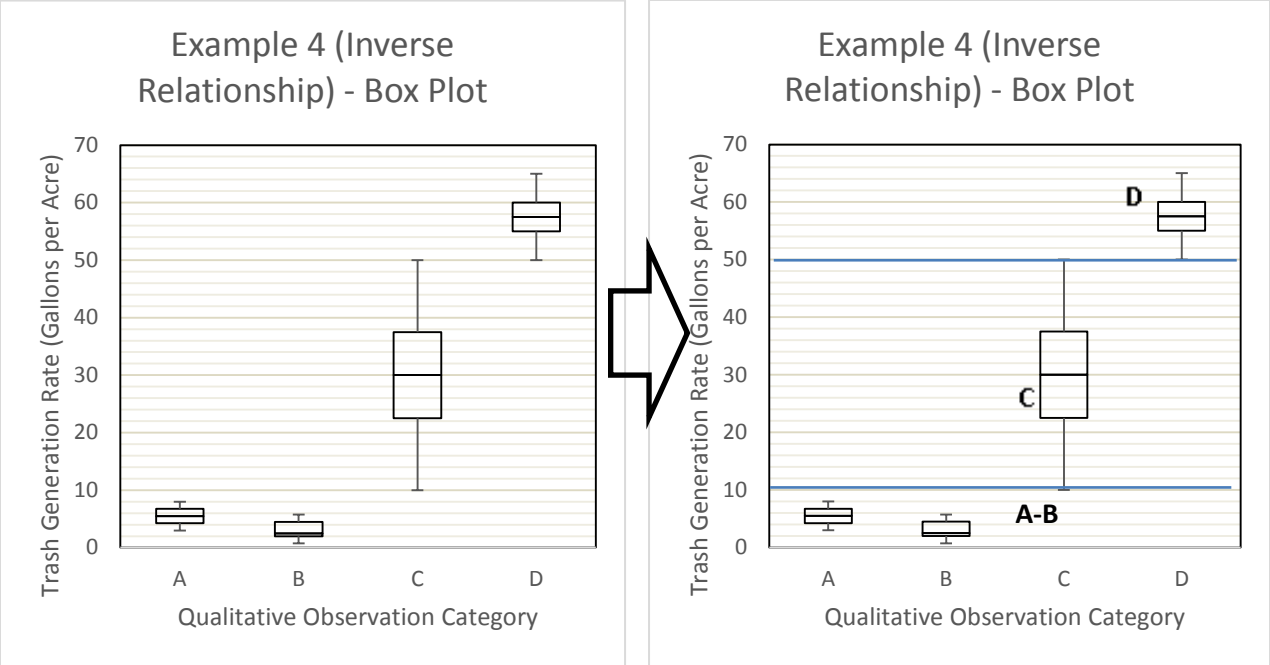
Step 5: The third adjustment that may be needed could occur when the visual observation categories do not increase with an increasing range. This scenario is referred to as an "inverse relationship" and is indicative that the categories may need to be combined as the data do not support more refined categorical limits. If this occurs, then the categories will be combined where upper bound of the higher category is less than upper bound of lesser category. Example 4 shows this scenario. For a given PLU, the data could produce results that would be correlated as follows:

A = 2 to 9 gallon/acre/year (combined with B to form A-B to 0 to 9 gallon/acre/year)

B = 1 to 6 gallon/acre/year (combined with A to form A-B to 0 to 9 gallon/acre/year)

C = 10 to 50 gallon/acre/year (adjusted to 9 to 50 gallon/acre/year)

D = 50+ gallon/acre/year (adjusted to 50+ gallon/acre/year)



Step 6: Compute the strength of correlation between measured trash generation rate and visual observation category by first converting the visual observation category to a number where A = 1, A/B = 1.5, B = 2, B/C = 2.5, C =3, C/D = 3.5, and D = 4. Each monitoring site will have a pair of points (trash generation rate and median qualitative observation category. For each PLU, the Pearson's product-moment coefficient set of all points will be computed to test the strength of the correlation. If the data indicate a non-linear relationship, then the strength of correlation will be tested based on "best-fit" regression method providing the highest associated r-squared value. While the "combination" (e.g., "A/B") results are not shown as separate categories the box-plots, they can be moved to either category to improve visual inspection, but regression calculations maintain the averaged value (e.g., 1.5)

Non-parametric approaches can be substituted as an alternative to the previously described visual inspection of distributional data (box-plots) for specific categories assessment approach. For-example, calculation of a non-parametric 95% confidence interval around the median value would provide a range of data within the category. This would be used similarly to the distributional box plots shown above while providing a more robust statistical measure of certainty until trash generation rate distributions and statistically significant factors are better understood. The statistical significance of the visual classifications could also be confirmed using binomial tests (i.e., success/failure sign test) that the paired observed trash generation rate is within the prescribed quantitative trash generation rates for that visual assessment category.

3. **Long term visual monitoring** will be evaluated as a cost-effective approach to satisfy monitoring, reporting, and compliance with the FCSE standard under Track 2 of the Statewide Trash Policies. If viable, the frequency and locations of long-term visual monitoring will be presented in the future, Track 2 Implementation Plan to achieve FCSE.

The following items are required to perform monitoring work:

- ✓ Clipboard
- ✓ Pens/permanent marker (recommend using a permanent marker for labeling).
- ✓ 30+ gallon trash bags and zip ties (Hefty Extra Strong Lawn and Leaf 39-gallon bags are one example). 30+ gallon trash can to hold trash bags.
- ✓ Site maps and key map that clearly show the location of the inlets being monitored.
- ✓ Manhole hook (for opening manholes)
- ✓ Flashlight
- ✓ Bright clothing and/or safety vests.
- ✓ Standard chain of custody form
- ✓ Approved traffic control plan, as
- ✓ Large plastic bins and tarps (required for the trash drying period).
- ✓ 5 gallon measuring buckets
- ✓ Electronic scale
- ✓ Standard woven wire cloth sieve
- ✓ Pens/pencils.
- ✓ Digital camera (with GPS capabilities).
- ✓ GPS unit (if camera is without capability)
- ✓ Two copies of the field form for each assessment location.
- ✓ Personal items (sunscreen, sunglasses, water, cell phone, etc.).

Project specific staff training will be required and is discussed in Section A.8. Maps depicting the monitoring sites for the project can be found within Attachment 1 of this document.

A.7: Quality Objectives & Criteria

The project objective is to quantify baseline trash generation rates for PLUs within San Diego County. The baseline trash rates are to be used to quantify FCSE per Track 2 requirements of the Statewide Trash Policies. Establishment of baseline rates will be done through measurement of trash volume collected during a monitoring period. One primary assumption of this project is that the monitoring locations will produce trash generation rates that are representative of specific land use types throughout San Diego County. The sites have been selected in a variety of communities within San Diego County that generally have characteristics that are representative of the jurisdictions within San Diego County.

The sampling and material characterization procedures will allow field personnel to measure trash volumes with a precision appropriate for this type of study. The precision will be improved by having repeatable procedures performed by the trained field personnel. The quality objective for measuring weight and volume is that independent measurements of volume and weight by two different personnel will be within ten percent of each other to be considered a valid measurement of volume and weight. Questions regarding measurement precision beyond this threshold will be brought to the attention of the project Quality Assurance (QA) Manager.

Volume will be measured using five-gallon buckets, measuring the depth that the bucket is filled, then multiplying by the surface area to compute volume. For the purposes of calculating FCSE, trash is defined as being greater than 5 mm, so a sieve will be used to separate finer material. Precision will be enhanced by having repeatable procedures completed independently by two trained personnel. This will also limit bias as there will be one repeatable measurement for volume completed independently by separate trained personnel. If the measurements are not within a sensitivity range of ten percent of the total value, the procedure will be repeated by both until consistency is achieved.

The accuracy of the computed trash generation rates from the monitoring sites as compared to actual trash generation rates from all sites is challenging to determine with certainty. The assumed representativeness of the monitoring locations anticipates that the accuracy of computed trash generation rates compared to the trash generation rates from all locations throughout San Diego County is high.

Bias can impact measurement and statistical evaluation. Bias can over- or under-estimate the actual trash generation rate based on the data generated from the monitoring sites. The tendency toward bias has been decreased by having a representative sample of monitoring sites of varying PLUs within different areas of San Diego County. Two-person crews will provide a second opinion at various steps in the process to confirm or challenge measurements to help ensure consistency in measurements (qualitative and quantitative)..

A.8: Special Training/Certification

No specialized certifications are required by project personnel; however project specific training will be required for staff involved in monthly and quarterly monitoring, supplemental inspections, and the material characterization processes associated with quantitative monitoring. Staff performing visual monitoring will also require project specific training. Staff training will be the responsibility of the Field Activities Manager, Visual Assessment Manager, and Materials Characterization Manager who will track the training of all field staff responsible for each specific portion of the work to ensure consistent application of procedures. The managers will provide a log of all staff training to the QA Manager for review and approval:

1. Staff involved with the quarterly removal process will be trained on the collection and transport of samples. Sample material from separate sites cannot be permitted to co-mingle and must be properly labeled, transported, and stored.
2. Staff involved with the material characterization process must be trained on the chain-of-custody procedures, drying methods, as well as methods involved determining weight and volume. Staff must also have a clear understanding of what constitutes the definition of "trash" from the perspective of the Statewide Trash Policies. (*…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.*)
3. Staff involved with supplemental inspection must be trained in the functionality of full capture systems and capable of identifying signs of breach, failure, or overflow.
4. Staff involved with qualitative monitoring must be trained in the application of the visual categorization process.
5. All staff involved must be trained in the use of applicable field forms, chain-of-custody process, database and record management, as well as safety procedures.

Documentation of all staff training associated with the project will be submitted with completed chain of custody forms, visual assessment forms, and material characterization forms as part of project documentation.

A.9: Documents and Records

The following documents will be retained by the Project Manager during the monitoring phase as part of the project records for the duration of the project monitoring period. These forms will be transferred to the Ad Hoc Committee with the final report and retained by the Ad Hoc Committee in its project files:

1. Completed chain-of-custody forms for all material extracted from full capture systems
2. Completed Material Characterization Form
3. Completed Visual Monitoring Forms

4. Site photographs and site plans
5. Completed supplemental inspection logs
6. Completed training logs

Electronic files including field photos, the project database with the trash measurements, visual monitoring category results will be stored by the Database Manager on the Consultants computer network. The Database Manager will ensure that electronic data is backed-up regularly using standard data back-up protocol. At the end of the project, the electronic data will be submitted on CD, DVD, or via FTP download.

At the conclusion of the monitoring phase, the data from forms and electronic database will be reported and summarized in a report prepared by the Project Manager for submittal to the Ad Hoc Committee Project and Ad Hoc Committee Program Managers. All data forms, electronic databases, and photos will be transmitted to the Ad Hoc Committee as Appendices to the final report.

The Database Manager will be responsible for updating the QAPP as necessary, and will distribute the updated document to all individuals listed in Section A3.

SECTION B - DATA GENERATION & AQCUISITION

B.1: Sampling Process Design (Experimental Design)

The monitoring sites will be located in catchments with homogeneous land use to the extent possible (90 percent or greater single PLU). Criteria for monitoring sites favors catch basins and curb inlets where installation and access to a full capture system is feasible, locations where clogging of the device would not constitute a hazard to public safety, and where conditions in the catchment (land use, population density, median household income, trash management actions) are known and consistent.

Trash volume data will be obtained from the quantitative monitoring program and used to determine the trash generation rates associated with specific PLUs. Ultimately, these rates will be applied to all similar PLUs within the San Diego County region to calculate FCSE. Weight measurements are intended for informational purposes only.

As previously stated, each location will be sampled quarterly (quantitative) and assessed visually monthly (qualitative). Monitoring will continue for one year, necessitating a minimum of four quantitative monitoring events and 12 visual monitoring events at each location. If the monitoring period is extended beyond one year, the QAPP will be updated to reflect new monitoring locations and/or new durations of the monitoring program.

If sites are temporarily inaccessible, then the sampling event or visual monitoring event will be rescheduled. If the site becomes permanently inaccessible, then the project management team will meet to discuss if results to date should be prorated, discarded, or the site should be replaced by an alternate site.

B.2: Sampling Methods

The following sections present *minimum required* protocols for quantitative and visual monitoring. These procedures are intended to achieve the objectives of the monitoring program, support the development of adequate documentation, and ensure quality control.

Quantitative Monitoring

<u>Quarterly Trash Removal and Transport</u>

Personnel conducting quarterly trash removal will be required to adhere to certain minimum procedures. The protocol for trash removal and transport requires a minimum of two people for both safety and quality control. The chain-of-custody form serves as documentation for trash removal and should be filled out for each removal event.

The following minimum procedures should be followed during removal of trash from the full capture systems and during transport to the storage and characterization site.

1. Assemble all equipment to conduct the assessment prior to leaving for the site.
2. Upon arrival, note any significant conditions or observations on the site specific monitoring map. These could include signs of illegal dumping, malfunctioning full capture system, or improper performance of the storm drain system. Provide a site specific ID and date for the monitoring sample. Take a photo of the site upon arrival.
3. Implement any necessary safety controls (e.g. hazard cones, safety vests, etc.) where applicable to ensure worker and public safety.
4. Collect all trash and debris until the site is completely clean. This may be done using the most

appropriate method based on the volume of trash and debris located within the drain inlet capture area.

In most cases, the volume of accumulated sediment and debris will likely be removed by hand using shovels, rakes, and bags. If a manual removal method is used, all applicable confined space entry requirements and precautions must be met to ensure safety of personnel operating within the drain inlet capture area. Other removal methods may also be employed, as appropriate, to remove and bag debris. The specific removal method is a process that can be decided on by field personnel based on field conditions.

If a significant amount of trash and debris has accumulated, the most efficient manner for extracting may be a vactor truck. If a vactor truck is used, all sediment and debris collected for a specific location should be removed from the vactor truck and placed into empty trash bags prior to removing debris and trash at the next project location. Depending on the volume collected in the vactor truck, this may require the use of a warehouse or other facility to effectively remove all material and place into bags.

Regardless of removal method, samples from each site must be collected and transported in a manner that maintains physical isolation (i.e. in separate bags). Care will be taken to make sure that the material maintains its integrity so that separation of trash from sediment and vegetation will not be affected.

Make sure sample bags are physically intact and free of tears and appropriately secured with zip-ties (or similar). If necessary, double bag the sample to avoid tears. Take photos before, during and after the clean out operation.

5. Label and date the sample, using the same convention used on the site specific map. If multiple bags are required for an individual site, the label should read "Bag 1 of 3" (or similar).
6. Complete the required entries in the Chain-of-Custody form (**Attachment 3**) at both the beginning and end of the transport process. Transfer bagged trash samples to the appropriate support facility where material characterization will occur.
7. Additional supplemental inspections should be conducted to verify that bypass and overflow within the full capture systems are only occurring when appropriate. All sites should be given a one-time supplemental inspection (after the first month). Subsequent inspections will be based on observed problems, or recommendation from Ad Hoc Committee staff that consider factors including site history, potential for debris, slope, contributing area, and others. Results and relevant photographs from the inspections should be documented and included in the project records. If a catch basin is found to be 40 percent full during a supplemental inspection, quantitative monitoring will be performed regardless of the quarterly schedule. The estimated volume of trash in the catch basin should be recorded for every supplemental inspection.
8. Characterize trash per the methods described in **Section B.4** of this document and complete the Material Characterization Form (**Attachment 4**).
9. After material characterization, the trash shall be disposed of in a sanitary landfill.

Visual Monitoring

The intent of visual monitoring is to provide qualitative estimates of the amount of trash generated on specific street segments, sidewalks, and land areas within the monitoring sites' drainage areas that may be reasonably transported to the storm drain system and deposited at the monitoring site (catch basin). As the catchment areas for the quantitative monitoring sites vary in size there is not a set minimum

number of visual assessment sites per drainage area. Rather, the number will depend on the size of the catchment area. The visual monitoring approach is based on the visual monitoring protocols developed in 2013 in the San Francisco Bay Area (EOA, 2013). This approach requires a minimum of two people for both objectivity and safety. Additionally, an office point of contact should be designated and have readily available the cell phone numbers and inspection schedule/location of the field staff. The Visual Monitoring Assessment Form is included as an attachment to this document and should be filled out by each one of the field personnel for each monitoring event. The protocol consists of the following steps that should be conducted in sequential order:

1. Post temporary No Parking signage in the visual assessment area, if necessary.
2. Assemble equipment needed to conduct the assessment.
3. Review standard trash condition category definitions found on the standard field inspection form.
4. Safely walk along the assessment area and carefully look for trash deposited. Team members should identify levels of trash in all portions of the public right-of-way, including but not limited to, the median, street, gutter, curb, sidewalk, back of sidewalk, and vegetated areas. The assessment area should be demarcated during the first assessment event and the field crews should utilize this area for all subsequent assessment events. For each visual monitoring location, the site will be approximately 1,000 linear feet along a public street and include the areas listed above. If it is not possible to achieve 1,000 linear feet, then the largest stretch of street possible in the drainage area will be used. To the extent practical, team members should also identify the level of trash in land areas adjacent to the street that appear to be directly connected to the stormwater drainage system via a storm drain on the adjacent property, or contribute trash to the storm drain in the public right-of-way. The trash observed in the area will be removed upon completion of the assessment and properly discarded.
5. Take at least three photos of each assessment area. The photos should represent the level of trash identified in the assessment area and will facilitate documentation within this QAPP.
6. Complete the first page of the field inspection form (**Attachment 5**). Each team member is encouraged to complete page one of the two-page inspection forms independently.
7. Based on individual observations, each team member should assign the area a primary condition category (A, B, C or D) based on the definitions provided on the Visual Monitoring Data Form. Large items such as furniture, shopping carts, tires, and appliances should not be considered when assigning a trash condition category, but should be noted and the appropriate agency should be notified to ensure removal of the large items. Additionally, graffiti and landscaping, such as tree branches or shrubbery, should not influence the visual monitoring trash condition category assigned.
8. Team members should then discuss and collectively agree on the appropriate condition category to assign the area. If agreement cannot be reached among team members, they may choose the appropriate secondary category (A/B, B/C, or C/D) based on their assessment results.
9. The area in and around the storm drain inlet should be included when assigning a condition category, particularly in areas initially assigned a category of “A.” If little to no litter is present in the storm drain inlet(s), then continue to assign an “A” grade to the assessment area.
10. Complete the second page of the Visual Monitoring Form.

11. Ensure no items, such as clipboards or personal items, have been left behind prior to leaving the assessment area.
12. At the end of each visual monitoring day, all field inspections forms will be scanned for electronic archiving. The original hard copies should be saved and stored in a binder. A database is required to track the results and link locations, photos, and any other pertinent information to each visual monitoring assessment area.

B.3: Sampling Handling & Custody

During quantitative monitoring, special care shall be taken to ensure trash removed from one particular location does not comingle with trash removed from another sample site. This is the first critical step to ensuring accurate results obtained from weight and volume measurements, and correlation of trash loads to particular land uses and drainage areas. This will be accomplished by properly labeling the sample. If multiple bags are required for an individual site, the label should read "Bag 1 of 3" (or similar). If the label is torn off the bag during transportation or handling, then it should be replaced immediately. Below is an example of a label to be included on a bag:

Date: **12-15-16**

Site ID: **PLU type (HDR)-City code (VIS)-Site # (1)**

Bag: __**1**__ of __**3**__

Standard heavy duty trash bags are considered an appropriate means for transportation of the collected materials. Once the materials have been delivered to the designated measuring location and the trash separated, special care will once again be required to ensure the drying period does not lead to the mixing of trash collected from different full capture systems. Physically separating the trash from each monitoring site onto its own tarp (or tarps) and leaving space between tarps will ensure samples will not be comingled. The labeling from the bags should remain with the trash on the tarps to track the source.

B.4: Analytical Methods

Trash Characterization

The protocol for trash characterization requires a minimum of two people for objectivity. All staff shall be trained in the proper procedures prior to performing material characterization. The following procedures should be followed:

1. Assemble equipment needed to conduct the characterization. The equipment needed for the characterization is as follows:
    - Gloves
    - Scale
    - Plastic buckets
    - Plastic trays
    - Tarps
    - Trash bags

- Sieve with 5 mm openings
- Material characterization forms

2. Separate trash from other materials such as vegetation (leaves, sediment, etc.) and dirt. Extra care shall be taken to ensure trash removed from a bag is not comingled with trash from a different bag (unless those bags contain the same identifier, and thus came from the same inlet). Once separated from the trash, vegetation can be discarded without drying or weighing. Use a sieve to identify and discard any trash less than five millimeters.
3. A 24-hour minimum drying period is required prior to weight and volume measurements of the trash. This will allow for a more accurate measurement of weight, and to a lesser extent, volume. Plastic trash bins and tarps are required for use during the drying period to ensure trash taken from one inlet does not comingle with trash from another inlet. The bins or tarp areas should be labeled with the same inlet and trash bag identifier to ensure consistency between field locations and weight/volume measurements.
4. The weight of trash shall be estimated by first placing an empty container on an electronic scale and recording the weight. The trash shall be placed in the container and weighed on the scale. In the event multiple bags of trash are removed from one particular inlet, the weight of trash from each bag shall be added together to achieve a cumulative weight of trash extracted from one inlet. The weight of the container shall be subtracted from the total weight of the trash and container (combined) to obtain the total weight of trash only.
5. The weight shall be recorded by hand and inserted into the Material Characterization Form (**Attachment 4**) and/or the electronic project database.
6. The volume of trash shall be estimated by placing the trash into a container of known volume (i.e. five gallon bucket). Care should be taken to level the trash as much as possible. The vertical distance between the trash level and the top of the container shall be measured and multiplied by the surface area to achieve the volume of empty space within the container. This empty space volume shall be subtracted from the total volume of the container to achieve the total volume of trash. This measurement shall be repeated by two different personnel to verify the accuracy of the measurement. If the measurements differ by more than ten percent, then the measurements shall be repeated to achieve consistency. If the measurement is repeated and is still not within the required ten percent tolerance, then the Project Manager shall be contacted to resolve the discrepancy or discount the value of the measurement. Volume measurements from all trash taken from a single inlet shall be added together to calculate the total volume extracted from each inlet.
7. The volume shall be recorded by hand and inserted into the Material Characterization Form and/or the electronic project database.
8. Independently repeat steps 4 through 7 following the quality assurance and quality control procedures described in the section below.
9. Disposal – after all measurements and records have been made for trash, place all trash in disposal containers and/or bags unless instructed to save trash for future characterization.
10. Complete the required entries in the chain-of-custody form at both the beginning and end of the characterization process, as well as prior to disposal. The turnaround time period from the time of receipt of the trash, drying, and material characterization should not exceed five business days.

In the event of protocol failure, the Materials Characterization Form shall document the problem and contact the Project Manager shall be contacted to discuss the best course of action. This documentation shall be submitted to the Project Manager with the materials characterization forms.

B.5: Quality Control

During quantitative measuring of volume and weight of trash, multiple (minimum of two) independent measurements and calculations of each sample by different personnel shall be performed to ensure accuracy and dispel potential errors associated with the scale and/or weight and volume measurements obtained. Each person shall perform the measurement independently and then compare with the other person's measurement. In the event of a discrepancy greater than ten percent, the measurements will be repeated until a consistent measurement is obtained. For visual monitoring, collective agreement is required to objectively classify the trash categories (A-D). Team members should discuss and collectively agree on the appropriate condition category to assign the area. If agreement cannot be reached among team members, they may choose the appropriate secondary category (A/B, B/C, or C/D) based on their assessment results.

The QA Manager may perform measurements on up to ten percent of the samples to independently verify that measurement processes are being done correctly and consistently and that weight and volume measurements are valid. The QA Manager will document sampling measurements and compare them to measurements by the materials characterization personnel. In the event of significant discrepancy, the QA Manager will contact the Project Manager to discuss to validity of the data and any necessary changes to the material characterization procedures.

In the event of missing data, the final trash generation rate may be calculated as on a prorated basis using the period of time covered by the samples with available data.

If outliers in the data are present that indicate significantly higher trash generation rates than those shown in previous studies (see *Literature Review, Michael Baker, 2015*), they will be brought to the attention of the Project Manager. The data forms will be reviewed to identify anomalies or errors. If the outlier remains, then the Project Manager will discuss the outlier with the Ad Hoc Committee Project Manager to evaluate the validity and usefulness of the sample. Data rejection will be based on whether there is evidence the data are in error rather than differences from expected values. The data evaluation process will be developed to consider extreme values. The rejection criteria should include: 1) documented error from log sheets, 2) calculation or measurement errors that deviate from the protocols, 3) documented unusual conditions that were not adequately considered and are not relevant to the study (e.g., previously unknown street sweeping or clean-up event, illegal dumping activity that was not immediately identified, special large scale event or other trash generating activity that infrequently occurs or is not representative, etc).

B.6: Instrument/Equipment Testing, Inspection, and Maintenance

Equipment shall be tested prior to each work day to ensure proper performance. Specifically;

1. Pens/permanent marker - Make sure pens and markers are functioning and that ink produces smudge free text.
2. Field data sheets - Verify that a sufficient quantity are available to document the trash collection, visual assessment, or material characterization
3. 30+ gallon trash bags - Ensure trash bags are free of tears and make sure sufficient quantity is on hand for planned work effort.

4. Labels for trash bags - Ensure sufficient quantity of labels are available for the amount of trash bags anticipated to be used during the day
5. Flashlight - Make sure bulb and batteries function properly. Field kits should contain a back up set of new batteries for each flashlight.
6. Large plastic bins and tarps - Make sure plastic bins are free of cracks, tears, etc. Sufficient quantities of tarps should be available to isolate trash from each sampled inlet separately during the drying period.
7. Five-gallon measuring buckets – Confirm size as anticipated. Make sure buckets are free of cracks, dents, deformation, etc.
8. Standard woven wire cloth sieve – Make sure sieve is appropriate size (5 mm). Make sure sieve is free of tears. If tears are found the sieve should be discarded and replaced prior to use in removing debris smaller than five millimeter. At least two tear-free sieves should be maintained at the characterization facility to ensure that work flow can continue if one becomes torn.
9. Cell phones and digital camera - Make sure cell phones, digital cameras, etc. are functioning and have adequate battery strength.
10. Transportation vehicles – Ensure that vehicle is in proper working order prior to performing any field visit. This could be accomplished through regular vehicle inspections.
11. Confined space entry equipment (as necessary) – tripod in working condition and without mechanical or structural issues. Gas meter inspected for proper operation on a daily basis. Harnesses are free of tears, cuts, or abrasions in fabric straps. Safety rings are securely attached and show no signs of deterioration in the mechanical support.

The Field Activities Manager and the Materials Characterization Manager shall be responsible for ensuring that the necessary supplies and equipment are available and operable prior to performing work. If deficiencies in any of the equipment in this section are noticed, then the equipment should be immediately replaced.

B.7: Instrument/Equipment Calibration and Frequency

Equipment shall be calibrated as needed to ensure proper performance. Specifically:

1. Electronic scale - Standard calibration consistent with the manufacture's recommendations shall be performed prior to each work day.

B.8: Inspection/Acceptance of Supplies & Consumables

Refer to Section B.6. The Field Activities Manager and the Materials Characterization Manager shall be responsible for ensuring that the necessary supplies and equipment are available and operable prior to performing work.

B.9: Data Acquisition Requirements for Non-Direct Measurements

No non-direct measured data will be collected for this project.

B.10: Data Management

The project will involve completion of standard forms, documentation, and other database information during completion of work. Specifically the following:

1. **Chain-of-Custody Form** – is used to show the disposition of collected material, from the monitoring, to the characterization site, and to disposal. A sample Chain-of-Custody Form is provided in **Attachment 3**.
2. **Material Characterization Form** – is used to record the measured volume and weight of trash from full capture systems. This form also documents that both measurements have been independently reproduced within the allowed tolerance. A Material Characterization Form is provided in **Attachment 4**.
3. **Supplemental Inspection Documents** – are used to verify that full capture systems are properly functioning and being adequately maintained, and that improper bypass and overflow are not contributing to inaccuracy of measured values of trash. Supplemental Inspection Documents will be provided to the Project Manager when other completed forms (Chain-of-Custody, Visual Assessment, and Material Characterization) are transmitted and will be included with final project documentation.
4. **Visual Assessment Forms** – are used to qualitatively document trash generation rates and demonstrate that the results are being independently verified be separate staff. A Visual Assessment Form is provided **Attachment 5**.
5. **Site Photographs** – shall be taken at all monitoring sites before and after maintenance, as well as during supplemental inspections and visual assessment,
6. **Training logs** – are used to document the date and attendance of staff and contractor training specific to the project QAPP and safety procedures. Training logs will be provided to the Project Manager when other completed forms (Chain-of-Custody, Visual Assessment, and Material Characterization) are transmitted and will be included with final project documentation.
7. **Project Database** – will include digital scans of all hard copy project forms, digital photographs, training logs, and applicable GIS files. The Database will be in Microsoft Access format. Digital scans shall be in PDF format, and digital photographs shall be in JPEG, TIF, or other generally accepted format. Photos will be transferred to the Database Manager via CD, DVD, or eftp for all stages of the project for which photos are captured. Photo file names should include the location where the photo was taken. The results of the material characterization will also be included in the database to allow more detailed analysis of the measured data.

The Database Manager will be responsible for scanning and maintaining the forms and entering the data on a quarterly basis. The database will be reviewed by the QA Manager to ensure that data have been entered and stored correctly.

SECTION C - ASSESSMENT AND OVERSIGHT

C.1: Assessments and Response Actions

Data quality will be assessed once every sampling day during the characterization process to ensure that measurements are within the required tolerance, (refer to Section A.7. of this document). Measurements not within the required tolerance will be repeated until independent verification can be confirmed through the project QA Manager. If the verification of the required tolerance cannot be achieved, then the Project Manager will be contacted. All measurements necessary to confirm independent verification shall be documented on the Material Characterization forms. All staff shall be trained in the proper procedures prior to performing material characterization.

Other factors affecting accuracy and precision may include proper separation of vegetation and debris from the trash, proper screening of trash with the five millimeter sieve, and retaining physical separation of trash collected from each inlet. Each of these factors will be discussed in detail during staff training. The Materials Characterization Manager will ensure that proper protocols are in place for staff performing material characterization. The Materials Characterization Manager may require resorting or re-screening of trash to ensure that only trash (as defined in section A.5) is included in the measurements.

The QA Manager may independently verify the weight and volume of ten percent of the samples to validate that measurements are done correctly. If discrepancies are found, then the QA Manager will contact the Project Manager to ensure that the proper protocols are being followed. The QA Manager may also inspect the sieve and the sorted material for residual debris or vegetation that should not be included in trash measurements. The QA Manager should sample a portion of trash to ensure that sorting has been done correctly. If the QA Manager discovers that any of the protocols have been violated, they will contact the Project Manager to discuss the best course of action. This may include re-sorting or re-measuring the sample, or discarding the data point.

Because of the subjectivity of visual assessments, it is important that the procedures be repeated as closely as possible during each visual assessment by trained staff and that the visual assessment areas remain constant throughout the duration of the study. If possible, it is preferred that the same staff perform visual assessments throughout the duration of the project to ensure consistency. The Visual Assessment Manager will ensure that all staff performing visual assessments are properly trained, including in-field training, and will ensure assessment forms are properly filled out.

C.2: Reports to Management

A summary report of all monitoring activity and results (quantitative, supplemental inspections, visual monitoring) shall be provided to the Project Manager and QA Manager on a quarterly basis by the Visual Monitoring Manager and the Material Characterization Manager as well as on an annual basis at the end of the monitoring year. The Project Manager and QA Manager are responsible for sharing the information and status of the project with the copermittees on a regular basis, preferably at the Regional Project Planning Subcommittee meetings. The reports shall document monitoring activity, results, and any/all potential quality control problems that have potentially occurred, along with a discussion of how the quality control issue was resolved. A final report will be prepared by the Consultant Project Manager, with assistance from the project team, to document the process and the results at the end of the monitoring period.

SECTION D - DATA VALIDATION AND USABILITY

Measurement data (i.e. volume and weight of trash) that have been accepted through the quality control process (**Section B.5**) will be considered valid and usable. It is not appropriate, given the limited empirical data, to establish a rigid data validation process for measurement of trash. However, professional judgment will be used to assess results that vary significantly from study. Data rejection will be based on whether there is evidence the data are in error rather than differences from expected values. Sample results judged to have been tainted or are inaccurate due to mixing of trash from various inlets, human errors in measurement of weight or volume, or improper sorting or separation of vegetation and trash may, at the discretion of the project management team, be excluded from determination of baseline trash generation rates and full capture equivalency.

Similar to quantitative data, it is not appropriate, given the limited amount of empirical visual assessment data, to establish a rigid data validation process for visual assessment data. Visual assessment data will be considered validated and useable if the data are deemed acceptable after the quality control process outlined in **Section B.5** is conducted. Furthermore, all visual monitoring field staff will go through pre-project training, which will ensure visual monitoring data are collected correctly during each monitoring event. The correct field sheets will be utilized by field staff for each monitoring event, which will also ensure the visual monitoring data are collected correctly and will provide a resource for reviewing trash data for validity and usability. Photo documentation will also be used as a resource for reviewing trash data for validity and usability.

Attachment 1
Monitoring Sites Map

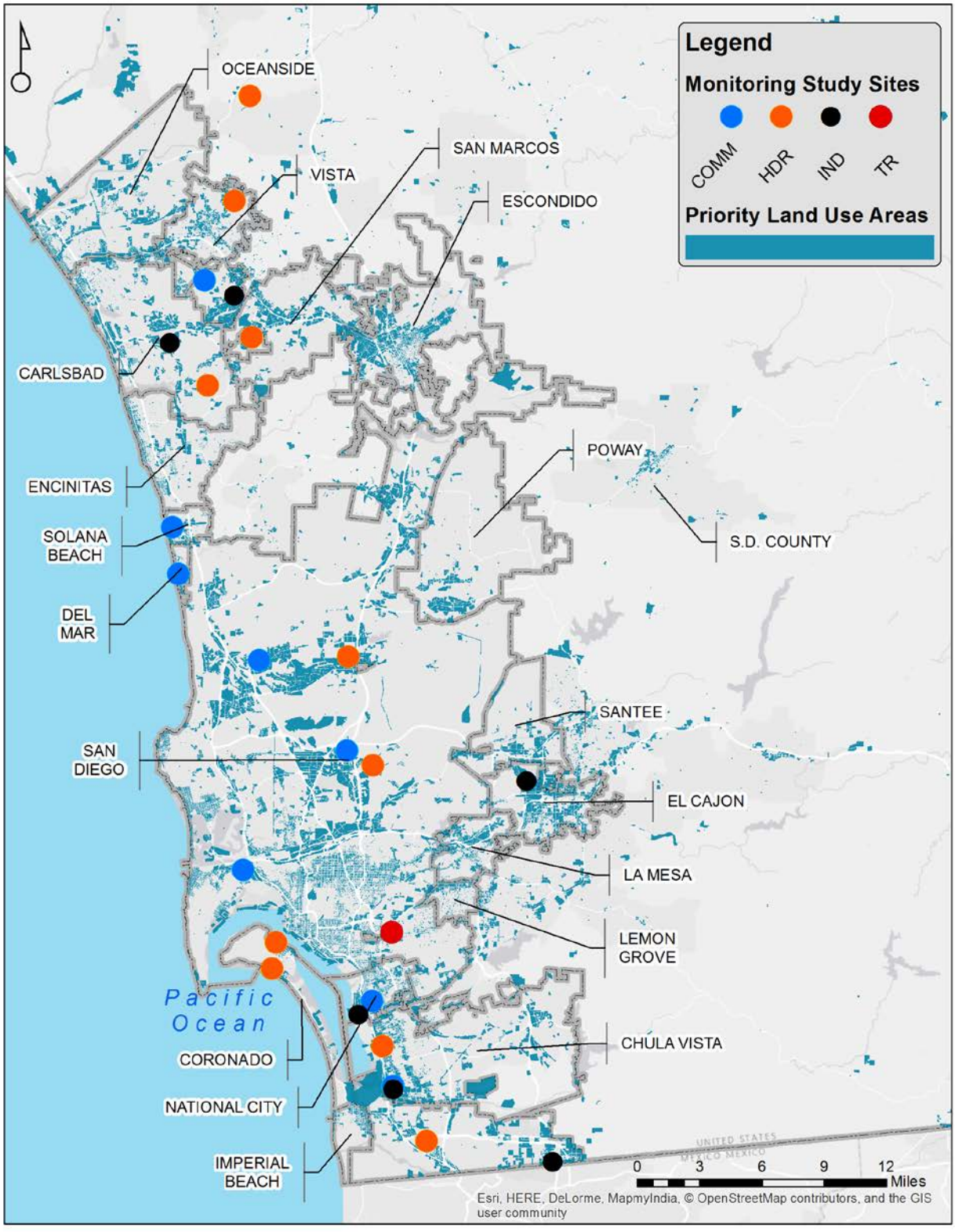


Figure 1. Monitoring Locations

Attachment 2
Alternate Monitoring Locations

Table 5. Regional Trash Generation Rate Study Alternate Monitoring Sites

Agency	Monitoring ID	Site Name	Latitude	Longitude	Location Description	PLU	Catchment Area (Ac)	Watershed Management Area
City of Carlsbad	COMM-1	1C-S202	33.179212	-117.336735	2124-2620 S. Vista Way, the Shoppes at Carlsbad	COMM	26.8	904.21
City of Del Mar	COMM-4	COM-DM-2	32.959470	-117.265270	15th St. and Camino Del Mar.	COMM	2.4	905.4
City of El Cajon	COMM-5	ARN-EC-3	32.803876	-116.971970	943-975 Arnele Ave, 92020,Curb inlet on the South side of Arnele Ave adjacent to parking lot	COMM	18.9	907.13
City of Solana Beach	COMM-10	Commercial-SB-3	32.99466	-117.26007	Within Solana Beach Town Center, in the SW corner of the parking lot in front of Dixieline	COMM	10.7	905.1
San Diego Unified Port District	COMM-14	COMM-SDUPD-E9-3	32.709252	-117.168310	53 Market Pl, 92101	COMM	>1	908.2
City of San Diego	COMM-17	Com-CiSD-2	32.545520	-117.039690	4347-4408 Camino De La Plaza, 92173, on north side of Camino De La Plaza in front of TMobile	COMM	3.9	911
City of San Diego	COMM-19	Com-CiSD-4	32.904790	-117.179420	6450-6488 Weathers Pl, 92121, on NW corner of Weathers Pl at Waples St.	COMM	1.5	906
City of Chula Vista	IND-3	IND-CV-872	32.595390	-117.019270	In front of 750 Design Court, S end of street where it meets Maxwell Rd catch basin 4'x4'x10.5', curb opening, outlet pipe 24", access through manhole	Industrial	13.1	910.2
San Diego County Unified Port District	IND-11	IND-SDUPD-2554	32.651186	-117.113866	Curb opening length-42", pipe diameter-42" (west connection) & 48" (east connection), manhole access	Industrial	6.75	908.3
City of El Cajon	HDR-5	ROS-EC-1	32.800356	-116.940716	503 Roselle Ave, 92021, on NE corner on Roselle, at the corner of E. Madison Ave.	HDR	6.9	907.13
City of Solana Beach	HDR-11	HDR-SB-1	32.986620	-117.258470	679-699 Valley Ave, 92075	HDR	14.4	905.1
City of San Diego	HDR-19	Res-CiSD-2	32.750440	-117.138720	4003 Texas St, at the corner of Texas St and Lincoln Ave	HDR	1.3	908.22

Agency	Monitoring ID	Site Name	Latitude	Longitude	Location Description	PLU	Catchment Area (Ac)	Watershed Management Area
City of San Diego	HDR-21	Res-CiSD-4	32.860740	-117.225150	7487 Palmilla Dr. 92122, at the corner of Palmilla Dr. and Porte De Palmas	HDR	2.1	906
City of San Diego	HDR-22	Res-CiSD-5	32.860700	-117.233600	8487-8499 via Mallorca, 92037	HDR	4.3	906
City of National City	HDR-27	HDR-NC-3	32.660607	-117.102534	2504 Transportation Ave, 91950 At Transportation Ave and W. 25th St.	HDR	2.2	908.32

Attachment 3
Chain-of-Custody Forms

San Diego County Trash Collection Chain-of-Custody

Site ID:_____

Site Location:_____ **Collection Date:**_____ **Collection Start Time:**_____

Collector Company Name:_____ **Receiving Company Name:**_____

Address:_____ **Address:**_____

Phone Number:_____ **Email:**_____ **Phone Number:**_____ **Email:**_____

Bag/Bin Number	**Item Notes** (Full, torn, mostly empty, etc.)

Chain of Custody

Date	Time	Released By	Received By	Purpose of Change of Custody
		Printed Name	Printed Name	
		Signature	Signature	
		Printed Name	Printed Name	
		Signature	Signature	
		Printed Name	Printed Name	
		Signature	Signature	

Final Disposal:

Date_____ **Time**_____ **Printed Name of Disposer**_____ **Signature**_____

Attachment 4
Material Characterization Form

Material Characterization Form

SITE ID:_____

No. of Items Received:_____ **Date Received:**_____ **Time Received:**_____

Receiving Personnel:_____ **Email:**_____ **Phone:**_____

Note: Fill out a separate Material Characterization Form for each assessment area.

I. Trash Sorting
Separate trash from vegetation, sediment, and articles smaller than 5 mm. Ensure trash from different sites are not comingled. Place trash into drying bins to be dried for 24 hours. Properly dispose of non-qualifying material.
Description of Disposed Material (Example: about 2 pounds of leaf litter with small amounts of sand and dirt)

Drying Start Date_____ **and Time:**_____ **Drying End Date**_____ **and Time:**_____

Characterizing Personnel:_____ **Email:**_____ **Phone:**_____

II. Trash Characterization			
After the 24-hour drying period, provide a description of the qualifying trash material. Weigh and measure the trash and record the cumulative totals.			
Description of Collected Trash (Example: plastic shopping bags, aluminum cans, and cigarette butts)			
Total Weight	lbs	**Total Volume**	gal

Additional Notes:

Attachment 5
Visual Monitoring Form and Examples of Visual Assessment Categories (EOA, 2013)

Visual Monitoring Form

Site ID:_____

Location:_____ **Date:**_____ **Time:**_____

Team Members:_____ **Contact Email:**_____

Note: Fill out a separate Visual Monitoring Form for each assessment area.

I. Assessment Area

Assessment Area: Below, describe the location and boundaries of the assessment area. Include the street segment name, length of the street based on cross streets, and land area description (if applicable).

II. Condition Category Assignment

Trash Condition Category:

Conduct the assessment in accordance with the Monitoring Work Plan for Trash Amendment Compliance (Refer to Definitions below). Check one of the categories below based on the assessment.

☐ Low (**A**) ☐ Medium (**B**) ☐ High (**C**) ☐ Very High (**D**)

☐ Low/Medium (**A/B**) ☐ Medium/High (**B/C**) ☐ High/Very High (**C/D**)

Photograph Documentation:
Check the box below to indicate that photographs were taken and are maintained by your agency.

Photographs: ☐ Number of photographs taken:

Trash Condition Category	Definition
A	Effectively no trash is observed in the assessment area. There may be some small pieces in the area, but they are not obvious at first glance.
B	Predominantly free of trash except for a few pieces that are easily observed in the assessment area.
C	Trash is widely/evenly distributed and/or small accumulations are visible on the street, sidewalks, or inlets.
D	Trash is continuously seen throughout the assessment area, with large piles and a strong impression of lack of concern for litter in the area. There is often significant litter along gutters.

III. Preliminary Source Identification

Stormwater trash sources currently identified within the assessment area (CHECK ALL SOURCES THAT APPLY).

Vehicles

- ☐ Moving Vehicles
- ☐ Parked Cars
- ☐ Uncovered Loads
- ☐ Other:

Inadequate Waste Container Management

- ☐ Overflowing or uncovered receptacles/dumpsters
- ☐ Dispersal of household trash and recyclables before, during, and after collection
- ☐ Other:

Pedestrian Liter

- ☐ Restaurants
- ☐ Convenience Stores
- ☐ Liquor Stores
- ☐ Bus Stops
- ☐ Special Events
- ☐ Other:

Illegal Dumping

- ☐ Illegal dumping on-land
- ☐ Homeless encampments
- ☐ Other:

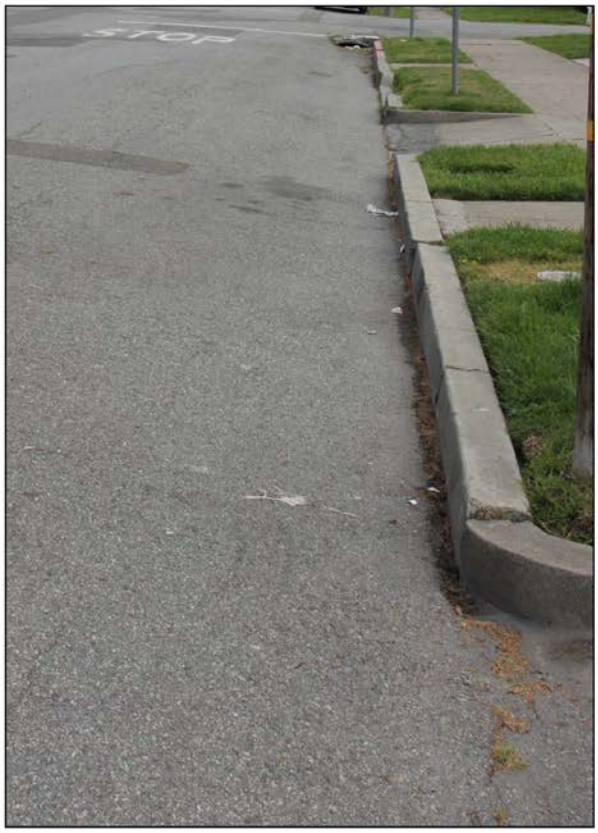
IV. Comments and Additional Information about the Assessment Area and Sources

CONDITION A - LOW TRASH LEVEL

Description of a Grade A: Effectively no trash can be observed on a city block or the equivalent. There may be some small pieces in the area, but they are not obvious at first glance and one individual could quickly pick them up.

CONDITION B – MODERATE TRASH LEVEL

Predominantly free of trash except for a few pieces that are easily observed along a city block, or the equivalent. The trash could be collected by one or two individuals in a short period of time.



CONDITION C: HIGH TRASH LEVEL

Trash is widely/evenly distributed and/or small accumulations are visible on the street, sidewalks, or inlets. It would take a more organized effort to remove the litter.

CONDITION D: VERY HIGH TRASH LEVEL

Trash is continuously seen throughout the area, with large piles and a strong impression of lack of concern for litter in the area. There is often significant litter even along gutters that are swept.