SEPTEMBER 2018

CITY OF CHICO

Statewide Trash Amendments: Track 1 Operations & Maintenance Plan (Part 2 of the Trash Master Plan)

prepared by:

LARRY WALKER ASSOCIATES

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1. Purpose

The purpose of this Operations and Maintenance (O&M) Plan is to provide general guidance to City staff regarding the protocols necessary to ensure that the operation and maintenance of the Full Capture Systems (FCS) installed within the City of Chico (City) meet the State Water Resource Control Board's (State Water Board) Track 1 Compliance Approach to the Statewide Trash Amendments. The goal of the Statewide Trash Amendments is to address the impacts of trash to the surface waters of California through the establishment of a statewide narrative water quality objective and implementation requirements to control trash, including a prohibition against the discharge of trash. This document includes maps, schedules, protocols and record keeping documents that may be used during and following the installation of FCS. Additionally, this Plan outlines vector control considerations for FCS. This document, coupled with the Implementation Plan, provides the City with a Trash Master Plan for the 10-15 year compliance period[1].

2. Roles and Responsibilities

The Mission of the City's Public Works Department is:

> *To protect and manage public resources for the enjoyment of the citizens of Chico, to maintain safe streets, storm drains, and facilities for public use, and to establish sustainable management techniques that ensure availability of fully functional and efficient infrastructure, facilities, parks, and greenways for future generations.*

This Mission is consistent with the overarching goals of the Track 1 Trash Implementation Plan. The O&M Division of the Public Works Department is charged with, among other tasks, maintaining and servicing the City's streets, sanitary sewers, storm drains, traffic signals and lights, fleet and equipment, the Chico Municipal Airport and other public buildings and facilities. The Public Works Department organizational chart is provided as **Attachment A**. This chain of command shall be used for trash O&M procedures, with the O&M of FCS mostly falling under the responsibility of maintenance crews from right-of-way/street cleaning.

3. Inspections

The City currently inspects priority catch basins annually (i.e., those needing extra cleaning due to sediment buildup and/or institutional knowledge of more frequent maintenance). This inspection frequency shall continue, with increased frequency of inspections at locations where FCS have been installed. The City will inspect the FCS devices a minimum of twice per year; once prior to the wet season (April 15 – October 15) and once during the wet season (October 15 – April 15). It should be noted that inspection of some FCS may be necessary within the first 30 days of installation, per manufacturer specifications. Thus, the City should be sure to discuss the necessary frequency of inspections with vendors as FCS models are selected.

City maintenance crews address leaf litter from the second week in November through the first week in January. During this time, it will be difficult to schedule routine inspections and maintenance on FCS. Therefore, all pre-wet season inspections will generally be completed in September and October. The second round of inspections and maintenance will generally be conducted starting in January, except for emergency maintenance and repairs, which will be conducted on an as needed basis. Based on findings

[1] Full compliance shall occur within ten years of the effective date of the first implementing permit or no later than fifteen years from the effective date of the Statewide Trash Amendments (December 2, 2030).

during the second round of inspections, additional inspections and or maintenance will be scheduled as needed. Maintenance of devices is best performed during dry weather as trash is easier to remove when dry.

INSPECTION FORMS

Three forms are provided for FCS inspection and cleaning. The initial form that will be used for FCS inspection is provided in **Attachment B**. The inspection and cleaning field form is filled out for each site visited. The form asks for relevant information about the site and FCS and whether cleaning or maintenance is necessary. A compilation of all inspections performed at each site can be entered into the site log forms, which are included as **Attachment C** (Regional FCS Maintenance Log) and **Attachment D** (Distributed FCS Maintenance Log) to provide a snapshot of the findings of all visits to each FCS.

4. Maps and Schedules

A map of the potential locations for the FCS is provided as **Attachment E**. The siting of these locations is discussed in additional detail in the Track 1 Implementation Plan document. It is anticipated that the schedule for maintenance of these devices will follow the schedule for installation. Maintenance obligations will generally increase each year, up to year twelve, due to the addition of new FCS each year. The schedule is provided as **Table 1**.

Table 1. Number of Each Type of Full Capture Systems Needing Maintenance Each Year

Device Type	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
Regional:												
Small	0	1	5	8	11	14	17	20	23	25	27	29
Medium	0	1	3	5	7	9	11	13	15	17	19	21
Large	0	0	1	3	5	7	9	11	13	15	17	19
Distributed:												
Various	3	6	18	30	42	54	67	80	93	106	119	132
Public:												
Detention Basin	9	9	9	9	9	9	9	9	9	9	9	9
Leach Trench	2	2	2	2	2	2	2	2	2	2	2	2
Interceptor	8	8	8	8	8	8	8	8	8	8	8	8

5. Standard Operating Procedures (SOPs)

STRUCTURAL FULL CAPTURE SYSTEMS

Standard Operation Procedures (SOPs) for the structural FCS being recommended are included as **Attachment F**. These include hydrodynamic separators, baffle boxes, connector pipe screens, inlet filters, and skimmer boxes. The SOPs include a description and depiction of how mosquito vector control personnel can reasonably access areas with standing water within the FCS and/or storm water vault for observation and mosquito treatment. Additionally, once vendors are selected, they may offer device-specific maintenance tips which should be followed. For all maintenance, a log should be kept of maintenance activities, as described above under **Inspection Forms**.

MULTI-BENEFIT TREATMENT SYSTEMS

The State Water Board has created fact sheets for multi-benefit treatment systems[2]. These fact sheets are included as **Attachment G**. Regular maintenance is required to maintain adequate trash capture capacity and to ensure that trapped trash does not migrate offsite from bioretention, capture and use systems, detention basin, infiltration trenches and ditches, and media filters. The City's maintenance schedule is based on site-specific factors, including the size of the BMP, storm frequency, and characterization of upstream trash and vegetation accumulation. Vegetated facilities require annual plant, soil, and mulch layer maintenance to ensure optimal infiltration, storage, and pollutant removal. Facility trash maintenance requirements include:

- Irrigation of vegetation as needed during prolonged dry periods.
- Inspection of flow entrances, ponding area, and surface overflow areas, at a minimum annually, and removal trash and debris.
- Removal and proper disposal of trash and other litter throughout the facility.
- Inspection, and cleaning if necessary, the underdrain and observation well/clean-out port.
- Inspection of overflow devices for obstructions or debris, which should be removed immediately.
- Repair or replacement of damaged pipes upon discovery.

6. Data Management

Tracking of installed FCS is not only required for annual reporting, but will also help the City maintain thorough records of the existing devices. As implementation proceeds, this will be increasingly important for tracking the status and locations of the devices. **Attachment H** contains an Excel spreadsheet for tracking the following information, which is also used for annual reporting:

- Unique device Identifier (linked to location)
- Type of FCS
- Date of installation
- Frequency of routine inspections
- Date of last inspection
- Date of last maintenance
- Verification that FCS and corresponding drainage area is in GIS-mapping system

[2] https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/trash_implementation/mbtscoversheet_revised_09mar18b.pdf

7. Training Program

Training on FCS inspections and maintenance will be coordinated with the illicit discharge training, when feasible. However, the initial training may be a separate event due to the new policies and procedures which will be necessary for starting up this new program. Training activities will likely include a review of all inspection forms, as well as manufacturer recommended maintenance based on specific devices. The training will be logged consistent with **Attachments I and J**.

8. Estimated Costs

Maintenance of FCS is a critical component of a Track 1 compliance program. The estimated costs for maintenance in **Table 2** assume that the City owns the vacuum truck and is based on 2017 maintenance labor rates. It is estimated that Regional FCS maintenance will be approximately $1,000/device/year. Distributed devices, while more plentiful, average out to $400/device/year. Finally, public BMPs are estimated to cost $500/BMP/year to maintain due to staff time to visit, assess, and remove trash and debris.

Table 2. Estimated Cumulative Costs of Full Capture System Maintenance

Device Type	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
Regional:												
Small	$0	$1,000	$5,000	$8,000	$11,000	$14,000	$17,000	$20,000	$23,000	$25,000	$27,000	$29,000
Medium	$0	$1,000	$3,000	$5,000	$7,000	$9,000	$11,000	$13,000	$15,000	$17,000	$19,000	$21,000
Large	$0	$0	$1,000	$3,000	$5,000	$7,000	$9,000	$11,000	$13,000	$15,000	$17,000	$19,000
Distributed	$1,200	$2,400	$7,200	$12,000	$16,800	$21,600	$26,800	$32,000	$37,200	$42,400	$47,600	$52,800
Public:												
Detention Basin	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500
Leach Trench	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
Interceptor	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000
TOTAL:	$10,700	$13,900	$25,700	$37,500	$49,300	$61,100	$73,300	$85,500	$97,700	$108,900	$120,100	$131,300

Assumptions: Regional FCS maintenance estimated at $1000/device/year. Distributed FCS maintenance estimated at $400/device/year. Public BMPs estimated at $500/BMP/year. Estimates are current industry standards based on efforts to date around California. The above costs are for planning level purposes only. Costs will be adjusted as the City begins maintenance activities and is able to assess actual levels of effort. Examples of documents providing planning cost estimates include:

- Bay Area-wide Trash Capture Demonstration Project, Final Report (2013, SFEI)
- City of San Jose, 2011. San Jose Litter and Trash Reduction Plan http://www.sanjoseca.gov/DocumentCenter/View/1292
- City of Palo Alto, City Council Informational Report on Installation of Trash Capture Devices in the Municipal Storm Drain System as Part of Palo Alto's Short-Term Trash Reduction Plan (2012)
- Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) BMP Trash Toolbox (July 2007).

9. Plan Optimization

While this Operations and Maintenance Plan covers the entire 12-year compliance period, it is understood that the first few years of implementation will serve as a pilot study and data gathering exercise for FCS installation. Information gathered during the initial FCS installations may alter the current, estimated costs and initial decisions presented in this Plan. As such, this Plan is dynamic and will be modified as needed based on experience and knowledge gained.

The City will evaluate this Plan every two years and make modifications as needed. In conducting this review, the City will consider data and information provided by program staff and/or other sources as needed. The Plan may be modified to remove or adjust maintenance of FCSs determined as ineffective or inappropriate. This review will generally include, but not be limited to, the following:

- Review of Devices
    - Are installed devices working as designed?
    - Are there any maintenance concerns?
    - Have any devices broken or been vandalized?
    - Have any new maintenance techniques been developed that may meet the City's needs?
- Review of Priority Areas
    - Are higher/lower levels of trash noticed anywhere in the City, such that the maintenance of FCS should be re-prioritized?
- Review of Maintenance Schedule
    - Is the maintenance schedule achievable?
    - Are schedule modifications needed (frequency, time of year, etc.)?
    - Is additional staffing or equipment necessary?

A log of any significant revisions to the Operations and Maintenance Plan will be maintained (**Attachment K**).

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Attachment A. Public Works Department Organizational Chart

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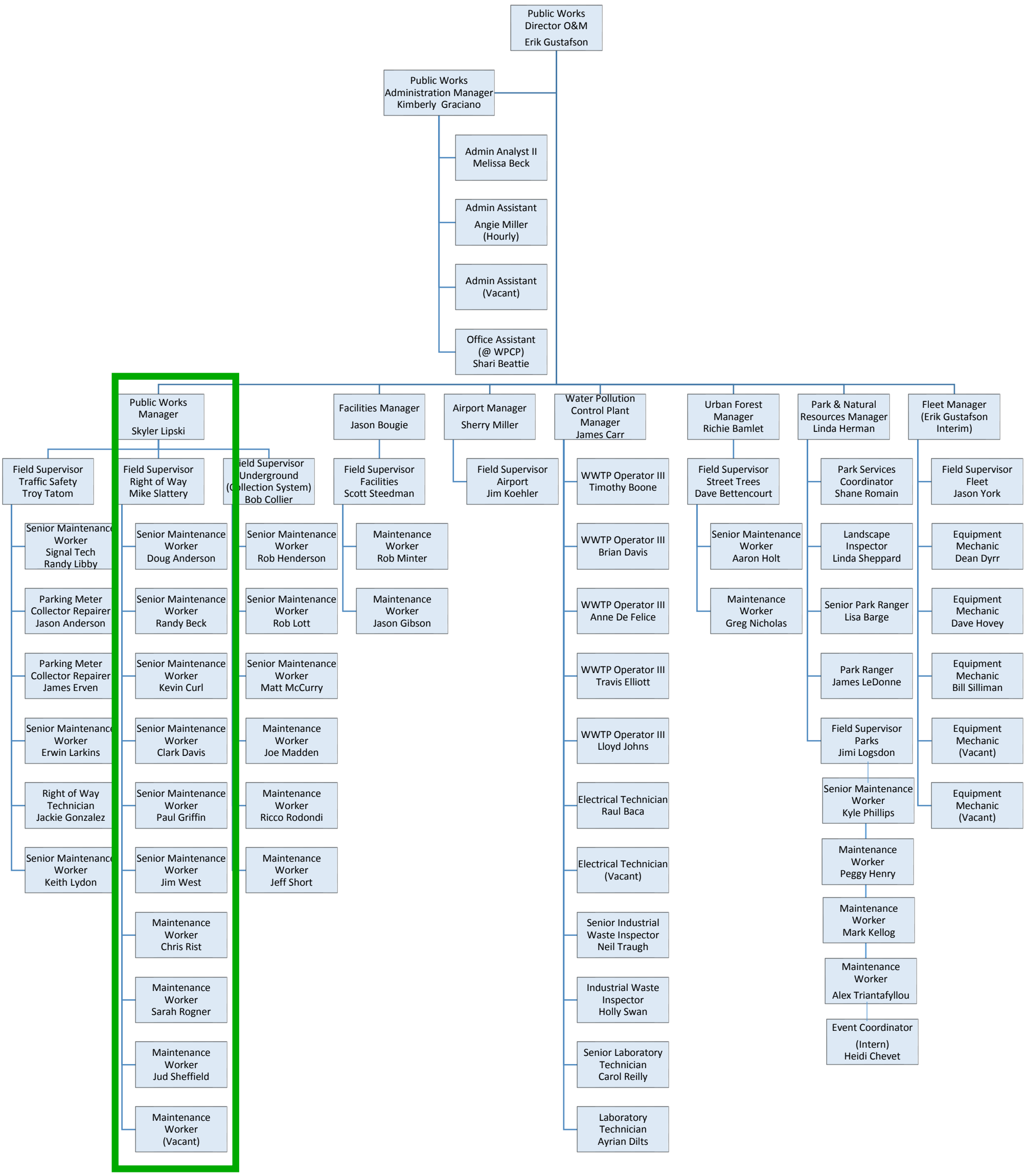
Public Works O&M Organization Chart



= Key staff for Trash O&M Plan

Updated: May 22, 2018

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Attachment B. Trash Full Capture System Inspection & Cleaning Field Form

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City of Chico

Trash Full Capture System Inspection & Cleaning Field Form

FCS Site ID:		Inspector:		Inspection Date:	

Date FCS was last cleaned prior to this inspection:

Type of FCS:

- ☐ Connector Pipe Screen
- ☐ Catch Basin Filter
- ☐ Inlet Skimmer
- ☐ Hydrodynamic Separator
- ☐ Baffle Box
- ☐ Capture and Use
- ☐ Detention Basin
- ☐ Bioretention Basin
- ☐ Infiltration Trench
- ☐ Media Filter
- ☐ Other:

Inspection Results

Percent full of trash:	
Percent full of sediment:	
Percent full of leaves:	
Does FCS require clean-out:	☐ Yes ☐ No

If evident, identify likely source of trash, sediment, leaves:

Clean-out Results

(Note: Trash and debris in high priority facilities must be removed prior to the start of the rainy season.)

Date facility cleaned out:	
Volume/Weight of trash removed from facility	
Volume/Weight of sediment removed from facility	
Volume/Weight of leaves removed from facility	
Water depth to sediment, feet (for HDS)	
Floatable layer thickness, inches (for HDS)	

Additional FCS Notes

(Note any repairs needed, vandalism concerns, vector issues, etc.)

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Attachment C. Regional Full Capture System Maintenance Log

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Device ID:

Date	Water Depth to Sediment (feet)	Flotable Layer Thickness (inches)	Description of Maintenance	Personnel	Comments

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Attachment D. Distributed/Multi-benefit Full Capture System Maintenance Log

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Device ID:

Date	% Full	% Sediment	% Leaves	% Trash	Description of Maintenance	Personnel	Comments

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Attachment E. Jurisdictional Maps and Identification of Potential Full Capture Systems

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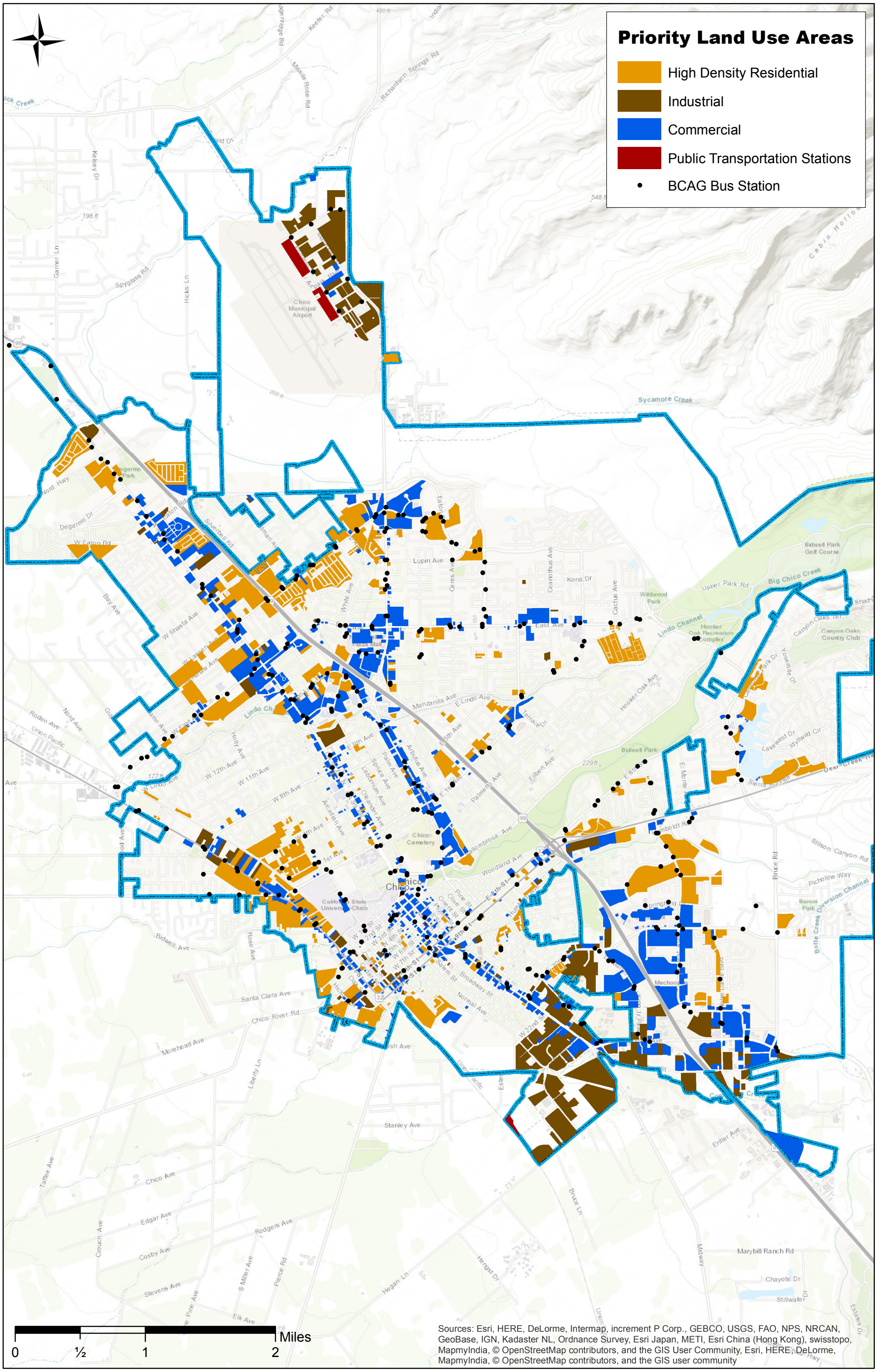
Priority Land Use Areas
High Density Residential
Industrial
Commercial
Public Transportation Stations
BCAG Bus Station
Chico Municipal Airport
Sycamore Creek
Lupin Ave
Manzanita Ave
E Lindo Ave
W Shasta Ave
Bidwell Park
Big Chico Creek
Lindo Channel
Chico
Stanley Ave
Marybill Ranch Rd
Chico River Rd
Santa Clara Ave
Morehead Ave
Bidwell Ave
Stillwater
Miles
0
½
1
2
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

Potential Full Capture Systems

New Installations

- Inlet Device
- Small Outfall Device
- Medium Outfall Device
- Large Outfall Device

Existing Devices

- Public Interceptor
- Other Public BMP
- Private BMP
- Detention Basin
- Stormdrain Lines

Other Areas of Interest

Priority Land Use Area

- Other PLU
- Industrial PLU
- SWRP Project Area
- City Boundary

0 ½ 1 2 Miles

Attachment F. Structural Full Capture System Standard Operating Procedures

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CITY OF CHICO
Public Works Department

STANDARD OPERATING PROCEDURE

Standard Operating Procedure to: Maintain Debris Separating Baffle Boxes	**Creation Date: 08/13/2018**
Prepared: **Approved:**	
Scope and Location: Clean and Maintain Debris Separating Baffle Boxes Citywide	
List of Tools/Equipment/Materials: • Vacuum truck • Traffic control devices • Manhole lid lifter	
Safety/Hazards Identification and Required Safety Equipment: Traffic Control – high visibility vests, hard hats, steel-toed safety boots, safety glasses	

Note: This SOP may be modified as needed based on manufacturer specifications and/or suggested maintenance.

A. Purpose

To inspect and clean the City-owned Debris Separating Baffle Boxes at least twice per year, with more frequent inspections as necessary in heavy trash, leaf or sediment generating areas.

B. Safety/Hazards Identification

Traffic control procedures need to be followed, as applicable. On an annual basis, before the wet season, City shall provide a list of newly installed FCS to the local mosquito and vector control agency. This list shall include the facility locations, a description of the FCS installed, and access considerations.

C. Resources

Full Capture System Maintenance Log Templates

D. Procedures

As sediment accumulates, the chance for resuspension of the material increases and pollutant removal efficiencies can decline, which can lead to odor and mosquito breeding problems. Confined space entry is not typically needed for inspection or maintenance.

It is important to establish a routine inspection and maintenance schedule. Maintenance schedules depend on individual site characteristics, including typical sediment loads, the size of the drainage area, flow rates, land use in the area. The size of the box may also impact the maintenance schedule. In general, the deeper the box, the longer it can function before needing maintenance.

1. <u>Site Preparation</u>

a. Position all traffic control devices immediately upon arrival at the work site
b. On a pre-prepared inspection report note all site conditions and device conditions. The report should include observations regarding:
    i. The stability of the watershed contributing to the device regarding landscaped areas, i.e. is there erosion occurring? Or are there any conditions present that may bring large quantities of sediment and debris to the unit?
    ii. Take note if there is damage, undue wear or any other noteworthy items in the unit's construction

2. Inspection
    a. Remove the manhole cover(s)
    b. Visually inspect the unit to determine whether the system components are in working order and that there are no blockages or obstructions.
3. Cleaning
    a. Clean the baffle box when the chamber is estimated to be 40% full.
    b. Clean the baffle box during dry weather conditions when no flow is entering the system.
    c. Insert the vacuum hose into the chamber. Completely evacuate the system of trash and leaves.
        i. Do not clean out boxes if base flow remains in the inlet pipes.
        ii. To block incoming flow, place inflatable plugs or sandbags in the inflow pipe or in the manhole upstream.
        iii. If the box is below the outfall level, use additional plugs to prevent backflow
    d. Residual material from baffle boxes is not considered hazardous and, therefore, its disposal is not problematic.
    a. Securely seat manhole covers (if applicable) to prevent leakage of runoff into the system.
    b. Sweep and remove any sediment and debris from the maintenance area and remove all traffic control devices.

References:

Bio Clean Environmental Services 2018, Debris Separating. Baffle Box (DSBB) [Brochure], Oceanside, CA. URL: http://www.biocleanenvironmental.com/wp-content/uploads/2018/03/DSBB-brochure.pdf

United States Environmental Protection Agency 2001, Storm Water Technology, Fact Sheet Baffle Boxes, EPA 832-F-01-004. URL: https://nepis.epa.gov/Exe/ZyPDF.cgi/P100IL55.PDF?Dockey=P100IL55.PDF

CITY OF CHICO
Public Works Department

STANDARD OPERATING PROCEDURE

Standard Operating Procedure to: Maintain Inlet Filters, Connector Pipe Screens and Skimmer Boxes	**Creation Date: 08/13/2018**
Prepared: **Approved:**	
Scope and Location: Clean and Maintain Inlet filters, Connector Pipe Screens and Skimmer Boxes Citywide	
List of Tools/Equipment/Materials: • Shovel • Small shop vacuum • Vacuum truck • Grate hook • Traffic control devices	
Safety/Hazards Identification and Required Safety Equipment: Confined Space Entry; Traffic Control – high visibility vests, hard hats, steel-toed safety boots, safety glasses	

Note: This SOP may be modified as needed based on manufacturer specifications and/or suggested maintenance.

A. Purpose

To inspect and clean the City-owned Inlet filters, Connector Pipe Screens and Skimmer Boxes prior to, during (as needed), and following the rainy season.

B. Safety/Hazards Identification

Traffic control procedures need to be followed, as applicable.
Confined space entry procedures need to be followed if physical access is required.
On an annual basis, before the wet season, City shall provide a list of newly installed FCS to the local mosquito and vector control agency. This list shall include the facility locations, a description of the FCS installed, and access considerations.

C. Resources

Full Capture System Maintenance Log Templates

D. Procedures

Catch basins should be cleaned out at least 2 times per year and/or if debris has filled above a 40% level inside of the catch basin. Sites with large amounts of foliage, high sediment loads, or smaller devices might need to be cleaned more frequently.

1. <u>One (1) day before cleaning or inspection</u>
    a. Notify supervisor of scheduled activities.
    b. Conduct a pre-entry confined space entry check list if necessary.
    c. Request rescue support from the City Fire Department (FD) if needed for confined space entry.
2. <u>Site Preparation</u>
    a. Position all traffic control devices immediately upon arrival at the work site

b. On a pre-prepared inspection report note all site conditions and device conditions. The report should include observations regarding:
    i. The stability of watershed contributing to the device regarding landscaped areas, i.e. is there erosion occurring? Is there any potential for transfer of large quantities of sediment and debris to the unit?
    ii. Take note if there is damage or undue wear in the unit's construction

3. Inspection
    a. Visually inspect the unit to determine whether the system components are in working order and that there are no blockages or obstructions.
    b. Visually inspect the catch basin for defects and possible illegal dumping.
        i. If illegal dumping has occurred, notify the proper authorities and property owner representative as soon as practicable.
    c. Ensure there is no standing water inside of catch basin. Such condition indicates the device is not properly draining.
4. Cleaning
    a. Clear trash and debris located immediately in front of curb opening or side opening of grated catch basin, and on top or between its metal grates.
    b. Remove vegetation growing across and/or blocking the basin opening.
    c. Remove all trash and debris and vegetation from inside the catch basin.
    d. Remove trash and debris that cover the perforated openings of, or is inside the connector pipe opening, upstream or downstream.
    e. Remove the collected materials from the device using an industrial vacuum or shovel.
        i. For deeper locations, confined space entry may be necessary if a shovel or small vacuum is used.
    f. If the devices contain fabrics or netting, pay extra attention while cleaning the device to prevent accidental tearing or breakage during cleaning.
    g. Inspect the filter liner, gaskets, stainless steel frame and mounting brackets, etc. after removal of the captured materials.
        i. Correct minor damage or defects on-the-spot and record it on the maintenance form.
        ii. Correct more extensive deficiencies (torn liner, bent frame, etc.)
    h. Replace the grate or maintenance cover if needed.
    i. For skimmer boxes, remove the grate and the skimmer tray
        i. Check the storm boom for replacement. If it needs replacement, cut zip ties and remove the storm boom from the skimmer tray. Remove all debris from skimmer tray.
        ii. Attach new storm boom to skimmer tray with zip ties.
        iii. For manual servicing, remove the filtration box from the inlet, dump contents into a trash container and brush screens clean. Wash them using a powerhead if necessary.
        iv. For vacuum servicing, reach into the filtration box with the vacuum and suction out collected debris. Clean screens with a spray wand or brush.
        v. Place filtration box into inlet, place skimmer tray into filtration box and replace grate.
    j. Upon completion of a cleanout operation, sweep the top surface of the catch basin and the area 2 feet around it.

References:

Jen-Hill Construction Materials 2013, Grate Inlet Skimmer Box [Brochure], Hendersonville TN. URL: http://www.jenhill.com/wp-content/uploads/2013/09/gisb-maintenance-service-guide-templatea.pdf
Flexstorm Inlet Filters 2018, Flexstorm Connector Pipe Screen (CPS) Maintenance Guidelines [Brochure]. URL: http://www.inletfilters.com/sites/default/files/resource-files/CPS%20maintenance%20guide_2.pdf

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CITY OF CHICO
Public Works Department

STANDARD OPERATING PROCEDURE

Standard Operating Procedure to: Maintain Hydrodynamic Separators	**Creation Date: 08/13/2018**
Prepared: **Approved:**	
Scope and Location: Clean and Maintain Hydrodynamic Separators Citywide	
List of Tools/Equipment/Materials: • Vacuum truck equipped with a water supply and high-pressure water spray • Traffic control devices • Calibrated dipstick	• Tape measure or other measuring instrument • As-built drawing for the unit • Manhole lid lifter
Safety/Hazards Identification and Required Safety Equipment: Confined Space Entry; Traffic Control; Disposal of Removed Materials – high visibility vests, hard hats, steel-toed safety boots, safety glasses	

Note: This SOP may be modified as needed based on manufacturer specifications and/or suggested maintenance.

A. Purpose

To inspect and clean the City-owned Hydrodynamic Separators twice per year, with more frequent inspections as necessary in heavy trash, leaf, sediment generating areas.

B. Safety/Hazards Identification

Traffic control procedures need to be followed, as applicable.
Confined space entry procedures need to be followed if physical access is required.
On an annual basis, before the wet season, City shall provide a list of newly installed FCS to the local mosquito and vector control agency. This list shall include the facility locations, a description of the FCS installed, and access considerations.

C. Resources

Full Capture System Maintenance Log Templates

D. Procedures

Access to the unit is typically achieved through manhole cover(s), which will allow for inspection and cleanout of the separation chamber (cylinder and screen), isolated sump, and sediment captured and retained outside the screen. It is important to establish a routine inspection and maintenance schedule. Maintenance schedules depend on individual site characteristics, including typical sediment loads, the size of the drainage area, flow rates, land use in the area.

1. <u>One (1) day before cleaning or inspection</u>
    a. Notify supervisor of scheduled activities.

b. Conduct a pre-entry confined space entry check list if necessary.
c. Request rescue support from the City Fire Department (FD) if needed for confined space entry.

2. Site Preparation
    a. Position all traffic control devices immediately upon arrival at the work site
    b. On a pre-prepared inspection report note all site conditions and device conditions. The report should include observations regarding:
        i. The stability of watershed contributing to the device regarding landscaped areas, i.e. is there erosion occurring? Is there any potential for transfer of large quantities of sediment and debris to the unit?
        ii. Take note if there is damage or undue wear in the unit's construction
        iii. Take note of the depth to any accumulated sediment pile using the manhole frame as a reference point, a tape measure or other graduated measuring device.
3. Inspection
    a. Remove the manhole cover(s)
    b. Visually inspect the unit to determine whether the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen.
    c. Quantify the accumulation of trash, leaves and sediment in the system by measuring pollutant accumulation using a calibrated dipstick, tape measure or other measuring instrument.
    d. Determine sediment level by measuring from finished grade down to the top of the sediment pile.
        i. Measuring device must be lowered to the top of the sediment pile.
        ii. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles in the bottom of the pile.
        iii. Record this measurement and compare to the unit's as-built drawing
4. Cleaning
    a. If not specified by manufacturer, clean the unit when the level of sediment reaches 75% of capacity in the isolated sump.
    b. Cleaning of a unit should be done during dry weather conditions when no flow is entering the system.
    c. The maintenance of most units requires the use of a vacuum truck equipped with a water supply and a high-pressure water spray.
        i. Use a high-pressure water spray to wash sediment and debris from all surfaces of the device into the sump where it may be vacuumed out. Insert the vacuum hose into the sump:
        ii. Fully drain down the system and evacuate the sump of sediment.
        iii. Clean the screen to ensure it is free of trash and debris.
        iv. Clean out the area outside the screen if pollutant build-up exists.
    d. Make another measurement from the same reference point used above to the bottom of the device. Calculate the sediment depth by subtracting the first measurement from the top of the sediment pile from the total unit dept.
        i. Record this depth on the inspection report.
    e. Securely seat manhole covers to prevent leakage of runoff into the system.
    f. Sweep and remove any sediment and debris from the maintenance area and remove all traffic control devices.

References:

Stormwater Equipment Manufacturers Association 2015, Hydrodynamic Separators, URL: https://www.stormwaterassociation.com/hydrodynamicseparators

United States Environmental Protection Agency 1999, Storm Water Technology, Fact Sheet Hydrodynamic Separators, EPA 832-F-99-017, URL: https://nepis.epa.gov/Exe/ZyPDF.cgi/P1000ZRK.PDF?Dockey=P1000ZRK.PDF

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Attachment G. Multi-Benefit Treatment System Fact Sheets

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Bioretention

Trash Best Management Practices (BMP)
Minimum Specifications

Figure A: CA State University-Sacramento Bioretention BMP

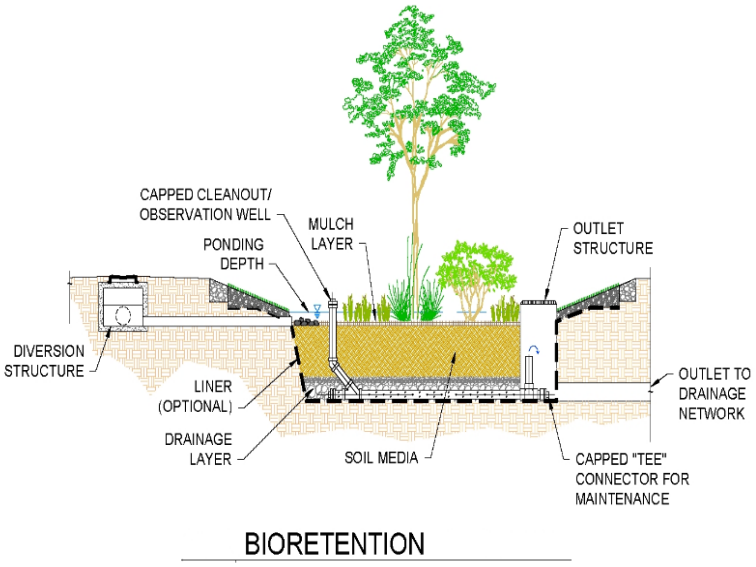

Figure B. Tetra Tech / CASQA

Description

Bioretention BMPs remove pollutants from storm water runoff through physical filtration as storm water passes through media layers. The treatment area consists of a ponding layer, a vegetated and mulched layer, an engineered soil layer, and a supporting bed layer of sand or gravel. Storm water entering the treatment area evapotranspires or gradually passes through the mulch/soil/gravel layers where it then infiltrates into native soil or collects in an underdrain that conveys to a discharge point. Bioretention BMPs vary in shapes and sizes. The Executive Director does not certify as trash Full Capture Systems any bioretention BMPs that have a permanent pool of water, such as wet ponds or wetlands.

Performance and Design

1. The bioretention BMP must trap trash particles that are 5 mm or greater, and include a screen[1] at the BMP inlet, overflow, or bypass outlet to trap these particles from either of the following:
    a. The peak flow rate generated by the region specific one-year, one-hour storm event from the applicable subdrainage area, or
    b. The flow capacity of the existing corresponding storm drain design.

    A screen is not required if the BMP has capacity to treat either of these flows through media filtration or infiltration into native or amended soils;
2. The bioretention BMP must have a minimum treatment capacity for either of the flow rates described in 1.a. or b. above. State Water Board recommends using the Rational Equation method to calculate the peak flow rate for runoff from a small subdrainage area that is approximately 50 acres or less. The Rational Equation is expressed as Q = CiA, where

    Q = design peak runoff rate, cfs,
    C = runoff coefficient, dimensionless,
    i = rainfall intensity as determined per the rainfall isohyetal map specific to each region, inches/hour, and
    A = subdrainage area, acres.

    State Water Board allows other calculation methods for drainage areas greater than 50 acres to accurately calculate and predict the peak flow rates; provided a registered California licensed professional engineer documents the calculations within the design plans.
3. The bioretention BMP design plans must be stamped and signed by a registered California licensed professional civil engineer (see Bus. & Prof. Code Section 6700, et seq.).

Maintenance

Regular maintenance is required to maintain adequate trash capture capacity and to ensure that trapped trash does not migrate offsite. The owner should establish a maintenance schedule based on site-specific factors, including the size of the bioretention BMP, storm frequency, and estimated or measured trash loading area.

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[1] Upon approval by the Regional Water Quality Control Board Executive Officer, a 5mm screen will not be required if there is an external design feature or up-gradient structure designed to bypass flows exceeding the region specific one-year, one-hour storm event; or when the BMP's capacity to trap particles exceeds flows generated by the one-year, one-hour storm event.

Storm Water Capture and Use or Release

Trash Best Management Practices (BMP) Minimum Specifications

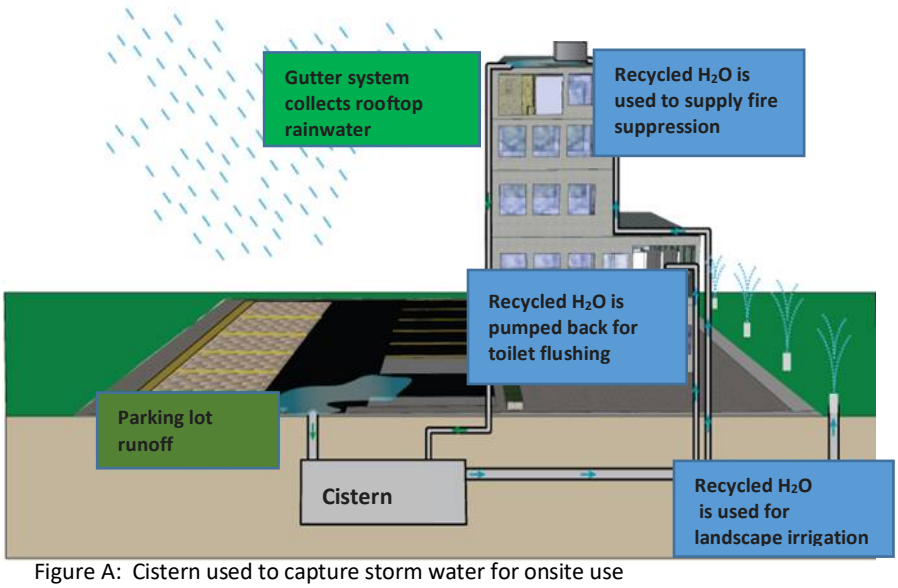

Figure A: Cistern used to capture storm water for onsite use
San Diego County LID Handbook Photo

Figure B: Large Scale Capture and Use Tank

Description

Storm Water Capture BMPs harvest storm water runoff to store for later use or release for immediate use. Storm water is then used in a variety of applications including irrigation, toilet flushing, and other non-potable uses. There are numerous designs for these storm water BMPs, in addition to the two shown above.

Performance and Design

1. The Storm Water Capture and Use or Release BMPs must be designed to trap particles that are 5 mm or greater, and include a screen[1] at the BMP inlet, overflow or bypass outlet to trap these particles from either of the following BMP designs:
   a. A flow-based design for: 1) peak flow rates generated by the region specific one-year, one-hour storm event from the applicable subdrainage area; or 2) the trash treatment capacity equal to or greater than the corresponding storm drain's design flow rate; or
   b. A volume-based design that includes a trash treatment capacity that is equal to or greater than the volumetric sizing criteria for treatment systems in the applicable storm water permit, but not less than the volume generated from a one-year, one-hour storm event.

   A screen is not required if the BMP has capacity to treat either of these flows through media filtration or infiltration into native or amended soils;
2. The Storm Water Capture and Use or Release BMPs must have a minimum treatment capacity for either of the flow rates described in 1.a. or b. above. State Water Board recommends using the Rational Equation method to calculate the peak flow rate for runoff from a small subdrainage area that is approximately 50 acres or less. The Rational Equation is expressed as Q = CiA, where
   Q = design peak runoff rate, cfs,
   C = runoff coefficient, dimensionless,
   i = rainfall intensity as determined per the rainfall isohyetal map specific to each region, inches/hour, and
   A = subdrainage area, acres.
3. The Storm Water Capture and Use or Release BMP design plans must be stamped and signed by a registered California licensed professional civil engineer (see Bus. & Prof. Code Section 6700, et seq.).

Regular maintenance is required to maintain adequate trash capture capacity for the generated runoff of the anticipated storm. The owner should establish a maintenance schedule based on site-specific factors, including the size of the Storm Water Capture BMP, storm frequency, and estimated or measured trash loading rates.

[1] Upon approval by the Regional Water Quality Control Board Executive Officer, a 5mm screen will not be required if there is an external design feature or up-gradient structure designed to bypass flows exceeding the region specific one-year, one-hour, storm event; or when the BMP's capacity to trap particles is considerably greater than the capacity to trap particles for flows generated by the one-year, one-hour storm event.

Detention Facilities

Trash BMP Minimum Specifications

Figure A: Detention BMP

Description

A detention BMP, or retarding basin, is a local topographic depression designed to reduce potential for flooding by reducing peak flow rates. These BMPs are also called "dry ponds," "holding ponds," or "dry detention basins," and are distinguishable from retention basins that are commonly known as "wet ponds" and designed to contain some water all-year-round. Detention BMPs may also be located underground in an array of pipe, chambers, concrete vaults, or other void structures.

Performance and Design

1. The detention BMP must trap trash particles that are 5 mm or greater, and include a screen[1] at the BMP inlet, overflow, or bypass outlet to trap these particles from either of the following BMP designs:
   a. A flow-based design for: 1) peak flow rates generated by the region specific one-year, one-hour storm event from the applicable subdrainage area; or 2) the trash treatment capacity equal to or greater than the corresponding storm drain's design flow rate; or
   b. A volume-based design that includes a trash treatment capacity that is equal to or greater than the volumetric sizing criteria for treatment systems in the applicable storm water permit, but not less than the volume generated from a one-year, one-hour storm event.
2. A screen is not required if the BMP has capacity to treat either of these flows through media filtration or infiltration into native or amended soils;
3. The detention BMP must have a minimum treatment capacity for either of the flow rates described in 1.a. or b. above. State Water Board recommends using the Rational Equation method to calculate the peak flow rate for runoff from a small subdrainage area that is approximately 50 acres or less. The Rational Equation is expressed as Q = CiA, where

   Q = design peak runoff rate, cfs,
   C = runoff coefficient, dimensionless,
   i = rainfall intensity as determined per the rainfall isohyetal map specific to each region, inches/hour, and
   A = subdrainage area, acres.

   State Water Board allows other calculation methods for drainage areas greater than 50 acres to accurately calculate and predict the peak flow rates; provided a registered California licensed professional engineer documents the calculations within the design plans.
4. The detention BMP design plans must be stamped and signed by a registered California licensed professional civil engineer (see Bus. & Prof. Code Section 6700, et seq.).

Maintenance

Regular maintenance is required to maintain adequate trash capture capacity and ensure that trapped trash does not migrate offsite. The owner should establish a maintenance schedule based on site-specific factors, including the size of the detention BMP, storm frequency, and estimated or measured trash loading area.

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[1] Upon approval by the Regional Water Quality Control Board Executive Officer, a 5mm screen will not be required if there is an external design feature or up-gradient structure designed to bypass flows exceeding the region specific one-year, one-hour storm event; or when the BMP's capacity to trap particles exceeds flows generated by the one-year, one-hour storm event.

Infiltration Trench or Basin

Trash Best Management Practices (BMP) Minimum Specifications

Figure A: Urban Infiltration Trench BMP

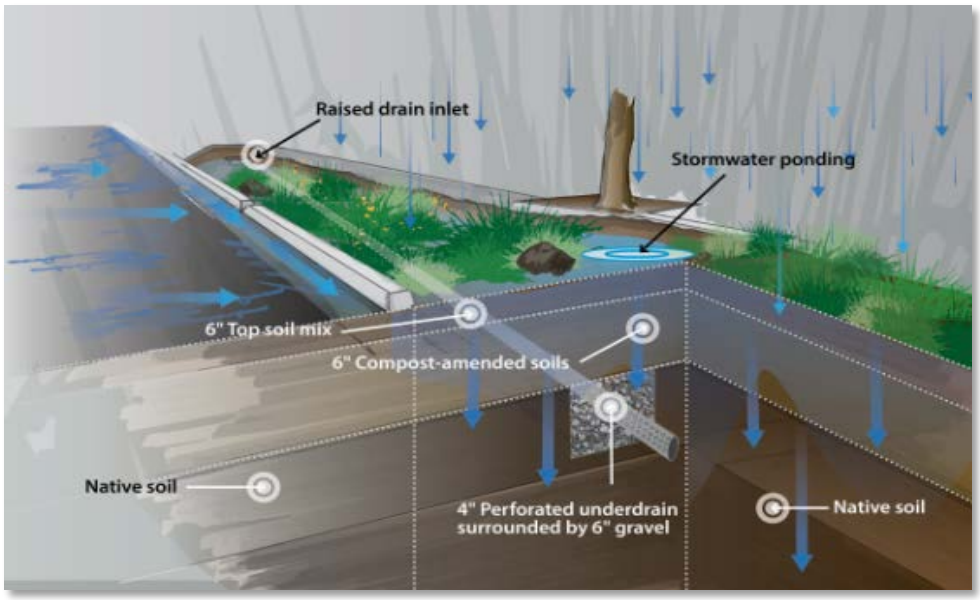

Figure B: CSUS-Sacramento Generic Urban Infiltration Trench BMP Detail

Description

An infiltration trench or basin BMP captures and infiltrates storm water runoff into native soils. Infiltration trench or basin BMPs come in a variety of shapes and sizes and the final appearance may vary substantially. Infiltration trenches may be backfilled with porous media such as gravel, sand, Cornell Soil, or various locally earthed rocks known not to generate pollutants of concern to the downstream waters. Subsurface designs may be comprised of perforated pipe, chambers, open bottom concrete galleries or other high voids structures. These trenches and basins store the design water quality volume for infiltration to underlying soils.

Performance and Design

1. The infiltration trench BMPs must trap trash particles that are 5 mm or greater, and include a screen[1] at the BMP inlet, overflow, or bypass outlet to trap these particles from either of the following BMP designs:
   a. A flow-based design for: 1) the peak flow rates generated by the region specific one-year, one-hour storm event from the applicable subdrainage area; or 2) the trash treatment capacity equal to or greater than the corresponding storm drain's design flow rate; or
   b. A volume-based design that includes a trash treatment capacity that is equal to or greater than the volumetric sizing criteria for treatment systems in the applicable storm water permit, but not less than the volume generated from a one-year, one-hour storm event.
2. A screen is not required if the BMP has capacity to treat either of these flows through media filtration or infiltration into native or amended soils;
3. The infiltration trench BMPs must have a minimum treatment capacity for either of the flow rates described in 1.a. or 1.b. above. State Water Board recommends using the Rational Equation method to calculate the peak flow rate for runoff from a small subdrainage area that is approximately 50 acres or less. The Rational Equation is expressed as Q = CiA, where
   Q = design peak runoff rate, cfs,
   C = runoff coefficient, dimensionless,
   i = rainfall intensity as determined per the rainfall isohyetal map specific to each region, inches/hour, and
   A = subdrainage area, acres.
   State Water Board allows other calculation methods for drainage areas greater than 50 acres to accurately calculate and predict the peak flow rates; provided a registered California licensed professional engineer documents the calculations within the design plans.
4. The infiltration trench BMPs design plans must be stamped and signed by a registered California licensed professional civil engineer (see Bus. & Prof. Code Section 6700, et seq.).

Maintenance

Regular maintenance is required to maintain adequate trash capture capacity and to ensure that captured trash does not migrate offsite. The owner should establish a maintenance schedule based on site-specific factors, including the size of the infiltration trench BMP, storm frequency, and characterization of upstream trash and vegetation accumulation.

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[1] Upon approval by the Regional Water Quality Control Board Executive Officer, a 5mm screen will not be required if there is an external design feature or up-gradient structure designed to bypass flows exceeding the region specific one-year, one-hour storm event; or when the BMP's capacity to trap particles exceeds flows generated by the one-year, one-hour storm event.

Media Filter
Trash Best Management Practices (BMP)
Minimum Specifications

Figure A: Media Filter BMP Image
County of San Diego LID Handbook BMP Image

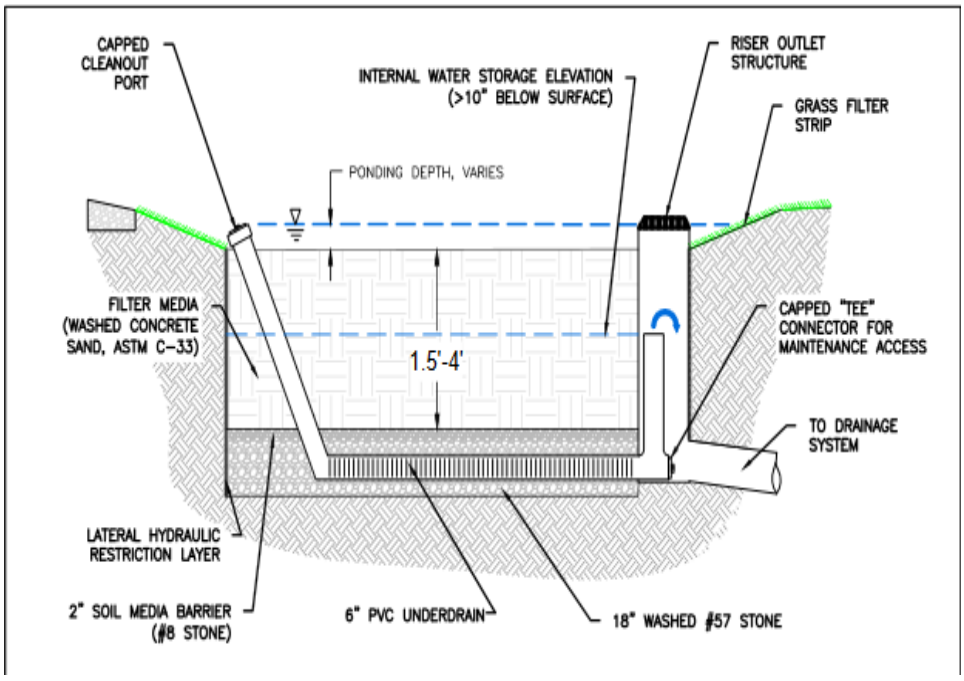

Figure B: Generic Media Filter BMP Detail
County of San Diego LID Handbook BMP Image

Description

A media filter BMP uses a bed of sand, peat, zeolite, anionic and/or cationic media, granite or other fine grained materials or fabrics to physically separate sediment and sediment-bound pollutants and/or electro-chemically remove dissolved constituents from storm water.

Performance and Design

1. The media filter BMP must trap trash particles that are 5 mm or greater, and include a screen[1] at the BMP inlet, overflow, or bypass outlet to trap these particles from either of the following BMP designs:
   a. A flow-based design for: 1) peak flow rates generated by the region specific one-year, one-hour storm event from the applicable subdrainage area; or 2) the trash treatment capacity equal to or greater than the corresponding storm drain's design flow rate; or
   b. A volume-based design that includes a trash treatment capacity that is equal to or greater than the volumetric sizing criteria for treatment systems in the applicable storm water permit, but not less than the volume generated from a one-year, one-hour storm event.
2. A screen is not required if the BMP has capacity to treat either of these flows through media filtration or infiltration into native or amended soils;
3. The media filter BMP must have a minimum treatment capacity for either of the flow rates described in 1.a. or b. above. State Water Board recommends using the Rational Equation method to calculate the peak flow rate for runoff from a small subdrainage area that is approximately 50 acres or less. The Rational Equation is expressed as Q = CiA, where
   Q = design peak runoff rate, cfs,
   C = runoff coefficient, dimensionless,
   i = rainfall intensity as determined per the rainfall isohyetal map specific to each region, inches/hour, and
   A = subdrainage area, acres.
   State Water Board allows other calculation methods for drainage areas greater than 50 acres to accurately calculate and predict the peak flow rates; provided a registered California licensed professional engineer documents the calculations within the design plans.
4. The bioretention BMP design plans must be stamped and signed by a registered California licensed professional civil engineer (see Bus. & Prof. Code Section 6700, et seq.).

Maintenance

Regular maintenance is required to maintain adequate trash capture capacity and to ensure that captured trash does not migrate offsite. The owner should establish a maintenance schedule based on site-specific factors including the size of the media filter BMP, storm frequency, and characterization of upstream trash and vegetation accumulation.

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[1] Upon approval by the Regional Water Quality Control Board Executive Officer, a 5mm screen will not be required if there is an external design feature or up-gradient structure designed to bypass flows exceeding the region specific one-year, one-hour storm event; or when the BMP's capacity to trap particles exceed flows generated by the one-year, one-hour storm event.

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Attachment H. City of Chico Annual Report of Full Capture System Compliance

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City of Chico Annual Report of Full Capture System Compliance

Date:

Device ID	Type of FCS	Date Installed	Inspection Frequency	Date of Last Inspection	Date of Last Maintenance	Drainage Area Mapped?

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Attachment I. Operations & Maintenance Staff Training Log

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Operations & Maintenance Staff Training Log

Date	Description of Training	Personnel in Attendance

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Attachment J. Operations & Maintenance Staff Training Sign-in Sheet

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City of Chico Operations & Maintenance Staff Training Sign-in Sheet

Training Title: _____

Date: _____

Name	Signature

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Attachment K. Operations & Maintenance Plan Change Log

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Trash Operations and Maintenance Plan Change Log

Date	Summary of Changes Made	Personnel	Comments

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Attachment L. August 2018 Public Review – Response to Comments

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City of Chico Track 1 Trash Operations & Maintenance Plan

August 2018 Public Review - Response to Comments

Number	Commentor	Comment	Response
1	Susan Mason	Regarding the Trash Master Plan for the City of Chico, I read the implementation and O&M plans and attended the presentation about the plan. What is primarily missing from the documents is a clear statement that this plan applies only to capturing trash from the city right-of-ways, primarily from pavement. Its purpose is to comply with the State Water Board mandate, but unfortunately it will only eliminate a tiny fraction of the trash in Chico's creeks at a very high cost for installation and maintenance.	Thank you for participating in the public review of the documents. A statement has been included in Section 1 regarding the intent of Trash Amendments.
2	Susan Mason	Also, I don't understand how the Adaptive Management element would work. What information will be collected and analyzed that might affect plan implementation? Who will be doing this analysis?	A new Section 9 titled "Plan Optimization" was added so that it is explicit as to what is being achieved through this work effort and how the plan will be adaptively managed over the next 12 years. As is described in this section, the City will conduct a review every two years to ensure that the plan is achieving the established goals and modify it as needed. The types of information that will be collected and assessed are expressed through the list of questions presented in this section.
3	Susan Mason	Operations and Maintenance costs seem low. With all of these additional drain filters to monitor, won't there need to be more staff? Will the city need to purchase an additional vacuum truck to clean the filters?	The costs are planning level estimates based on costs experienced in other areas of the state. However, it is reconized that they may need to be modified in the future. The City will evaluate the personnel and resource needs as the plan is implemented (also see Section 9).