

Trash Reduction Pilot Study #A1 End-of-Pipe Trash Systems

Prepared by:
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Background

On September 19, 2001, the Los Angeles Regional Water Quality Control Board (LARWQCB) adopted the Trash Total Maximum Daily Loads (TMDLs) for both the Ballona Creek and Los Angeles River Watersheds. In accordance with the Trash TMDL requirements, there should be zero trash discharges from the City storm drain systems into the receiving waterbodies by the year 2013. With this zero discharge requirement, the City must implement several programs in order to comply.

On August 1, 2001, the City Council voiced a strong commitment to reducing trash in the Los Angeles River and Ballona Creek; the Council endorsed an internal City goal of 60% trash reduction by the fifth year of the Trash TMDL implementation (2008), and encouraged staff to utilize best efforts to reach this goal. Additionally, the Council directed the Bureau of Sanitation (BOS) to lead the Trash TMDL Implementation Work Group in preparing pilot studies to explore the effectiveness of structural and institutional control Best Management Practices (BMPs).

The evaluation of outlet screens/baskets as a potential BMP was one of the seven pilot studies conducted during the first half of 2002. This document is the summary report for this pilot study. It describes the methodology used in evaluating the performance of the newly installed screens/baskets, assesses its flooding potential and finally makes recommendations with respect to optimum design and widespread implementation.

Unit Description

The trash capturing units evaluated are as follows: three screen “*barriers*” and two screen “*baskets*”. The screening material is composed of a primary and secondary layer. The primary layer is type 19 galvanized bar grating size 1 3/16-inch by 4-inch. The secondary layer is 0.032 GA, 5 mm opening, welded wire mesh attached by screws, to the primary layer. During December 2001, these five trash capture units were installed at the outlets of storm drains that discharge into the Los Angeles River. The five locations are:

	<u>Land Use</u>	<u>Area</u>	<u>Location</u>	<u>Size/Type</u>	<u>Drainage Area</u>
1.	100% residential	Elysian Park	Duvall & Blake	42” CMP	0.055 sq.mi.
2.	Mostly residential	Silver Lake	Fletcher Bridge	66” Drain	0.390 sq.mi.

3. 100% recreation	Griffith Park	Crystal Springs Grounds	2-48" RCP	0.896 sq.mi.
4. 100% commercial	Studio City	Ventura Blvd & Laurel Cyn	18" VCP	0.026 sq.mi.
5. Mostly industrial	Chatsworth	Owensmouth & Osborne St	60" RCP	0.310 sq.mi.

Screen barriers at locations 1, 2, and 3 were installed on the trapezoidal section of the LA River channel. These screen barriers were placed two to three feet from the end of the outlets. Location 4 has a screen basket size of 2.75'L x 3.75'H x 2.25' W that is anchored onto the channel wall directly in front of the outlet opening. Location 5 has a fully enclosed screen basket 15.5' L x 7.5' H x 3' W anchored onto the wall and floor of the channel directly in front of the outlet opening.

Evaluation Methodology

This study focused on the monitoring and evaluation of the five newly installed screen units to assess their effectiveness in capturing trash and debris. The performance of the systems was assessed by visual inspections to determine if these systems overflow during intense rainstorms. Watershed Protection Division (WPD) staff made the observations during two rain events, and documented their observations on the systems' performance. The systems were evaluated based on their ability to capture trash and debris. Other factors such as safety, odors, vectors, and potential for upstream flooding were also considered.

Results

The results of the visual observations are shown in the attached record of field observations. At the time of the field observations conducted on December 20 and 21 of 2001, only the units at locations 1, 2, 3 and 5 were installed. The unit at location 4 was installed on December 31, 2001. Two of the screen units were observed to have trash and debris on top of the screens, which seems to indicate that there might have been overflow. The screens at all four units were observed to be substantially clogged with trash and debris. Additionally, at locations 1 and 2 small amounts of water, trash and debris are observed escaping through a void between the bottom of the screens and the sloped channel floor.

Observations of location 4 on February 26, showed all trash carried to the basket was successfully trapped. On the same day, catch basin inserts were installed upstream of this outlet screen and this monitoring site was removed from this pilot study.

Wastewater Collection System Division (WCSD) cleaned these units in March, April, and May of 2002. The amounts of trash collected are tabulated below. An estimated total of 21,355 lbs of trash were collected from the five trash capture sites.

Site	Height	Area	Volume	Weight (est.)	Comments
Elysian Park	3"	9'x3'	6.8 cf	135 lbs	
Silver Lake	8" & 6"	6'x5'	35 cf	700 lbs	Two cleanings were performed

Griffith Park	14"	16'x20'	370 cf	7, 500 lbs	
Studio City	2"	2.25'x2.75'	1	20 lbs	Upstream inserts reduced the amount deposited in the cage
Chatsworth	2 _ ' & 2 _ '	16'x8'	640 cf	13,000 lbs	

Discussion of Results

It appears from the observations, and the table above, that these screen units are capable of capturing tremendous amounts of trash and debris. However, because of the small openings, the screens are easily clogged. Enlarging the mesh openings will potentially reduce if not eliminate the clogging problems. However, mesh openings that are too large may have the reverse effect on the amount of trash captured, i.e., a significant amount of trash can potentially be lost if the openings are too large.

Conclusions and Recommendations

It is clear that the outlet screens, as currently designed, are very effective at capturing trash and debris. However, there are some potential problems associated with clogging due to the small opening size in the screens. To maximize the effectiveness of these units without compromising hydraulics performance, the screens need to be modified.

The following conclusions are made:

- Obtaining approval from the Los Angeles County and Corps of Engineers for the installation of the screens was time consuming. It took almost 12 months to obtain their approval.
- The currently designed outlet screens, while very effective at capturing trash and debris, can quickly become clogged due to the small size of the screens' openings.
- Selecting a larger opening size in the mesh will reduce the potential for clogging.
- The type of trash collected from the Griffith Park (location 3) is predominantly debris and vegetation (estimated at about 99%).
- Flooding is not a concern at location 1 (Elysian Park), location 2 (Silver Lake), location 3 (Griffith Park) and location 4 (Studio City). The fifth location (Chatsworth) may result in upstream flooding because it is fully enclosed and will not allow flow to bypass the unit.
- The cost of these units is much lower compared to other full capture systems.
- Not all outlets qualify for outlet screens. Space limitations, and maintenance accessibility are factors that need to be satisfied when selecting an outlet screen location.

The following recommendations are made:

- For the four existing units (locations 1, 2, 3 & 5), replace the 5 mm opening mesh with mesh that has 1-inch openings.
- For location 4, keep the 5 mm opening mesh.

- For future design of outlet screen “barriers”, consider a two-process system. The first process shall include a primary screen with 2-inch by 4-inch opening to screen out large debris and trash while allowing the flow to pass through, with minimal head loss, to the second process screen. The second process screen shall be located two to three feet from the primary screen, and sized accordingly.
- For future design of screen baskets, use 1-inch openings.
- The optimum capture can be determined experimentally or by reviewing the trash size profile.
- Remove the 5mm wire mesh from the cover section of the fully enclosed unit located at Chatsworth area (location 5). In the event of flow reaching the top of the unit, the primary screen will allow more flow to escape, thus, limiting upstream flooding.
- Minimize the void between the outlet invert and the bottom of the screen.
- Plan maintenance after every rain event that is 0.25 inch or higher and record the amount of trash.

Attachment

LA River Outlet Trash Capturing Units – Pictorial Record of Field Observations

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Background

City of Los Angeles staff conceived, designed, and contracted the installation of five outlet trash capture screens. These screens are used to capture trash and their performance was examined during the 2001/2002 rain season. The five locations and their characteristics are summarized below.

<u>No</u>	<u>Land Use</u>	<u>Area</u>	<u>Location</u>	<u>Size/Type</u>	<u>Drainage Area</u>
1.	100% residential	Elysian Park	Duvall & Blake	42" CMP	0.055 sq.mi.
2.	Mostly residential	Silver Lake	Fletcher Bridge	66" Arch Drain	0.390 sq.mi.
3.	100% recreation	Griffith Park	Crystal Springs Grounds	2-48"	0.896 sq.mi.
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Location # 1



Location # 2



Location # 3



Location # 5



December 11-12, 2001 – Observations by Peter Tonthat

The contractor installed four of the screens. Those included locations 1, 2, 3, and 5. Pictures were taken subsequent to installation.

December 20, 2001 – Observations by Kosta Kaporis

Between 4:30 pm and the next morning a total of 0.62 in of rainfall was recorded for Downtown Los Angeles.

Location 1 – Duvall and Blake

Observations were made at 9:45 pm. Three quarters of the height of the screen were clogged. Flow was trickling through the screen and from the bottom. See picture below.



Location 2 - Fletcher Street Bridge

Observations were made at 9:30 pm. The surface of the screen had fully clogged with very little flow trickling through the screen. Almost all the flow along with any suspended matter was escaping the screen from the side. See picture below.



The Wastewater Collection Systems Division (WCSD) was notified that the screen on location 5 may also be clogged and may cause flooding upstream. WCSD staff indicated that there were no reports of flooding. No response was required.

December 21, 2001 – Observations by Kosta Kaporis and Ammar Eltawil

Location 1 – Duvall and Blake

Rain was tapering off at the time of the inspection. About 77% of the screen was covered with leaves. No sign of flooding. Few trash items, about 2 pounds, were trapped in the holding area. The bottom of the holding area had a one inch layer of leaves only.

Location 2 - Fletcher St. Bridge

The entire screen was covered with debris. There were signs of overflow over the top of the screen, and along the sidewall of the containment area. Trapped stormwater runoff was flowing through the trapezoidal void between the bottom of the screen and the existing concrete slab. Captured trash and debris was not escaping through that void. The debris was scraped off the screen to allow the trapped runoff to drain. After the flow drained, three to four inches of sediment were found at the bottom of both the containment area and the invert of the outlet pipe for a length of approximately 40 feet. An unspecified amount of trash was also captured against the screen. See picture below.



Location 3 - Griffith Park

Large quantities of leaves with very little trash were found in the containment area of this screen. There were signs of overflow over the top of the screen.



Location 5 - Chatsworth

There were signs of overflow through the access cover located at the top of the screen cage. It was difficult to determine how full the basket was. It was estimated to be about one third of its height. See pictures below.



December 31, 2001 – Observations by Peter Tonthat

Location 4 – Studio City

The screen at the location 4 was installed.



Pictures were also taken of locations 1, 2, and 3.

