Trash Total Maximum Daily Loads

for the

Los Angeles River Watershed

August 9, 2007

California Regional Water Quality Control Board
Los Angeles Region
320 West Fourth Street, Suite 200
Los Angeles, California 90013

This page intentionally left blank

TABLE OF CONTENTS

List of Tables

List of Figures

I. Introduction – Legal Background

The California Regional Water Quality Control Board, Los Angeles Region (hereinafter referred to as the "Regional Board") has developed this total maximum daily load (TMDL) designed to attain the water quality standards for trash in the Los Angeles River. The TMDL has been prepared pursuant to state and federal requirements to preserve and enhance water quality in the Los Angeles Basin River Watershed.

The California Water Quality Control Plan, Los Angeles Region, also known as the *Basin Plan*, sets standards for surface waters and ground waters in the regions. These standards are comprised of designated beneficial uses for surface and ground water, and numeric and narrative objectives necessary to support beneficial uses and the state's antidegradation policy. Such standards are mandated for all waterbodies within the state under the Porter-Cologne Water Quality Act. In addition, the Basin Plan describes implementation programs to protect all waters in the region. The Basin Plan implements the Porter-Cologne Water Quality Act (also known as the "California Water Code") and serves as the State Water Quality Control Plan applicable to the Los Angles River, as required pursuant to the federal Clean Water Act (CWA).

Section 305(b) of the CWA mandates biennial assessment of the nation's water resources, and these water quality assessments are used to identify and list impaired waters. The resulting list is referred to as the 303(d) list. The CWA also requires states to establish a priority ranking for impaired waters and to develop and implement TMDLs. A TMDL specifies the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and allocates pollutant loadings to point and non-point sources.

The United States Environmental Protection Agency (USEPA) has oversight authority for the 303(d) program and must approve or disapprove the state's 303(d) lists and each specific TMDL. USEPA is ultimately responsible for issuing a TMDL, if the state fails to do so in a timely manner.

As part of California's 1996 and 1998 303(d) list submittals, the Regional Board identified the reaches of the Los Angeles River at the Sepulveda Flood Basin and downstream as being impaired due to trash.

A consent decree between the USEPA, the Santa Monica BayKeeper and Heal the Bay Inc., represented by the Natural Resources Defense Council (NRDC), was signed on March 22, 1999. This consent decree requires that all TMDLs for the Los Angeles Region be adopted within 13 years. The consent decree also prescribed schedules for certain TMDLs. According to this schedule, a Trash TMDL for the Los Angeles River watershed had to be approved before March 2001.

On September 19, 2001, the Regional Board adopted a Trash TMDL for the Los Angeles River Watershed. The TMDL was subsequently approved by the State Water Resources Control Board on February 19, 2002 and by the Office of Administrative Law on July 16, 2002. The United States Environmental Protection Agency approved the Los Angeles River Trash TMDL on August 1, 2002.

The City of Los Angeles and the County of Los Angeles both filed petitions and complaints in Los Angeles Superior Court challenging the Los Angeles River Trash TMDL. Subsequent negotiations led to a settlement agreement, which became effective on September 23, 2003. Twenty-two other cities[1] ("Cities") sued the Regional Board and State Water Resources Control Board (State Water Board) to set aside the TMDL, on several grounds. The trial court entered an order deciding some claims in favor of the Los Angeles Water Board and State Water Board (collectively "California Water Boards"), and some in favor of the Cities. Both sides appealed, and on January 26, 2006, the Court of Appeal decided every one of the Cities' claims in favor of the California Water Boards, except with respect to CEQA compliance. (*City of Arcadia et al., Los Angeles Regional Water Quality Control Board et al.* (2006) 135 Cal.App.4th 1392.) The Cities filed a petition for review by the California Supreme Court, but on April 19, 2006, the Supreme Court declined to hear any of the Cities' claims.

The Appellate Court found that the California Water Boards did not adequately complete the environmental checklist, and that evidence of a "fair argument" of significant impacts existed such that the California Water Boards should have performed an EIR level of analysis through an EIR or its functional equivalent. (135 Cal.App.4th at 1420-26.) The Court therefore affirmed a writ of mandate issued by the trial court, which orders the California Water Boards to set aside and not implement the TMDL, until it has been brought into compliance with California Environmental Quality Act (CEQA).

On June 8, 2006 the Regional Board set aside the trash TMDL and resolution # 01-013 which established it, pursuant to the writ of mandate and to sections 13240 and 13242 of the Water Code. Setting aside the TMDL was not deemed a repudiation of the settlement agreement entered into between the Los Angeles Regional Water Quality Control Board and the City of Los Angeles and the County of Los Angeles, which was executed on September 24, 2003, and the Los Angeles Water Board expressed its continued intent to be bound by that agreement. The Regional Board also directed staff to revise the CEQA documentation as directed by the writ of mandate, and to prepare and submit for the Regional Board's reconsideration, a TMDL for Trash in the Los Angeles River Watershed, consistent with the requirements of the writ. Staff was also directed to incorporate into its proposed revised TMDL the changes agreed upon in the settlement with the City of Los Angeles, Los Angeles County and the Los Angeles County Flood Control District.

This TMDL staff report and accompanying Basin Plan Amendment incorporate, the changes agreed upon in the settlement with the City of Los Angeles, Los Angeles County and the Los Angeles County Flood Control District. Additional revisions have been made to the TMDL to update the Implementation and Compliance schedules and include city-specific baseline waste load allocations derived from results of the baseline monitoring program

[1] The cities include Arcadia, Baldwin Park, Bellflower, Cerritos, Commerce, Diamond Bar, Downey, Irwindale, Lawndale, Monrovia, Montebello, Monterey Park, Pico Rivera, Rosemead, San Gabriel, Santa Fe Springs, Sierra Madre, Signal Hill, South Pasadena, Vernon, West Covina, and Whittier. They are members of a group that refers to itself as "The Coalition for Practical Regulation."

conducted by the Los Angeles County Department of Public Works (LACDPW). In addition, the CEQA checklist has been revised as directed by the writ of mandate.

The Los Angeles River Trash TMDL is a Basin Plan Amendment and is therefore subject to the 2001 provision of the Public Resources Code Section 21083.9 that requires a CEQA Scoping to be conducted for Regional Projects. CEQA Scoping involves identifying a range of project/program related actions, alternatives, mitigation measures, and significant effects to be analyzed in an EIR or its functionally equivalent document. On June 28, 2006 a CEQA Scoping hearing was held to present and discuss the foreseeable potential environmental impacts of compliance with the Los Angeles River Trash TMDL. A notice of the CEQA Scoping hearing was sent to interested parties including cities and/or counties with jurisdiction in or bordering the Los Angeles River watershed. Input from all stakeholders and interested parties was solicited for consideration in the development of the CEQA document

This Trash TMDL is based on existing, readily available information concerning the conditions in the Los Angeles River watershed and other watersheds in Southern California, as well as TMDLs previously developed by the State and USEPA.

II. Definitions

The definitions of terms as used in this TMDL are provided as follows:

Baseline Waste Load Allocation. The Baseline Waste Load Allocation is the Waste Load Allocation assigned to a permittee before reductions are required. The progressive reductions in the Waste Load Allocations will be based on a percentage of the Baseline Waste Load Allocation. The Baseline Waste Load Allocation was calculated based on the annual average amount of trash discharged to the storm drain system from a representative sampling of land use areas, as determined during the Baseline Monitoring Program.

Daily Generation Rate (DGR). The DGR is the average amount of litter deposited to land or surface water during a 24-hour period, as measured in a specified drainage area.

Full Capture System. A full capture system is any single device or series of devices that traps all particles retained by a 5 mm mesh screen and has a design treatment capacity of not less than the peak flow rate Q resulting from a one-year, one-hour, storm in the subdrainage area. Rational equation is used to compute the peak flow rate: $Q = C \times I \times A$, where Q = design flow rate (cubic feet per second, cfs); C = runoff coefficient (dimensionless); I = design rainfall intensity (inches per hour, as determined per the rainfall isohyetal map in Figure A),[2] and A= subdrainage area (acres).

[2] The isohyetal map may be updated annually by the Los Angeles County hydrologist to reflect additional rain data gathered during the previous year. Annual updates published by the Los Angeles County Department of Public Works are prospectively incorporated by reference into this TMDL and accompanying Basin Plan amendment.

Monitoring Entity. The Monitoring Entity is the permittee or one of multiple permittees and/or co-permittees that has been authorized by all the other affected permittees or co-permittees to conduct baseline monitoring on their behalf.

Permittee. The term "permittee" refers to any permittee or co-permittee of a stormwater permit.

Trash. In this document, we are defining "trash" as man-made litter, as defined in California Government Code Section 68055.1(g):

> "Litter means all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the state, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling or manufacturing."

For purposes of this TMDL, we will consider trash to consist of litter and particles of litter, including cigarette butts. These particles of litter are referred to as "gross pollutants" in European and Australian scientific literature. This definition excludes sediments, and it also excludes oil and grease, and vegetation, except for yard waste that is illegally disposed of in the storm drain system. Additional TMDLs for sediments[3] and oil and grease may be required at a later date.

Urbanized Portion of the Watershed. For the purposes of this TMDL, the urban portion of the watershed includes the sum total area of the incorporated cities and the unincorporated portion of Los Angeles County which are located on the Los Angeles River watershed.[4] The estimated area of the "urbanized" portion of the watershed is 609 square miles[5]. The remainder of the watershed is made up of the Los Angeles National Forest and other open space.

[3] Sediments which may be addressed in a separate TMDL are natural particulate matters such as silt and sand. Sediments result from erosion and are deposited at the bottom of a stream. Sediments do not refer to the decomposition of settleable litter into small particulate matters, which this TMDL is trying to prevent.

[4] The Regional Board recognizes that some areas within the unincorporated sections of Los Angeles County are actually suburban or rural.

[5] As determined by the Regional Board from GIS mapping. (Other minor differences in figures are due to rounding.)

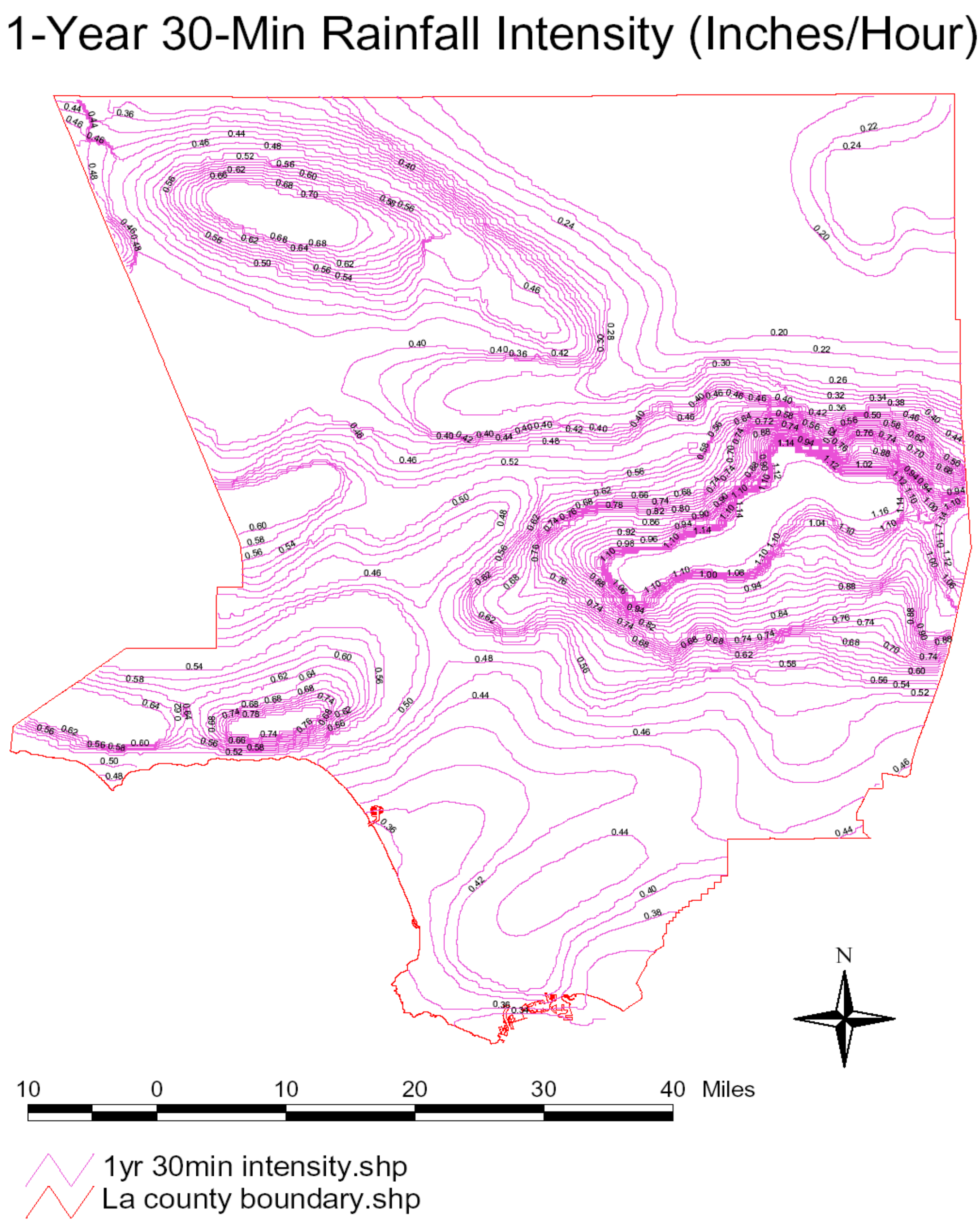

Figure A: Isohyethal Map of Rainfall Intensities in Portions of Los Angeles County (LADPW, 2003).

III. Problem Statement

The problem statement consists of a description of the watershed, beneficial uses, water quality objectives, and a description of the impairment to the watershed caused by trash.

A. Description of the Watershed

The Los Angeles River flows 51 miles from the western end of the San Fernando Valley to the Queensway Bay and Pacific Ocean at Long Beach (see Figure B). The headwaters are at the confluence of Arroyo Calabasas and Bell Creek. Arroyo Calabasas drains Woodland Hills, Calabasas, and Hidden Hills in the Santa Monica Mountains. Bell Creek drains the Simi Hills and receives flows from Chatsworth Creek. From the confluence of Arroyo Calabasas and Bell Creek, the Los Angeles River flows east through the southern portion of the San Fernando Valley, bends around the Hollywood Hills before it turns south onto the broad coastal plain of the Los Angeles Basin, eventually discharging into Queensway Bay and thence into San Pedro Bay West of Long Beach Harbor. Together with its several major tributaries, notably the Tujunga Wash, Burbank Western Channel, Arroyo Seco, Rio Hondo, and Compton Creek, the Los Angeles River drains an area of about 834[6] square miles. Of this area, the incorporated cities and unincorporated portion of Los Angeles County comprise 599 square miles. The remaining acreage consists of the Los Angeles National Forest and other uses.

In the San Fernando Valley, the river flows east for approximately 16 miles along the base of the Santa Monica Mountains. Most of the Los Angeles River channel was lined with concrete between 1935 and 1959 for flood control purposes[7]. This reach is lined in concrete except for a section of the river with a soft bottom at the Sepulveda Flood Control Basin. The Sepulveda Basin is a 2,150-acre open space, located upstream of the Sepulveda Dam. It is designed to collect flood waters during major storms. Because the area is periodically inundated, it remains in natural or semi-natural conditions and supports a variety of low-intensity uses. The US Army Corps of Engineers owns the entire basin and leases most of the area to the City of Los Angeles Department of Recreation and Parks, which has developed a multi-use recreational area that includes a golf course, playing fields, hiking trails, and bicycle paths.

The river is again lined in concrete for most of its course except for a seven-mile soft-bottomed segment between the confluence of the Burbank/Western Channel near Riverside Drive and north of the Arroyo Seco confluence. Three miles of this segment border Griffith Park (encompassing 4,217 acres). Four miles downstream, the river flows parallel to Elysian Park (585 acres in size). The original Pueblo de Los Angeles was founded just east of the river "to take advantage of the river's dependable supply of water."[8] Early this century, the progressive pumping of ground water, together with major diversions of water for irrigation and other uses throughout the watershed, contributed to a decreased flow in the River. From

---

[6] As determined by the Regional Board from GIS mapping.
[7] Gumprecht, Blake (1999) *The Los Angeles River: Its Life, Death, And Possible Rebirth*, p. 206.
[8] Los Angeles River Master Plan, June 1996, p. 211.

Willow Street all the way through the estuary, the river is soft bottomed with areas of riparian vegetation. This unlined section is about three miles long. Also part of the watershed are a number of lakes including Peck Road Park Lake, Echo Park Lake, and Lincoln Park Lake.

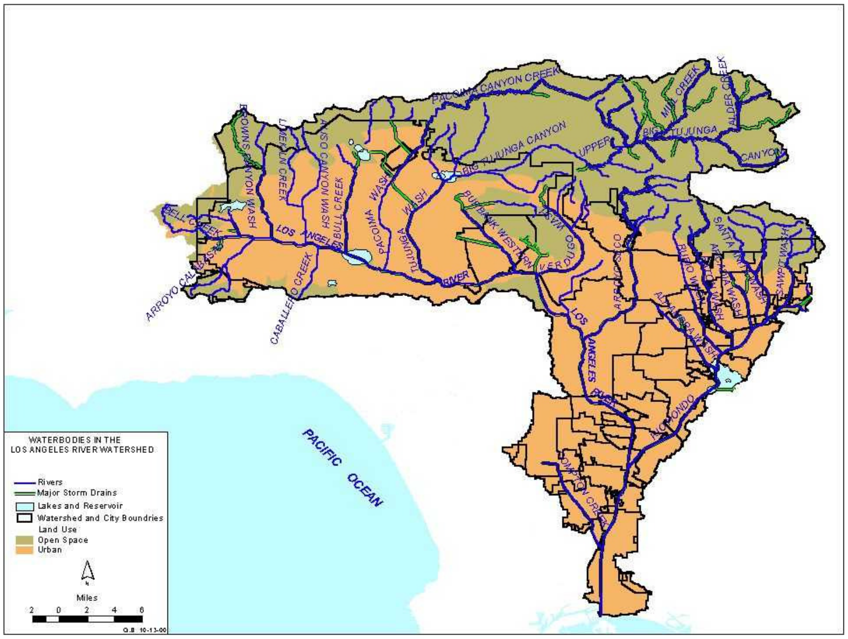

Figure B. Waterbodies in the Los Angeles River Watershed.

B. Beneficial Uses of the Watershed

A brief description of the beneficial uses most likely to be impaired due to trash in the Los Angeles River is provided in this section.

The upper reaches of the Los Angeles River include Sepulveda Basin, a soft-bottomed area that is designed as a flood control basin. Designated beneficial uses for the upper reaches are Municipal and Domestic Supply (MUN) (although most reaches only have conditional MUN designations), Ground Water Recharge (GWR), Water Contact Recreation (REC1), Non-Contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Wildlife Habitat (WILD), and Wetland Habitat (WET). The arroyo chub is also found in the Sepulveda Basin area, and cannot survive on the flat surfaces on the concrete-lined portions of the Los Angeles River. The thick growth of riparian plants in this area provides habitat for a variety of wildlife. Native oaks grow along stretches of Valleyheart Drive in Studio City and Sherman Oaks. The river levees along this reach are accessible and neighborhood residents use them for walking and jogging.

Three native species of fish (the south coast minnow-sucker community) are found in Big Tujunga Creek from Big Tujunga Dam downstream to upper Hansen Dam. These are the Santa Ana sucker (Catastomus santaanae), which is listed as a federally endangered species, the Santa Ana speckled dace (Rhinichthys osculus) and the arroyo chub (Gila orcutti), both of which are State Species of Special Concern. They thrive in the moderate to fast cool or cold flows in gravelly and rocky riffles (suckers and dace), alternating with slower pools (chubs)[9].

Glendale Narrows, from Riverside Drive to Arroyo Seco (Figueroa Street), with the longest soft-bottomed segment (seven miles), supports many beneficial uses and is designated accordingly in the Basin Plan. This portion of the Los Angeles River is designated as open space in the various community general plans. Dense riparian vegetation provides habitat for wildlife including birds, ducks, frogs and turtles. Several small pocket parks are found along this section of the River, many of which were designed by North East Trees (NET), sometimes in partnership with the Mountains Recreation and Conservation Authority (MRCA), such as a small park South and North of Los Feliz Boulevard sometimes referred to as the "Los Angeles RiverWalk"[10] and Sunnynook park on the Atwater side, and Rattlesnake Park and Zanja Madre Park on the Silver Lake side. Another example of a pocket park, designed by MRCA, is Knox Park[11], at the end of Knox Avenue. The riparian vegetation closely mimics the historical "willow sloughs" that once dotted the basin[12]. The relatively lush environment in this reach attracts people who enjoy many forms of recreation including walking, jogging, horseback riding, bicycling, bird watching, photography and crayfishing. There are several access points in this reach, including the pedestrian bridge over the Golden State Freeway from Griffith Park near Los Feliz Boulevard (Sunnynook Bridge). This whole section is lined with a maintained bike path, and many bicyclists use the path, which is cooled in places by the riparian trees. In addition, cut fences provide easy access for the many people who use this section of the river, including the homeless who have set up camp under some of the bridges within this reach or on the vacant land between Highway 5 and the fence to the river.

Figure C. Fletcher Drive: Great Egret, October 26, 1999.

[9] Camm Swift, Emeritus Natural History Museum of Los Angeles County, California Academy of Sciences, May 20, 2000.
[10] Nishith Dhandha, North East Trees, August 24, 2000.
[11] Ibid.
[12] Dan Cooper, Audubon Society, California Academy of Sciences, May 20, 2000.

From Figueroa Street to Washington Boulevard, the river supports several beneficial uses, including the Downtown Channel, which is used by many for recreation and bathing, in particular by homeless people who seek shelter there.

The mid-cities reach (11½ miles from Washington Boulevard to Atlantic Avenue), has several beneficial uses. The western levee is available for trail use from Atlantic Boulevard in Vernon to Firestone Boulevard in South Gate. There is a county bike path on the eastern levee (the Lario Trail) and a county equestrian and hiking trail adjacent to the levee. Continuous access to the Lario Trail is provided below each street bridge crossing. Several parks have been developed adjacent to the river on the east side, some of which provide access to the river trail (Cudahy Park). In Vernon, the channel invert is used for lunchtime soccer games, and people walk or jog on the river maintenance roads mostly during the week at lunchtime. The utility easement in Bell is used partly for small, informal vegetable gardening.[13] South of the confluence of the Los Angeles River and the Rio Hondo Channel in South Gate, increasing numbers of birds can be seen using the channel and adjacent lands.[14]

The nine-mile reach from Atlantic Avenue to the ocean supports some of the most abundant bird life found on the Los Angeles River. The parks, spreading grounds, utility easements and vacant land adjacent to the river provide roosting and feeding habitat. Many species of birds also feed in the concrete channel, where algae grow in the warm, shallow water, and in the estuary South of Willow Street, including fish-eaters like waders (herons, egrets, occidental bitterns and rails), terns, osprey (a fish-eating hawk), pelicans and cormorants. California Brown Pelican and California Least Tern are Federally Endangered Species.[15]

The water in the estuary pools is deep and slow enough to support an abundant fish community as well. In addition to gobies and tilapia (mostly *Tilapia mozambica*)[16], which are very abundant in the Los Angeles River, especially South of Willow Street, many species of fish are found in the estuary of the Los Angeles River. As an example, the following species have been found between the Ocean boulevard bridge and Queensway Bay bridge: California tonguefish, California halibut, specklefin midshipman, California lizardfish, diamond turbot, barcheek pipefish, and Pacific staghorn sculpin (bottom feeders), as well as white croaker, queenfish, deepbody anchovy, white seaperch, slough anchovy, barred sand bass, shiner perch, California grunion, and striped mullet (midwater feeders, often associated with bottom environment). This area also has harbored some pelagic fish, some of which will venture up an undetermined portion of the estuary: northern anchovy, Pacific sardine, Pacific pompano, Pacific barracuda, topsmelt, jacksmelt, white seabass, barred pipefish, giant kelpfish, and bay pipefish.[17]

[13] Los Angeles River Master Plan, p. 99.
[14] At the confluence there is a ten-acre site (approx.) owned by the City of South Gate that contains an abandoned landfill which is vegetated with grasses, shrubs and trees (Los Angeles River Master Plan).
[15] Dan Cooper, California Audubon Society, December 17, 1999.
[16] Charles Mitchell, MBC Applied Environmental Sciences, December 19, 1999.
[17] Marine Biological Baseline Study of Queensway Bay, Long Beach Harbor, MBC Applied Environmental Sciences, 1994.

Beneficial uses of the Los Angeles River watershed are summarized in Table 1, excerpted from the 1994 Basin Plan. These are the designated beneficial uses that must be protected.[18]

Table 1. Beneficial Uses of Surface Waters of the Los Angeles River.

Surface Waters	Hydro Unit	MUN	IND	PROC	GWR	NAV	REC1	REC2	COMM	WARM	COLD	EST	MAR	WILD	RARE	MIGR	SPWN	SHELL	WET
Los Angeles River Estuary	405.12		E			E	E	E	E			E	E	E	E	E	E	P	E
Los Angeles River to Estuary	405.12	P*	P	P	E		E	E		E			E	E	E	P	P	P	
Los Angeles River	405.15	P*	P		E		E	E		E				P					
Los Angeles River	405.21	P*	P		E		E	E		E				E					E
Compton Creek	405.15	P*			E		E	E		E				E					E
Rio Hondo downstream Spreading Grounds	405.15	P*			I		P	E		P				I					
Rio Hondo	405.41	P*			I		I	E		P				I	E				E
Alhambra Wash	405.41	P*			I		P	I		P				P	E				
Rubio Wash	405.41	P*			I		I	I		I				E	P				
Rubio Canyon	405.31	P*			E		I	I		I				E	E				E
Eaton Wash	405.41	P*			I		I	I		I				E					
Eaton Wash (downstream dam)	405.31	P*			I		I	I		I				E					
Eaton Wash (upstream dam)	405.31	P*			I		I	I		I				E					
Eaton Dam and Reservoir	405.31	P*			I		P	I		I				E					
Eaton Canyon Creek	405.31	P*			E		E	E		E				E	E		E		E
Arcadia Wash (lower)	405.41	P*			I		P	I		P				P					
Arcadia Wash (upper)	405.33	P*			I		P	I		P				P					
Santa Anita Wash (lower)	405.41	P*			I		P	E		P				P	E				
Santa Anita Wash (upper)	405.33	P*			E		E	E		E				E	E				
Little Santa Anita Canyon Creek	405.33	P*			I		I	I		I				E					
Big Santa Anita Reservoir	405.33	P*			E		P	E		E	E			E					

[18] Water Quality Control Plan, Los Angeles Region, California Regional Water Quality Control Board, Los Angeles Region, 1994, p. 2-10.

Table 1. Beneficial Uses of Surface Waters of the Los Angeles River, continued.

Surface Waters	Hydro Unit	MUN	IND	PROC	GWR	NAV	REC1	REC2	COMM	WARM	COLD	EST	MAR	WILD	RARE	MIGR	SPWN	SHELL	WET
Santa Anita Canyon Creek	405.33	E*			E		E	E		E	E			E	E		E		E
Winter Creek	405.33	P*			I		I	E		I				E					E
East Fork Santa Anita Canyon	405.33	P*			E		E	E		E	E			E			E		E
Sawpit Wash	405.41	I			I		I	I		I				E					
Sawpit Canyon Creek	405.41	P*			I		I	I		I				E	E				
Sawpit Dam and Reservoir	405.41	P*			I		P	I		I				E					
Monrovia Canyon Creek	405.41	I			I		I	I		I				E					E
Arroyo Seco downstream Devil's Gate R. (L)	405.15	P*					I	I		P				P					
Arroyo Seco downstream Devil's Gate R. (U)	405.31	P*					I	I		P				P	E				
Devil's Gate Reservoir (L)	405.31	P*			I		I	I		I				E					
Devil's Gate Reservoir (U)	405.32	I*			I		I	I		I				E					
Arroyo Seco upstream Devil's Gate R.	405.32	E	E	E	E		E	E		E	E			E					E
Millard Canyon Creek	405.32	E*	E	E	E		E	E		E				E	E				E
El Prieto Canyon Creek	405.32	I	I	I	I		I	I		I				E					
Little Bear Canyon Creek	405.32	P*			I		I	I		I	I			E					E
Verdugo Wash	405.24	P*			I		P	I		P				P					
Halls Canyon Channel	405.24	P*	I	I	I		I	I		I				E					
Snover Canyon	405.32	I	I	I	I		I	I		I				E					
Pickens Canyon	405.24	I*			I		I	I		I				E					
Shields Canyon	405.24	I	I	I	I		I	I		I				E					
Dunsmore Canyon Creek	405.24	I	I	I	I		I	I		I				E					

Table 1. Beneficial Uses of Surface Waters of the Los Angeles River, continued.

Surface Waters	Hydro Unit	MUN	IND	PROC	GWR	NAV	REC1	REC2	COMM	WARM	COLD	EST	MAR	WILD	RARE	MIGR	SPWN	SHELL	WET
Burbank Western Channel	405.21	P*					P	I		P				P					
La Tuna Canyon Creek	405.21	P*			I		I	I		I				E					
Tujunga Wash	405.21	P*			I		P	I		P	P			P					
Hansen Flood Control Basin & Lakes	405.23	P*			E		E	E		E	E			E	E				
Lopez Canyon Creek	405.21	P*			I		I	I		I				E					
Little Tujunga Canyon Creek	405.23	P*			I		I	E		I	I			E	E				
Kagel Canyon Creek	405.23	P*			I		I	I		I				E					
Big Tujunga Canyon Creek	405.23	P*			E		E	E		E	E			E	E		E		E
Upper Big Tujunga Canyon Creek	405.23	P*			E		E	E		I	P			E					E
Haines Canyon Creek	405.23	P*			I		I	I		I				E	E				
Vasquez Creek	405.23	P*			E		E	E		P	P			E					E
Clear Creek	405.23	P*			E		E	E		E	E			E					E
Big Tujunga Reservoir	405.23	P*			E		P	E		E	P			E			E		
Mill Creek	405.23	P*			E		E	E		E	E			E					E
Pacoima Wash	405.21	P*			E		P	E		E				E	E				
Pacoima Reservoir	405.22	P*			E		E	E		E				E					
Pacoima Canyon Creek	405.22	P*			E		E	E		E	E			E	E		E		E
Stetson Canyon Creek	405.22	P*			I		P	E		P				P					
Wilson Canyon Creek	405.22	P*			I		E	E		I				E					
May Canyon Creek	405.22	P*			I		I	E		I				E					
Sepulveda Flood Control Basin	405.21	P*			E		E	E		E				E					E
Bull Creek	405.21	P*			I		I	I		I				E					
Los Angeles Reservoir	405.21	E	E	E	P		P	E		E				E	E				
Lower Van Norman Reservoir	405.21	E*	E	E	E		E	E		E				E	E				
Solano Reservoir	405.21	E*					P			P				E					
Caballero Creek	405.21	P*			I		I	I		I				E					
Aliso Canyon Wash and Creek	405.21	P*			I		I	I		I				E					
Limeklin Canyon Wash	405.21	P*			I		I	I		I				E					

Table 1. Beneficial Uses of Surface Waters of the Los Angeles River, concluded.

Surface Waters	Hydro Unit	MUN	IND	PROC	GWR	NAV	REC1	REC2	COMM	WARM	COLD	EST	MAR	WILD	RARE	MIGR	SPWN	SHELL	WET
Browns Canyon Wash and Creek	405.21	P*			I		I	I		I				E					
Arroyo Calabasas	405.21	P*					P	I		P				P					
McCoy Canyon Creek	405.21	P*			I		I	I		I				E					
Dry Canyon Creek	405.21	P*			I		I	I		I				E					
Bell Creek	405.21	P*			I		I	I		I				E					
Chatsworth Reservoir	405.21	E	E	E			P	E		E				E					
Dayton Canyon Creek	405.21	P*			I		I	I		I				E					
Echo Lake	405.15	P*					P	E		P				E					
Lincoln Park Lake	405.15	P*					P	E		P				E					

E: Existing beneficial use
P: Potential beneficial use
I: Intermittent beneficial use

BENEFICIAL USE CODES (see Basin Plan for more details):
MUN - Municipal and Domestic Water Supply
IND - Industrial Service Supply
PROC - Industrial Process Supply
GWR - Ground Water Recharge
REC1 - Water Contact Recreation
REC2 - Non-Contact Water Recreation
COMM - Commercial and Sport Fishing

: Conditional designation: the waters designated with an "" in the table do not have MUN as a designated use until such time as the Basin Plan is modified based on additional study. In the interim, no new effluent limitations will be placed in Waste Discharge Requirements as a result of these designations until the Regional Board adopts an amendment that identifies those waters in the Region that should be excepted from the MUN designation.

WARM - Warm Freshwater Habitat
COLD - Cold Freshwater Habitat
EST - Estuarine Habitat
MAR - Marine Habitat
WILD - Wildlife Habitat
RARE - Rare, Threatened or Endangered Species
SPWN - Spawning, Reproduction, and/or Early Development
SHELL - Shellfish Harvesting
WET - Wetland Habitat

C. Water Quality Objectives

Water quality standards consist of a combination of beneficial uses, water quality objectives and the State's Antidegradation Policy. The Regional Board has determined that the narrative water quality objectives applicable to this TMDL are **floating materials**: *"Waters shall not contain floating materials, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses*"[19] and **solid, suspended, or settleable materials:** "*Waters shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses*."[20] The States' Antidegradation Policy is formally referred to as the *Statement of Policy with Respect to Maintaining High Quality Waters in California* (State Board Resolution No. 68-16).

D. Impairment of Beneficial Uses

Existing beneficial uses impaired by trash in the Los Angeles River are contact recreation (REC 1) (contact sports: swimmers are spotted regularly in the Los Angeles River at Glendale Narrows and also at Willow Street in Long Beach) and non-contact recreation such as fishing (REC 2) (trash is aesthetically displeasing and deters recreational use and tourism); warm fresh water habitat (WARM); wildlife habitat (WILD); estuarine habitat (EST) and marine habitat (MAR); rare, threatened or endangered species (RARE); migration of aquatic organisms (MIGR) and spawning, reproduction and early development of fish (SPWN); Commercial and sport fishing (COMM); Wetland Habitat (WET), and Cold freshwater habitat (COLD). These beneficial uses in the Los Angeles River are impaired by large accumulations of suspended and settled debris throughout the river system. The problem is even more acute in Long Beach where debris flushed down from the upper reaches of the river collects. Common items that have been observed by Regional Board staff include Styrofoam cups, Styrofoam food containers, glass and plastic bottles, toys, balls, motor oil containers, antifreeze containers, construction materials, plastic bags, and cans. Heavier debris can be transported during storms as well.

Reaches of the Los Angeles River that are impaired by trash, and listed on the 303(d) list for such, are Tujunga Wash (downstream Hansen Dam to Los Angeles River), Los Angeles River Reach 5 (within Sepulveda Basin), Los Angeles River Reach 4 (Sepulveda Dam to Riverside Dr.), Los Angeles River Reach 3 (Riverside Dr. to Figueroa St.), Los Angeles River Reach 2 (Figueroa St. to upstream Carson St.), Los Angeles River Reach 1 (upstream Carson St. to estuary), Burbank Western Channel, Verdugo Wash (Reaches 1 & 2), Arroyo Seco Reach 1 (downstream Devil's Gate Dam) & Reach 2 (W. Holly Ave. to Devil's Gate), and Rio Hondo Reach 1 (Santa Ana Fwy to Los Angeles River). In addition, Peck Road Lake, Echo Park Lake and Lincoln Park Lake are listed as impaired for trash.

Trash in waterways causes significant water quality problems. Small and large floatables can inhibit the growth of aquatic vegetation, decreasing spawning areas and habitats for fish and other living organisms. Wildlife living in rivers and in riparian areas can be harmed by ingesting or becoming entangled in floating trash. Except for large items such as shopping carts, settleables are not always obvious to the eye. They include glass, cigarette butts, rubber,

[19] Water Quality Control Plan ("Basin Plan"), p. 3-9.
[20] Ibid., pp. 3-16.

construction debris and more. Settleables can be a problem for bottom feeders and can contribute to sediment contamination. Some debris (e.g. diapers, medical and household waste, and chemicals) are a source of bacteria and toxic substances. Floating debris that is not trapped and removed will eventually end up on the beaches or in the open ocean, repelling visitors away from our beaches and degrading coastal waters.

A major trash problem experienced in the Los Angeles River Watershed contributes to a broader phenomena that affects ocean waters, as small pieces of plastic called "nurdles" (defined as pre-production virgin material from plastic parts manufacturers, as well as post-production discards that are occasionally recycled) float at various depths in the ocean and affect organisms at all levels of the food chain. As sunlight and UV radiation render plastic brittle, wave energy pulverizes the brittle material, with a subsequent chain of nefarious effects on the various filter feeding organisms found near the ocean's surface. Studies in the North Pacific indicate that both large floating plastic and smaller fragments are increasing. As a result of increased reports of resin pellet ingestion by aquatic wildlife and evidence that the ingested pellets are harming wildlife, the Interagency Task Force on Persistent Marine Debris (ITF) identified resin pellets, also know as plastic pellets, as a debris of special concern.[21] When released into the environment, these pellets either may float on or near the water surface, may become suspended at mid-depths, or may sink to the bottom of a water body. Whether a specific pellet floats or sinks depends on the type of polymer used to create the pellet, on additives used to modify the characteristics of the resin, and on the density of the receiving water.

A 1999 study of Marine Debris in the Mid-Pacific Gyre in an attempt to assess the potential effects of ocean particles on filter feeding marine organisms, collected plankton samples at various locations throughout the gyre. The results were stunning: the mass of plastic particles collected was six times higher than the mass of plankton (841 g/km^2), although the number of planktonic organisms (1,837,342/km^2) was five times the number of plastic pieces. The distribution of the sampling points allows one to assume that this number can be safely extrapolated to the breadth of the Mid-Pacific Gyre. A remarkable finding was that the number of particles did not increase in successively smaller size classes as expected, indicating there may be non-selective removal by mucus web-feeding jellies and salp. In this study, the most common type of identifiable particle, thin plastic film, accounted for 29% of the total. Many birds will die from ingesting this non-nutritive plastic.[22]

The prevention and removal of trash in the Los Angeles River ultimately will lead to improved water quality and protection of aquatic life and habitat, expansion of opportunities for public recreational access, enhancement of public interest in the rivers and public participation in restoration activities, and propagation of the vision of the river as a whole and enhancement of the quality of life of riparian residents.

---

[21] US Environmental Protection Agency (US EPA) (1992) **Plastic Pellets in the Aquatic Environment: Sources and Recommendations.**

[22] Moore, C.J. et al. **Marine Debris in the North Pacific Gyre, 1999, with a Biomass Comparison of Neustonic Plastic and Plankton**. (in preparation)

E. Extent of the Trash Problem in the Los Angeles River

Trash is a water quality problem throughout the Los Angeles River. The Regional Board has determined that current levels of trash exceed the existing Water Quality Objectives necessary to protect the beneficial uses of the river.

For many years, Los Angeles County and other cities have recognized that trash is a problem.[23] The Los Angeles County Department of Public Works is reporting a "30% decrease in roadway trash on unincorporated County roads and a 50% decrease in trash entering catchbasins since adoption of the current National Pollutant Discharge Elimination System (NPDES) Permit".[24] However, trash in the Los Angeles River continues to be a serious problem.

Every city in the watershed agrees that the amount of trash found in the waterways is excessive, and that trash is found in all reaches of the river from Calabasas to Long Beach, and in all tributaries. Although the Regional Board has not yet received the data that the Los Angeles County Department of Public Works used for its findings, Regional Board staff regularly observe trash in the waterways of this watershed. Non-profit organizations such as Heal the Bay, Friends of the Los Angeles River (FoLAR) and others, organize volunteer clean-ups periodically, and document the amount of trash that was removed on such days, but these data do not indicate how long the trash had been accumulating at that particular site, only the amount that was picked up by the volunteers on a given day.

For example, at Coastal Clean-up Day in 1996, 26,300 lbs of trash were collected in Los Angeles County. During the September 18, 1999, California Coastal Clean up organized by Heal the Bay, a total of 60,711 lbs of trash were collected.[25]

At a clean-up organized during the Sacred Music Festival on Saturday, October 16, 1999, between Los Feliz Boulevard and Fletcher Drive over a distance of slightly under 1.5 miles, eleven shopping carts and six 40-gallon bags of trash were removed (see Figure D). However, this was not the total amount of trash on site, as Regional Board staff noticed more shopping carts and more trash on the same site the very next afternoon.[26] Meanwhile, the purpose of volunteer clean-ups is to visibly clean the river and its banks, not to quantify debris. As a result, it is likely that some of the debris collected during those events are not recorded. In

---

[23]See comments from Los Angeles County, Agoura Hills, Artesia, Beverly Hills, Hermosa Beach, Hidden Hills, Carson, Diamond Bar, La Habra Heights, La Mirada, La Puente, Monrovia, Norwalk, Rancho Palos Verdes, Rolling Hills, San Fernando, San Marino, West Hollywood, Westlake Village, and the Executive Advisory Committee (Stormwater Program - Los Angeles County) on behalf of all the Los Angeles County cities, submitted in response to the first draft of this Trash TMDL for the Los Angeles River Watershed.

[24]Comment letter from County of Los Angeles, Department of Public Works, May 15, 2000, p. 1.

[25] Alix Gerosa, Heal the Bay, November 22, 1999.

[26] Trash observed by Regional Board staff on October 17, 1999, included mixed polystyrene waste (cups, plates and others), plastic bags, cement, sound boards, large clusters of cigarette butts, disposable plastic glass lids, aluminum wrappers, balloons, medications, plastic bottles, clothing, books, and aerosol paint cans.

addition, volunteers traditionally focus on larger, more visible debris to the exclusion of smaller debris which are commonly encountered, such as cigarette butts.

Figure D. Trash waiting for pick-up at Los Feliz Boulevard after the Sunday, October 16, 1999 river clean-up.

Several studies which attempted to quantify trash generated from discreet areas have been completed, but they concern relatively small areas, or relatively short periods, or both. The findings of some of these studies are discussed below.

The City of Calabasas cleaned out the Continuous Deflective Separation (CDS) Unit they had installed in December of 1998, on September 28, 1999. This CDS unit, located in Calabasas at the intersection of Las Virgenes Road and Agoura Road, collects trash from the runoff of a small storm drain, as well as part of the runoff from Calabasas Park Hills (Santa Monica Mountains), and eventually empties to Las Virgenes Creek. It is assumed that this CDS unit prevented all trash from passing through. The calculated area drained by this CDS Unit, as provided to the Regional Board by Los Angeles County Department of Public Works staff, amounts to 12.8 square miles. The urbanized area was estimated by Regional Board staff to amount to 0.10 square miles of the total area. The result of this clean-out, which represents approximately half of the 1998-1999 rainy season, was 2,000 gallons of sludgy water and a 64-gallon bag about two-third full of plastic food wrappers. It is assumed that part of the trash that accumulated in the CDS unit over roughly half of the rainy season had decomposed in the unit, hence the absence of paper products. Given the CDS unit was cleaned out after slightly more than nine months of use, it was assumed that this 0.10 square mile urbanized area produced a volume of 64 gallons of trash over one year. This datum will be used as the default value for the implementation plan. Although other studies are informative, studies currently available to the Regional Board provide insufficient data and could not be applied directly to establishing trash generation rates.

The City of Los Angeles conducted an Enhanced Catch Basin Cleaning Pilot Project in compliance with a consent decree between the United States Environmental Protection Agency, the State of California, and the City of Los Angeles. The project goals were to determine debris loading rates, characterize the debris, and find an optimal cleaning schedule through enhancing catch basin cleaning. The project evaluated trash loading at two drainage basins:

-The Hollywood Basin (1,366 acres and 793 catch basins) includes much of Hancock Park and is mostly residential with some commercial and open space, and no industrial land;

-The Sawtelle Basin (2,267 acres and 502 catch basins) includes residential areas with some commercial, industrial and transportation-related uses, and some open space.

The catch basins are inlet structures without a sump below the level of the outlet pipe to capture solids and trash washed down by the stormwater.[27] These inlets also collect trash, grass clippings and animal wastes during dry weather. Catch basins were cleaned 3-4 times from March 1992 to December 1994 and yielded approximately 0.79 yd^3 (160 Gal) of debris per cleaning (Sawtelle – 1.04 yd^3 (210 Gal) and Hollywood – 0.61 yd^3 (123 Gal)), characterized as paper (26%), plastic wastes (10%), soil (33%), and yard trimmings (31%).

The study also observed that the amount of plastic waste was less in residential areas and greater in non-residential areas, that paper waste was greater in commercial areas, and that soil and yard waste was greater in residential areas and open spaces.[28]

Long Beach collects large amounts of trash at the mouth of the Los Angeles River, as much of the trash carried down the Los Angeles River ends up at the river's mouth in Long Beach. Debris tonnage at the mouth of the Los Angeles River is listed in Table 2.

Table 2. Storm Debris Collection Summary for Long Beach: Debris is measured in Tonnage.[29]

Storm Year	First Quarter (July-Sept.)	Second Quarter (Oct.-Dec.)	Third Quarter (Jan.-March)	Fourth Quarter (April-June)	Total
1994-95	436	509	3,576	702	5,224
1995-96	504	344	3,100	645	4,593
1996-97	350	2,361	601	681	3,993
1997-98	647	3,650	4,016	977	9,290
1998-99	565	720	532	1,274	3,091
1999-00	781	176	1,664	1,223	3,844
2000-01	757	581	2,625	474	4,437
2001-02	424	739	288	407	1,858
2002-03	430	752	2,564	884	4,630
2003-04	299	779	607	951	2,636

[27] Such structures are usually termed *catchments*, but the term *catch basin* is used throughout Southern California. The absence of flow during dry weather allows trash to collect at the inlet. (Phone conversation with Wing Tam, City of Los Angeles, November 10, 1999.)
[28] This information and all of the above concerning the City of Los Angeles Enhanced Catch Basin Cleaning was found in: City of Los Angeles Department of Public Works, Bureau of Sanitation: Consent Decree Report, Enhanced Catch Basin Cleaning, April 1999. (Unpublished report.)
[29] City of Long Beach *L.A. River Debris Summary* (as of June 2006).

Storm Year	First Quarter (July-Sept.)	Second Quarter (Oct.-Dec.)	Third Quarter (Jan.-March)	Fourth Quarter (April-June)	Total
2004-05	273	4,390	6,176	1,416	12,255
2005-06	561	495	862	670	2,591

IV. Numeric Target

The numeric target for this TMDL is 0 (zero) trash in the water. The numeric target is derived from the narrative water quality objectives, including an implicit margin of safety. Although a substantial number of comments were received in response to the March 17, 2000 Draft TMDL, no information was provided to justify any other number for the final TMDL target that would fully support the designated beneficial uses. The numeric target was used to calculate the Waste Load Allocations as described in the Implementation Plan (see Section VIII.)

V. Source Analysis

The major source of trash in the river results from litter, which is intentionally or accidentally discarded in watershed drainage areas. Transport mechanisms include the following:

1. Storm drains: trash is deposited throughout the watershed and is carried to the various reaches of the river and its tributaries during and after significant rainstorms through storm drains.

2. Wind action: trash can also blow into the waterways directly.

3. Direct disposal: direct dumping also occurs.

Extensive research has not been done on trash generation or the precise relationship between rainfall and its deposition in waterways. However, it has been found that the amount of gross pollutants entering the stormwater system is rainfall dependent but does not necessarily depend on the source (Walker and Wong, December 1999). The amount of trash which enters the stormwater system depends on the energy available to re-mobilize and transport deposited gross pollutants on street surfaces rather than on the amount of available gross pollutants deposited on street surfaces. The exception to this finding of course would be in the event that there is zero gross pollutants deposited on the street surfaces or other drainages tributary to the storm drain. Where gross pollutants exist, a clear relationship between the gross pollutant load in the stormwater system and the magnitude of the storm event has been established. The limiting mechanism affecting the transport of gross pollutants, in the majority of cases, appears to be re-mobilization and transport processes (i.e., stormwater rates and velocities).

Several studies conclude that urban runoff is the dominant source of trash. The large amounts of trash conveyed by urban storm water to the Los Angeles River is evidenced by the amount of as trash that accumulates at the base of storm drains. The amount and type of trash that is washed into the storm drain system appears to be a function of the surrounding land use.

A number of studies (Walker and Wong, 1999, Allison, 1995), have shown that commercial land-use catchments generate more pollutants than residential land use catchments, and as much as three times the amount generated from light industrial land use catchment. It is generally accepted that commercial land uses tend to contribute larger loads of gross pollutants per area compared to residential and mixed land-use areas. This is in spite of daily street sweeping in the commercial sub-catchment compared to once every two weeks in residential and mixed land use areas.

VI. Waste Load Allocations

Storm drains have been identified as a major source of trash in the Los Angeles River. The strategy for meeting the water quality objective will focus on reducing the trash discharged via municipal storm drains.

Waste Load Allocations are assigned to the Permittees and Co-permittees of the Los Angeles County Municipal Stormwater Permit (hereinafter referred to as Permittees) and Caltrans. In addition, Waste Load Allocations may be issued to additional facilities in the future under Phase II of the US EPA Stormwater Permitting Program. Waste Load Allocations assigned under the MS4 permit and the Caltrans permit will be based on a phased reduction from the estimated current discharge (i.e., baseline) over a 9-year period until the final Waste Load Allocation (currently set at zero) is met. Permittees under the Phase II Stormwater Permitting Program will also be assigned a final WLSA of zero trash discharge. The baseline allocation for the MS4 Permittees and Co-permittees (referred to hereinafter as the "Permittees") is derived from data collected during the Baseline Monitoring Program.

A. Reconsideration and Refinement Provision

The baseline Waste Load Allocations for the MS4 Permittees and Co-permittees have been modified from that assigned in the earlier trash TMDL. The Regional Board will review and reconsider the final Waste Load Allocations once a reduction of 50% of the Baseline Waste Load Allocation has been achieved. This means that the final Waste Load Allocation will be reviewed only after substantial reductions are achieved. This reconsideration of the Waste Load Allocation will be based on the findings of future studies regarding the threshold levels needed for protecting beneficial uses.

B. Default Baseline Waste Load Allocation

The Default Baseline Waste Load Allocation for the municipal stormwater permittees, in the earlier version of the trash TMDL was equal to 640 gallons of uncompressed trash per square mile per year. No differentiation was applied for different land uses in the Default Baseline Waste Load Allocation.

C. Refined Baseline Waste Load Allocations

The municipal stormwater permittees opted to seek refinement of the Default Baseline Waste Load Allocation by implementing a "Baseline Monitoring Plan." The goal of the Baseline Monitoring program was to derive a representative trash generation rate for various land uses from across the Los Angeles River watershed. The Baseline Waste Load Allocation for any single city is the sum of the products of each land use area multiplied by the Waste Load Allocation for the land use area, as shown below:

$$LA = \sum for\ each\ city\ (area\ by\ land\ uses \bullet allocations\ for\ this\ land\ use)$$

The urban portion of the Los Angeles River watershed was divided into twelve types of land uses for every city and unincorporated area in the watershed. Similar land use classifications already exist on the land use maps used by L.A. County Department of Public Works to assess the generation of certain pollutants by land use.[30] The land use categories are: (1) high density residential[31], (2) low density residential[32], (3) commercial and services, (4) industrial, (5) public facilities[33], (6) educational institutions[34], (7) military installations, (8) transportation[35], (9) mixed urban[36], (10) open space and recreation[37], (11) agriculture[38], and (12) water[39]. Given that the minimum mapping resolution is 2.5 acres, a non-critical land use unit may not be mapped if it is less than 2.5 acres in size[40].

The appendix contains a table which shows the square mileage for each land use for each city and unincorporated areas in the watershed, and a list of maps showing land uses for each city. Unincorporated areas include areas such as Altadena, East Compton, East Los

---

[30] The land use classification was developed by Aerial Information Systems as a modified Anderson Land Use Classification and originally included 104 categories. The land use coverages were donated for GIS library use by Southern California Association of Governments (SCAG), and show land use for 1990 and for 1993. The coverages were map-joined into a single coverage by Teale Data Center. The Regional Board layers were aggregated from the TDC coverage into the land uses shown above.

[31] High Density Residential includes High Density Single Family Residential and all Multi Family Residential, Mobile Homes, Trailer Parks and Rural Residential High Density.

[32] Under 2 units per acre.

[33] These include government centers, police and sheriff stations, fire stations, medical health care facilities, religious facilities large enough to be distinguished on an aerial photograph, libraries, museums, community centers, public auditoriums, observatories, live indoor and outdoor theaters, convention centers which were built prior to 1990, communication facilities, and utility facilities (electrical, solid waste, liquid waste, water storage and water transfer, natural gas and petroleum).

[34] Preschools and daycare centers, elementary schools, high schools, colleges and universities, and trade schools, including police academies and fire fighting training schools.

[35] Airports, railroads, freeways and major roads (that meet the minimum mapping resolution of 2.5 acres), park and ride lots, bus terminals and yards, truck terminals, harbor facilities, mixed transportation and mixed transportation and utility.

[36] Mixed commercial, industrial and/or residential, and areas under construction or vacant in 1990.

[37] Golf courses, local and regional parks and recreation, cemeteries, wildlife preserves and sanctuaries, botanical gardens, beach parks.

[38] Orchards and vineyards, nurseries, animal intensive operations, horse ranches.

[39] Open water bodies, open reservoirs larger than 5 acres, golf course ponds, lakes, estuaries, channels, detention ponds, percolation basins, flood control and debris dams.

[40] Critical land uses were mapped regardless of resolution limits. Critical land use units below 1 acre in size were mapped as 1-acre units.

Angeles, East Pasadena, East San Gabriel, Florence, La Crescenta, Mayflower Village, North El Monte, South San Gabriel, Walnut Park, Westmount and Willowbrook. For cities that are only partially located in the watershed, the square mileage indicated is for the part of this city that is in the watershed only.

Land uses that are not under municipal jurisdiction, such as military installations, will be dealt with through separate permits, and were thus not included in the calculation of the baseline Waste Load Allocations.

Each permittee will be allowed 60% of their baseline Waste Load Allocation during the first year of implementation, and subsequent annual reductions of 10% of from the baseline will be required through every year of implementation.

D. Baseline Waste Load Allocations for Caltrans

A Litter Management Pilot Study (LMPS)[41] was conducted to evaluate the effectiveness of several litter management practices in reducing litter that is discharged from Caltrans storm water conveyance systems. The LMPS employed four field study sites, each of which was used to test a separate BMP. Each site included three replicate testing pairs, consisting of one site designed to measure the amount of trash produced when treatment was applied, and one control with no treatment site. The LMPS averages the data collected at the control outfalls in order to obtain the annual litter loads. The average combined total loads for the three control outfalls at each site normalized by the total area of control catchments is presented in the following table, adapted from the LMPS report[42]:

Table 3. Average Combined Total Loads for Control Outfalls at 3 Litter Management Pilot Study (LMPS) Sites.

Site	Weight lbs/sq mi	Volume cu ft/sq mi
1E	10584.00	1312.97
1W	7479.36	971.73
6	7479.36	881.34
8	4374.72	404.51

The baseline Waste Load Allocation for weight and volume load generation for freeways is arrived at by averaging weight and volume columns. (see Table 4.) It is to be noted that control site 1E already had one BMP in place before testing of the other BMPs, as it was cleaned monthly through an "Adopt a Highway" program.

[41] California Department of Transportation District 7 Litter Management Pilot Study, June 2000. This study defined litter in stormwater as "manufactured items that can be retained by ¼-inch mesh made from paper, plastic, cardboard, etc.", and "that are not of natural origin (i.e. does not include sand, soil, gravel, vegetation, etc.)" (p. 1-2).
[42] Ibid., Table 6-8.

Table 4. A Preliminary Baseline Waste Load Allocation for Weight and Volume for Freeways.

Weight lbs/sq mi	Volume cu ft/sq mi
7479.36	892.64

Average Annual Daily Traffic (AADT) for all control sites in the study ranged from 216,000 to 238,000.[43] Considering AADT on Los Angeles County freeways may be close to 300,000 on some sections[44], the chosen sites, although typical freeway outfalls, are not distributed throughout the whole AADT range. As the purpose of the study was to assess the effectiveness of specific BMPs, not to assess a trash generation factor, sites were chosen with similar characteristics.

E. Baseline Waste Load Allocations for Municipal Permittees

Baseline Monitoring was conducted by the Los Angeles County Department of Public Works, as prescribed in the September 19, 2001 Los Angeles River Trash TMDL. The goal of the Baseline Monitoring Program was to collect representative data from across the watershed to refine the default Waste Load Allocations presented in the 2001 Los Angeles River Trash TMDL. Monitoring data was used to establish specific trash generation rates per land use. The land use categories that were monitored by the LACDPW baseline monitoring group (to determine land use based generation rates) were:

- High density residential,
- Low density residential,
- Commercial and services,
- Industrial, and
- Open space and recreation.

Public facilities-, Educational Institutions-, Mixed urban-, Agricultural-, and Water- land uses were exempt from monitoring.

In the analysis of the monitoring results provided by LACDPW, staff assumed the litter generation rate from public facilities and mixed urban landuse to be equivalent to that from the industrial land use. The transportation land use was equated with industrial land use, and agricultural land use was equated to open space. Water was assigned a litter generation rate of zero since it is not considered a generator of trash. The portion of the transportation land use that is under Caltrans' jurisdiction will be covered under Caltrans' permit. Major boulevards that are currently under Caltrans' jurisdiction, but are affected by trash generated on municipal sites, such as Santa Monica Boulevard, will be addressed by the cities concerned.

Military Installations were not included in the Waste Load Allocations of the cities that had this land use. Under EPA Phase II of the Storm Water Regulations, separate permits will be written for these facilities. While public educational institutions will also be covered under separate permits under Phase II, the analysis did not differentiate between public and private

[43] Ibid., Table 6-8.
[44] Information on AADT on select freeways can be found on Caltrans' website: http://www.caltrans.ca.gov/.

educational facilities under this landuse. Therefore, the cities have the option of providing information on the acreage of such land uses within their jurisdiction in order that contributions from these facilities be removed from their assigned baseline waste load allocations.

The baseline Waste Load Allocations for the municipal permittees is presented on a city by city basis in Table 5. A more detailed breakdown along land uses is provided in Appendix II. The Waste Load allocations for the first year of compliance will be a 40% reduction in the baseline Waste Load Allocation. The subsequent annual Waste Load Allocations will be a progressive 10% reduction in the baseline Waste Load Allocations over a period of 6 years, and apply except in areas serviced by Full Capture Systems. The values shown, in gallons, are in uncompressed volumes.

Table 5. Los Angeles River Trash TMDL Baseline Waste Load Allocations (gallons and lbs of trash) *Military Installations were not included in calculation of Baseline WLA

City	WLA (gals)	WLA (lbs)
Alhambra	39903	68761
Arcadia	50108	93036
Bell*	16026	25337
Bell Gardens	13500	23371
Bradbury	4277	12160
Burbank*	92590	170389
Calabasas	22505	52230
Carson	6832	10208
Commerce	58733	85481
Compton*	53191	86356
Cudahy	5935	10061
Downey	39063	68507
Duarte	12210	23687
El Monte	42208	68267
Glendale*	140314	293498
Hidden Hills	3663	10821
Huntington Park	19159	30929
Irwindale	12352	17911
La Cañada Flintridge	33496	73747
Long Beach*	87135	149759
Los Angeles*	1374845	2572500
Los Angeles County*	310223	651806
Lynwood	28201	46467
Maywood	6129	10549
Monrovia	46687	100988
Montebello	50369	83707
Monterey Park	38899	70456
Paramount	27452	44490
Pasadena*	111998	207514
Pico Rivera	13953	22549
Rosemead	27305	47378
San Fernando	13947	23077
San Gabriel	20343	36437
San Marino	14391	29147
Santa Clarita	901	2326
Sierra Madre	11611	25192
Signal Hill	9434	14220
Simi Valley	137	344
South El Monte	15999	24319
South Gate	43904	72333
South Pasadena	14907	28357
Temple City	17572	31819
Vernon	47203	66814
Caltrans	59421	66566

VII. Implementation and Compliance

As required by the Clean Water Act, discharges of pollutants to surface waters from storm water are prohibited, unless the discharges are in compliance with a National Pollutant Discharge Elimination System (NPDES) Permit. Discharge of trash to the Los Angeles River will be regulated via the Municipal NPDES Storm Water Permits and the Caltrans stormwater permit. In addition, USEPA Phase II stormwater permits, general permits, and industrial permits may also be used to regulate discharges of trash to the river.

In June 1990, the first Municipal NPDES Storm Water Permit was issued jointly to Los Angeles County and 84 cities as co-permittees. A separate NPDES Storm Water Permit was issued to the City of Long Beach on June 30, 1999. Storm water municipal permits will be one of the implementation tools of this Trash TMDL, and will include the allocations as effluent limits or other permit requirements. Thus, future storm water permits will be modified to incorporate the Waste Load Allocations and to address monitoring and implementation of this TMDL.

The implementation and compliance schedule is designed to accommodate trash reduction efforts that have been conducted by several cities and the county throughout the Los Angeles River Watershed, in response to the previously adopted trash TMDL. The calculated baseline waste load allocations are derived from data collected during the 2002/03 and 2003/04 storm years. The initial compliance requirement of a 40% reduction from baseline trash levels assumes a 10% reduction per year in trash discharges from the end of the baseline monitoring period. Flexibility is provided by determining compliance based on a 2-year average in the second year and 3-year rolling averages in subsequent years until the numeric target of a zero discharge is attained. The purpose of the rolling averages is to account for fluctuations in trash discharge rates that may occur as a result of variations in annual rainfall patterns and/or littering and trash removal. This approach ensures that measurable reductions to the trash impairment will be achieved in a timely manner, while flexibility in implementation is provided for the responsible agencies

A. Compliance Determination

For those areas not covered by Full Capture Systems, compliance with the Waste Load Allocations will be calculated as follows:

The first compliance date during the Implementation Phase will be September 30, 2007. Compliance will be evaluated based on the total load discharged to the river during the period October 1, 2007 through September 30, 2008. The second compliance date will be based on the average annual load discharged to the river from October1 2007 through September 30, 2009. Compliance thereafter will be evaluated at the end of each successive storm season and will be based on a rolling three-year average (see Table 6). This method will provide allowances for variability due to rainfall. Exceedance of the allowable discharges will subject the permittee to enforcement action. A summary of the schedule for determining compliance with the Waste Load Allocations is presented in Table 6.

The final waste load allocation will be considered complied with when the Executive Officer finds that devices or systems and/or institutional controls have removed effectively 100% of the trash from the storm drain system discharge to Los Angeles River or its listed tributaries.

Table 6. Los Angeles River Trash TMDL: Implementation Schedule.[45]
(Required percent reductions based on initial baseline wasteload allocation of each city)

Year	Implementation	Waste Load Allocation	Compliance Point
1 Sept 2008	Implementation: Year 1	60% of Baseline Waste Load Allocations for the Municipal permittees; and Caltrans	Compliance is 60% of the baseline load
2 Sept 2009	Implementation: Year 2	50% of Baseline Waste Load Allocations for the Municipal permittees; and Caltrans	Compliance is 55% of the baseline load calculated as a 2-year annual average
3 Sept 2010	***Implementation: Year 3***[46]	40% of Baseline Waste Load Allocations for the Municipal permittees; and Caltrans	Compliance is 50% of the baseline load calculated as a rolling 3-year annual average
4 Sept 2011	***Implementation: Year 4***	30% of Baseline Waste Load Allocations for the Municipal permittees; and Caltrans	Compliance is 40% of the baseline load calculated as a rolling 3-year annual average
5 Sept 2012	***Implementation: Year 5***	20% of Baseline Waste Load Allocations for the Municipal permittees; and Caltrans	Compliance is 30% of the baseline load calculated as a rolling 3-year annual average
6 Sept 2013	Implementation: Year 6	10% of Baseline Waste Load Allocations for the Municipal permittees; and Caltrans	Compliance is 20% of the baseline load calculated as a rolling 3-year annual average
7 Sept 2014	Implementation: Year 7	0% of Baseline Waste Load Allocations for the Municipal permittees; and Caltrans	Compliance is 10% of the baseline load calculated as a rolling 3-year annual average
8 Sept 2015	Implementation: Year 8	0% of Baseline Waste Load Allocations for the Municipal permittees; and Caltrans	Compliance is 3.3% of the baseline load calculated as a rolling 3-year annual average
9 Sept 2016	Implementation: Year 9	0% of Baseline Waste Load Allocations for the Municipal permittees; and Caltrans	Compliance is 0% of the baseline load calculated as a rolling 3-year annual average

[45] "Notwithstanding the zero trash target and the baseline waste load allocations shown in Table 5, a Permittee will be deemed in compliance with the Trash TMDL in areas served by a Full Capture System within the Los Angeles River Watershed."
[46] As specified in Section VI.A., the Regional Board will review and reconsider the final Waste Load Allocations once a reduction of 50% has been achieved and sustained in the watershed.

B. Compliance Strategies

Permittees may employ a variety of strategies to meet the progressive reductions in their Waste Load Allocations. These strategies may be broadly classified as either:

- Full capture systems or
- Partial capture control systems and/or
- Institutional controls.

A permittee could comply with the successive reduction in Waste Load Allocations by installing Full Capture Systems progressively throughout the watershed until all of the outlets to the Los Angeles River system are covered. This approach may be best suited for open space areas, where low levels of trash may accumulate over large vegetated drainage areas. However, in more urban settings, institutional controls including enforcement of litter laws and more frequent street sweeping may be preferred.

It is to be noted that ordinances that prohibit litter are already in place in most cities. For example, the Los Angeles City Code of Regulations recognizes that trash becomes a pollutant in the storm drain system when exposed to storm water or any runoff and prohibits the disposal of trash on public land:

> No person shall throw, deposit, leave, cause or permit to be thrown, deposited, placed, or left, any refuse, rubbish, garbage, or other discarded or abandoned objects, articles, and accumulations, in or upon any street, gutter, alley, sidewalk, storm drain, inlet, catch basin, conduit or other drainage structures, business place, or upon any public or private lot of land in the City so that such materials, when exposed to storm water or any runoff, become a pollutant in the storm drain system. (City Code of Regulations, §64.70.02.C.1(a).)

Institutional controls provide several advantages over structural full capture systems. Foremost, institutional controls offer other societal benefits associated with reducing litter in our city streets, parks and other public areas. The capital investment required to implement institutional controls is generally less than for full capture systems. However, the labor costs associated with institutional controls may be higher, and institutional controls may be more costly in the long-term.

There have been a number of discussions as to how permittees may best implement the gradual reductions required by this Trash TMDL, and as to the types of devices or best management practices they should elect. The permittees will be free to implement trash reduction in any manner that they choose.

A discussion of the means for determining compliance for various implementation strategies is presented in the following subsections.

1. Full Capture Treatment Systems

The amount of trash discharged to the river by an area serviced by a full-capture system will be considered to be in compliance with the final Waste Load Allocation for the drainage area, provided that the Full Capture Systems are adequately sized, maintained and maintenance records are available for inspection by the Regional Board. Compliance with the final Waste Load Allocation will be assumed wherever Full Capture Systems are installed in the Los Angeles River Watershed. The installation of a Full Capture System by a discharger does not establish any presumption that the system is adequately sized, and the Regional Board reserves the right to review sizing and other data in the future to validate that a system satisfies the criteria established in this TMDL for a Full Capture System.

2. Partial Capture Treatment Systems and Institutional Controls

Measuring the effectiveness of partial-capture systems and institutional controls is more complicated. The discharge resulting from an area addressed by partial capture and/or institutional controls will be estimated using a mass balance approach, based on the daily generation rate (DGR) for the specific area. [Note: The DGR should not be confused with the trash generation rates obtained during baseline monitoring. The baseline monitoring program is designed to obtain "typical" trash generation rates for a given land use. Those values are then used to calculate a Permittee's baseline load allocation. The DGR is the average amount of trash deposited within a specified drainage area over a 24-hour period. The DGR will be used in a mass balance equation to estimate the amount of trash discharged during a rain event.] (See Example 1.)

Annual re-calculation of the DGR will serve as a measure of the effectiveness of source reduction measures including public education, enforcement of litter laws, etc. Source reduction measures will be accredited based on an annual recalculation of the DGR to allow for progressive improvement and/or to account for backsliding.

The DGR will be determined from direct measurement of trash deposited in the drainage area during any 30-day period from June 22nd to September 22nd of a given year[47], and re-calculated every year thereafter. This three-month period was assumed to be a time characterized by high outdoor activity when trash is most likely to be deposited on the ground. The recommended method for measuring trash during this time period is to close the catch basins in a manner that prevents trash from being swept into the catch basins and then to collect trash on the ground via street sweeping, manual pickup, or other comparable means. The DGR will be calculated as the total amount of trash collected divided by 30 (the required duration of trash collection).

[47] Provided no special events are schedule that may affect the representative nature of this period.

Accounting of DGR and trash removal via street sweeping, catch basin clean outs, etc. will be tracked in a central spreadsheet or database to facilitate the calculation of discharge for each rain event. The spreadsheet and/or database will be available to the Regional Board for inspection during normal working hours. The database/spreadsheet system will allow for the computation of calculated discharges and can be coordinated with enforcement. This database will be developed by cities or groups of cities.

The Executive Officer may approve alternative compliance monitoring programs other than those described above, upon finding that the program will provide a scientifically-based estimate of the amount of trash discharged from the storm drain system.

3. Examples of Implementation Strategies

Two example control strategies for municipal stormwater discharges are described in this section.

Example 1.

A permittee installs catch basin inserts and "dry weather trash door" devices of the type that maintains the catch basin shut during dry weather, and implements regular street sweeping. After each storm of 0.25 inch or greater, the catch basin inserts are emptied. In this case, the DGR was calculated during the month of July as follows:[48]

DGR = (Volume of trash collected via street sweeping during the month of July / 31 days.)

The stormwater discharge for a given rain event then would be calculated by multiplying the number of days since the last street sweeping by the DGR and subtracting the volume of trash recovered in the catch basin inserts.

Stormwater Discharge = [(Days since last street sweeping) (DGR)] –
[Volume of trash recovered from catch basin inserts]

Example 2.

City X is comprised of three land use areas (Land Uses A, B, and C). The city has adopted an implementation strategy using a combination of full capture structural and institutional controls. As of year five, the city has installed full capture systems in Area A and institutional controls in Area B. City X has not yet taken any action to control trash in Area C. The watershed-wide baseline Waste Load Allocation have been established at 100 lbs per square mile for Land Uses A and B, and at 200 lbs per square mile for landuse C. The full capture system is assumed to meet the final Waste Load Allocation. The city's mass balance calculations show that 100 lbs of trash was discharged from Land Use Area B. The discharge from Land Use Area C is assumed to be the base load allocation since no controls were

[48] In the event that trash generation rates differ between weekday and weekends, a distinction in the DGRs may be warranted.

implemented and the daily generation rate has not been established. As shown in Figure E City X's discharge for the year was 1,100 lbs, and the 3-year rolling average discharge was less than the 5-Year Waste Load Allocation. Therefore the city was found to be in compliance with its discharge loading unit.

4. Potential Environmental Impact of Implementation Strategies

An accompanying CEQA Checklist document analyses the potential negative environmental impacts of compliance with the trash TMDL based on the implementation strategies discussed above. The previous Los Angeles River Trash TMDL became effective in 2002 and several municipalities have completed projects in which storm sewer catchment basins were retrofitted with inserts and vortex separation devices were installed within storm drain systems. The most significant environmental impacts have proved to be construction activities associated with the installation of these devices, and maintenance activities. Construction impacts from structural measures are similar to those of small scale public works projects that are sited in previously developed areas. The major construction activities appear to be concrete and electrical work, and in some areas, earth work associated with structural improvements. The environmental impacts and mitigation methods for these types of activities are well known. The environmental impacts from maintenance of the structural measures are associated with removing and disposing trash collected from the structural devices.

Regarding cumulative impacts, it is noted that both the construction and maintenance activities are in small, discrete, discontinuous areas over a short duration. Consequently, cumulative impacts are not significantly exacerbated from the sum of individual project impacts. Project level environmental analysis, by municipalities and responsible agencies for implementation of structural methods, were conducted under notices of exemption. Categorical exemptions were based on the nature of the projects including:

-Minor alteration of existing public structures involving negligible expansion of an existing facility.
-Modifications of existing storm drain system and addition of environmental protection devices in existing structures with negligible or no expansion of use.
-Modifications to sewers constructed to alleviate a high potential or existing public health hazard.

The analysis concludes that the implementation of this TMDL will result in improved water quality in the Los Angeles River Watershed, but may result in temporary or permanent localized significant adverse impacts to the environment. While specific projects employed to implement the TMDL may have significant impacts, these impacts are expected to be limited, short-term or may be mitigated through careful design and scheduling. Furthermore, to the extent the alternatives, mitigation measures, or both, are not deemed feasible by those agencies, the necessity of implementing the federally required TMDL and removing the trash impairment from the Los Angeles River the Watershed (an action required to achieve the express, national policy of the Clean Water Act) outweigh the unavoidable adverse environmental effects, as they will be minimal because project level planning, construction, and operation methods are available to mitigate foreseeable environmental impacts from implementing the TMDL as described in the CEQA checklist.

Figure E. Example 2, City X After Year 5.

Land Use A: 10 sq miles treated by a full capture system Baseline Waste Load Allocation: 100 lbs/sq mi/year	Land Use B: 5 sq miles treated via institutional controls and partial capture Baseline Waste Load Allocation: 100 lbs/sq mi/year
	Land Use C: 5 sq miles - No treatment applied Baseline Waste Load Allocation: 200 lbs/sq mi/year

<u>Baseline Waste Load Allocation for each land use in City X</u>:
A=(100 lbs/sq mi/yr) (10 sq mi)=1000 lbs
B=(100 lbs/sq mi/yr) (5 sq mi)=500 lbs
C=(200 lbs/sq mi/yr) (5 sq mi)=1000 lbs
Total baseline Waste Load Allocation = 2,500 lbs
Year 5 Waste Load Allocation = 2,000 lbs*
*An 80% reduction based on a 3-year rolling average.

<u>Previous Years' Discharge:</u>
Year 3 = 2,400 lbs
Year 4 = 2,000 lbs

Trash Discharge for Year 5:
A=0
B=100 lbs (Determined by mass balance)
C=1,000 lbs (No reduction)
Total Discharge (Year 5) = 1,100 lbs

Three-Year Rolling Average Discharge
Year 3 = 2,400 lbs
Year 4 = 2,000 lbs
Year 5 = 1,100 lbs
3-year rolling average discharge = 1,833 lbs

Compliance is achieved: Discharge (1,833 lbs) < Waste Load Allocation (2,000 lbs).

A summary of implementation strategies and compliance assurance methods is provided in Table 7.

Table7. Summary of Possible Trash Reduction Implementation Measures.

Treatment Applied	Measure of Effectiveness	Compliance Determination
Source Control: Public education, enforcement of litter laws, container redemption programs, etc.	Daily Generation Rate: Amount of trash collected via street sweeping and or from catch basin inserts divided by the number of days provides a measure of source control measure effectiveness	DGR used in mass balance calculation of discharge: Discharge = [DGR (x) Days since last street sweeping] (-) [Catch basin cleanouts]
Partial Capture: (Catch basin inserts, trash excluder doors, etc.)	Mass Balance: Discharge = [DGR (x) Days since last street sweeping] (-) [Catch basin cleanouts] OR Downstream Monitoring w/ Full Capture System	Discharge based on mass balance calculation: Discharge = [DGR (x) Days since last street sweeping] (-) [Catch basin cleanouts] OR Monitoring Results
Full Capture System: Any single device or series of devices that traps all particles retained by a 5 mm mesh screen and has a design treatment capacity of not less than the peak flow rate Q resulting from a one-year, one-hour storm in a sub drainage area. Rational equation is used to compute the peak flow rate: $Q = C \times I \times A$, where Q = design flow rate (cubic feet per second, cfs); C = runoff coefficient (dimensionless); I = design rainfall intensity (inches per hour, as determined per the rainfall isohyetal map in Figure A),* and A= subdrainage area (acres).	Effectiveness verified by literature	Final Waste Load Allocation Achieved: Provided system is adequately sized, maintained and maintenance records are available for Regional Board inspection

* The isohyethal map may be updated annually by the Los Angeles County hydrologist to reflect additional rain data gathered during the previous year. Annual updates published by the Los Angeles County Department of Public Works are prospectively incorporated by reference into this TMDL and accompanying Basin Plan amendment.

.

VIII. Cost Considerations

The Porter-Cologne Section 13241(d), requires staff to "consider costs" associated with the establishment of water quality objectives. The TMDL does not establish water quality objectives, but is merely a plan for achieving existing water quality objectives. Therefore cost considerations required in Section 13241 are not required for this TMDL.

The purpose of this cost analysis is to provide the Regional Board with information concerning the potential cost of implementing this TMDL and to addresses concerns about costs that have been raised by stakeholders. This section takes into account a reasonable range of economic factors in fulfillment of the applicable provisions of the California Environmental Quality Act (Public Resources Code Section 21159.)

An evaluation of the costs of implementing this Trash TMDL amounts to evaluating the costs of preventing trash from getting from the storm drains to the river. This brief report gives a summary overview of the costs associated with the most likely ways the permittees will achieve the required reduction in discharges to the storm drain system. Such an analysis would be incomplete if it failed to consider the existing cost that presently is transferred to "innocent" downstream communities. Approximately 1,620 tons of litter are estimated to be discharged to the Los Angeles River annually, requiring costly removal measures. In addition there is an unquantified cost to aquatic life within the River and the Ocean.

The Regional Board has some information about various facets of the costs of preventing trash from getting into the storm drains. However, exact information on infrastructure currently in place and current structural projects being undertaken is currently not available to the Board. Furthermore, lack of complete information on existing costs precludes a comparison between costs of compliance with existing costs.

A. Cost of Trash Clean-Ups

Cleaning up the river, its tributaries and the beaches is a costly endeavor. The Los Angeles County Department of Public Works contracts out the cleaning of over 75,000 catchments (catch basins) for a total cost of slightly over $1 million per year, billed to 42 municipalities. Each catch basin is cleaned once a year before the rainy season, except for 1,700 priority catch basins that fill faster and have to be cleaned out more frequently.

Over 4,000 tons of trash is collected from Los Angeles County beaches annually, at a cost of $3.6 million to Santa Monica Bay communities in fiscal year 1988-89 alone. In 1994 the annual cost to clean the 31 miles of beaches (19 beaches) along Los Angeles County was $4,157,388.

Long Beach bears a large part of the financial burden for cleaning up trash from the Los Angeles River watershed, which is disproportionate to the amount actually produced by this city.[49] The costs of gathering and disposing of trash at the mouth of the Los Angeles River during the rainy season are listed on Table 8.

Table 8. Storm Debris Summary for Long Beach: Billings.[50]

	First Quarter (July-Sept.)	Second Quarter (Oct.-Dec.)	Third Quarter (Jan.-March)	Fourth Quarter (April-June)	Total
1995-96	$44,152[51]	$130,986	$224,023	$126,416	$525,577
1996-97	$102,055	$187,344	$88,180	$122,416	$499,995
1997-98	$158,612	$268,594	$282,988	$169,340	$879,534
1998-99	$247,986	$198,147	$185,179	$246,950	$878,262

B. Cost of Implementing Trash TMDL

The cost of implementing this TMDL will range widely, depending on the method that the Permittees select to meet the Waste Load Allocations. Arguably, enforcement of existing litter ordinances could be used to achieve the final Waste Load Allocations at minimal or no additional cost. The most costly approach in the short-term is the installation of full capture systems on all discharges to the river. However, in the long term this approach would result in lower labor costs and may be less expensive than some other approaches.

Most of the information presented herein consists of catch basin inserts, structural vortex separation devices and end of pipe nets. We are considering the costs associated with preventing the disposal of trash into the storm drain system over the whole watershed. For all calculations, the urbanized portion of the Los Angeles River watershed is estimated to span an area of 599 square miles[52].

Regardless of the method(s) used, costs associated with the gradual decrease of the amount of trash in the waterways, and the maintenance of the Los Angeles River and its tributaries free of trash include monitoring and implementation costs. Any device chosen for monitoring trash or removing trash from storm drain, regardless of its installation costs, will also be associated with labor costs.

We are looking at several methods separately, from retrofitting all the catch basins in the urbanized portion of the watershed, to using solely structural full capture methods.

[49] However, the cost to the City of Long Beach is offset somewhat by an annual reimbursement from Los Angeles County in the amount of $500,000. (Written comment from The City of Los Angeles, June 23, 2000.)
[50] Memorandum from Geoffrey Hall; City of Long Beach; Parks and Recreation.
[51] 9/95 only.
[52] Although the urbanized portion of the watershed is 609 square miles, about 10 square miles are covered with water.

1. Catch Basin Inserts

At a cost of around $800 per insert, catch basin inserts are the least expensive structural treatment device in the short term. However, if they are not a full capture method, they must be monitored frequently and must be used in conjunction with frequent street sweeping. We assumed that approximately 150,000 catch basins would have to be retrofitted with inserts to cover 574 square miles of the watershed. A summary of estimated costs for using catch basin inserts across the entire watershed is provided in Table 9.

The analysis includes capital costs for catch basin improvements and increases to the annual operating costs for additional street sweeping that may be incurred to ensure that catch basins are kept free from debris. It is assumed that the current annual street sweeping in the Los Angeles River watershed is on a monthly basis and will be increased to twice per month to implement the trash TMDL. Costs for street sweeping are estimated from a range of costs derived from a nationwide study of seven municipalities that are normalized to a "curb-mile" basis. The low and high costs range from $12 to $60 per curb-mile with a median cost of $20 per curb-mile (SWRCB NPDES Stormwater Cost Survey (Cal State Sacramento), www.owp.csus.edu/research/npdes/costsurvey.pdf)

The curb-miles of the Los Angeles River watershed are estimated from the area of the developed portion of the Los Angeles River watershed. Based on an estimated area of 589 square miles, and an assumption that streets are spaced an average of 300-feet apart, and there are two curbs per street, the estimated number of curb-miles is approximately 440,000. On an annual basis, it is assumed that the streets are swept on a monthly basis to yield a total of 5,280,000 curb miles annually. For TMDL implementation, it is assumed that street sweeping will be increased to semi-monthly. It is assumed that the number of curb miles subject to increased street sweeping will increase on an annual basis of 10% as more catch basin improvements are installed. Finally, the annual costs are normalized to an estimated 2 million households in the Los Angeles River watershed.

Table 9. Costs of retrofitting the urban portion of the watershed with catch basin inserts. (amounts in millions)

Number of years into the program	1	2	3	4	5	6	7	8	9	10	11	12
Capital costs (yearly)	$12	$12	$12	$12	$12	$12	$12	$12	$12	$12	$00	$00
Operation & Maintenance costs (yearly, cumulative)	$5.1	$10.2	$15.4	$20.5	$25.6	$30.1	$35.9	$41.0	$46.2	$51.3	$51.3	$51.3
Costs per year (servicing + capital costs)	$17.1	$22.2	$27.4	$32.5	$37.6	$42.1	$47.9	$53	$58.2	$51.3	$51.3	$51.3

The total capital costs required for retrofitting the whole watershed would be $120 million, while the yearly maintenance costs after full implementation would be $51.3 million.

2. Full Capture Vortex Separation Systems (VSS)

Permanent structural devices can be used to trap gross pollutants for monitoring purposes as well as implementation. Among those "litter control devices" are structural vortex separation systems (VSS), floating debris traps, end-of-pipe nets and trash racks. VSS units appear to be among the best alternatives to evaluate or remove the amount of trash generated throughout a particular drainage area.

An ideal way to capture trash deposited into a storm drain system would be to install a VSS unit. This device diverts the incoming flow of storm water and pollutants into a pollutant separation and containment chamber. Solids within the separation chamber are kept in continuous motion, and are prevented from blocking the screen so that water can pass through the screen and flow downstream. This is a permanent device that can be retrofitted for oil separation as well. Studies have shown that VSS systems remove virtually all of the trash contained in the treated water. The cost of installing a VSS is assumed to be high, so limited funds will place a cap on the number of units which can be installed during any single fiscal year.

Table 10 shows estimated costs associated with retrofitting the watershed with low capacity vortex separation systems progressively over ten years.

Table 10. Costs Associated with Low Capacity Vortex Gross Pollutant Separation Systems. (amounts in millions)

Number of years into the program	1	2	3	4	5	6	7	8	9	10	11	12
Operations and Maintenance (yearly, cumulative)	$14.8	$29.5	$44.3	59.1	$73.9	$88.6	$103.4	118.2	$132.9	$147.7	$147.7	$147.7
Capital costs (yearly)	$94.5	$94.5	$94.5	$94.5	$94.5	$94.5	$94.5	$94.5	$94.5	$94.5	$0.0	$0.0
Annual costs per year (capital costs + Operation and Maintenance)	$109.3	$124.1	$138.8	$153.6	$168.4	$183.2	$197.9	$212.7	$227.5	$242.2	$147.7	$147.7

Similarly, Table 11 provides estimates of costs associated with the installation of large capacity VSS systems.

Table 11. Costs Associated with Large Capacity Vortex Gross Pollutant Separation Systems.
(amounts in millions)

Number of years into the program	1	2	3	4	5	6	7	8	9	10	11	12
Operations and Maintenance (yearly, cumulative)	$0.7	$1.5	$2.2	$3.0	$3.7	$4.4	$5.2	$5.9	$6.6	$7.4	$7.4	$7.4
Capital costs (yearly)	$33.2	$33.2	$33.2	$33.2	$33.2	$33.2	$33.2	$33.2	$33.2	$33.2	$0.0	$0.0
Annual costs per year (capital costs + Operation and Maintenance)	$34.0	$34.7	$35.5	$36.2	$36.9	$37.7	$38.4	$39.1	$39.9	$40.6	$7.4	$7.4

As shown in Table 12, outfitting a large drainage with a number of large VSS systems may be less costly than using a larger number of small VSS systems. Maintenance costs decrease dramatically as the size of the system increases. Topographical and geotechnical considerations also should come into play when choosing VSS systems or other structural systems or devices.

Table 12. Costs Associated with VSS.

Capacity	Acres (average)	Number of devices needed on urban portion of watershed	Capital costs	Yearly costs for servicing all devices
1 to 2 cfs	5	73,856	$945,356,800	$147,712,000
6 to 8 cfs	30	12,309	$553,920,000	$24,618,000
19 to 24 cfs	100	3,693	$332,352,000	$7,386,000

For this table, we have assumed the cost of yearly servicing of a VSS unit to be $2000 per year.

3. End of Pipe Nets

"Release nets" are a relatively economical way to monitor trash loads from municipal drainage systems. However, in general, they can only be used to monitor or intercept trash at the end of a pipe and are considered to be partial capture systems, as the nets are usually sized at a 1/2" to 1" mesh. These nets are attached to the end of pipe systems. The nets remain in place on the end of the drains until water levels upstream of the net rise sufficiently to release a catch that holds the net in place. The water level may rise from either the bag being too full to allow sufficient water to pass, or from a disturbance during very high flows. When the nets release they are attached to the side of the pipe by a steel cable and as they are washed downstream (a yard or so) are tethered off so that no pollutants from within the bags are washed out.

Preliminary observations suggest that the nets rarely fill sufficiently to cause the bags to release. And therefore, if they are cleaned after a storm event, the entire quantity of material is captured and can be measured for monitoring purposes using two bags per trap. This makes it easy to replace the full or partially full bag with an empty one, so that the first bag can be taken to a laboratory for analysis without manual handling of the material it contains.

The nets are valid devices because of the ease of maintenance and also because the devices can be relocated after a set period at one location (provided the pipe diameters are the same). With limited funding, installation could be spread over several land uses and lead to valuable monitoring results.

Because the devices require attachment to the end of a pipe, this can severely reduce the number of locations within a drainage system that can be monitored. In addition, these nets cannot be installed on very large channels (7 feet in diameter is the maximum), while the largest outlets into the Los Angeles River are 10 feet in diameter. Thus costs shown in Table 13 are given per pipe, and no drainage coverage is given.

Table 13. Sample Costs for End of Pipe Nets.

Pipe Size	Release nets (cost estimates)
End of 3 ft pipe	$10,000
End of 4 ft pipe	$15,000
End of 5 ft pipe	$20,000
In 3 ft pipe network	$40,000
In 4 ft pipe network	$60,000
In 5 ft pipe network	$80,000

4. Cost Comparison

A comparison of costs between strategies based on catch basin inserts (CBIs), low capacity VSS, high capacity VSS systems, and enforcement of litter laws is presented in Table 14.

Table 14. Cost Comparison (amounts in millions)

	CBI only	Low capacity VSS Units	Large capacity VSS Units	Enforcement of Litter Laws[53]
Cumulative capital costs over 10 years	$120	$945	$332	<$1
Cumulative maintenance and capital costs after 10 years	$450	$1,758	$373	<$1
Annual servicing costs after full implementation	$51.3	$148	$7.4	<$1

Costs to implement the Los Angeles River trash TMDL will depend on the BMPs selected by the permittees.

5. Implementation Costs per Household

In order to estimate the magnitude of fiscal impact that may be incurred to households in the Los Angeles River watershed, the estimated capital, operation and maintenance costs for implementation of the trash TMDL are normalized on an annual per household basis. This analysis of household costs is based on the capital costs for catch basin improvements, and annual operation and maintenance costs, estimated above. The analysis assumes that 50% of the costs of installing, operating and maintaining catch basins improvements will be incurred by households in the Los Angeles River watershed. The remaining costs are estimated to be incurred by commercial, industrial, municipal and public agencies. The methodology for the household cost analysis is to normalize the estimated annual costs of TMDL compliance to the number of households in the Los Angeles River watershed.

It is assumed that there are approximately 3.3 million households in Los Angeles County (SCAG -2000 Census Data) and 2 million households in the Los Angeles River watershed. It is also assumed that household fees will fund approximately 50% of the trash TMDL costs. Based on these assumptions, the costs for implementing the trash TMDL initially are on the order of $3.00 per year per household and increases to approximately $14.55 per year per household.

[53] Revenues from fines assessed to offset increased law enforcement cost. The cost of a database system used to calculate trash discharges estimated to be less than $250,000.

Bibliography

Allison, R.A., Chiew, F.H.S., and McMahon, T.A. (1998) **A Decision-Support-System for Determining Effective Trapping Strategies for Gross Pollutants**. Cooperative Research Centre for Catchment Hydrology. Victoria.

Allison, R.A., Walker, T.A., Chiew, F.H.S., O'Neill, I.C., McMahon, T.A. (1998) **From Roads to Rivers, Gross Pollutant Removal From Urban Waterways**. Cooperative Research Centre for Catchment Hydrology. Victoria.

California Department of Transportation (Caltrans). (1999) **California Department of Transportation District 7 Litter Management Pilot Study.** Sacramento. Caltrans CT-SW-RT-00-013.

California State Water Resources Control Board. (2005). **NPDES Stormwater Cost Survey.** Prepared by Office of Water Programs, California State University, Sacramento, January 2005.

Durrum, Emmett: The Control of Floating Debris in an Urban River. **In Marine Debris: Sources, Impacts, and Solutions**, Coe, James and Rogers, Donald, Eds. New York: Springer-Verlag, 1997.

Garrett, K.L. (1993) **The Biota of the Los Angeles River**. Los Angeles County Natural History Museum.

Moore, C.J. (Algalita Marine Research Foundation), Moore, S.L., Leecaster, M.K., and Weisberg, S.B.(Southern California Coastal Water Research Project) **Marine Debris in the North Pacific Gyre, 1999, with a Biomass Comparison of Neustonic Plastic and Plankton**. (In preparation.)

Moore, S. L., D. Gregorio, M. Carreon, S. B. Weisberg, and M. K. Leecaster. In press. Composition and distribution of beach debris in Orange County, California. In: S.B. Weisberg (ed.), **Southern California Coastal Water Research Project Annual Report 1999-2000**. Southern California Coastal Water Research Project. Westminster, CA.

Moore, S.L. and Allen, M.J. (2000) **Distribution of Anthropogenic and Natural Debris on the Mainland Shelf of the Southern California Bight**. Marine Pollution Bulletin 40:83-88.

Ribic, C.A., Johnson, S.W., and Cole, C.A. (1997) **Distribution, Type Accumulation, and Source of Marine Debris in the United States, 1989-1993**. Pp. 35-47 *in*: Coe, J.M., and Rogers, D.B. (eds.), *Marine debris: Sources, impacts, and solutions*. Springer-Verlag. New York, NY.

US Environmental Protection Agency (US EPA) (1992) **Plastic Pellets in the Aquatic Environment: Sources and Recommendations**. Washington D.C. EPA 842-B-92-010.

Walker, T.A., Allison, R.A., Wong, T.H.F., and Wooton, R.M (1999) **Removal of Suspended Solids and Associated Pollutants by a CDS Gross Pollutant Trap**. Cooperative Research Centre for Catchment Hydrology. Victoria.

Walker, T.A., Wong, T.H.F. (1999) **Effectiveness of Street Sweeping for Stormwater Pollution Control, Technical Report, Report 99/8, December 1999**. Cooperative Research Centre for Catchment Hydrology. Victoria.

Appendix I

This table shows the square mileage for "high density residential", "low density residential", "commercial and services", "industrial", "public facilities", "educational institutions", "military institutions", "transportation and utilities", "mixed urban", "open space", "agriculture", "water" and "recreation" land uses for every city and incorporated areas in the watershed. The "water" land use of water is not in itself a source of trash, and will therefore not receive an allocation. For cities that are only partially located on the watershed, the square mileage indicated is for the portion located in the watershed.

SQUARE MILEAGE ESTIMATED FOR EACH LAND USE FOR CITIES IN THE WATERSHED, AND FOR UNINCORPORATED AREAS.

Jurisdiction	High Density Residential	Low Density Residential	Commercial	Industrial	Public Facilities	Educational Institutions	Military	Transportation	Mixed Urban	Open Space	Agriculture	Water	Recreation	Total
Alhambra	5.12	0.01	0.89	0.29	0.23	0.32	0.00	0.39	0.01	0.04	0.00	0.02	0.29	**7.61**
Arcadia	6.55	0.97	1.28	0.23	0.23	0.22	0.00	0.23	0.01	0.34	0.00	0.19	0.68	**10.94**
Bell	1.21	0.00	0.27	0.45	0.20	0.08	0.04	0.20	0.00	0.02	0.00	0.27	0.01	**2.74**
Bell Gardens	1.41	0.00	0.32	0.26	0.03	0.16	0.00	0.02	0.00	0.03	0.09	0.05	0.12	**2.49**
Bradbury	0.03	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.59	0.18	0.02	0.01	**1.41**
Burbank	8.03	0.01	1.56	1.27	0.43	0.35	0.01	1.28	0.07	3.72	0.01	0.06	0.56	**17.36**
Calabasas	2.05	0.12	0.21	0.00	0.02	0.12	0.00	0.04	0.02	2.59	0.03	0.03	0.35	**5.58**
Carson	0.26	0.00	0.01	0.51	0.00	0.02	0.00	0.06	0.00	0.00	0.00	0.01	0.01	**0.88**
Commerce	0.65	0.00	0.55	3.73	0.26	0.04	0.00	1.09	0.03	0.07	0.01	0.02	0.11	**6.57**
Compton	4.43	0.01	0.73	1.58	0.16	0.71	0.01	0.53	0.03	0.14	0.06	0.09	0.12	**8.60**
Cudahy	0.76	0.00	0.09	0.16	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.01	0.02	**1.12**
Downey	5.29	0.02	0.76	0.16	0.47	0.39	0.00	0.15	0.00	0.02	0.00	0.11	0.43	**7.80**
Duarte	0.74	0.01	0.21	0.11	0.18	0.06	0.00	0.09	0.01	0.85	0.00	0.01	0.05	**2.30**
El Monte	3.74	0.00	1.06	0.98	0.15	0.31	0.00	0.43	0.03	0.03	0.00	0.18	0.07	**6.97**
Glendale	12.54	0.13	1.87	0.72	1.08	0.44	0.00	0.67	0.12	11.99	0.01	0.10	0.95	**30.63**
Hidden Hills	0.01	1.29	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.23	0.01	0.00	0.00	**1.57**
Huntington Park	1.60	0.00	0.53	0.50	0.05	0.16	0.00	0.11	0.03	0.00	0.00	0.00	0.06	**3.03**
Irwindale	0.02	0.00	0.06	1.00	0.07	0.00	0.00	0.09	0.01	0.08	0.00	0.57	0.00	**1.89**

SQUARE MILEAGE ESTIMATED FOR EACH LAND USE FOR CITIES IN THE WATERSHED, AND FOR UNINCORPORATED AREAS, CONTINUED.

Jurisdiction	High Density Residential	Low Density Residential	Commercial	Industrial	Public Facilities	Educational Institutions	Military	Transportation	Mixed Urban	Open Space	Agriculture	Water	Recreation	Total
La Cañada Flintridge	2.94	2.03	0.18	0.15	0.23	0.17	0.00	0.25	0.00	2.16	0.06	0.04	0.37	**8.58**
Long Beach	9.56	0.02	1.76	1.08	0.41	0.53	0.00	1.16	0.08	0.32	0.26	0.81	0.69	**16.67**
Los Angeles	146.95	6.86	17.04	16.81	8.83	7.72	0.13	11.66	2.16	45.85	2.61	5.11	9.77	**281.49**
Los Angeles County	24.75	2.20	2.35	4.39	1.39	1.01	0.02	1.88	0.18	25.59	0.76	0.66	2.99	**68.16**
Lynwood	2.99	0.00	0.49	0.44	0.09	0.24	0.00	0.47	0.05	0.03	0.00	0.00	0.05	**4.86**
Maywood	0.85	0.00	0.15	0.08	0.01	0.04	0.00	0.02	0.01	0.01	0.00	0.00	0.01	**1.19**
Monrovia	3.26	0.30	0.57	0.56	0.11	0.16	0.00	0.16	0.03	4.94	0.00	0.08	0.16	**10.34**
Montebello	3.86	0.00	0.71	1.68	0.40	0.33	0.00	0.31	0.01	0.22	0.12	0.21	0.51	**8.37**
Monterey Park	4.63	0.00	0.64	0.22	0.52	0.28	0.00	0.20	0.03	0.81	0.14	0.01	0.18	**7.67**
Paramount	1.89	0.00	0.44	0.99	0.08	0.22	0.00	0.24	0.04	0.06	0.17	0.14	0.08	**4.35**
Pasadena	11.93	1.19	2.28	0.30	1.02	0.98	0.02	0.89	0.06	2.63	0.09	0.25	1.06	**22.71**
Pico Rivera	1.17	0.02	0.21	0.54	0.02	0.06	0.00	0.12	0.02	0.01	0.02	0.89	0.04	**3.13**
Rosemead	3.31	0.00	0.73	0.15	0.13	0.28	0.00	0.19	0.02	0.07	0.11	0.01	0.15	**5.14**
San Fernando	1.43	0.00	0.42	0.30	0.06	0.08	0.00	0.03	0.01	0.01	0.00	0.03	0.04	**2.42**
San Gabriel	2.86	0.01	0.54	0.09	0.09	0.14	0.00	0.05	0.02	0.02	0.07	0.00	0.23	**4.12**
San Marino	2.21	0.87	0.07	0.00	0.12	0.11	0.00	0.08	0.00	0.01	0.00	0.00	0.30	**3.77**
Santa Clarita	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.20	0.00	0.00	0.00	**0.21**
Sierra Madre	1.71	0.06	0.05	0.01	0.05	0.06	0.00	0.00	0.00	0.93	0.01	0.06	0.04	**3.00**
Signal Hill	0.19	0.00	0.18	0.55	0.02	0.03	0.00	0.05	0.04	0.04	0.00	0.00	0.04	**1.14**
Simi Valley	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	**0.03**
South El Monte	0.58	0.00	0.15	1.14	0.03	0.04	0.00	0.01	0.02	0.05	0.03	0.02	0.02	**2.10**
South Gate	3.92	0.00	0.78	1.25	0.18	0.26	0.00	0.40	0.07	0.04	0.10	0.22	0.27	**7.48**
South Pasadena	2.43	0.13	0.20	0.00	0.06	0.10	0.00	0.09	0.02	0.24	0.01	0.01	0.13	**3.43**
Temple City	3.44	0.00	0.27	0.08	0.07	0.12	0.00	0.01	0.00	0.00	0.00	0.00	0.03	**4.02**
Vernon	0.00	0.00	0.02	3.85	0.09	0.00	0.00	0.82	0.01	0.06	0.00	0.23	0.00	**5.09**
Totals	**291.54**	**18.09**	**40.62**	**46.86**	**17.58**	**16.39**	**0.22**	**24.52**	**3.28**	**113.46**	**5.01**	**10.52**	**21.02**	**598.95**

Appendix II

This table shows the Waste Load Allocations for trash per land use in each city base on square mileage. The "water" land use of water is not in itself a source of trash, and therefore did not receive an allocation. Contributions from Military Installations were not included in the Waste Load Allocations of the cities that had this land use. For cities that are only partially located on the watershed, the square mileage indicated is for the portion located in the watershed.

WASTE LOAD ALLOCATIONS FOR TRASH PER LAND USE IN EACH CITY (GALLONS OF UNCOMPRESSED VOLUME)

City	High Density Residential	Low Density Residential	Commercial Services	Industrial	Public Facilities	Educational Institutions	Military Institutions	Transportation	Mixed Urban	Open Space	Agriculture	Water	Recreation	Total for all classes
Alhambra	18264	23	8380	2816	2262	2983	0	3865	92.2	135	15	0	1067	39903
Arcadia	23362	1879	12106	2265	2243	2113	0	2274	64.8	1266	0	0	2535	50108
Bell	4305	0	2508	4396	1993	740	0	1953	3.9	71	0	0	55	16026
Bell Gardens	5024	0	3033	2503	323	1502	0	235	0.0	108	343	0	429	13500
Bradbury	99	1102	0	0	39	0	0	0	137	2198	659	0	42	4277
Burbank	28637	12	14703	12477	4187	3305	0	12592	707	13850	44	0	2077	92590
Calabasas	7323	232	1964	0	211	1169	0	411	163	9643	105	0	1284	22505
Carson	940	0	108	5019	0	157	0	563	0	0	0	0	44	6832
Commerce	2320	0	5178	36590	2505	371	0	10717	319	268	52	0	415	58733
Compton	15810	25	6919	15462	1545	6727	0	5218	273	527	239	0	447	53191
Cudahy	2718	0	831	1531	85	613	0	47	25	0	0	0	85	5935
Downey	18865	46	7187	1548	4599	3657	0	1519	0	57	0	0	1586	39063
Duarte	2625	25	1944	1059	1745	523	0	864	83	3158	0	0	183	12210
El Monte	13332	2	10050	9568	1501	2904	0	4199	270	121	0	0	261	42208
Glendale	44697	250	17678	7088	10552	4131	0	6560	1171	44593	52	0	3544	140314
Hidden Hills	40	2511	9	0	0	122	0	70	0	857	55	0	0	3663
Huntington Park	5692	0	5004	4880	504	1481	0	1060	309	0	0	0	229	19159
Irwindale	58	0	550	9771	676	0	0	900	90	307	0	0	0	12352

WASTE LOAD ALLOCATIONS FOR TRASH PER LAND USE IN EACH CITY (GALLONS OF UNCOMPRESSED VOLUME) - CONTINUED

City	High Density Residential	Low Density Residential	Commercial Services	Industrial	Public Facilities	Educational Institutions	Military Institutions	Transportation	Mixed Urban	Open Space	Agriculture	Water	Recreation	Total for all classes
La Canada Flintridge	10494	3943	1685	1502	2273	1565	0	2409	0	8027	210	0	1387	33496
Long Beach	34085	36	16609	10563	4009	4973	0	11355	757	1207	964	0	2577	87135
Los Angeles	523851	13302	161072	164951	86603	72974	0	114426	21170	170494	9692	0	36310	1374845
Los Angeles County	88236	4265	22185	43081	13654	9511	0	18407	1799	95145	2840	0	11100	310223
Lynwood	10671	0	4612	4347	859	2290	0	4587	529	118	0	0	187	28201
Maywood	3023	0	1401	771	96	367	0	225	146	55	0	0	45	6129
Monrovia	11624	577	5432	5526	1097	1522	0	1616	323	18375	13	0	584	46687
Montebello	13743	0	6751	16486	3935	3121	0	3071	105	811	441	0	1905	50369
Monterey Park	16521	4	6067	2157	5071	2609	0	1957	310	3011	511	0	680	38899
Paramount	6729	0	4157	9705	832	2072	0	2397	392	239	631	0	297	27452
Pasadena	42519	2315	21595	2929	9970	9281	0	8694	616	9783	339	0	3957	111998
Pico Rivera	4154	48	1998	5317	224	596	0	1146	214	22	75	0	159	13953
Rosemead	11814	0	6859	1442	1279	2673	0	1842	175	249	419	0	552	27305
San Fernando	5093	9	3933	2979	598	796	0	289	57	54	0	0	140	13947
San Gabriel	10178	14	5139	893	868	1327	0	530	183	79	262	0	870	20343
San Marino	7863	1690	621	0	1205	1054	0	830	0	26	0	0	1101	14391
Santa Clarita	0	0	0	0	12	0	0	158	0	731	0	0	0	901
Sierra Madre	6112	121	500	132	523	529	0	5	39	3471	27	0	151	11611
Signal Hill	679	0	1659	5379	207	313	0	513	407	136	0	0	140	9434
Simi Valley	0	0	0	0	0	0	0	32	0	105	0	0	0	137
South El Monte	2084	0	1410	11161	332	340	0	130	178	177	105	0	82	15999
South Gate	13965	0	7367	12284	1724	2424	0	3941	693	147	363	0	997	43904
South Pasadena	8670	254	1897	39	616	939	0	847	232	897	38	0	479	14907
Temple City	12256	5	2595	770	639	1104	0	74	0	0	15	0	114	17572
Vernon	12	0	145	37816	881	45	0	8004	63	234	3	0	0	47203

Appendix III
CALCULATION OF LITTER GENERATION RATE PER LAND USE

Land Use	Drainage Area* (acres)	Litter (gallons) 2002-03*	2003-04*	Average (gallons)	LGR (gals/acre)	LGR (gals/sq mi)
Commenrcial	104.46	1591.92	1494.09	1543	14.77	9453
High Density Single Family Residential	113.98	423.07	846.85	635	5.57	3565
Industrial	119.88	2159.82	1517.7	1839	15.33	9811
Low Density Single Family Residential	164.36	173	822.75	498	3.03	1939
Open Space & Parks	128.89	509.55	988.15	749	5.81	3718
Total	631.56	4857.36	5669.54	5263	8.33	5334

Land Use	Drainage Area* (acres)	Litter (lbs) 2002-03*	2003-04*	Average (lbs)	LGR (lbs/acre)	LGR (lbs/sq mi)
Commenrcial	104.46	1924.96	2697.04	2311	22.12	14157
High Density Single Family Residential	113.98	480.20	1986.3	1233	10.82	6925
Industrial	119.88	2586.60	2586.96	2587	21.58	13811
Low Density Single Family Residential	164.36	124.08	2989.71	1557	9.47	6061
Open Space & Parks	128.89	549.79	3723.72	2137	16.58	10611
Total	631.56	5665.63	13983.73	9825	15.56	9956

*Data provided by the Los Angeles County Department of Public Works - Baseline Monitoring Program

LGR: Litter Generation Rate

Baseline Waste Load Allocation per City = □ Landuse Area X Litter Generation Rate