

PRELIMINARY EVALUATION OF AN ILLEGAL DUMPING ABATEMENT NON-STRUCTURAL BMP

FINAL REPORT

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PROGRAM ASSESSMENT SERVICES
BMP DEVELOPMENT & ENGINEERING
ASSET MANAGEMENT SERVICES
ENVIRONMENTAL ASSESSMENT & PERMITTING
STRATEGIC PLANNING
MONITORING & INVESTIGATIONS



CITY OF SAN DIEGO

URS



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List of Acronyms and Abbreviations

BMP	Best Management Practice
CCFSTI	Chollas Creek Family Stream Team Initiative
City	City of San Diego
Dumpster	40-yard roll-off bin
EPA	Environmental Protection Agency
ESD	Environmental Services Department
E-waste	Electronic waste
Field Team	Team of 2 URS monitoring staff
GIS	Geographic Information System
GPS	Global Positioning System
GWSDCC	Groundwork San Diego Chollas Creek
HDWO	High-Density Work Order
HSP	Health and Safety Plan
I-15	Interstate 15
I-805	Interstate 805
IDEA	Illegal Dumping Economic Assessment
LEA	Local Enforcement Agency
LITUs	Large Item Trash Units
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
Participant Surveys	Participant informational surveys
Refuse Characterization	Trash and debris characterization and quantification
Report	Chollas Creek Mobile Trash Collection Effectiveness Assessment Report
RWQCB	San Diego Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
TMDLs	Total Maximum Daily Loads
TSS	Total Suspended Sediment
URS	URS Corporation
VTA	Visual Trash Assessment
WRCC	Western Regional Climate Center
303(d) list	Final 2008 Draft Clean Water Act Sections 303(b) and 303(d) Integrated Report for the San Diego Region



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EXECUTIVE SUMMARY

The City of San Diego (City) manages a large Municipal Separate Storm Sewer System (MS4) that discharges stormwater and urban runoff to creek, bay, and ocean receiving waters. The San Diego Regional Water Quality Control Board (RWQCB) regulates the discharge of urban runoff through the City's MS4 under the National Pollutant Discharge Elimination System (NPDES) permit program. In response to NPDES permit obligations and as a result of other program drivers, the City has engaged in a multi-faceted urban runoff management program that includes studies to determine the most cost-effective and efficient methods to implement water quality improvements.

The City receives over 25,000 reports of illegal dumping, littering, and waste-related violations each year. In addition, numerous natural creek channels, concrete-lined stormwater conveyances, and other waterways are impacted by illegal dumping activities that have potentially significant impacts to downstream water quality. In the Chollas Creek watershed, the City is performing a variety of BMP projects that include public outreach, targeted aggressive street sweeping, low impact development, and collaboration with non-profit and other groups in alternative pollutant reduction efforts such as trash cleanup day sponsorships. The Groundwork San Diego Chollas Creek (GWSDCC) Chollas Creek Family Stream Team Initiative (CCFSTI) was a grant-funded effort to provide outreach and assistance by engaging the local community to participate in trash cleanup, landscape assistance, and trash collection activities to address illegally-dumped materials and pollutants in Chollas Creek. The City participated in the CCFSTI project by performing an effectiveness assessment of the Refuse Collection Event portion of the program. This program component is considered a non-structural best management practice (BMP) designed to reduce illegal dumping in the Chollas Creek watershed by providing periodic collection services where local residents can dispose of large, unwanted household items for free.

The CCFSTI project area consisted of an approximately 1.4-mile section of the south fork of Chollas Creek between the I-15 and I-805 freeways. The creek in this area is mostly an open prismatic channel with alternating sections of concrete-lined channel bottom and natural channel bottom. The area is highly urbanized with residential, commercial and roadway land uses covering significant portions of the surrounding area.

A three component effectiveness assessment monitoring program was conducted in order to assess the effectiveness of the CCFSTI project. The monitoring included Visual Trash Assessment surveys (VTAs), Participant Surveys, and Refuse Characterization. The quarterly VTAs were used to document the quantity and quality of large trash and debris items present in the project area. Participant Survey data were used to measure public attitudes about refuse collection and illegal dumping. Refuse Characterization data were used to identify the quantity and type of items participants dispose of at the mobile collection events.

A total of five VTA surveys were conducted during the study period at quarterly intervals, including a baseline survey. The VTA survey data indicated that there are significant deposits of Large Item Trash Units (LITUs) within the CCFSTI project area consisting of household items, construction materials, and green waste. Several suspected illegal dumping areas and homeless encampments were also identified. In general, the quantity of LITU materials observed in the creek area increased throughout the study period.



A total of 9 CCFSTI-funded Refuse Collection Events were conducted and observed from April through October 2009. Events were typically held on Saturdays at 1- to 4-week intervals and were publicized by the distribution of promotional flyers. Urban Corps staff was present during the events to assist residents in loading refuse items from vehicles into collection bins. The number of participants at each event varied from 0 (one event did not have any participants) to approximately 25 and resulted in the collection of approximately 115 tons of material. A total of 95 Refuse Collection Event participants were surveyed using Participant Surveys to assess their attitudes, perceptions, and needs related to disposal of large items and illegal dumping. Survey responses indicated that the flyer marketing technique was relatively effective, where 42% of the respondents noted they had been notified via flyers. Respondents also indicated they had large item disposal needs between 1 and 4 times per year and that e-waste disposal was generally a relatively limited proportion of disposal items. In addition, respondents indicated that potentially important impediments to efficient large item disposal included the need for appropriately sized vehicles, landfill fees, and travel distance to the landfill.

The VTA survey and Refuse Collection Event data suggest that there is a relative similarity between the types of LITUs observed in creek areas and the refuse disposed of during collection events. However, the relatively infrequent events and the limited number of event participants, combined with a number of other factors such as seasonal and daily weather influences, prevent comprehensive assessment of potential overall pollutant removal impact of the CCFSTI program using the project data. An extensive review of available local, regional, and national literature and data was conducted in order to allow a quantitative estimate of the effectiveness of non-structural illegal dumping abatement programs in changing behavior, diverting waste from being illegally dumped and/or preventing pollution to potentially be conducted. However, these types of quantitative measurements are not often attempted. This is presumably a result of the relative difficulty associated with assessing behavioral changes and measuring the relative amount waste disposed through various mechanisms in the presence or absence of non-structural programs.

A preliminary assessment of the per-event cost of the CCFSTI program was estimated to be approximately \$3,167. This cost includes budget for project management, labor, advertising, disposal, and miscellaneous project costs. Available ESD and other land use data were then used to scale the project costs to provide a preliminary estimate of per-event and annual costs for program implementation in other areas of the City with high-incidence of illegal dumping and other waste-related work orders. These costs were also compared to estimated cost of implementation of structural BMPs designed to capture and remove large-item waste from wet weather flows in portions of Chollas Creek adjacent to the project area.

The data collected as part of this monitoring program provide useful insight to the quantity and characterization of LITUs currently present in the Chollas Creek project area and deposited within the project timeframe; the type and quantity of large-item refuse material that residents need to dispose of; and a general understanding of the attitudes and perceptions of participants in the CCFSTI program regarding illegal dumping issues. Future efforts to assess the effectiveness of non-structural BMPs that may reduce or abate illegal dumping in the Chollas Creek or other watersheds may utilize the project data to assess relative effectiveness and allow more comprehensive assessment of the efficiency of these types of programs. The data may also be used to provide guidance for the development of appropriate management measures related to illegal dumping abatement.



SECTION 1 INTRODUCTION

This Preliminary Evaluation of an Illegal Dumping Abatement Non-structural BMP Report (Report) has been prepared for the City of San Diego (City) Storm Water Department to assess the effectiveness of a non-structural best management practice (BMP) program designed to reduce illegal dumping in the Chollas Creek watershed. The Groundwork San Diego Chollas Creek (GWSDCC) Chollas Creek Family Stream Team Initiative (CCFSTI) was a grant-funded effort to provide outreach, education, and assistance by engaging the local community to participate in trash cleanup, landscape assistance, and trash collection activities to address illegally-dumped materials and pollutants in Chollas Creek. The purpose of this Report is to document activities and analysis methods that were used to assess the effectiveness of parts of the CCFSTI program that address illegal dumping and trash pollutant issues in portions of the Chollas Creek watershed.

1.1 BACKGROUND

The problem of illegal dumping is widespread among urban and rural communities throughout California and the United States. It is widely accepted that illegal dumping has significant environmental, financial, and societal impacts. These impacts include: public health and safety issues, potential decreases in water quality, decreases in property values, impediments to economic development, increased municipal operating costs, potential regulatory action against property owners, and lost revenues for impacted areas. In addition, municipalities and property owners can incur significant costs to cleanup and dispose of illegally dumped materials.

According to survey results from an illegal dumping survey in 33 counties in California more than \$17 million is spent annually to combat illegal dumping (California State Association of Counties, 2006). The survey reported that the most commonly dumped items, in order of appearance are: appliances, tires, household waste, furniture, vehicles, electronic waste, hazardous waste, and construction materials. In San Diego County, vacant lots and alleys were noted as common sites for illegal dumping and the annual jurisdictional costs related to illegal dumping exceeded \$1 million.

In the City, there are over 25,000 reports of illegal dumping, littering, and waste-related violations each year. These reports are investigated by the City's Solid Waste Code Enforcement team, a group within the City Environmental Services Department (ESD) responsible for enforcing the City's solid waste codes. In addition to the reported incidence of illegal dumping there is evidence that numerous natural creek channels, concrete-lined stormwater conveyances, and other waterways are impacted by illegal dumping. During storm events, these channels and conveyances can transport significant discharges of urban runoff (stormwater) which can carry trash, debris, and other large illegally dumped materials downstream.

The City manages a large Municipal Separate Storm Sewer System (MS4) that discharges stormwater and urban runoff to creek, bay, and ocean receiving waters throughout its jurisdiction. The San Diego Regional Water Quality Control Board (RWQCB) regulates the discharge of urban runoff through the City's MS4 under the National Pollutant Discharge Elimination System (NPDES) permit program, and the City is identified as a discharger (or "Copermittee") under RWQCB Order No. R9-2007-0001 (San Diego Regional Water Quality Control Board, 2007). Under the NPDES permit program, the City must



reduce the discharge of pollutants in urban runoff to the Maximum Extent Practicable (MEP) through a combination of pollution prevention, source control, and treatment control BMPs.

In response to NPDES permit obligations and as a result of other program drivers, the City has engaged in a multi-faceted urban runoff management program in the 6 watershed management areas that fall within the City limits. As an integral part of these BMP efforts, the City also has developed a process to assess and track project efficiency in order to both assess the cost and pollutant removal efficiency of individual urban runoff management projects as well as document the effectiveness of projects as required by the NPDES permit. In the Chollas Creek watershed, the City is performing a variety of BMP projects that include public outreach, targeted aggressive street sweeping, low impact development, and collaboration with non-profit and other groups in alternative pollutant reduction efforts such as trash cleanup day sponsorships.

In early 2009, GWSGCC received grant funding from the San Diego Unified Port District to initiate the CCFSTI program to perform a coordinated community education and participation program. The CCFSTI program was designed to reduce illegal dumping in portions of Chollas Creek by implementing community education and outreach programs, hosting Refuse Collection Events at designated community centers, and providing non-native vegetation removal services. The CCFSTI project area is focused in the communities adjacent to the south fork of Chollas Creek roughly bounded by Interstate 805 (I-805) and Interstate 15 (I-15) (Figure 1-1). Education and outreach activities within the project area include print and electronic “clean water” messaging, bilingual door-to-door outreach, and volunteer training and education activities. The Refuse Collection Event portion of the program, conducted in coordination with GWSGCC and Urban Corps as project partners, aims to reduce illegal dumping of trash and other items in Chollas Creek and other public areas by publicized collection events held at local community centers. The Refuse Collection Events are designed to encourage local residents to dispose of trash or unwanted large household items (such as furniture, appliances, and toys) in designated trash bins during the bimonthly events. The CCFSTI program also includes a non-native vegetation (*Arundo donax*) removal component for portions of Chollas Creek and a removal of non-natives and replacement with landscaping alternatives component for qualifying creek-side residents.



Figure 1-1. Chollas Creek Watershed Map.

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The City has partnered with GWSDCC to assess the effectiveness of the CCFSTI program in reducing illegal dumping in Chollas Creek and to evaluate the relative cost of the Refuse Collection Event program. The results of the CCFSTI effectiveness assessment will be incorporated into the City's overall efficiency assessment program which aims to identify the most efficient combination of stormwater programs and activities that will cost-effectively maximize pollutant load reductions.

1.2 OBJECTIVE

The purpose of this Report is to document effectiveness assessment results of portions of the CCFSTI program. The Report identifies the methodology that was used to assess the effectiveness of the Refuse Collection Events in: (1) increasing public awareness of trash issues in Chollas Creek, (2) implementing the collection of trash items in local communities, and (3) reducing illegal dumping of trash and large household items. Results from the various assessment activities and a cost evaluation of the CCFSTI program are also presented.

1.3 GENERAL SCOPE OF ACTIVITIES

3 main types of data collection activities were conducted.

- Visual Trash Assessment (VTA) surveys were performed on a quarterly basis to evaluate the amount and type of large item trash units (LITUs), anthropogenic habitation areas, and suspected illegal dumping areas present in the project area. For the purposes of the VTA monitoring program, a LITU was defined as any single trash item or grouped set of items (including bags/boxes of smaller items) greater than one cubic foot in volume.
- Participant informational surveys (Participant Surveys) were conducted during the 9 Refuse Collection Events to assess participants' motivational drivers and knowledge of trash issues in Chollas Creek and to determine any impediments to future program participation.
- Trash and debris characterization and quantification (Refuse Characterization) data, collected during the Refuse Collection Events were compiled to assess the type and amount of refuse collected at the events.

These elements provided the basis for the development of this Report, which evaluates the effectiveness of the CCFSTI program.

1.4 PROJECT ORGANIZATION AND RESPONSIBILITIES

The project team for this project consisted of staff representing the City, GWSDCC, and URS Corporation (URS). The City Project Coordinator for this project was Stephanie Bracci. The GWSDCC project manager was Leslie Reynolds. The URS Task Order Manager was Bryn Evans.

1.5 EFFECTIVENESS ASSESSMENT GOALS

A central purpose of the CCFSTI program is to raise awareness of trash issues in Chollas Creek and to mobilize the local community to participate in the Refuse Collection Events in order to reduce illegal dumping. The effectiveness of portions of the CCFSTI program will be measured by assessment of 3



main monitoring technologies: VTAs, Participant Surveys, and Refuse Characterization. The effectiveness assessment is designed to address the following goals:

- document current conditions of LITU deposits and presence of suspected illegal dumping areas within the project area,
- document changes in conditions of LITU deposits in the project area as a result of CCFSTI efforts and other factors,
- identify the temporal variation of potential illegal dumping in the project area,
- assess participant perceptions of the CCFSTI program and illegal dumping,
- quantify and characterize the trash and debris collected at the Refuse Collection Events,
- estimate the pollutant reduction effects of the CCFSTI program, and
- determine the cost-effectiveness of the CCFSTI program.

The observational methods and analytical approach developed to meet these effectiveness assessment goals are identified in Section 3.

1.6 DOCUMENT ORGANIZATION

The report organization is described below.

- Section 1 *Introduction:* Summarizes the project background information, including objectives, general scope of activities, project organization and responsibilities, and assessment goals.
- Section 2 *Site Characteristics:* Describes the Chollas Creek watershed and CCFSTI project area.
- Section 3 *Data Collection and Field Observation Methods:* Describes the monitoring methodology that was used to measure the effectiveness of portions of the CCFSTI program, the data that were collected to perform the effectiveness assessment, and the data analysis approach.
- Section 4 *Project Results:* Presents the results of the VTA surveys, Participant Surveys, and Refuse Characterization collection data.
- Section 5 *Project Effectiveness Assessment:* Summarizes an effectiveness assessment for portions of the CCFSTI program in addressing illegal dumping and trash pollutant issues.
- Section 6 *Summary and Considerations:* Identifies key components of the project and provides considerations for City staff.
- Section 7 *References:* Provides a summary of report references.



SECTION 2 SITE CHARACTERISTICS

This section describes the Chollas Creek watershed and CCFSTI project area.

2.1 CHOLLAS CREEK WATERSHED

The 16,270-acre Chollas Creek watershed, located in San Diego County, California, contains 2 main forks. The north fork watershed area encompasses 9,276 acres and the south fork watershed area covers 6,997 acres. The headwaters of the 2 forks begin in the northeastern section of the watershed, flow approximately 15 miles downstream through the City, and drain into the eastern shoreline of the central portion of San Diego Bay. The lower approximately one mile of the creek is tidally influenced. Due to its geographic location within central San Diego County, the watershed is highly urbanized with residential, road, freeway, and highway land uses covering significant portions of the land area. Over the past 50 years, urbanization and the corresponding need for flood control have resulted in significant modifications to, diversions of, and channelization of much of the creek bed. In the lower watershed, portions of the remaining un-channelized sections of the creek bed are dominated by invasive plants, the presence of illegally dumped trash and large refuse items, and generally degraded habitat.

Both the north and south forks of Chollas Creek are typically ephemeral or contain very little flow during the May-September southern California dry season. During the wet season, rain events produce periodic high volume flows. During these high flow periods, densely vegetated areas in the creek act as energy dissipaters by slowing stormwater flow and trapping or capturing trash and other debris. As a result of the long dry season, during which the creek and bank areas are relatively accessible to humans, and wet weather flows containing high amounts of trash and debris, trash and debris are actively and passively deposited in many locations within the creek bed.

The RWQCB has identified the lower 3.5-mile portion of Chollas Creek as an impaired water body on the 2008 "Final 2008 Draft Clean Water Act Sections 303(b) and 303(d) Integrated Report for the San Diego Region" (303(d) list) for copper, Diazinon, indicator bacteria, lead, phosphorus, total nitrogen as N, zinc, and trash (San Diego Regional Water Quality Control Board, 2009). The Federal Clean Water Act regulates that the RWQCB must also prioritize the water bodies on the 303(d) list and develop Total Maximum Daily Loads (TMDLs) for water bodies that do not meet regulatory standards. A TMDL for Diazinon has also been developed based on previous 303(d) listings and was approved by the Environmental Protection Agency (EPA) in 2003. TMDLs for dissolved copper, lead, and zinc for the lower portion of Chollas Creek were also approved by EPA in late 2008, and a TMDL for indicator bacteria is currently being finalized. In addition to the pollutants identified on the 303(d) list and in TMDLs, other pollutants, such as total suspended sediment, turbidity, surfactants (methylene blue active substances), biological oxygen demand, chemical oxygen demand, and trash, have been identified as exceeding water quality objectives and potentially contributing to incidences of aquatic toxicity observed during wet weather monitoring events (County of San Diego, 2009).

The City ESD is generally responsible for receipt and compilation of public complaints of illegal dumping in the right-of-way and waste on private property and also performs abatements in the right-of-way and of homeless encampments within the City jurisdiction. ESD annually receives over 25,000 reports of illegal dumping, littering, and waste-related violations (City of San Diego, 2010b). The



incidence of illegal dumping in the Chollas Creek watershed from January 2009 to December 2009 is presented in Figure 2-1. These identified complaint areas are likely representative of the overall illegal dumping issue within the watershed. However, there are likely other additional illegally dumped items and areas of human habitation in portions of the creek bed and banks that are relatively inaccessible by many members of the public and/or are adjacent to private property with limited access. To combat these illegal disposal activities, the City Code Enforcement group provides anti-waste education classes and organizes over 70 community cleanup/recycling events around the City each year.

2.2 CCFSTI PROJECT AREA

The CCFSTI project area includes an approximately 1.4-mile section of the south fork of Chollas Creek between the I-15 and I-805 freeways (Figure 2-2). The creek in this area is mostly an open prismatic channel (i.e., the creek has a constant cross section and often has a constant bed slope for long lengths of the channel) with alternating sections of concrete-lined and natural channel bottom. Land use in areas adjacent to the creek within the project area is predominantly residential, with some interspersed areas of light industry, open space and park, and vacant and undeveloped land. There are also numerous potentially available public access points to the creek and banks through existing residential streets and open space areas. There is evidence that the creek and bank areas are frequently used by humans for recreation, as shown by the presence of walking trails, and, in some cases, habitation.



**Figure 2-1. City of San Diego, Environmental Services Dept., Illegal Dumping, Litter, and Transient Related Work Orders,
Chollas Subarea- January 1-Dec. 31, 2009**

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Figure 2-2. Approximate CCFSTI Project Area

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2.3 PROJECT AREA POPULATION

An important component in the determination of the relative effectiveness of non-structural BMPs, such as the CCFSTI program, is assessment of the number of program participants relative to the potential people exposed to the program. The approximate population density data for the project area were obtained through interpolation of San Diego Association of Governments (SANDAG) Geographic Information System (GIS) data (San Diego Association of Governments, 2010). The SANDAG data use census data from the year 2000 to provide specific blocks of population data (Figure 2-3), based on geographic and other boundaries. The estimated population data were used to develop predictions of the number of residents and/or households within the project area who might participate in components of the CCFSTI program.

In order to estimate the number of people that live within the project area, the approximate fraction of overlap between the census block and project area was estimated. The fraction of overlap was then applied to the population count for each census block to determine the approximate population size within the project area to allow estimation of the number of participant households in the CCFSTI program. The estimation process is explained in greater detail in the work plan (City of San Diego, 2009a).The population within the CCFSTI project area was estimated to be 10,391.

Based on the CCFSTI project area population value and an estimated 3 people per household, a total of 3,464 households were estimated within the project area. Based on this total, Table 2-1 provides the expected number of households that may participate in the CCFSTI program at various levels of participation.

Table 2-1. Example Program Participation Levels and Estimated Participant Households

Participation Level	Estimated Households Participating
5%	173
10%	346
15%	520



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Figure 2-3. Population Block and CCFSTI Project Area

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SECTION 3 DATA COLLECTION AND FIELD OBSERVATION METHODS

This section identifies the monitoring logistical components and approach that were used to evaluate the CCFSTI program components. The monitoring program includes health and safety considerations and 3 main components: VTAs, Refuse Characterization, and Participant Surveys. VTAs were used to document the quantity and quality of large trash and debris items present in the project area. Refuse Characterization data were used to identify the quantity and type of items participants dispose of at the mobile collection events. Participant Survey data were used to measure public attitudes about refuse collection and illegal dumping.

3.1 HEALTH AND SAFETY

The monitoring program identified in this Report required careful consideration of health and safety issues. The project area is located within a highly urbanized section of the watershed and there are numerous areas where natural and anthropogenic hazards may provide the potential for injury. The Health and Safety Plan (HSP) is documented within the project work plan (City of San Diego, 2009a). The HSP was complied with throughout the duration of the project.

3.2 VISUAL TRASH ASSESSMENTS

The purpose of the VTA surveys was to document the presence of LITUs in the Chollas Creek channel and nearby bank areas within the project area at quarterly intervals for the duration of the 12-month CCFSTI program (Table 3-1). The initial survey was conducted prior to CCFSTI program implementation and is considered an estimate of baseline conditions. For each survey, the project area was divided into 4 subsections labeled 2a, 2b, 2c and 2d (Figure 3-1). The details of the VTA survey preparation, monitoring protocol, and documentation can be found in the work plan (City of San Diego, 2009a). The VTA monitoring was conducted by a team of 2 URS monitoring staff (Field Team) performing a “walking” assessment of the creek bed and immediately adjacent bank areas. The Field Team recorded and geo-referenced all areas where LITUs were present, there was evidence of human habitation within the creek bed or banks, and there was evidence of suspected illegal dumping.

Table 3-1. Visual Trash Assessment Survey Periods and Dates

Visual Trash Assessment Survey Period	Visual Trash Assessment Date
Baseline	4/22/2009
Q1	7/2/2009
Q2	10/20/2009
Q3	1/8/2010
Q4	4/13/2010



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Figure 3-1. Overview of VTA Survey Areas

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The Field Team documented LITUs encountered within or immediately adjacent to the creek channel or banks. Each LITU was described and classified into 1 of the categories presented in Table 3-2. The Field Team photo-documented LITUs for reference in future surveys and for reporting purposes.

Table 3-2. Large Item Trash Unit Group Categories and Examples

Large Item Trash Unit Category	Examples
Appliance Electronic	Water heater
	Washing machine
	Vacuum
Auto/Mechanical	Tires
	Car dashboard
	Car parts
	Jet ski gas tank
Baby Supplies/Children's Toys	Stuffed animals
	Dolls
	Baby supplies
	Bike frame
	Children's bike seat
Building Materials	Sheet metal
	Shower floor
	Cement bags
	Bucket
	Metal
Furniture (Couch/Lounge)	Couch
Furniture (Mattress/ Bedding)	Mattress
	Sleeping bag
	Bed frame
	Patio furniture
	Lawn chair
Misc. Litter	Clothes
	Suit case
Shopping Carts	Shopping cart
Trash Bags	Trash bags full of refuse (> 1 feet(ft) ³ in size)



3.3 REFUSE COLLECTION EVENTS

A portion of the CCFSTI program included the organization of Refuse Collection Events at a total of 3 sites within the project area. The original CCFSTI project plan included 4 Refuse Collection Event locations. Logistical constraints at 1 of the project sites prevented implementation of the Refuse Collection Event service. The 3 Refuse Collection Event locations within the project area were: 1) Jackie Robinson YMCA, located at 151 YMCA Way, 92102; 2) Southcrest Recreational Center, located at 4149 Newton Avenue, 92113; and 3) 38th Street and Alpha Park, located at S. 38th Street and Alpha Street, 92113 (Figure 3-2).



Figure 3-2. Refuse Collection Event Locations

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The Refuse Collection Events were designed to provide appropriate trash receptacles and assistance staff for event participants needing to dispose of large, unwanted household items, vegetation, and other debris. The Refuse Collection Events were publicized prior to each occurrence date. Each event included 1 to 4 40-yard roll-off bins (dumpsters) positioned so that local residents were able to use motor vehicles or other types of transportation to transfer and dispose of non-hazardous waste and items at no cost. The program schedule included approximately bi-monthly events, alternating between 3 event locations. The events were held on Saturday mornings and were staffed by Urban Corps personnel who assisted in unloading and disposing of items. The Refuse Collection Events that occurred in 2009 are presented in Table 3-3.

Table 3-3. 2009 Refuse Collection Events

Event Location	Dates
38 th and Alpha Park	5/23/2009 7/25/2009
Jackie Robinson YMCA	5/9/2009 6/6/2009 ¹ 6/27/2009 8/15/2009 ¹ 10/17/2009
Southcrest Community Park	4/25/2009 7/11/2009 8/22/2009 9/26/2009

¹. Field Team was not present during event. .

The monitoring approach for the Refuse Collection Events included characterization of the type and relative volume of the items disposed by the event participants. During the collection events, the Field Team documented the disposed items using field data sheets and photographs. Urban Corps also monitored the types of items deemed unacceptable for collection, such as batteries, paint, electronic equipment, and other items deemed hazardous or potentially hazardous. The total weights of the filled dumpsters were also compiled using the dump fee receipts collected by Urban Corps staff.

3.4 PARTICIPANT SURVEYS

The Field Team engaged Refuse Collection Event participants to take part in general Participant Surveys designed to assess the participants’ motivation in event participation, relative need for the refuse collection service, general understanding and attitude toward illegal dumping, and potential impediments toward future event participation. Based on the local businesses and signage present within and adjacent to the project area, it was anticipated that a portion of the potential participants of the Refuse Collection Events may be native Spanish speakers. Accordingly, the written survey was developed in both English and Spanish languages. The Participant Survey forms are provided in Appendix A.

During the Refuse Collection Events, the Field Team used both conversational and written assessment methods to survey event participants. The Field Team used care in explaining to participants the purpose of the Refuse Collection Events and the voluntary survey and then used best professional judgment to



administer questions in the most effective format. The voluntary survey form included the *Think Blue*¹ logo to promote the CCFSTI program's connection to responsible stormwater management practices and techniques. The total number of Refuse Collection Event participants, regardless of whether they provided survey responses, was recorded by the Field Team.

1. *Think Blue* is the City's storm water education campaign for both external and internal audiences, and is managed by the Pollution Prevention Division's Education and Outreach Program. The *Think Blue* campaign is a multi-faceted effort which encompasses education, public outreach, storm water pollution prevention advocacy, mass media advertising, and employee training.



SECTION 4 PROJECT RESULTS

The following sections document the project results for the VTA surveys and activities associated with the Refuse Characterization events, which include event marketing and Participant Surveys. The collected data were evaluated to determine validity using procedures in Appendix B. Discussion of the results with respect to assessing the effectiveness of the CCFSTI program is presented in Section 5.

4.1 VISUAL TRASH ASSESSMENT SURVEYS

The VTA surveys generated characterization and geographic location data for the following types of potential sources of trash within the project area:

- LITUs within or immediately adjacent to the creek channel or banks within the project area,
- areas with evidence of human habitation, and/or
- areas with evidence of illegal dumping activity.

These data were quantified and compiled into a GIS layer for each survey period (Appendix C). An example VTA survey map is presented in Figure 4-1. Examples of the types of materials observed during the VTA surveys are presented in Figure 4-2. Results are compiled based on initial conditions observed prior to CCFSTI program implementation and throughout the program implementation period.



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Figure 4-1. Example Visual Trash Assessment Overview





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Figure 4-2. Visual Trash Assessment Survey Examples



Homeless encampment (observed July 2009).



Trash and debris dumped over a fence (observed April 2009).



Trash and debris dumped through a break in a fence (observed January 2010).



Homeless encampment (observed April 2009).



Furniture dumped at easy access point for vehicles (observed July 2009).



Trash and debris blocking the stream channel (observed October 2009).



4.1.1 Initial Conditions of Large Item Trash Unit Deposits and Presence of Illegal Dumping Areas

The baseline VTA survey was conducted prior to CCFSTI project initiation and the first Refuse Collection Event. The presence of LITU deposits during this initial VTA was highest in Survey Subsections 2a and 2c. Survey Subsections 2b and 2d each contained successively lower amounts of LITUs during this initial survey period (Appendix C). Generally, building materials, auto/mechanical, and mattress/bedding furniture were commonly observed items in Sections 2a, 2b and 2c (Table 4-1). Shopping carts were commonly observed items in Sections 2b and 2c. There were generally very few LITUs observed in Section 2d, but several shopping carts, appliance/electronic, and auto/mechanical items were documented.

In addition to the observed LITUs, 2 suspected homeless encampments were identified within Section 2a (Appendix C). Several areas where field crews suspected illegal dumping was occurring were identified in Sections 2a, 2b and 2c. A single area of suspected illegal dumping was identified in Section 2d. Additional discussion of these results with respect to CCFSTI program effectiveness is presented in Section 5.2.



Table 4-1. VTA Survey Large Item Trash Unit Category Quantities

Large Item Trash Unit Category	VTA Survey Subsections																			
	2a					2b					2c					2d				
	April 2009	July 2009	October 2009	January 2010	April 2010	April 2009	July 2009	October 2009	January 2010	April 2010	April 2009	July 2009	October 2009	January 2010	April 2010	April 2009	July 2009	October 2009	January 2010	April 2010
Household Waste																				
Appliance/ Electric	4	4	7	9	10	2	2	3	1	5	5	4	5	12	4	2	3	3	1	2
Auto/ Mechanical	6	9	9	11	9	2	3	7	11	9	5	3	10	6	6	2	3	4	4	3
Baby Supplies/ Children's Toys	1	1	3	2	1	3	6	5	5	2	2	1	3	6	4	0	1	0	1	1
Furniture (Couch/ Lounge)	2	4	5	4	4	1	3	4	0	1	0	4	5	4	1	1	0	0	1	0
Furniture (Mattress/ Bedding)	7	10	12	15	21	5	8	15	10	16	5	2	15	17	13	1	4	1	4	3
Furniture (Other)	1	3	4	3	4	4	9	5	6	2	3	5	6	10	9	0	3	0	2	4
Misc. Litter	5	17	10	13	21	1	2	5	2	3	3	5	3	3	2	0	1	1	2	3
Shopping Cart	4	4	2	7	5	10	24	20	24	23	10	2	7	8	13	2	11	9	4	6
Trash Bags	1	13	11	18	15	2	3	9	0	3	1	1	5	6	0	0	1	0	0	1
Construction Waste																				
Building Materials	8	3	8	9	19	3	3	10	14	10	5	7	14	23	12	0	1	1	3	4
Green Waste																				
Yard Waste	-	0	0	0	0	-	0	2	1	3	-	3	9	9	1	-	0	0	0	5
Total	39	68	71	91	109	33	63	85	74	77	39	37	82	104	65	8	28	19	22	32



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4.1.2 Variation of Large Item Trash Unit Distribution

The VTA survey maps generated for each of the VTA survey periods were used to assess the temporal and spatial distribution of illegal dumping within the project area (Appendix C). Observed quantities for the general LITU categories during the quarterly surveys are presented in Table 4-1. A qualitative scale was developed to perform an assessment of the quantity of LITUs present within the surveyed area during each of the VTA survey periods (Table 4-2).

Table 4-2. Large Item Trash Unit Scale Designation

Quantity of LITUs per VTA Survey Area	LITU Qualitative Designation
0-19 LITUs	Low
20-39 LITUs	Medium
40+ LITUs	High

During the initial VTA survey period, Sections 2a and 2b were defined as containing a medium level of LITUs. Subsequent VTA surveys indicated a high level of LITUs present for these 2 VTA areas (Table 4-3). The observed amount of LITUs also increased in Sections 2c and 2d over the year long period.

Table 4-3. Quantity of Large Item Trash Units in Each Area Over Time

VTA Survey Area	2009			2010	
	April	July	Oct.	Jan.	April
2a	Medium	High	High	High	High
2b	Medium	High	High	High	High
2c	Medium	Medium	High	High	High
2d	Low	Medium	Low	Medium	Medium

Additional discussion of these results with respect to CCFSTI program effectiveness is presented in Section 5.3.



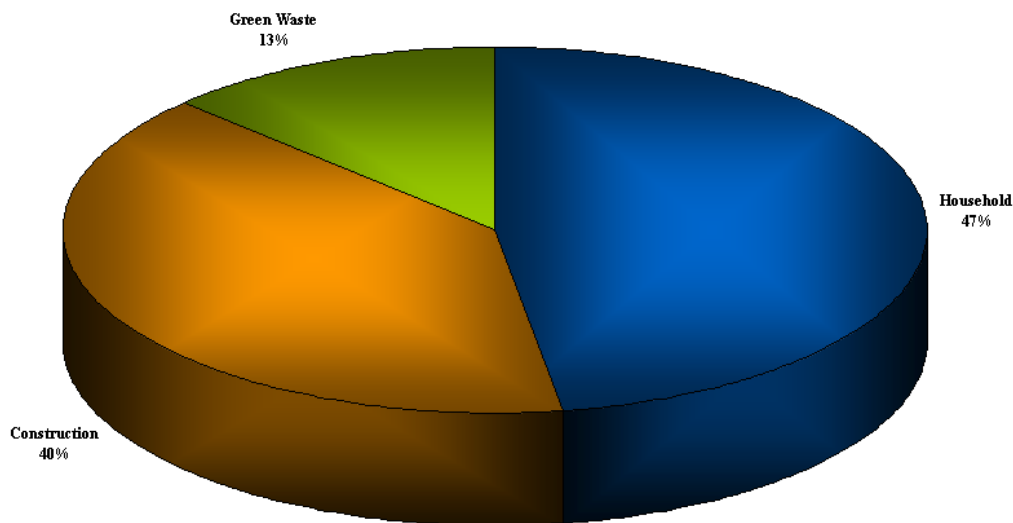
4.2 REFUSE CHARACTERIZATION

The Refuse Characterization monitoring generated quantity and categorization information regarding the refuse collected during the Refuse Collection Events. A detailed summary of an example Refuse Collection Event is presented in Appendix D. The following data were collected during each event:

- Types of items disposed,
- Photo documentation of disposed items, and
- Cumulative weight of items disposed.

The refuse collected during the Refuse Collection Events was categorized by Field Teams as household, construction, or green waste. Estimated amounts of the relative amount of material in each waste category are presented in Figure 4-3.

Figure 4-3. Types of Refuse Disposed of During Refuse Collection Events



Examples of household items collected included a game table, furniture, toys, a glass aquarium, automotive parts, a lawn mower, and appliances (Figure 4-4). Examples of construction items collected included cement, carpet, wood pieces, metal tubing, particle board, dry paint cans, PVC pipe, and scrap metal. Examples of green waste items collected included branches, yard waste, and palm trimmings. A summary of the amount of refuse collected during the Refuse Collection Events is presented in Table 4-4. Additional discussion of these results with respect to CCFSTI program effectiveness is presented in Section 5.5.



Figure 4-4. Examples of Items Disposed of at Various Refuse Collection Events



4/25/09 Southcrest Community Park Event.



5/9/09 Jackie Robinson YMCA Event.



7/25/09 38th & Alpha Park Event.



8/22/09 Southcrest Community Park Event.



Table 4-4. Refuse Collection Event Debris Weight

Date	Site	Total Weight (tons)
4/25/2009	Southcrest Community Park	- ¹
5/9/2009	Jackie Robinson YMCA	11.83
5/23/2009	38th & Alpha Park	21.41
6/6/2009	Jackie Robinson YMCA	- ¹
6/27/2009	Jackie Robinson YMCA	13.4
7/11/2009	Southcrest Community Park	19.28
7/25/2009	38th & Alpha Park	14.44
8/15/2009	Jackie Robinson YMCA	24.60
8/22/2009	Southcrest Community Park	6.10
9/26/2009	Southcrest Community Park	3.60
10/17/2009	Jackie Robinson YMCA	0 ²
Total		114.66

¹ Data not available

² No participants attended event

4.3 PARTICIPANT SURVEYS

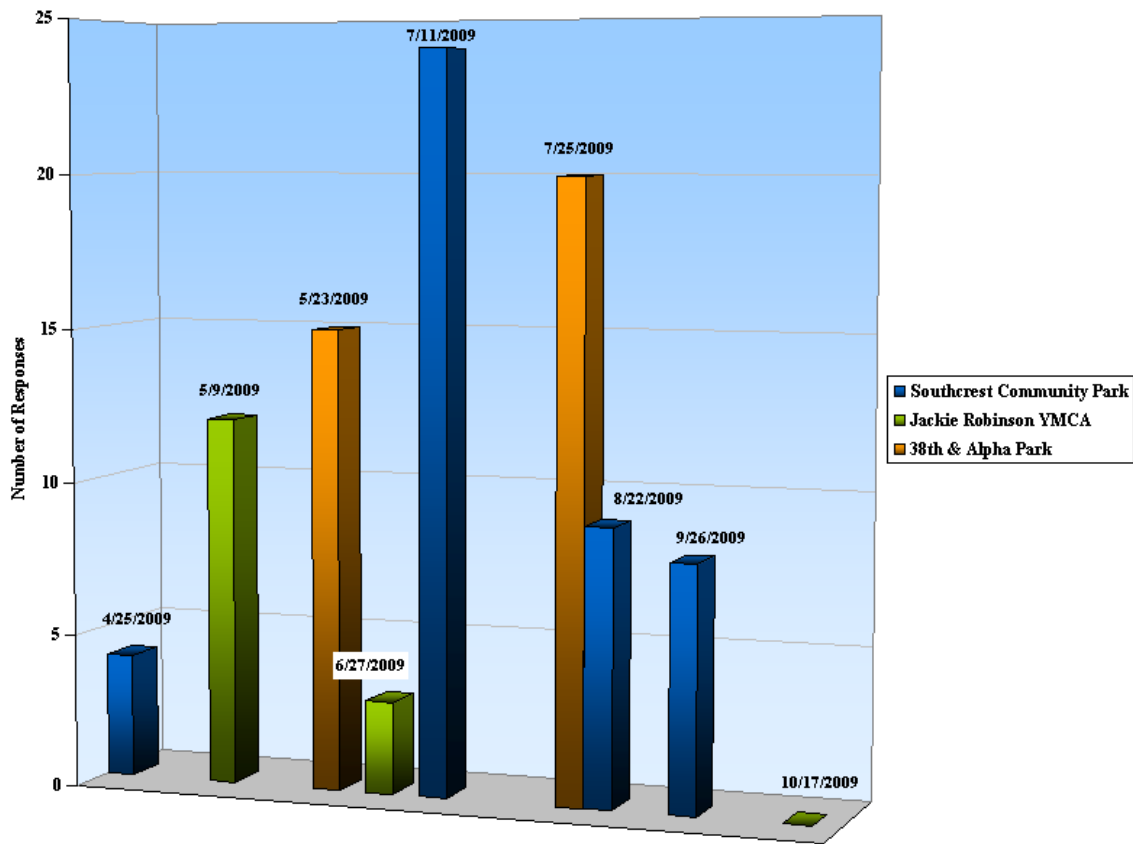
The Participant Survey monitoring was used to compile the number of participants and their behavior and knowledge response data associated with the Refuse Collection Events. Behavior and knowledge were measured using the Participant Survey (Appendix A) and included measures such as:

- motivation to participate in the Refuse Collection Event,
- need for LITU refuse collection service,
- general understanding of, and attitude towards, illegal dumping, and
- potential impediments toward future trash collection event participation.

A total of 95 Participant Surveys were completed during the course of the 9 Refuse Collection Events that were attended by Field Teams (Figure 4-5).



Figure 4-5. Refuse Collection Event Attendance by Location



Each Participant Survey included a map indicating general geographic areas, each identified by a number (Figure 4-6). As part of each Participant Survey, respondents were asked which area, if any, they resided in. The majority of participants responded that they lived within areas 3, 4, or 5 (Figure 4-7).



Figure 4-6. Map of Project Areas

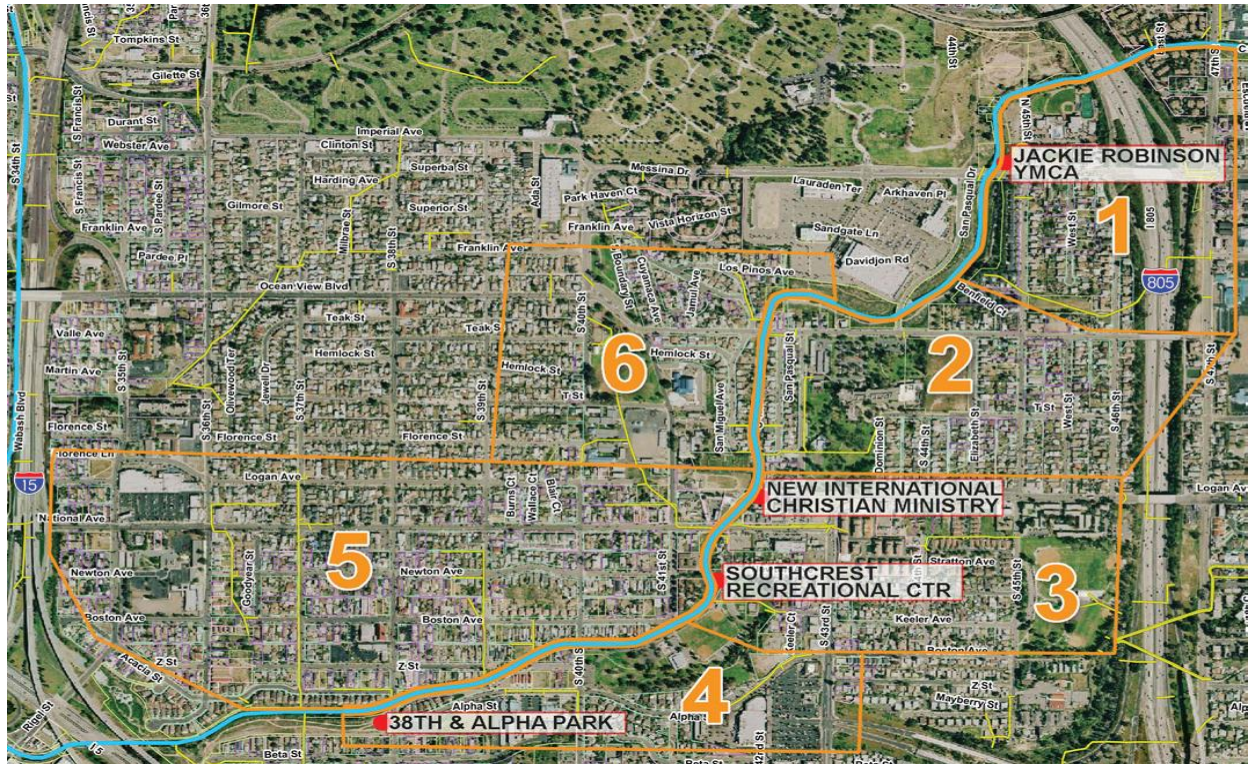
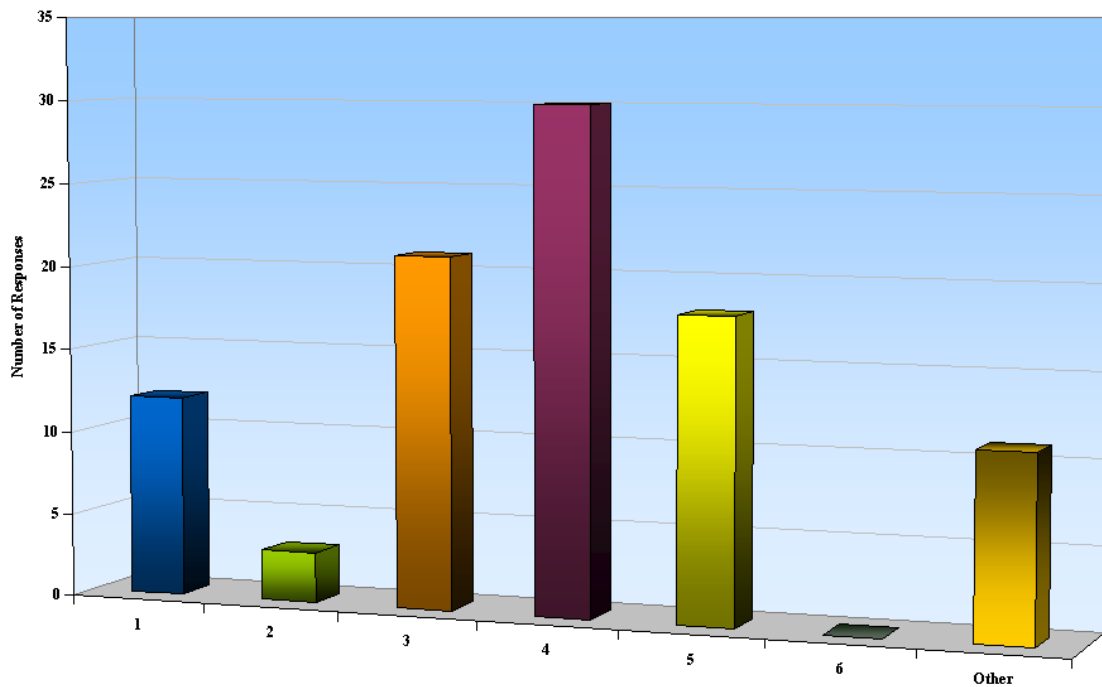


Figure 4-7. Project Areas Identified as Participant Residence Locations

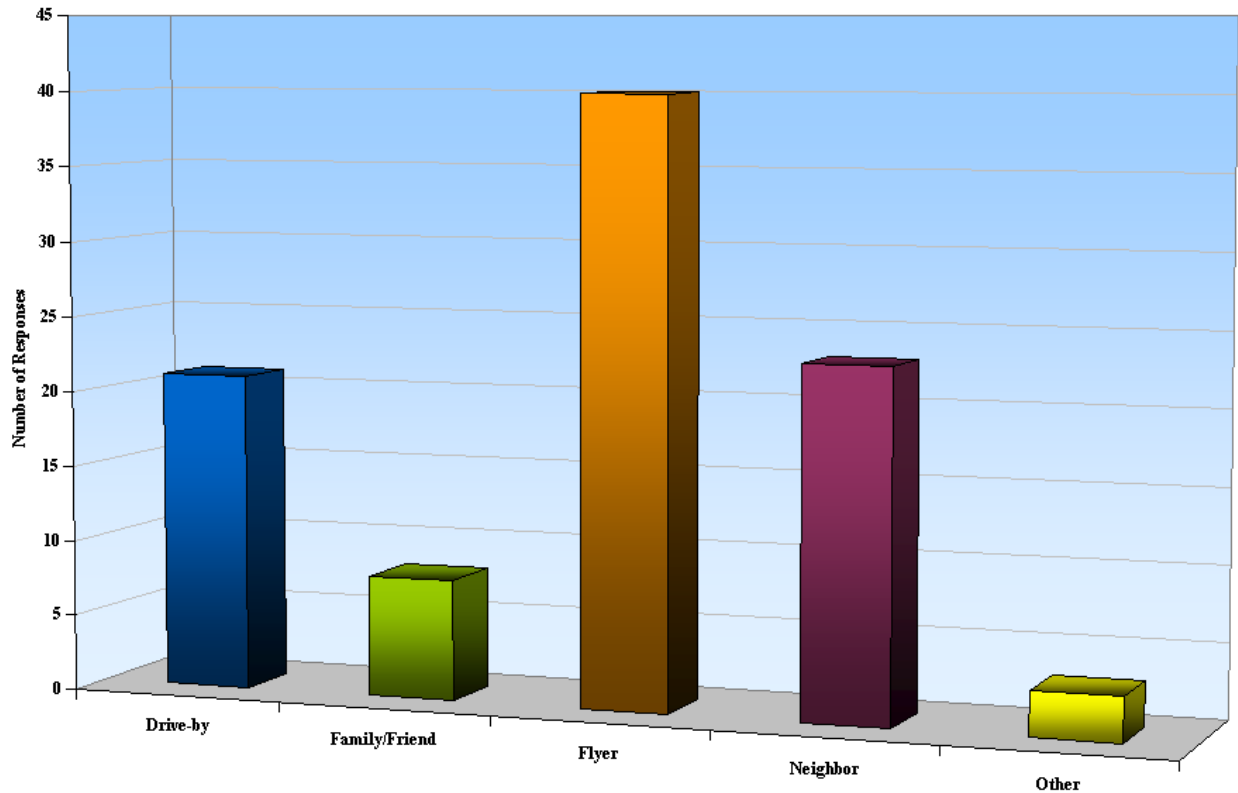


Note: Other includes responses of "Yes" and "No" but not a specific geographic area.



In order to assess the relative effectiveness of various marketing techniques, participants were asked how they learned about the event. Responses were categorized into 5 categories that included drive-by, family/friend, flyer, neighbor, and other. The majority of participants learned of events via flyer with drive-by and neighbor being also very common methods (Figure 4-8).

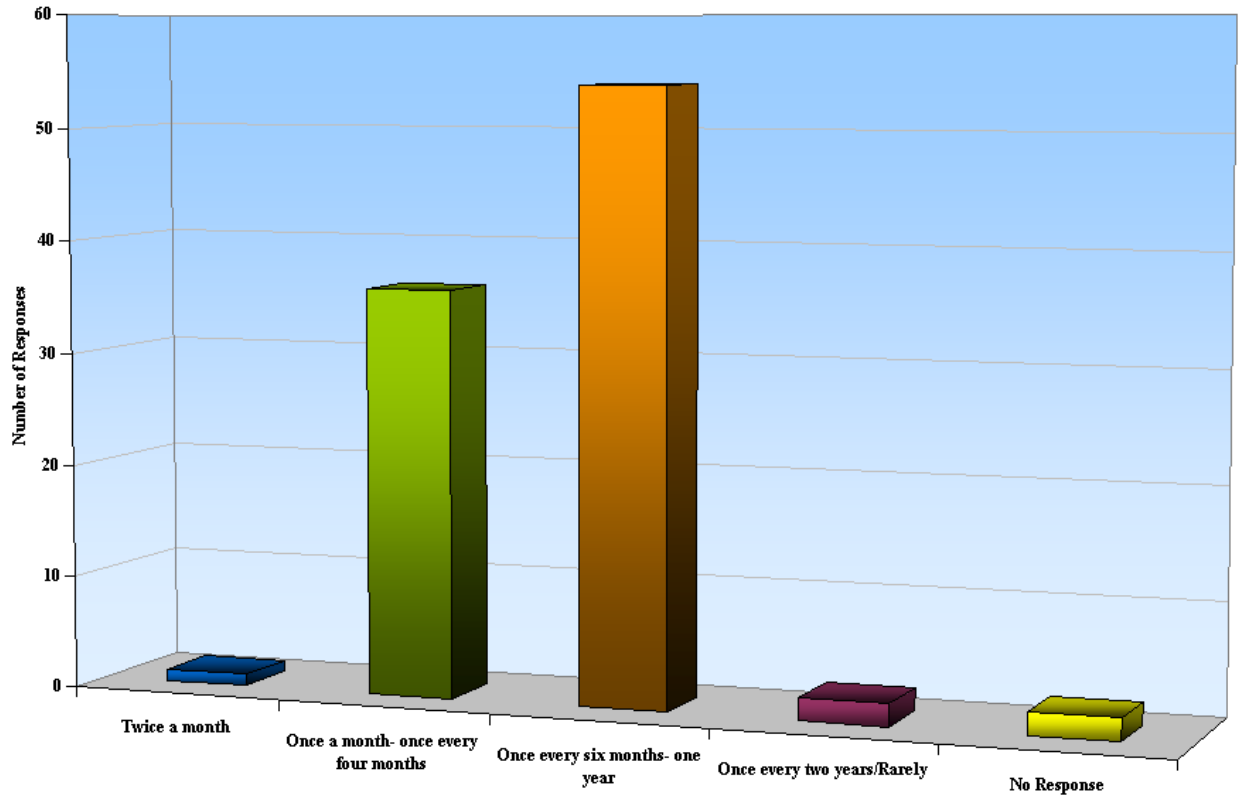
Figure 4-8. Comparison of Refuse Collection Event Notification Methods





Participants were also asked to estimate how often they need to dispose of large items from their homes. Responses were categorized into 4 categories: (1) twice a month, (2) once a month to once every four months, (3) once every six months to annually, and (4) once every two years/rarely. The majority of participants indicated that large item disposal is required between once and month to once per year (Figure 4-9).

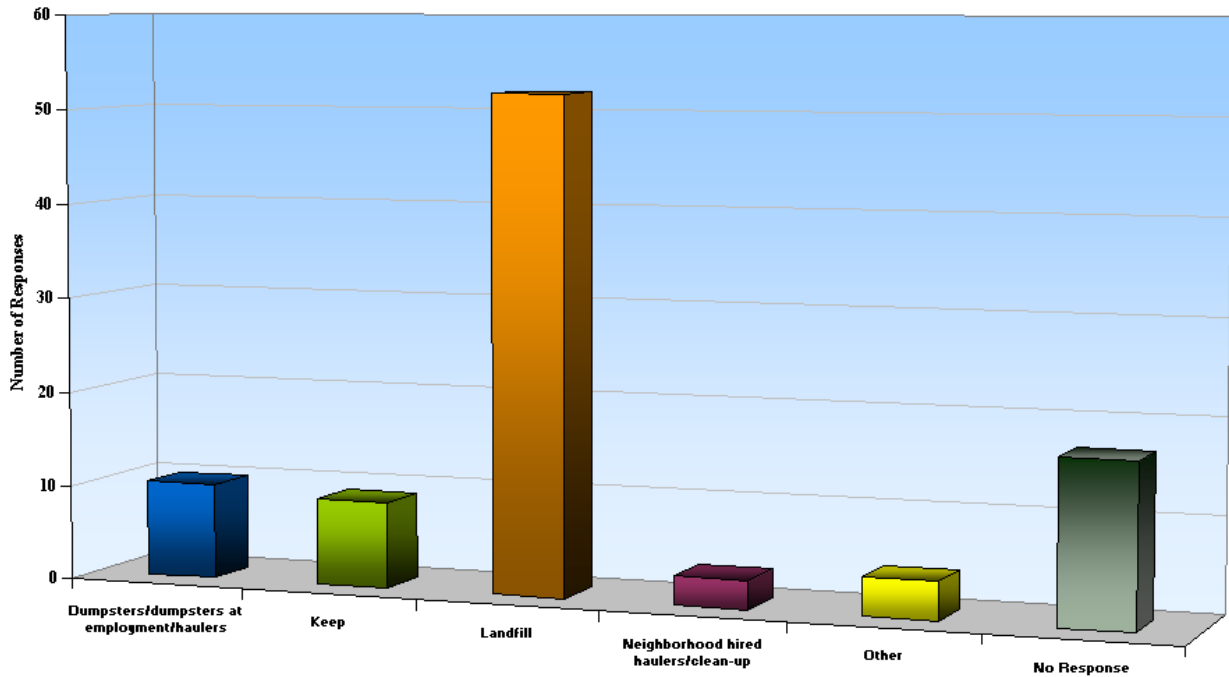
Figure 4-9. Frequency of Large Item Disposal Need





Participants were also asked how they typically dispose of large items. Responses were categorized into 1 of 5 options that included (1) dumpsters (including employer dumpsters) and/or haulers, (2) keep (3) landfill, (4) hired haulers, and (5) other. A significant majority of the responders indicated that they typically take large items to a landfill (Figure 4-10).

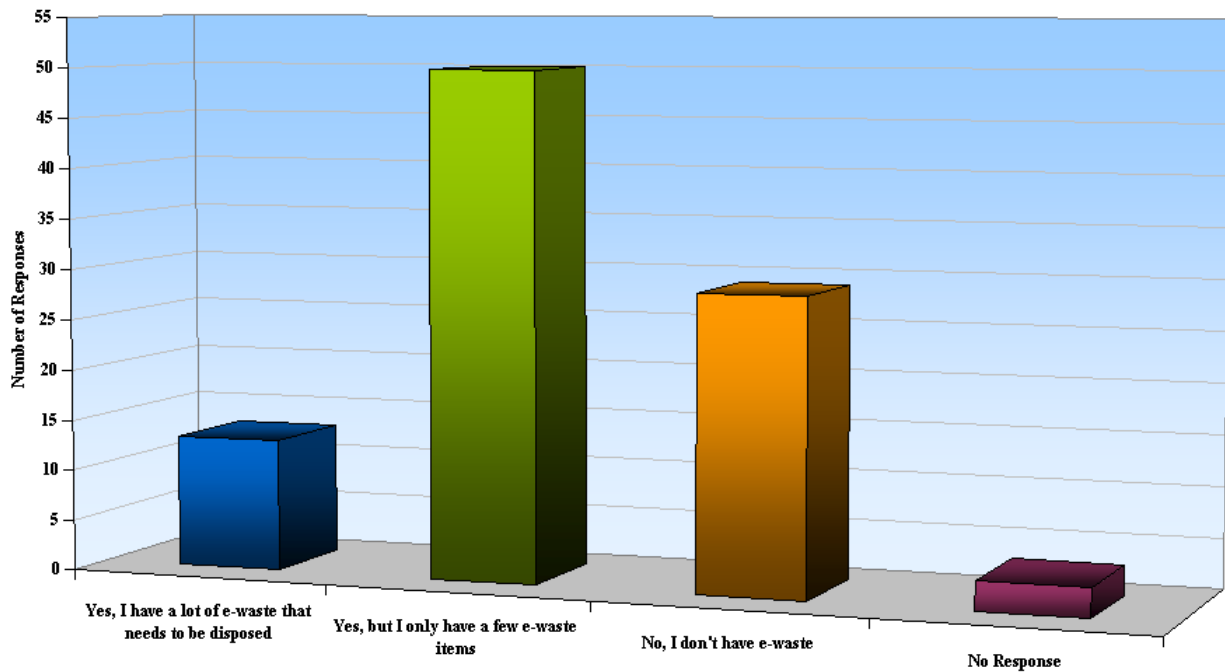
Figure 4-10. Comparison of Large Item Disposal Methods





Participants were asked about electronics disposal needs in order to assess whether future Refuse Collection Events should include an electronic waste (e-waste) recycling component. Responses were categorized into 3 categories: (1) Yes, I have a lot of e-waste that needs to be disposed, (2) Yes, but I only have a few e-waste items; or (3) No, I don't have e-waste. Most participants indicated that an e-waste recycling component would be a good idea, but that they had a few e-waste items of which they wanted to dispose Figure 4-11.

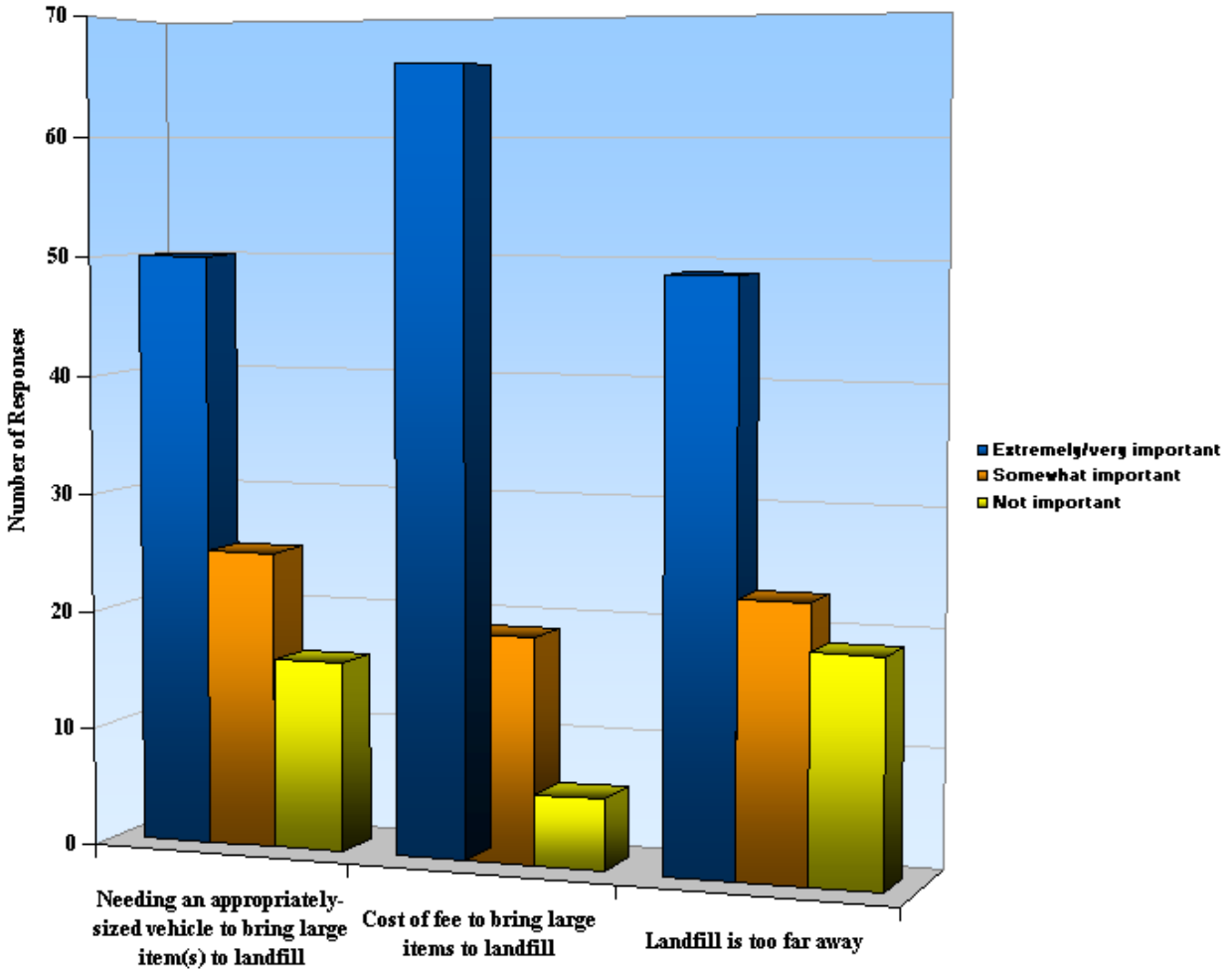
Figure 4-11. Comparison E-Waste Recycling Needs of Participants





In order to assess potential barriers participants may typically face in bringing large items to a landfill, participants were asked to rate the relative importance of 3 potential barriers to large item disposal. The 3 barriers included: a) needing an appropriately-sized vehicle to bring large item(s) to landfill, b) cost of fee to bring large items to landfill, and c) landfill is too far away. Most respondents indicated each of these barriers were extremely or very important (Figure 4-12). There were 4 participants that did not respond.

Figure 4-12. Participants Perception of Barriers to Proper Disposal





Participants were asked to categorize their perception of illegal dumping in their community. Participants were able to select illegal dumping as a very big problem, a big problem, somewhat of a problem, or not a problem. The majority of the participants responded that illegal dumping is a big or very big problem. It should be noted however that 13 of 95 respondents (14 percent) answered that illegal dumping was “not a problem” in the community. Participants were also asked to categorize their perception of the program effectiveness in potentially reducing illegal dumping. A large majority of participants (94 percent) perceived the program was effective in reducing illegal dumping.

In order to further assess participants’ perception of the program effectiveness, the participants were asked to provide specific comments about their perception of the program. Responses were categorized using best professional judgment into 5 categories: 1) positive feedback encouraging continuation of the program; 2) have more labor available so more events in more locations can be held; 3) increased advertising and more advanced notice; 4) provide supplies and equipment that can accept a wider variety of materials; and 5) no specific comment. Participant feedback and comments on the program are presented in Table 4-5.

Table 4-5. Summary of Participants’ Comments

Participant Comment	Number of Responses
Positive feedback encouraging continuation of the program	21
Have more labor available so more events in more locations can be held	10
Increased advertising and more advanced notice	16
Provide supplies and equipment that can accept a wider variety of materials	2
No comment	46
Total	95

In order to begin to assess the relative frequency of participants need to dispose of large items, participants were asked during the September 26, 2009 event if they had participated in a previous event. A majority of the participants during this event had not previously participated in previous events (75 percent), but 2 participants indicated that they attended a previous event. This question was only posed to participants during this event. Accordingly, the limited number responses limit the interpretive value of these responses.



4.4 REFUSE COLLECTION EVENT MARKETING

Flyers indicating the date and location of Refuse Collection Events were created and distributed by GWSDCC (Appendix E). A number of flyers were distributed by hand for each event in various locations near the project area (Table 4-6). In general, the event flyer distribution locations were within or adjacent to the project areas (Figure 4-13) though not every collection event involved a separate marketing event. Additional discussion of these results with respect to CCFSTI program effectiveness is presented in Section 5.5.



Table 4-6. Summary of Marketing Efforts for Refuse Collection Events

Marketing Area ¹	Date ²	Event Location	Number of Flyers Distributed	Number of Distribution Staff	Approximate Flyer Distribution Area			
					Street Boundary (North)	Street Boundary (East)	Street Boundary (South)	Street Boundary (West)
1	4/25/2009	Southcrest Community Park	200	4	S. 40 th St.	S. 41 st St.	Gamma St.	S. 38 th St.
2	5/9/2009	Jackie Robinson YMCA	250	4	Imperial Ave.	Dominion St.	Logan Ave.	S. 46 th St.
3	6/6/2009	Jackie Robinson YMCA	200	3	Broadway	Denby St.	Market St.	Boundary St.
4	8/15/2009	Jackie Robinson YMCA	280	6	Market St.	47 th St.	Market St.	I-805
5	10/17/2009	Jackie Robinson YMCA	180	2	Market St.	47 th St.	Borner St	45 th St.
6	5/23/2009	38th and Alpha Park	250	4	Newton Ave.	Keeler Ave.	Alpha St.	S. 40 th St.
7	7/11/2009	Southcrest Community Park	200	6	Newton Ave.	S. 40 th St.	Alpha St.	S. 38 th St.
8	8/22/2009	Southcrest Community Park	250	4	Newton Ave.	S. 38 th St.	Beta St.	S. 36 th St.
9	9/26/2009	Southcrest Community Park	200	4	Beta St.	S. 38 th St.	Epsilon St.	Thor St.
10	10/17/2009	Jackie Robinson YMCA	175	3	Imperial Ave.	S. 46 th St.	Ocean View Blvd.	S. 45 th St.

¹ Refer to Figure 4-13 for locations of marketing areas

² Collection events and marketing events may not align; marketing events did not occur for every individual collection event.



Figure 4-13. CCFSTI Program Marketing and Project Area Overview

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SECTION 5 PROJECT EFFECTIVENESS ASSESSMENT

Assessment of the effectiveness of portions of the CCFSTI program includes evaluation of the VTA survey data and both the observational data and Participant Survey responses associated with the Refuse Collection Events. The assessment includes preliminary analysis of previous and current work in the City and other municipalities in order to allow evaluation of the project outreach efforts (Environmental Protection Agency, 2010a; Think Blue San Diego, 2004) and changes in illegal dumping patterns in the project area (Cal Recycle, 2009b). In addition, the effectiveness assessment included a preliminary analysis of the cost-efficiency of the CCFSTI program.

The original work plan for this study identified EPA's Illegal Dumping Economic Assessment (IDEA) model (Environmental Protection Agency, 2010b) as a potential resource for examining the relative cost of illegal dumping abatement programs. However, upon further research it was determined that the IDEA model primarily pertains to developing cost estimates for illegal dumping abatement at a single, known source location. Accordingly, application of the IDEA model to this project that addresses dispersed incidence of illegal dumping in a portion of a watershed is not appropriate and is not discussed further in this Report.

Enforcement programs and collaboration efforts are considered alternatives to the source control-type CCFSTI program. ESD currently employs Code Enforcement Officers who are tasked with enforcing municipal code related to illegal dumping (Poston, 2010). In order for enforcement actions to be taken, a written summary of activities observed by a witness must be prepared. However, witnesses to illegal dumping activities are rare. In the absence of witnesses, ESD may examine illegally dumped material for identifying markings that may allow identification of the person(s) responsible. If the identified party(ies) resides in San Diego County, ESD may notify the party to request cleanup the illegally dumped material. ESD, or the owner of the property where the material was illegally dumped, may also prosecute the individual in Small Claims court for cleanup costs. It is understood that most individuals accused of illegal dumping plead guilty in order to receive a reduced sentence or fine. Conviction of illegal dumping can include probation and fines, usually consisting of the cleanup cost for the illegally dumped material.

5.1 DATA ANALYSIS

The VTA survey, Refuse Characterization and Participant Survey data were used to address the effectiveness assessment program goals (Section 1.5). As documented in the work plan, Table 5-1 presents the quantitative and qualitative data comparisons that were developed to assess the effectiveness of portions of the CCFSTI program with respect to the project goals (City of San Diego, 2009a). During the assessment activities, it was determined that Goals 2 and 3 contained overlapping data; therefore these goals are discussed in a single section.



Table 5-1. CCFSTI Effectiveness Assessment Analytical Approach

Goal	Goal Description	Data Analysis Approach
1	Document current conditions of Large Item Trash Unit deposits and presence of suspected illegal dumping areas within the project area	<ul style="list-style-type: none"> a. Appraise baseline Visual Trash Assessment survey geographic data b. Compare Visual Trash Assessment baseline to historic and/or Environmental Services Department work order data within the project area
2	Document changes in conditions of Large Item Trash Unit deposits in the project area as a result of CCFSTI efforts and other factors	<ul style="list-style-type: none"> a. Compare baseline and quarterly Visual Trash Assessment survey geographic information data b. Assess potential impact of identified creek cleanup efforts within the project area¹ c. Assess the potential impact of stormwater flows on Large Item Trash Unit deposits/human habitation areas/suspected illegal dumping areas d. Compare available pre-project to concurrent Environmental Services Department work order initiation data within the project area
3	Identify the temporal variation of potential illegal dumping in the project area	<ul style="list-style-type: none"> a. Compare baseline and quarterly Visual Trash Assessment survey geographic data for areas where illegal dumping is suspected b. Compare baseline and quarterly Visual Trash Assessment geographic data to available pre-project and concurrent Environmental Services Department work order initiation data within the project area c. Compare baseline and quarterly Visual Trash Assessment survey qualitative descriptions of dumped/deposited items in areas where illegal dumping is suspected
4	Assess participant perceptions of the CCFSTI program and illegal dumping	<ul style="list-style-type: none"> a. Evaluate site-specific, temporal and project-wide Participant Survey data for patterns of raised awareness, modified attitudes, and/or improved behaviors relative to illegal dumping and refuse disposal b. Compare Participant Survey data to other available City, regional and/or comparable data
5	Quantify and characterize the trash and debris collected at the Refuse Collection Events	<ul style="list-style-type: none"> a. Evaluate site-specific, temporal and project-wide Refuse Characterization data for patterns of refuse type, volume and/or weight collected



Goal	Goal Description	Data Analysis Approach
6	Estimate the pollutant reduction effects of the CCFSTI program	<ul style="list-style-type: none"> a. Compare baseline and quarterly Visual Trash Assessment survey geographic data for areas where illegal dumping is suspected b. Compare baseline and quarterly Visual Trash Assessment survey qualitative descriptions of dumped/deposited items in areas where illegal dumping is suspected c. Estimate the amount of material collected during the Refuse Collection Events which may have been dumped illegally prior to CCFSTI implementation
7	Determine the cost-effectiveness of the CCFSTI program	<ul style="list-style-type: none"> a. Estimate the cost of CCFSTI program implementation b. Identify other feasible methods and costs of refuse collection and illegal dumping abatement activities c. Estimate costs for current City methods of addressing illegal dumping issues (work order processing and response, annual channel clearing, and other activities) d. Compare project costs (including effectiveness assessment) with current effort and other identified refuse collection and illegal dumping abatement activities

1. Creek cleanup efforts are often performed by Urban Corps and other non-profit groups in Chollas Creek



5.2 INITIAL CONDITIONS OF LARGE ITEM TRASH UNIT DEPOSITS AND PRESENCE OF ILLEGAL DUMPING AREAS

This section describes the initial conditions within the project area with respect to LITU deposits and the presence of suspected illegal dumping areas. As described in Section 4.1.1, a relatively significant amount of building materials, auto/mechanical items, shopping carts, mattress/bedding furniture, and other LITUs were commonly observed dumped or deposited items in the project area during the baseline survey. In addition, 2 suspected homeless encampments and several areas where field crews suspected illegal dumping had recently occurred were identified.

The observed pattern of LITU distribution and abundance within the project area during the initial VTA survey is generally consistent with City ESD data that identifies illegal dumping as a significant issue. In 2009, ESD received and/or took action on a significant number of activities related to illegal dumping (Table 5-2). However, reports of illegal dumping received by ESD are often associated with street addresses rather than creek areas, making direct comparison of the VTA survey data to the ESD dataset difficult. Accordingly, based on the data presented in Figure 2-1 and Table 5-2 it may be inferred that the number of reports of illegal dumping within the project area is relatively high.

Table 5-2. Illegal Dumping and Abatement Complaints and Abatements as Reported by Environmental Services Department

ESD Reported Action	Jan.-Mar. 2009	Apr.-Jun. 2009	Jul.-Sep. 2009	Oct.-Dec. 2009
Public complaints of illegal dumping in the right-of-way	1,154	921	846	668
Public complaints of waste on private property	418	500	541	442
Abatements in the right-of-way	5,091	5,517	7,677	7,679
Homeless encampments abated	13	12	20	5

Studies of illegal dumping patterns in other areas of the country have indicated that locations in urban areas that are susceptible to illegal dumping patterns more often tend to be areas that are either less visible to the general public, even if they are more difficult to access. However, illegal dumping also occurs in highly accessible areas, even if those areas may be highly visible (Romero, 2003). This pattern is partially supported by the VTA data. Examination of the initial conditions survey data indicated that there were several areas of suspected illegal dumping immediately adjacent to roadway areas and bridges across the creek. However, there were also suspected illegal dumping areas adjacent to private residences. These areas are presumably difficult for the general public to access but are relatively easy to access by the residents of the adjacent houses. In Section 2a, there is an access road leading directly to the creek that appeared to be a trash accumulation/deposition area, as well as the site of a homeless encampment. In Section 2b where residential property lines were directly adjacent to the creek area, there were areas of increased trash accumulation where it appears relatively difficult for members of the general public to access.



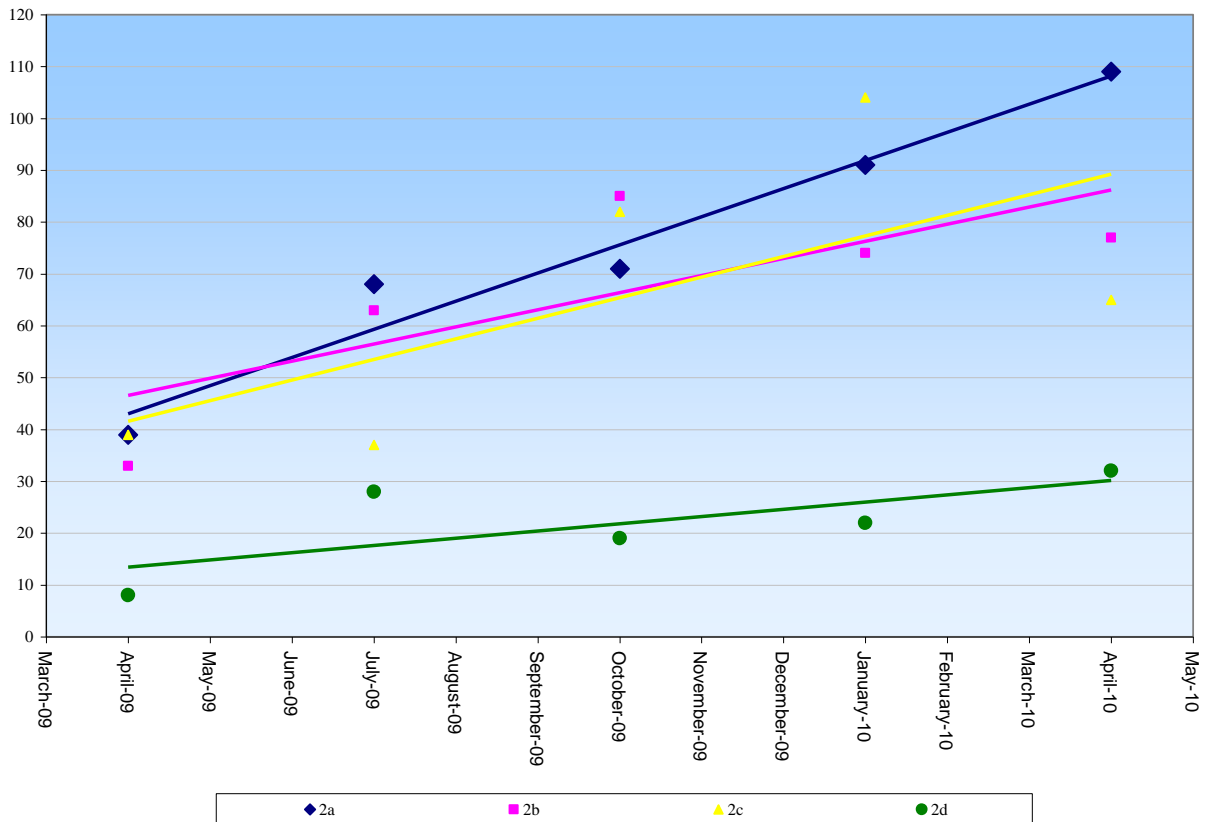
5.3 CHANGES IN CONDITION OF LARGE ITEM TRASH UNIT DISTRIBUTION AND TEMPORAL VARIATION OF ILLEGAL DUMPING

This section describes changes in condition and temporal variation in LITU distributions.

5.3.1 LITU Condition Changes

The VTA survey maps generated for each of the VTA survey periods were used to assess the temporal and spatial distribution of illegal dumping within the project area (Appendix C). The qualitative scale developed to assess of the quantity of LITUs present within the surveyed area during each of the VTA survey periods generally indicates an increase in LITUs over the monitoring period (Table 4-3). Plotting the combined count of observed LITUs over the quarterly surveys indicates the volume of LITUs generally increased over the length of the survey period (Figure 5-1).

Figure 5-1. Combined Count of Large Item Trash Units Throughout the Visual Trash Assessment Period





5.3.2 Potential Impact of Creek Cleanup Efforts on Large Item Trash Unit Deposits

The distribution and abundance of LITUs and other potential sources of pollution within the Chollas Creek area were influenced by a multitude of factors. Creek cleanup events are relatively common in, and adjacent to, the CCFSTI project area. Organizers for these cleanup events are commonly non-profit organizations and/or stakeholders with interests in habitat or water quality improvements. Urban Corps provided information on cleanup events that were conducted during the CCFSTI program in the project area (Table 5-3; Lopez, 2009). However, there are known limitations of the completeness of available cleanup event data. A number of nonprofit organizations are known to perform periodic cleanup events in the Chollas Creek area. For example, a creek cleanup event occurred on April 25, 2009 in the creek area adjacent to Southcrest Community Park. This event coincided with the date and location of the initial CCFSTI Refuse Collection event and therefore a Field Team was present at this event. It was noted that approximately 1 40-yard bin was filled with material by the cleanup event volunteers, the number of participants, length and area of creek cleaned and general type of material removed during this event was not well documented (Table 5-3). Cleanup events with limited or no documentation that occurred within the project area during the VTA survey period have an unknown impact on the overall interpretation of the VTA survey results.

Table 5-3. Known Cleanup Events Within the Project Area

Event Number ₂	Date	Starting Location	Approximate Number of Cleanup Participants	Approximate Length of Area Cleaned (feet)	Number of Dumpsters Filled	General Type of Material Removed (Non-native vegetation/Trash/Mixed)
1	4/25/09	Southcrest Community Park	- ¹	- ¹	~1	- ¹
2	5/18/09	38th and Alpha	17	300	0	Litter and vegetation
3	5/23/09	38th and Alpha	20	300	1	Litter and vegetation
4	7/19/09	Main Street	33	120	0	Litter and vegetation
5	7/25/09	National Avenue	20	300	0	Litter and vegetation
6	9/27/09	National Avenue	30	- ¹	0	Litter and vegetation

1. Data not available.

2. Only includes organized cleanup events conducted by Urban Corps. Other groups or individuals may have also conducted events not listed in this table.

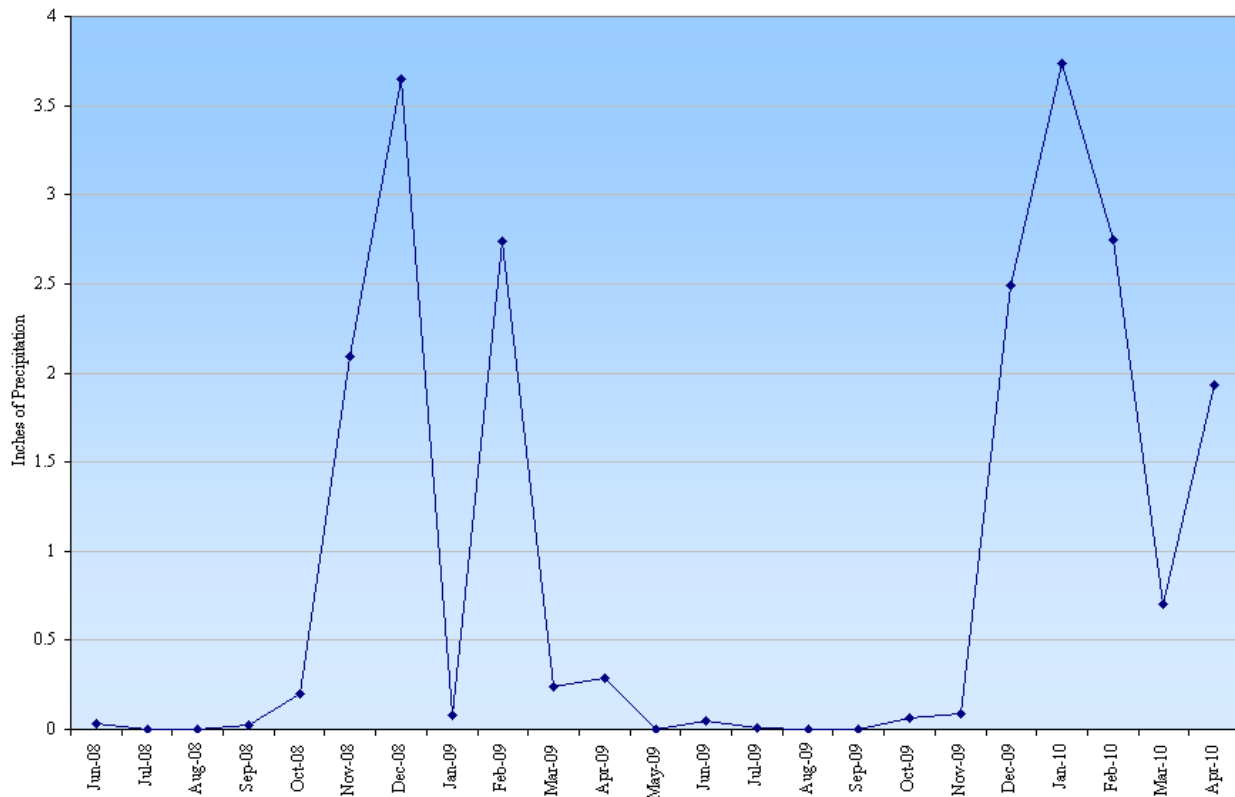


5.3.3 Potential Impact of Precipitation Events on Large Item Trash Unit Distribution

The distribution and abundance of LITUs, human habitation areas and/or suspected illegal dumping areas may also be impacted by precipitation events. Chollas Creek is typical of a smaller southern California ephemeral stream that contains very little flow during the May-September dry season. During the wet season, rain events produce periodic high volume flows. During these high flow periods, densely vegetated areas in the creek act as energy dissipaters by slowing stormwater flow and trapping or capturing trash and other debris. As a result of the long dry season, where the creek and bank areas are relatively accessible to humans, and wet weather flows containing high amounts of trash and debris, the creek channel contains numerous areas where trash and debris are actively and passively deposited. Prior to project implementation, it was thought that during storm events some LITUs may be transported downstream both in and out of the project area. This process was recognized as potentially making changes in the quantity of LITUs present in the project area difficult to directly attribute to Refuse Collection Events, storm events or other creek cleanup event activities.

In the months leading up to project initiation, significant rainfall events occurred during the months of November 2008, December 2008, and February 2009 (Figure 5-2). Between the first VTA survey in April 2009 and October 2009, very little rain was recorded. However, significant storm events in December 2009 and January-February 2010 resulted in nearly 9 inches of cumulative precipitation in the San Diego region.

Figure 5-2. Precipitation Totals for the City of San Diego Region July 2008-April 2010





The amount of LITUs was observed to increase over the project period, which included the large rainfall events in the 2009-2010 wet season (Figure 5-1). A potential explanation for this pattern is that LITU deposits may be less susceptible to transport from rain events than originally anticipated. This hypothesis may be supported by the fact that the relatively high quantities of LITUs observed in the upstream sections of the project area (Sections 2a and 2b) did not appear to be transported downstream to Section 2d, which had relatively fewer LITUs throughout the VTA surveys.

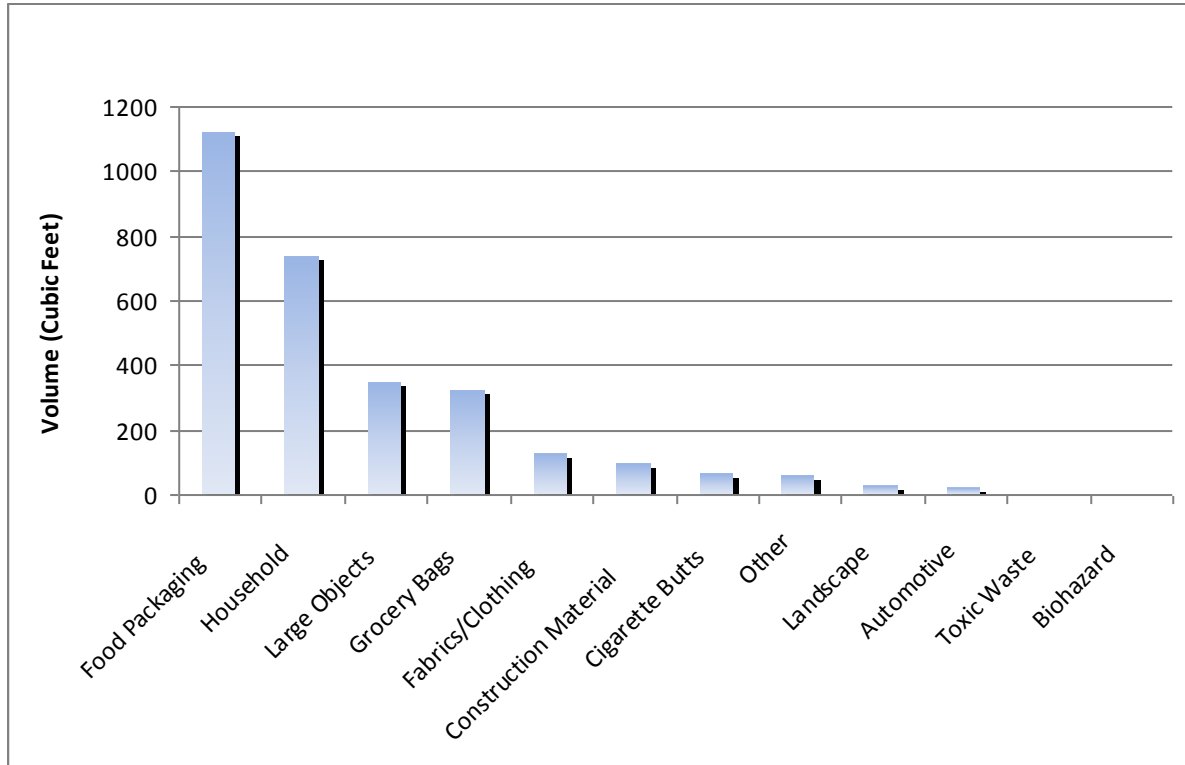
5.3.4 Evaluation of Available City Illegal Dumping and Trash Assessment Data

The City ESD collects data on the frequency and location of illegal dumping, litter, and transient-related work orders within City limits (Table 5-2). Comparison of VTA survey results with this dataset confirmed that the project area generally has a high frequency of illegal dumping and other litter-related work order requests. However, the relatively limited scale of the CCFSTI program and the limited resolution capability of the ESD dataset prevent assessment of the direct benefit of the CCFSTI program in impacting patterns of illegal dumping. However, source control and abatement programs provide potential for direct water quality benefit if residents utilize the program to efficiently dispose of unwanted large items.

The City also performs dry weather monitoring assessments at 758 outfall sites throughout its jurisdiction. Examination of this dataset indicates that household and large items are some of the most frequently observed items (Figure 5-3). Fabrics/clothing, construction material, landscape, and automotive items are also commonly observed at MS4 outfall locations. These data support the VTA survey data and suggest that these categories of trash items are potentially common pollutants in the San Diego region.



Figure 5-3. Trash Volume Observed During City of San Diego Dry Weather Monitoring Assessment May- September 2009⁴



⁴ Erickson, Jessica. <JErickson@sandiego.gov> "trash data." 27 January 2010. Personal e-mail (27 January 2010).



5.4 PARTICIPANT PERCEPTIONS OF THE CCFSTI PROGRAM AND ILLEGAL DUMPING

The project Participant Survey data was used to examine spatial and temporal patterns of program participation and awareness related to illegal dumping and refuse disposal. Given that, in general, a Participant Survey was completed for each participant group (which is assumed to be roughly correlated with the number of households participating), it is assumed that a total of approximately 95 households participated in the series of 9 Refuse Collection Events. Based this level of participation and the project area population (Table 2-1), the estimated level of participation in the CCFSTI program is approximately 3 percent. Based on this level of participation, there is limited data available to detect spatial and temporal patterns related to program implementation.

Although there was considerable variation among events, overall 40 of the 95 completed Participant Surveys (42 percent) indicated the respondent had learned of the event through a flyer (Table 5-4). These participants generally identified that they lived within the all of project areas but a distinct pattern of participation was not evident. This trend was partially driven by the areas where the event flyers were distributed (Figure 4-13). Although there is limited available data, when the flyer distribution area included or was very near the event location, event participation tended to be higher than when the marketing areas were more distant from the event location.

Table 5-4. CCFSTI Participant Attendance Summary

Event Location	Participant Surveys Completed	Participants Who Learned of the Event by Flyer	Participant Area						
			1	2	3	4	5	6	Other
Southcrest Community Park	45	14	0	0	6	3	4	0	1
Jackie Robinson YMCA	15	11	7	2	0	0	0	0	2
38th and Alpha Park	35	15	0	0	0	11	2	0	2
Total	95	40	7	2	6	14	6	0	5

Participant Survey responses to questions related to perceptions of illegal dumping problems in the project area generally indicate that Refuse Collection Event participants perceive that illegal dumping is a big or very big problem in the community. Given event attendance and the relatively few Participant Survey responses available, there is little data to examine temporal changes in participant attitudes and/or perceptions towards the issue of illegal dumping. However, anecdotal comments received by the Field Teams during the Refuse Collection Events suggests that event performance tended to generate public interest and generally increased awareness of the issue of illegal dumping in the project area community. Feedback received included: “thank you, great positive for community and environment” and “appreciate the service, wish more people would use it.” This increased awareness may have, in some cases, lead to changes in behavior. Residents may have chosen to participate in a Refuse Collection Event to dispose of large unwanted items rather than utilize other potential disposal mechanisms.



Other existing data were evaluated in order to assess local and regional opinions of illegal dumping. Several years ago, a series of focus group meetings that included residents, businesses, property managers, and community-based organizations that live or work in the Chollas Creek Watershed, were held (Think Blue San Diego, 2004). Information from these focus group meetings revealed that most people in the watershed appear to understand the concept of stormwater pollution. In addition, it was found that stormwater is not a high priority to many people who live and work in the watershed unless there is a direct impact through natural events such as flooding. Similarly, stormwater issues become more important when the people understand that stormwater pollution may contaminate receiving waters where they live and recreate. The participants in the focus groups did not admit to contributing to stormwater pollution, even though many responses indicated they may be potential contributors through activities such as hosing walkways and parking lots. This conflicting information potentially indicates a general lack of understanding related to the link between everyday behaviors and potential water quality problems. This information indicates that a non-structural BMP such as the CCFSTI program that includes outreach and marketing activities, may allow participants to better understand the issues related to stormwater pollution. Over time, this may lead to changes in perception and behavior related to illegal dumping. Creative approaches and additional effort to measure trends in participation and awareness related to non-structural BMP programs will likely be required to quantitatively measure these changes.

5.5 EVALUATION OF REFUSE COLLECTED AT REFUSE COLLECTION EVENTS

Refuse collected at the Refuse Collection Events included household waste, building/construction materials and green waste (Figure 4-3). The total weight of material collected at the Refuse Collection Events (approximately 115 tons) and the relative percentage of the types of refuse disposed were used to estimate the collected weight of each general refuse category (Table 5-5).

Table 5-5. Generalized Categories of Material Disposed at Refuse Collection Events

General Refuse Category	Estimated Amount Collected	Estimated Weight Collected (tons)
Household	47%	54
Construction	40%	46
Green	13%	15

A general decrease in the amount of refuse collected at each event was observed over time (Figure 5-4). The limited data available as part of this study does not allow a specific cause for this pattern to be identified but potential explanations may include:

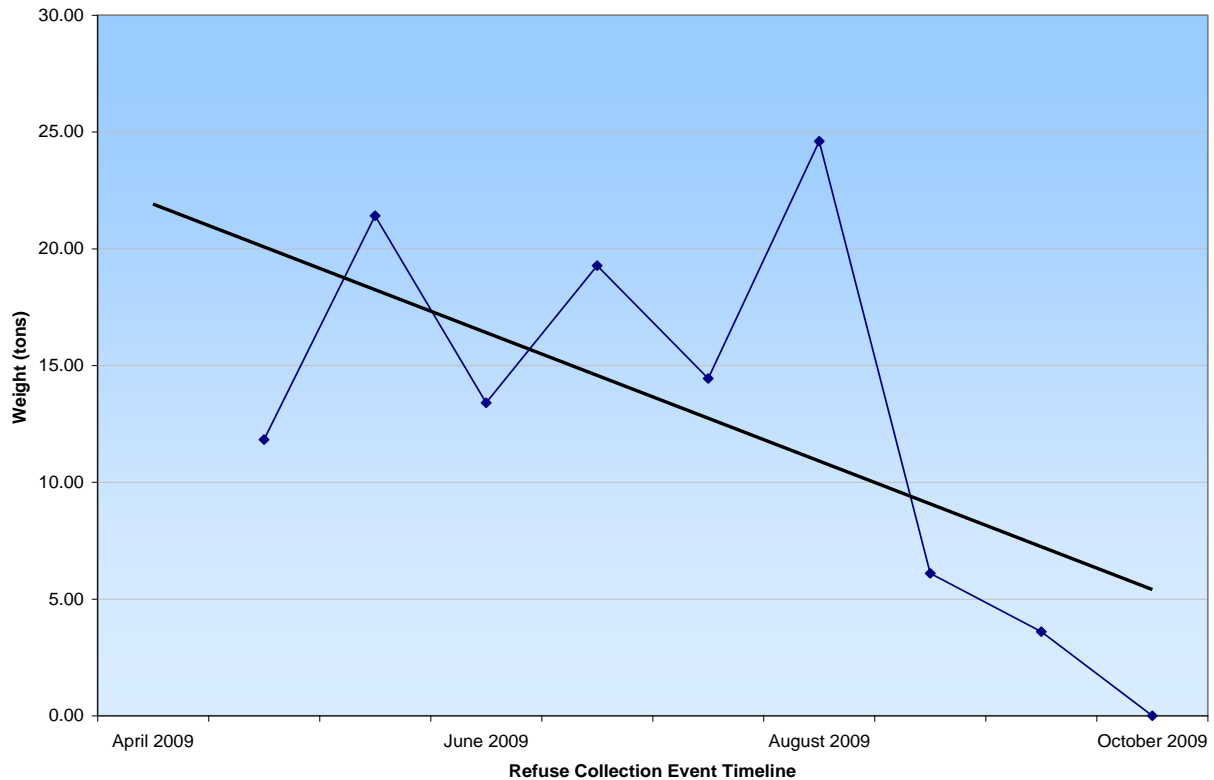
- residents aware of the CCFSTI program disposed of their large items during the initial events,
- marketing efforts appealed to a limited subset of project area residents and were unable to generate additional attendees, and



- seasonal or environmental events (such as impending rain events) reduced attendance at events held later in the year.

It should be noted that a subsequent Refuse Collection Event held in January 2010, after the monitoring portion of this project was concluded, was well attended and resulted in the collection of several bins of refuse material.

Figure 5-4. Refuse Collection Event Weight Data



5.6 ESTIMATED POLLUTANT REDUCTION EFFECTS OF CCFSTI PROGRAM

The CCFSTI program was successful in collecting approximately 115 tons of waste during a number of Refuse Collection Events held in the project area. Surveyed participants generally provided positive feedback about the program and there were indications that the event marketing and word-of-mouth advertising methods generated attendance and allowed collection of significant amounts of unwanted material. In addition, many participants indicated they have periodic need to dispose of large items and issues such as landfill distance and disposal fees and the need for appropriate sized vehicles to transport items can serve as impediments to efficient disposal of unwanted large trash items.

In order to assess the relative efficiency of the CCFSTI program in reducing incidence of illegal dumping and associated pollutant loading to creek areas, a review of the project data was conducted. The baseline



and quarterly VTA survey data was examined in order to assess potential trends in LITU deposits in the project area. The VTA data suggests there was a general increase in LITU deposits over the project timeframe (Figure 5-1). However, several factors were identified which may impact the sensitivity of the VTA survey data to detect trends LITU deposits related to the CCFSTI program. These factors include creek cleanup events performed in the project area (Table 5-3), precipitation events (Figure 5-2) and the estimated limited Refuse Collection Event participation level (Figure 4-5).

An extensive review of available local, regional and national literature and data was also conducted to estimate the level of participation in voluntary municipal programs, such as the CCFSTI program. The purpose of the review process was to determine both how the relative participation estimate for the CCFSTI program compared with other like programs and to potentially identify standard methodology used to quantitatively estimate effectiveness of non-structural illegal dumping abatement programs in changing behavior, diverting waste from being illegally dumped and/or preventing pollution. Unfortunately, quantitative measurement of the effectiveness of illegal dumping abatement and other non-structural pollution prevention programs are not often attempted. This is presumably a result of the relative difficulty associated with assessing behavioral changes and measuring the amount of waste that has been diverted to traditional disposal mechanisms rather than illegally dumped. The literature and data review did not result in identification of applicable data or methods that could be applied to provide an appropriate quantitative measurement proxy of the pollutant reduction effectiveness of this project.

Given these challenges, quantitative measurement of the pollutant reduction effects of the CCFSTI program using the available project data including: collected weight, participant survey responses, and VTA surveys is problematic. In addition there are limited available local and regional data sources that may provide appropriate proxies to determine pollutant reduction effects using the project data. A conservative approach to utilization of the project data may be to recognize that a small portion of the collected material may have been properly disposed rather than illegally dumped as a result of the CCFSTI program. Future efforts to assess the effectiveness non-structural BMPs that may reduce or abate illegal dumping in the Chollas Creek or other watersheds may utilize the project data to assess relative effectiveness and allow more comprehensive assessment of the efficiency of these type of programs.

5.7 COST EFFECTIVENESS ASSESSMENT OF THE CCFSTI PROGRAM

A critical component to understanding and assessing the effectiveness of pollution prevention, source control and other potential stormwater BMP activities is determining the cost effectiveness of the given focal program. Often, the cost effectiveness of a program will drive implementation feasibility considerations and allow planners, water quality managers, and others to make informed decisions regarding how to best allocate available resources to improve water quality. Unfortunately, determining of the true cost effectiveness of a given pollution prevention or source control BMP can be difficult in large, complex watershed systems with many confounding variables. However, the thoughtful use of available program data and direct or comparable cost information may allow watershed managers to make informed decisions as to how specific programs or program components may be utilized to reduce or eliminate problems which cause or contribute to water quality impairment. This section describes the estimated cost of the CCFSTI program.



In order to provide cost estimates for practical City-wide implementation of the CCFSTI program, ESD work order data (Figure 2-1) was used to estimate the size of areas where there is a relatively high-density of illegal dumping and other waste-related problems. Using these data and a uniform 10-acre grid area system overlaid on the City, areas of low, medium, and high incidence of illegal dumping and other waste-related problems were identified (Figure 5-5).



Figure 5-5. City of San Diego 2009 Illegal Dumping Work Order Density Based on 10-Acre Grid

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General land use data was then used to determine the relative percentage of developed land within the City limits (Table 5-6). Developed land was used as the baseline to estimate the relative percentage of area with low, medium and high amounts of illegal dumping and waste-related work orders. Of the 143,999 acres of developed land in the City, there are 6,590 acres of high-density work order (HDWO) area (approximately 5 percent of the City) (Figure 5-6). These areas of high-density ESD work orders are generally distributed among 4 communities: Pacific Beach, Ocean Beach, Normal Heights/Kensington, and Logan Heights/Mountain View. The CCFSTI project area consisted of 840 acres of HDWO area. The 840 acres CCFSTI project area is equivalent to approximately one eighth (12.75 percent) of the 6,590 acres total of HDWO areas in the City.

Table 5-6. City of San Diego General Land Use Estimate

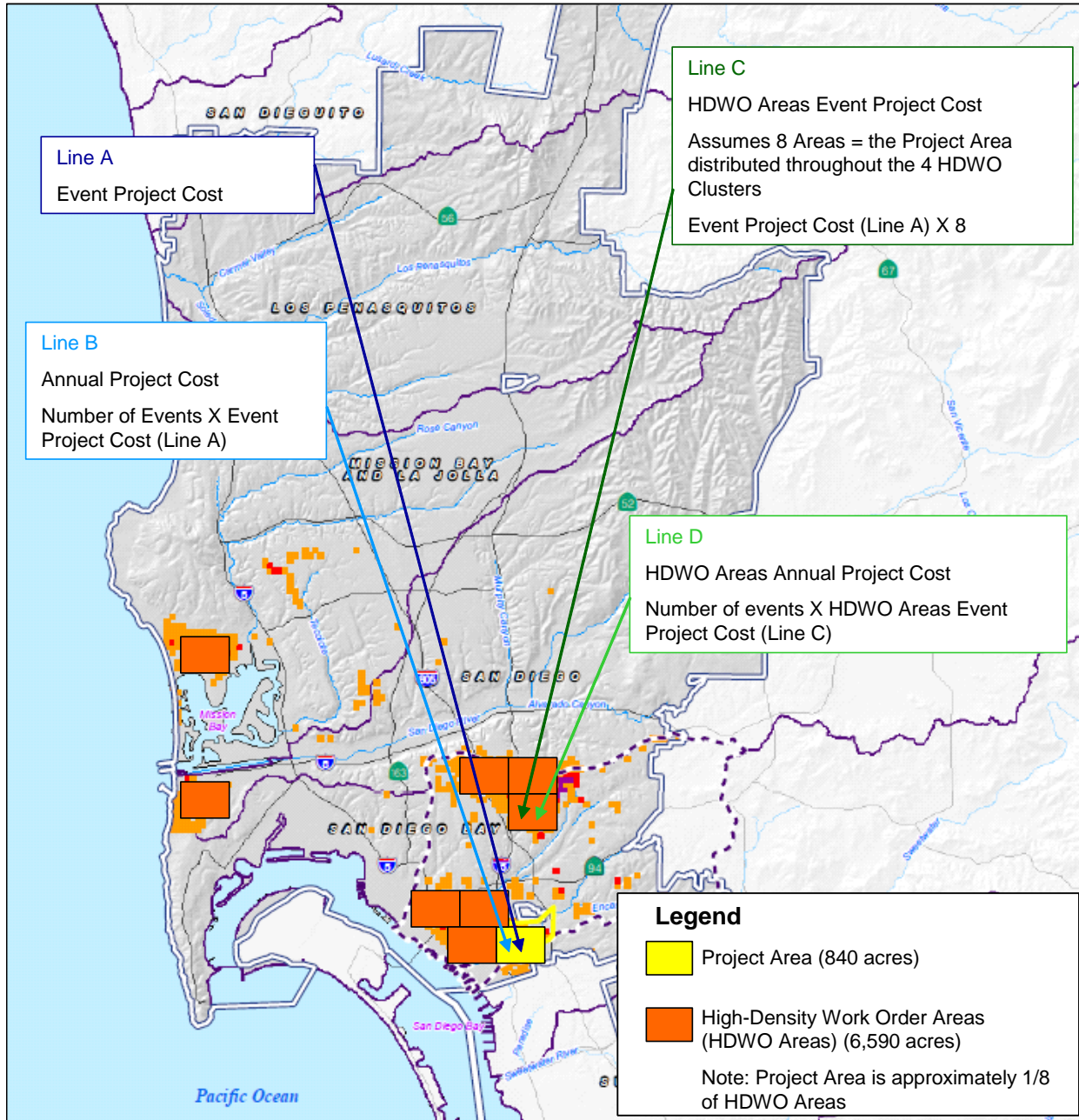
Land use Category ¹	Area (acres)	Percent of Total
Undeveloped-Open Space/Vacant/Park	75,253	34%
Developed	143,999	66%
Total	219,252	100%

¹ Source: San Diego Association of Governments, 2010

In order to standardize comparison and allow scaled cost estimation for CCFSTI project implementation costs to be developed, the estimated cost was calculated both on a per-event and annual basis and scaled relative to the 840 acre CCFSTI project area and the estimated total 6,590 acres HDWO area (Figure 5-6). This calculation was performed to account for the fact that certain areas of the City have higher incidence of illegal dumping and are likely to receive a greater benefit from illegal dumping abatement programs. However, wide-spread implementation of these programs may be logistically infeasible and cost prohibitive. The method used to scale the cost of the programs is presented in Figure 5-6 and applied to the cost data presented in Table 5-7.



Figure 5-6. Scaled Cost Estimation Method for Illegal Dumping Programs





5.7.1 CCFSTI Program Cost Estimate

The CCFSTI program originally intended to perform approximately 24 Refuse Collection Events over a 1-year period. It was anticipated that the 1-year program would require project budget for project management, labor for a non-profit job training program collaboration, advertising, disposal, and some miscellaneous project costs (this included overweight charges for bins that exceeded the 4 ton weight limit) (Groundwork San Diego Chollas Creek, 2008; Table 5-7). These budgeted costs were used in this analysis and are detailed in the table below.

Based on review of the project financial data for the 9 Refuse Collection Events that were conducted during the focal period of effectiveness assessment activities, the estimated per-event cost of \$3,167 (Line A; Table 5-7) is roughly accurate and scales to an estimated annual cost of \$76,000 (Line B; Table 5-7). Based on these costs, implementation of singular events, similar in size and scope to the CCFSTI event, in the identified HDWO areas would cost approximately \$24,836 per occurrence (Line C; Table 5-7). Accordingly, implementation of similarly sized events in the identified HDWO areas, at a frequency of 2 events per month for a year, would result in approximately \$596,061 in annual costs (Line D; Table 5-7).

Table 5-7. Estimated Cost of the CCFSTI Project

Line ID	Budget Item	Refuse Collection Events
	Number of Events (days per year)	24
	Project Management	\$12,000
	Labor	\$32,000
	Advertising	\$7,000
	Disposal Fees	\$15,000
	Miscellaneous Costs	\$10,000
A	Estimated Event Cost Standardized to Project Area	\$3,167
B	Estimated Annual Cost Standardized to Project Area	\$76,000
C	Estimated Event Cost to Implement in High-Density Work Order Areas	\$24,836
D	Estimated Annual Cost to Implement in High-Density Work Order Areas	\$596,061



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SECTION 6 SUMMARY

The Chollas Creek watershed, located in San Diego County, California, contains 2 main forks. The north fork watershed area encompasses 9,276 acres and the south fork watershed area covers 6,997 acres (Figure 1-1). Due to its geographic location within the City, the Chollas Creek watershed is highly urbanized, with residential, commercial, and roadway land uses covering significant portions of the land area. During the dry season, where the creek and bank areas are relatively accessible, and during wet weather flows that carry high volumes of trash and debris, there are several areas in the creek channel where trash and debris are actively and passively deposited. For this reason, the Chollas Creek watershed was selected as an appropriate area to conduct this illegal dumping abatement effectiveness assessment study.

The CCFSTI program was a grant-funded effort to provide outreach, education, and assistance by allowing the local community to participate more easily in trash cleanup, landscape assistance, and trash collection activities to address illegal dumping and pollutants in Chollas Creek. This Report documented activities and analysis methods that were used to assess the effectiveness of parts of the CCFSTI program that address illegal dumping and trash pollutant issues in portions of the Chollas Creek watershed. The Report also provided a preliminary relative cost assessment for the CCFSTI program.

The CCFSTI project area consisted of an approximately 1.4-mile section of the south fork of Chollas Creek between the I-15 and I-805 freeways (Figure 2-2). The creek in this area is mostly an open prismatic channel with alternating sections of concrete-lined channel bottom and natural channel bottom. The creek is relatively accessible to residents and the general public in many areas and is subject to a number of illegal dumping activities.

In order to assess the effectiveness of the CCFSTI program, a 3-component monitoring program was conducted that included quarterly VTAs, Participant Surveys, and Refuse Characterization activities. The quarterly VTAs were used to document the quantity and quality of large trash and debris items present in the project area. Participant Survey data were used to measure public attitudes about refuse collection and illegal dumping. Refuse Characterization data were used to identify the quantity and type of items participants dispose of at the mobile collection events.

6.1 SUMMARY OF RESULTS

A total of 5 VTA surveys were conducted during the study period at quarterly intervals, including a baseline survey. The VTA surveys were conducted in 4 survey areas within the project area. The VTA survey data indicated that there are significant deposits of LITUs within the CCFSTI project area. The LITU deposits include household items, construction materials, and green waste. In addition, several areas where illegal dumping activities appear to be relatively common and homeless encampments were identified. A significant quantity of refuse material was observed in the homeless encampment areas. In general, the quantity of LITU materials observed in the creek area increased throughout the study period (Table 6-1).



Table 6-1. Quantity of Large Item Trash Units in Each Area Over Time

VTA Survey Area	2009			2010	
	April	July	Oct.	Jan.	April
2a	Medium	High	High	High	High
2b	Medium	High	High	High	High
2c	Medium	Medium	High	High	High
2d	Low	Medium	Low	Medium	Medium

A total of 9 CCFSTI-funded Refuse Collection Events conducted on Saturdays at 1- to 4-week intervals from April through October 2009 were observed. The events were conducted by Urban Corps staff members who performed pre-event marketing through the distribution of promotional flyers and also assisted residents in loading refuse items into the collection bins. A small amount of onsite promotional signage was displayed during the collection events. The number of participants at each event varied from 0 (one event did not have any participants) to approximately 25 vehicle groups. The Refuse Collection Events resulted in the collection of approximately 115 tons of material. Participant loads and the collection bins were observed by the Field Team in order to characterize the type and relative quantity of materials participants disposed of during the events (Table 6-2).

Table 6-2. Generalized Categories of Material Disposed at Refuse Collection Events

General LITU Category	Estimated Amount Collected	Estimated Weight Collected (tons)
Household	47%	54
Construction	40%	46
Green	13%	15

A total of 95 Refuse Collection Event participants were surveyed using the Participant Surveys to assess their attitudes, perceptions, and needs related to disposal of large items and illegal dumping. Although the limited total number of CCFSTI participants and Participant Survey responses prevent robust analysis of program effectiveness, preliminary evaluation of the data provides useful insight for assessing certain aspects of the project. Survey responses indicated that there were relatively more participants that lived in southern portion of the project area (project areas 3, 4, and 5; Figure 4-6 and Figure 4-7) than the northern and eastern areas. The distributed flyer marketing technique employed by Urban Corps staff appeared to be relatively effective, 42% of the respondents noted that they had been notified about the events from the flyers. Respondents also indicated that the frequency that they need to dispose of large items was often between once a month to once a year, although most respondents indicated that 1-2 disposal events per year was an optimal frequency. In addition, the survey responses indicated that e-waste disposal was generally a relatively limited proportion of participants' disposal needs.



In general, respondents indicated that they would typically transport large items to the landfill for disposal. However, respondents also noted that appropriately sized vehicles, landfill fees and distance to the landfill were important potential impediments to efficient large item disposal (Table 6-3).

Table 6-3. Summary of Participant Perceptions of Potential Barriers to Large Item Disposal

Potential Barrier	Extremely/ Very important	Somewhat important	Not important
Needing an appropriately-sized vehicle to bring large item(s) to landfill	50	25	16
Cost of fee to bring large items to landfill	66	19	6
Landfill is too far away	49	23	19

Survey responses also generally indicated that participants considered illegal dumping a problem in the community and that the Refuse Collection Events program provided a useful way for residents to dispose of large trash items.

6.2 EVALUATION OF PROJECT EFFECTIVENESS

Assessment of the effectiveness of the CCFSTI program includes evaluation of the VTA survey data and both the observational data and Participant Survey responses associated with the Refuse Collection Events. The assessment also includes preliminary analysis of previous and current City and other municipality data in order to allow evaluation of the project outreach efforts (Environmental Protection Agency, 2010a; Think Blue San Diego, 2004).

The observed pattern of LITU distribution and abundance within the project area during the initial VTA survey is generally consistent with City ESD data sources. The pattern observed in Chollas Creek is similar to studies in other areas, where incidences of illegal dumping tend to occur in areas that are relatively difficult to access but generally less visible to the public. In Chollas Creek, areas with evidence of illegal dumping were observed both adjacent to roadway areas and/or bridges that are highly visible and in areas relatively inaccessible to the general public but were highly accessible to adjacent residences. In addition, City dry weather monitoring assessment data supports the VTA survey regarding the relative proportion of household and large items observed at MS4 outfall locations City-wide.

The abundance of observed LITU deposits generally increased during the project period. A number of factors with potential impacts on interpretation of the LITU data were examined. Creek cleanup events, which are commonly held in the Chollas Creek area, may provide significant reductions in LITU deposits in certain areas. However, there is relatively little available data available related to the date, scope, frequency, and amount of material removed by the multiple organizations that are known to conduct cleanup events. Similarly, precipitation events may also impact the distribution and abundance of LITUs, human habitation areas and suspected illegal dumping areas. As a result of activities during the dry season, where the creek and bank areas are relatively accessible to humans, and wet weather flows which presumably contain significant amounts of trash and debris, the creek channel contains numerous areas where trash and debris are actively and passively deposited. Contrary to pro-project hypotheses, the VTA



surveys indicated that precipitation events do not result in decreases to the observed pattern of LITU deposits in Chollas Creek. This observation may have bearing when selecting appropriate structural and non-structural BMPs to address LITU issues in Chollas Creek.

Spatial and temporal patterns of program participation and awareness related to illegal dumping and refuse disposal were difficult to detect with the limited available Participant Survey data. In general, participants indicated that illegal dumping is a big or very big problem in the community and that a CCFSTI-type program may allow residents to dispose of large unwanted items rather than utilize other potential disposal mechanisms. In addition, there was evidence that the Refuse Collection Events generated significant word-of-mouth communication and subsequent participation. This finding suggests that illegal dumping abatement activities in the Chollas Creek watershed should consider creative and other non-traditional mechanisms for creating general awareness of large-item disposal options and future event notifications.

Examination of the VTA Survey and Refuse Collection Event data suggests that there is relative similarity between the types of LITU refuse observed in creek areas and that is disposed of during collection events. The CCFSTI program resulted in a general decrease over time in the amount of material collected at each Refuse Collection Event. However, the relatively infrequent and limited number of event participants at each event; combined with a number of other factors such as seasonal and daily weather influences, prevent direct assessment of potential overall impact of the CCFSTI program on patterns of illegal dumping in the Chollas Creek project area.

Overall, the CCFSTI program was successful in collecting more than 100 tons of waste during a number of Refuse Collection Events held in the project area. An extensive review of available local, regional and national literature and data was conducted to allow evaluation of the relative participation observed in the CCFSTI program and identify methods to quantitatively estimate effectiveness of non-structural illegal dumping abatement programs in changing behavior, diverting waste from being illegally dumped and/or preventing pollution to be conducted. However, quantitative measurements of participation and the relative effectiveness of illegal dumping abatement and other non-structural pollution prevention programs are not often attempted. This is presumably a result of the relative difficulty associated with assessing behavioral changes and measuring the amount of waste that has been diverted to traditional disposal mechanisms rather than illegally dumped. The data collected as part of this monitoring program provided useful insight to the quantity and characterization of LITUs currently present in the Chollas Creek project area and deposited within the project timeframe; the type and quantity of large-item refuse material that residents need to dispose of; and a general understanding of the attitudes and perceptions of participants in the CCFSTI program regarding illegal dumping issues. Future efforts to assess the effectiveness of non-structural BMPs that may reduce or abate illegal dumping in the Chollas Creek or other watersheds may utilize the project data to assess relative effectiveness and allow more comprehensive assessment of the efficiency of these types of programs. The data may also be used to provide guidance for the development of appropriate management measures related to illegal dumping abatement.



A preliminary assessment of the per-event cost of the CCFSTI program was estimated to be approximately \$3,167. The CCFSTI program cost estimate was based on the estimated budget for the originally planned 24 Refuse Collection Events to be conducted over a 1-year period (Table 6-4). It was anticipated that the 1-year program would include budget for project management, labor for a non-profit job training program collaboration, advertising, disposal, and some miscellaneous project costs (this included overweight charges for bins that exceeded the 4 ton weight limit). Available ESD and other land use data were then used to scale the project costs to provide a preliminary estimate of per-event and annual costs for program implementation in other areas of the City with high-incidence of illegal dumping and other waste-related work orders.

Table 6-4. Estimated Cost of the CCFSTI Program

Estimated Event Cost in Project Area	Number of Events (Days per Year)	Estimated Total Cost Standardized to Project Area	Estimated Event Cost to Implement in City ESD High-Density Work Order Areas	Estimated Total Cost to Implement in City ESD High-Density Work Order Areas
\$3,167	24	\$76,000	\$24,836	\$596,061

A variety of other potential structural/non-structural programs designed to prevent unwanted trash items from entering creek or other open areas are potentially available. Implementation logistics and costs for alternative programs are likely to significantly vary based on target project area, level of implementation and other factors. It is anticipated that the results of this project may be useful for comparison to other potential illegal dumping abatement and other structural/non-structural pollution prevention programs as additional pollutant removal- and cost-efficiency data becomes available.



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APPENDIX A PARTICIPANT SURVEY FORMS



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Today's **Mobile Trash Collection** event has been sponsored by the nonprofit group **Groundwork San Diego** and the **Think Blue - City of San Diego Storm Water Department**. The program is designed to discourage illegal disposal of unwanted items into neighborhood spaces and creeks and also reduce the amount of trash and pollutants that enter our creeks and waterways where our families swim, fish and play.

This brief survey will help us evaluate the success of the program and the effectiveness in reducing pollution and improving water quality in Chollas Creek. The neighborhood area near Chollas Creek where this project is directed is highlighted in the map to the right.

Thank you for your participation and feedback.



Neighborhood Map - Chollas Creek

How did you hear about this event? 1. Flyer 2. Neighbor 3. Meeting 4. Website 5. Other _____

How often do you need to dispose of large items from your home or business?

1. Once a month 2. Once every six months 3. Once a year 4. Other _____

Would it be helpful if this program included electronic waste (e-waste)? 1. No, I don't have e-waste

2. Yes, but I only have a few e-waste items 3. Yes, I have a lot of e-waste that needs to be disposed

How did you typically dispose of large items before this event?

Do you live or work in any of the project areas noted above? 1. Yes 2. No **If so, which one?** _____

Do you see illegal dumping as a problem in your community?

1. Not a problem 2. Somewhat of a problem 3. A big problem 4. A very big problem

Rate the importance of each item below as it relates to proper disposal of large items:

1. Needing a large truck to bring large item(s) to landfill

1. Not important 2. Somewhat important 3. Very important 4. Extremely important

2. Cost of fee to bring large items to landfill

1. Not important 2. Somewhat important 3. Very important 4. Extremely important

3. Landfill is too far away

1. Not important 2. Somewhat important 3. Very important 4. Extremely important

If more events like this were available to the public, do you think it would reduce the amount of illegal dumping taking place in Chollas Creek? 1. Yes 2. No 3. Don't know

Do you have any additional comments or suggestions to help prevent illegal dumping in our creeks and neighborhoods? _____

OPTIONAL DEMOGRAPHIC INFORMATION

Would it be okay to contact you in the future for input on this or other environmental programs?

Yes No

(Optional) Name: _____

(Optional) Address: _____

(Optional) Email Address: _____

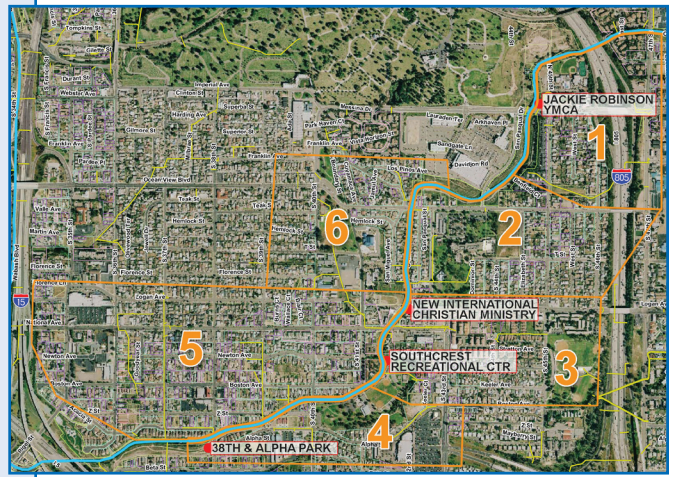


think BLUE
SAN DIEGO

SURVEY

El evento de recolección de basura móvil que estamos realizando hoy ha sido patrocinado por el grupo **Groundwork San Diego**, una organización sin ánimo de lucro, y el **Pienza Azul - Departamento de Aguas Pluviales de la Ciudad de San Diego**. El programa está diseñado para desanimar la disposición ilegal de artículos indeseados en los barrios y los arroyos y reducir la cantidad de basura y contaminantes que entran en los arroyos y vías acuáticas en las cuales nuestras familias nadan, pescan y se divierten.

Esta corta encuesta nos ayudara a evaluar el éxito de este programa y la efectividad del mismo en la reducción de polución y el mejoramiento que de la calidad de agua del arroyo Chollas. El área del barrio cercana al arroyo chollas donde este proyecto se esta llevando a cabo esta delineado en el siguiente mapa.



Gracias por su participación y sus comentarios.

Como se entero de este evento? 1. Volantes 2. Vecinos 3. ¿Reuniones? 4. ¿Página de Internet? 5. Otro medio _____

Con que frecuencia necesita disponer de artículos grandes de su hogar o de su trabajo?

1. Una vez al mes 2. Cada seis meses 3. Una vez al año 4. Otra frecuencia _____

¿Usted considera que sería útil si este programa incluyera disposición de equipos electrónicos (e-waste)?

1. No, yo no tengo artículos electrónicos para botar 2. Si, yo tengo pocos artículos electrónicos
3. Si, yo tengo muchos artículos electrónicos que necesito botar

Antes de este evento, ¿generalmente como ha botado de este tipo de artículos?

¿Usted vive o trabaja en cualquiera de la areaj que arriba se mencionan? 1. Si 2. No Y si ej asi en cual? _____

¿Usted considera que la disposición ilegal de basuras es un problema en su comunicad?

1. No es un problema 2. Es un problema menor 3. Es un problema significativo 4. Es un problema mayor

Califique la importancia de cada unos de los siguientes factores en cuanto a disposición adecuada de artículos grandes.

1. Necesidad de tener un camión disponible para llevar el(los) artículo(s) al centro de recolección

1. No es importante 2. Poco importante 3. Muy importante 4. Extremadamente importante

2. Costo de las tarifas para botar artículos grandes en el centro de recolección.

1. No es importante 2. Poco importante 3. Muy importante 4. Extremadamente importante

3. El centro de recolección está muy lejos

1. No es importante 2. Poco importante 3. Muy importante 4. Extremadamente importante

Si hubiera más eventos similares a este disponibles para el publico; ¿usted cree que reduciría la cantidad de basura ilegal en el arroyo Chollas? 1. Si 2. No 3. No sabe

¿Usted Tiene algún comentario o sugerencia adicional que nos ayude a prevenir basura ilegal en nuestros arroyos y vecindarios?

Información Demográfica (Opcional)

¿Usted nos permitiría contactarlo(a) en el futuro para pedirle su opinión en otro tipo de programas ambientales?

- Si No

Nombre (Opcional) _____

Dirección (Opcional) _____

Correo electrónico (Opcional) _____



piensaAZUL
SAN DIEGO



APPENDIX B DATA QUALITY OBJECTIVES



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B.1 DATA QUALITY OBJECTIVES

This section will identify the data validation procedures that were used to evaluate the usability of the collected data. This section also specifies the acceptable limits on measurement uncertainty and describes the potential limitations of the data collection methodology and procedures to assess the overall effectiveness of the trash collection portion of the CCFSTI program.

B.1.1 VTA Survey Data

Data collected during VTA surveys was documented by 2 field crew members. Field data was entered into a MS Excel spreadsheet by the team lead and reviewed by the second team member for consistency. Photographs taken during each VTA were saved by date and location and serve as documentation and proof of field observations. An independent review and quality assurance check was performed on 5 percent of the entered data to check for transcript errors. If errors were found during the 5 percent check, the scope of the independent review was extended at the discretion of the Project Manager. Comments and/or corrective action recommendations were provided to the field crew and data entry technician. The independent reviewer verified that the comments were incorporated into the final data set.

B.1.2 Refuse Collection Events

Participant Surveys

The project team transferred survey responses from the hard copy survey sheets completed by the Field Team and/or event participants to a MS Excel spreadsheet. Survey responses collected in Spanish were translated into English and entered into the project spreadsheet. An independent reviewer then performed an integrity check to 5 percent of the surveys entered. If transcription errors were found, the scope of the review was extended at the discretion of the Project Manager. Comments were provided to the data entry technician for correction and the reviewer re-verified and documented that the comments had been addressed.

Refuse Characterization

Similar to the Participant Survey process, data collected during Refuse Characterization was documented by field crew members and then entered into a MS Excel spreadsheet by the team lead. Photographs taken during the Refuse Characterization process were saved by date and location and serve as a documentation and proof of field observations. An independent review was performed on 5 percent of the entered data to check for transcript errors. If errors were found, the scope of the independent review was extended at the discretion of the Project Manager. Comments were provided to the data entry technician for correction and the reviewer re-verified and documented that the comments had been addressed.



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APPENDIX C QUALITATIVE DESCRIPTIONS OF DUMPED/DEPOSITED ITEMS AND MAPS OF QUARTERLY VISUAL TRASH ASSESSMENT SURVEYS



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C.1 EVALUATION OF LITUS IN SECTION 2A

The locations and sizes of the homeless encampment/transient dwelling areas, suspected illegal dumping areas, and the trash accumulation/deposition areas generally increased within Section 2a between the April 2009 and July 2009 VTA survey periods, subsequently remained relatively static during the October 2009 and January 2010 survey periods, and then increased during the April 2010 VTA survey period. (Appendix C). The 2 homeless encampment/transient dwelling areas present in the April 2009 VTA survey period grew slightly and an additional relatively small-sized area located near the terminus of Benfield Court was identified in the July 2009 VTA survey period. An additional relatively medium-sized homeless encampment/transient dwellings area was observed during the October 2009 survey period and another during the January 2010 VTA survey period. The 2 relatively medium-sized homeless encampment/transient dwellings areas observed during the October 2009 and January 2010 VTA survey periods were not observed during the April 2010 VTA survey period and the relatively small-sized area north of Imperial Avenue grew somewhat substantially. The relatively large suspected illegal dumping area identified in the creek area adjacent to the western edge of the Jackie Robinson YMCA appeared to contain additional LITUs during each subsequent survey period. A large and smaller area of suspected illegal dumping was observed during the April 2009 VTA survey period. The smaller area remained approximately the same size during the July 2009 and October 2009 VTA survey periods, but the larger area had been divided into 3 medium-sized areas during the July 2009 VTA survey period, and then remained approximately the same size during the October 2009 VTA survey period. The smaller suspected illegal dumping area and 1 of the 3 medium-sized areas had merged at the time of the January 2010 VTA survey period making a total of 3 areas. 3 areas of suspected illegal dumping were observed during the April 2009 VTA survey period, 1 was similar in size to the January 2010 VTA survey period, 1 seemed to be more concentrated than in the January 2010 VTA survey period, and the third appeared to be a newly observed area. The identified trash accumulation/deposition areas remained relatively static between the VTA survey periods. A relatively large area adjacent to I-805 was smaller during the July 2009 VTA survey period than during the April 2009 VTA survey period, remained approximately the same size during the October 2009 and January 2010 VTA survey period, and then was not observed during the April 2010 VTA survey period. The second trash accumulation/deposition area observed during the April 2009 VTA survey period grew in size by the July 2009 VTA survey period, remained approximately the same size during the October 2009 VTA survey period, and was joined by an additional area; the additional area was not observed during the January 2010 VTA survey period, but was observed as being substantially larger during the April 2010 VTA survey period.

Items observed in this area during the survey periods consisted of miscellaneous litter, appliance/electronic material, building material, trash bags, and mattress/bedding furniture items. Miscellaneous litter was the most frequently observed item during the April 2009 VTA survey period in areas of suspected illegal dumping and appliance/electronic material, couch/lounge furniture, and mattress/bedding furniture were observed in equal amounts (1 observance per category). Miscellaneous litter and trash bags were the most frequently observed items during the July 2009 VTA survey period in areas of suspected illegal dumping with appliance/electronic material, building material, couch/lounge furniture, and mattress/bedding furniture being observed in equal amounts (2 observances per category) and auto/mechanical material and shopping carts being observed in equal amounts (1 observance per category). Appliance/electronic material, mattress/bedding furniture and trash bags were the most frequently observed items during the October 2009 VTA survey period in areas of suspected illegal



dumping with baby supplies/children's toys, couch/lounge furniture, and miscellaneous litter being observed in equal amounts (2 observances per category) and building materials and chair furniture being observed in equal amounts (1 observance per category). Appliance/electronic material, mattress/bedding furniture, trash bags, and miscellaneous litter were the most frequently observed items during the January 2010 VTA survey period in areas of suspected illegal dumping with 3 observances of building materials; 2 observances of couch/lounge furniture; and baby supplies/children's toys and chair furniture being observed in equal amounts (1 observance per category). Appliance/electronic material, building material, trash bags, and miscellaneous litter were the most frequently observed items during the April 2010 VTA survey period in areas of suspected illegal dumping with couch/lounge furniture and mattress/bedding furniture being observed in equal amounts (2 observances per category), and auto/mechanical material being observed once.

C.2 EVALUATION OF LITUS IN SECTION 2B

The location of some of the suspected illegal dumping areas and trash accumulation/deposition areas generally remained unchanged within Section 2b during most of the VTA survey periods, while some others changed location and/or size (Appendix C). During the April 2009 VTA survey period, 4 suspected illegal dumping areas were observed, 2 were relatively medium-sized and 2 were relatively small-sized. During the July 2009 VTA survey period, a relatively medium-size illegal dumping area and relatively small-size illegal dumping area increased to 2 relatively large-size areas, 2 other areas from the April 2009 VTA survey period remained approximately the same, and 4 additional relatively medium-size areas were observed. No significant changes were observed between the July 2009 VTA survey period and the October 2009 VTA survey period. A relatively large-sized area, 2 relatively medium-sized areas, and a relatively small-size illegal dumping area that had been observed during previous VTA survey periods were not observed during the January 2009 VTA survey period, but the other 4 areas remained approximately the same as observed during the October 2009 VTA survey period. 2 of the remaining relatively medium-size illegal dumping areas were reclassified as trash accumulation/deposition areas, a relatively medium-size illegal dumping area remained approximately the same, and the relatively large-size illegal dumping area was reduced to a relatively medium-size area during the April 2010 VTA survey period. The 1 trash accumulation/deposition area observed during the April 2009 VTA survey period was observed to be approximately half the size during the July 2009 VTA survey period. No significant changes were observed between the July 2009 VTA survey period and the October 2009 VTA survey period. During the October 2009 VTA survey period, the trash accumulation/deposition area returned to approximately the size observed during the April 2009. No significant changes were observed between the July 2009 VTA survey period and the October 2009 VTA survey period. A new trash accumulation/deposition area, similar in size to the 1 observed in the area earlier, was observed during the January 2010 VTA survey period. During the April 2010 VTA survey period, the 2 trash accumulation/deposition areas merged and increased in sized and a formerly suspected illegal dumping area was reclassified as a trash accumulation/deposition area. The size and number of homeless encampment/transient dwelling areas increased between the April 2009 and July 2009 VTA survey periods and then remained relatively unchanged from the July 2009 VTA survey period to the October 2009 VTA survey period. There were no homeless encampment/transient dwelling areas observed between the October 2009 and April 2010 VTA survey periods.



The areas of suspected illegal dumping observed during the VTA survey periods consisted mostly of yard waste, mattress/bedding furniture, building material, shopping carts, auto/mechanical material, and other furniture. Miscellaneous litter and furniture were the most frequently observed items during the April 2009 VTA survey period in areas of suspected illegal dumping and appliance/electronic material and mattress/bedding furniture were observed in equal amounts (1 observance per category). Shopping carts, mattress/bedding furniture, and other furniture were the most frequently observed items during the July 2009 VTA survey period in areas of suspected illegal dumping with baby supplies/children's toys, building material, and couch/lounge furniture being observed in equal amounts (3 observances per category); auto/mechanical material and miscellaneous litter carts being observed in equal amounts (2 observances per category); and appliance/electronic material and trash bags being observed in equal amounts (1 observance per category). Auto/mechanical material, building material, mattress/bedding furniture and shopping carts were the most frequently observed items during the October 2009 VTA survey period in areas of suspected illegal dumping with other furniture and trash bags being observed in equal amounts (5 observances per category); couch/lounge furniture and miscellaneous litter being observed in equal amounts (3 observances per category). In addition, there were 4 observances of baby supplies/children's toys, 2 observances of yard waste, and an observance of appliance/electronic material. Shopping carts, mattress/bedding furniture, and building material were the most frequently observed items during the January 2010 VTA survey period in areas of suspected illegal dumping with 4 observances of auto/mechanical material; 3 observances of baby supplies/children's toys; 2 observance per category of miscellaneous litter and other furniture; and an observance of yard waste. Building material, mattress/bedding furniture, and yard waste were the most frequently observed items during the April 2010 VTA survey period in areas of suspected illegal dumping with 2 observances per category of shopping carts and trash bags and an observance of other furniture.

C.3 EVALUATION OF LITUS IN SECTION 2C

The location of some of the suspected illegal dumping areas was generally the same and the size of all the suspected illegal dumping areas was generally larger within Section 2c from the April 2009 to the July 2009 VTA survey periods (Appendix C). There were approximately 8 areas of suspected illegal dumping of varying size observed during the April 2009 VTA survey period. 1 of the suspected illegal dumping areas remained approximately the same size, 4 of the areas were observed to be somewhat larger, and 3 of the areas were not observed during the July 2009 VTA survey period. Between the July 2009 and October 2009 VTA survey periods, nearly all of the suspected illegal dumping areas changed in size and/or location. 1 of the suspected illegal dumping areas remained approximately the same size, 2 of the areas were observed to be somewhat smaller, 1 of the areas was observed to be somewhat larger, and 2 new relatively medium-size areas were observed during the October 2009 VTA survey period. Most of the suspected illegal dumping areas remained the same size and in the same location between the October 2009 and January 2010 VTA survey periods, but an area was no longer observed and 2 new relatively medium-size areas were observed during the January 2010 VTA survey period. During the April 2010 VTA survey period, observations of suspected illegal dumping areas was very different than previously; only 2 areas were observed with 1 being in the same location as in previous survey periods, but smaller in size and a new relatively small-sized area observed. The 4 trash accumulation/deposition areas identified in the April 2009 VTA survey period were no longer present in the July 2009 VTA survey period, but an area was seen again during the October 2009 VTA survey period and remained the same size and in the same location between the October 2009 and April 2010 VTA survey periods. 5 new areas of trash



accumulation/deposition, of relatively medium- or large-size, were also observed during the April 2010 survey period. No areas of homeless encampment/transient dwellings were observed during any of the survey periods.

During the VTA survey periods, materials observed in areas of suspected illegal dumping consisted primarily of building material, appliance/electronic material, auto/mechanical material, mattress/bedding material, yard waste, couch/lounge furniture, and other furniture. Mattress/bedding furniture was the material most frequently observed during the April 2009 VTA survey period in areas of suspected illegal dumping with 2 observances of appliance/electronic material and auto/mechanical material and an observance per category of baby supplies/children's toys, other furniture, and shopping charts. Building material, couch/lounge furniture, and other furniture were the materials most frequently observed during the July 2009 VTA survey period in areas of suspected illegal dumping with auto/mechanical material and miscellaneous litter being observed in equal amounts (3 observances per category); appliance/electronic material, mattress/bedding furniture, and yard waste being observed in equal amounts (2 observance per category); and baby supplies/children's toys, shopping carts, and trash bags being observed in equal amounts (1 observance per category). Auto/mechanical material, building material, mattress/bedding furniture and yard waste were the materials most frequently observed during the October 2009 VTA survey period in areas of suspected illegal dumping with 5 observances of other furniture; 4 observances per category of appliance/electronic material, shopping carts and trash bags; 2 observances per category of baby supplies/children's toys and couch/lounge furniture; and an observance of miscellaneous litter. Appliance/electronic material, auto/mechanical material, building material, mattress/bedding furniture, and yard waste were the most frequently observed materials during the January 2010 VTA survey period in areas of suspected illegal dumping with 5 observances per category of trash bags and other furniture; 4 observances per category of baby supplies/children's toys and shopping carts; 2 observances of couch/lounge furniture; and an observance of miscellaneous litter. Building materials were the materials most frequently observed during the April 2010 VTA survey period in areas of suspected illegal dumping with 2 observances of baby supplies/children's toys and couch/lounge furniture, and an observance of mattress/bedding furniture.

C.4 EVALUATION OF LITUS IN SECTION 2D

In Section 2d, there was a defined suspected illegal dumping area observed during the April 2009 VTA survey period, no observed areas during the July 2009, October 2009, or January 2010 VTA survey periods, and an area observed during the April 2010 VTA survey period (Appendix C). There was a relatively small-sized trash accumulation/deposition area observed during the April 2009 VTA survey period which was observed to be somewhat larger and more downstream during the July 2009 VTA survey period. The 1 trash accumulation/deposition area remained in the same location and of the same size during the October 2009 VTA survey period and was observed to be larger during the January 2010 VTA survey period. In addition, a new trash accumulation/deposition area was observed during the January 2010 VTA survey period. There were no observable changes from the January 2010 VTA survey period to the April 2010 VTA survey period. There were no homeless encampment/transient dwelling areas observed between the October 2009 and April 2010 VTA survey periods.

Yard waste, shopping carts, appliance/electronic material, and couch/lounge furniture were observed in areas of suspected illegal dumping during the VTA survey periods. Shopping carts, appliance/electronic

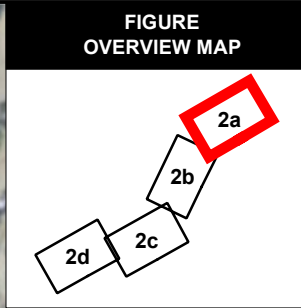


material, and couch/lounge furniture was observed during the April 2009 VTA survey period in areas of suspected illegal dumping in equal amounts (1 observance per category). There were 6 observances of yard waste during the April 2010 VTA survey period in areas of suspected illegal dumping.



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LEGEND	
	Chollas Creek
	Appliance/Electronic
	Auto/Mechanical
	Baby Supplies/Children's Toys
	Building Materials
	Furniture (Couch/Lounge)
	Furniture (Mattress/Bedding)
	Furniture (Other)
	Misc. Litter
	Shopping Cart
	Trash Bags
	Homeless Encampment/Transient Dwelling
	Suspected Illegal Dumping Area
	Trash Accumulation/Deposition Area



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	SOURCES: SanGIS 2009, Aerials Express 2008		BASELINE LARGE-ITEM TRASH ASSESSMENT CHOLLAS CREEK - APRIL 2009	
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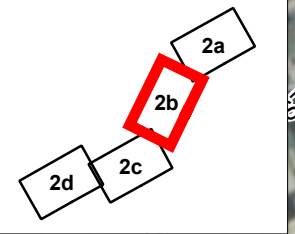
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LEGEND

- Chollas Creek
- Appliance/Electronic
- Auto/Mechanical
- ⊙ Baby Supplies/Children's Toys
- ⊕ Building Materials
- ⊕ Furniture (Couch/Lounge)
- ⊕ Furniture (Mattress/Bedding)
- ⊕ Furniture (Other)
- ⊕ Misc. Litter
- ⊕ Shopping Cart
- ⊕ Trash Bags
- ⊕ Homeless Encampment/Transient Dwelling
- ⊕ Suspected Illegal Dumping Area
- ⊕ Trash Accumulation/Deposition Area

FIGURE OVERVIEW MAP



Matchline

Matchline

 	SOURCES: SanGIS 2009, Aerials Express 2008		BASELINE LARGE-ITEM TRASH ASSESSMENT CHOLLAS CREEK - APRIL 2009	
	 SCALE: 1" = 150' (1:1,800) SCALE CORRECT WHEN PRINTED AT 11X17	CREATED BY: PM PM: BE	DATE: 06-10-09 PROJ. NO: 27679002.04000	FIG. NO: 2b

Path: G:\gis\projects\137727679002\map_docs\mxdl\Chollas Watershed Trash 11x17 April 2009.mxd, 02/01/10, paul_morero

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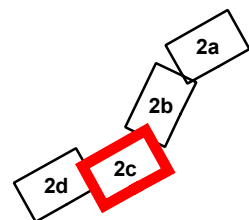
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LEGEND

- Chollas Creek
- Appliance/Electronic
- Auto/Mechanical
- ⊙ Baby Supplies/Children's Toys
- + Building Materials
- Furniture (Couch/Lounge)
- Furniture (Mattress/Bedding)
- + Furniture (Other)
- Misc. Litter
- Shopping Cart
- ⊙ Trash Bags
- Homeless Encampment/Transient Dwelling
- Suspected Illegal Dumping Area
- Trash Accumulation/Deposition Area

FIGURE OVERVIEW MAP



SOURCES: SanGIS 2009, Aerials Express 2008

**BASELINE LARGE-ITEM TRASH ASSESSMENT
CHOLLAS CREEK - APRIL 2009**



75 0 75 150 Feet

SCALE: 1" = 150' (1:1,800)

SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: PM	DATE: 06-10-09	FIG. NO:
PM: BE	PROJ. NO: 27679002.04000	2c

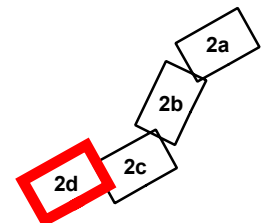


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LEGEND

- Chollas Creek
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FIGURE OVERVIEW MAP



SOURCES: SanGIS 2009,
Aerials Express 2008

**BASELINE LARGE-ITEM TRASH ASSESSMENT
CHOLLAS CREEK - APRIL 2009**



75 0 75 150 Feet
SCALE: 1" = 150' (1:1,800)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: PM	DATE: 06-10-09	FIG. NO:
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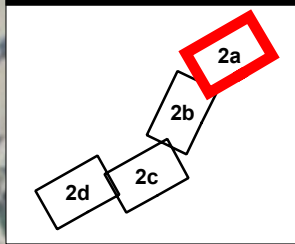
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LEGEND

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- ◆ Yard Waste
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- Trash Accumulation/Deposition Area

FIGURE OVERVIEW MAP



Path: G:\gis\projects\137727679002\map_docs\mxl\Chollas Watershed Trash 11x17_July_2009 Results.mxd, 03/12/10, paul_morano

SOURCES: SanGIS 2009, Aerials Express 2008

**QUARTERLY LARGE-ITEM TRASH ASSESSMENT
CHOLLAS CREEK - JULY 2009**



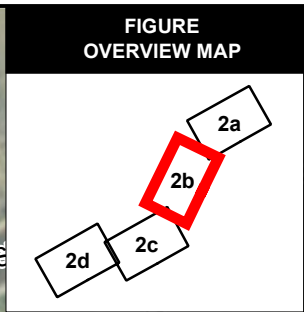
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SCALE CORRECT WHEN PRINTED AT 11X17

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LEGEND

- Chollas Creek
- Appliance/Electronic
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- ⊙ Baby Supplies/Children's Toys
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- ⊕ Furniture (Couch/Lounge)
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- Shopping Cart
- ⊙ Trash Bags
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- Homeless Encampment/Transient Dwelling
- Suspected Illegal Dumping Area
- Trash Accumulation/Deposition Area



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 	SOURCES: SanGIS 2009, Aerials Express 2008		QUARTERLY LARGE-ITEM TRASH ASSESSMENT CHOLLAS CREEK - JULY 2009	
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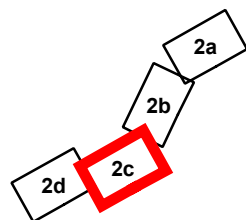
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LEGEND

- Chollas Creek
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FIGURE OVERVIEW MAP



SOURCES: SanGIS 2009, Aerials Express 2008

**QUARTERLY LARGE-ITEM TRASH ASSESSMENT
CHOLLAS CREEK - JULY 2009**



75 0 75 150 Feet
SCALE: 1" = 150' (1:1,800)
SCALE CORRECT WHEN PRINTED AT 11X17

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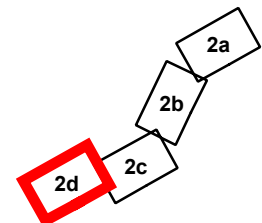


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LEGEND

- Chollas Creek
- Appliance/Electronic
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- Trash Bags
- Yard Waste
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- Suspected Illegal Dumping Area
- Trash Accumulation/Deposition Area

FIGURE OVERVIEW MAP



 URS	SOURCES: SanGIS 2009, Aerials Express 2008	QUARTERLY LARGE-ITEM TRASH ASSESSMENT CHOLLAS CREEK - JULY 2009		
	 <small>SCALE: 1" = 150' (1:1,800) SCALE CORRECT WHEN PRINTED AT 11X17</small>	CREATED BY: PM	DATE: 11-10-09	FIG. NO:
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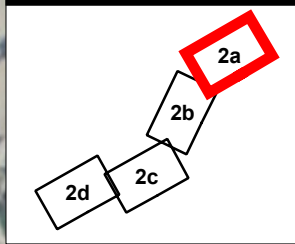
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LEGEND

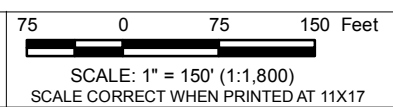
- Chollas Creek
- Appliance/Electronic
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- ⊙ Baby Supplies/Children's Toys
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- ◇ Yard Waste
- ⬜ Homeless Encampment/Transient Dwelling
- ⬜ Suspected Illegal Dumping Area
- ⬜ Trash Accumulation/Deposition Area

FIGURE OVERVIEW MAP



SOURCES: SanGIS 2009,
Aerials Express 2008

**QUARTERLY LARGE-ITEM TRASH ASSESSMENT
CHOLLAS CREEK - OCTOBER 2009**



CREATED BY: PM	DATE: 12-10-09	FIG. NO:
PM: BE	PROJ. NO: 27679017.04000	2a

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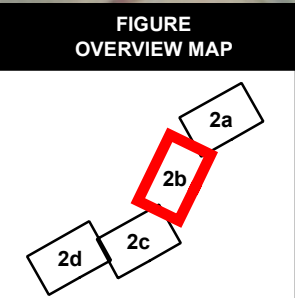
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LEGEND

- Chollas Creek
- Appliance/Electronic
- Auto/Mechanical
- ⊕ Baby Supplies/Children's Toys
- + Building Materials
- Furniture (Couch/Lounge)
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 	SOURCES: SanGIS 2009, Aerials Express 2008		QUARTERLY LARGE-ITEM TRASH ASSESSMENT CHOLLAS CREEK - OCTOBER 2009	
	 <small>SCALE: 1" = 150' (1:1,800) SCALE CORRECT WHEN PRINTED AT 11X17</small>	CREATED BY: PM	DATE: 12-10-09	FIG. NO:
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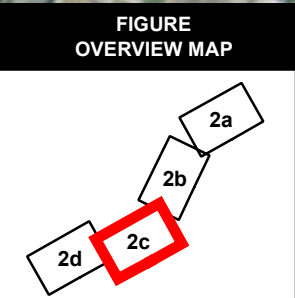
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LEGEND

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SOURCES: SanGIS 2009, Aerials Express 2008

**QUARTERLY LARGE-ITEM TRASH ASSESSMENT
CHOLLAS CREEK - OCTOBER 2009**

75 0 75 150 Feet

URS

SCALE: 1" = 150' (1:1,800)
SCALE CORRECT WHEN PRINTED AT 11X17

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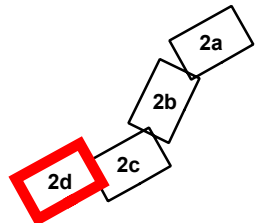
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LEGEND

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- Appliance/Electronic
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FIGURE OVERVIEW MAP



 URS	SOURCES: SanGIS 2009, Aerials Express 2008		QUARTERLY LARGE-ITEM TRASH ASSESSMENT CHOLLAS CREEK - OCTOBER 2009	
	75 0 75 150 Feet SCALE: 1" = 150' (1:1,800) SCALE CORRECT WHEN PRINTED AT 11X17		CREATED BY: PM PM: BE	DATE: 12-10-09 PROJ. NO: 27679017.04000



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LEGEND

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- Homeless Encampment/Transient Dwelling
- ▭ Suspected Illegal Dumping Area
- ▭ Trash Accumulation/Deposition Area

FIGURE OVERVIEW MAP



SOURCES: SanGIS 2009, Aerials Express 2008

**QUARTERLY LARGE-ITEM TRASH ASSESSMENT
CHOLLAS CREEK - JANUARY 2010**

UR S

75 0 75 150 Feet

SCALE: 1" = 150' (1:1,800)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: PM	DATE: 2-01-10	FIG. NO:
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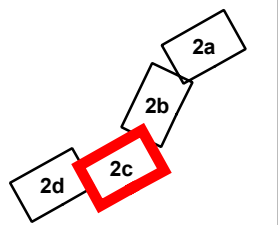
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LEGEND

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FIGURE OVERVIEW MAP



SOURCES: SanGIS 2009,
Aerials Express 2008

**QUARTERLY LARGE-ITEM TRASH ASSESSMENT
CHOLLAS CREEK - JANUARY 2010**



75 0 75 150 Feet



SCALE: 1" = 150' (1:1,800)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: PM

DATE: 2-01-10

FIG. NO:

PM: BE

PROJ. NO: 27679017.04000

2c

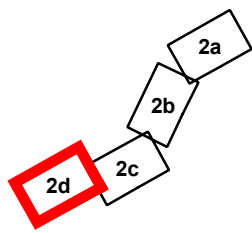
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FIGURE OVERVIEW MAP



SOURCES: SanGIS 2009,
Aerials Express 2008

**QUARTERLY LARGE-ITEM TRASH ASSESSMENT
CHOLLAS CREEK - JANUARY 2010**



75 0 75 150 Feet
SCALE: 1" = 150' (1:1,800)
SCALE CORRECT WHEN PRINTED AT 11X17

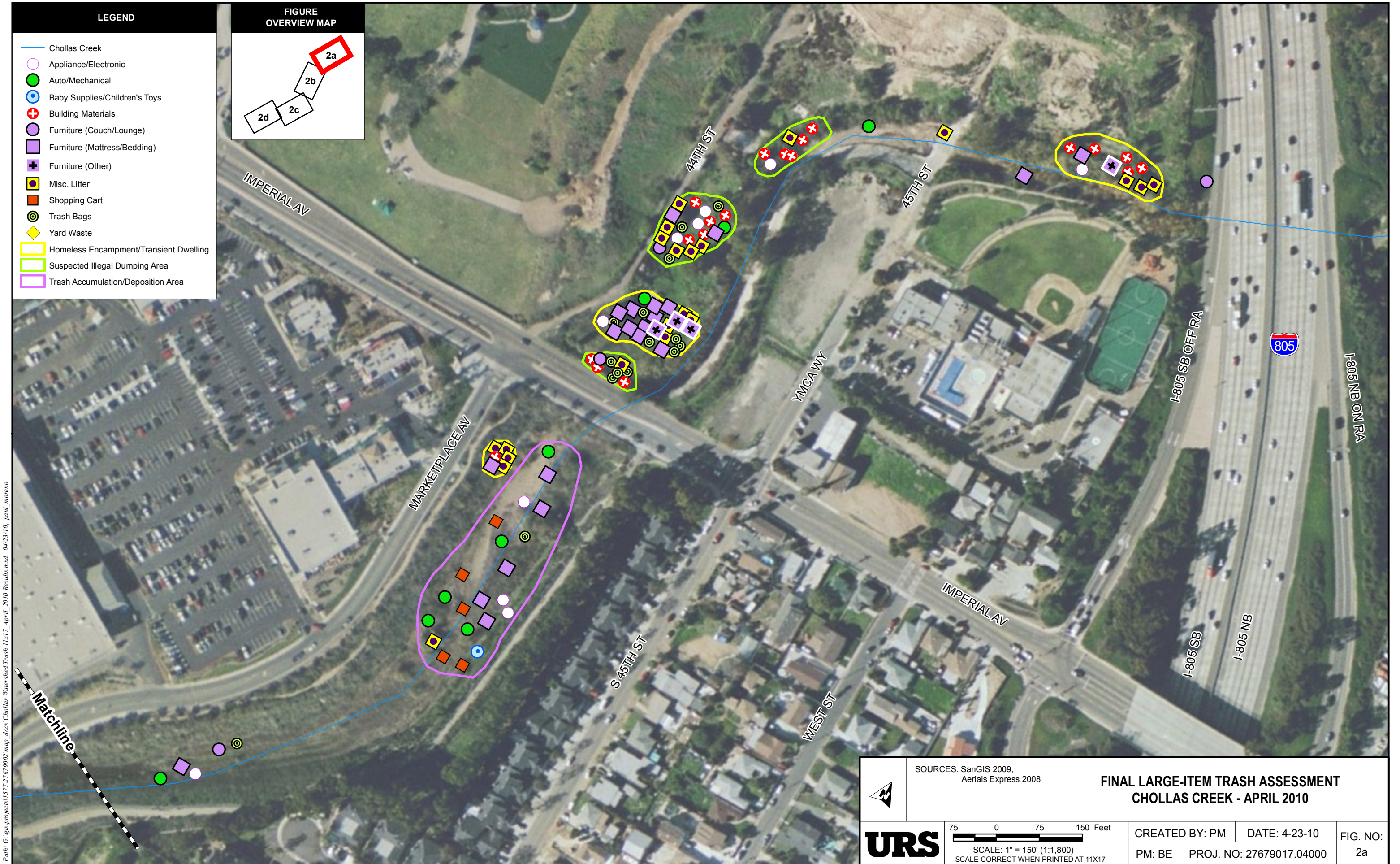


CREATED BY: PM	DATE: 2-01-10	FIG. NO:
PM: BE	PROJ. NO: 27679017.04000	2d

LEGEND

- Chollas Creek
- Appliance/Electronic
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- ⊠ Yard Waste
- ⬜ Homeless Encampment/Transient Dwelling
- ⬜ Suspected Illegal Dumping Area
- ⬜ Trash Accumulation/Deposition Area

FIGURE OVERVIEW MAP



Path: G:\gis\projects\137727679002\map_docs\Chollas Watershed Trash\1x17_April_2010 Results.mxd, 04/23/10, paul_moreno

	SOURCES: SanGIS 2009, Aerials Express 2008		FINAL LARGE-ITEM TRASH ASSESSMENT CHOLLAS CREEK - APRIL 2010		
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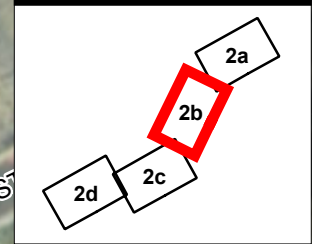
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LEGEND

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- Appliance/Electronic
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FIGURE OVERVIEW MAP



Path: G:\gis\projects\137727679002\map_docs\Chollas Watershed Trash 11x17_April_2010 Results.mxd, 04/23/10, paul_moreno

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SCALE: 1" = 150' (1:1,800) SCALE CORRECT WHEN PRINTED AT 11X17		FIG. NO: 2b		

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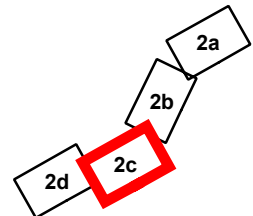
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LEGEND

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FIGURE OVERVIEW MAP



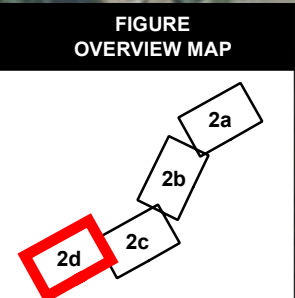
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		PM: BE	PROJ. NO: 27679017.04000	FIG. NO: 2c



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LEGEND

- Chollas Creek
- Appliance/Electronic
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- ◇ Yard Waste
- Homeless Encampment/Transient Dwelling
- Suspected Illegal Dumping Area
- Trash Accumulation/Deposition Area



SOURCES: SanGIS 2009, Aerials Express 2008

**FINAL LARGE-ITEM TRASH ASSESSMENT
CHOLLAS CREEK - APRIL 2010**

URS

75 0 75 150 Feet

SCALE: 1" = 150' (1:1,800)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: PM	DATE: 4-23-10	FIG. NO:
PM: BE	PROJ. NO: 27679017.04000	2d

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APPENDIX D EXAMPLE SUMMARY OF MOBILE TRASH COLLECTION EVENT



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Introduction

This summary presents an overview and description of the first Refuse Collection Event held as part of the CCFSTI program. It provides a summary of the typical activities that occurred at the first and subsequent Refuse Collection Events. This was the only summary completed in the duration of the project, but is representative of activities at all events conducted.

Event Overview

Groundwork San Diego Chollas Creek (GWSDCC) held its first mobile trash collection event at 9:00 a.m on Saturday April 25th in the parking lot of Southcrest Community Park as part of its CCFSTI (CCFSTI) Program. The event coincided with I Love a Clean San Diego’s annual Creek to Bay Cleanup, which utilized Southcrest Community Park as a staging area for its scores of volunteers. Urban Corps employees arrived on site by 8:30 and had the parking lot equipped with two mobile dumpsters and a vehicle staging area demarked by road cones by 8:45. Another two dumpsters were held in reserve in case of need. Urban Corps employees remained on site throughout the event to assist participants with unloading trash.

Part I

Participants:Creek to Bay Cleanup volunteers, Urban Corps employees

Yield:Greater than three quarters of one mobile 40-yard size roll-off bin (dumpster)

Character:15 large bags of trash, six shopping carts full of trash
five mattresses, two box springs, and one bed frame
nine chairs, one lamp, one door frame, and one table
15 large plywood pieces, six tires
one roll of carpet (five cubic ft
, plastic sheeting (10 cubic ft)

The first three hours of the event were noted as having no community participants in the mobile trash collection. All of the trash received by the mobile dumpsters during this portion of the event was removed from Chollas Creek and adjacent areas by Creek to Bay volunteers and Urban Corps employees. Creek to Bay volunteers staged in the park at 9:00 am, were mobilized by 10:00 am and began bringing bags of trash from Chollas Creek around 10:30. Volunteers were observed depositing trash bags and large items of trash into the mobile dumpsters throughout the day. The majority of trash bags collected by Creek to Bay volunteers were deposited at locations along the creek of pickup, and most of what was deposited into the mobile dumpsters was large item trash. Urban Corps employees also removed many large items from creek areas close to the collection site and deposited them in the mobile dumpsters. These activities produced enough trash to nearly fill one of the mobile dumpsters.

Part II

Participants:three members of local community, one from outside neighborhood



Yield: Greater than three quarters of one mobile dumpster

Character: Several mattresses and bed frames, one children's electric car, one foosball table, one couch, one children's plastic table, two large speakers, several items of wood furniture, one aquarium, several pieces of cement, pillows, motorcycle parts, one pickup truck bed of plywood., various small items

At approximately 12:00 pm all trash collection associated with the Creek to Bay Cleanup was completed and volunteers returned to the park. The first participant in the mobile trash collection event arrived at approximately 12:30 pm with a 10 to 12 foot trailer full of trash. Over the next hour three more individuals came to dump trash, one with a similarly-sized trailer full of trash and the other two with pickup trucks full of trash. All four parties willingly participated in the effectiveness assessment survey. Survey responses indicated that one of the participants was only aware of the event because he drove by earlier and observed another party unloading trash. Survey responses varied, but the following can be derived:

- 1) If more events like this were available to the public, the amount of illegal dumping in Chollas Creek may be reduced.
- 2) The cost of fee to bring items to landfill appears to be a very important factor in large item disposal.
- 3) Survey respondents expressed a need to dispose of large items from their home or business at least once a year, but usually more often.
- 4) One of the four participants learned of the event from flyers; two stated that they knew other members of the community who would have taken advantage of the event if they had known about it.

Summary and Recommendations

Part I of the event, creek cleaning activities conducted by local community members and the Urban Corps, may be considered a moderate success. Many items that had been identified in the pre-event Visual Trash Assessment survey were removed from Chollas Creek.

The success of Part II of the event, the large item disposal service conducted as part of the Groundwork San Diego program, may be improved with additional promotional activities to generate public participation. Only four groups participated in the event, with one of the four participating as a result of observing the trash dumping on the day of the event. Participants indicated that most of the disposed large items were items that they had been stockpiling for a general disposal trip to a local landfill. All of the participants indicated that that distance and cost can be prohibitive to dumping large items.

As a result of participant responses that the Miramar Landfill was the only area where they could dump large items, URS has investigated the proximity of landfills to the target community that accept general public large item disposals. There are several landfills that are closer to the target community that accept public deposits. Future events is to find out whether or not they know what their disposal resources are and how to find them.



Community attendance was later in the day and the first person that came to use the service was the catalyst for the rest of the attendees. This could speak to two different things: The event could be more successful if it ended later. If the event were to run from 9 a.m.-3 p.m., this would allow time for community members to collect their large items and bring them to the event. It would also coincide when neighborhoods tend to be busiest.

A recommendation for the marketing of the event is to take it a step further and advertise for the event beyond fliers. It would be of interest to the event to have a banner to remind the residents of the neighborhood, the day of the event, of the service that are being provided. Some thing to keep in mind for other events is that they do not coincide with events such as Creek to Bay or Earth Day. Since the events will not have the benefit of tents and music, marketing for large item disposal will have to be more noticeable.



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APPENDIX E GROUNDWORK SAN DIEGO CHOLLAS CREEK FLYER



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Get Ready For Spring

"Come Dump On Us"

Brought to you by Groundwork San Diego-Chollas Creek
Month on the 2nd & 4th

2 Sites Per

What: Free, Free, Free Trash Removal for Residents!!!!
Bring your trash and put it in our bins that are supervised by San Diego Urban Corps. Accepted items include: lawn/yard waste, sofas, furniture, shopping carts, cardboard, wood, BBQs
Ministries

4/25 Southcrest Park
5/9 JRYMCA
5/23 38th & Alpha
6/13 NuWay Christian

When: Saturday, May 9th from 9 am - 1 pm.
Dumpsters will be dropped off at 9 & picked up at 1.

6/27 Southcrest
7/11 JRYMCA
7/25 38th & Alpha
8/8 NuWay Christian Ministries
8/22 Southcrest
9/12 JRYMCA

Where: Jackie Robinson YMCA - dirt parking lot west of entrance

No Hazardous Waste Accepted

Items NOT accepted include: Computers, Monitors, T.V.s, Printers, Paint, Oil, Gas, Pesticides, Refrigerators, Air Conditioners

Go to www.groundworksandiego.org to find out how to safely dispose of these items.

For more information please call 619-543-0430

"No Trash In Chollas Creek"





APPENDIX F CITY OF SAN DIEGO EFFECTIVENESS ASSESSMENT SCORECARD



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Project Title: Chollas Creek Mobile Trash Collection Effectiveness Assessment.					
Watershed: Chollas Creek Watershed.					
Efficiency Assessment		Compliance Assessment			
<p>Overview: The fundamental management question the City of San Diego is working to answer in its efficiency assessment program is: “What is the most cost effective combination of storm water programs and activities that will maximize pollutant load reductions?”</p> <p>Therefore, to answer this question and direct resources to the most efficient programs the City is working to answer two program-wide management questions:</p> <ol style="list-style-type: none"> 1. Has each individual program or activity optimized its efficiency (i.e., pollutant load reduction/cost)? 2. What is the optimal efficiency (cost/benefit) of each program or activity? <p>To answer these program-wide questions, the City identifies project-specific management questions to be evaluated as part of targeted watershed activities. The project-specific management questions are detailed below.</p>		<p>Overview: A description of the project’s effectiveness assessment as required by the Municipal Permit is provided below.</p>			
Part I: Development of Project Specific Management Questions <i>(to be completed by City)</i>					
Project Specific Management Questions		Click here to enter text.			
Part II: Development of Assessment Methodology <i>(to be completed by Consultant)</i>					
Assessment Methodology	Targeted Measurable Outcome(s)	<ol style="list-style-type: none"> a.) Public awareness and participation(Level 2) b.) Implementation of community trash collection events to address illegal dumping and pollutants(Level 3) c.) Load Reduction(Level 4) d.) Change in Urban Runoff Quality(Level 5) 	<ol style="list-style-type: none"> a.) Percent reduction in pollution loading (estimated by observations) before and after community trash collection events b.) Pounds of pollution loading removed from project area annually (estimated from collected trash) c.) Increase in awareness of trash as a pollution source d.) Increase in compliance of proper disposal (estimated by observations) 		
	Assessment Method(s)	<ol style="list-style-type: none"> a.) Perform visual trash assessments (VTAs) b.) Participant Surveys c.) Community education and assistance activities 	<ol style="list-style-type: none"> a.) Estimate percent load reduction due to community trash collection events based on observations b.) Estimate load reduction due trash collected c.) Assess improvement in participation in community trash collection events related to awareness of trash as a pollutant d.) Assess improvement in quantity of illegally dumped material related to likelihood owner will properly dispose of waste 		
	Data	<table border="1"> <tr> <td>Sample specific weight of trash collect per event.</td> </tr> <tr> <td>Quarterly VTAs</td> </tr> <tr> <td>Participant surveys</td> </tr> </table>	Sample specific weight of trash collect per event.	Quarterly VTAs	Participant surveys
Sample specific weight of trash collect per event.					
Quarterly VTAs					
Participant surveys					

	Perform visual observations	
	Qualitative Data	
	Program Implementation / O&M Costs	

1- San Diego Regional Water Quality Control Board. 24 January 2007. California Regional Water Quality Control Board, San Diego Region, Order No. R9-2007-0001, NPDES No. CAS0108758, Waste Discharge Requirements for Discharges of Urban Runoff from Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds of the County of San Diego, the Incorporated Cities of San Diego County, the San Diego Unified Port District, and the San Diego County Regional Airport Authority. <http://www.swrcb.ca.gov/sandiego/water_issues/programs/stormwater/sd_stormwater.shtml> (Accessed June 19, 2009).

Part III: Project Scorecard (to be completed by Consultant)

A: Technical Feasibility

Pollutant Load Reductions			Average Pollutant Load Reduction ¹ (tons/event)	Overall Project Costs						Average Efficiency Rating
Collection Events	Total Weight Collected (Tons)	Number of Collection Events Monitored		Project Management	Labor	Advertising	Disposal Fees	Miscellaneous Costs	Avg. Daily Cost	
Trash collection at events	114.66	9	12	\$12,000	\$32,000	\$7,000	\$15,000	\$10,000	\$3,167	TBD

¹ Pollutant load reduction based on 5% diversion of collected trash

Technical Feasibility?

Yes.

If Project is technically feasible, complete section B

B: Non-quantifiable Factors

1. Level of public support?	High.
2. Opportunities for partnerships?	Yes; Non-profit organizations, local businesses, residents
3. Additional benefits derived from Project implementation?	Reduced illegal dumping clean-up costs for ESD, potential support of local businesses
4. Overriding factors?	None
5. Other?	N/A

Overall Project Rating:

Ease of implementation

Project partnership with available stakeholders is recommended. Future non-structural illegal dumping abatement project implementation may benefit from Storm Water Department staff guidance using lessons learned from this and other non-structural BMP programs.

Overall efficiency

Project estimated to be a moderately efficient and relatively low cost mechanism to potentially divert illegally dumped materials and waste. Direct measurement of project load reduction difficult due to lack of available comparative data. Future non-structural illegal dumping abatement project implementation may allow relative project efficiency comparisons to be made.

Assuming the Project is technically feasible, and after analyzing the Project's non-quantifiable factors, Consultant to provide bulleted recommendations for optimizing the Project

C: Project Optimization Improvements & Recommendations

Recommendations are not included in this report.

