# Trash Monitoring and Reporting Plan

*Los Angeles River and Ballona Creek Watersheds*

December 15, 2016

Project No. TOS-SN61

***City of Los Angeles***
*Public Works/Sanitation/Watershed Protection*

***ADvTECH* Environmental, Inc.**
*Environmental Engineering Consultants*

# TRASH MONITORING AND REPORTING PLAN
# LOS ANGELES RIVER AND BALLONA CREEK WATERSHEDS
# CITY OF LOS ANGELES

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Project No. TOS-SN61
Public Works/Sanitation/Watershed Protection
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## Limitations

This document has been prepared for the exclusive use of the City of Los Angeles, Bureau of Sanitation (LASAN) and its representatives, including all responsible parties in the Upper Los Angeles and Ballona Creek Watershed Management Groups. The Trash Monitoring and Reporting Plan (TMRP) recommendations provided herein are based on sound technical principles and professional opinions following currently accepted hydrologic and engineering standards and practices in Storm Water Management and Planning. It is acknowledged that the sources of data compiled in this report have been derived from previous studies and investigations conducted by LASAN and or other consultants, including TRC Solutions, Inc. This information have been obtained from visual inspections, site reconnaissance, and examination of existing records, as well as use of the City's Geographic Information System, and interviews with individuals with first-hand knowledge of the Upper Los Angeles and Ballona Creek watershed areas.

The completion of this TMRP document could not have been possible without the expertise and timely guidance provided by the LASAN staff members. Members of the team provided insight and assistance in preparing the overall framework of this document, requiring several iterations in reviewing not only the selected monitoring sites, but refining the field protocols to address the TMRP compliance requirements. Without such knowledge, expertise and technical support, the completion of this plan would not have been possible.

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| | |
|---|---|
| BC | Ballona Creek |
| BC WMG | Ballona Creek Watershed Management Group |
| BMP | Best Management Practice |
| CIMP | Coordinated Integrated Monitoring Program |
| CM | Continuous Monitoring |
| CWA | Clean Water Act |
| EWMP | Enhanced Watershed Management Program |
| GIS | Geographic Information System |
| HEPO | High Elevation Point Observation |
| HUC | Hydrologic Unit Code |
| IRO | In-River Observation |
| LA | Los Angeles |
| LACDPW | Los Angeles County Department of Public Works |
| LACFCD | Los Angeles County Flood Control District |
| LARWQCB | Los Angeles Regional Water Quality Control Board |
| LAR | Los Angeles River |
| LASAN | City of Los Angeles Bureau of Sanitation |
| MFAC | Minimum Frequency of Assessment and Collection |
| MRP | Monitoring and Reporting Program |
| MS4 | Municipal Separate Storm Sewer System |
| NPDES | National Pollutant Discharge Elimination System |
| SWAMP | Surface Water Ambient Monitoring Program |
| TMDL | Total Maximum Daily Load |
| TMRP | Trash Monitoring and Reporting Plan |
| ULAR WMG | Upper Los Angeles River Watershed Management Group |
| USEPA | United States Environmental Protection Agency |
| WMA | Watershed Management Area |
| WMG | Watershed Management Group |

# 1. Introduction

The City of Los Angeles is one of the responsible agencies of the Los Angeles River and Ballona Creek Trash Total Maximum Daily Load (TMDLs) compliance program. The City of Los Angeles Bureau of Sanitation (LASAN) is also the lead agency for the Upper Los Angeles River Watershed Management Group (ULAR WMG) and the Ballona Creek Watershed Management Group (BC WMG). Except for the Los Angeles County Flood Control District (LACFCD), which will submit a separate TMRP as the LACFCD has no land use jurisdiction within the Upper LA River and Ballona Creek, the ULAR WMG and BC WMG agencies have collectively agreed to develop this Trash Monitoring and Reporting Plan (TMRP) under the lead of LASAN. Therefore, this TMRP covers all of the areas served by the Municipal Separate Storm Sewer System (MS4) Permit No. R4-2012-0175 (Permit) and owned by the MS4 permittees within the ULAR WMG and BC WMG watershed (LARWQCB, 2012). This document, with the participation of all the agencies in the ULAR WMG and BC WMG, is a culmination of a year-long effort in LASAN's cooperative agreement to develop a standardize trash-monitoring approach across these two "significant" watersheds in the Los Angeles basin.

## 1.1 Overview

The City of Los Angeles Bureau of Sanitation (LASAN) and agencies in the ULAR WMG and BC WMG are required to propose and implement a TMRP to comply with the LARWQCB's recently amended and adopted MS4 Permit. It is noted that compliance with the Trash TMDL under the MS4 Permit is governed by the installation of best management practices (BMPs), which include full and partial-capture devices, and institutional programs. Traditionally, a monitoring component is included at the time of TMDL development. Despite some agencies, such as the City of Los Angeles, having met the final Trash TMDL milestone of 100% by having in place over the past 15 years a variety of approved trash BMPs, a TMRP monitoring component for trash remains an integral factor for compliance.

LASAN will be implementing the TMRP on behalf of the watershed groups, and has sought an alternative approach for the development of the TMRP that would address the needs of the Permit and meet the requirements of the revised Los Angeles River and Ballona Creek Trash TMDL. To evaluate possible TMRP alternatives for this effort, LASAN employed the services of a consultant, TRC Solutions, Inc. in early 2016, to develop and test monitoring protocols for a limited number of locations in the Upper Los Angeles River (ULAR) watershed area. The test protocols evaluated were so that a recommendation could be made for the wider implementation of the TMRP. As such, this document outlines the alternative protocol for the ULAR and Ballona Creek TMRP .

## 1.2 Regulatory

In March 22, 1999, the United State Environmental Protection Agency (USEPA) and USEPA Region IX settled a lawsuit (*Heal the Bay, et.al. v. Browner, et.al., 1999*) in the form of a Consent Decree requiring the development of the Total Maximum Daily Loads (TMDL) for the Los Angeles area to be completed in

13 years or by 2012. The responsibility to implement these provisions of the Clean Water Act was delegated by the USEPA to the State of California, specifically the LARWQCB. The consent decree established a schedule for the development of certain TMDLs over a 13-year period.

Trash has been widely recognized as a serious water-quality concern in California, impacting creeks, shorelines, rivers, and lakes. The LARWQCB further identified trash in urban runoff that is conveyed through the storm-drain system as a primary source of pollution reaching the receiving waters. When trash is discarded on land, pollutants are contained in or become entrained in paper, plastic, polystyrene, cans, and other debris. Rain storms frequently wash trash into gutters, storm drains, and eventually into waterways, lakes, and ocean. The State Water Resources Control Board's 2015 Trash Policy (SWRCB, 2015) identified trash impacts associated with public health beneficial use. In addition, the LARWQCB lists numerous habitat beneficial uses that are impacted by trash in their Trash TMDL staff report (LARWQCB, 2001a). A list of these impacts is found in Appendix A.

For this reason, in 2001, the Los Angeles River and Ballona Creek Trash TMDLS were among the first TMDLs to be developed and approved by the LARWQCB (LARWQCB 2001b, 2001c). From 2004 to 2007, the LARWQCB revised the Los Angeles River and Ballona Creek Trash TMDLs to incorporate implementation approaches (LARWQCB 2004, 2007). Compliance with the Trash TMDLs is predicated on the implementation of full-capture systems, partial-capture systems, and institutional programs.

In June 2015, the LARWQCB amended the Los Angeles River and Ballona Creek Trash TMDL (LARWQCB 2015a, 2015b). Assessment and monitoring are key components of TMDLs. At the time of the development of the Los Angeles River and Ballona Creek Trash TMDLs in 2001, no standard method for trash assessment was in use, and consequently, neither the Los Angeles River Trash TMDL nor the Ballona Creek Trash TMDL included receiving water monitoring. In June 2007, the Surface Water Ambient Monitoring Program (SWAMP) of the SWRCB issued its "Final Technical Report" documenting a method to assess trash levels in streams (SWRCB, 2007). With a method now available to assess trash, the LAWRQCB included a monitoring component in the 2015 re-evaluated Trash TMDLs. The new requirements of the TMDL reconsiderations became effective June 30, 2016. On September 8, 2016, the LARWQCB also amended the MS4 Permit to incorporate changes from the revised Los Angeles River and Ballona Creek Trash TMDLs (LARWQCB, 2016). These changes require the City of Los Angeles and agencies in the WMGs to submit a TMRP by December 30, 2016, for Executive Officer approval.

## 1.3 Purpose of TMRP

The overall purpose of the TMRP is to document the types and quantities of trash in the Los Angeles River or Ballona Creek watersheds, and assess the ambient condition of the waterbody for presence of trash conveyed through various modes of transport. Through this TMRP, quantitative information on trash will be obtained which will be useful for management to determine any trends, sudden breaches, and if these changes warrant modifications to the implementation program. As mentioned, compliance with the Trash TMDLs is based on the implementation of BMPs and institutional measures for controlling point sources. Since 2001, BC WMG and ULAR WMG agencies, and LASAN have established and implemented BMP programs to reduce trash, comprising of full-capture systems, partial-capture devices, and institutional controls across the watersheds (BC WMG, 2015; ULAR WMG, 2015). Agencies must have completed their Trash TMDL implementation by September 2016. It is anticipated that any trash found would most likely be from non-point sources. Thus, the information obtained from the TMRP will be used to:

1. Develop a quantitative characterization of trash in the Los Angeles River and Ballona Creek; and
2. Establish a baseline of trash loading for use to assess the continued health of the watershed with which to compare changes that may trigger actions by the respective impacted agencies.

To accomplish this, LASAN, as lead agency, has chosen to develop an alternative approach to the SWAMP protocol as allowed by the MS4 Permit and TMDLs. This TMRP is designed to prioritize the use of resources in implementation, while providing a monitoring approach that will allow for an establishment of new baseline, and support any needed actions or adjustments to the programs. This protocol can be implemented across large watersheds efficiently without compromising the data or assessment.

## 1.4 Authorized Use Permission

LASAN is aware this public document may be utilized by other agencies in developing related documents for general use and/or regulatory agency approval. This Trash TMRP has been developed specifically for the use of the ULAR WMG and BC WMG in the RWQCB-LA Region. Thereby, LASAN DISCLAIMS LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES and assumes no responsibility or liability for any loss or damage suffered by any person or agency as a result of the use or misuse of any of the information or content in this document. LASAN assumes or undertakes NO LIABILITY for any loss or damage suffered as a result of the use, misuse or reliance on the information and content in this document.

## 1.5 Points of Contact

The lead agency responsible for implementing and reporting on the trash receiving water monitoring for the ULAR WMG and BC WMG is LASAN. The principal LASAN “point of contacts” are:

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## 1.6 Participating Agencies in this TMRP

This TMRP is written with the intent that all ULAR WMG and BC WMG Responsible Agencies will participate, with the exception of the LACFCD. A list of the participating agencies and contact information are located in Appendix B.

### 1.6.1 Los Angeles River Watershed

The area in the Upper Los Angeles River Watershed Management Group (ULAR WMG) is approximately 485 square miles as shown in Figure 1. The Los Angeles River is approximately 55 miles long, and five of six reaches lie within the ULAR WMG. The natural hydrology of the Los Angeles River watershed has been altered by channelization and the construction of dams and flood control reservoirs. The Los Angeles River and many of its tributaries are lined with concrete for most or all of their length. Soft-bottomed segments of the Los Angeles River occur where groundwater upwelling prevents armoring of the river bottom, most notably at the Glendale Narrows.

Collectively, the ULAR WMG area makes up over 58 percent of the total LA River watershed area. With the exception of LACFCD, a breakdown of the areas associated with the participating MS4 Permittees is provided in Table 1. Despite being a member of the ULAR WMG, the LACFCD will submit a separate TMRP as the LACFCD has no land use jurisdiction within the ULAR. It should be noted that agencies participating in the ULAR WMG have no jurisdiction over the land owned by the State of California (i.e., California Department of Fish and Wildlife [CDFW], the State Lands Commission, and California Department of Transportation [Caltrans]), and the U.S. Government.

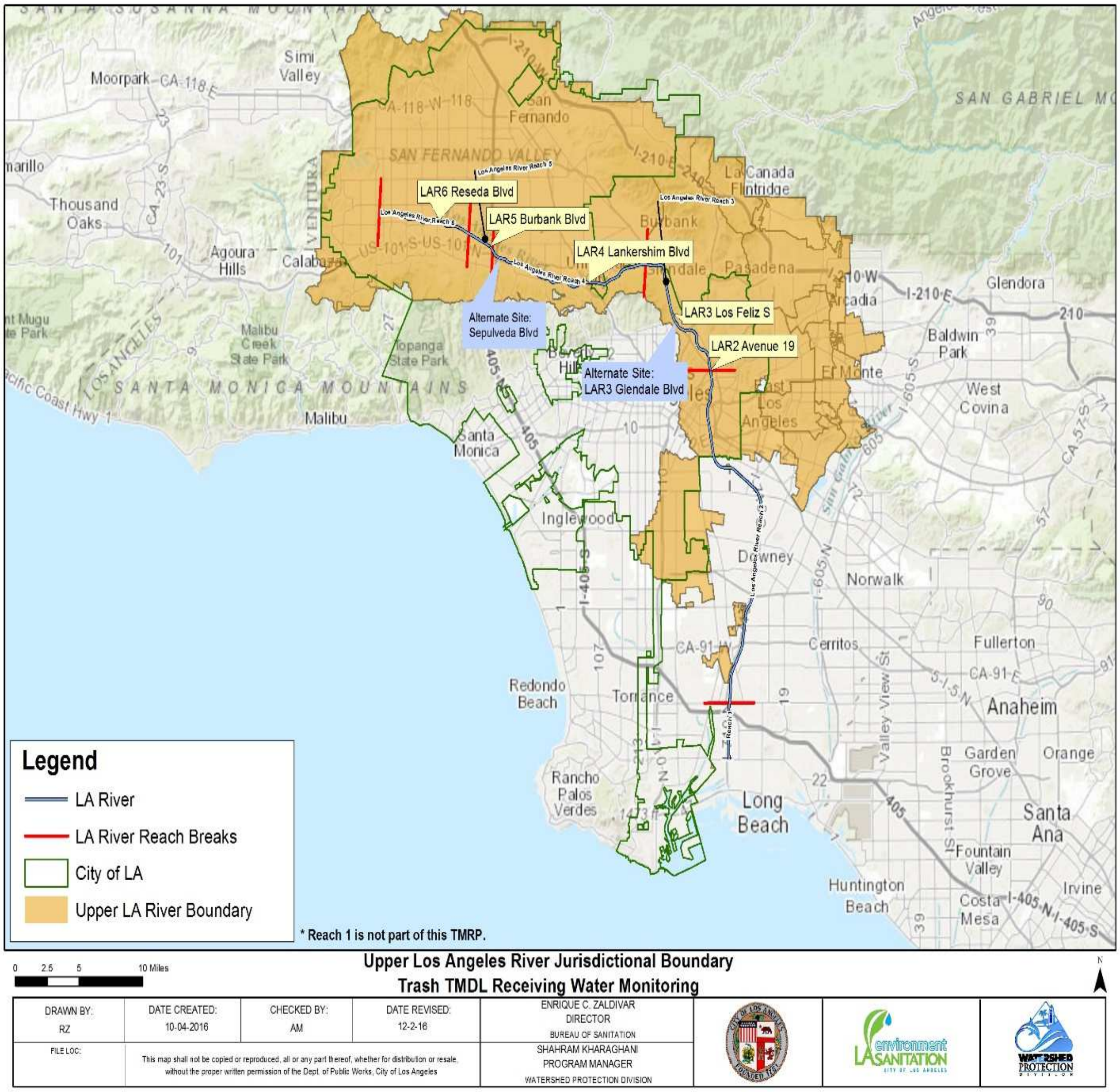



**Figure 1. ULAR Jurisdictional Boundaries**

**Table 1. ULAR WMG Agencies and Land Areas**

| ULAR WMG Agency | Land Area (Acres) | % of WMG Area |
|---|---|---|
| City of Los Angeles | 181,288.00 | 58.48 |
| County of Los Angeles | 41,048.07 | 13.24 |
| City of Alhambra | 4,884.31 | 1.58 |
| City of Burbank | 11,095.20 | 3.58 |
| City of Calabasas | 4,005.68 | 1.29 |
| City of Glendale | 19,587.50 | 6.32 |
| City of Hidden Hills | 961.03 | 0.31 |
| City of La Canada Flintridge | 5,534.46 | 1.79 |
| City of Montebello | 5,356.38 | 1.73 |
| City of Monterey Park | 4,951.51 | 1.60 |
| City of Pasadena | 14,805.30 | 4.78 |
| City of Rosemead | 3,310.87 | 1.07 |
| City of San Fernando | 1,517.64 | 0.49 |
| City of San Gabriel | 2,644.87 | 0.85 |
| City of San Marino | 2,409.64 | 0.78 |
| City of South El Monte | 1,823.94 | 0.59 |
| City of South Pasadena | 2,186.20 | 0.71 |
| City of Temple City | 2,576.50 | 0.83 |
| **Area of ULAR WMG Agencies** | **309,987.10** | **100** |

The 18 agencies participating in this TMRP are subject to Trash TMDL. Those agencies assigned point source responsibilities have chosen to meet the requirements as follows:

*Installation of full-capture devices*: County of Los Angeles and cities of Burbank, Calabasas, Glendale, La Cañada Flintridge, Montebello, Pasadena, San Fernando, San Gabriel, and South El Monte.

*Combination of full capture, partial capture, and/or institutional controls*: cities of Alhambra, Hidden Hills, Los Angeles, Monterey Park, Rosemead, San Marino, South Pasadena, and Temple City.

### 1.6.2 Ballona Creek Watershed

The BC WMG is approximately 128 square miles in area and comprises the Cities of Beverly Hills and West Hollywood, and portions of the Cities of Los Angeles, Inglewood, Culver City, and Santa Monica as well as unincorporated areas of the County of Los Angeles. Additionally, LACFCD owns and operates drainage infrastructure within incorporated and unincorporated areas in the watershed. A map of the watershed boundaries and the delineation of the jurisdictions of the MS4 Permittees and other entities within the BC watershed are shown on Figure 2.

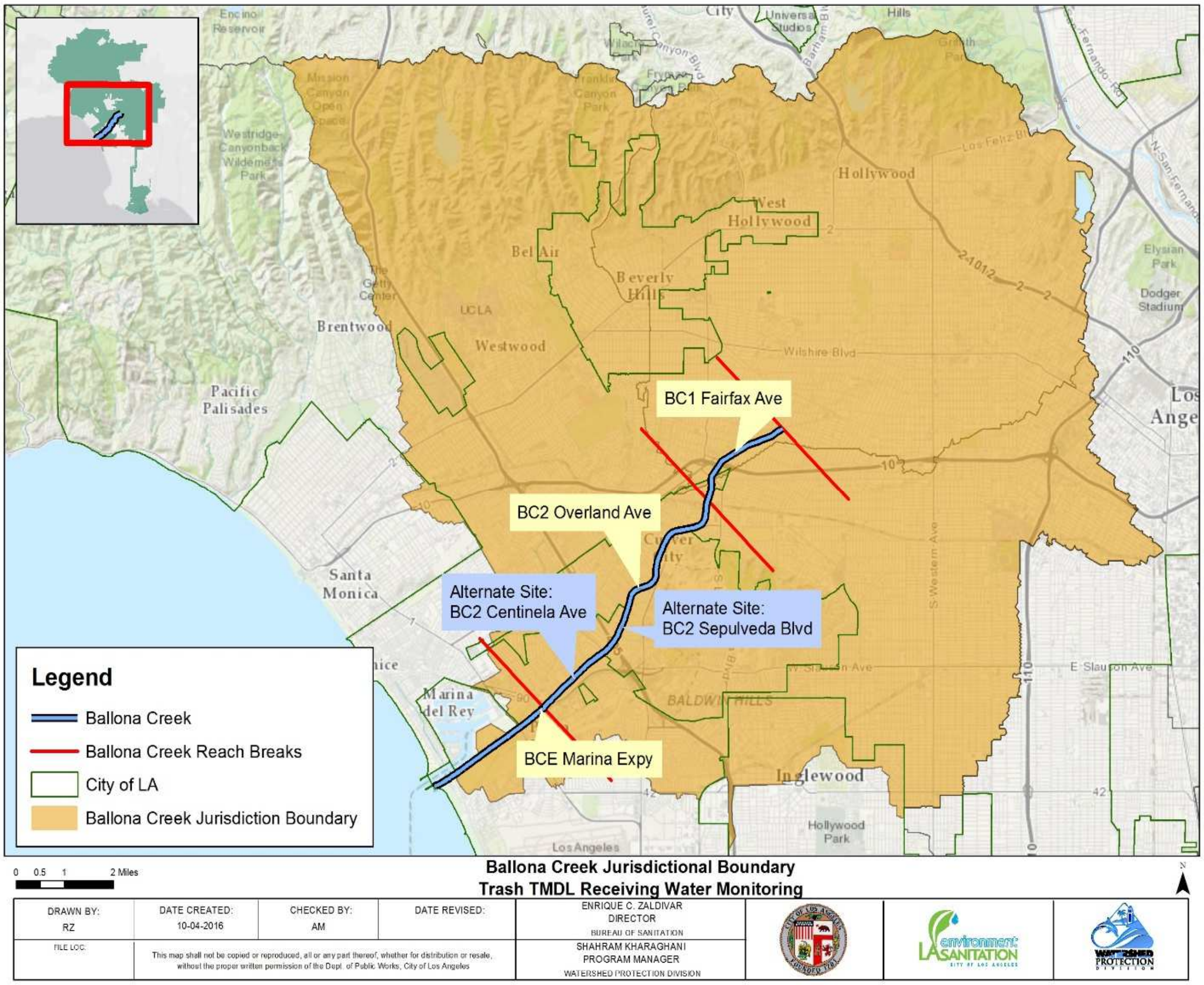



**Figure 2. Ballona Creek Jurisdictional Boundary**

With exception of LACFCD, a breakdown of areas by MS4 Permittee and other agencies is provided in Table 2. Collectively, the MS4 Permittees in the Ballona Creek Watershed have jurisdiction over about 123 square miles or 96 percent of the total watershed area. Although a member of the BC WMG, the LACFCD will submit a separate TMRP as the LACFCD has no land use jurisdiction within the Ballona Creek. Similar to ULAR, the BC WMG agencies have no jurisdiction over the land that is owned by the State of California (e.g., CDFW, the State Lands Commission, and the California Department of Transportation [Caltrans]), or the US Government.

**Table 2. Ballona Creek Watershed Land Area Distribution**

| BC WMG Agency | Land Area (Acres) | % of WMG Area |
|---|---|---|
| City of Los Angeles | 65,272.89 | 83.21 |
| County of Los Angeles | 3,164.76 | 4.03 |
| City of Beverly Hills | 3,618.95 | 4.61 |
| City of Culver City | 3,125.00 | 3.98 |
| City of Inglewood | 1,907.72 | 2.43 |
| City of West Hollywood | 1,135.00 | 1.45 |
| City of Santa Monica | 217.31 | 0.29 |
| | **78,441.63** | **100** |

The seven TMRP participating BC WMG agencies are all subject to Trash TMDL. The agencies assigned point source responsibilities have chosen to meet the requirements as follows:

- *Installation of full-capture devices*: County of Los Angeles and the cities of Inglewood and Santa Monica.
- *Combination of full capture, partial-capture systems and/or institutional controls*: The cities of Beverly Hills, Culver City, Los Angeles, and West Hollywood.

### 1.6.3 Agency Non-participation

If one or more Responsible Agency chooses to absolve itself from the WMG's Enhanced Watershed Management Plan (EWMP), associated Coordinated Integrated Monitoring Plan (CIMP) or this TMRP, after submittal of this TMRP, those agencies will be removed as a participating Responsible Agency within this TMRP. At the time of withdrawal, the non-participating Responsible Agency shall:

1. Provide a Notice of Termination to the LARWQCB and all other participating Responsible Agencies;
2. Comply with all Trash TMDL requirements using their own resources;
3. Report directly to the LARWQCB for their share of compliance with this applicable Ballona Creek or Los Angeles River Trash TMDL, and
4. Clean and maintain its own jurisdictional area and receiving water section.

# 2. Trash Receiving Water Monitoring Protocol

This section describes the alternative Trash Receiving Water Monitoring Protocol adapted from the "Pilot Study for the Development of a Trash Receiving Water Monitoring Protocol", as provided in Appendix C. This section includes a discussion of the protocol development, modifications of the sites and frequency of monitoring to better reflect conditions in the river and creek and allow better evaluation of trash conditions in receiving waters.

## 2.1 Protocol

### 2.1.1 Development

In early 2016, LASAN tasked TRC Solutions, Inc. (TRC) to conduct a pilot study of possible protocols to be used in a Trash Monitoring and Reporting Plan. The overall intent was to develop a protocol that can effectively document the types and quantities of trash in the receiving water. Additional objectives were to determine if the protocol could:

1. Be scalable from the small number of test locations to the large number of sites necessary for implementation for both Los Angeles River and Ballona Creek; and
2. Demonstrate reproducible results and provide an effective basis for comparisons from site to site.

### 2.1.2 Methodology

This pilot study was conducted from Spring 2016 to early Summer 2016. The study evaluated three protocols at Los Angeles River sites. The protocols include a High Elevation Point Observation (HEPO), In-River Observation (IRO), and a Continuous Monitoring (CM) method using video cameras (TRC Solutions, Inc., 2016).

TRC collaborated with LASAN staff while developing the protocol with the following criteria in mind:

- Seasonality — *the protocols should be designed for execution in dry weather only*. This is defined as sampling events occurring a minimum of 72 hours after a rain event. This is intended to keep sampling technicians out of dangerous flow conditions if surveys were to occur during or recently after a rain event. The dry weather requirement is also consistent with the typical weather patterns in the area thus allowing more opportunities to implement survey events.

- Quantifiability — the protocol should provide a customized approach to quantifying trash loading to the ULAR and BC watershed to establish current trash ambient conditions. An objective scoring method would provide consistency and meet the needs of the TMRP requirement pursuant to the Trash TMDLs.

- Areal Limits — the methodology should allow for observations on a wide survey area that would consider both in-river and riverbank areas. This allows for a broader number of opportunities to detect trash accumulation and its sources.

- Scalability — the TMRP must be scalable to allow for implementation of the selected protocol on a watershed-wide basis with diverse sites. For this to be feasible, the survey methodology should be executable within a relatively short timeframe and require minimal training of staff.

- Reproducibility — the methodology should allow for collection of a significant photo record during the sampling event. Photographs allow for a clearer and more reproducible record of trash present that is more reliable than simple trash tabulation methods.

### 2.1.3 Description of Pilot Study Monitoring Sites

As noted in the TRC-LASAN pilot study, four test-monitoring sites were selected, located in Reach 3 of the Los Angeles River. Selected sites represented the complete range of land uses (commercial, industrial, high- and low-density residential, recreational), and surveys were performed over a 300-foot long stretch of the channel for HEPO and IRO protocols. These protocols were designed for a team of two people. Two sites were selected for the CM (Continuous Monitoring) protocol. HEPO and IRO are conducted as follows:

**HEPO** - surveyors positioned themselves on a bridge, located within a fixed 300-foot demarcation zone and they photo documented all observable trash impacts in the river and on the river banks, and recorded type, quantities, and approximate locations.

**IRO** - surveyors located within a fixed 300-foot demarcation zone, photo documented all observable trash, recorded type, quantities, approximate locations, conducted stream-flow velocity measurements, and suspended trash monitoring utilizing a net placed in the river. A more detailed survey of debris could be characterized and recorded using IRO.

### 2.1.4 Recommended Protocol

At the completion of the TRC-LASAN pilot study, it was concluded that with some modifications, both HEPO and IRO protocols would be employed for monitoring trash. The IRO protocol would be the primary method and the HEPO would be the secondary or alternate method.

The IRO protocol provides the survey team with closer proximity to the observation area and offers multiple vantage points within the observation area. The HEPO protocol will allow the survey team to obtain information from the same site if conditions do not allow them to carry out IRO. The combined IRO and HEPO protocols allow for:

1. Ability to "fix" monitoring sites as much as possible, and reduce the need for use of Alternative sites. This minimizes variability for data review and assessment;
2. Monitoring three times the length compared to SWAMP, providing a greater representation of trash conditions in the waterbody;
3. Collection of river data including river depth, flow velocity, suspended trash, through IRO protocol;
4. Conducting comprehensive visual survey and sampling photo documentation; and
5. Use of LASAN developed first-of-its-kind "Trash Library" for assessing monitoring and trash collection information, as provided in Appendix D.

For the CM protocol, the wide camera angle installed during the pilot study to capture the full 300-feet length of the survey limited the detail needed to utilize the video for monitoring purposes. Should CM be utilized, a camera with greater zoom capability and higher clarity optics need to be employed.
Although SWAMP protocol has a goal of 30 minutes or less from beginning to end as an optimal timeframe for a single survey event, it is not realistic for the extended length and additional measurements being made in LASAN's alternate approach. The estimated total field time could range from 25 to 45 minutes depending on the location. A comparison of the alternative protocol with the SWAMP protocol is provided in Table 3.

**Table 3. Comparison of Alternative Protocol to SWAMP**

| Protocol | Stream Type | Length (ft) Monitored | Documentation | River Banks | Characterization | Fixed Site | Measure Flow | Suspended Trash Collection | Trash Collection |
|---|---|---|---|---|---|---|---|---|---|
| **SWAMP** | Wadeable | 100 | Record, photo | Y | Y | N | N | N | Y |
| **IRO** | Wadeable | 300 | Record, extensive photo documentation | Y | Y | Y* | Y | Y | Y |
| **HEPO** | Inaccessible | 300 | Record, extensive photo documentation | Y | Y | Y | N | N | Y |

*If field conditions warrant, crews can use HEPO as alternate and reduce need to change locations.

### 2.1.5 Coordination with MFAC

The protocol for ULAR WMG will be coordinated with the Minimum Frequency Assessment and Collection (MFAC) implementation in parks adjacent to Los Angeles River. Under the Los Angeles River Trash TMDL, the adjacent parks are required to have regular trash assessments. The parks are also located at or near the vicinity of the TMRP monitoring sites. Coordination with the MFAC implementation will allow a rotating monitoring schedule among two teams, TMRP and MFAC, to efficiently monitor a large watershed area cost effectively. Park and open space MFAC programs under Los Angeles City jurisdiction that may be included in this coordination are found in Figure 3. MFAC staff will be trained on and use the TMRP HEPO protocol. This approach was chosen to maintain consistency of the “visual survey” allowing monitoring staff to focus, throughout the waterbody at various site locations, on recording and photo documenting information with precision. No trash will be removed for the purpose of collecting data. However, staff are aware that in the event observed trash potentially poses a hazard, these items will be removed by trained personnel or reported to the appropriate authorities.

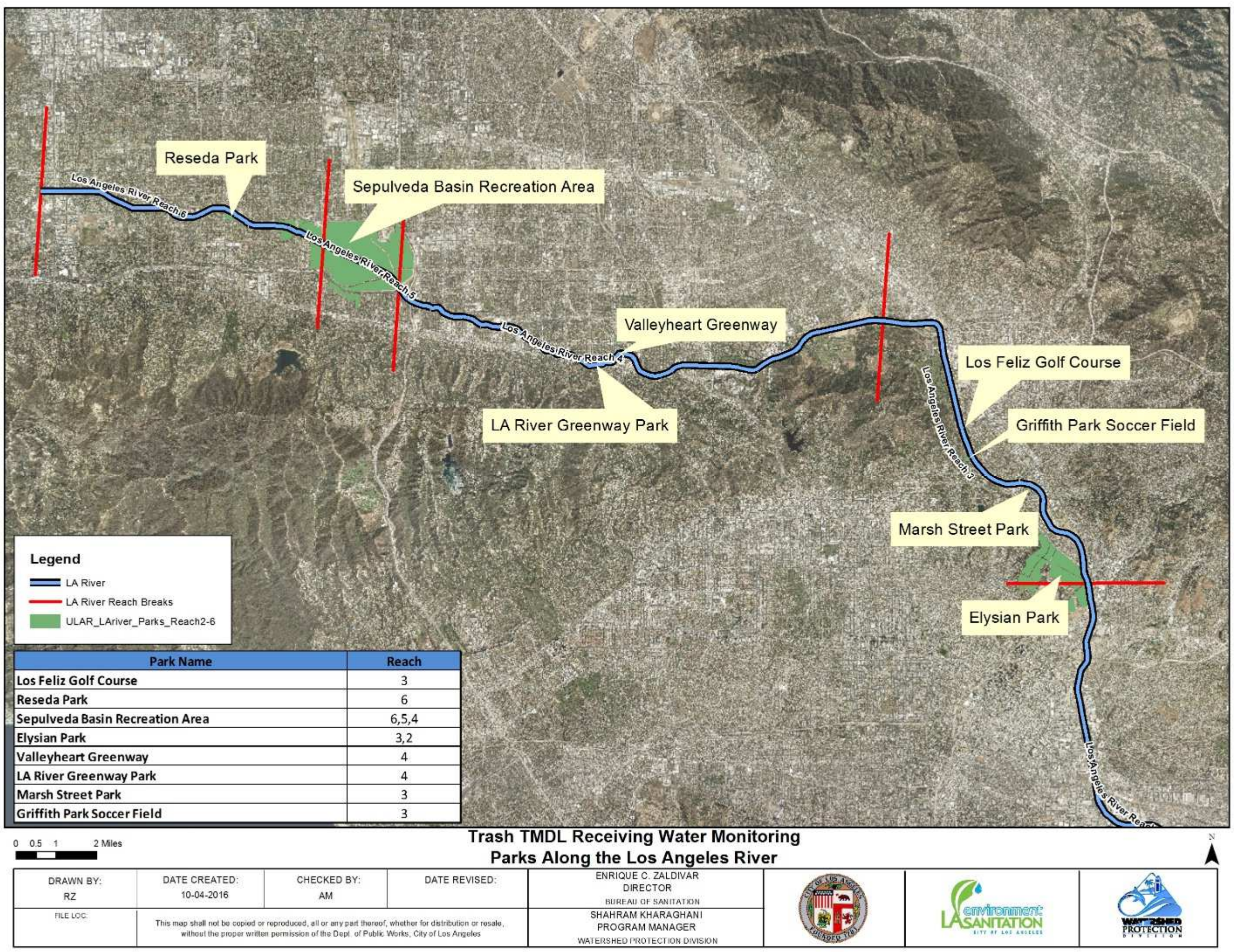



**Figure 3. Parks Along the Los Angeles River**

The major component of the MFAC program is trash collection in parks. Personnel tasked with implementing the MFAC need to be specially trained and will have proper equipment to remove trash, if any, in the parks. Based on past observations and volunteer cleanups, large items likely found in parks and observed near banks are a result of illegal dumping. These large items were comprised of shopping carts, furniture, and large pieces of wood. Trash collection under MFAC would also include coordination support from other agencies, such as solid waste, hazardous materials, and enforcement groups to safely handle and dispose of a wide range of possible waste materials. MFAC requires safety training, use of different equipment, and coordination with other groups and would be the appropriate program to combine with the TMRP visual survey. Coordination with MFAC needs to take the following into consideration:

- Equipment – easy collection method using large 39-gallon trash bags, trash grabbers, tongs, dumpster or large trash bin, depending on level of cleanup effort.
- Training – for potential contact/exposure to hazardous materials, and safe handling in exercising proper judgment if safe to remove.
- Proper disposal of collected trash – hazardous waste, municipal waste, or taken to recycling center; and heavy, large items – may need special equipment to safely remove.
- Measurements – weights and volume recording. Can include characterization of trash collected from river/creek banks.
- Homeless – including the legal concerns regarding their property. Field personnel trained for special procedures need to be employed when picking up trash where homeless are located. There exists the possibility of unknowingly collecting items that may be deemed the property of a homeless individual, and thus creating the potential for an altercation with said individual. Recent court decisions related to homeless persons and their properties require following established procedures before trash pickup.

## 2.2 Monitoring Preparation

Monitoring event preparation includes preparation of field equipment, obtaining recording forms, and contacting the necessary personnel regarding site access and schedule. The following steps will be completed prior to each monitoring event:

1. Obtain any necessary permits or permissions required for access to the channel.
2. Check weather forecast immediately prior to each monitoring event. Monitoring will be conducted during dry weather only and in full daylight hours.
3. Confirm scheduled monitoring date with field crew(s), set-up survey itinerary, obtain equipment, and reserve vehicles.
4. Ensure safety equipment available for all field staff, and staff are familiar with safety procedures.

5. Prepare the monitoring event summary and field-log sheets to indicate the type of field measurements, field observations to be recorded at each of the monitoring sites.
6. Verify that field measurement equipment is operating properly (i.e., check batteries, calibrate, etc.).

### 2.2.1 Field Equipment

Prior to deploying for each monitoring event, staff will ensure needed equipment is available to perform the assessment by utilizing the Field Equipment Checklist, as noted in Table 4. Equipment includes forms and camera to record visual surveys, flow meters, equipment to collect floatables, and safety equipment.

**Table 4. Field Equipment Checklist**

| | |
|---|---|
| ☐ | Monitoring Plan |
| ☐ | Vehicle |
| ☐ | Binoculars |
| ☐ | Field Observation Forms |
| ☐ | Clip Board or Electronic Device with Forms (e.g., laptop or tablet computer) |
| ☐ | Pencils, pens |
| ☐ | Directions to Observation Locations (Survey Markers, GPS or Landmarks) |
| ☐ | Leather gloves or other puncture resistant gloves |
| ☐ | Tape Measure |
| ☐ | Steel-toed Boots; Rubber boots and/or waders for walking in-river locations" |
| ☐ | Safety Equipment, Personal Flotation Device |
| ☐ | First Aid Kit, Hand Sanitizer |
| ☐ | Cellular Telephone with GPS capability if not available on digital camera |
| ☐ | Gate Keys |
| ☐ | Pool net or other similar water collection device with 5 mm sized mesh |
| ☐ | Extension Rod |
| ☐ | Small Plastic Bag |
| ☐ | In-stream/river Flow Meter – Marsh McBierney Water Velocity Meter or Equivalent |
| ☐ | Hand-held Weighing Scale |
| ☐ | Digital Camera with Zoom capable of capturing debris detail. GPS capability preferred |

### 2.2.2 Monitoring Implementation

Monitoring events will be conducted during dry weather, during full daylight hours, and under safe weather and channel conditions. Whenever possible, IRO protocol will be utilized in accessible sites. However, there may be unplanned conditions that would cause substitution of HEPO for IRO. For example, safety concerns could present itself, such as sudden precipitation, high-water level, hostile individuals, or homeless camps near the monitoring point. In such cases, IRO will not be applied and the HEPO protocol will be implemented instead. By having alternate protocols, LASAN would be able to maintain the site as a "fixed" monitoring point and enable consistency of data for the assessment. In the event that both protocols could not be used in the primary location, field personnel may choose to employ the alternative monitoring site. Finally, if at any time during a monitoring event field personnel feel that site conditions are unsafe for any reason, monitoring will be "abandoned" and the project manager will be notified that the monitoring event is cancelled, or "suspended" and rescheduled for a later time. The HEPO and IRO protocols and observation forms, adapted from the TRC Pilot Study, are found in Appendix E. LASAN will employ these protocols to monitor trash on behalf of the ULAR and BC WMGs.

## 2.3 Determination of Monitoring Sites

The following describes the approach and evaluation of the trash monitoring site selection process, as well as details for each selected site. The identification of sites are intended to assess the condition of the waterbody for the presence of trash that has entered by the various modes of transportation, as well as be representative of the "areas of interest" for participating agencies in the ULAR and BC WMGs.

The reconsidered LA River and Ballona Creek Trash TMDL requires that at least one monitoring site be located within a reach and tributary. For development of the process in the selection of the monitoring sites, this requirement has been interpreted to mean that a tributary must be located in the reach being assessed as the intent of the TMDL is the evaluation of the overall collective health of the Los Angeles River and Ballona Creek watersheds. It was determined that a scoring criterion would be developed to evaluate and standardize the selected monitoring sites for this TMRP for use with the alternative protocols. Based on interviews with experienced City of Los Angeles staff that have been involved in the implementation of the Trash TMDL, the following criteria for structural measures and institutional controls, shown in Figure 4, was established for the standardization of the monitoring sites.

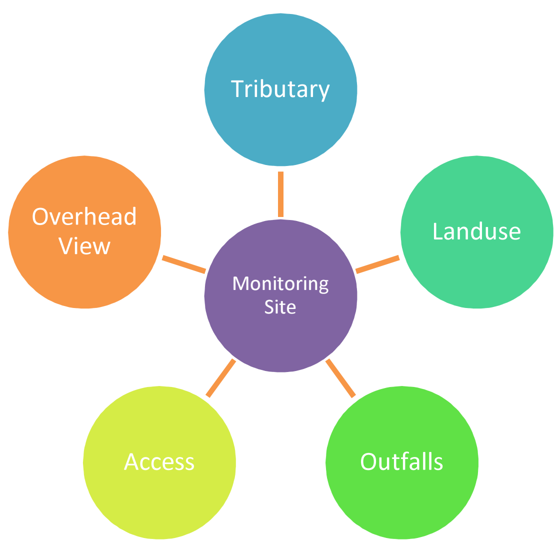
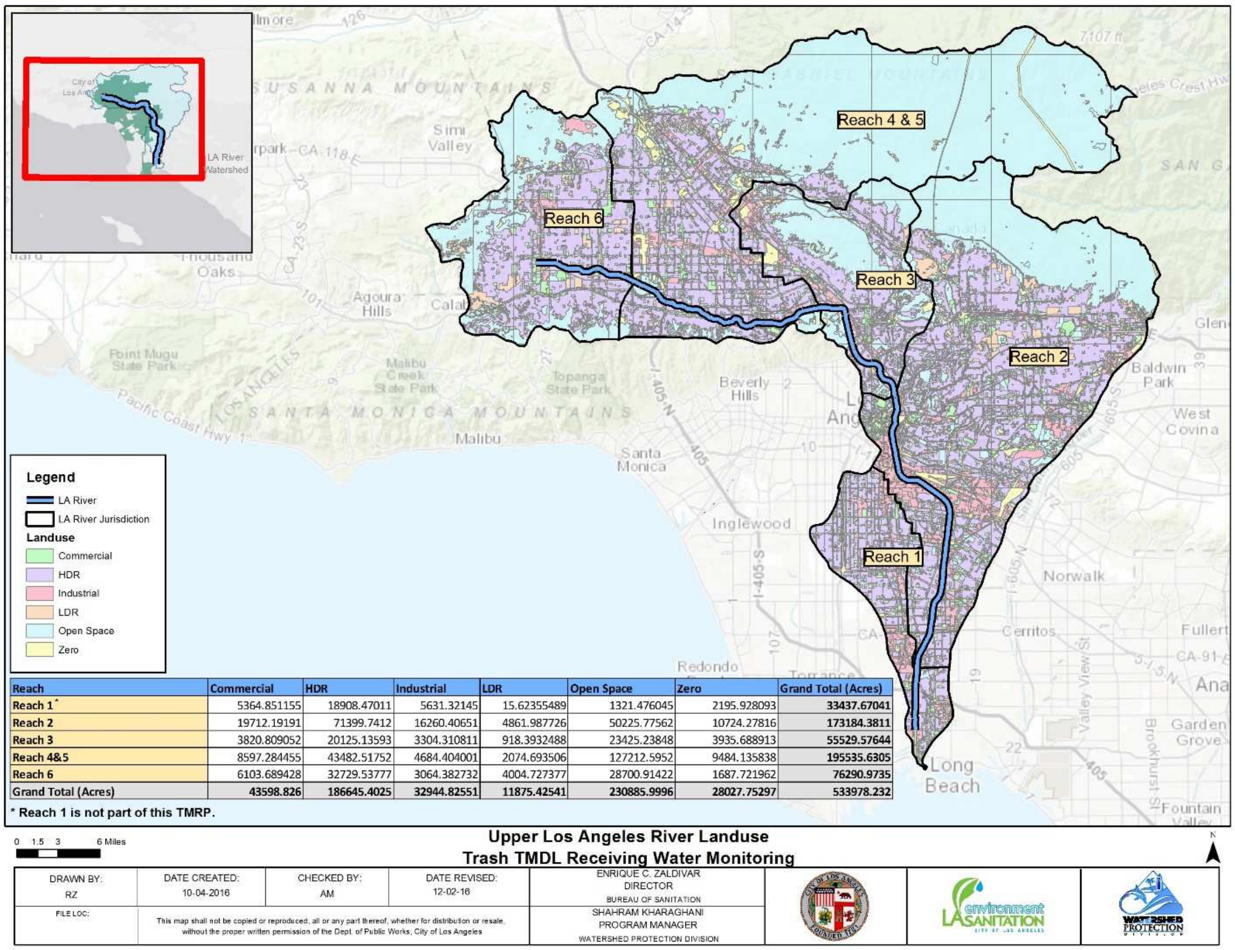



**Figure 4. Trash TMDL Receiving Water Monitoring Station Standardization Criteria**

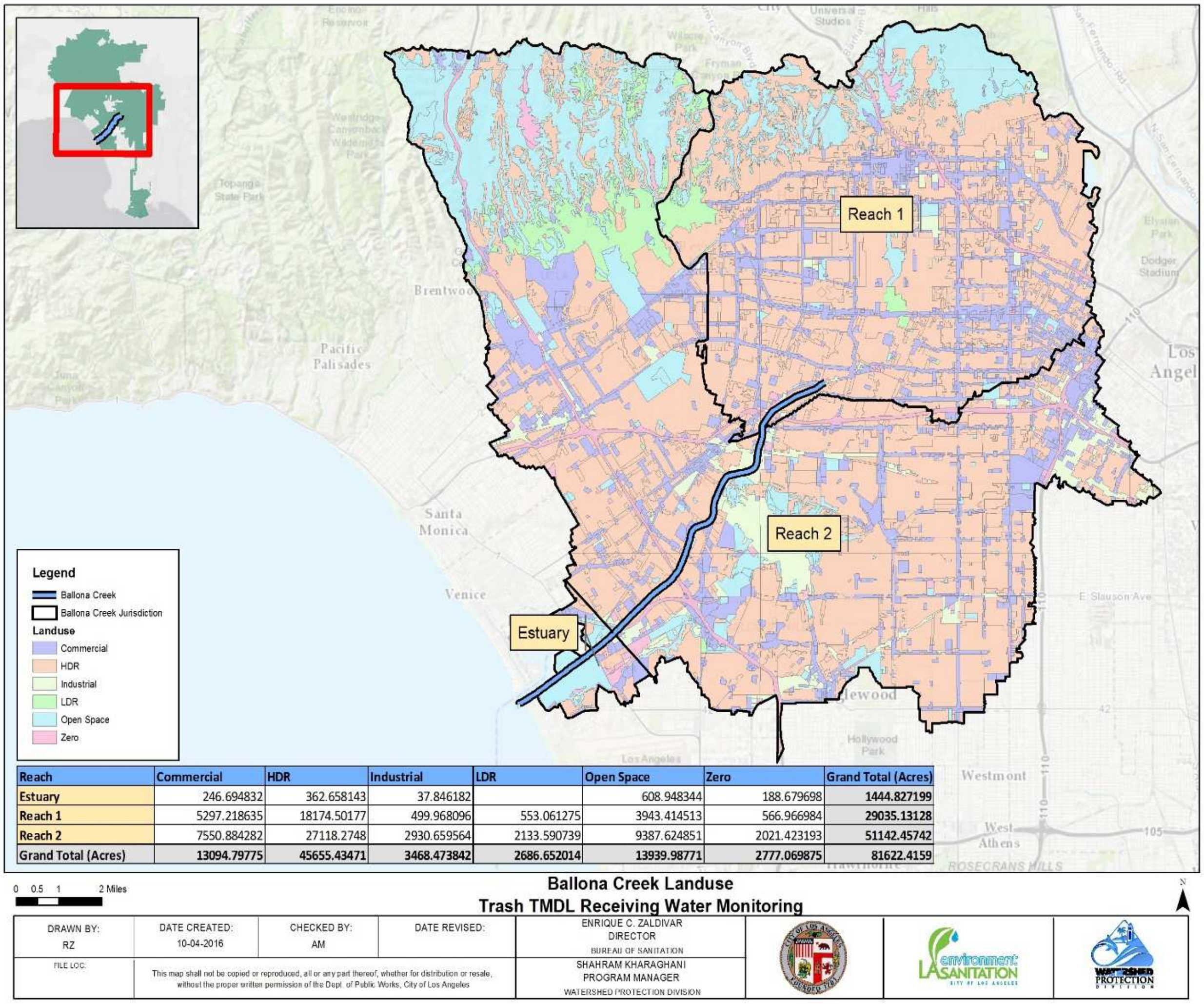
Through desktop analysis using the City's geographical information system (GIS), both the Los Angeles River and Ballona Creek were mapped to determine reach extents, tributaries, landuses, as well as outfalls. A general view of the waterbody reaches as well as the tributaries to each are provided in Figures 5 and 6. Using GIS, the Trash TMDL landuse categories (commercial, industrial, high-density residential, low-density residential, open space) were determined for each reach. Since the reaches for the Los Angeles River do not coincide with any predefined drainage area that exists (i.e., segments of the LA River), it was determined best to ensure that the selected monitoring site contain as many landuse categories, regardless of their geographical area in the reach. The number of outfalls for each reach were determined using GIS files previously submitted to the LARWQCB for the development of the respective watershed Coordinated Integrated Monitoring Plans (CIMP) for water-column monitoring purposes.




| Reach | Commercial | HDR | Industrial | LDR | Open Space | Zero | Grand Total (Acres) |
|---|---|---|---|---|---|---|---|
| Reach 1* | 5364.851155 | 18908.47011 | 5631.32145 | 15.62355489 | 1321.476045 | 2195.928093 | **33437.67041** |
| Reach 2 | 19712.19191 | 71399.7412 | 16260.40651 | 4861.987726 | 50225.77562 | 10724.27816 | **173184.3811** |
| Reach 3 | 3820.809052 | 20125.13593 | 3304.310811 | 918.3932488 | 23425.23848 | 3935.688913 | **55529.57644** |
| Reach 4&5 | 8597.284455 | 43482.51752 | 4684.404001 | 2074.693506 | 127212.5952 | 9484.135838 | **195535.6305** |
| Reach 6 | 6103.689428 | 32729.53777 | 3064.382732 | 4004.727377 | 28700.91422 | 1687.721962 | **76290.9735** |
| Grand Total (Acres) | **43598.826** | **186645.4025** | **32944.82551** | **11875.42541** | **230885.9996** | **28027.75297** | 533978.232 |

* Reach 1 is not part of this TMRP.

**Figure 5. ULAR Landuses**




| Reach | Commercial | HDR | Industrial | LDR | Open Space | Zero | Grand Total (Acres) |
|---|---|---|---|---|---|---|---|
| Estuary | 246.694832 | 362.658143 | 37.846182 | | 608.948344 | 188.679698 | **1444.827199** |
| Reach 1 | 5297.218635 | 18174.50177 | 499.968096 | 553.061275 | 3943.414513 | 566.966984 | **29035.13128** |
| Reach 2 | 7550.884282 | 27118.2748 | 2930.659564 | 2133.590739 | 9387.624851 | 2021.423193 | **51142.45742** |
| Grand Total (Acres) | **13094.79775** | **45655.43471** | **3468.473842** | **2686.652014** | **13939.98771** | **2777.069875** | **81622.4159** |

**Figure 6. Ballona Creek Landuses**

Access to the monitoring sites is imperative to have a successful monitoring program that would be efficient in the use of staff resources and overall program costs. The City of Los Angeles staff have for many years conducted water-column sampling in both the Los Angeles River and Ballona Creek, and has first-hand knowledge to entry points to the waterbodies (river banks, river/creek bottom, etc.). This information was gathered through interviews with City staff to evaluate the monitoring site for ease of entry and safety.

As part of the alternative protocols being proposed by the City, a key component is the HEPO (high-elevation point observations - greater than 30 feet) of the River or Creek to assess its health. Therefore, monitoring sites were also evaluated for closeness to street overpasses that would provide the opportunity to utilize this HEPO protocol in the field.

A "Scoring Guideline" has been developed in selecting numerous possible sites along the River and Creek for use with the proposed protocols. While proposed protocols collect the necessary information required by the TMDL, it was determined that standardization of the monitoring sites would be appropriate to ensure that data collected was consistent and reliable. Consequently, these guidelines developed will further clarify the scoring criteria and approach. A summary of these guidelines and rationalization, as to the degree of score, is provided in Table 5.

**Table 5. Site Selection Guidelines and Criteria**

| Criteria | Guideline |
|---|---|
| Tributary adjacent to site | From extensive field reconnaissance it was determined that at the confluence of the tributary a 100-yard buffer on the downstream side of the River and Creek to mitigate tributary flow influence on any trash that may have traveled in the tributary is necessary. The protocols require that the trash be fixed (non-moving) to gather data. If the monitoring site can start at the 100-yard buffer, it would receive a score of "5", the farther it moves downstream the score would decrease proportionally. |
| Landuse distribution representative | The TMDL has determined trash generation rates for five landuses (commercial, industrial, high density residential, low density residential, open space) as the predominant areas for trash generation. A higher score would be given for this criteria if the monitoring site includes all five landuses and decrease as fewer landuses are included. |
| Number of upstream main stem outfalls | From extensive field reconnaissance it was determine that the minimum number of upstream outfalls for a monitoring site would be 20, thus garnering a score of "5". Lower scores would be given for fewer outfalls. |
| Waterbody cross section configuration | This criterion is included to account for field staff safety. From field reconnaissance it was determine that River or Creek cross section of a trapezoid posed the least safety concerns (score = 5). All other cross sections would receive a lower score to be determined by user. |
| Ease of access | This criterion is included to account for field staff safety. From field reconnaissance it was determine that a monitoring site in the River or Creek that is drivable would be the best (score = 5). All other modes of reaching the monitoring site would receive a lower score to be determined by user. |
| Street bridge overpass | This criterion is included to accommodate those sites that would be inaccessible or would pose a safety concern if staff proceeds into the River or Creek. The alternative protocol provides direction on how to gather data if a high elevation view point will be utilized. |

Furthermore, a sample table developed for the evaluation of monitoring sites is depicted in Table 6. Subsequent sections provide the completed table for all monitoring selected sites in the Los Angeles River and Ballona Creek watersheds.

**Table 6. Sample Table for the Evaluation of Monitoring Sites**

| CRITERIA | | SCORE | | | | |
|---|---|---|---|---|---|---|
| | GUIDELINES | 1 | 2 | 3 | 4 | 5 |
| Tributary adjacent to site[1] | ≤ 100 yds = 5; increasing distance lower points, Not determine = 1 | | | | | |
| Landuse distribution representative | All landuses = 5; all others, score equal to number of landuses | | | | | |
| Number of upstream main stem outfalls[2] | ≥ 20 outfalls = 5; fewer outfalls lower score | | | | | |
| Waterbody cross section configuration | Trapezoidal = 5; all others user Established, Rectangular = 3, Square = 4, Natural = 1 | | | | | |
| Ease of access | Drivable = 5, Walkable = 3; all others user established | | | | | |
| Street bridge overpass | Adjacent to site = 5, No bridge overpass = 1 | | | | | |

Notes

| 1. Score | Distance from tributary (Yards) |
|---|---|
| 1 | ≥4,000 & Tributary not determine |
| 2 | 2,500 - 3,999 |
| 3 | 1,000 - 2,499 |
| 4 | 101 - 999 |
| 5 | 1 - 100 |

| 2. Score | Number of upstream main stem outfalls |
|---|---|
| 1 | 1 - 5 |
| 2 | 6 - 10 |
| 3 | 11 - 15 |
| 4 | 16 - 19 |
| 5 | ≥ 20 |

### 2.3.1 Los Angeles River Monitoring Sites

The Los Angeles River is segmented into six reaches by the California Water Quality Control Plan, Los Angeles Region (Basin Plan), as follows from upstream to downstream:

- Reach 6 begins at the headwaters of the Los Angeles River (the confluence of Arroyo Calabasas and Bell Creek) and extends to Balboa Boulevard.
- Reach 5 runs from Balboa Boulevard through the Sepulveda Basin.
- Reach 4 runs from Sepulveda Dam to Riverside Drive.
- Reach 3 runs from Riverside Drive to Figueroa Street.
- Reach 2 runs from Figueroa Street to Carson Street.
- Reach 1 runs from Carson Street to the estuary.

The major water bodies in the ULAR WMG area are summarized in Table 7.

**Table 7. Waterbodies within the ULAR Area**

| Waterbody (Mainstem) | Associated Major Tributaries |
|---|---|
| Los Angeles River Reach 6 | Dry Canyon Creek<br>McCoy Creek<br>Bell Creek<br>Aliso Canyon Wash |
| Los Angeles River Reach 5 | Bull Creek |
| Los Angeles River Reach 4 | Pacoima Wash<br>Tujunga Wash |
| Los Angeles River Reach 3 | Burbank West Channel<br>Verdugo Wash<br>Arroyo Seco |
| Los Angeles River Reach 2 | Rio Hondo Reach 2 and 3<br>Compton Creek |

### 2.3.2 Los Angeles River Monitoring Site Selection

Using the method described in this section, City of Los Angeles' staff trekked the length of the Los Angeles River within the ULAR WMG boundary during the Summer of 2016 to locate the most appropriate sites to conduct the receiving water monitoring. For each of the River reaches, several sites were identified in the field and later evaluated in the office based on the established criteria. The convention used for coordinate identification is shown in Figure 7; and summary of the primary and alternate Los Angeles River Monitoring Sites is provided in Table 8.

A summary of the cross section of the waterbody at the ULAR monitoring sites, as well as the protocol being proposed are provided in Appendix F; and the scoring results for each individual monitoring site as evaluated by City staff is provided in Appendix G.
It should be noted that for the purposes of monitoring, Arroyo Seco will be used as the tributary for Reach 2, as it is a better representative location of the ULAR WMG. The Rio Hondo and Compton Creek tributaries are further downstream and are more representative of the lower two watershed management groups' activities (Upper Reach 2 WMG and Lower LA River WMG).

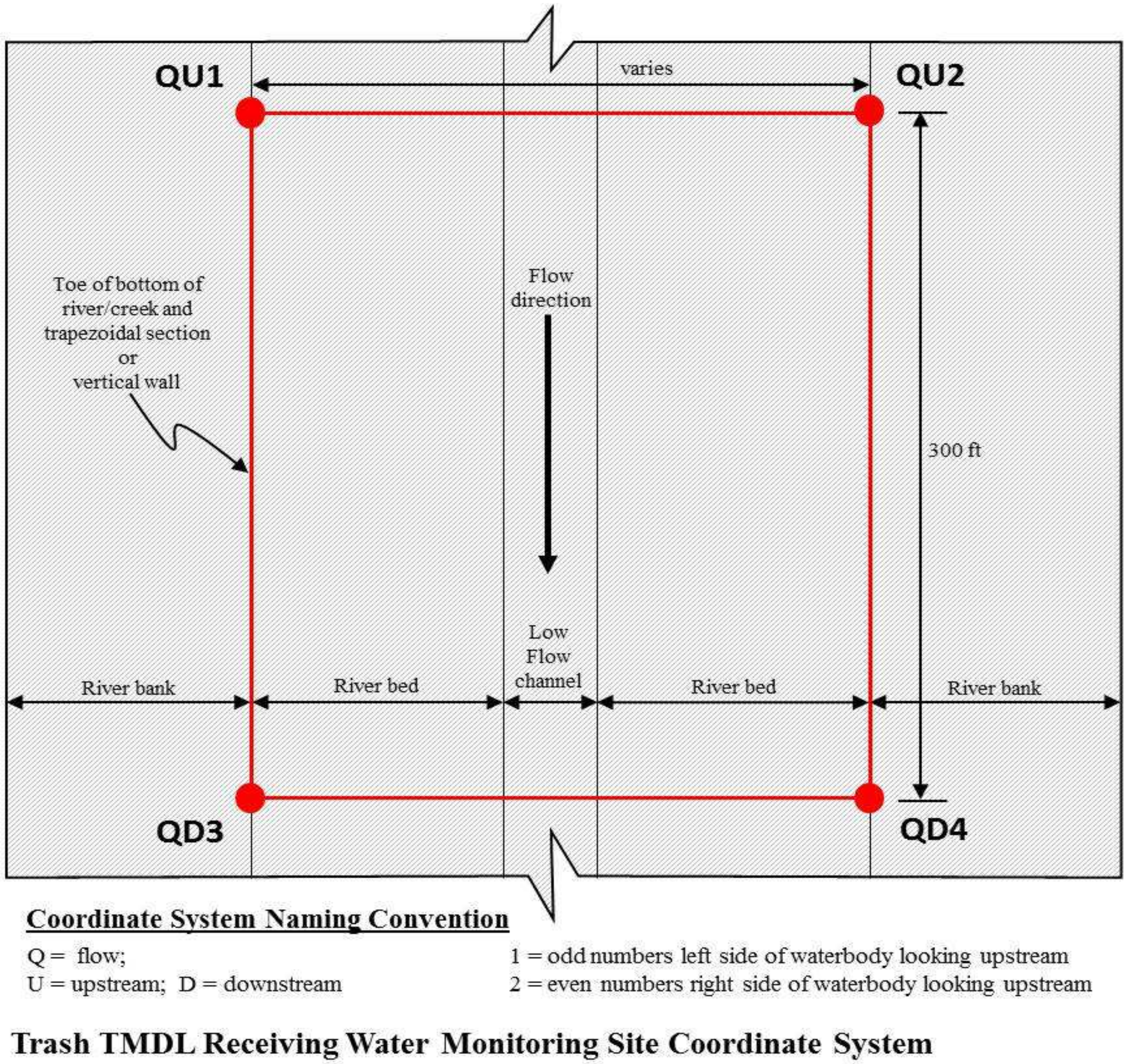



**Figure 7. Receiving Water Monitoring Site Coordinate System**

### Table 8. Los Angeles River Trash TMDL Receiving Water Monitoring Sites Description

| Site Name | ID | Outfalls | Nearest Upstream Tributary to Monitoring Site | Geographical Coordinates | | | Sampling Frequency (year) | Protocol Type | Participating Agencies |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Point | Latitude | Longitude | | | |
| LAR2 Avenue 19 | 2 | 149 | Arroyo Seco | QU1<br>QU2<br>QD3<br>QD4 | -118.226614<br>-118.225895<br>-118.226441<br>-118.225755 | 34.078864<br>34.078933<br>34.07806<br>34.078113 | Even | IRO | La Canada Flintridge, Pasadena, South Pasadena,<br>Alhambra, Monterey Park,<br>LA County, Los Angeles |
| LAR3 Los Feliz | 3 | 166 | Verdugo Wash | QU1<br>QU2<br>QD3<br>QD4 | -118.27025<br>-118.269644<br>-118.269865<br>-118.26929 | 34.120848<br>34.121051<br>34.120117<br>34.120276 | Odd | IRO | Burbank, Glendale, La Canada Flintridge,<br>LA County, Los Angeles, Pasadena,<br>La Canada Flintridge |
| LAR4 Lankershim Blvd | 4 | 264 | Tujunga Wash | QU1<br>QU2<br>QD3<br>QD4 | -118.364728<br>-118.364725<br>-118.363741<br>-118.363737 | 34.143351<br>34.143689<br>34.143309<br>34.143661 | Even | IRO | LA County, Los Angeles,<br>San Fernando, Glendale, Burbank |
| LAR5 Burbank Blvd | 5 | 4 | Bull Creek | QU1<br>QU2<br>QD3<br>QD4 | -118.477201<br>-118.47689<br>-118.476491<br>-118.476207 | 34.170144<br>34.170398<br>34.169618<br>34.169855 | Odd | IRO | LA County, Los Angeles,<br>San Fernando, Glendale, Burbank |
| LAR6 Reseda Blvd | 6 | 92 | Aliso Canyon | QU1<br>QU2<br>QD3<br>QD4 | -118.534725<br>-118.534509<br>-118.533843<br>-118.533645 | 34.189518<br>34.189799<br>34.189135<br>34.189365 | Even | IRO | LA County, Los Angeles, Hidden Hills,<br>Calabasas |
| Alternate Sites | | | | | | | | | |
| LAR3 Glendale Blvd | 3 | 166 | Verdugo Wash | QU1<br>QU2<br>QD3<br>QD4 | -118.2665<br>-118.266068<br>-118.265859<br>-118.265424 | 34.114486<br>34.114781<br>34.113845<br>34.114175 | Odd | IRO/HEPO (Limited Access) | Burbank, Glendale, La Canada Flintridge,<br>LA County, Los Angeles, Pasadena,<br>La Canada Flintridge |
| LAR4 Sepulveda Blvd | 4 | 264 | Bull Creek | QU1<br>QU2<br>QD3<br>QD4 | -118.467356<br>-118.467312<br>-118.466417<br>-118.466375 | 34.161954<br>34.162088<br>34.161681<br>34.161802 | Even | HEPO | LA County, Los Angeles,<br>San Fernando, Glendale, Burbank |

### *Information Inventory*

Further details of the ULAR primary and alternate sites, including monitoring site maps and photographs are located in Appendices H and I, respectively.

### 2.3.3 Ballona Creek Monitoring Sites

Ballona Creek and Estuary are collectively approximately 9.5 miles long and divided in three hydrological units:

- Ballona Creek Reach 1 is approximately two miles long from Cochran Avenue to National Boulevard. This portion of the creek is channelized with vertical concrete walls.
- Ballona Creek Reach 2 is approximately four miles long between National Boulevard and Centinela Avenue where Ballona Estuary starts. Reach 2 is also channelized for the most part, with trapezoidal walls.
- Ballona Estuary starts at Centinela Creek and continues to the Pacific Ocean. This portion of the creek is approximately 3.5 miles of soft bottom channel and experiences tidal inundation.

Major tributaries to Ballona Creek include Sepulveda Canyon Channel (tributary to Reach 2) and Centinela Creek (tributary to Ballona Estuary). Other water bodies in the watershed include the Del Rey Lagoon and the Ballona Wetlands, which are both connected to the Ballona Estuary through tide gates. It is observed that although Benedict Canyon Channel is identified in TMDLs as a tributary to Ballona Creek, it is a closed channel that daylights where the channel meets Ballona Creek and is not identified in the Basin Plan as a waterbody in the watershed. As such, it is not considered a tributary. The relevant water bodies are summarized in Table 9.

**Table 9. Waterbodies Associated with the BCWMG**

| Waterbody (Mainstem) | Associated Major Tributaries |
|---|---:|
| Ballona Creek Reach 1 | NA |
| Ballona Creek Reach 2 | Sepulveda Channel |
| Ballona Creek Estuary | Centinela Creek Channel |

NA – No Associated Tributary

### 2.3.4 Ballona Creek Monitoring Site Selection

Similar to the method previously described, City of Los Angeles' staff trekked the length of the Ballona Creek within the BC WMG boundary during the Summer of 2016 to locate the most appropriate sites to conduct the receiving water monitoring. For each of the Creek reaches, several sites were identified in the field and later evaluated in the office based on the established criteria. A summary of the final and alternate Ballona Creek Sites are provided in Table 10; and the convention used for coordinate identification was provided (see Figure 7). A summary of the cross section of the waterbody at the monitoring site as well as the protocol being proposed is provided in Appendix J; and the results for each individual monitoring site as evaluated by City staff is provided in Appendix K.

### *Information Inventory*

Further details of the Ballona Creek primary and alternate sites, including monitoring site maps and photographs are located in Appendices L and M, respectively.

**Table 10. Ballona Creek Trash TMDL Receiving Water Monitoring Sites Description**

| Site Name | ID | Outfalls | Nearest Upstream Tributary to Monitoring Site | Geographical Coordinates | | | Sampling Frequency (year) | Protocol Type | Participating Agencies |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Point | Latitude | Longitude | | | |
| BC1 Fairfax Avenue | 1 | 103 | NA | QU1<br>QU2<br>QD3<br>QD4 | -118.367815<br>-118.367935<br>-118.368624<br>-118.368546 | 34.038819<br>34.038599<br>34.038441<br>34.038294 | Yearly | HEPO | West Hollywood, Beverly Hills, Culver City, Los Angeles, LA County |
| BC2 Overland Ave | 2 | 207 | NA | QU1<br>QU2<br>QD3<br>QD4 | -118.396261<br>-118.39622<br>-118.397199<br>-118.397157 | 34.00713<br>34.007051<br>34.00686<br>34.006777 | Yearly | IRO | Inglewood, Santa Monica, Beverly Hills, Culver City, Los Angeles, LA County, Unincorporated |
| BCE Marina Expy | E | 8 | Centinela | QU1<br>QU2<br>QD3<br>QD4 | -118.425939<br>-118.425442<br>-118.4267<br>-118.426243 | 33.979439<br>33.978962<br>33.978904<br>33.978415 | Yearly | IRO/HEPO (Limited Access) | Culver City, Los Angeles, Unincorporated |
| Alternate Sites | | | | | | | | | |
| BC2 Sepulveda Blvd | 2 | 207 | NA | QU1<br>QU2<br>QD3<br>QD4 | -118.401931<br>-118.401793<br>-118.402358<br>-118.402215 | 33.998478<br>33.998418<br>33.997727<br>33.997673 | Yearly | IRO | Inglewood, Santa Monica, Beverly Hills, Culver City, Los Angeles, LA County, Unincorporated |
| BC2 Centinela Ave | 2 | 207 | Sepulveda | QU1<br>QU2<br>QD3<br>QD4 | -118.41614<br>-118.415887<br>-118.416883<br>-118.416634 | 33.986634<br>33.986424<br>33.986079<br>33.985869 | Yearly | HEPO | Inglewood, Santa Monica, Beverly Hills, Culver City, Los Angeles, LA County, Unincorporated |
| | | | | | | | | | |

NA = No Associated Tributary

### 2.3.5 Banks and Tributaries

For purposes of clarity and continuity, the following terms are defined.

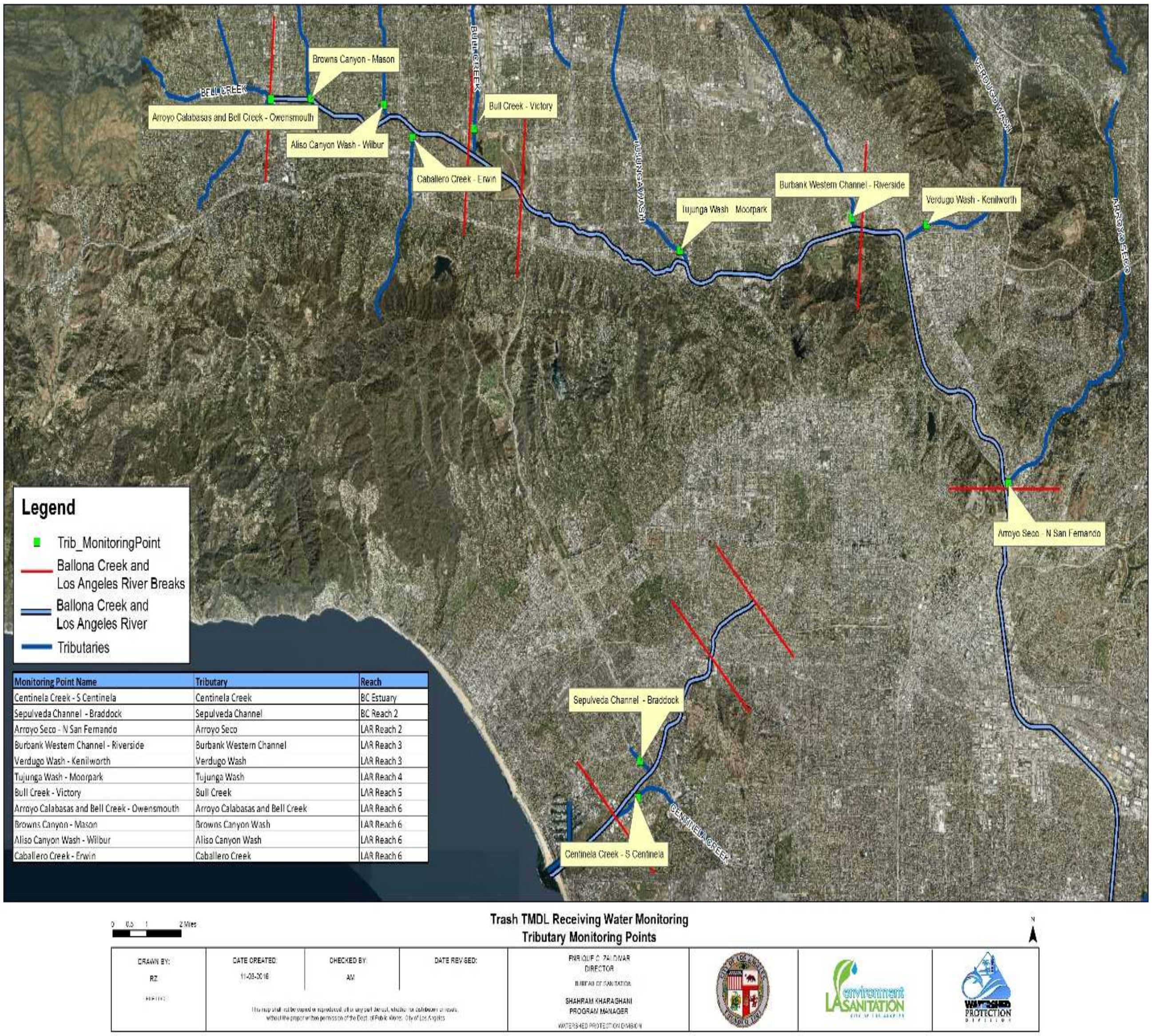
*Riverbed* – “the ground over which a river flows”;
*Riverbank* - “the land at either side of a river”; and
*Tributary* – “a river or stream that flows into a larger river or lake”.

As such, the following monitoring protocols will be observed:

**Riverbed -** The Los Angeles River riverbed and the Ballona Creek creekbed will be monitored as described in Section 2.2.2.

**Riverbank -** Due to the channeling of the Los Angeles River and the Ballona Creek by the Army Corps of Engineers in the early 1950s to 1960s, the riverbanks at most monitoring locations have been greatly altered. Monitoring of the banks at these locations may impose safety risks to field personnel, or the riverbank may have been replaced by vertical walls and is therefore non-existent. Monitoring will be from the boundary of the river bed to top of bank using the HEPO protocol or IRO if field staff determine it is safe based on river conditions.

**Tributaries** - The associated water bodies to the Los Angeles River and Ballona Creek will be monitored using the HEPO protocol. Tributary monitoring locations for both ULAR and Ballona Creek watersheds are presented in Figure 8, and site descriptions provided in Table 11. Photographs of the monitoring points for Los Angeles River and Ballona Creek can be found in Appendices I and M, respectively, and all supporting data associated with tributary sites for each respective watershed are provided in Appendix N.




| Monitoring Point Name | Tributary | Reach |
|---|---|---|
| Centinela Creek - S Centinela | Centinela Creek | BC Estuary |
| Sepulveda Channel - Braddock | Sepulveda Channel | BC Reach 2 |
| Arroyo Seco - N San Fernando | Arroyo Seco | LAR Reach 2 |
| Burbank Western Channel - Riverside | Burbank Western Channel | LAR Reach 3 |
| Verdugo Wash - Kenilworth | Verdugo Wash | LAR Reach 3 |
| Tujunga Wash - Moorpark | Tujunga Wash | LAR Reach 4 |
| Bull Creek - Victory | Bull Creek | LAR Reach 5 |
| Arroyo Calabasas and Bell Creek - Owensmouth | Arroyo Calabasas and Bell Creek | LAR Reach 6 |
| Browns Canyon - Mason | Browns Canyon Wash | LAR Reach 6 |
| Aliso Canyon Wash - Wilbur | Aliso Canyon Wash | LAR Reach 6 |
| Caballero Creek - Erwin | Caballero Creek | LAR Reach 6 |

**Figure 8. Tributary Monitoring Locations**

**Table 11. Los Angeles River and Ballona Creek - Tributary Monitoring Points**

**Los Angeles River – Tributary Monitoring Points**

| Monitoring Point Name | Tributary | Latitude | Longitude | Reach |
|---|---|---|---|---|
| Arroyo Seco - N San Fernando | Arroyo Seco | -118.225 | 34.080438 | LAR Reach 2 |
| Burbank Western Channel - Riverside | Burbank Western Channel | -118.3051 | 34.160586 | LAR Reach 3 |
| Verdugo Wash – Kenilworth | Verdugo Wash | -118.2669 | 34.158445 | LAR Reach 3 |
| Tujunga Wash - Moorpark | Tujunga Wash | -118.3926 | 34.150302 | LAR Reach 4 |
| Bull Creek - Victory | Bull Creek | -118.4978 | 34.186745 | LAR Reach 5 |
| Arroyo Calabasas and Bell Creek - Owensmouth | Arroyo Calabasas and Bell Creek | -118.6017 | 34.195209 | LAR Reach 6 |
| Browns Canyon - Mason | Browns Canyon Wash | -118.5813 | 34.195455 | LAR Reach 6 |
| Aliso Canyon Wash – Wilbur | Aliso Canyon Wash | -118.544 | 34.193767 | LAR Reach 6 |
| Caballero Creek - Erwin | Caballero Creek | -118.5292 | 34.183861 | LAR Reach 6 |

**Ballona Creek - Tributary Monitoring Points**

| Monitoring Point Name | Tributary | Latitude | Longitude | Reach |
|---|---|---|---|---|
| Centinela Creek - S Centinela | Centinela Creek | -118.4133 | 33.985046 | BC Estuary |
| Sepulveda Channel - Braddock | Sepulveda Channel | -118.412 | 33.996065 | BC Reach 2 |

## 2.4 Determination of Monitoring Frequency

The purpose of the TMRP is to assess the presence of trash that has entered the waterbody by the various modes of transportation, as well as be representative of the participating agencies in the ULAR and BC WMGs. Based on existing literature, studies, and LASAN experience, trash generation appears to be closely linked to land use. On the other hand, there does not appear to be much literature on the "seasonal" characteristics of trash. Nevertheless, as required by the MS4 Permit, monitoring will occur to capture the "seasons" of trash (tied to "Wet" and "Dry" seasons) as described in the following paragraphs.

The first TMRP monitoring event will be conducted after Memorial Day, a major holiday when there is increasing outdoor activity due to warmer weather. It has been found that the amount of trash entering the stormwater system is rainfall dependent, and specifically is contingent upon the energy available to re-mobilize and transport it from street surfaces (LARWQCB, 2001c). Since trash can be mobilized during wet weather, any trash discharges to the waterbody will most likely be accounted for during this time. As such, monitoring after Memorial Day will enable agencies to assess trash conditions shortly after the "Wet Season" from October 1 to April 30.

The second TMRP monitoring event will be conducted after Independence Day (July 4), a major holiday. Monitoring after July 4 will account for trash observed during the "Dry Season" (May 1 to September 30), and corresponds closely to the accepted period, between June 22 and September 22, for conducting the Daily Generation Rate calculations for trash. This time period allows agencies to assess trash conditions during the driest month.

With these two TMRP monitoring events scheduled for the calendar year, where the 1st event of the scheduled year starts after Memorial Day (representative of the Wet season), and the 2nd event after July 4th holiday (representative of the Dry season), a "seasonal" characterization of trash can be realized.

### 2.4.1 ULAR Monitoring Frequency

With the large size of the ULAR watershed management area and large number of monitoring sites, coordination and cooperation with other implementation groups is imperative to have a cost-effective monitoring program. To achieve a cost-effective program, the TMRP for receiving water monitoring will be implemented in conjunction with the MFAC being conducted by the impacted municipalities. The MFAC program focuses on non-point sources of trash, and utilizes trained staff to collect trash in parks and open spaces at a set frequency. Several parks subject to MFAC that lie along the Los Angeles River were noted in Figure 3, as shown in Section 2.1.5. LASAN will coordinate with the MFAC program for the assessment of trash along the banks of the river adjacent to the park after Memorial Day and after Independence Day (July 4). Trash monitoring data collected by HEPO protocol from main stem banks will be documented separately from the park.

The ULAR requires the monitoring of 14 main stem and tributary sites along approximately a 51 mile length. Ballona Creek has 5 main stem and tributary sites along approximately 9.5 miles length. Combined, the ULAR and Ballona Creek trash monitoring program will require 38 site visits each year to cover the Wet and Dry Seasons. LASAN, the implementer of TMRP for both ULAR WMG and BC WMG is proposing a rotating schedule for the ULAR WMG. The TMRP monitoring of each ULAR WMG reach will alternate – odd reaches on odd years, even reaches on even years. Under this arrangement, reaches on a scheduled year would be assessed 4 times. Reaches that are not visited under the TMRP during a particular year will still be assessed two times by the MFAC program. As a result, each reach would be assessed every year, by the combined programs or alternately between the TMRP and the MFAC. The TMRP frequencies for ULAR are provided in Table 12.

**Table 12. Combined TMRP (T) and MFAC (M) Monitoring Site Frequency[1]**

| Site Name | Year | | | | Tributary |
|---|---|---|---|---|---|
| | Odd | | Even | | |
| | Wet Season | Dry Season | Wet Season | Dry Season | |
| LAR2 Avenue 19 | M | M | T,M | T,M | Arroyo Seco |
| LAR3 Los Feliz | T,M | T, M | M | M | Verdugo Wash<br>Burbank Western Channel |
| LAR4 Lankershim Blvd | M | M | T, M | T,M | Tujunga Wash |
| LAR5 Burbank Blvd | T,M | T, M | M | M | Bull Creek |
| LAR6 Reseda Blvd | M | M | T, M | T,M | Browns Canyon<br>Aliso Canyon<br>Caballero Creek<br>Bell Creek |

Notes:

*1. ULAR reaches will be monitored by TMRP in alternative years. TMRP monitoring will be based on calendar year and the first event of the scheduled year will start after Memorial Day, resulting in an event representative of the Wet Season and one event representative of the Dry Season.*

In addition, the proposed monitoring frequency for ULAR is based on the following assumptions and past observations:

1. Compliance with Trash TMDL was required by September 30, 2016, and all WMG agencies have implemented full or partial-capture system BMPs according to the design storm, as well as institutional programs.
2. Results of the LASAN pilot study assessment in Reach 3 of LAR indicated very low numbers of trash using the IRO method. After two monitoring events, the total number of pieces of trash found from all four sites in the first assessment was 19, and a total of 13 pieces of trash was found in the second assessment. The two assessments at the four sites covered 1,200 feet of reach length (3 times the length of SWAMP protocol) each time. Monitoring sites represented industrial, commercial, recreational and residential land uses. The first event was conducted after Memorial Day, usually a high outdoor activity day. A second monitoring event was conducted in June, when outdoor activity would be greater.
3. Trash items from the study included two shopping carts, large pieces of wood, cloth, and pieces of paper and plastic. A comparison of characteristics of trash collected from the streets and from the water (Chen and Kharaghani, 2016), leads to the conclusion that the presence of large objects are indicative of illegal dumping and discards of individuals rather than point source discharges as these items are too large to fit through a catch basin opening. Lighter material is likely wind-blown sources and not necessarily from the storm drain.

The protocols and assessments are intended to assist with management decision making and any actions as they relate to observed trash in the waterbody. The results of the Pilot Study and on-going Trash TMDL implementation by WMG agencies have shown that a higher frequency of assessment does not transform to constructive receiving water status and trend evidence to support when management actions need to be taken. Thus, it is important that efficient use of resources be spent to collect data that will help note any spatial and temporal variability for future management decisions.

### 2.4.2 Ballona Creek Monitoring Frequency

Ballona Creek, with three reaches and two tributaries along its 9.5 mile length, is a smaller watershed compared to the Los Angeles River. Monitoring of Ballona Creek would also occur after Memorial Day and Independence Day (July 4) annually as depicted in Table 13.

**Table 13. Ballona Creek Monitoring Frequency**

| Site Name | Each Year | | Tributary |
|---|---|---|---|
| | Wet Season | Dry Season | |
| BC1 Fairfax Avenue | T | T | NA |
| BC2 Overland Avenue | T | T | Sepulveda |
| BCE Marina Expy | T | T | Centinela |

Note: T = TMRP*;* NA = No Associated Tributary

## 3. Monitoring Data Analysis

As discussed in Section 1.3, the overall purpose of the TMRP is to document the types and quantities of trash in the Los Angeles River or Ballona Creek and assess the condition of the waterbody for presence of trash. With this quantitative and qualitative data, one can identify trends over time that ultimately can be used to evaluate and highlight the need for strategic changes or plan modifications for Trash TMDL implementation actions. Two different metrics, as discussed below, will be used to quantify and compare data collected across numerous sites: 1) Abundance Metric; and 2) Mass Loading Metric. A summary of the data review process is as follows:

<u>Data Review and Reporting for IRO and HEPO</u>

- Download photos and observation data.
- Enter into spreadsheet.
- After data is transferred to the spreadsheet, have an independent staff review for errors.
- Perform calculations for metrics using pre-determined weight table for standardization. If no pre-determined weight exists for new items, research and/or perform measurements to add to LASAN Trash Library Table.
- Calculation for Abundance metric:
    - $Abundance\ Metric = \frac{Total\ abundance\ number}{Observation\ area, ft^2}$

  *Where:*

  *Total abundance number = number of items observed at monitoring sight*
  *Observation area = square foot area of monitoring sight. Area will differ depending on width of the sight*

- Calculation for Mass Loading:

- $Mass\ Loading\ = \frac{\sum(Abundance\ by\ category\ \times Category\ standard\ weight)}{Observation\ area, ft^2}$

*Where:*

*Abundance Category = trash category as identified in the Receiving Water Observation Form (Appendix E)*

*Category Weight = weight of individual trash item identified in the Trash Library (Appendix D)*

- Produce monitoring report.

Data from the MFAC program will also include abundance and categories recorded in the LASAN supplied survey sheets for consistency. Based on analysis of the data, it may be possible other conclusions can be made related to sources of trash. The results of the analyzed data will be extrapolated to provide a complete assessment of the River and Creek. This is reasonable in that:

1. The monitoring site length spans three times the traditional 100 feet utilized by other jurisdictions and SWAMP protocol; and
2. Any increase in assessment time and trash numbers would not result in any change to the ranges of trash items (Randall and Fusco, 2006).

## 3.1 Data Inputs

LASAN will be implementing the TMRP on behalf of the ULAR and BC WMG agencies. The MFAC will be implemented by the TMDL responsible agencies with their respective jurisdictions over the park space interfacing the River TMRP monitoring sites. Each agency supplying the survey data gathered by their MFAC program will be responsible for data validation and will present it in a format acceptable to LASAN for analysis (see List of Agencies and Parks from Trash TMDL in Appendix O).

The accumulated TMRP and MFAC information will be used to establish a data set to characterize trash in the Los Angeles River and Ballona Creek watersheds. Incumbent in this process is the ability to standardize the field datasets that allows for data validation, and an appropriate level of quality assurance and quality control. Training and open communication are imperative in assuring consistency and quality in the data used. With this in mind, the assessed information will help establish quantitative thresholds and categories to guide agencies' management on the type and level of actions to be taken.

## 3.2 Output Reports

The ULAR and BC WMGs will prepare an annual monitoring report that provides information on the status of the TMRP and results of the combined data sets (TMRP and MFAC) assessment. The initial year of monitoring offers an early snapshot that will become reflective of the characterization of trash in the Los Angeles River and Ballona Creek as more information is collected over the years to identify any trends or sudden breaches. By using the calculations for determining abundance and mass to assess the condition of trash in this protocol and equating this to trash category levels, the ULAR and BC WMGs agencies will have a quantitative and objective reason to reduce, continue, or escalate their trash management programs on the land-side of the watersheds.

# 4. Protocol Adaptive Process

One of the key components of the TMRP is the incorporation of an "adaptive process" for data collection, evaluation of monitoring data and "lessons learned" or experience gained during implementation in determining ambient conditions and trends for trash. Notwithstanding, another key component to this plan is to recognize and deliver value to the Stakeholders and community. Value defined by not only achieving regulatory threshold trash requirements under MS4 and TMDL trash compliance, but to Stakeholders in their efforts to enhance on-going outreach and awareness within their respective community. Conceptually, the "adaptive process" will enhance and promote our ability to improve the value of our understanding and our ability to advance our strategies for this plan with time.

Since both ambient conditions and trends for trash are time dependent, it becomes even more imperative that the protocols are uniform, consistent and reliable. For purposes of data validation and quality assurance, the teams collecting the information must be appropriately trained under all circumstances. Thus, it is of utmost importance that this TMRP be revisited twice a year after each monitoring event to evaluate the established TMRP protocols and frequencies. At a minimum, the program should be updated, as necessary, at the same time frequency as the adaptive process for the CIMP.

Watershed conditions, stormwater science, and water-quality regulations will certainly change over the coming years. These factors will affect the current site conditions and can potentially change locations, alter the method of recording data, type of data, and method of analysis. It is anticipated that WMG agencies will continue and update their Trash Implementation Programs based on new identified opportunities (e.g. new type of structural BMP) and/or lessons learned during control measure implementation that may also cause modifications to the TMRP.

# 5. References

Ballona Creek Watershed Management Group (BCWMG). 2016. Enhanced Watershed Management Program (EWMP) for the Ballona Creek Watershed. January 2016. Available at: http://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/watershed_management/index.shtml

BCWMG. 2015. Coordinated Integrated Monitoring Program (CIMP) for the Ballona Creek Watershed. 7 September 2015. Available at: http://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/watershed_management/index.shtml

BCWMG. 2014. Enhanced Watershed Management Program (EWMP) Final Work Plan. 25 June 2014. Available at: http://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/watershed_management/index.shtml

Chen, D., and Kharaghani, S. (2016, January/February). Surf and Turf: Characterization of Trash in Water and Land. *Stormwater, 17*, 22-27.

City of Los Angeles, Bureau of Sanitation. 2016. Pilot Study for the Development of A Trash Receiving Water Monitoring Protocol. 30 June 2016.

Heal the Bay et al. v. Browner, No. C98-4825 SBA (N.D. Cal. 1999)

Los Angeles Regional Water Quality Control Board (LARWQCB). 2016. Order No. R4-2012-0175-A01, amending Order No. R4-2012-0175 as amended by State Water Board Order WQ 2015-0075 NPDES Permit No. CAS004001, Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges Within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4. Adopted 8 September 2016. Available at: http://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/permit_amendments/index.shtml

LARWQCB. 2015a. Staff Report: Reconsideration of Certain Technical Matters of the Trash TMDLs for the Los Angeles River Watershed and the Ballona Creek Watershed. June 2015. Available at: http://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/tmdl_list.shtml

LARWQCB. 2015b. Proposed order and Amendment to the Water Quality Control Plan for the Los Angeles Region to revise the Los Angeles River Watershed Trash TMDL. Attachment A to Resolution No. R15-006. 11 June 2015. Available at: http://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/tmdl_list.shtml

LARWQCB. 2012. Order No. R4-2012-0175, NPDES Permit No. CAS004001, Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges Within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4. Adopted November 2012. Available at: http://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/permit_amendments/index.shtml

LARWQCB. 2010. Santa Monica Bay Nearshore and Offshore Debris TMDL Final Draft. October 25, 2010. California Regional Water Quality Control Board. Available at:

http://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/tmdl_list.shtml

LARWQCB. 2007. Attachment A to Resolution No. 07-012 - Amendment to the Water Quality Control Plan – Los Angeles Region to incorporate the TMDL for Trash in the Los Angeles River Watershed 9 August 2007. Available at:

http://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/tmdl_list.shtml

LARWQCB. 2004. Resolution No. 04-023 Amendment to the Water Quality Control Plan for the Los Angeles Region to Amend the Total Maximum Daily Load for Trash in the Ballona Creek and Wetland. 4 March 2004. Available at: http://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/tmdl_list.shtml

LARWQCB. 2001a. Attachment A to Resolution No. 01-014 Amendments to the Water Quality Control Plan – Los Angeles Region for the Ballona Creek Trash TMDL. 19 September 2001. Available at: http://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/tmdl_list.shtml

LARWQCB. 2001b. Attachment A to Resolution No. 01-013 Amendments to the Water Quality Control Plan – Los Angeles Region for the Los Angeles River Trash TMDL. 19 September 2001. Available at: http://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/tmdl_list.shtml

LARWQCB. 2001c. Staff Report – Trash Total Maximum Daily Load for Ballona Creek and Wetlands. 19 September 2001. Available at: http://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/tmdl_list.shtml

Randall, P and Fusco, J. 2006. Development of Urban Rapid Trash Assessment Protocol. SCVURPPP Memorandum to Trash Ad Hoc Task Group. 13 March 2006. Available at: http://www.scvurppp-w2k.com/poc_wp.shtml#trash

Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP). 2003. SCVURPPP and SMSTOPPP Pilot Implementation and Testing of the RWQCB Rapid Trash Assessment. 1 March 2003. Available at: http://www.scvurppp-w2k.com/poc_wp.shtml#trash

State Water Resources Control Board (SWRCB). 2015. Trash Policy Final Staff Report Including the Substitute Environmental Documentation Amendment to the Water Quality Control Plan for the Ocean Waters of California to Control Trash and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California. 7 April 2015. Available at: http://www.waterboards.ca.gov/water_issues/programs/trash_control/documentation.shtml

SWRCB. 2007. A Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region: Trash Measurement in Streams. April 2007. Available at: http://www.waterboards.ca.gov/water_issues/programs/swamp/

Upper Los Angeles River Watershed Management Group (ULAR WMG). 2016. Enhanced Watershed Management Program (EWMP). January 2016. Available at: http://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/watershed_management/index.shtml

ULAR WMG. 2015. Coordinated Integrated Monitoring Program (CIMP). 26 August 2015. Available at: http://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/watershed_management/index.shtml

# Appendix A

# PUBLIC HEALTH AND HABITAT BENEFICIAL USE IMPACTS

# Appendix A

## Public Health and Habitat Beneficial Use Impacts

**Trash-Related Impacts to Public Health Beneficial Uses.**

| Beneficial Use | Impact of Trash to Specific Public Health Beneficial Use |
|---|---|
| **Municipal and Domestic Supply (MUN)** | • Alterations or degradation to waters that are used for community, military, or individual water supply systems (including drinking water).<br>• Health hazards due to ingestion of water where diseases were transported by trash. |
| **Navigation (NAV)** | • Safety hazards (including hazards to boats, rafts or other vessels used for shipping, travel, or transportation by private, military or commercial vessels). |
| **Water Contact Recreation (REC-1)** | • Health and safety hazards (including hazards from bacteria, viruses, toxic substances, mosquito production, and injuries).<br>• Health hazards due to consumption of fish with diseases transported by trash or ingestion of water where diseases were transported by trash.<br>• Safety hazards (including hazards to boats, rafts or other recreational vessels).<br>• Alterations or degradation to waters that support contact water recreation. |
| **Non-Contact Water Recreation (REC-2)** | • Safety hazards (including hazards to boats, rafts or other recreational vessels).<br>• Alterations or degradation to waters that support non-contact water recreation. |
| **Commercial and Sport Fishing (COMM)** | • Safety hazards (including hazards to boats, rafts or other commercial or recreational vessels).<br>• Health hazards due to consumption of fish, shellfish, or other aquatic species with diseases transported by trash.<br>• Alterations or degradation to waters that support commercial and sport fishing. |
| **Aquaculture** | • Health hazards due to consumption of aquatic plants or animals with diseases transported by trash.<br>• Alterations or degradation to waters that support aquaculture. |
| **Shellfish Harvesting (SHELL)** | • Safety hazards (including hazards to boats, rafts or other commercial or recreational vessels).<br>• Health hazards due to consumption of filter-feeding shellfish with diseases transported by trash.<br>• Alterations or degradation to waters that support shellfish harvesting. |

**Trash Related Impacts to Habitat Beneficial Uses (Con't).**

| Beneficial Use | Description |
|---|---|
| **Warm Freshwater Habitat (WARM)** | Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates. |
| **Cold Freshwater Habitat (COLD)** | Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates. |
| **Estuarine Habitat (EST)** | Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds). |
| **Wildlife Habitat (WILD)** | Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources. |
| **Marine Habitat (MAR)** | Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds). |
| **Wetland Habitat (WET)** | Uses of water that support wetland ecosystems, including, but not limited to, preservation or enhancement of wetland habitats, vegetation, fish, shellfish, or wildlife, and other unique wetland functions which enhance water quality, such as providing flood and erosion control, stream bank stabilization, and filtration and purification of naturally occurring contaminants. |

# Appendix B

# WMG AGENCIES – ULAR WMG AND BC WMG

LA SANITATION environment CITY OF LOS ANGELES

## Appendix B
## WMG Agencies – ULAR WMG and BC WMG

### Upper Los Angeles River – Responsible Agency Representatives

| Agency/Address | Representative | Contact Info. |
|---|---|---|
| Los Angeles<br>**City of Los Angeles**<br>Bureau of Sanitation<br>Watershed Protection Div<br>1149 S. Broadway, 10th Fl<br>Los Angeles, CA 90015 | Alfredo Magallanes | Alfredo.Magallanes@lacity.org<br>Phone: (213) 485-3958 |
| Alhambra<br>**City of Alhambra**<br>11 South First Street<br>Alhambra, CA 91801-3796 | David Dolphin | ddolphin@cityofalhambra.org<br>Phone: (626) 300-1571 |
| Burbank<br>**City of Burbank**<br>P.O. Box 6459<br>Burbank, CA 91510 | Alvin Cruz | acruz@burbankca.gov<br>Phone: (818) 238-3941 |
| Calabasas<br>**City of Calabasas**<br>100 Civic Center Way<br>Calabasas, CA 91302-3172 | Alex Farassati | afarassati@cityofcalabasas.com |
| **County of Los Angeles**<br>**Department of Public Works**<br>Wastershed Management Div, 11th Floor<br>900 South Fremont Ave.<br>Alhambra, CA 91803-1311 | Paul Alva<br><br>Aracely Lasso | palva@dpw.lacounty.gov<br>Phone: (626) 458-4325<br>alasso@dpw.lacounty.gov<br>Phone: (626) 458-7146<br>Fax: (626) 457-1526 |
| Glendale<br>**City of Glendale**<br>Engineering Section<br>633 East Broadway, Rm 209<br>Glendale, CA 91206-4308 | Chris Chew | cchew@glendale.ca.gov<br>Phone: (818) 548-3945 |
| Hidden Hills<br>**City of Hidden Hills**<br>6165 Spring Valley Road<br>Hidden Hills, CA 91302 | Joe Bellomo | jbellomo@willdan.com<br>Phone: (805) 279-6856 |

| | | |
|---|---|---|
| La Canada Flintridge<br>**City of La Canada Flintridge**<br>1327 Foothill Blvd.<br>La Canada Flintridge, CA 91011 | Edward Hitti | ehitti@lcf.ca.gov<br>Phone: (818) 790-8882<br>Fax: (818) 790-8897 |
| Montebello<br>**City of Montebello**<br>1600 W. Beverly Blvd.<br>Montebello, CA 90640 | Norma Salinas<br><br><br>Eric Woosley | nsalinas@cityofmontebello.com<br>Phone: (323) 887-1365<br>Fax: (323) 887-1410<br>ewoosley@infrastructureeng.com<br>Phone: (714) 940-0100 |
| Monterey Park<br>**City of Monterey Park**<br>320 West Newmark Ave.<br>Monterey Park, CA 91754 | Bonnie Tam | btam@montereypark.ca.gov<br>(626) 307-1383 |
| Pasadena<br>**City of Pasadena**<br>P.O. Box 7115<br>Pasadena, CA 91109-7215 | Cathy Chang | cachang@cityofpasadena.net<br>Phone: (626) 744-4622 |
| Rosemead<br>**City of Rosemead**<br>8838 East Valley Blvd.<br>Rosemead, CA 91770-1787 | Rafael Fajardo<br><br>Curtis Cannon | rfajardo@cityofrosemead.org<br>Phone: (626) 569-2107<br>ccannon@cityofrosemead.org<br>Phone: (626) 569-2107 |
| San Fernando<br>**City of San Fernando**<br>117 MacNeil Street<br>San Fernando, CA 91340 | Joe Bellomo | jbellomo@willdan.com<br>Phone: (805) 279-6856 |
| San Gabriel<br>**City of San Gabriel**<br>425 South Mission Ave.<br>San Gabriel, CA 91775 | Daren Grilley<br><br>Patty Pena | dgrilley@sgch.org<br><br>ppena@sgch.org<br>Phone: (626) 308-2825 |
| San Marino<br>**City of San Marino**<br>2200 Huntington Drive<br>San Marino, CA 91108-2691 | Kevin Sales | kserv@aol.com |
| | | |

| | | |
|---|---|---|
| South El Monte<br>**City of South El Monte**<br>1415 Santa Anita Avenue<br>South El Monte, CA 91733 | Manuel Mancha<br><br>Ian McAleese | mmancha@soelmonte.org<br>Phone: (626) 579-6540<br>imcaleese@soelmonte.org<br>(626) 579-6540 ext. 3201 |
| South Pasadena<br>**City of South Pasadena**<br>1414 Mission Street<br>South Pasadena, CA 91030 | Thomas Amare | tamare@SouthPasadenaCA.gov<br>Phone: (626) 403-7245<br>Fax (626) 403-7241 |
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## Ballona Creek WMG – TMRP Participating Responsible Agency Representatives

| | | |
|---|---|---|
| Los Angeles<br>**City of Los Angeles**<br>Bureau of Sanitation<br>Watershed Protection Div<br>1149 S. Broadway, 10th Fl<br>Los Angeles, CA 90015 | Hubertus Cox | Hubertus.Cox@Lacity.org<br>Phone: (213) 485-3984 |
| Beverly Hills<br>**City of Beverly Hills**<br>345 Foothill Blvd.<br>Beverly Hills, CA 90210 | Josette Descalzo<br><br>Trish Rhay | jdescalzo@beverlyhills.org<br><br>trahy@beverlyhills.org |
| Culver City<br>**City of Culver City**<br>9770 Culver Blvd.<br>Culver City, CA 90232 | Kaden Young | Kaden.young@culvercity.org<br>Phone: (310) 253-6445 |
| **County of Los Angeles**<br>**Department of Public Works**<br>Wastershed Management Div, 11th Floor<br>900 South Fremont Ave.<br>Alhambra, CA 91803-1311 | Paul Alva<br><br>Aracely Lasso | palva@dpw.lacounty.gov<br>Phone: (626) 458-4325<br>alasso@dpw.lacounty.gov<br>Phone: (626) 458-7146<br>Fax: (626) 457-1526 |
| Inglewood<br>**City of Inglewood**<br>One Manchester Blvd.<br>Inglewood, CA 90301 | Lauren Amimoto | lamimoto@cityofinglewood.org<br>Phone: (310) 412-5192 |
| Santa Monica<br>**City of Santa Monica**<br>200 Santa Monica Pier, Ste. K<br>Santa Monica, CA 90401 | Neal Shapiro | Neal.shapiro@santa-monica.org<br>Phone: (310) 458-8223 |
| West Hollywood<br>**City of West Hollywood**<br>8300 Santa Monica Blvd.<br>West Hollywood, CA 90069 | Sharon Peristein | speristein@weho.org<br>Phone: (323) 848-6383 |

# Appendix C

# PILOT STUDY FOR THE DEVELOPMENT OF A TRASH RECEIVING WATER MONITORING PROTOCOL

# Pilot Study

## Development of a Trash Receiving Water Monitoring Protocol

TRC

environment LA SANITATION
CITY OF LOS ANGELES

# PILOT STUDY FOR THE DEVELOPMENT OF A TRASH RECEIVING WATER MONITORING PROTOCOL

Los Angeles Bureau of Sanitation
Watershed Protection Division
1149 S. Broadway Ave., 10th Floor
Los Angeles, CA 90065

June 30, 2016

**TRC Solutions, Inc.**
9685 Research Drive
Irvine, California 92618
(949) 727-9336

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| | |
|---|---|
| ARS | Automatic Retractable Screens |
| BOS | Bureau of Sanitation |
| CDS™ | Continuous Deflective Separation |
| CM | Continuous Monitoring |
| CMP | Continuous Monitoring Protocols |
| CPS | Connector Pipe Screens |
| FCS | Full Capture Systems |
| HELO | High Elevation Point Observation |
| HEPO | High Elevation Point Observation |
| IRO | In-River Observation |
| LAMC | Los Angeles Municipal Code |
| LARWQCB | Los Angeles Regional Water Quality Control Board |
| MS4 | Municipal Separate Storm Sewer System |
| TMDL | Total Maximum Daily Load |
| TMRP | Trash Monitoring and Reporting Plan |
| ULAR | Upper Los Angeles River |

## EXECUTIVE SUMMARY

The City of Los Angeles Bureau of Sanitation (BOS) has employed TRC Solutions, Inc. (TRC) to conduct a pilot study of possible protocols to be used in a Trash Monitoring and Reporting Plan (TMRP). This pilot study was conducted over the period of May 16 through June 6, 2016. The study evaluated three protocols in four selected locations in Reach 3 of the Los Angeles River. The protocols include a High Elevation Point Observation (HEPO), and In-River Observation (IRO), and a Continuous Monitoring (CM) method using video cameras. The protocols were evaluated for their effectiveness as a Trash Monitoring and Reporting Plan (TMRP), for their scalability, and for their reproducibility.

As demonstrated in the findings below, the HEPO and IRO protocols were both effective in measuring trash quantities. The CM method was far less effective is quantifying trash presence sufficiently to be considered for long-term implementation. Both HEPO and IRO were equally effective in determining the source of the trash, which was generally found to be from external sources such as wind-blown, illicit dumping, and human traffic as opposed to coming from outfalls into the river.

The IRO protocol generally produced higher trash counts than the HEPO protocol. This would be expected since the IRO surveys allowed much closer proximity to the trash locations. However, the IRO observations required a longer time period to perform, averaging approximately 8 minutes longer per location. The longer time period is typically due to the need to safely enter and traverse the river, as well as the extra time dedicated to taking flow and depth measurements. However, this extra time period is not deemed prohibitive considering the improved accuracy of the trash counts garnered by the IRO and the additional measurement data obtained.

For these reasons, the recommendation of this report is to employ the IRO protocol for full implementation of the TMRP. It is also recommended that the IRO be performed, whenever possible, on both sides of the river. However in certain circumstances time or access issues may make it difficult to visit both sides of the river. In those cases, it may be warranted to perform only a HEPO protocol for the second side if an elevated observation point is obtainable from a bridge, bank, or other vantage point.

BOS should consider additional investigations that could clarify potential issues with implementation of a watershed-wide TMRP. This could include evaluation over a more diverse set of locations representative of the wide diversity present in the LA River. Additionally, future phases in TMRP development should include the Ballona Creek water shed as it under the same requirement to develop a TMRP, and may provide additional insight to survey methodology given its topographic differences with the LA River watershed area. This diversity may call for an expanded set of protocols that could include the CM and HEPO protocols tested here or a hybrid of all three protocols. Additionally, the diversity of the locations may also require different metrics to be applied that can take into consideration other trash attributes such as volume, visual impacts, or toxicity.

# 1.0 INTRODUCTION

The City of Los Angeles Bureau of Sanitation (BOS) is required to propose and implement a Trash Monitoring and Reporting Plan (TMRP) as part of its compliance with the Los Angeles Regional Water Quality Control Board (LARWQCB) adoption of the Municipal Separate Storm Sewer System (MS4) Permit No. R4-2013-0175 (Permit). BOS sought a customized approach for the development of the TMRP that would be specific to the needs of their Permit and which will be required by the LA River and Ballona Creek Trash Total Maximum Daily Load (TMDL) reopener. To evaluate possible TMRP alternatives for this effort, BOS has asked TRC to develop and test monitoring protocols for a limited number of locations in the Upper Los Angeles River (ULAR) watershed area. These test protocols were evaluated so that a recommendation could be made for the wider implementation of the TMRP. This report presents the results of the test protocols as developed by TRC in conjunction with BOS staff.

As noted in a similar monitoring work plan, “Trash is not only an aesthetic concern, but one which can adversely affect water quality, fish and wildlife, and the beneficial uses of water bodies. It can affect beneficial uses such as recreation in water bodies (fishing and swimming) and degrade aquatic habitat. Trash may become marine debris and has the potential to harm fish and wildlife as it travels through streams and rivers and reaches the ocean. Most water quality concerns from trash are related to wildlife in the form of entanglement and ingestion. In addition to wildlife, the human health effects from poor water quality are sometimes a result of discarded medical waste, human or pet waste, and broken glass. Trash “hotspots” such as illegal dumping, littering, and/or accumulation of trash are also of concern from a management perspective. Trash in the form of leaf litter or other organic materials (such as from intentional dumping) can be of concern and cause nutrient and ecosystem imbalance in streams and rivers. During storms, trash may block drainage areas and result in flooding. Excess suspended solids (including trash) are detrimental to aquatic organisms and may scour stream beds and damage habitats.” (Weston Solutions, Inc., 2007) These solids may also block drain system inlet structures and may result in localized flooding.

# 2.0 BACKGROUND

## 2.1 LARWQCB MS4 PERMIT REQUIREMENTS

The LARWQCB has issued TMDL requirements for the watersheds under its jurisdiction, including the City of Los Angeles, as part of its compliance with the Federal Clean Water Act. TMDL Trash Requirements imposed by the Permit require BOS to comply with the Waste Load Allocation of zero trash discharge through the implementation of full capture systems. These systems must comply with the following requirements:

- Meet design flows generated from a 1-year/1-hour storm event in the watershed.
- Trap all particles 5 mm or greater before entering the receiving waters.
- Routinely maintain all installed devices/systems.

Compliance is demonstrated by a phased implementation of Full Capture Systems (FCS) over a 9-year period. The Permit put forth an aggressive compliance schedule for the City for reduction of trash according Table 1.

**Table 1 – Trash Effluent Limitations per Storm Year (gallons of uncompressed trash)**

| Permittee | Baseline | 2012 | 2013 | 2014 | 2015 | 2016 and beyond |
|---|---|---|---|---|---|---|
| Los Angeles | 1,374,845 | 412,454 | 274,969 | 137,485 | 45,370 | 0 |

The BOS strategy for compliance was based on a two-prong approach of 1) implementing institutional measures, and 2) installing structural trash control devices in the storm drain system on a priority ranking based on their relative volume of trash generation. Through the successful execution of this strategy, BOS has already met the compliance standard zero discharge compliance requirement. More details on the compliance activities are discussed below.

Recent regulatory amendments now also require BOS to demonstrate the effectiveness of their compliance efforts at preventing the discharge of trash to receiving waters. BOS must propose and implement a TMRP for Executive Officer approval.

## 2.2 LOS ANGELES CITY COMPLIANCE ACTIVITIES

BOS has made extensive efforts through institutional control measures and structural control systems to minimize and eliminate trash from entering the City MS4 system. Through institutional requirements, the City seeks to eliminate trash, and discourage dumping of materials. Institutional controls include the Los Angeles Municipal Code (LAMC) sections making littering illegal and enforceable by the Los Angeles Police Department. Also, street sweeping, catch basin cleaning, and public trashcans are other operational controls used by the City to control trash. Additionally, the City promotes public outreach, educational programs, and community programs to discourage littering and illegal dumping. Community programs are encouraged to use volunteers for trash cleanup days.

The City has purchased and installed thousands of structural control systems to capture trash in the MS4 system and prevent it from reaching the local water bodies, including the Los Angeles River. As of June 2016, eighty-two million dollars have been spent by the City to purchase and install the structural control systems. These systems include the following types of devices:

- Continuous Deflective Separation (CDS™)
- Netting TrashTrap™
- Catch Basin Inserts
- Catch Basin Opening Covers/Connector Pipe Screens (CPS)/Automatic Retractable Screens (ARS)

Through the implementation of both operational control measures and structural control systems, the City has achieved compliance with the final water quality-based effluent limitation of zero trash discharged to the LA River, pursuant to the requirements of the MS4 permit, by 2016. City-wide trash control implementation has been a major challenge and expense ($82M) for BOS, with the most expansive watershed--the LA River alone, required $40M to achieve compliance--however, the program was fully deployed and implemented prior to the compliance deadline. This pilot study will help to demonstrate the effectiveness of the City trash control program in eliminating urban-generated trash from entering the local watershed areas.

## 3.0 PILOT STUDY APPROACH

The overall intent of the TMRP is to develop a protocol that can effectively document the types and quantities of trash in the receiving water, if any. Given the implementation by BOS of the zero discharge program, the sources of any trash, if found, should theoretically be from sources originating outside the MS4 system. This may include wind-blown trash, illicit dumping, and impacts from homeless encampments, among other sources. The TMRP should also provide the means to determine, to the extent possible, what routes are being used for trash to enter the receiving waters.

### 3.1 GOALS AND OBJECTIVES

The goals of this evaluation were to determine if the proposed TMRP protocols could:

1. Achieve the overall TMRP goal stated above.
2. Be scalable from the small number of test locations to the large number of sites necessary for the City-wide application of the protocol. This should include an evaluation of the time and labor required (both for training and for execution) and any other resources necessary to perform the protocol for a given location.
3. Demonstrate reproducible results and provide an effective basis for comparisons from site to site.

### 3.2 SURVEY METHODOLOGY

TRC has worked in conjunction with BOS staff to develop protocols that could be evaluated in this Pilot Study for potential full-scale implementation. These protocols were developed with the following criteria in mind:

- Seasonality—*<u>the protocols should be designed for execution in dry weather only</u>*. This is defined as sampling events occurring a minimum of 72 hours after a rain event. This is intended to keep sampling technicians out of dangerous flow conditions if surveys were to occur during or recently after a rain event. The dry weather requirement is also consistent with the typical weather patterns in the area thus allowing more opportunities to implement survey events.

- Quantifiable—the protocol should provide a customized approach to quantifying trash loading to the City's watershed in order to track the effectiveness of the City's control measures. A subjective scoring method would be insufficient to drive trash management decisions, and inconsistent with the needs of the City's TMRP requirement pursuant to the Trash TMDLs.

- Areal Limits—the methodology should allow for observations on a wide survey area that would consider both in-river -and riverbank areas. This allows for a broader number of opportunities to detect trash accumulation and its sources. Inclusion of the banks in the survey area will allow for better detection of trash sources such as wind-blown, pedestrian traffic, illicit dumping, and homeless encampments.

- Scalability—the TMRP must be scalable to allow for implementation of the selected protocol on a watershed-wide basis with diverse sites. For this to be feasible, the survey methodology should be executable within a relatively short timeframe and require minimal training of staff. A goal of 30 minutes or less from beginning to end was discussed as an optimal timeframe for a single survey event.

- Reproducibility—the methodology should allow for collection of a significant photo record during the sampling event. Photographs allow for a clearer and more reproducible record of trash present that is more reliable than simple trash tabulation methods.

Given these criteria, TRC—in conjunction with BOS staff—developed three protocols for consideration for the Pilot Study.

## 3.3 TRASH MONITORING SITES

The Pilot Study was conducted within Reach 3 of the Los Angeles River. The area and the selected sites within this area are shown in Figure 1. Land use of Reach 3 consists of 64% residential, 26% commercial/industrial, 10% open, and less than 1% agricultural or nursery use.

Four test sites, each consisting of a 300-foot long stretch of the Los Angeles River channel, were selected in which both the High Elevation Point Observation (HEPO) and In-River Observation (IRO) test protocols could be employed. Test sites were selected to capture representative areas of Los Angeles while allowing for comparisons between sites with similar uses. Two sites, Main Street Bridge and Colorado Street Bridge, were selected to represent commercial/industrial land use areas. Two other sites, the pedestrian bridge north of Hyperion Avenue, and Marsh Park, were selected for their proximity to areas of community recreational land use. Details of the test sites are further discussed in the following sections. See Figure 1 for the locations of the four test sites along the Los Angeles River.

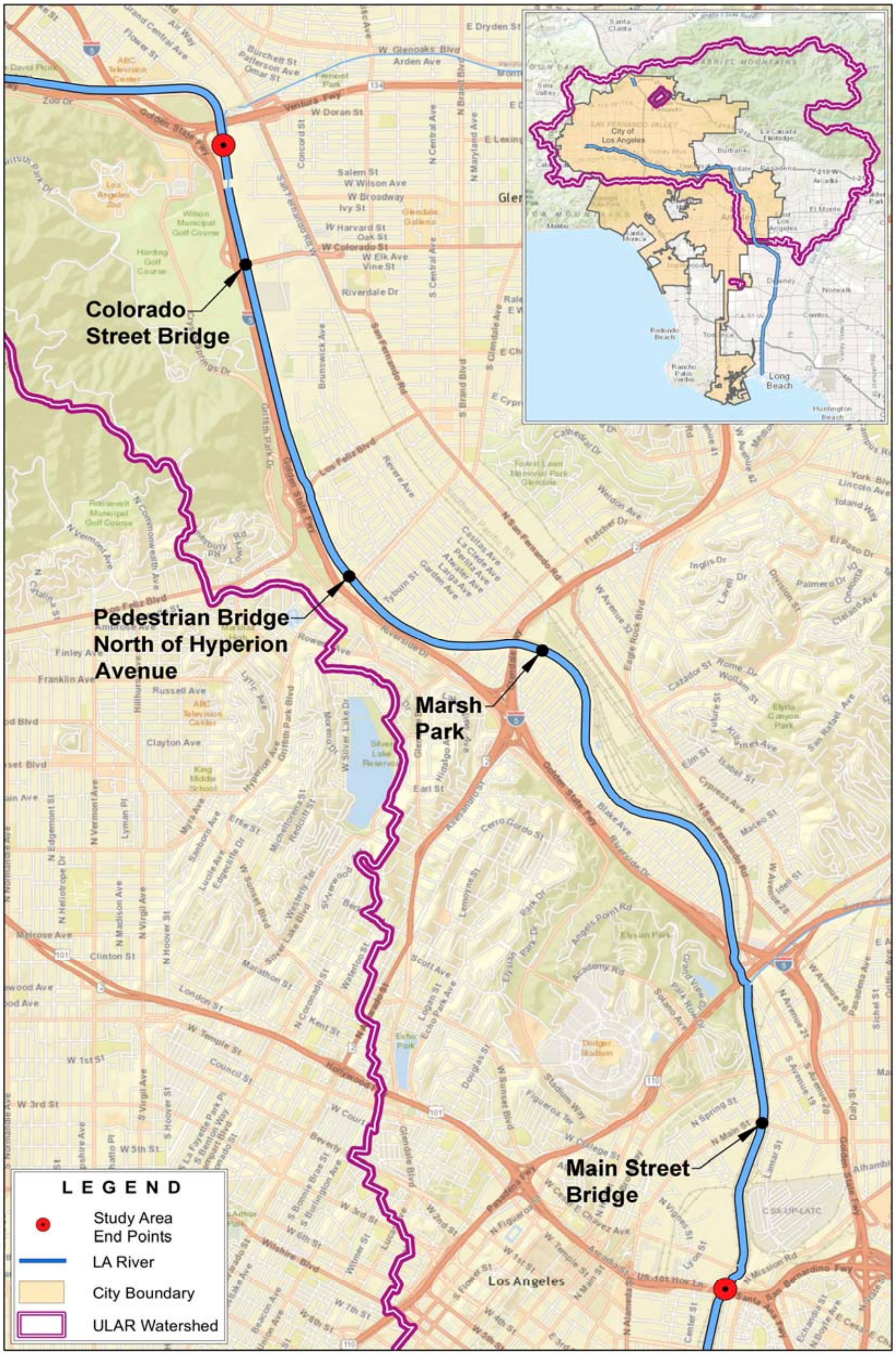



**Figure 1 – Map Showing Pilot Study Locations Selected Within the Upper LA River (ULAR)**

## 3.4 MAIN STREET BRIDGE

### 3.4.1 Location

The Main Street Bridge test site was selected as being representative of the urban, commercial, and industrial land use area of Los Angeles. The site aerial view and a view from the river basin is shown in Figure 2.


**Figure 2: Main Street Bridge monitoring site shown as aerial view highlighting the in-river and full observation areas (top) and as seen from the river basin (bottom)**

The test site includes a 300-foot-long section of the Los Angeles River channel north of the intersection of the Main Street Bridge and the Los Angeles River in the City of Los Angeles, California. The channel is predominantly concrete-lined at this location.

Some vegetation was observed at the bottom of the channel, although no vegetation was observed above the water level. Main Street Bridge is located approximately 0.85 mile southwest of Lincoln Heights. An outfall is located north of the observation area along the western sidewall, as well as north of the observation area and north of Spring Street Bridge along the eastern sidewall. Another outfall is located beneath Main Street Bridge along the eastern sidewall.

### 3.4.2 Land Uses

The surrounding land uses observed at the time of the inspection for the site are shown in Table 2.

**Table 2 - Land Use Around Main Street Bridge Location**

| Test Site | North | East | South | West |
|---|---|---|---|---|
| Main Street Bridge | Los Angeles River channel. | Railroad tracks beyond which are industrial buildings. | Main Street bridge. | Railroad tracks, beyond which are industrial/commercial buildings. |

### 3.4.3 River Profile Description

The river is approximately 9 to 11 inches deep. The river is 20 feet wide, with access roads 70 to 75 feet wide and sloped side walls 36 to 40 feet wide totaling approximately 72,300 square feet. Figure 3 presents a cross-sectional profile of the river at this location. The river flows to the south. Fencing is present along each side and prevents access to the channel by foot. Access into the channel is by an access road to the north of the bridge. The river is lined predominantly with concrete, although there is some vegetation growing along the bottom of the river. No vegetation was observed above the water surface of the river.

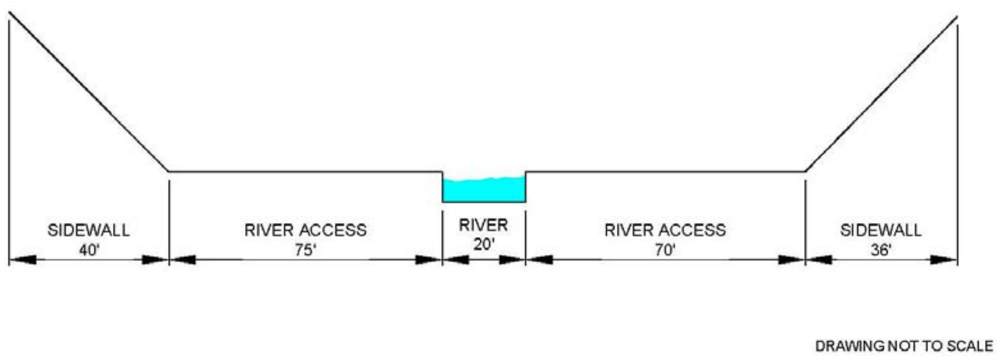



**Figure 3 - Cross Sectional Profile of Los Angeles River in the proximity of the Main Street Bridge Location.**

## 3.5 PEDESTRIAN BRIDGE NORTH OF HYPERION AVENUE BRIDGE

### 3.5.1 Location

The pedestrian bridge located north of Hyperion Avenue test site was selected as being representative of the recreational, residential and commercial land use area of Los Angeles. The site is shown in Figure 4.


**Figure 4: Pedestrian Bridge north of Hyperion Avenue monitoring site shown as aerial view highlighting the in-river and full observation areas (left) and as seen from the river basin (right)**

The test site includes a 300-foot long section of the Los Angeles River channel south of the Pedestrian Bridge east of Sunny Nook Park and north of the intersection of the Hyperion Avenue Bridge and the Los Angeles River in the City of Los Angeles, California. The river bottom consists of soft sediments, and the central portion of the river southeast of the pedestrian bridge is covered with vegetation, including dense trees and shrubs that divide the eastern and western portions of the river. The site is located 0.30 mile southwest of Atwater Village and is 3.80 miles north of downtown Los Angeles. Three MS4 outfalls are located along the western sidewall and one outfall is located on the eastern sidewall of the observation area.

### 3.5.2 Land Uses

The surrounding land uses observed at the time of the inspection for the site are shown in Table 3:

**Table 3 – Land Use Around Hyperion Avenue Bridge Location**

| Test Site | North | East | South | West |
|---|---|---|---|---|
| Pedestrian Bridge north of Hyperion Avenue | Los Angeles River channel. | Walking path, beyond which are residential properties. | Los Angeles River channel and Hyperion Avenue Bridge. | Walking/bike path and Sunny Nook Park bridge which crosses over the Interstate 5 Freeway. |

### 3.5.3 River Profile Description

At the pedestrian bridge north of Hyperion Avenue, the river (in dry weather) is approximately 1 to 3 feet deep. The river is 188 feet wide with access roads 16 to 18 feet wide and sidewalls 44 to 73 feet wide, totaling approximately 101,700 square feet. Figure 5 presents a cross-sectional profile of the river at this location. Vegetation is present in the middle of the river that divides the river into an eastern and western portion, and the high density of the vegetation prevents making observations across the river when an observer is at the river elevation. The river flows to the south.

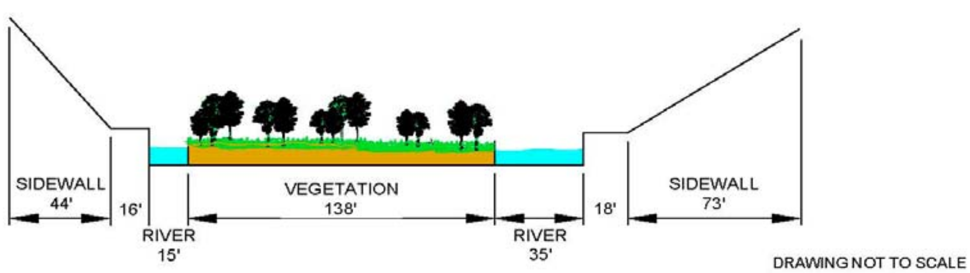



**Figure 5 - Cross Sectional Profile of Los Angeles River in the proximity of the Hyperion Avenue Pedestrian Bridge Location.**

## 3.6 COLORADO STREET BRIDGE

### 3.6.1 Location

The Colorado Bridge test site was selected as being representative of the commercial land use area of Los Angeles. The site is shown in Figure 6.


**Figure 6: Colorado Street Bridge monitoring site shown as aerial view highlighting the in-river and full observation areas (top) and as seen from the river basin (bottom)**

The test site includes a 300-foot long section of the Los Angeles River channel north of the intersection of the Colorado Street Bridge and the Los Angeles River in the City of Los Angeles, California. The river bottom consists of soft sediments, and vegetation covers the central portion of the river. The site is located approximately 1.20 miles west of Glendale and approximately 6.0 miles north of downtown Los Angeles. One outfall is located along the western sidewall of the observation area.

### 3.6.2 Land Uses

The surrounding land uses observed at the time of the inspection for the site are shown in Table 4

**Table 4 – Land Use Around Colorado Street Bridge Location**

| Test Site | North | East | South | West |
|---|---|---|---|---|
| Colorado Street Bridge | Los Angeles River channel | Walking path, a church, and commercial properties. | Colorado Street Bridge. | A bicycle path and a storm water catch basin, beyond which is the Interstate 5 Freeway. |

### 3.6.3 River Profile Description

At the Colorado Street Bridge test site, dry weather flow along the left bank is approximately 4 inches deep, the right bank is 1 foot deep, and the river is 1 foot to 1.33 feet deep. The river is 161 feet wide with access roads 15 feet wide and sloped sidewalls 67 feet wide, totaling approximately 97,500 square feet. Figure 7 presents a cross-sectional profile of the river at this location. Vegetation present in the middle of the river divides the river into an eastern and western portion, and the high density of the vegetation prevents making observations across the river when an observer is at the river elevation. The river flows to the south. The sides of the channel are concrete-lined and the bottom of the river consist of soft sediments. Access into the channel is on the east side of the channel down the slope. A 3-feet tall wire mesh fence covered by a tarp is present on the east side of the channel but can be easily traversed.

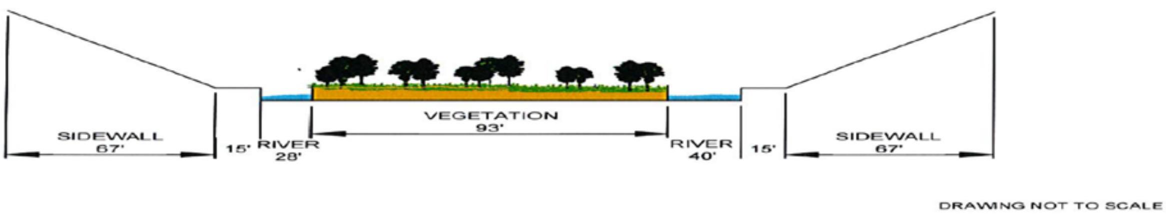



**Figure 7 Cross Sectional Profile of Los Angeles River in the proximity of the Colorado Street Bridge Location.**

## 3.7 MARSH PARK

### 3.7.1 Location


**Figure 8: Marsh Park monitoring site shown as aerial view highlighting the in-river and full observation areas (top) and as seen from the river basin (bottom)**

The Marsh Park test site was selected as being representative of the commercial land use area of Los Angeles. The site is shown in Figure 8.

The test site includes a 300-foot long section of the Los Angeles River channel adjacent to and north of Marsh Street Nature Park and extends to the southeast. The river bottom consists of soft sediments, and vegetation covers the central portion of the river. The site is located approximately 1.85 mile northeast of Silver Lake and approximately

3.9 miles north of downtown Los Angeles. One MS4 outfall is located on both the northern and southern sidewalls just northwest of the observation area, as well as along the southern sidewall at the southeast end of the observation area.

### 3.7.2 Land Uses

The surrounding land uses observed at the time of the inspection for the site are shown in Table 5.

**Table 5 - Land Use Around Marsh Park Location**

| Test Site | North | East | South | West |
|---|---|---|---|---|
| Marsh Park | Railroad tracks, vacant land and commercial properties. | Los Angeles River channel. | A bike path and commercial properties. | Los Angeles River channel. |

### 3.7.3 River Profile Description

At the Marsh Park test site, the river is 181 feet wide, with sloped sidewalls of 57 to 68 feet. Vegetation is present in the central portion of the river and divides the observation area into a northern and southern section at the start of the observation area. Figure 9 presents a cross-sectional profile of the river at this location. Vegetation is present in the southern portion at the end of the observation area. The density of the vegetation prevents observations being made from across the river at both the river elevation and from the elevated observation location on the southern end of the river. The sides of the channel are concrete-lined with sloped walls of 57 feet and 68 feet with a rise of approximately 25 feet, totaling approximately 91,800 square feet. The river flows to the east/southeast. At the downgradient end of the observation area, water in the southern section becomes stagnant and passes through breaks in the vegetation at low velocities into the subsequent portion of the river. Access to the channel is on the southwest side of the channel down the slope. An open railing is present along the bike path that can be easily traversed.

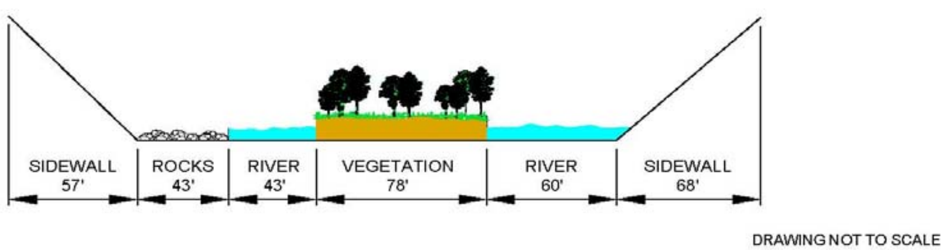



Figure 9 - Cross Sectional Profile of Los Angeles River in the proximity of the Marsh Park Location.

## 4.0 TRASH RECEIVING MONITORING PROTOCOL (TRMP)

Three distinct protocols were developed with the overall goal of providing quantitative trash assessments, and the potential source of trash in or adjacent to the receiving waters. Trash assessment include a visual survey of the water body and adjacent areas from which trash elements can be carried to the water body by wind, water, or gravity. The delineation of these adjacent areas is site-specific and requires some judgment and documentation, and is dependent on the ease and safe access to the site and river channel. The monitoring protocols consist of a High Elevation Point Observation (HEPO), an In-River Observation (IRO), and a Continuous Monitoring (CM).

An initial site visit of the test sites was conducted on May 18, 2016 to determine access points into the channels at each location, visually inspect any trash or potential trash sources within the test site areas, and to determine the potential effectiveness of the protocols. The sites and the protocols were reviewed with BOS personnel to ensure the objectives of the TMRP could be met with these selections.

For each test site, a data form was customized and completed to assess and tabulate the trash observed during each event with the specified protocol. A copy of the data form developed for each site is presented in Appendix 2. The following sections detail the field activities performed by TRC staff at the trash monitoring test sites. Field activities were conducted between May 18 and June 2, 2016 by TRC staff. Field training standard operating procedures are provided in Appendix 1. Photographic documentation is provided in Attachment 1.

### 4.1 HIGH ELEVATION POINT OBSERVATION (HEPO)

The HEPO protocol is a step by step procedure for conducting an evaluation of trash impacts over a limited area typically addressing a 300 foot length of area in ULAR. It is designed to be conducted by a survey team of two people. In the initial visit, the survey selects or creates fixed demarcation points defining the observation area so that all future observations are done over the same defined area. The team also designates an observation area on the river bank or on a bridge over the area from which all future observations will be conducted. A typical HEPO observation area aerial view and the corresponding vantage point from the observation location are shown in Figure 10 below.


**Figure 10: A typical HEPO observation area aerial view and the corresponding vantage point from the observation location.**

The full HEPO Protocol is presented in Attachment 2. The following summary presents the general steps performed for each HEPO event:

- Proceed to the designated location and walk to the predetermined observation point
- Locate the fixed demarcation points defining the observation area
- Take an overview photograph of the entire location
- Take as many additional photos as necessary to capture all observable trash impacts in the area while maintaining a photo log
- Record on the forms or tablet the locations of all observable trash noting types, quantities, approximate locations (river, banks, floating, submerged, etc.)
- Conduct prescribed field QA/QC procedures
- Return to the office and transfer data onto spreadsheets as necessary
- Produce monitoring report/graph

TRC conducted HEPO at the test sites on May 26 and June 1, 2016. Photographic documentation of each location is presented in Attachment 1.

### 4.1.1 Main Street Bridge

Main Street Bridge HEPO was conducted from a point along Main Street Bridge looking upstream and along the east and west side of the channel behind fencing, as noted on the observation form.

### 4.1.2 Pedestrian Bridge North of Hyperion Avenue Bridge

As noted on the observation form, HEPO was conducted from the west side of the Los Angeles River channel along the bike path adjacent to the Pedestrian Bridge and from the east side of the Los Angeles River Channel along a walk path with access from Sunnynook Drive. The Pedestrian Bridge was not readily accessible due to safety conditions of the bridge.

### 4.1.3 Colorado Street Bridge

The Colorado Street Bridge HEPO was conducted from the east and west sides of the Los Angeles River channel along a walk path on the east and a bike path on the west looking upstream from Colorado Street Bridge, as noted on the observation form. The Colorado Street Bridge was not accessible because no sidewalk was available for pedestrians to cross the bridge.

### 4.1.4 Marsh Park

Marsh Park HEPO was conducted from the bike path along the south side of the Los Angeles River channel looking upstream and downstream, as noted on the observation form. The north side of the channel was not accessible.

## 4.2 IN-RIVER OBSERVATION (IRO)

TRC conducted IRO at the test sites on May 26 and June 1, 2016. IRO consisted of survey personnel physically entering the river channel from an accessible point. Similar to the HEPO, observations conducted in the river included the visual inspection and documentation of trash debris in the channel and potential sources along the channel sides. A similar photo record is also created. Additionally, a fishing net is placed into the stream flow for approximately 5 minutes at each test site to capture flowing debris within the river. Figure 11 presents typical photos of this activity. IRO events also include the measurement of the depth of water in stream, the measuring of the flow velocity of the stream from the safest most accessible center point of the stream using a Marsh McBierney flow velocity meter. Photographic documentation is presented in Attachment 1.

**Figure 11: A typical seining measurement using a net with the flow velocity equipment shown in the foreground (left) and a typical result of the seining measurement showing no trash present (right).**

#### 4.2.1 Main Street Bridge

Access into the Main Street Bridge channel for conducting the IRO was available through a construction site access point near the Figueroa Street Bridge north of the test site. Observation was conducted while walking the 300-foot section north of the Main Street Bridge along the east side of the river and visually observing trash debris within the channel. Measurements of the river depth and flow velocity were recorded from the central most point of the river that could safely be reached from the east side.

#### 4.2.2 Pedestrian Bridge North of Hyperion Avenue Bridge

The pedestrian bridge north of Hyperion Avenue IRO was conducted through available access from the west side of the channel. The east side of the channel was not accessible; therefore, the HEPO could only be conducted on the east side of the test site. The IRO was conducted by walking the 300-foot long section along the west side of the channel and visually observing and documenting trash debris within the channel. River depth and velocity measurements were recorded from the central most portion of the river near the vegetation that could safely be reached from the west side.

#### 4.2.3 Colorado Street Bridge

The Colorado Street Bridge IRO was conducted from the east and west sides of the Los Angeles River channel along a walk path on the east side and a bike path along the west side. Access into the river on the east side was gained by crossing a sand-packed tarp barrier separating the walk path from the river channel. The west side of the channel was accessed by traversing a guardrail from a construction area along the Interstate 5 North Freeway onramp. River depth and velocity measurements were taken from the edge of the bank on the west side of the river.

#### 4.2.4 Marsh Park

Marsh Park IRO was conducted from access along a bike path along the south side of the river channel by traversing a guardrail. River depth and velocity measurements were taken from the edge of the bank along the south side of the river. The north side of the river did not have available access.

### 4.3 CONTINUOUS MONITORING ACTIVITIES

In order to document long-term continuous activities at the site, TRC mounted two Go-Pro Hero 4 cameras at Colorado Street Bridge and Hyperion Avenue Pedestrian Bridge. A camera was mounted at Colorado Street Bridge on the eastern side of the river channel to capture activity at the test site looking upstream. A camera was also mounted on the Hyperion Avenue Bridge test site looking upstream on the western side of the channel. After approximately 10 days, both camera positions were moved. The Colorado Street Bridge camera was moved to the west side of the channel and the camera at Hyperion Avenue was moved to a location adjacent west of the

Pedestrian Bridge looking downstream. Figure 12 shows the camera locations and one of the vantage points for the Colorado Street Bridge location.


**Figure 12: A typical continuous monitoring location aerial view showing camera installations (left) and a typical camera vantage point (right).**

## 5.0 FINDINGS

Trash abundance was calculated at each site and compared between sampling events as shown in Table 6). In general, the results were variable with no clear link between incidence of trash and accessibility or site use. There was a tendency for greater trash findings during the second survey event on June 1. Although no change in weather patterns (e.g., rain or increased wind) were noted in the days prior to this event, this increase could possibly be linked to this second event being conducted two days after the Memorial Day holiday weekend. The long weekend likely caused additional recreational use all along the river trails and bike paths and in adjacent parks as well. This additional use may have led to increased litter accumulation and subsequent distribution onto the river banks in general. Part of the increased abundance in the Main Street location for the June 1 event was due to 7 items of trash accumulated against a fence just outside the observation area but included in the “Banks” total. This accumulation was likely due to wind-driven trash collecting at the base of the fence.

**Table 6 – Trash abundance comparison among sites using the two pilot trash protocols**

| | | HEPO | | | IRO | | |
|---|---|---|---|---|---|---|---|
| Location | Date | Banks | In River | Total | Banks | In River | Total |
| Main Street | 5/26/16 | 5 | 0 | 5 | 7 | 0 | 7 |
| | 6/1/16 | 20 | 0 | 20 | 14 | 1 | 15 |
| Hyperion Ave | 5/26/16 | 2 | 3 | 5 | 3 | 2 | 5 |
| | 6/1/16 | 1 | 1 | 2 | 12 | 1 | 13 |
| Colorado St. | 5/26/16 | 5 | 0 | 5 | 4 | 4 | 8 |
| | 6/1/16 | 0 | 1 | 1 | 0 | 3 | 3 |
| Marsh Park | 5/26/16 | 0 | 1 | 1 | 0 | 0 | 0 |
| | 6/1/16 | 0 | 3 | 3 | 7 | 3 | 10 |

The following sections detail the findings of the TRMP conducted between May 18 and June 1, 2016. Detailed findings for each event are tabulated in Attachment 3-1.

In general, trash items were more often found on the banks of the river rather than in the river or its vegetation. The Main Street Bridge survey site reported the least amount of in-river trash, which could be linked to its hydrology (concrete-lined channel) and limited pedestrian access. Conversely, soft-bottom sediment sites reported higher levels of in-river trash, which could be related to their dense vegetation, increased points of access, heightened recreational via their proximity to urban parks and commercial venues (Marsh Park site is adjacent to a local coffee house). Figures 13 and 14 represent the cumulative trash distribution for both events per protocol.

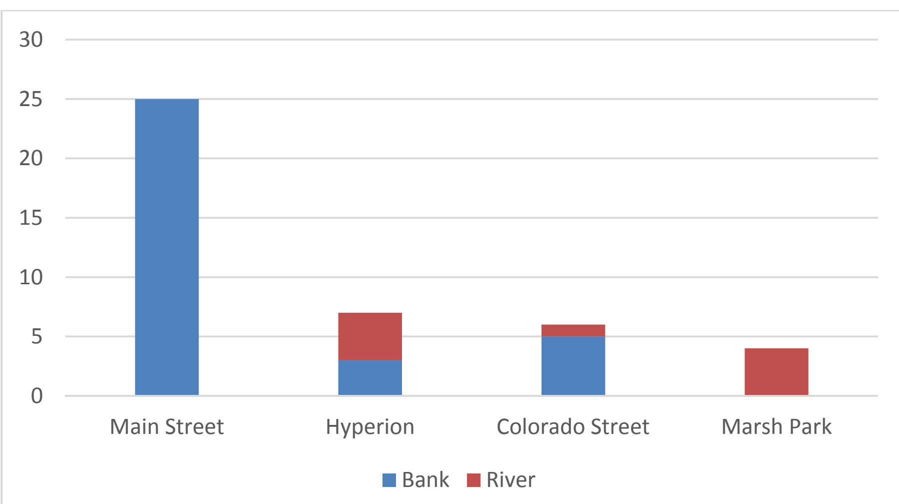



**Figure 13 - In-river and riverbank trash distribution across sampling events using the HEPO method.**

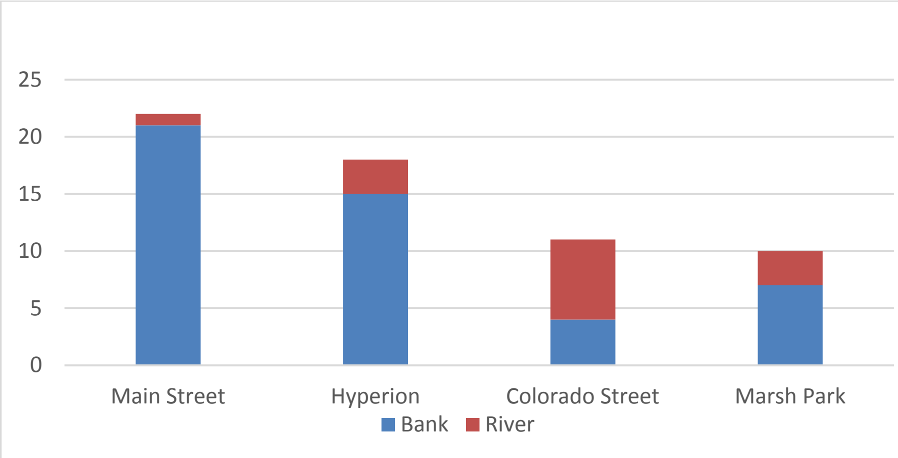



**Figure 14 - In-river and riverbank trash distribution across sampling events using the IRO method.**

## 5.1 HIGH ELEVATION POINT OBSERVATION

Findings of the HEPO observation are discussed below. Photographic documentation is presented in Attachment 1. Measurements of trash debris observed are tabulated in Attachment 3-1.

### 5.1.1 Main Street Bridge

Trash observed during the HEPO at Main Street Bridge consisted of plastic bottles, bottle caps, rebar, wood, clothing, and plastic and paper. All trash observed was on the edge of the channel. No trash was observed within the flow of the river. Trash was observed continuously along the fence lining the west side of the channel. A break in the fence on the west side of the channel was also observed—with no visible trash at the opening—suggesting a potential point source of trash to the river.
MS4 outfalls were located upstream of the observation area, and one outfall was located at the downstream end of the observation area; no outfalls were located in the observation site. Homeless encampments were observed outside of the observation area beyond the railroad tracks on the east side. The duration of the observation events ranged from 15 to 20 minutes.

### 5.1.2 Pedestrian Bridge North Of Hyperion Avenue Bridge

Trash observed at the Pedestrian Bridge during the HEPO included large objects such as a shopping cart and a trash bin, trash consisting of paper and plastic within the channel vegetation, and small clusters of paper, glass shards, and plastic debris along the edge of the river channel. Three outfalls were observed within the monitoring site area along the west slope and one outfall along the east slope into the channel. All of these outfalls were dry during the observation events. No trash debris was observed proximal to the outfalls.

Trash observed on the east side of the channel consisted of paper and plastic within the in-river vegetation. Most trash observed on the east side was located on the outside of the observation area on the other side of the sandbag guardrail along the walking path and consisted of shopping carts and small debris of paper, trash, and glass shards. The duration of the observation events ranged from 15 to 25 minutes.

#### 5.1.3 Colorado Street Bridge

Trash observed during the Colorado Bridge HEPO included small debris on the edge of the channel, debris on the outside of the observation area along the walking path on the east side beyond the sandbag barriers, and plastic and paper debris entangled in the channel vegetation. One outfall was observed along the west slope into the channel. This outfall was dry during the observation events. Some paper debris was also observed along the Colorado Street Bridge above the river. The duration of the observation events ranged from 10 to 15 minutes.

#### 5.1.4 Marsh Park

Trash observed during the Marsh Park HEPO included paper and plastic debris along the sloped south edge of the channel. Some plastic and paper debris was also observed within the in-river vegetation. Duration of the observation events ranged from 15 to 20 minutes. One outfall was observed along the north slope and one along the south slope into the channel just northwest of the observation area near Marsh Park. One outfall was observed along the south slope at the end of the observation area. No trash debris was observed proximal to the outfalls.

#### 5.1.5 Summary Data

Refer to Table 6 for a summary of trash encountered during HEPO observations at all four locations. Figures 15 and 16 depict the total trash findings across all four locations for each HEPO sample event. Miscellaneous items were the most abundant debris found during both surveying events, and included items such as candy wrappers, gum wrappers, apple cores, orange peels, pens, etc. All other debris categories were found in similar abundance across the two events, though a higher amount of paper was observed during the second event.

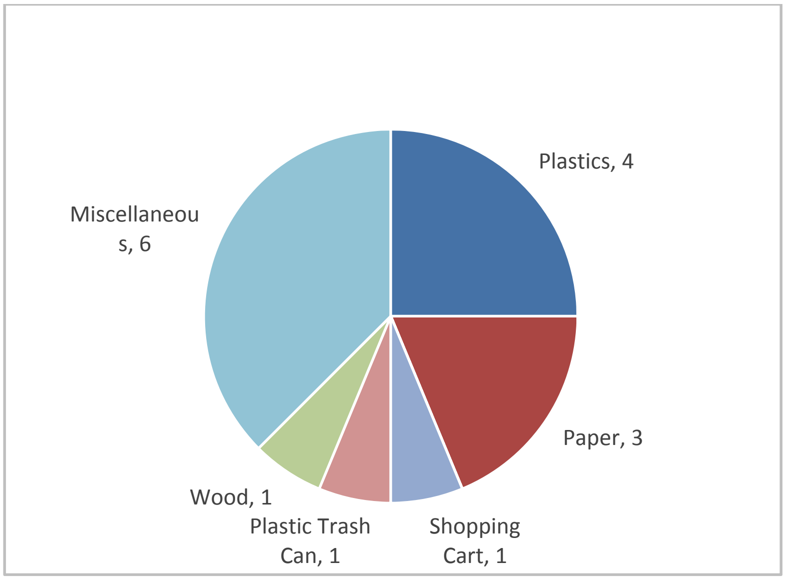



**Figure 15- Total trash abundance by category at all sites observed during the first survey event (May 26, 2016) using the HEPO method.**

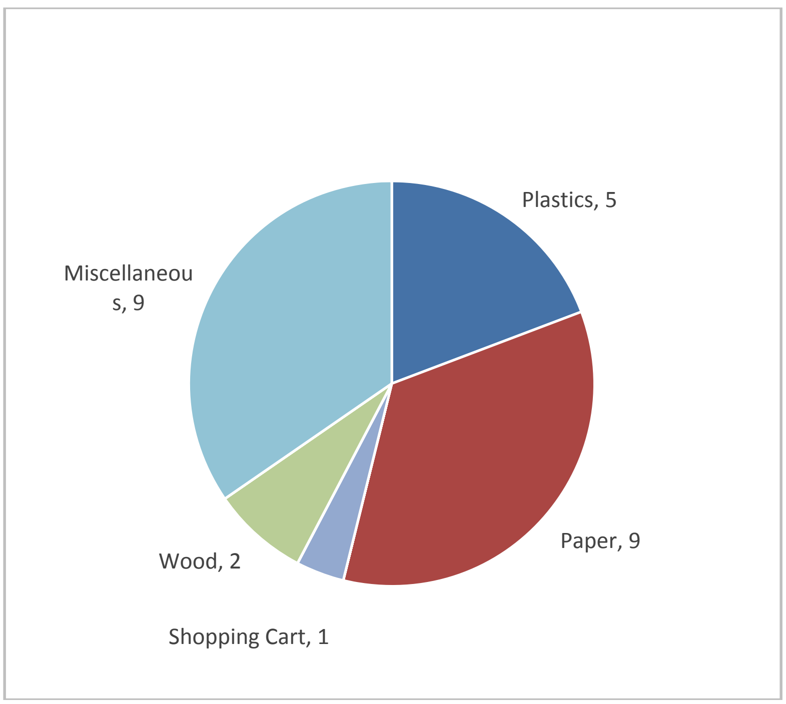



**Figure 16 - Total trash abundance by category at all sites observed during the second survey event (June 1, 2016) using the HEPO method.**

## 5.2 IN-RIVER OBSERVATION

Findings of the IRO observation are discussed below. Photographic documentation is presented in Attachment 1. Measurements of trash debris observed is presented in Table 6. Trash abundance is presented graphically in Figures 17 and 18 for the two events.

### 5.2.1 Main Street Bridge

Trash observed during the IRO at Main Street Bridge consisted of plastic bottles, bottle caps, rebar, wood, clothing, and miscellaneous plastic and paper. All trash debris observed was on the edge of the channel outside of the river. Smaller debris not visible from the higher elevation included glass shards, and paper and plastic debris under the Main Street Bridge. No trash was observed within the flow of the river, with the exception of a pen. Oil was also observed seeping from the edges along the east side of the channel walls and appeared to be from natural subterranean seeps.

River depths measured at the Main Street Bridge test site ranged from 0.75 to 1 foot and flow velocity measured was approximately 1.4 to 2.5 feet per second (ft/s). Duration of the observation events ranged from 25 to 45 minutes

### 5.2.2 Pedestrian Bridge North Of Hyperion Avenue Bridge

Trash observed at the Pedestrian Bridge during the IRO included large objects, such as a shopping cart and a trash bin, trash debris consisting of paper and plastic within the channel vegetation, and small clusters of paper, glass shards, and plastic debris along the edge of the river channel. The east side of the river channel was not observed during IRO.

River depths measured at the pedestrian bridge north of the Hyperion Avenue Bridge test site ranged from 1 to 3 feet and flow velocity measured was approximately 0.3 to 0.6 ft/s. Duration of the observation events ranged from 15 to 20 minutes.

### 5.2.3 Colorado Street Bridge

Trash observed during the Colorado Bridge IRO included small debris on the edge of the channel, and plastic and paper debris within the channel vegetation. Cigarette butts were observed on the east side of the channel. A homeless encampment was observed under the Colorado Street Bridge on the east side of the channel.

River depths measured at the Colorado Street Bridge test site ranged from 1 to 1.33 feet and flow velocity measured was approximately 0.4 to 1.9 ft/s. The duration of the observation events ranged from 20 to 25 minutes.

### 5.2.4 Marsh Park

Trash observed during the Marsh Park IRO included paper and plastic debris along the sloped south edge of the channel. Some debris was observed within the in-river vegetation.

River depths measured at the Marsh Park test site ranged from 9 inches to 1.33 feet and flow velocity measured was approximately 0.0 to 1.6 ft/s. Duration of the observation events ranged from 10 to 40 minutes (the difference in time was the effort during the initial IRO to make observations on both the northern and southern portions of the river by crossing through the dense vegetation and rocky terrain in the central portion of the river).

### 5.2.5 Summary Data

Refer to Table 6 for a summary of trash encountered during IRO observations at all four locations. Figures 17 and 18 depict the total trash findings across all four locations for each IRO sample event. Miscellaneous items were found in greater abundance across both events, and included items such as candy wrappers, gum wrappers, pens, apple cores, orange peels, etc. The types and abundance of other categories of debris were reported similarly during surveys except plastic, which was found only during the first surveying event.

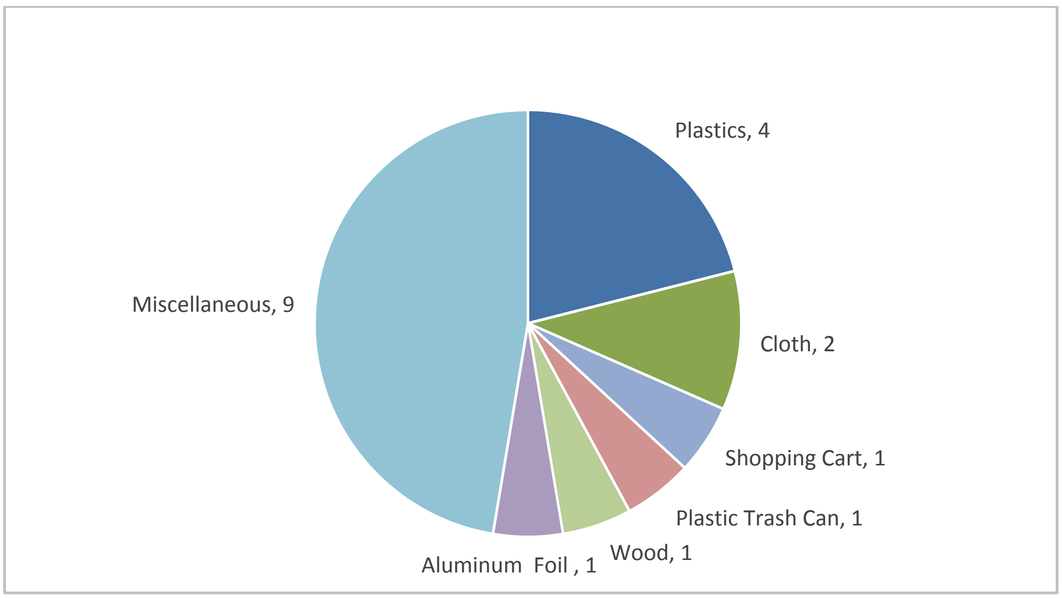



**Figure 17 - Total trash abundance by category at all sites observed during the first survey event (May 26, 2016) using the IRO method.**

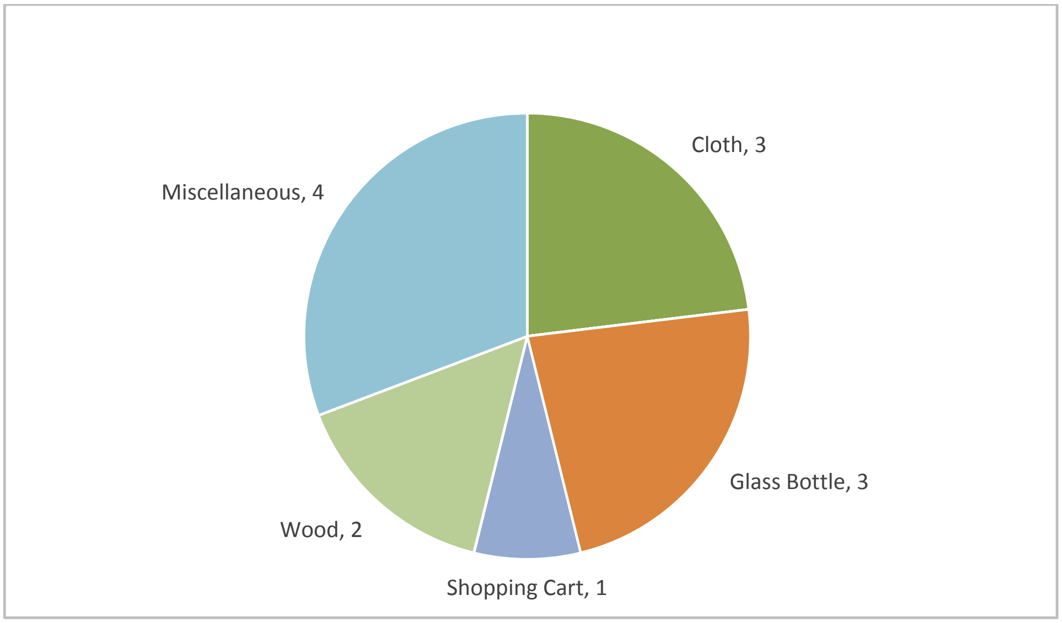



**Figure 18 - Total trash abundance by category at all sites observed during the second survey event (June 1, 2016) using the IRO method.**

## 5.3 CONTINUOUS MONITORING

A camera was mounted on Hyperion Avenue Bridge looking upstream on the western side of the channel, and a camera was mounted at Colorado Street Bridge on the eastern side of the river channel looking upstream to capture activity at the test sites to monitor continuous activity at the two sites. To create the continuous record, the camera was programmed to take a snapshot of the observation area every 15 seconds. After approximately 10 days of recorded observation, each camera was moved to a new location on the opposing bank and recording restarted. This was done to obtain a more balanced and complete evaluation of each site. Video logs of each site and observation point are included as a DVD set in Attachment 4 of this report.

### 5.3.1 Pedestrian Bridge North Of Hyperion Avenue Bridge

Review of the video footage at Hyperion Avenue Bridge reveals heavy pedestrian traffic along the bike/walk path on the west side of the channel. Some trash debris was observed flowing down the stream and some people were observed within the river. Review of the video footage following the relocation of the camera looking downstream from the pedestrian bridge reveals heavy pedestrian traffic near and within the channel. Significant amounts of trash debris could be observed flowing downstream periodically. However, no detailed observation of trash types or sources could be made from the video. The vantage point of the camera was set to observe the entire 300 foot length of the observation area which reduces the camera's ability to discern detail in any specific area.

### 5.3.2 Colorado Street Bridge

Review of the video footage at Colorado Street depicts some pedestrian traffic along the river edge on the east side of the channel. Review of the camera footage following relocation of the camera to the west side of the channel observed heavy pedestrian traffic along the bike path adjacent to the channel and some pedestrian traffic within the channel. As with the Hyperion location, significant amounts of trash debris could be observed flowing downstream periodically. However, no detailed observation of trash types or sources could be made from the video. As with the Hyperion location, the vantage point of the camera was set to observe the entire 300 foot length of the observation area which reduces the camera's ability to discern detail in any specific area.

# 6.0 TRASH DATA ANALYSIS

## 6.1 EVALUATION METRICS

As discussed in Section 3, the goal for the TMRP is to quantify trash impacts as means to track the effectiveness of BOS trash management activities. Two different metrics were developed to determine which would be the most effective means to quantify and compare data collected across numerous sites with multiple data collection methods.

Table 7 presents the calculated metric for each survey event and protocol. The results are discussed in more detail below. Metrics for the Continuous Monitoring protocol were not calculated due to a lack of usable abundance data.

**Table 7 – Comparison of the Abundance and Mass Loading Metrics using the HEPO and IRO protocols**

| | | HEPO Protocol | | | IRO Protocol | | |
|---|---|---|---|---|---|---|---|
| Location | Date | Abundance (items/ft$^2$) | Mass Loading (lbs/ ft$^2$) | Duration (min.) | Abundance (items/ft$^2$) | Mass Loading (lbs/ ft$^2$) | Duration (min.) |
| Main St. Bridge | 5/26/2016 | 0.0000746 | 0.000031 | 15 | 0.0001045 | 0.000038 | 25 |
| | 6/1/2016 | 0.0002985 | 0.000074 | 20 | 0.0002239 | 0.000104 | 45 |
| Hyperion Ave. Pedestrian Bridge | 5/26/2016 | 0.0000498 | 0.000579 | 15 | 0.0000498 | 0.000583 | 15 |
| | 6/1/2016 | 0.0000199 | 0.000568 | 25 | 0.0001294 | 0.000586 | 20 |
| Colorado St. Bridge | 5/26/2016 | 0.0000543 | 0.000007 | 10 | 0.0000869 | 0.000011 | 20 |
| | 6/1/2016 | 0.0000109 | 0.0000004 | 15 | 0.0000326 | 0.000004 | 25 |
| Marsh Park | 5/26/2016 | 0.0000095 | 0.0000003 | 15 | --- | --- | 10 |
| | 6/1/2016 | 0.0000286 | 0.000006 | 20 | 0.0000952 | 0.000020 | 40 |

## 6.2 ABUNDANCE METRIC

Trash abundance was calculated by adding up the total number of trash articles observed and dividing by the square footage of the observation area. Trash abundance values per square foot were calculated for both the HEPO and IRO for both observation events. See Attachments 3-1 and 3-2 for a summary of trash articles observed and calculated trash abundance values.

Trash abundance values ranged between approximately 0.0000095 items/ft$^2$ and 0.000298 items/ft$^2$ (the May 26, 2016 IRO for Marsh Park had an abundance metric of 0.00 since no articles of trash were observed during this IRO). Generally, IRO abundance values were higher than HEPO abundance values during an event due to the observers being closer to the trash articles along the sidewalls, access roads, and in the vegetation of the river. Very few trash articles were observed to be floating or stuck in the non-vegetation portions of the river, and those observed appeared weathered and suggesting that they had been in the system for an extended period of time rather than linked to a recent storm event.

## 6.3 MASS LOADING

Mass loading was calculated for both HEPO and IRO for both observation events by assigning a weight for each article of trash observed and calculating the total mass by the square footage of the observation area. Predetermined trash weights are listed with references in Attachment 3-3, and calculated mass loading values are shown in Attachments 3-4 and 3-5. A "miscellaneous" category was used to capture assorted items including apple cores, orange peels, various wrappers, etc. As each new item was added to the category, a new weight was determined for that item using a hand-held scale, and a new representative weight for the category was then calculated.

Mass loading values ranged between approximately 0.0000003 lb/ft$^2$ and 0.000586 lb/ft$^2$ (the May 26, 2016 IRO for Marsh Park had a mass loading of 0.00 since no articles of trash were observed during this IRO). Similar to abundance values, generally IRO mass loading values were higher than HEPO abundance values due to the observers being closer to the trash articles along the sidewalls, access roads, and in the river and vegetation. The highest mass loading values were observed at the pedestrian bridge north of Hyperion Avenue due to a large plastic trash can and a metal shopping cart observed to be stuck in the river during both observation dates. All other articles of trash observed at all four sites were of much lighter weight.

# 7.0 CONCLUSIONS AND RECOMMENDATIONS

## 7.1 DETERMINATION OF TRASH SOURCES

Both the HEPO and IRO protocols were useful in determining trash sources. In both types of observations, it appeared that very little, if any, trash was entering the river from the outfalls. This is based on the outfalls being dry during the observation events and that none of the locations showed trash accumulations directly below the outfalls. The trash that was found appeared to be present from other sources such as wind-blown and littering from human traffic along the river. Trash was often found accumulated against barriers near the top of the observation areas. This was indicative of a wind-blown source for much of the trash.

The CM protocol could also potentially provide better sourcing data if the perspective area selected were more limited. As implemented in this Pilot Study however, the wide angle needed to capture the full 300 feet length of the survey area necessarily limited the detail available to utilize the video for determining trash sources.

## 7.2 SCALABILITY OF PROTOCOLS

Both the HEPO and IRO protocols appear to be scalable for use in larger studies. This is based on the training time and implementation time requirements for these protocols. Training time for both protocols is very short, less than two hours for each. Implementation time for each event was also relatively short, as seen in Table 7. However the average time to conduct an IRO survey event, approximately 25 minutes, was approximately 8 minutes longer than the average time needed for a HEPO event of approximately 17 minutes. The additional time for the IRO events were due to taking river depth and velocity readings, as well as measuring for debris flowing in the river.

## 7.3 REPRODUCIBILITY OF RESULTS

As shown in Table 7, both the abundance per square foot metric and the mass-loading metric were usually larger for the IRO surveys than for the HEPO surveys. This makes sense given the closer proximity of the survey technicians to the trash in the IRO events. Finding more trash provides more validity to the IRO protocol and should justify the extra time needed to execute this type of survey. The IRO protocol could be expanded to include both sides of the river as long as access to both sides is possible.

## 7.4 RECOMMENDED PROTOCOL

The recommendation of this report is to employ the IRO protocol for full implementation of the TMRP. The IRO protocol provides the survey team with closer proximity to the observation area and offers multiple vantage points within the observation area relative to the HEPO protocol. The net result is generally higher abundance totals. The IRO protocol also provides for the collection of river data including river depth, velocity, and entrained trash that may prove useful as the TMRP is implemented across the entire watershed where a greater diversity of locations will be encountered. It is also recommended that the IRO be performed, whenever possible, on both sides of the river. Although traversing the river adds additional time, it provides an increased ability to quantify and characterize trash components. However in certain circumstances time or access issues may make it difficult to visit both sides of the river. In those cases, it may be warranted to perform at least a HEPO protocol for the second side if an elevated observation point is obtainable from a bridge, bank, or other vantage point.

BOS should consider some additional study as warranted to continue to investigate some other questions that were revealed through this Pilot Study, including:

- Are there locations where the time-lapse benefits of the CM protocol could be used more successfully? This could include areas of limited size where the camera could be focused on a smaller area and thus give better resolution for identifying trash impacts and sources.
- Are the data metrics used in this study appropriate for scaling to the larger study? Mass loading may be problematic when one or two large trash items present (e.g., shopping carts, other pieces of metal) can skew this metric repeatedly. Some consideration was given to a percent cover metric but this tended to produce very small numbers that were hard to compare meaningfully. Other metrics could be devised or more research invested into what are the appropriate metrics.
- Has the limited number of locations in this study provided enough data to ensure successful scalability? This pilot study was conducted across four locations. This is a relatively small data set from which to extrapolate to the needs of a full scale TMRP that could conceivably apply to hundreds of locations. Consideration may be warranted to the development of a second phase of this study to further test the implementation of the recommendations on a more numerous and diverse set of locations. This may provide further insights into the true scalability of the protocol on a watershed-wide scale. Some areas that could be added for testing include low-flow regions such as river tributaries where there may be unique access and observation issues. Additional focus may also be warranted on locations in the Ballona Creek watershed that will also be captured in the BOS TMRP requirements.

## 8.0 REFERENCES

Weston Solutions, Inc., 2007. Monitoring Workplan for the Assessment of Trash in San Diego County Watersheds. August 30.

California Regional Water Quality Control Board, Los Angeles Region, 2015. Proposed Amendment to the Water Quality Control Plan for the Los Angeles Region to revise3 the Los Angeles River Watershed Trash TMDL.

California Regional Water Quality Control Board, Los Angeles Region, 2012. Order no. R4-2012-0175 as amended by State Board Order WQ 2015-0075 NPDES Permit No. CAS004001, Waste Discharge Requirements For Municipal Separate Storm Sewer Systems (MS4) Discharges Within The Coastal Watersheds of Los Angeles County, Except Those Discharges Originating From The City of Long Beach MS4

California Regional Water Quality Control Board, Los Angeles Region, 2012. Attachment F – Fact Sheet, Order no. R4-2012-0175 as amended by State Board Order WQ 2015-0075 NPDES Permit No. CAS004001, Waste Discharge Requirements For Municipal Separate Storm Sewer Systems (MS4) Discharges Within The Coastal Watersheds of Los Angeles County, Except Those Discharges Originating From The City of Long Beach MS4

# ATTACHMENT 1

## Field Photos of Monitoring Site Locations

1-1 Main Street Bridge Location – Field Photos
1-2 Pedestrian Bridge Location North of Hyperion Avenue – Field Photos
1-3 Colorado Street Bridge Location – Field Photos
1-4 Marsh Park Location – Field Photos

# PHOTO LOG

| | | | |
|---|---|---|---|
| **Client:** | Los Angeles Bureau of Sanitation | **Site Address:** | Main Street Bridge |
| **Project:** | Trash Receiving Monitoring Protocols Pilot Study | **Location:** | Los Angeles, California |
| **Site Name:** | Los Angeles River | **Date Taken:** | May 26 and June 1, 2016 |


Photograph # 1
Looking west at the river channel from the Main Street Bridge.

Photograph # 2
Looking east at Main Street Bridge from within the river channel.

# PHOTO LOG

| | | | |
|---|---|---|---|
| **Client:** | Los Angeles Bureau of Sanitation | **Site Address:** | Main Street Bridge |
| **Project:** | Trash Receiving Monitoring Protocols Pilot Study | **Location:** | Los Angeles, California |
| **Site Name:** | Los Angeles River | **Date Taken:** | May 26 and June 1, 2016 |


Photograph # 3

Looking at miscellaneous trash debris below the outfall beneath the Main Street Bridge.


Photograph # 4

View of the crude oil seeping from the sides within the river channel.

# PHOTO LOG

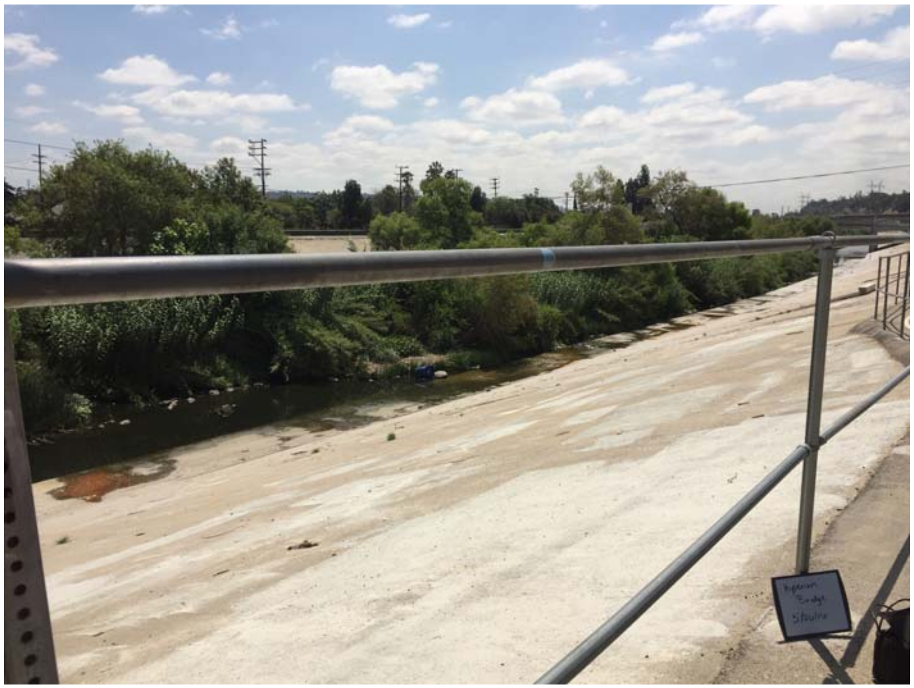
| | | | |
|---|---|---|---|
| **Client:** | Los Angeles Bureau of Sanitation | **Site Address:** | Main Street Bridge |
| **Project:** | Trash Receiving Monitoring Protocols Pilot Study | **Location:** | Los Angeles, California |
| **Site Name:** | Los Angeles River | **Date Taken:** | May 26 and June 1, 2016 |


Photograph # 5
Looking trash along fence line at Main Street location.


Photograph # 6
Rebar within the Main Street Bridge channel.

# PHOTO LOG

| | | | |
|---|---|---|---|
| **Client:** | Los Angeles Bureau of Sanitation | **Site Address:** | Pedestrian Bridge |
| **Project:** | Trash Receiving Monitoring Protocols Pilot Study | **Location:** | Los Angeles, California |
| **Site Name:** | Los Angeles River | **Date Taken:** | May 26 and June 1, 2016 |



Photograph # 1
Looking south from the Pedestrian Bridge at the river channel


Photograph # 2
View of the plastic trash bin within the river on the west side of the channel.

# PHOTO LOG

| | | | |
|---|---|---|---|
| **Client:** | Los Angeles Bureau of Sanitation | **Site Address:** | Pedestrian Bridge |
| **Project:** | Trash Receiving Monitoring Protocols Pilot Study | **Location:** | Los Angeles, California |
| **Site Name:** | Los Angeles River | **Date Taken:** | May 26 and June 1, 2016 |

Photograph # 3
Looking south from the Pedestrian Bridge within the river channel at the trash debris within the river. Clothing, trash bin, and shopping cart can be seen.

Photograph # 4
View of the trash catcher on the storm drain near the Pedestrian Bridge location.

# PHOTO LOG

| | | | |
|---|---|---|---|
| **Client:** | Los Angeles Bureau of Sanitation | **Site Address:** | Pedestrian Bridge |
| **Project:** | Trash Receiving Monitoring Protocols Pilot Study | **Location:** | Los Angeles, California |
| **Site Name:** | Los Angeles River | **Date Taken:** | May 26 and June 1, 2016 |


Photograph # 5
Looking north at the Pedestrian Bridge from the east side of the channel. View of the sand bag barrier and walking path. Trash debris observed on the outside of the barrier.

Photograph # 6
Looking at the river channel and Pedestrian Bridge from the east side.

# PHOTO LOG

| | | | |
|---|---|---|---|
| **Client:** | Los Angeles Bureau of Sanitation | **Site Address:** | Colorado Street Bridge |
| **Project:** | Trash Receiving Monitoring Protocols Pilot Study | **Location:** | Los Angeles, California |
| **Site Name:** | Los Angeles River | **Date Taken:** | May 26 and June 1, 2016 |

Photograph # 1
Looking south at the Colorado Street Bridge and river channel on the west side.

Photograph # 2
Looking south at the Colorado Street Bridge and river channel on the east side.

# PHOTO LOG

| | | | |
|---|---|---|---|
| **Client:** | Los Angeles Bureau of Sanitation | **Site Address:** | Colorado Street Bridge |
| **Project:** | Trash Receiving Monitoring Protocols Pilot Study | **Location:** | Los Angeles, California |
| **Site Name:** | Los Angeles River | **Date Taken:** | May 26 and June 1, 2016 |

Photograph # 3
View of the trash debris observed within the vegetation.

Photograph # 4
View of the homeless encampment beneath the Colorado Street Bridge.

# PHOTO LOG

| | | | |
|---|---|---|---|
| **Client:** | Los Angeles Bureau of Sanitation | **Site Address:** | Colorado Street Bridge |
| **Project:** | Trash Receiving Monitoring Protocols Pilot Study | **Location:** | Los Angeles, California |
| **Site Name:** | Los Angeles River | **Date Taken:** | May 26 and June 1, 2016 |

Photograph # 5
View of trash debris in the river and within the vegetation.

Photograph # 6
Looking at the outfall located on the east side of the channel.

# PHOTO LOG

| | | | |
|---|---|---|---|
| **Client:** | Los Angeles Bureau of Sanitation | **Site Address:** | Marsh Park |
| **Project:** | Trash Receiving Monitoring Protocols Pilot Study | **Location:** | Los Angeles, California |
| **Site Name:** | Los Angeles River | **Date Taken:** | May 26 and June 1, 2016 |


Photograph # 1
Looking east at the at the river channel from Marsh Park.

Photograph # 2
Looking at the river channel from within the river channel.

# PHOTO LOG

| | | | |
|---|---|---|---|
| **Client:** | Los Angeles Bureau of Sanitation | **Site Address:** | Marsh Park |
| **Project:** | Trash Receiving Monitoring Protocols Pilot Study | **Location:** | Los Angeles, California |
| **Site Name:** | Los Angeles River | **Date Taken:** | May 26 and June 1, 2016 |

Photograph # 3
Looking at the river channel.

Photograph # 4
Looking at the outfall located on the south side of the river channel.

# PHOTO LOG

| | | | |
|---|---|---|---|
| **Client:** | Los Angeles Bureau of Sanitation | **Site Address:** | Marsh Park |
| **Project:** | Trash Receiving Monitoring Protocols Pilot Study | **Location:** | Los Angeles, California |
| **Site Name:** | Los Angeles River | **Date Taken:** | May 26 and June 1, 2016 |

Photograph # 5
Trash debris located on the bank at Marsh Park location.

Photograph # 6
View of the north side of the river channel.

# ATTACHMENT 2

## Field Methodology

## High Elevation Point Observation

1. This protocol should be conducted by at least two people, each equipped with working cell phones to allow for communication with each other and for outside parties for coordination, and in case of the event of an emergency.
2. Drive to predetermined bridge location and park in a safe spot close to or on the bridge.
3. Walk to the designated observation point on bridge. If this is the first visit, record GPS coordinates.
4. Fixed point demarcations on the river or banks should be selected at approximately 300 feet, so that repeated observations are made consistently in the same sight range and of the same observation area.
   a. If no demarcations are available, placement of paint stripes or other semi-permanent markers should be made during the initial visit.
5. Locate fixed demarcation point on river or river bank.
   b. Take an overview photographs of the entire 300-foot zone
   c. Take as many additional photographs as necessary to capture all observable trash impacts in the river and on the river banks.
6. After completion of the photographic record, observations of trash impacts should be recorded.
   d. Tablet-based observation record noting types, quantities, approximate locations (river, banks, floating, submerged, etc.) (see attached form).
7. When complete, return to vehicle and proceed to the next designated bridge observation location.

<u>Field QA/QC</u>

- First and second staff from the observation team should compare observations.
- Have third party staff review observation notes.

<u>Data Review and Reporting</u>

- Download photos and observation data.
- Enter into spreadsheet.
- After data is transferred to the spreadsheet, have an independent staff review for errors.
- Perform calculations for metrics using pre-determined weight table for standardization. If no pre-determined weight exists for new items, research and/or perform measurements to add to table.
- Example calculation for Abundance metric = (Total abundance number) / (Observation area in square feet)
- Example calculation for Mass Loading = Sum [(Abundance by category) x (Category standard weight)] / (Observation Area in square feet)
- Produce monitoring report/graph.

## In-River Observation Protocol

The locations will be selected to optimize the potential for capture of trash impacts from sources that could be hidden from bridge vantage points, such as homeless encampments, illicit dumping locations, and recreational areas. The protocol designed for these locations will allow for a closer inspection of the trash impacts to the river, and possibly better quantification of the floating, submerged, and partially submerged trash components present. For each location, a transect line across the river perpendicular to the river flow will be designated from one fixed point on the near bank to another fixed point on the opposing bank. This transect line will be the consistent line for trash observation as well as flow and trash measurements.

1. This protocol should always be conducted by at least two people, each equipped with working cell phones to allow for communication with each other and for outside parties for coordination, and in case of emergencies.
2. Drive to the closest available parking location for the designated in-river location. Park safely and call the project manager to alert that you are about to enter the river location.
3. Fixed point demarcations on the river or banks should be selected at approximately 300 feet, so that repeated observations are made consistently in the same sight range and of the same observation area.
    a. If no demarcations are available, placement of paint stripes or other semi-permanent markers should be made during the initial visit.
4. Locate fixed demarcation point on river or river bank.
    a. Take an overview photographs of the entire 300-foot zone
    b. Take as many additional photographs as necessary to capture all observable trash impacts in the river and on the river banks.
5. After completion of the photographic record, observations of trash impacts should be recorded.
    a. Tablet-based observation record noting types, quantities, approximate locations (river, banks, floating, submerged, etc.) (see attached form).
6. Proceed to record the river flow velocity and up to 3 different points from the shoreline along the transect line, e.g., 1 foot, 2 feet, and 3 feet.
    a. Flow velocity measurements should be made one foot from the shoreline and from the center of the river. Use an extension rod to insert the meter into the river at the selected distances as needed to minimize disturbance to the natural flow patterns.
    b. Record the flow velocity measurements in the appropriate section of the data table on the tablet.
7. Initiate the suspended trash monitoring from the shoreline along the transect line.
    a. Insert the portable net at a fixed location in the river flow just deep enough to fully submerge the entire net surface.
    b. Hold this position for approximately 5 minutes to allow for trash particles to accumulate in the net.
    c. After 5 minutes, remove the net and assess the accumulated material for trash components. Natural materials such as moss, algae, sticks, or twigs should be ignored.
    d. Count each type of debris and record the findings in the appropriate data table on the tablet.
    e. Using the same procedure, repeat the in-river collection at a point on the opposite side of the river.

8. When assessments are completed, gather all materials and return with partner to the vehicle. Call the project manager just before leaving the site to communicate your safe exit from the site.

Field QA/QC

- First and second staff from the observation team should compare observations.
- Have third party staff review observation notes.

Data Review and Reporting

- Download photos and observation data.
- Enter into spreadsheet.
- After data is transferred to the spreadsheet, have an independent staff review for errors.
- Perform calculations for metrics using pre-determined weight table for standardization. If no pre-determined weight exists for new items, research and/or perform measurements to add to table.
- Produce monitoring report/graph.

# ATTACHMENT 3

## Data Analyses by Metric

**Table 3-1**

**TRASH ABUNDANCE**
**May 26 , 2016**
**Main Street Bridge, Hyperion Avenue Pedestrian Bridge, Colorado Street Bridge, and March Park**
**Los Angeles, CA**

| Site | Observation | Locaton | Types of Debris | Total | Abundance/ $ft^2$ |
|---|---|---|---|---|---|
| Main Street | Elevated | Left Bank | Plastic (1), Wood (1) | 2 | |
| | | Right Bank | Plastic (1), Paper (2) | 3 | |
| | | River | No Trash Observed | 0 | |
| | | Vegetation | No Vegetation | 0 | |
| | | Other | Not observed | 0 | |
| | | | | Subtotal = 5 | 0.00007 |
| | In River | Left Bank | Wood (1) | 1 | |
| | | Right Bank | Cloths (1), Plastic Bottle (1), Plastic (2), Rebar (1), Aluminum Foil (1) | 6 | |
| | | River | No Trash Observed | 0 | |
| | | Vegetation | No Vegetation | 0 | |
| | | Other | Not observed | 0 | |
| | | | | Subtotal = 7 | 0.00010 |
| Hyperion Avenue (Pedestrian Bridge) | Elevated | Left Bank | Not observed | 0 | |
| | | Right Bank | Plastic Bag (1), Miscellaneous (1) | 2 | |
| | | River | Plastic Trash Can (1), Metal Shopping Cart (1) | 2 | |
| | | Vegetation | Paper (1) | 1 | |
| | | Other | Not observed | 0 | |
| | | | | Subtotal = 5 | 0.00005 |
| | In River | Left Bank | Not observed | 0 | |
| | | Right Bank | Cloth (1), Plastic Bag (1), Miscellaneous (1) | 3 | |
| | | River | Plastic Trash Can (1), Metal Shopping Cart (1) | 2 | |
| | | Vegetation | Not observed | 0 | |
| | | Other | Not observed | 0 | |
| | | | | Subtotal = 5 | 0.00005 |
| Colorado Street | Elevated | Left Bank | Not observed | 0 | |
| | | Right Bank | Miscellaneous (5) | 5 | |
| | | River | Not observed | 0 | |
| | | Vegetation | Not observed | 0 | |
| | | Other | Trash along northern ledge of Colorado Street Bridge, to the right of barrier wall along eastern sidewall | 0 | |
| | | | | Subtotal = 5 | 0.00005 |
| | In River | Left Bank | Not observed | 0 | |
| | | Right Bank | Miscellaneous (4) | 4 | |
| | | River | Not observed | 0 | |
| | | Vegetation | Miscellaneous (4) | 4 | |
| | | Other | Not observed | 0 | |
| | | | | Subtotal = 8 | 0.00009 |
| Marsh Park | Elevated | Left Bank | Not observed | 0 | |
| | | Right Bank | Not observed | 0 | |
| | | River | Not observed | 0 | |
| | | Vegetation | Plastic (1) | 1 | |
| | | Other | Not observed | 0 | |
| | | | | Subtotal = 1 | 0.00001 |
| | In River | Left Bank | Not observed | 0 | |
| | | Right Bank | Not observed | 0 | |
| | | River | Not observed | 0 | |
| | | Vegetation | Not observed | 0 | |
| | | Other | Not observed | 0 | |
| | | | | Subtotal = 0 | 0.00000 |

**Table 3-2**

**TRASH ABUNDANCE**
**June 1, 2016**
**Main Street Bridge, Hyperion Avenue Pedestrian Bridge, Colorado Street Bridge, and March Park**
**Los Angeles, CA**

| Site | Observation | Locaton | Description | | Total | Abundance/ ft$^2$ |
|---|---|---|---|---|---|---|
| Main Street | Elevated | Left Bank | Paper (3), Wood (1), Miscellaneous (3) | 7 | | |
| | | Right Bank | Paper (5), Wood (1) | 6 | | |
| | | River | No Trash Observed | 0 | | |
| | | Vegetation | No Vegetation | 0 | | |
| | | Other | Paper (1) and Miscellaneous (3) to left of left bank. Paper (3) to right of right bank. | 7 | | |
| | | | | | Subtotal = 20 | 0.00030 |
| | In River | Left Bank | Paper (1), Cloth (1) | 2 | | |
| | | Right Bank | Plastic (4), Paper (4), Wood (2), Glass (2) | 12 | | |
| | | River | Pen (1) | 1 | | |
| | | Vegetation | No Vegetation | 0 | | |
| | | Other | Not observed | 0 | | |
| | | | | | Subtotal = 15 | 0.00022 |
| Hyperion Avenue (Pedestrian Bridge) | Elevated | Left Bank | Not observed | 0 | | |
| | | Right Bank | Plastic (1) | 1 | | |
| | | River | Metal Shopping Cart (1) | 1 | | |
| | | Vegetation | Not observed | 0 | | |
| | | Other | Not observed | 0 | | |
| | | | | | Subtotal = 2 | 0.00002 |
| | In River | Left Bank | Not observed | 0 | | |
| | | Right Bank | Plastic (8), Paper (1), Cloth (2), Miscellaneous (1) | 12 | | |
| | | River | Metal Shopping Cart (1) | 1 | | |
| | | Vegetation | Not observed | 0 | | |
| | | Other | Not observed | 0 | | |
| | | | | | Subtotal = 13 | 0.00013 |
| Colorado Street | Elevated | Left Bank | Not observed | 0 | | |
| | | Right Bank | Not observed | 0 | | |
| | | River | Not observed | 0 | | |
| | | Vegetation | Plastic (1) | 1 | | |
| | | Other | Not observed | 0 | | |
| | | | | | Subtotal = 1 | 0.00001 |
| | In River | Left Bank | Not observed | 0 | | |
| | | Right Bank | Not observed | 0 | | |
| | | River | Not observed | 0 | | |
| | | Vegetation | Plastic (1), Miscellaneous (2) | 3 | | |
| | | Other | Not observed | 0 | | |
| | | | | | Subtotal = 3 | 0.00003 |
| Marsh Park | Elevated | Left Bank | Not observed | 0 | | |
| | | Right Bank | Not observed | 0 | | |
| | | River | Not observed | 0 | | |
| | | Vegetation | Miscellaneous (3) | 3 | | |
| | | Other | Not observed | 0 | | |
| | | | | | Subtotal = 3 | 0.00003 |
| | In River | Left Bank | Not observed | 0 | | |
| | | Right Bank | Plastic (4), Paper (2), Glass (1) | 7 | | |
| | | River | Not observed | 0 | | |
| | | Vegetation | Plastic (2), Paper (1) | 3 | | |
| | | Other | Not observed | 0 | | |
| | | | | | Subtotal = 10 | 0.00010 |

**Attachment 3-3**

**ASSISGNED TRASH WEIGHTS**

**May 26 and June 1, 2016**

**Main Street Bridge, Hyperion Avenue Pedestrian Bridge, Colorado Street Bridge, and Marsh Park**

**Los Angeles, CA**

| Trash Type | Selected Weight (lbs) | Reference |
|---|---|---|
| Plastic | 0.03 | Weighed 12"x8" plastic bag |
| Plastic Bottle | 0.03 | Weighed empty 500 mL plastic bottle |
| Paper | 0.01 | Weighted 8.5"x11" piece of paper |
| Cloth | 0.44 | Weighted mens large polo shirt |
| Rebar | 1.83 | For 2' length as observed in field, researched and averaged weight of #8 and #9 rebar using Steel Rebar Size Chart |
| Aluminum Soda/Beer Can | 0.03 | Weighed empty soda can |
| Glass Bottle | 1.10 | Researched weight of empty wine bottle to be on average 500 grams, or 17.6 ounces |
| Metal Shopping Cart | 38.00 | Researched on Premier Carts Website |
| Plastic Trash Can | 20.00 | Researched Toter Residential Heavy Duty 32-Gallon Trash Can on Amazon |
| Wood | 2.00 | For 1' length as observed in field, researched 2x4 has weight of 2 pounds per foot using Home Gardens reference guide |
| Aluminum foil | 0.01 | Weighed 8.5"x11" piece of aluminum foil |
| Miscellaneous | -- | Weight determined by hand held scale in the field |

**Attachment 3-4**

**MASS LOADING**
**May 26 , 2016**
**Main Street Bridge, Hyperion Avenue Pedestrian Bridge, Colorado Street Bridge, and March Park**
**Los Angeles, CA**

| Site | Observation | Locaton | Plastics | Paper | Cloth | Rebar | Aluminium Can | Glass Bottle | Shopping Cart | Plastic Trash Can | Wood | Aluminum Foil | Miscellaneous | Total | Weight (lbs) | Mass Loading (lbs/ $ft^2$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Main Street | Elevated | Left Bank | 1 | | | | | | | | 1 | | | 2 | 2.03 | |
| | | Right Bank | 1 | 2 | | | | | | | | | | 3 | 0.05 | |
| | | River | | | | | | | | | | | | 0 | 0 | |
| | | Vegetation | | | | | | | | | | | | 0 | 0 | |
| | | Other | | | | | | | | | | | | 0 | 0 | |
| | | | | | | | | | | | | | | | Total Weight= 2.08 | 0.000031 |
| | In River | Left Bank | 3 | | 1 | | | | | | 1 | 1 | | 6 | 2.54 | |
| | | Right Bank | | | | | | | | | | | | 0 | 0 | |
| | | River | | | | | | | | | | | | 0 | 0 | |
| | | Vegetation | | | | | | | | | | | | 0 | 0 | |
| | | Other | | | | | | | | | | | | 0 | 0 | |
| | | | | | | | | | | | | | | | Total Weight= 2.54 | 0.000038 |
| Hyperion Avenue (Pedestrian Bridge) | Elevated | Left Bank | | | | | | | | | | | | 0 | 0 | |
| | | Right Bank | 1 | | | | | | | | | | 1 | 2 | 0.16 | |
| | | River | | | | | | | 1 | 1 | | | | 2 | 58 | |
| | | Vegetation | | 1 | | | | | | | | | | 1 | 0.01 | |
| | | Other | | | | | | | | | | | | 0 | 0 | |
| | | | | | | | | | | | | | | | Total Weight= 58.17 | 0.000579 |
| | In River | Left Bank | | | | | | | | | | | | 0 | 0 | |
| | | Right Bank | 1 | | 1 | | | | | | | | 1 | 3 | 0.6 | |
| | | River | | | | | | | 1 | 1 | | | | 2 | 58 | |
| | | Vegetation | | | | | | | | | | | | 0 | 0 | |
| | | Other | | | | | | | | | | | | 0 | 0 | |
| | | | | | | | | | | | | | | | Total Weight= 58.6 | 0.000583 |
| Colorado Street | Elevated | Left Bank | | | | | | | | | | | | 0 | 0 | |
| | | Right Bank | | | | | | | | | | | 5 | 5 | 0.65 | |
| | | River | | | | | | | | | | | | 0 | 0 | |
| | | Vegetation | | | | | | | | | | | | 0 | 0 | |
| | | Other | | | | | | | | | | | | 0 | 0 | |
| | | | | | | | | | | | | | | | Total Weight= 0.65 | 0.000007 |
| | In River | Left Bank | | | | | | | | | | | | 0 | 0 | |
| | | Right Bank | | | | | | | | | | | 4 | 4 | 0.52 | |
| | | River | | | | | | | | | | | | 0 | 0 | |
| | | Vegetation | | | | | | | | | | | 4 | 4 | 0.52 | |
| | | Other | | | | | | | | | | | | 0 | 0 | |
| | | | | | | | | | | | | | | | Total Weight= 1.04 | 0.000011 |
| Marsh Park | Elevated | Left Bank | | | | | | | | | | | | 0 | 0 | |
| | | Right Bank | | | | | | | | | | | | 0 | 0 | |
| | | River | | | | | | | | | | | | 0 | 0 | |
| | | Vegetation | 1 | | | | | | | | | | | 1 | 0.03 | |
| | | Other | | | | | | | | | | | | 0 | 0 | |
| | | | | | | | | | | | | | | | Total Weight= 0.03 | 0.0000003 |
| | In River | Left Bank | | | | | | | | | | | | 0 | 0 | |
| | | Right Bank | | | | | | | | | | | | 0 | 0 | |
| | | River | | | | | | | | | | | | 0 | 0 | |
| | | Vegetation | | | | | | | | | | | | 0 | 0 | |
| | | Other | | | | | | | | | | | | 0 | 0 | |
| | | | | | | | | | | | | | | | Total Weight= 0 | 0.0000000 |

**Attachment 3-5**

**MASS LOADING**
**June 1, 2016**
**Main Street Bridge, Hyperion Avenue Pedestrian Bridge, Colorado Street Bridge, and March Park**
**Los Angeles, CA**

| Site | Observation | Locaton | Plastics | Paper | Cloth | Rebar | Aluminium Can | Glass Bottle | Shopping Cart | Plastic Trash Can | Wood | Aluminum Foil | Miscellaneous | Total | Weight (lbs) | Mass Loading (lbs/ $ft^2$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Main Street | Elevated | Left Bank | 3 | | | | | | | | 1 | | 3 | 7 | 2.48 | |
| | | Right Bank | | 5 | | | | | | | 1 | | | 6 | 2.05 | |
| | | River | | | | | | | | | | | | 0 | 0 | |
| | | Vegetation | | | | | | | | | | | | 0 | 0 | |
| | | Other | | 4 | | | | | | | | | 3 | 7 | 0.43 | |
| | | | | | | | | | | | | | | | Total Weight= 4.96 | 0.000074 |
| | In River | Left Bank | | 1 | 1 | | | | | | | | | 2 | 0.45 | |
| | | Right Bank | 4 | 4 | | | | 2 | | | 2 | | | 12 | 6.36 | |
| | | River | | | | | | | | | | | 1 | 1 | 0.13 | |
| | | Vegetation | | | | | | | | | | | | 0 | 0 | |
| | | Other | | | | | | | | | | | | 0 | 0 | |
| | | | | | | | | | | | | | | | Total Weight= 6.94 | 0.000104 |
| Hyperion Avenue (Pedestrian Bridge) | Elevated | Left Bank | | | | | | | | | | | | 0 | 0 | |
| | | Right Bank | 1 | | | | | | | | | | | 1 | 0.03 | |
| | | River | | | | | | | 1 | | | | | 1 | 38 | |
| | | Vegetation | | | | | | | | | | | | 0 | 0 | |
| | | Other | | | | | | | | | | | | 0 | 0 | |
| | | | | | | | | | | | | | | | Total Weight= 38.03 | 0.000568 |
| | In River | Left Bank | | | | | | | | | | | | 0 | 0 | |
| | | Right Bank | 8 | 1 | 2 | | | | | | | | 1 | 12 | 1.26 | |
| | | River | | | | | | | 1 | | | | | 1 | 38 | |
| | | Vegetation | | | | | | | | | | | | 0 | 0 | |
| | | Other | | | | | | | | | | | | 0 | 0 | |
| | | | | | | | | | | | | | | | Total Weight= 39.26 | 0.000586 |
| Colorado Street | Elevated | Left Bank | | | | | | | | | | | | 0 | 0 | |
| | | Right Bank | | | | | | | | | | | | 0 | 0 | |
| | | River | | | | | | | | | | | | 0 | 0 | |
| | | Vegetation | 1 | | | | | | | | | | | 1 | 0.03 | |
| | | Other | | | | | | | | | | | | 0 | 0 | |
| | | | | | | | | | | | | | | | Total Weight= 0.03 | 0.0000004 |
| | In River | Left Bank | | | | | | | | | | | | 0 | 0 | |
| | | Right Bank | | | | | | | | | | | | 0 | 0 | |
| | | River | | | | | | | | | | | | 0 | 0 | |
| | | Vegetation | 1 | | | | | | | | | | 2 | 3 | 0.29 | |
| | | Other | | | | | | | | | | | | 0 | 0 | |
| | | | | | | | | | | | | | | | Total Weight= 0.29 | 0.000004 |
| Marsh Park | Elevated | Left Bank | | | | | | | | | | | | 0 | 0 | |
| | | Right Bank | | | | | | | | | | | | 0 | 0 | |
| | | River | | | | | | | | | | | | 0 | 0 | |
| | | Vegetation | | | | | | | | | | | 3 | 3 | 0.39 | |
| | | Other | | | | | | | | | | | | 0 | 0 | |
| | | | | | | | | | | | | | | | Total Weight= 0.39 | 0.000006 |
| | In River | Left Bank | | | | | | | | | | | | 0 | 0 | |
| | | Right Bank | 4 | 2 | | | | 1 | | | | | | 7 | 1.24 | |
| | | River | | | | | | | | | | | | 0 | 0 | |
| | | Vegetation | 2 | 1 | | | | | | | | | | 3 | 0.07 | |
| | | Other | | | | | | | | | | | | 0 | 0 | |
| | | | | | | | | | | | | | | | Total Weight= 1.31 | 0.000020 |

# ATTACHMENT 4

## Continuous Monitoring Videos on DVD

# APPENDIX 1

## Field Training SOP

# FIELD TRAINING SOP

Before executing either the High Elevation Point Observation (HEPO) protocol or the In-River Observation (IRO) protocol, a brief training of the survey team members should be conducted. The following elements should be covered.

General:

Health and Safety:

1. Both protocols are designed to be conducted by a two-man team. Each team member should know where his partner is at all times. Each team member should have a cell phone with him at all times. Before entering and after leaving remote locations the team should communicate with a team leader or project manager in the office to note their location and activity.
2. Care should be taken at all times in and around each river location. Wet and uneven surfaces, vegetation, and limited access points can all cause potential hazards in moving through these locations.
3. Review Health & Safety Plan and Job Safety Analyses for each location.

First Site Assessment:

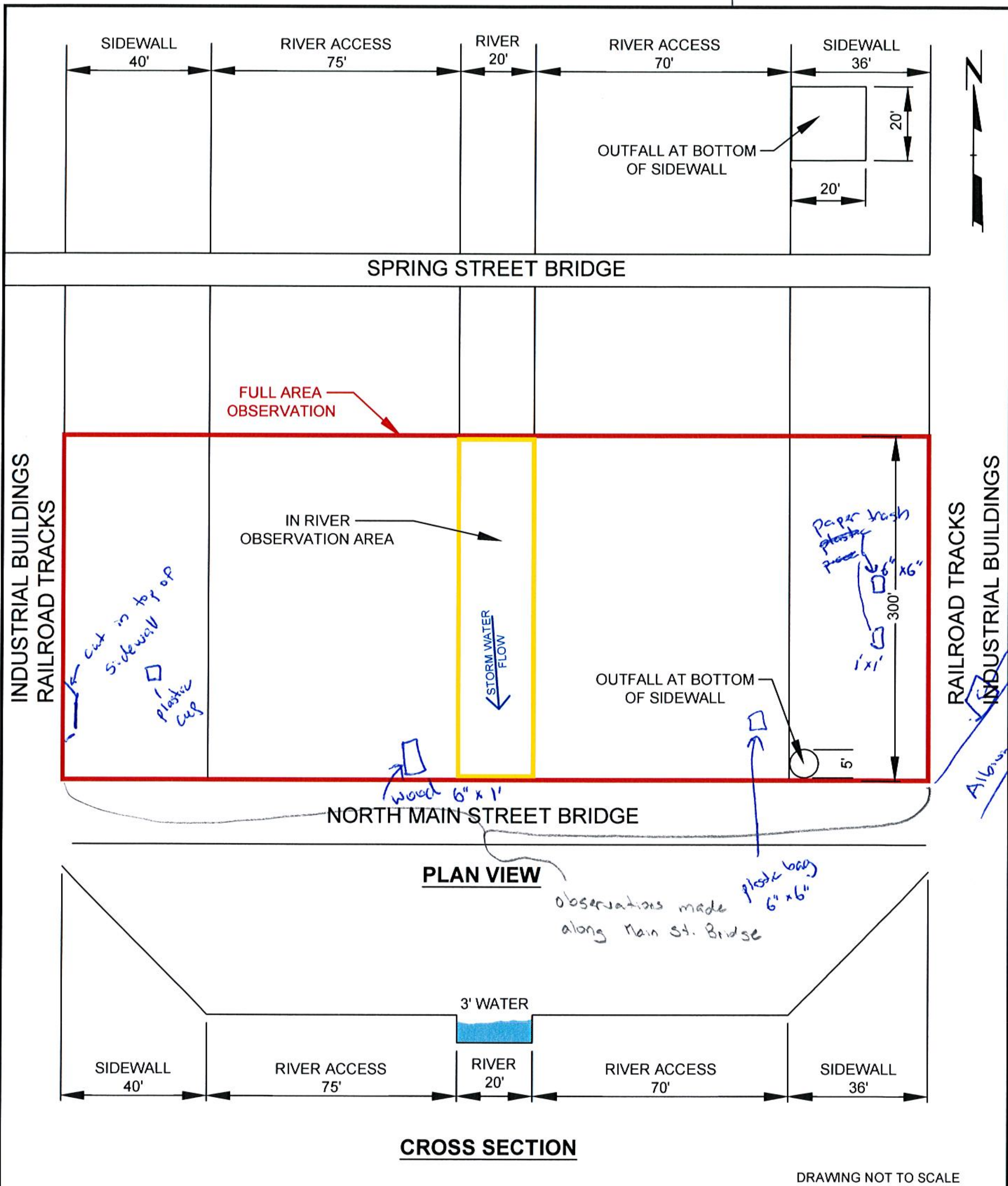
1. Emphasize the importance of first site visit in creating clear demarcations for observation area.
2. Review proper use of forms for documenting barriers, outfalls, vegetation, and river profile.
3. Investigate safe access routes to observation points

Review written HEPO protocol step by step.
Review written IRO protocol step by step.
Review Equipment List needs and assign for purchase any missing items.

# APPENDIX 2

## Field Observation Forms

Main Street Bridge - Observation Only




TRC
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www.trcsolutions.com

PROJECT:
**LOBOS MACHADO LAKE TRASH TMDL-TOS SN-32**
**CITY OF LOS ANGELES, CALIFORNIA**

TITLE:
**OBSERVATION FORM**
**MAIN STREET BRIDGE**

| | |
|---|---|
| DRAWN BY: | RMC |
| CHECKED BY: | DL |
| APPROVED BY: | DL |
| DATE: | 05/20/2016 |
| PROJ. NO.: | 241839.0000.0000 |
| FILE: | Main-Street-Observation.dwg |

**FIGURE**

8.5x11 -- ATTACHED XREFS: -- ATTACHED IMAGES: Aerial-Main St. Main-Scan
DRAWING NAME: L:\Graphics\ProjectsbyName\Lobos Machado Lake\241839-0002\Main Street\ Main-Street-Observation.dwg --- PLOT DATE: May 24, 2016 - 4:57PM --- LAYOUT: Observation Form

**TRASH OBSERVATION FORM**

| | |
|---|---|
| **Site Name** | Main St. Bridge - Bridge Observation |
| **Monitoring Staff** | Anand Helekar, Jonathan Johnson, David Lennon, Dawn (BOS) |
| **Date** | 5/27/16 |
| **Time** | 10:10 am - 10:25 am |

| | | | |
|---|---|---|---|
| **Weather** | Sunny | Partly Cloudy | Overcast |
| **Last Rain (**Must be >72 hours prior to survey event) | | > 72 hrs. | |

| | | | |
|---|---|---|---|
| **River Flow Rate** | No flow | Ponded | Flowing |
| **River Dimensions** | Width (ft) | Depth (ft) | |
| **River Velocity/Flow** | Left Bank | Center | Right Bank |

| | |
|---|---|
| **Surrounding Area Description** | bound to east & west by railroad tracks & industrial buildings |
| **Are Homeless Camps Present?** | YES NO<br>NOTES Homeless encampment at corner of Main St. & Albion Rd to the east of the river. |
| **Are dumped materials present?** | YES NO<br>NOTES |
| | |

TRASH OBSERVATION FORM

**Trash Item Inventory**

| CATEGORY/DESCRIPTION | NUMBER OF ITEMS | | |
|---|---|---|---|
| | RIVER BANK | IN WATER/ FLOATING | IN WATER/ SUBMERGED |
| **PLASTIC** | | | |
| Plastic Bags | \| | | |
| Plastic | [illegible] | | |
| Stryrofoam | \| | | |
| **PAPER** | \|\| | | |
| **METAL** | | | |
| **WOOD** | \| | | |
| **GLASS** | | | |
| **CONCRETE/BRICK** | | | |
| **CLOTH/FABRIC** | | | |
| **RUBBER** | | | |
| **BIOHAZARD** | | | |
| **MISCELLANEOUS** | | | |

**TRASH OBSERVATION FORM**

| | | | |
|---|---|---|---|
| | | | |

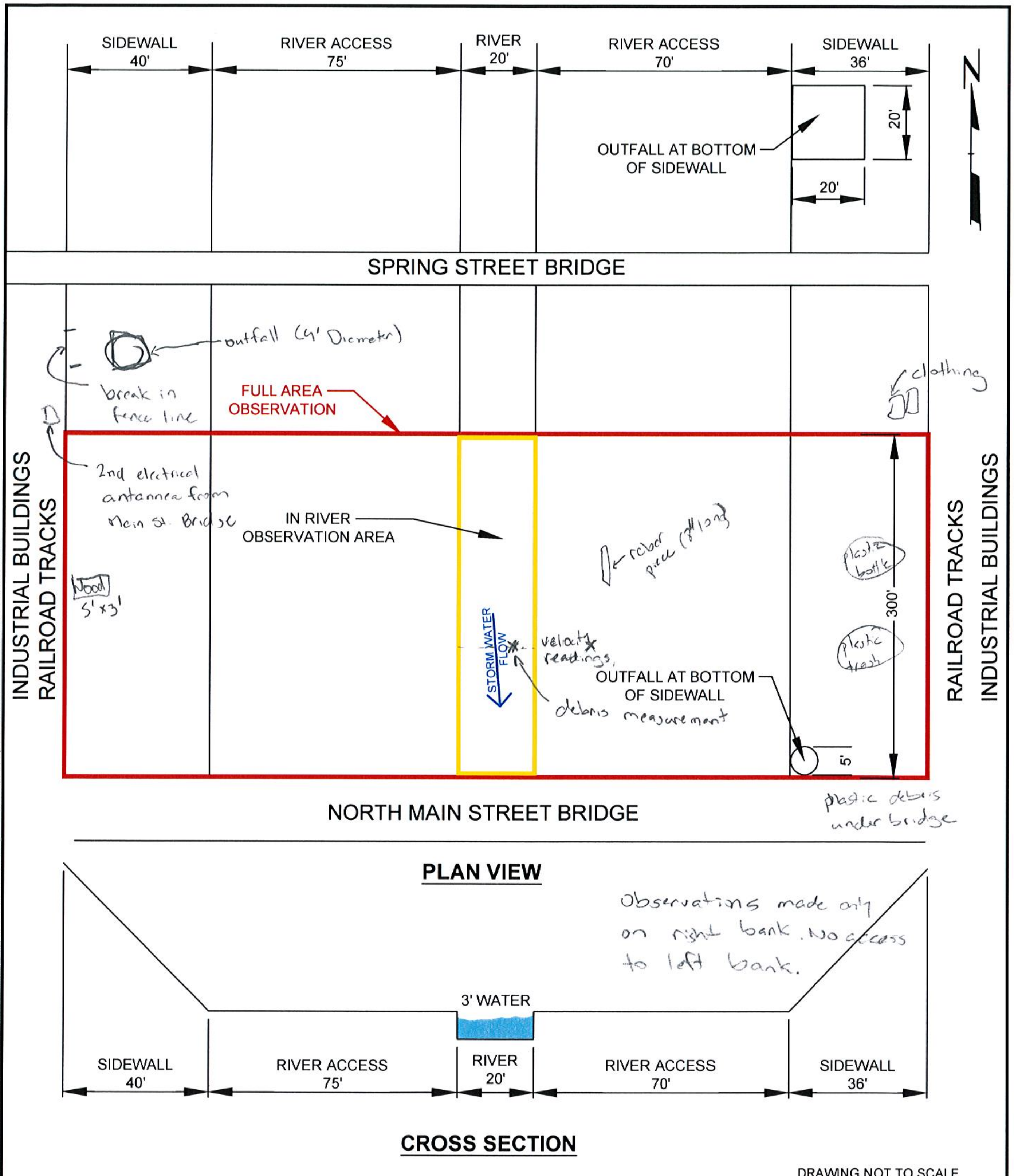
**Category Types**

- Plastic – bags, bottles, cups, six-pack rings, bottle caps
- Paper – card board, newspaper, letter paper
- Metal – cans, metal pipe, rebar
- Wood – lumber, pallets
- Glass – bottles, window
- Biohazard – Diapers, pet waste, dead animals, syringes
- Miscellaneous – appliance, furniture, tires, shopping carts, cigarette butts

**Photo Log**

| PHOTO NUMBER | PHOTO DESCRIPTION |
|---|---|
| 1 | entire 300' section from southeast corner of observation area |
| 2 | entire 300' section looking north from Main St. Bridge |
| 3 | cut in top of western sidewall near Main St. Bridge |
| 4 | piece of wood along western access road near Main St. Bridge |
| 5 | trash along west sidewall fence |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |

Main St. Bridge- In River Observation




| | | |
|---|---|---|
| TRC<br>9685 Research Drive<br>Irvine, CA 92618<br>Phone: 949.727.9336<br>www.trcsolutions.com | PROJECT:<br>**LOBOS MACHADO LAKE TRASH TMDL-TOS SN-32<br>CITY OF LOS ANGELES, CALIFORNIA** | DRAWN BY: RMC<br>CHECKED BY: DL<br>APPROVED BY: DL<br>DATE: 05/20/2016 |
| | TITLE:<br>**OBSERVATION FORM<br>MAIN STREET BRIDGE** | PROJ. NO.: 241839.0000.0000<br>FILE: Main-Street-Observation.dwg<br>**FIGURE** |

8.5x11 — ATTACHED XREFS — ATTACHED IMAGES: Aerial-Main St. Main-Scan
DRAWING NAME: L:\Graphics\ProjectsbyName\Lobos Machado Lake\241839-0002\Main Street\Main-Street-Observation.dwg — PLOT DATE: May 24, 2016 - 4:57PM — LAYOUT: Observation Form

**TRASH OBSERVATION FORM**

| | |
|---|---|
| **Site Name** | Main St. Bridge - In River Observation |
| **Monitoring Staff** | Anand Helekar, Jonathan Johnson, David Lennon, Dawn (BOS) |
| **Date** | 5/26/16 |
| **Time** | 8:30am - 9:15 am |

| | | | |
|---|---|---|---|
| **Weather** | Sunny | Partly Cloudy | Overcast |
| **Last Rain** (Must be >72 hours prior to survey event) | | > 72 hrs. | |

| | | | |
|---|---|---|---|
| **River Flow Rate** | No flow | Ponded | Flowing |
| **River Dimensions** | Width (ft) | Depth (ft)<br>11" deep | |
| **River Velocity/Flow** | Left Bank | Center<br>1.4-1.9 ft/s | Right Bank<br>1.6-2.5 ft/s (3" deep) |

| | |
|---|---|
| **Surrounding Area Description** | trash above western sidewalk along railroad tracks |
| **Are Homeless Camps Present?** | YES NO<br>NOTES |
| **Are dumped materials present?** | YES NO<br>NOTES |
| | Only algae observed with fishing net. |

TRASH OBSERVATION FORM

**Trash Item Inventory**

| CATEGORY/DESCRIPTION | NUMBER OF ITEMS | | |
|---|---|---|---|
| | RIVER BANK | IN WATER/ FLOATING | IN WATER/ SUBMERGED |
| **PLASTIC** | 1 (plastic bottle) | | |
| Plastic Bags | 1 (Photo 2) | | |
| Plastic | 11 (Photo 2,4 | | |
| Stryrofoam | 11 (Photo 2) | | |
| **PAPER** | | | |
| **METAL** | 1 | | |
| **WOOD** | | | |
| **GLASS** | | | |
| **CONCRETE/BRICK** | | | |
| **CLOTH/FABRIC** | | | |
| **RUBBER** | | | |
| **BIOHAZARD** | | | |
| **MISCELLANEOUS** | 1 (Photo 4) aluminum foil | | |

**TRASH OBSERVATION FORM**

| | | | |
|---|---|---|---|
| | | | |

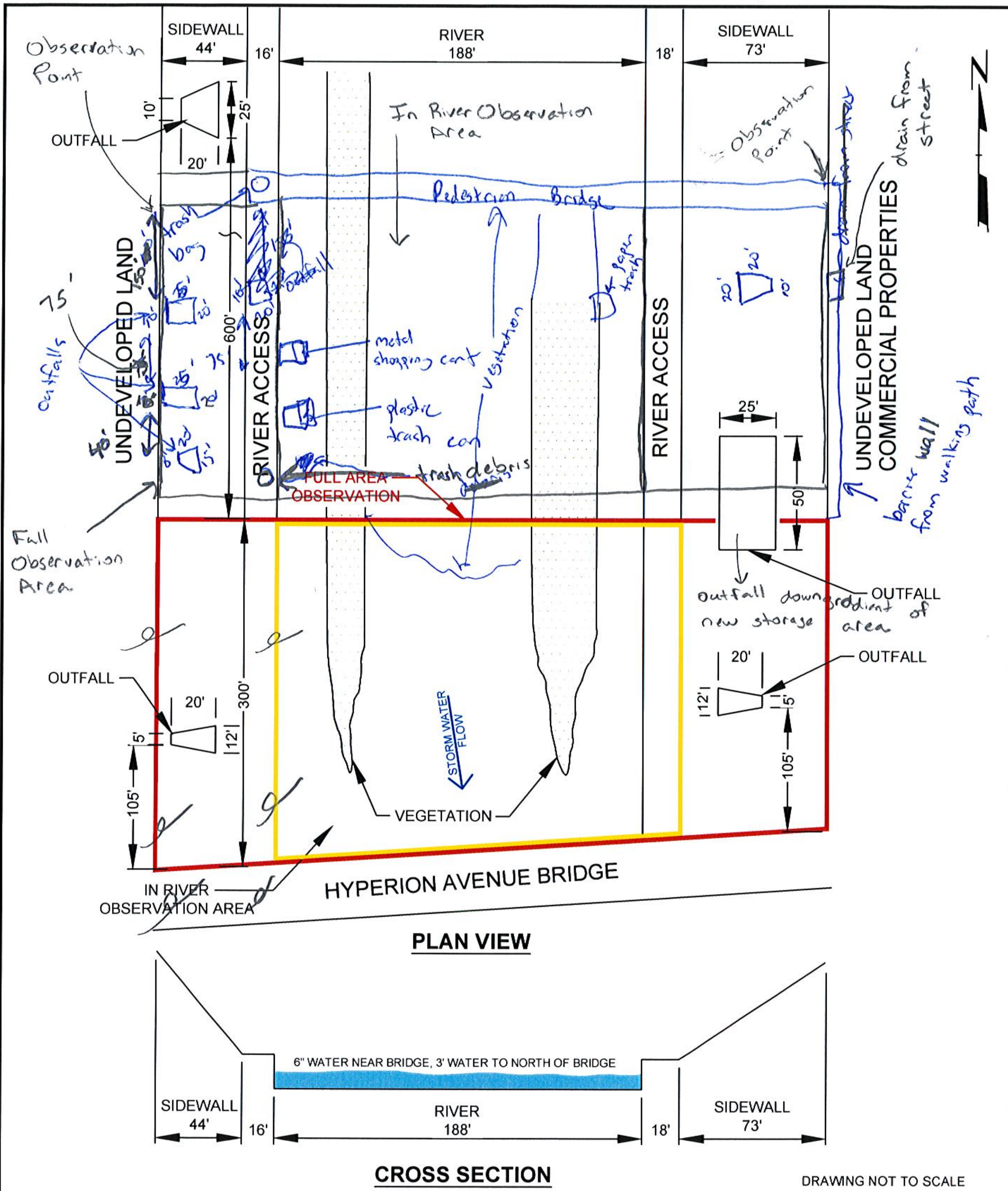
**Category Types**

- Plastic – bags, bottles, cups, six-pack rings, bottle caps
- Paper – card board, newspaper, letter paper
- Metal – cans, metal pipe, rebar
- Wood – lumber, pallets
- Glass – bottles, window
- Biohazard – Diapers, pet waste, dead animals, syringes
- Miscellaneous – appliance, furniture, tires, shopping carts, cigarette butts

**Photo Log**

| PHOTO NUMBER | PHOTO DESCRIPTION |
|---|---|
| 1 | Looking south towards Main Street Bridge |
| 2 | Pieces of plastic near Main St Bridge on eastern access road |
| 3 | Looking north just under Main St. Bridge |
| 4 | aluminum foil under Main St Bridge, other debris under bridge (eastern access road) |
| 5 | oily sheen near Main St. Bridge on eastern access road |
| 6 | 8" long piece of rebar near Main St. Bridge on eastern access road |
| 7 | trash debris along west fence |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |

Hyperion Avenue - Observation Only




DRAWING NOT TO SCALE

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Irvine, CA 92618
Phone: 949.727.9336
www.trcsolutions.com

PROJECT:
**LOBOS MACHADO LAKE TRASH TMDL-TOS SN-32**
**CITY OF LOS ANGELES, CALIFORNIA**

TITLE:
**OBSERVATION FORM**
**HYPERION AVENUE BRIDGE**

| | |
|---|---|
| DRAWN BY: | RMC |
| CHECKED BY: | DL |
| APPROVED BY: | DL |
| DATE: | 05/20/2016 |
| PROJ. NO.: | 241839.0000.0000 |
| FILE: | Hyperion-Ave-Observation.dwg |
| FIGURE | |

DRAWING NAME: L:\Graphics\ProjectsbyName\Lobos Machado Lake\241839-0002\Hyperion Avenue\Hyperion-Ave-Observation.dwg — PLOT DATE: May 25, 2016 - 10:01AM — LAYOUT: Observation Form

**TRASH OBSERVATION FORM**

| | |
|---|---|
| **Site Name** | Pedestrian Bridge ~ Bridge Observation |
| **Monitoring Staff** | Anand Hellecar, Jonathan Johnson, David Lennon, Dawn (BOS) |
| **Date** | 5/26/16 |
| **Time** | 11:00 am 11:15 am |

| | | | |
|---|---|---|---|
| **Weather** | Sunny | Partly Cloudy | Overcast |
| **Last Rain** (Must be >72 hours prior to survey event) | | >72 hrs | |

| | | | |
|---|---|---|---|
| **River Flow Rate** | No flow | Ponded | Flowing |
| **River Dimensions** | Width (ft) | Depth (ft) | |
| **River Velocity/Flow** | Left Bank | Center | Right Bank |

| | |
|---|---|
| **Surrounding Area Description** | bike path along western side |
| **Are Homeless Camps Present?** | YES NO<br>NOTES Homeless encampments closer to Hyperion Bridge (downgradient). |
| **Are dumped materials present?** | YES NO<br>NOTES |
| | |

**TRASH OBSERVATION FORM**

**Trash Item Inventory**

| CATEGORY/DESCRIPTION | NUMBER OF ITEMS | | |
|---|---|---|---|
| | RIVER BANK | IN WATER/ FLOATING | IN WATER/ SUBMERGED |
| **PLASTIC** | | | |
| Plastic Bags | | | |
| Plastic | 1 (trash can) | | |
| Stryrofoam | | | |
| **PAPER** | 1 | | |
| **METAL** | 1 (shopping cart) | | |
| **WOOD** | | | |
| **GLASS** | | | |
| **CONCRETE/BRICK** | | | |
| **CLOTH/FABRIC** | | | |
| **RUBBER** | 1 | | |
| **BIOHAZARD** | | | |
| **MISCELLANEOUS** | 1 | | |

**TRASH OBSERVATION FORM**

| | | | |
|---|---|---|---|
| | | | |

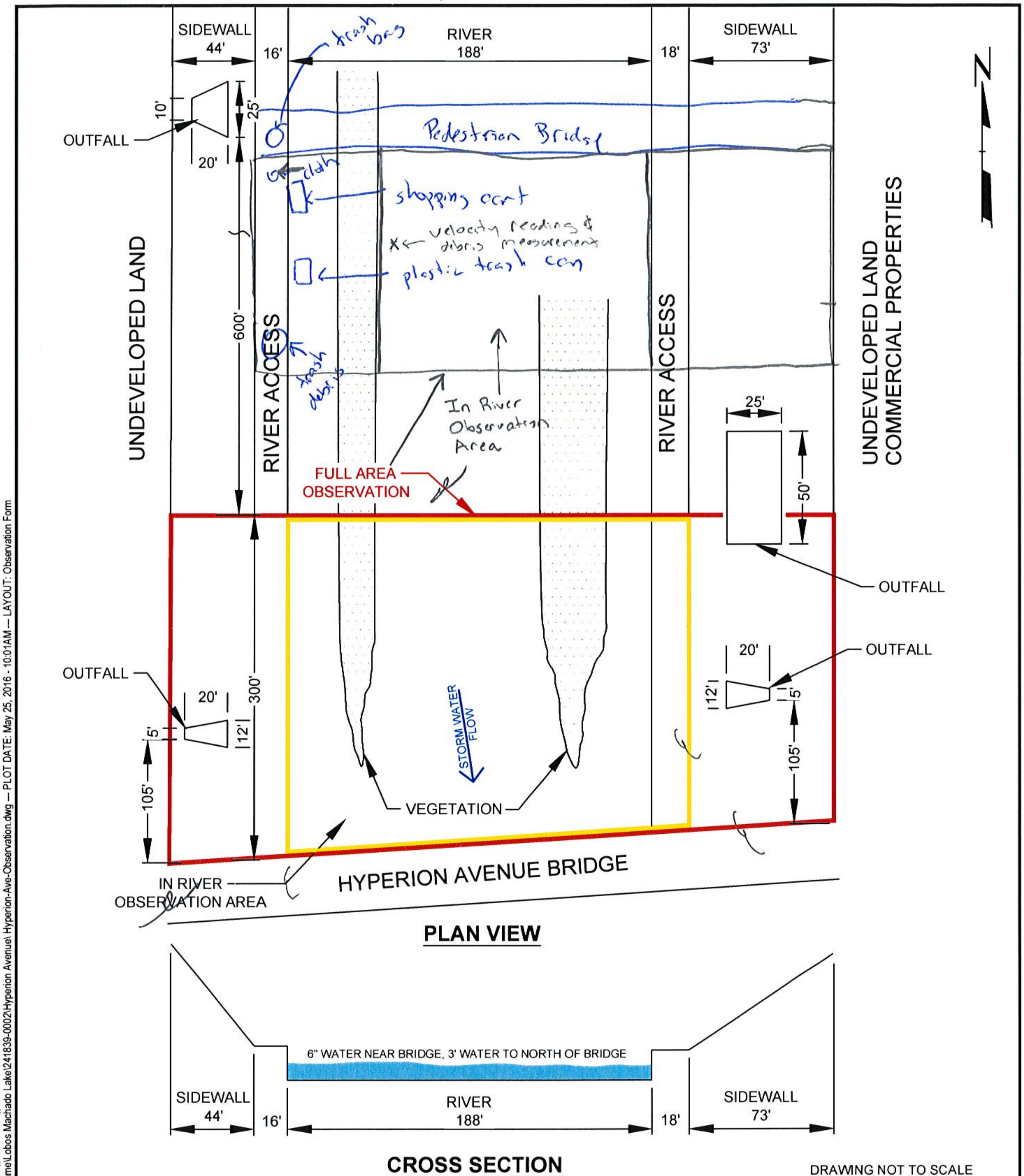
**Category Types**

- Plastic – bags, bottles, cups, six-pack rings, bottle caps
- Paper – card board, newspaper, letter paper
- Metal – cans, metal pipe, rebar
- Wood – lumber, pallets
- Glass – bottles, window
- Biohazard – Diapers, pet waste, dead animals, syringes
- Miscellaneous – appliance, furniture, tires, shopping carts, cigarette butts

**Photo Log**

| PHOTO NUMBER | PHOTO DESCRIPTION |
|---|---|
| 1 | From NW corner of pedestrian bridge, took 300' overview photo |
| 2 | metal shopping cart in river |
| 3 | plastic trash can |
| 4 | drain along eastern edge of river |
| 5 | 300' outlook eastern edge of river |
| 6 | 3' tall barrier wall along eastern edge above sidewall |
| 7 | bag of trash under pedestrian bridge |
| 8 | trash catch on east side of river along intersection of Sunnybrook and West Legion Drive |
| 9 | looking ~~west~~ from east walkway |
| 10 | 300' section from pedestrian bridge toward Hyperion on east side |
| 11 | Sand barriers on east side of channel |
| 12 | |

Hyperion Avenue - In River Observation




DRAWING NOT TO SCALE

| | | |
|---|---|---|
| TRC<br>9685 Research Drive<br>Irvine, CA 92618<br>Phone: 949.727.9336<br>www.trcsolutions.com | PROJECT:<br>**LOBOS MACHADO LAKE TRASH TMDL-TOS SN-32**<br>**CITY OF LOS ANGELES, CALIFORNIA** | DRAWN BY: RMC<br>CHECKED BY: DL<br>APPROVED BY: DL<br>DATE: 05/20/2016 |
| | TITLE:<br>**OBSERVATION FORM**<br>**HYPERION AVENUE BRIDGE** | PROJ. NO.: 241839.0000.0000<br>FILE: Hyperion-Ave-Observation.dwg<br>**FIGURE** |

DRAWING NAME: L:\Graphics\ProjectsbyName\Lobos Machado Lake\241839-0002\Hyperion Avenue\ Hyperion-Ave-Observation.dwg — PLOT DATE: May 25, 2016 - 10:01AM — LAYOUT: Observation Form
8.5x11 — ATTACHED XREFS: — ATTACHED IMAGES: aerial-Hyperion Avenue, Hyperion-Scan

**TRASH OBSERVATION FORM**

| | |
|---|---|
| **Site Name** | Pedestrian Bridge - Hyperion Ave. In River Observation |
| **Monitoring Staff** | A. Helekar, J. Johnson, D. Lennon |
| **Date** | 5/27/16 |
| **Time** | 11:20 - 11:40 am |

| | | | |
|---|---|---|---|
| **Weather** | Sunny | Partly Cloudy | Overcast |
| **Last Rain** (Must be >72 hours prior to survey event) | | 772 hrs. | |

looking south from pedestrian bridge

| | | | |
|---|---|---|---|
| **River Flow Rate** | No flow | Ponded | Flowing |
| **River Dimensions** | Width (ft) | Depth (ft) | |
| **River Velocity/Flow** | Left Bank ~~0.3 ft/sec~~ ~~3' deep~~ | Center | Right Bank 0.3 ft/sec, 3' deep |

| | |
|---|---|
| **Surrounding Area Description** | |
| **Are Homeless Camps Present?** | YES NO<br>NOTES |
| **Are dumped materials present?** | YES NO<br>NOTES trash debris on western river bank. |
| | no debris caught with fishing net |

**TRASH OBSERVATION FORM**

**Trash Item Inventory**

| **CATEGORY/DESCRIPTION** | **NUMBER OF ITEMS** | | |
|---|---|---|---|
| | **RIVER BANK** | **IN WATER/ FLOATING** | **IN WATER/ SUBMERGED** |
| **PLASTIC** | | | |
| Plastic Bags | | | |
| Plastic | 1 (trash can) | | |
| Stryrofoam | | | |
| **PAPER** | | | |
| **METAL** | 1 (shopping cart) | | |
| **WOOD** | | | |
| **GLASS** | | | |
| **CONCRETE/BRICK** | | | |
| **CLOTH/FABRIC** | 1 | | |
| **RUBBER** | | | |
| **BIOHAZARD** | | | |
| **MISCELLANEOUS** | 1 | | |

**TRASH OBSERVATION FORM**

| | | | |
|---|---|---|---|
| | | | |

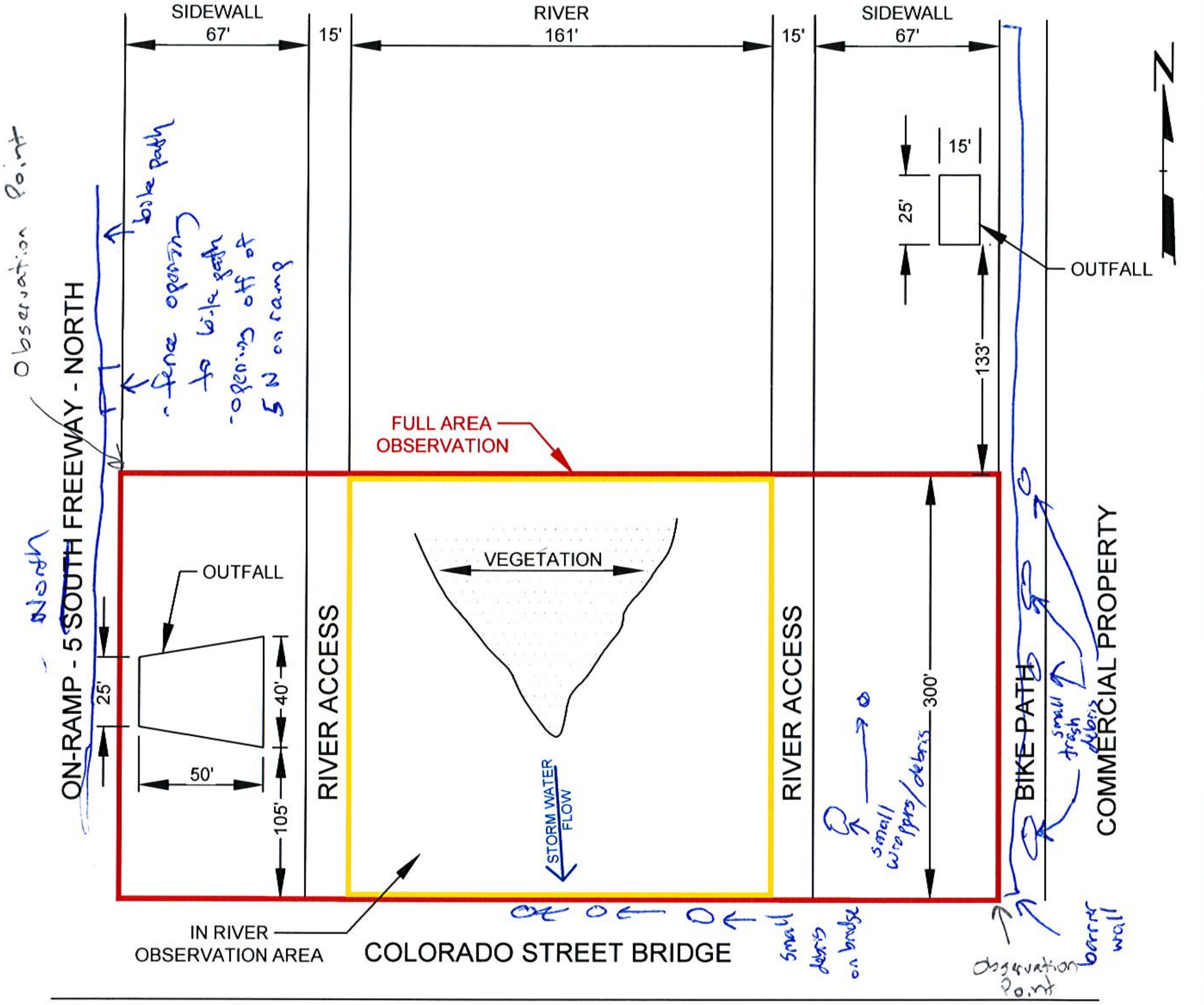
**Category Types**

- Plastic – bags, bottles, cups, six-pack rings, bottle caps
- Paper – card board, newspaper, letter paper
- Metal – cans, metal pipe, rebar
- Wood – lumber, pallets
- Glass – bottles, window
- Biohazard – Diapers, pet waste, dead animals, syringes
- Miscellaneous – appliance, furniture, tires, shopping carts, cigarette butts

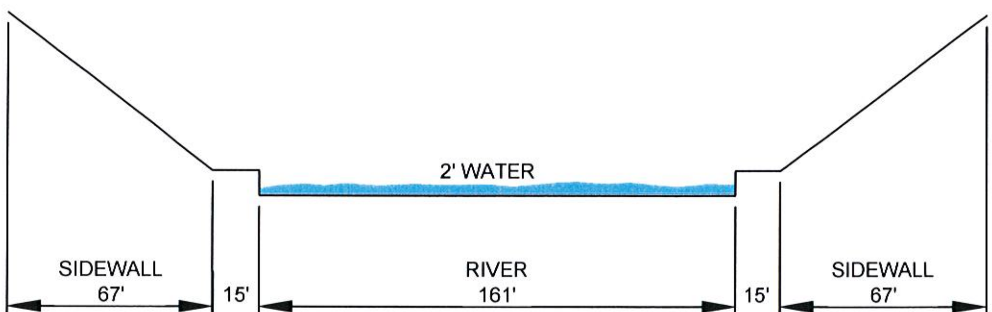
**Photo Log**

| PHOTO NUMBER | PHOTO DESCRIPTION |
|---|---|
| 1 | overview from pedestrian bridge looking south |
| 2 | shopping cart in river |
| 3 | trash can in river |
| 4 | Fishing net - no debris caught |
| 5 | trash debris below outfall |
| 6 | photo of capped outfall on west slope |
| 7 | debris in the vegetation |
| 8 | 300' section looking toward pedestrian bridge |
| 9 | |
| 10 | |
| 11 | |
| 12 | |

Colorado Bridge- Observation Only




**PLAN VIEW**




**CROSS SECTION**

DRAWING NOT TO SCALE

| | | |
|---|---|---|
| TRC<br>9685 Research Drive<br>Irvine, CA 92618<br>Phone: 949.727.9336<br>www.trcsolutions.com | PROJECT:<br>**LOBOS MACHADO LAKE TRASH TMDL-TOS SN-32**<br>**CITY OF LOS ANGELES, CALIFORNIA** | DRAWN BY: RMC<br>CHECKED BY: DL<br>APPROVED BY: DL<br>DATE: 05/20/2016 |
| | TITLE:<br>**OBSERVATION FORM**<br>**COLORADO STREET BRIDGE** | PROJ. NO.: 241839.0000.0000<br>FILE: Colorado-Street-Observation.dwg<br>**FIGURE** |

8.5x11 --- ATTACHED XREFS: --- ATTACHED IMAGES: aerial-Colorado St
DRAWING NAME: L:\Graphics\ProjectsbyName\Lobos Machado Lake\241839-0002\Colorado Street\Colorado-Street-Observation.dwg --- PLOT DATE: May 25, 2016 - 10:17AM --- LAYOUT: Observation Form

**TRASH OBSERVATION FORM**

| | |
|---|---|
| **Site Name** | Colorado Bridge - Bridge ~~Monitoring~~ observation |
| **Monitoring Staff** | A. Helekar, J. Johnson, D. Lennon |
| **Date** | 5/27/16 |
| **Time** | 13:10 - 13:20 |

| | | | |
|---|---|---|---|
| **Weather** | Sunny | Partly Cloudy | Overcast |
| **Last Rain** (Must be >72 hours prior to survey event) | | >72 hrs. | |

| | | | |
|---|---|---|---|
| **River Flow Rate** | No flow | Ponded | Flowing |
| **River Dimensions** | Width (ft) | Depth (ft) | |
| **River Velocity/Flow** | Left Bank | Center | Right Bank |

| | | |
|---|---|---|
| **Surrounding Area Description** | walkway & commercial buildings to east, 5N on ramp to west | |
| **Are Homeless Camps Present?** | YES<br>NOTES | NO |
| **Are dumped materials present?** | YES<br>NOTES | NO |
| | | |

**TRASH OBSERVATION FORM**

**Trash Item Inventory**

| **CATEGORY/DESCRIPTION** | **NUMBER OF ITEMS** | | |
|---|---|---|---|
| | **RIVER BANK** | **IN WATER/ FLOATING** | **IN WATER/ SUBMERGED** |
| **PLASTIC** | | | |
| Plastic Bags | | | |
| Plastic | | | |
| Stryrofoam | | | |
| **PAPER** | | | |
| **METAL** | | | |
| **WOOD** | | | |
| **GLASS** | | | |
| **CONCRETE/BRICK** | | | |
| **CLOTH/FABRIC** | | | |
| **RUBBER** | | | |
| **BIOHAZARD** | | | |
| **MISCELLANEOUS** | ~~IIII~~ | | |

## TRASH OBSERVATION FORM

| | | | |
|---|---|---|---|
| | | | |

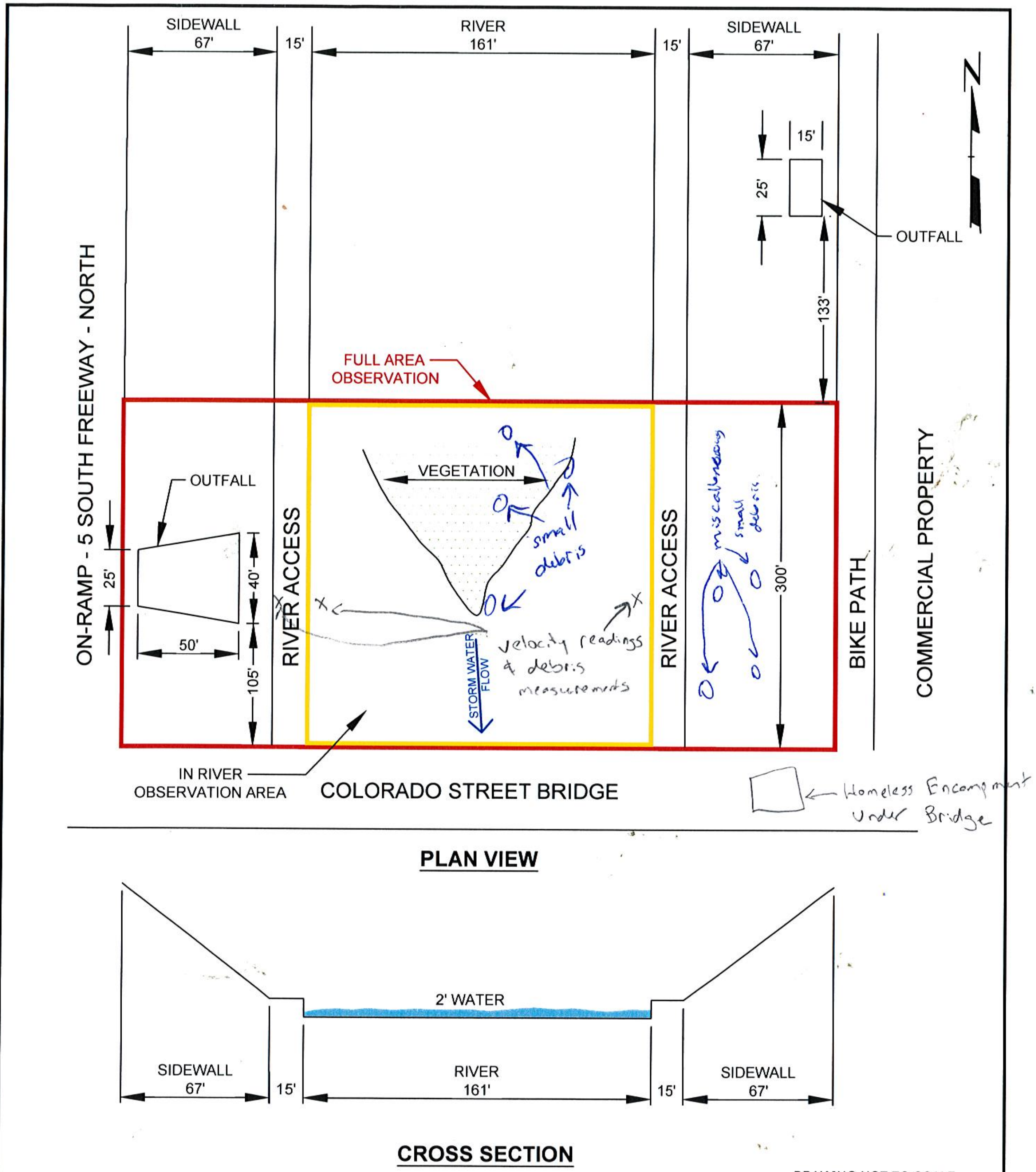
## Category Types

- Plastic – bags, bottles, cups, six-pack rings, bottle caps
- Paper – card board, newspaper, letter paper
- Metal – cans, metal pipe, rebar
- Wood – lumber, pallets
- Glass – bottles, window
- Biohazard – Diapers, pet waste, dead animals, syringes
- Miscellaneous – appliance, furniture, tires, shopping carts, cigarette butts

## Photo Log

| PHOTO NUMBER | PHOTO DESCRIPTION |
|---|---|
| 1 | overview looking north from NE corner of Colorado Bridge |
| 2 | green blockade wall along eastern edge of river |
| 3 | trash along northern edge of bridge |
| 4 | fence opening on western edge off 5N onramp |
| 5 | 300' section along western edge |
| 6 | stormwater trap long western edge |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |

Colorado Bridge - In River Observation

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PROJECT:
LOBOS MACHADO LAKE TRASH TMDL-TOS SN-32
CITY OF LOS ANGELES, CALIFORNIA

TITLE:
**OBSERVATION FORM**
**COLORADO STREET BRIDGE**

| | |
|---|---|
| DRAWN BY: | RMC |
| CHECKED BY: | DL |
| APPROVED BY: | DL |
| DATE: | 05/20/2016 |
| PROJ. NO.: | 241839.0000.0000 |
| FILE: | Colorado-Street-Observation.dwg |
| FIGURE | |

8.5x11 -- ATTACHED XREFS: -- ATTACHED IMAGES: aerial-Colorado St.
DRAWING NAME: L:\Graphics\ProjectsbyName\Lobos Machado Lake\241839-0002\Colorado Street\ Colorado-Street-Observation.dwg -- PLOT DATE: May 25, 2016 - 10:17AM -- LAYOUT: Observation Form

**TRASH OBSERVATION FORM**

| | |
|---|---|
| **Site Name** | Colorado Bridge - In-River Observation |
| **Monitoring Staff** | A. Melekar, J. Johnson, D. Lennon |
| **Date** | 5/27/16 |
| **Time** | 13:15 - 13:40 |

| | | | |
|---|---|---|---|
| **Weather** | Sunny | Partly Cloudy | Overcast |
| **Last Rain** (Must be >72 hours prior to survey event) | | >72 hrs. | |

| | | | |
|---|---|---|---|
| **River Flow Rate** | No flow | Ponded | Flowing |
| **River Dimensions** | Width (ft) | Depth (ft) | |
| **River Velocity/Flow** | Left Bank 1.6 - 1.9 ft/s at edge & in river<br>edge - 4" deep<br>river - 16" deep | Center | Right Bank 0.4 ft/sec 1' deep |

| | |
|---|---|
| **Surrounding Area Description** | |
| **Are Homeless Camps Present?** | YES NO<br>NOTES<br>tent near NE corner of Colorado Bridge |
| **Are dumped materials present?** | YES NO<br>NOTES |
| | no debris from fishing net |

**TRASH OBSERVATION FORM**

**Trash Item Inventory**

| CATEGORY/DESCRIPTION | NUMBER OF ITEMS | | |
|---|---|---|---|
| | RIVER BANK | IN WATER/ FLOATING | IN WATER/ SUBMERGED |
| **PLASTIC** | | | |
| Plastic Bags | | | |
| Plastic | | | |
| Stryrofoam | | | |
| **PAPER** | | | |
| **METAL** | | | |
| **WOOD** | | | |
| **GLASS** | | | |
| **CONCRETE/BRICK** | | | |
| **CLOTH/FABRIC** | | | |
| **RUBBER** | | | |
| **BIOHAZARD** | | | |
| **MISCELLANEOUS** | \|\|\|\| | | |

**TRASH OBSERVATION FORM**

| | | | |
|---|---|---|---|
| | | | |

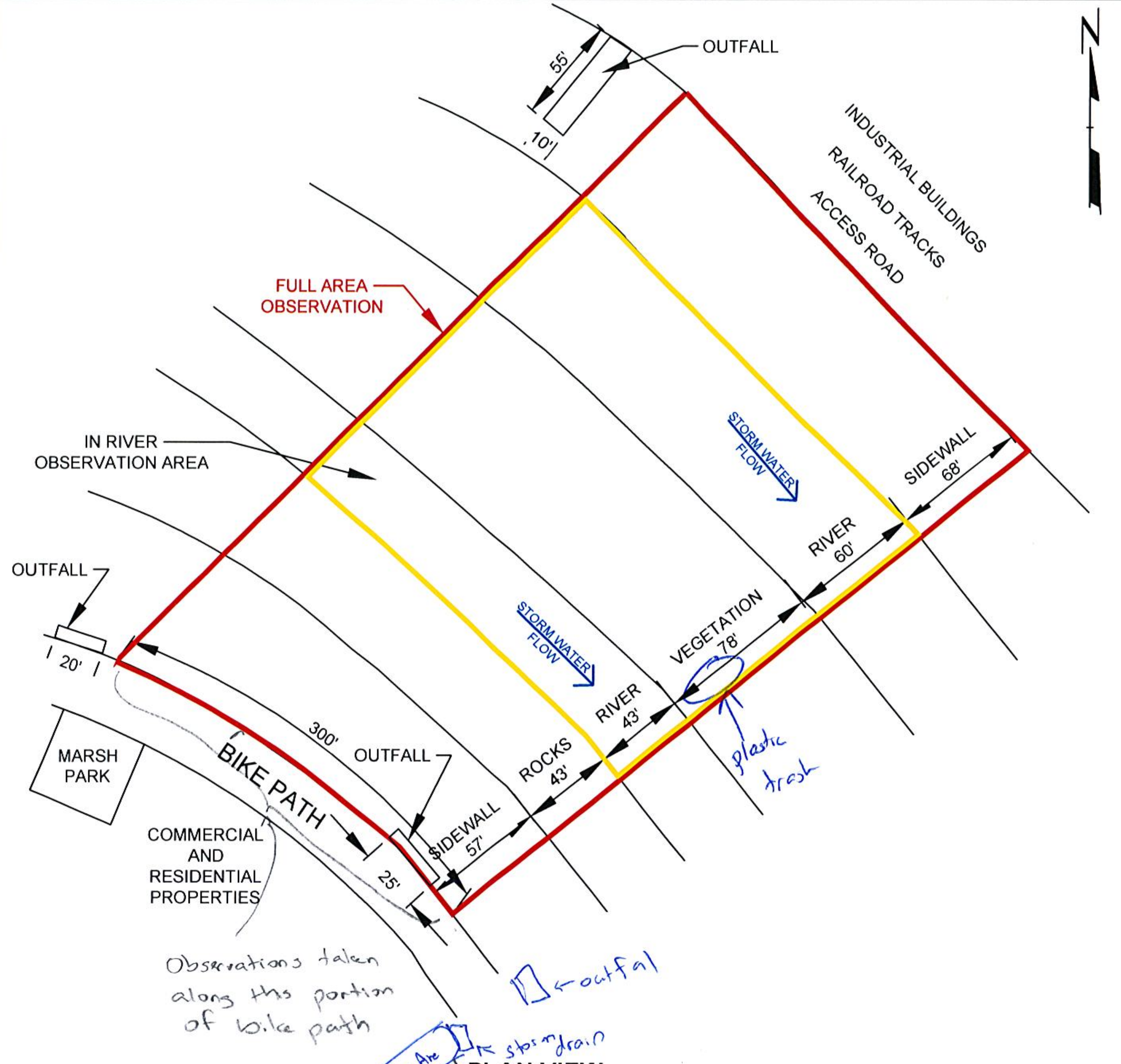
**Category Types**

- Plastic – bags, bottles, cups, six-pack rings, bottle caps
- Paper – card board, newspaper, letter paper
- Metal – cans, metal pipe, rebar
- Wood – lumber, pallets
- Glass – bottles, window
- Biohazard – Diapers, pet waste, dead animals, syringes
- Miscellaneous – appliance, furniture, tires, shopping carts, cigarette butts

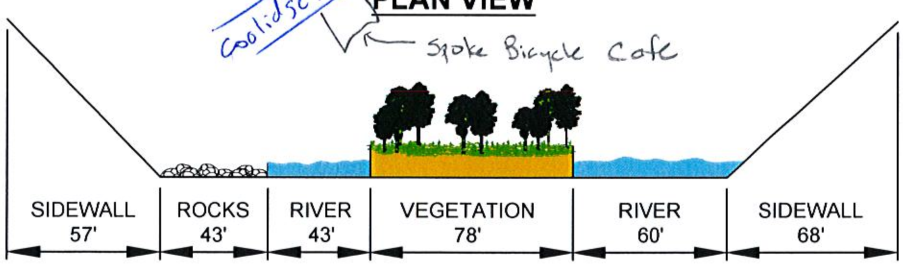
**Photo Log**

| PHOTO NUMBER | PHOTO DESCRIPTION |
|---|---|
| 1 | overview of river looking south towards Colorado St. Bridge |
| 2 | trash in bushes/vegetation |
| 3 | tent in NE corner of Colorado Bridge |
| 4 | debris along center of river |
| 5 | outfall located on western slope |
| 6 | debris in channel |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |

Marsh Park - Observation Only




PLAN VIEW




CROSS SECTION

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PROJECT:
**LOBOS MACHADO LAKE TRASH TMDL-TOS SN-32**
**CITY OF LOS ANGELES, CALIFORNIA**

TITLE:
**OBSERVATION FORM**
**MARSH PARK**

| | |
|---|---|
| DRAWN BY: | RMC |
| CHECKED BY: | DL |
| APPROVED BY: | DL |
| DATE: | 05/24/2016 |
| PROJ. NO.: | 241839.0000.0000 |
| FILE: | Marsh-Observation.dwg |
| FIGURE | |

8.5x11 --- ATTACHED XREFS: --- ATTACHED IMAGES: Elysian-Aerial
DRAWING NAME: L:\Graphics\ProjectsbyName\Lobos Machado Lake\241839-0002\Marsh Park\ Marsh-Observation.dwg --- PLOT DATE: May 25, 2016 - 11:05AM --- LAYOUT: Observation Form

**TRASH OBSERVATION FORM**

| | |
|---|---|
| **Site Name** | Marsh Park - Park Observation |
| **Monitoring Staff** | A. Helekar, J. Johnson, D. Lennon |
| **Date** | 5/26/16 |
| **Time** | 14:35 - 14:50 |

| | | | |
|---|---|---|---|
| **Weather** | Sunny | Partly Cloudy | Overcast |
| **Last Rain** (Must be >72 hours prior to survey event) | | >72 hrs | |

| | | | |
|---|---|---|---|
| **River Flow Rate** | No flow | Ponded | Flowing |
| **River Dimensions** | Width (ft) | Depth (ft) | |
| **River Velocity/Flow** | Left Bank | Center | Right Bank |

| | | |
|---|---|---|
| **Surrounding Area Description** | | |
| **Are Homeless Camps Present?** | YES<br>NOTES | NO |
| **Are dumped materials present?** | YES<br>NOTES | NO |
| | | |

**TRASH OBSERVATION FORM**

**Trash Item Inventory**

| CATEGORY/DESCRIPTION | NUMBER OF ITEMS | | |
|---|---|---|---|
| | RIVER BANK | IN WATER/ FLOATING | IN WATER/ SUBMERGED |
| **PLASTIC** | | | |
| Plastic Bags | | | |
| Plastic | 1 | | |
| Stryrofoam | | | |
| **PAPER** | | | |
| **METAL** | | | |
| **WOOD** | | | |
| **GLASS** | | | |
| **CONCRETE/BRICK** | | | |
| **CLOTH/FABRIC** | | | |
| **RUBBER** | | | |
| **BIOHAZARD** | | | |
| **MISCELLANEOUS** | | | |

**TRASH OBSERVATION FORM**

| | | | |
|---|---|---|---|
| | | | |

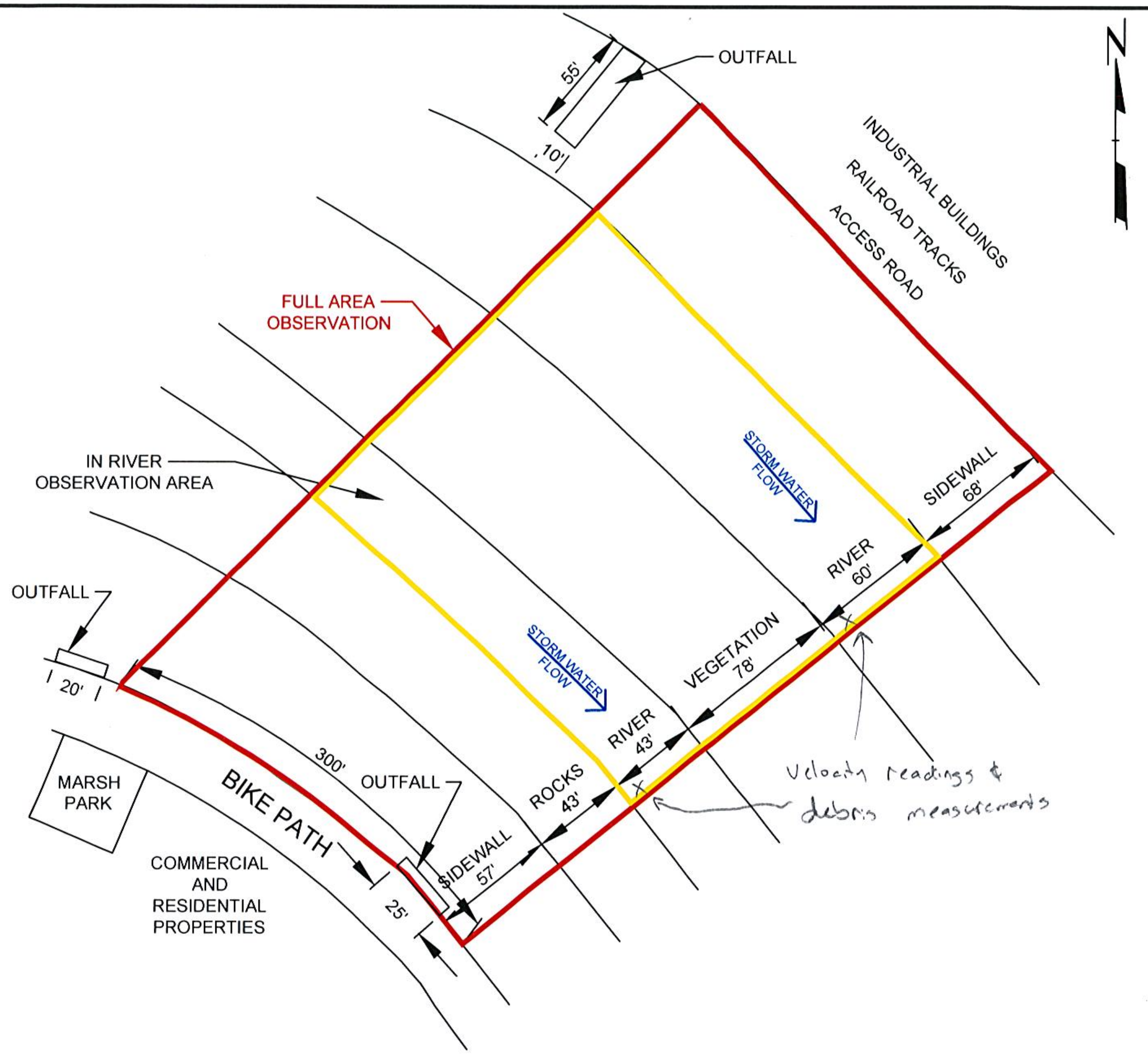
**Category Types**

- Plastic – bags, bottles, cups, six-pack rings, bottle caps
- Paper – card board, newspaper, letter paper
- Metal – cans, metal pipe, rebar
- Wood – lumber, pallets
- Glass – bottles, window
- Biohazard – Diapers, pet waste, dead animals, syringes
- Miscellaneous – appliance, furniture, tires, shopping carts, cigarette butts

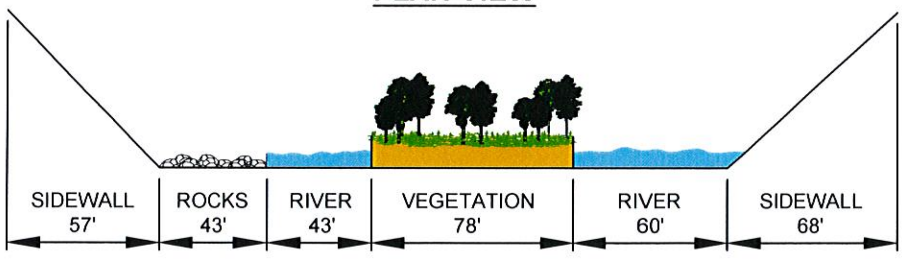
**Photo Log**

| PHOTO NUMBER | PHOTO DESCRIPTION |
|---|---|
| 1 | overview of entire observation area |
| 2 | stormwater drain at end of N. Coolidge. No trash catch |
| 3 | Outfall in channel full of trash debris near N. Coolidge |
| 4 | 300' section looking east from Marsh Park |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |

Marsh Park - In-River Observation




## PLAN VIEW




## CROSS SECTION

DRAWING NOT TO SCALE

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PROJECT:
LOBOS MACHADO LAKE TRASH TMDL-TOS SN-32
CITY OF LOS ANGELES, CALIFORNIA

TITLE:
OBSERVATION FORM
MARSH PARK

| | |
|---|---|
| DRAWN BY: | RMC |
| CHECKED BY: | DL |
| APPROVED BY: | DL |
| DATE: | 05/24/2016 |
| PROJ. NO.: | 241839.0000.0000 |
| FILE: | Marsh-Observation.dwg |
| FIGURE | |

8.5x11 -- ATTACHED XREF'S -- ATTACHED IMAGES Elysian-Aerial
DRAWING NAME: L:\Graphics\ProjectsbyName\Lobos Machado Lake\241839-0002\Marsh Park\ Marsh-Observation.dwg -- PLOT DATE: May 25, 2016 - 11:05AM -- LAYOUT: Observation Form

**TRASH OBSERVATION FORM**

| | |
|---|---|
| **Site Name** | Marsh Park- In River Observation |
| **Monitoring Staff** | A. Helekar, J. Johnson, D. Lennon |
| **Date** | 5/26/16 |
| **Time** | 14:50 - 15:30 |

| | | | |
|---|---|---|---|
| **Weather** | Sunny | Partly Cloudy | Overcast |
| **Last Rain** (Must be >72 hours prior to survey event) | | >72 hrs. | |

| | | | |
|---|---|---|---|
| **River Flow Rate** | No flow | Ponded ~~right bank~~ - right bank (south side) | Flowing ~~left bank~~ - left bank (north side) |
| **River Dimensions** | Width (ft) | Depth (ft) | |
| **River Velocity/Flow** | Left Bank 1.4-1.6 ft/s 9" deep (north side of river) | Center | Right Bank 0.1 ft/sec - 1' deep (south side of river) |

| | | |
|---|---|---|
| **Surrounding Area Description** | | |
| **Are Homeless Camps Present?** | YES<br>NOTES | NO |
| **Are dumped materials present?** | YES<br>NOTES | NO |
| | - no debris on right side of river (south), no debris on left (north) side of river either | |

* walked across rocky vegetation from right bank to left bank

- flow and depth measurements and debris collection conducted at eastern edge of observation area on both right and left banks

TRASH OBSERVATION FORM

**Trash Item Inventory**

| CATEGORY/DESCRIPTION | NUMBER OF ITEMS | | |
|---|---|---|---|
| | RIVER BANK | IN WATER/ FLOATING | IN WATER/ SUBMERGED |
| **PLASTIC** | | | |
| Plastic Bags | | | |
| Plastic | | | |
| Stryrofoam | | | |
| **PAPER** | | | |
| **METAL** | | | |
| **WOOD** | | | |
| **GLASS** | | | |
| **CONCRETE/BRICK** | | | |
| **CLOTH/FABRIC** | | | |
| **RUBBER** | | | |
| **BIOHAZARD** | | | |
| **MISCELLANEOUS** | | | |

**TRASH OBSERVATION FORM**

| | | | |
|---|---|---|---|
| | | | |

**Category Types**

- Plastic – bags, bottles, cups, six-pack rings, bottle caps
- Paper – card board, newspaper, letter paper
- Metal – cans, metal pipe, rebar
- Wood – lumber, pallets
- Glass – bottles, window
- Biohazard – Diapers, pet waste, dead animals, syringes
- Miscellaneous – appliance, furniture, tires, shopping carts, cigarette butts

**Photo Log**

| PHOTO NUMBER | PHOTO DESCRIPTION |
|---|---|
| 1 | overview of entire observation area |
| 2 | debris in vegetation |
| 3 | slope along south edge. |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |

**OBSERVATION FORM**
**MAIN STREET BRIDGE**

Date: 6/1/16

environment LASANITATION CITY OF LOS ANGELES

TRASH RECEIVING WATER PROTOCOL

Elevated ~~In-River~~ Observation Form

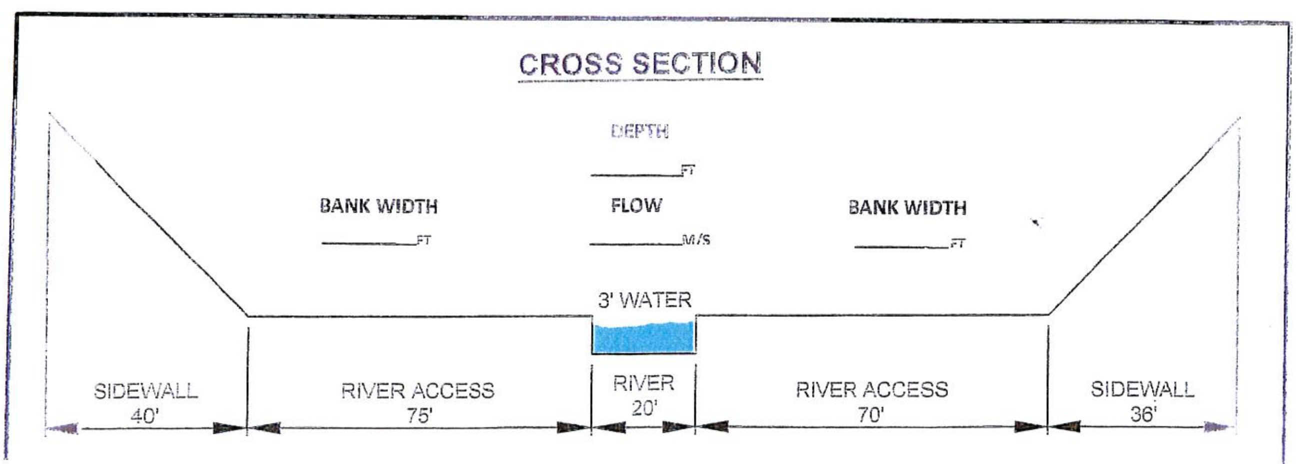
Department of Public Works, Bureau of Sanitation, Watershed Protection Division

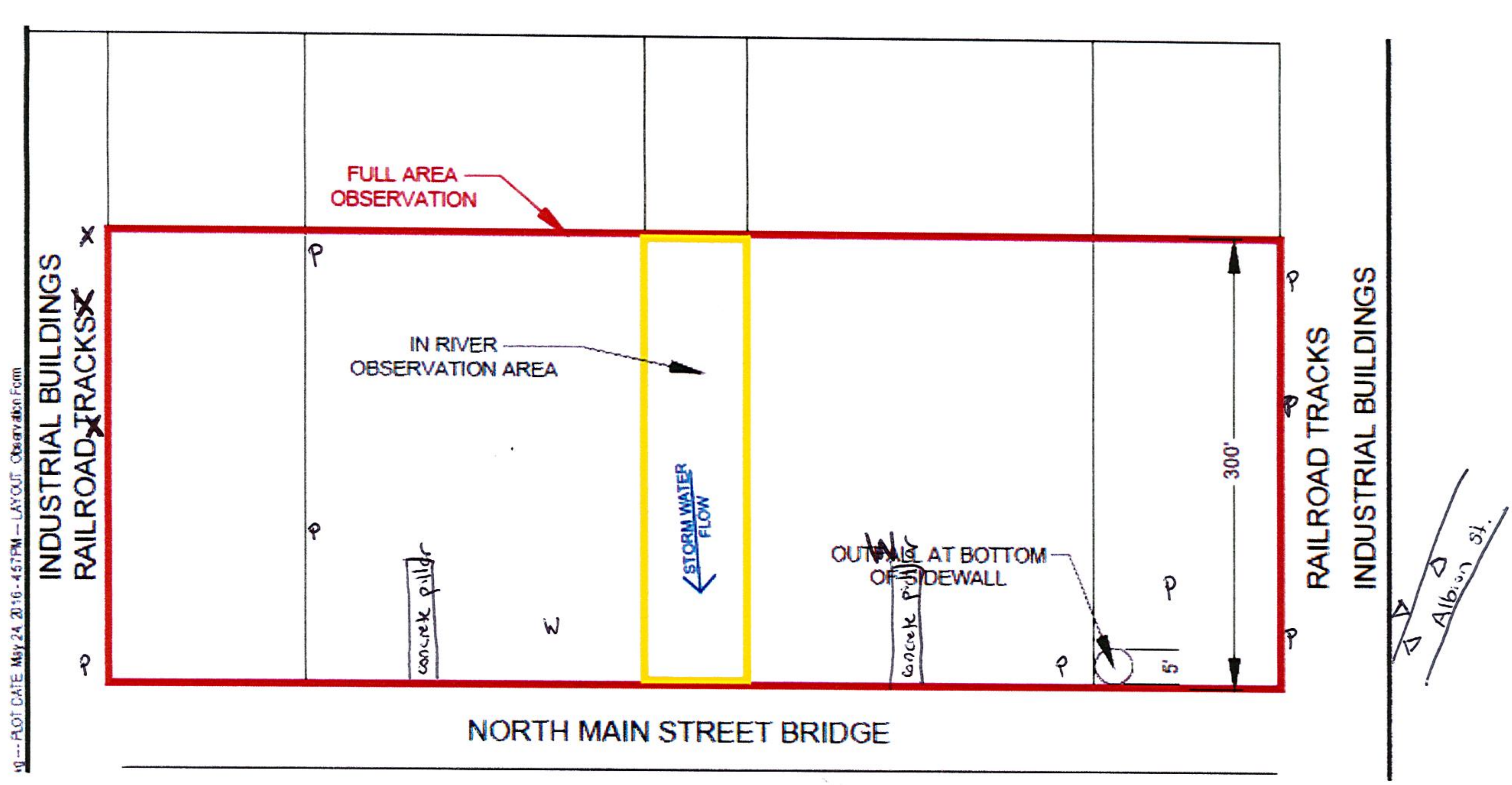
Surveyor's Name(s): A. Melcker, J. Johnson
Surveyor's Title(s):
Survey Start Time: 9:35

Trash Program:
Survey Location: Main St. Bridge
Survey End Time: 9:55

| Weather | Sunny | Partly Cloudy | Windy/No Wind |
|---|---|---|---|
| Last Rain | | | |

| Trash Categories | Number of Items Surveyed | | |
|---|---|---|---|
| | River Bank (L/R) | In Water/Floating | In Water/Submerged |
| Plastic<br>❑ Bags<br>❑ Plastic<br>❑ Styrofoam | | | |
| Paper | 3(L), 5(R) | | |
| Metal<br>❑ Cans<br>❑ Rebar<br>❑ Scrap Plate<br>❑ Shopping Cart | | | |
| Wood | 1(L), 1R | | |
| Glass | | | |
| Cloth<br>❑ Rags<br>❑ Clothing<br>❑ Blankets, other large | | | |
| Biohazard | | | |
| Miscellaneous | 3(L) | | |






LEGEND

B = Biohazard | G = Glass | L = Plastic | (red box) = Full Area Observation
C = Cloth | M = Metal | W = Wood | (yellow box) = In-River Observation
△ = Encampment | P = Paper | X = Miscellaneous

PHOTOGRAPH LOG

1. overviews from center, right bank, & left bank
2. piece of wood along left bank
3.
4.
5.
6.

Remarks: water in river only, not on banks, miscellaneous trash on left side to the left of fence line paper trash to right of fence along right bank

OBSERVATION FORM
MAIN STREET BRIDGE

Date: 6/1/16

TRASH RECEIVING WATER PROTOCOL

In-River Observation Form

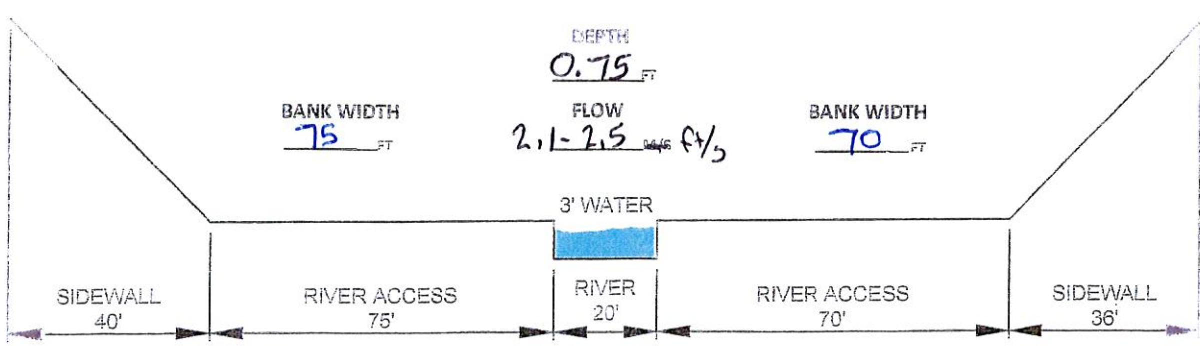
Department of Public Works, Bureau of Sanitation, Watershed Protection Division

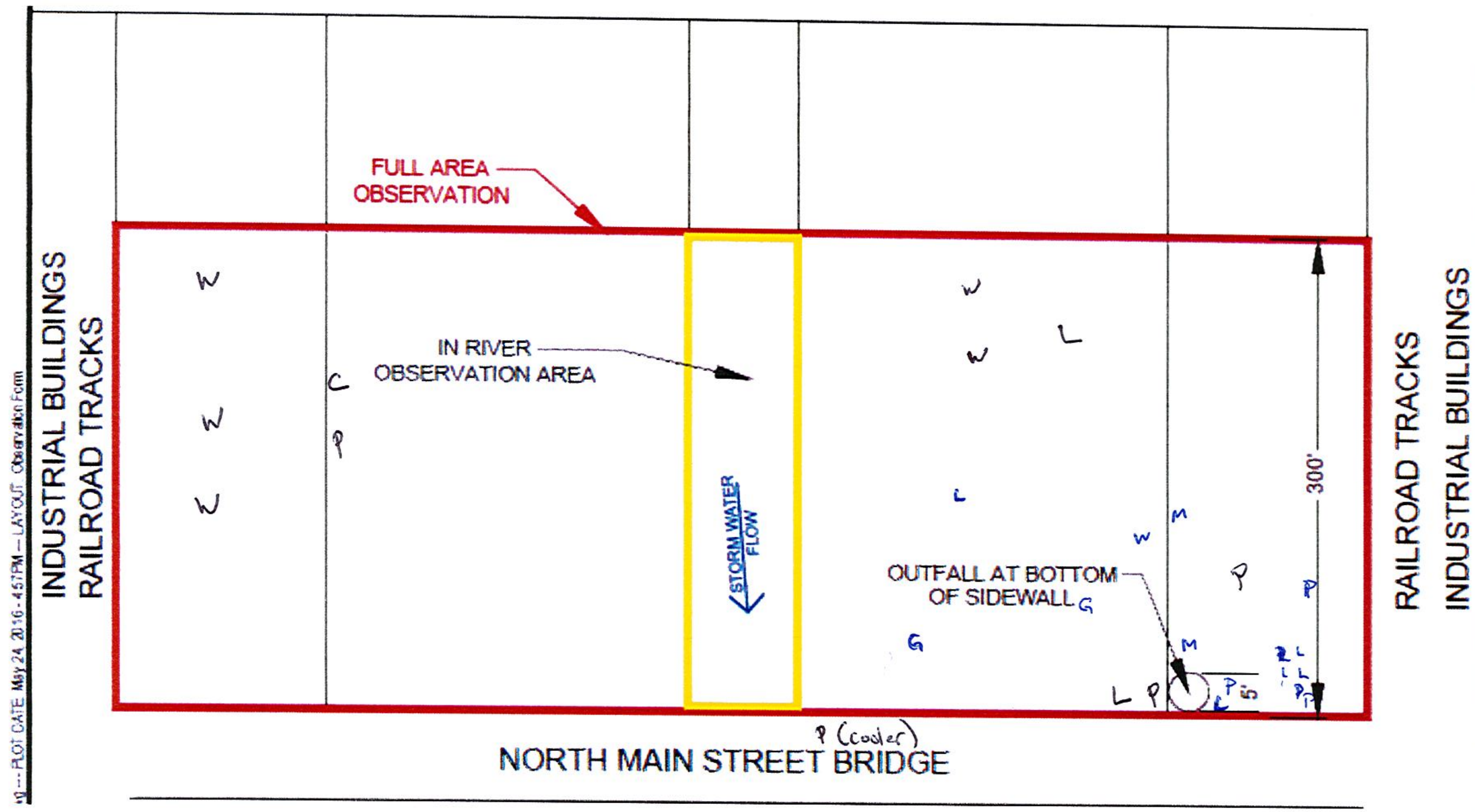
Surveyor's Name(s): A. Hekker, J. Johnson
Trash Program: Main St. - In River
Surveyor's Title(s):
Survey Location:
Survey Start Time: 10:10 am
Survey End Time: 10:35

| | | | |
|---|---|---|---|
| Weather | Sunny | Partly Cloudy | Windy/No Wind |
| Last Rain | | | |

| Trash Categories | Number of Items Surveyed | | |
|---|---|---|---|
| | River Bank (L/R) | In Water/Floating | In Water/Submerged |
| Plastic<br>☐ Bags<br>☒ Plastic<br>☐ Styrofoam | 4 (R) | 1 (Pen) | |
| Paper | 4 (R), 1 (L) | | |
| Metal<br>☐ Cans<br>☐ Rebar<br>☐ Scrap Plate<br>☐ Shopping Cart | | | |
| Wood | 3 (L), 2 (R) | | |
| Glass | 2 (R) | | |
| Cloth<br>☒ Rags<br>☐ Clothing<br>☐ Blankets, other large | 1 (L) | | |
| Biohazard | | | |
| Miscellaneous | | | |

## CROSS SECTION






LEGEND

| | | | |
|---|---|---|---|
| B = Biohazard | G = Glass | L = Plastic | = Full Area Observation |
| C = Cloth | M = Metal | W = Wood | = In-River Observation |
| △ = Encampment | P = Paper | X = Miscellaneous | |

PHOTOGRAPH LOG

1. overview of river
2. crude oil coming out of drain
3. 
4. 
5. 
6. 

Remarks: mostly algae caught with net, 1 writing pen

OBSERVATION FORM
HYPERION AVENUE BRIDGE

Date: 6/1/16

TRASH RECEIVING WATER PROTOCOL

Elevated ~~InRiv~~er Observation Form

Department of Public Works, Bureau of Sanitation, Watershed Protection Division

Surveyor's Name(s): A. Heldkar, J. Johnson

Surveyor's Title(s):

Survey Start Time: 11:15 am – 12:00 pm (both sides)

Trash Program:

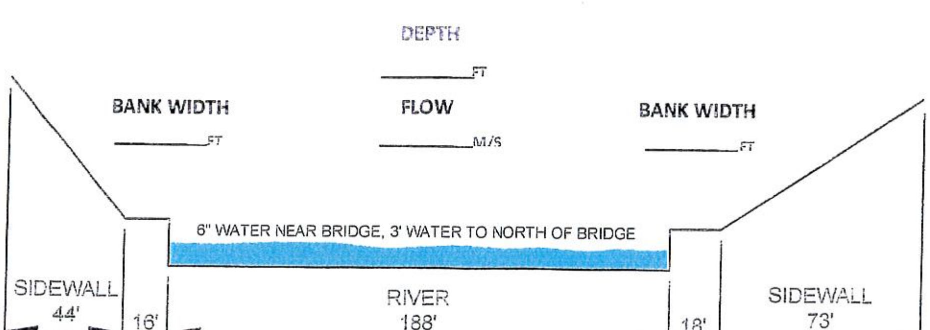
Survey Location: Hyperion- Elevated obserV.

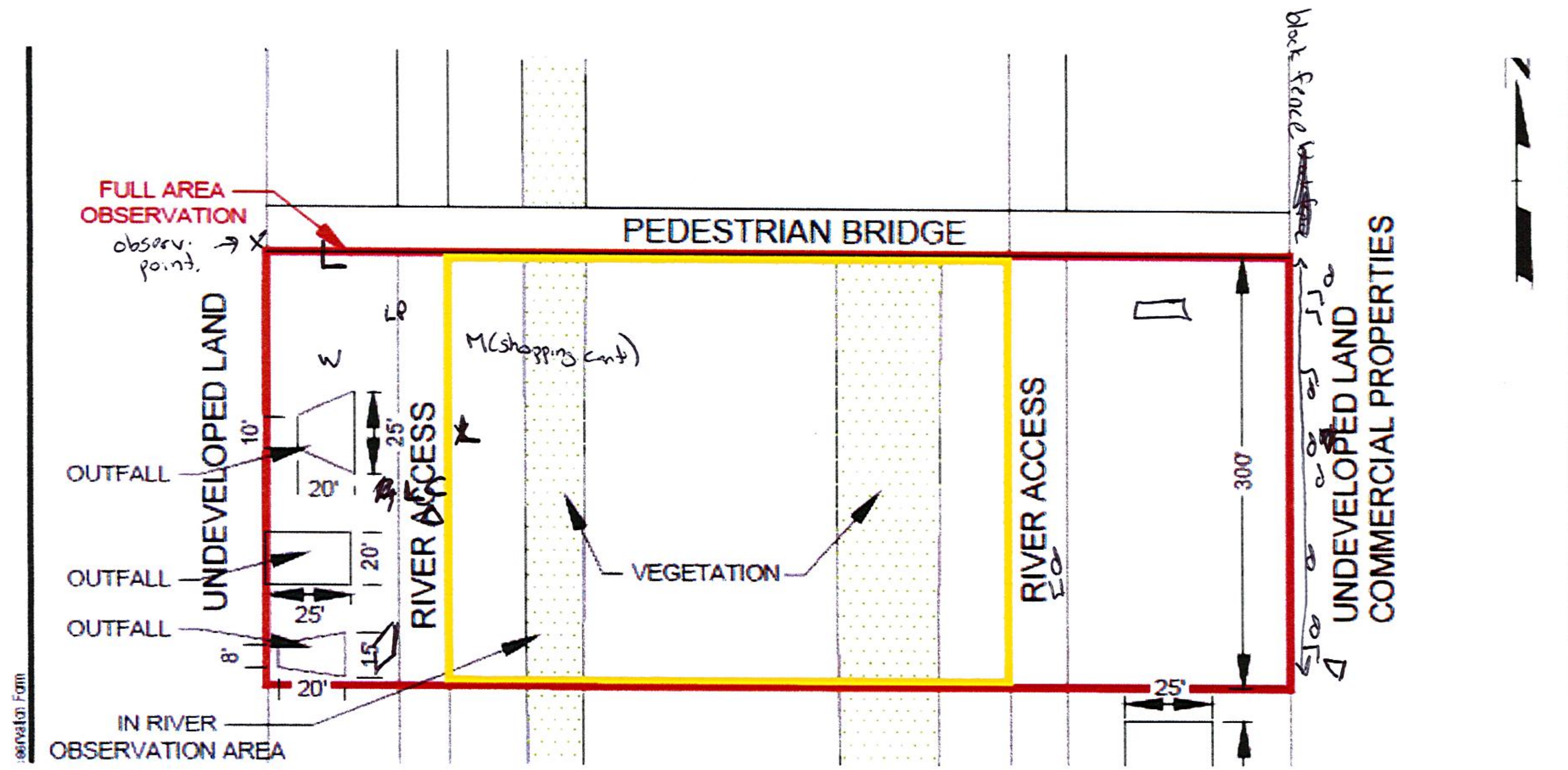
Survey End Time:

| | | | |
|---|---|---|---|
| Weather | Sunny | Partly Cloudy | Windy/No Wind |
| Last Rain | | | |

| Trash Categories | Number of Items Surveyed | | |
|---|---|---|---|
| | River Bank (L/R) | In Water/Floating | In Water/Submerged |
| Plastic<br>☐ Bags<br>☐ Plastic<br>☐ Styrofoam | | | |
| Paper | | | |
| Metal<br>☐ Cans<br>☐ Rebar<br>☐ Scrap Plate<br>☒ Shopping Cart | | 1(R) | |
| Wood | | | |
| Glass | | | |
| Cloth<br>☐ Rags<br>☐ Clothing<br>☐ Blankets, other large | | | |
| Biohazard | | | |
| Miscellaneous | | | |

## CROSS SECTION






LEGEND

| | | | |
|---|---|---|---|
| B = Biohazard | G = Glass | L = Plastic | = Full Area Observation |
| C = Cloth | M = Metal | W = Wood | = In-River Observation |
| △ = Encampment | P = Paper | X = Miscellaneous | |

PHOTOGRAPH LOG

1. overview from right corner
2. shopping cart in river
3. storm drain at end of Sunnybrook Ave.
4.
5.
6.

Remarks: elevated observations done on right & left sides of river. Paper and plastic debris on ~~left side~~ left side to the left of block fencing.

**OBSERVATION FORM**
**HYPERION AVENUE BRIDGE**

Date: 6/1/16

TRASH RECEIVING WATER PROTOCOL

In-River Observation Form

Department of Public Works, Bureau of Sanitation, Watershed Protection Division

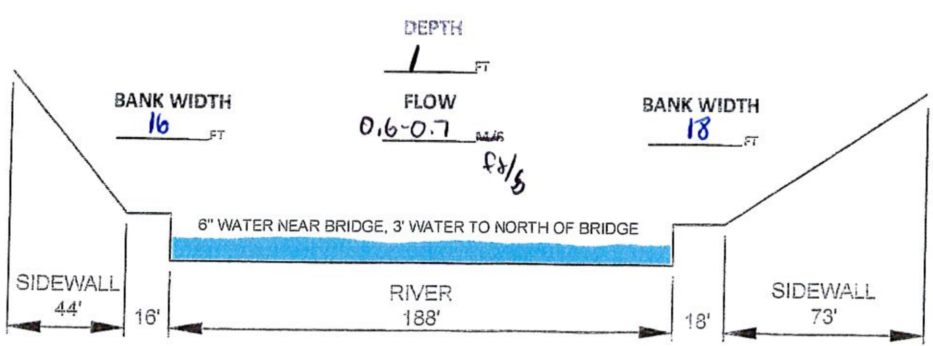
Surveyor's Name(s): A. Hekkar, J. Johnson
Surveyor's Title(s):
Survey Start Time: 11:30

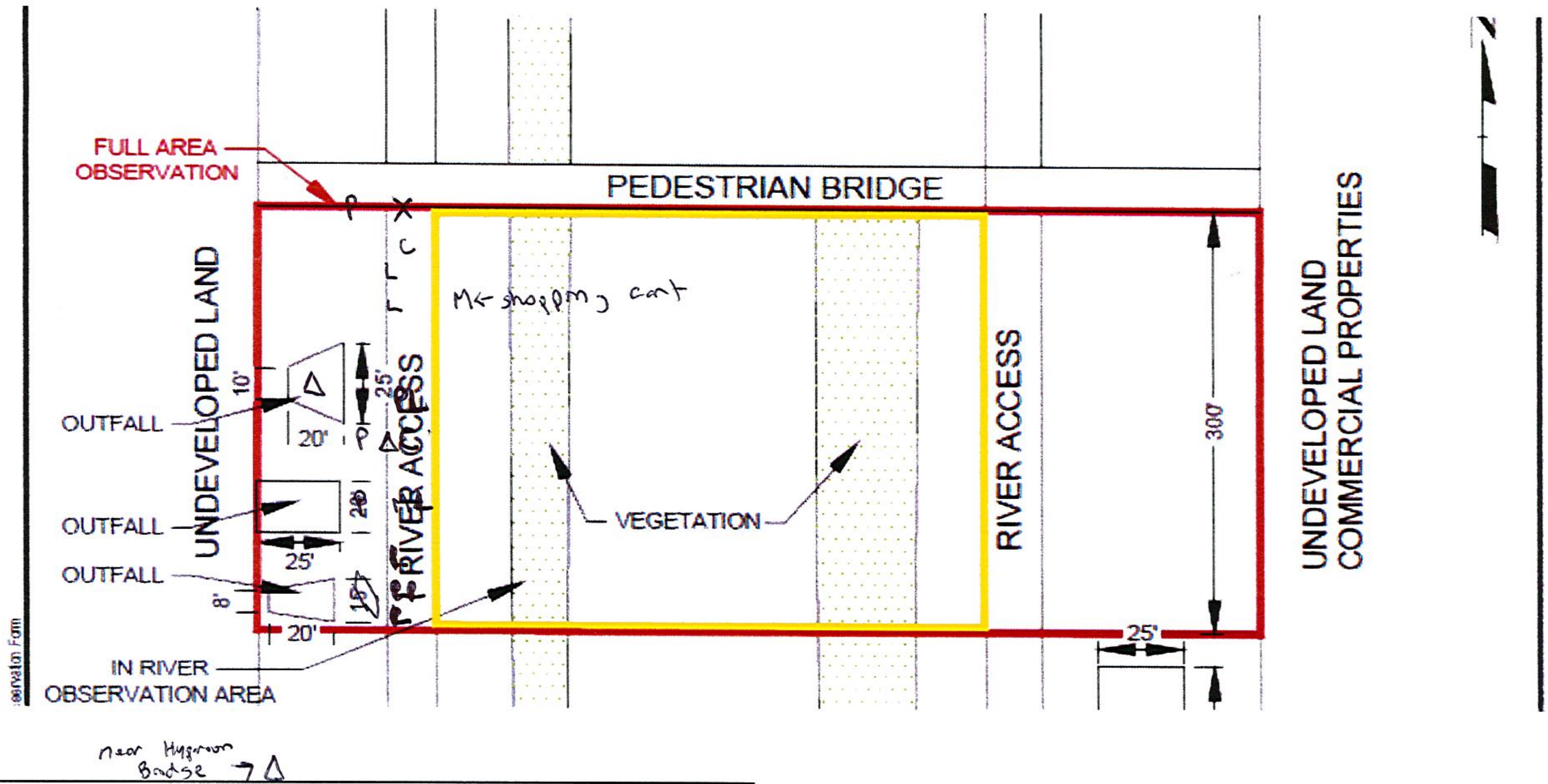
Trash Program:
Survey Location: Hyperion - River Observ.
Survey End Time: 11:45

| Weather | Sunny | Partly Cloudy | Windy/No Wind |
|---|---|---|---|
| Last Rain | | | |

| Trash Categories | Number of Items Surveyed | | |
|---|---|---|---|
| | River Bank (L/R) | In Water/Floating | In Water/Submerged |
| Plastic<br>☒ Bags<br>☒ Plastic<br>☒ Styrofoam | 8 (R) | | |
| Paper | 1 (R) | | |
| Metal<br>☐ Cans<br>☐ Rebar<br>☐ Scrap Plate<br>☒ Shopping Cart | 1 (R) - shopping cart | | |
| Wood | | | |
| Glass | | | |
| Cloth<br>☒ Rags<br>☐ Clothing<br>☐ Blankets, other large | 2 (R) | | |
| Biohazard | | | |
| Miscellaneous | 1 (R) | | |

## CROSS SECTION






LEGEND

| | | | |
|---|---|---|---|
| B = Biohazard | G = Glass | L = Plastic | = Full Area Observation |
| C = Cloth | M = Metal | W = Wood | = In-River Observation |
| Δ = Encampment | P = Paper | X = Miscellaneous | |

PHOTOGRAPH LOG

1. overview of river
2. homeless encampment
3. shopping cart in river
4.
5.
6.

Remarks: did river observation from right bank only, No debris measured with net.

**OBSERVATION FORM**

**COLORADO STREET BRIDGE**

Date: 6/1/16

TRASH RECEIVING WATER PROTOCOL

~~In-River~~ Elevated Observation Form

Department of Public Works
Bureau of Sanitation
Watershed Protection Division

Surveyor's Name(s): A. Hejekar, J. Johnson

Trash Program: __________

Surveyor's Title(s): __________

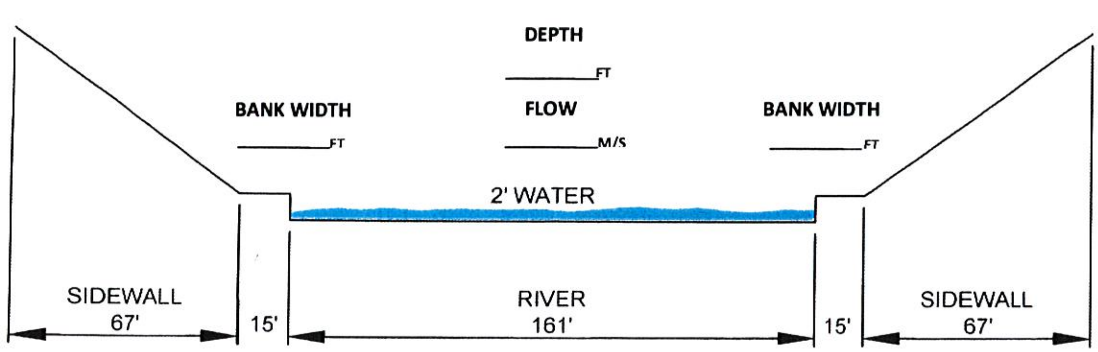
Survey Location: __________

Survey Start Time: 13:25

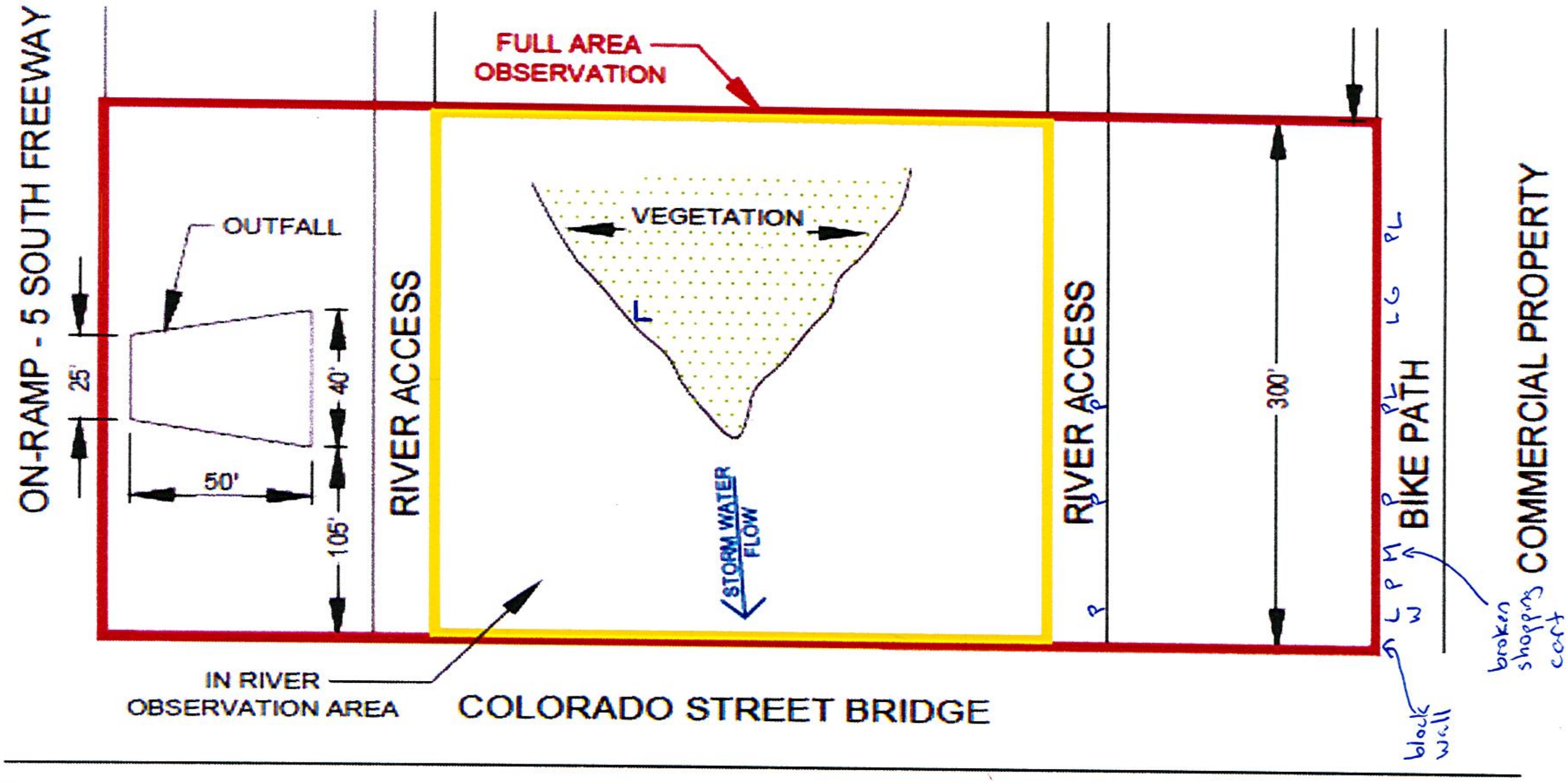
Survey End Time: 14:05

| | | | |
|---|---|---|---|
| Weather | Sunny | Partly Cloudy | Windy/No Wind |
| Last Rain | > 72 hours | | |

| Trash Categories | Number of Items Surveyed | | |
|---|---|---|---|
| | River Bank (L/R) | In Water/Floating | In Water/Submerged |
| Plastic<br>☐ Bags<br>☒ Plastic<br>☐ Styrofoam | | 1 (in vegetation) | |
| Paper | | | |
| Metal | | | |
| Wood | | | |
| Glass | | | |
| Cloth | | | |
| Biohazard | | | |
| Miscellaneous | | | |




**RIVER CROSS SECTION**




| LEGEND | | | |
|---|---|---|---|
| B = Biohazard | G = Glass | L = Plastic | = Full Area Observation |
| C = Cloth | M = Metal | W = Wood | = In-River Observation |
| △ = Encampment | P = Paper | X = Miscellaneous | |

Photograph Log

1. plastic debris to right of block wall near bridge
2. walking path to east of river east of block wall
3. overview of observation area looking south
4. construction of sand filter tank below grade
5. 
6. 

Remarks:

**OBSERVATION FORM**

**COLORADO STREET BRIDGE**

Date: 6/1/16

TRASH RECEIVING WATER PROTOCOL

In-River Observation Form

Department of Public Works
Bureau of Sanitation
Watershed Protection Division

Surveyor's Name(s): A. Helekar, J. Johnson

Trash Program: ______

Surveyor's Title(s): ______

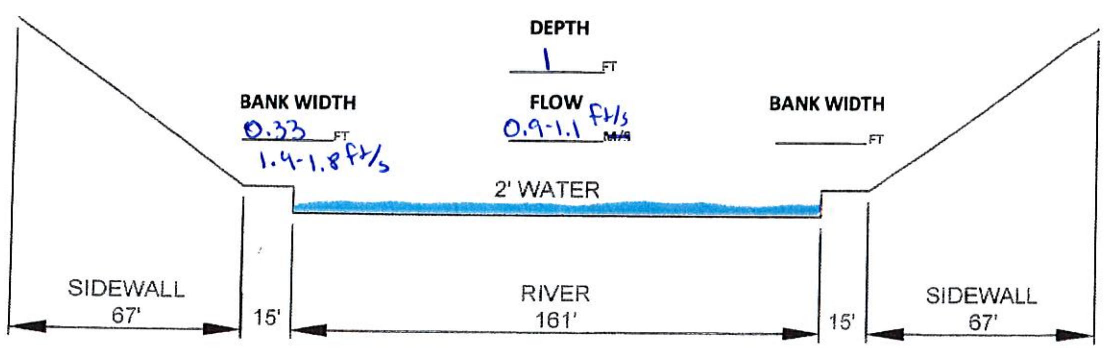
Survey Location: ______

Survey Start Time: 13:40

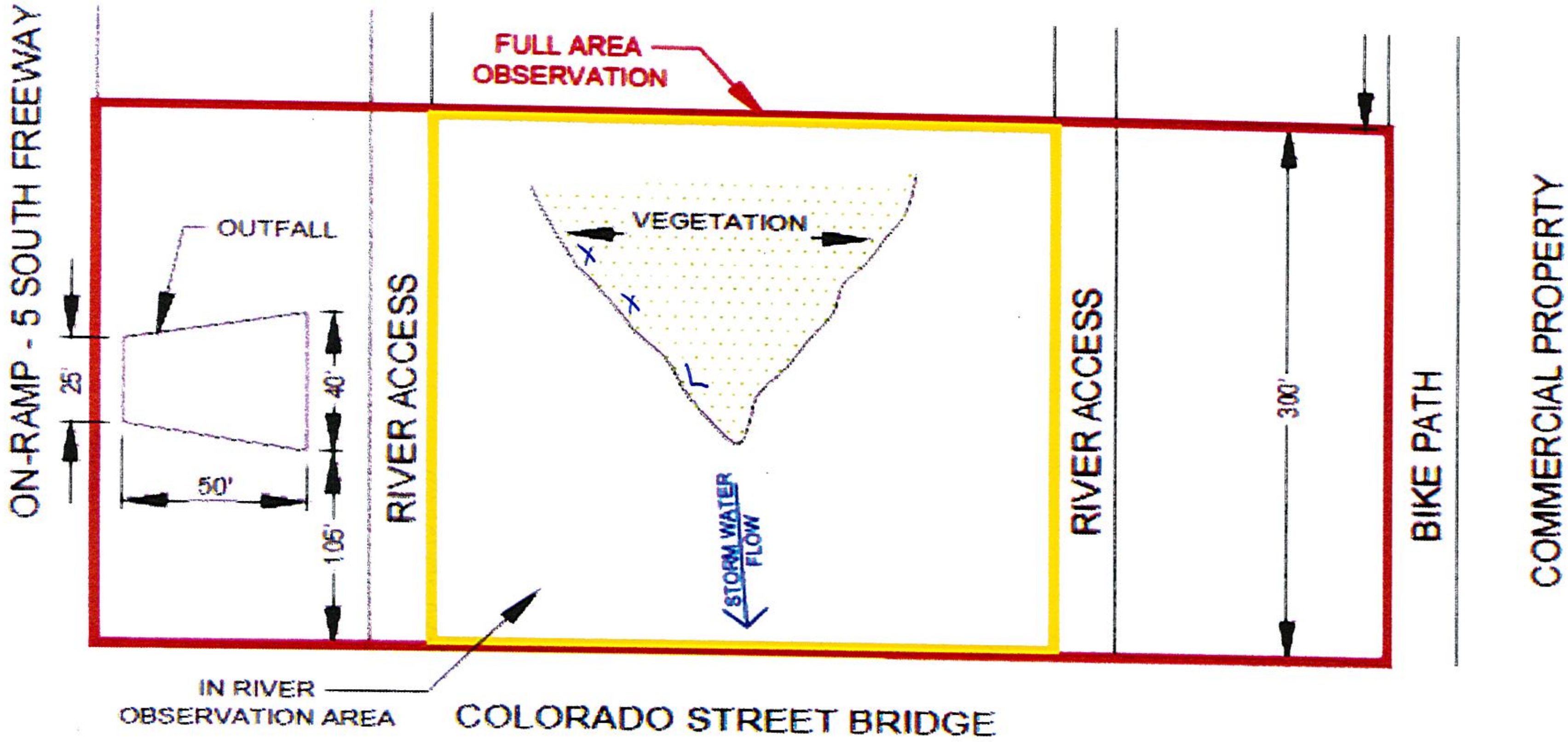
Survey End Time: 14:00

| | | | |
|---|---|---|---|
| Weather | Sunny | Partly Cloudy | Windy/No Wind |
| Last Rain | > 72 hours | | |

| Trash Categories | Number of Items Surveyed | | |
|---|---|---|---|
| | River Bank (L/R) | In Water/Floating | In Water/Submerged |
| Plastic<br>☐ Bags<br>☒ Plastic<br>☐ Styrofoam | | 1 (in vegetation) | |
| Paper | | | |
| Metal | | | |
| Wood | | | |
| Glass | | | |
| Cloth | | | |
| Biohazard | | | |
| Miscellaneous | | 2 (in vegetation) | |




**RIVER CROSS SECTION**




LEGEND

| | | | |
|---|---|---|---|
| B = Biohazard | G = Glass | L = Plastic | = Full Area Observation |
| C = Cloth | M = Metal | W = Wood | = In-River Observation |
| △ = Encampment | P = Paper | X = Miscellaneous | |

Photograph Log

1. overview of river observation area looking north
2. outfall on western sidewall
3. plastic debris in vegetation
4. 
5. 
6. 

Remarks: Only small particulate matter observed with net, Plastic and miscellaneous trash in vegetation on left side.

**OBSERVATION FORM**

**MARSH PARK**

Date: 6/1/16

TRASH RECEIVING WATER PROTOCOL

~~In-River~~ Elevated Observation Form

Department of Public Works
Bureau of Sanitation
Watershed Protection Division

Surveyor's Name(s): A. Helekar, J. Johnson

Trash Program: ____________

Surveyor's Title(s): ____________

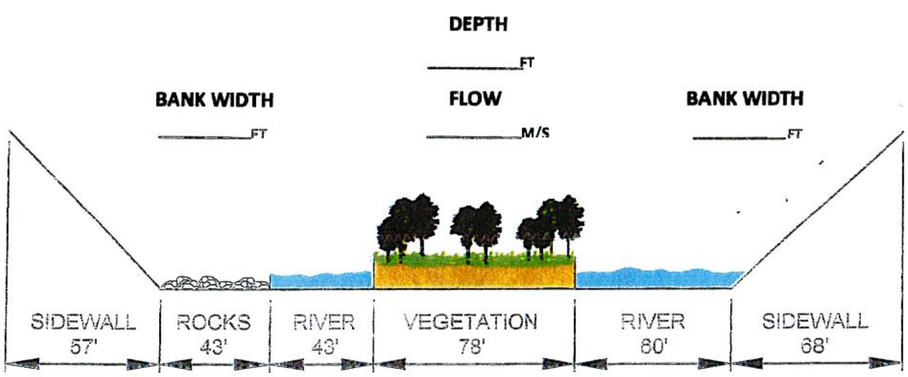
Survey Location: ____________

Survey Start Time: 14:25

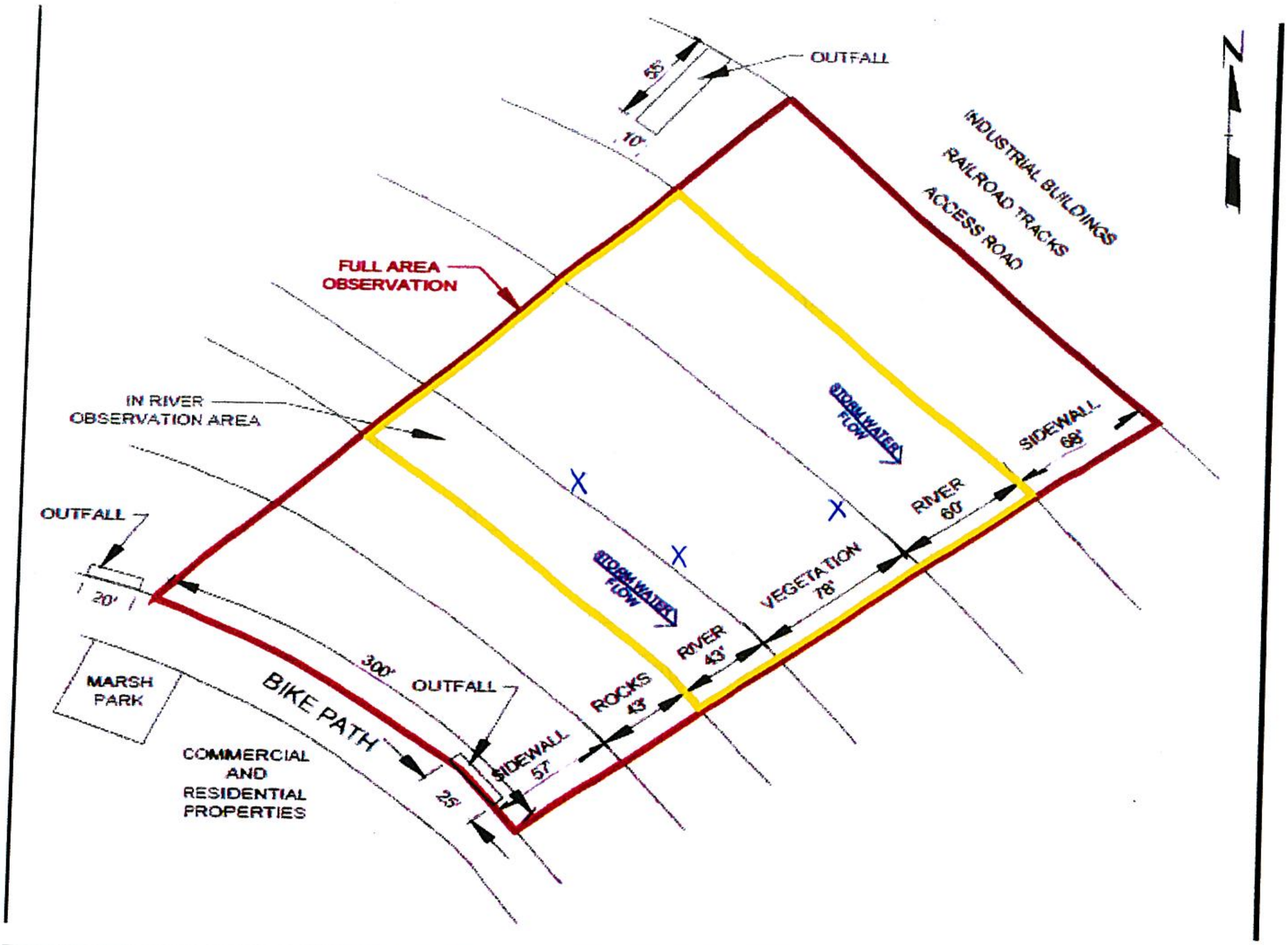
Survey End Time: 14:55

| Weather | Sunny | Partly Cloudy | Windy/No Wind |
|---|---|---|---|
| Last Rain | > 72 hours | | |

| Trash Categories | Number of Items Surveyed | | |
|---|---|---|---|
| | River Bank (L/R) | In Water/Floating | In Water/Submerged |
| Plastic<br>❑ Bags<br>❑ Plastic<br>❑ Styrofoam | | | |
| Paper | | | |
| Metal | | | |
| Wood | | | |
| Glass | ~~2 (R~~) | | |
| Cloth | | | |
| Biohazard | | | |
| Miscellaneous | | 3 (in vegetation) | |




**RIVER CROSS SECTION**




## LEGEND

| | | | |
|---|---|---|---|
| B = Biohazard | G = Glass | L = Plastic | = Full Area Observation |
| C = Cloth | M = Metal | W = Wood | = In-River Observation |
| △ = Encampment | P = Paper | X = | |

Photograph Log

1. overview of full observation area looking east from southern edge
2. Kayaker heading east along river
3. 
4. 
5. 
6. 

Remarks: -

**OBSERVATION FORM**

**MARSH PARK**

Date: 6/1/16

TRASH RECEIVING WATER PROTOCOL

In-River Observation Form

Department of Public Works
Bureau of Sanitation
Watershed Protection Division

Surveyor's Name(s): A. Heleker, J. Johnson

Trash Program:

Surveyor's Title(s):

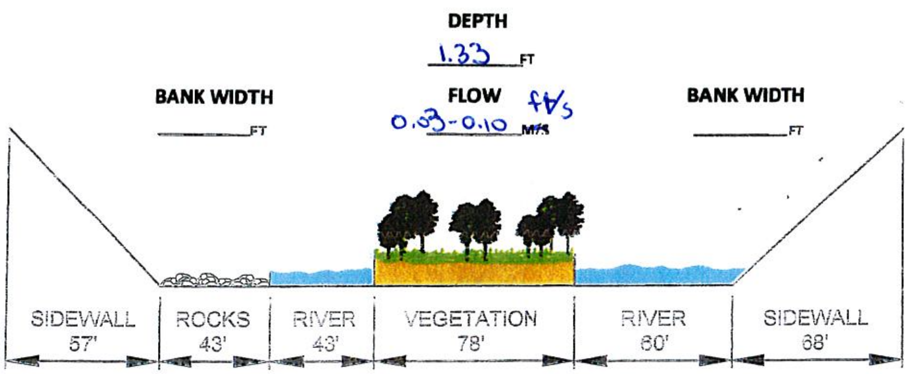
Survey Location:

Survey Start Time: 14:35

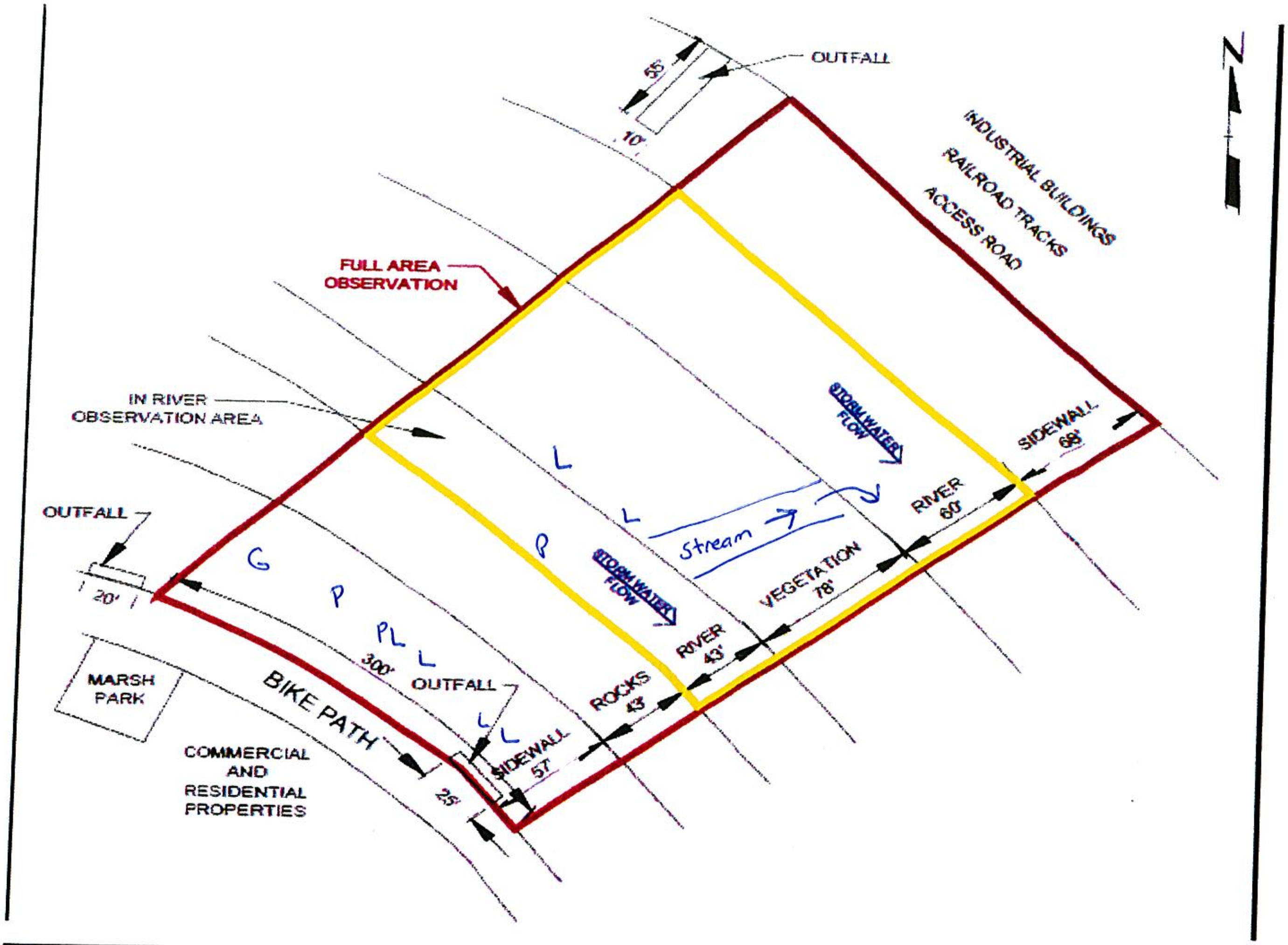
Survey End Time: 14:45

| | | | |
|---|---|---|---|
| Weather | Sunny | Partly Cloudy | Windy/No Wind |
| Last Rain | > 72 hours | | |

| Trash Categories | Number of Items Surveyed | | |
|---|---|---|---|
| | River Bank (L/R) | In Water/Floating | In Water/Submerged |
| Plastic<br>☐ Bags<br>☒ Plastic<br>☐ Styrofoam | 4 (R) | 2 (in vegetation) | |
| Paper | 2 (R) | 1 | |
| Metal | | | |
| Wood | | | |
| Glass | 1 (R) | | |
| Cloth | | | |
| Biohazard | | | |
| Miscellaneous | | | |




**RIVER CROSS SECTION**




| | | | |
|---|---|---|---|
| **LEGEND** | | | |
| B = Biohazard | G = Glass | L = Plastic | = Full Area Observation |
| C = Cloth | M = Metal | W = Wood | = In-River Observation |
| △ = Encampment | P = Paper | X = | |

Photograph Log

1. outfall ~~along son~~ at southeast corner of observation area
2. debris along southern sidewall
3. flow along northern portion of river at eastern edge of observation area
4.
5.
6.

Remarks: -

No debris observed with net,

# APPENDIX 3

## Field Equipment List

## FIELD EQUIPMENT LIST

- Vehicle (pickup truck or automobile)
- Digital Camera w/zoom
- Binoculars
- Smart phone with GPS capability
- Clipboard
- Pencils and pens
- Field observation forms (extra copies)
- Tablet (if available) for record keeping
- Directions to the observation locations
- Safety vest
- Safety glasses
- Steel-toed boots
- Rubber boots and/or waders for walking in river locations
- Leather gloves or other puncture resistant gloves
- Latex or nitrile gloves
- Hand sanitizer
- Pool net or other similar water collection device with 10 micron sized mesh
- In-stream/river flow meter
    - Marsh McBierney Water Velocity Meter or equivalent
- Hand-held weighing scale
- Personal flotation device
- Trash pick-up tools
- Heavy duty trash bags
- Small plastic bags

# Sample Form

**OBSERVATION FORM**
**MAIN STREET BRIDGE**

Date: ____________________

TRASH RECEIVING WATER PROTOCOL

In-River Observation Form

Department of Public Works, Bureau of Sanitation, Watershed Protection Division

Surveyor's Name(s): ____________________ Trash Program: ____________________

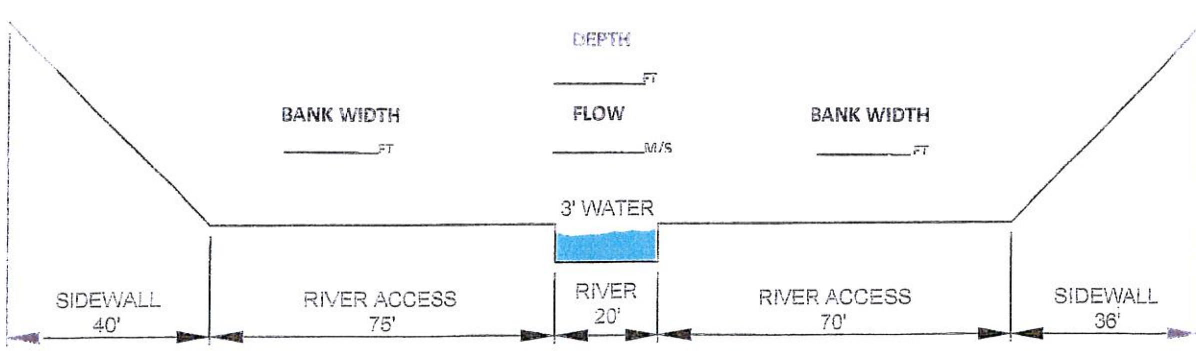
Surveyor's Title(s): ____________________ Survey Location: ____________________

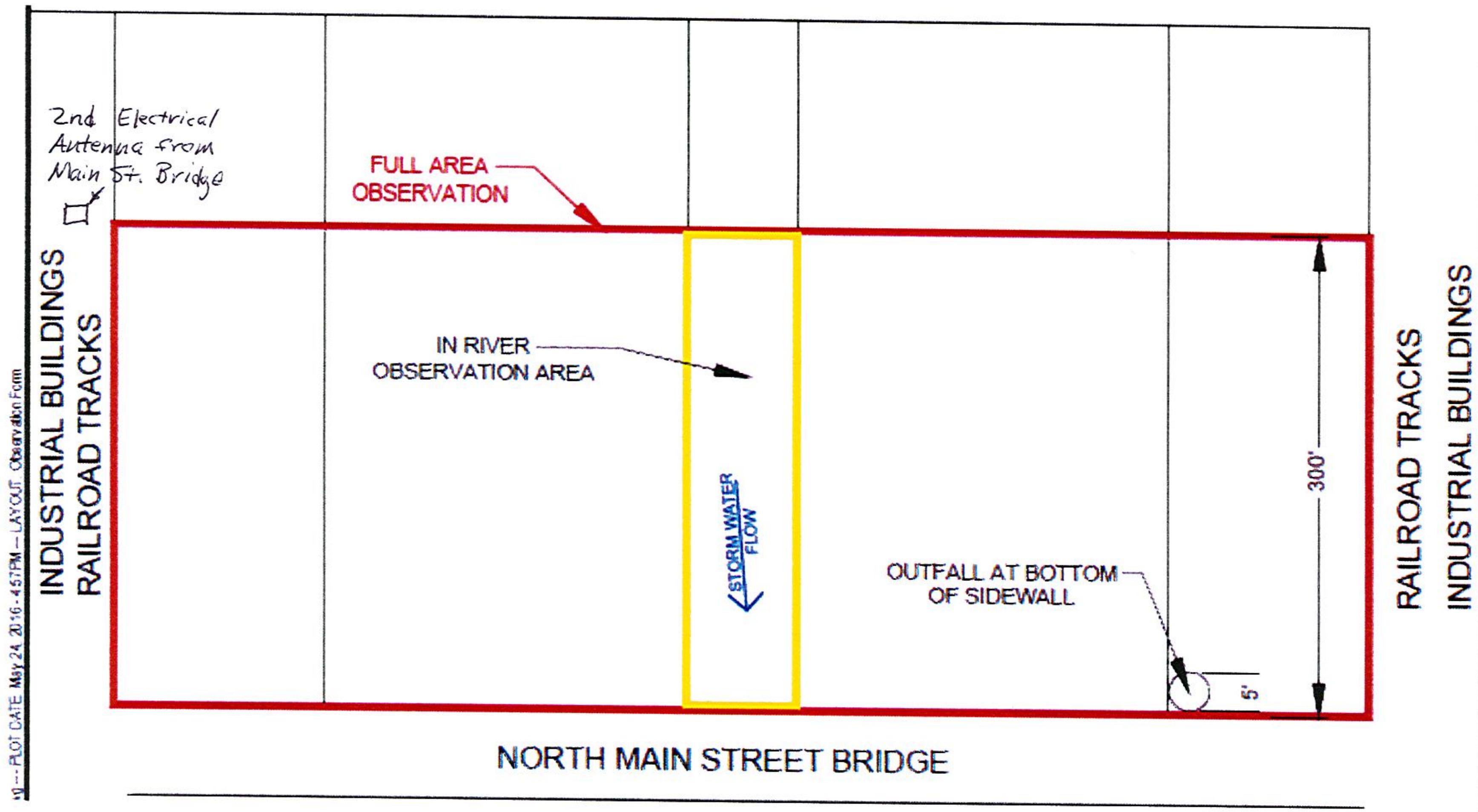
Survey Start Time: ____________________ Survey End Time: ____________________

| Weather | Sunny | Partly Cloudy | Windy/No Wind |
|---|---|---|---|
| Last Rain | | | |

| Trash Categories | Number of Items Surveyed | | |
|---|---|---|---|
| | River Bank (L/R) | In Water/Floating | In Water/Submerged |
| Plastic<br>❑ Bags<br>❑ Plastic<br>❑ Styrofoam | | | |
| Paper | | | |
| Metal<br>❑ Cans<br>❑ Rebar<br>❑ Scrap Plate<br>❑ Shopping Cart | | | |
| Wood | | | |
| Glass | | | |
| Cloth<br>❑ Rags<br>❑ Clothing<br>❑ Blankets, other large | | | |
| Biohazard | | | |
| Miscellaneous | | | |

## CROSS SECTION






LEGEND

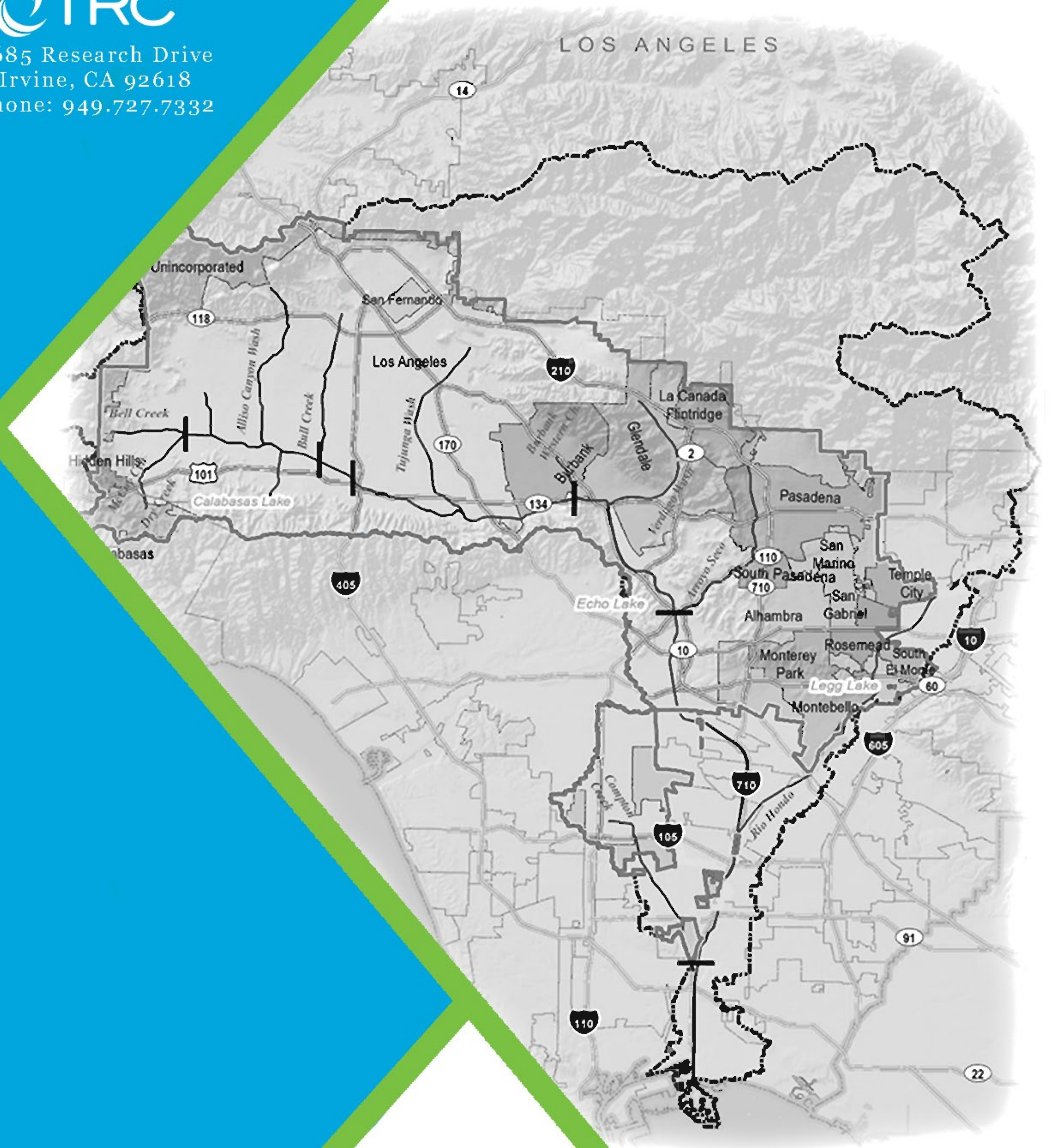
| | | | |
|---|---|---|---|
| B = Biohazard | G = Glass | L = Plastic | = Full Area Observation |
| C = Cloth | M= Metal | W= Wood | = In-River Observation |
| △ = Encampment | P = Paper | X= Miscellaneous | |

PHOTOGRAPH LOG

1. ______
2. ______
3. ______
4. ______
5. ______
6. ______

Remarks:______

TRC
9685 Research Drive
Irvine, CA 92618
Phone: 949.727.7332




environment
LA SANITATION
CITY OF LOS ANGELES

# Appendix D

# LASAN TRASH LIBRARY

## Appendix D

# LASAN TRASH LIBRARY

**Typical Dry Weights of Materials collected in a Receiving Waterbody**

**PLASTIC BAG**
12 inch x 8 inch

**0.01 lbs/ea**

1


**NEWSPAPER**

**0.01 lbs/pg**

2

**PAPER**
8.5 inch x 11inch

**0.01 lbs/pg**

3

**WOOD**
2 inch x 4 inch board

**2.00 lbs/ft**

4


**PLASTIC WATER BOTTLE**

**0.03 lbs/ea**

5

**STYROFOAM CONTAINER**

**0.35 lbs/ea**

6

**ALUMINUM FOIL**
12 inch x 12 inch

**0.01 lbs/ft$^2$**

7

**PAPER BAG**

**0.14 lbs/ea**

8


**GLASS BEVERAGE BOTTLE – 12oz**

**0.92 lbs/ea**

9

**CARD BOARD BOX**

**1.88 lbs/ea**

10

# TRASH LIBRARY

**Typical Dry Weights of Materials collected in a Receiving Waterbody**

**CLOTH**

**0.07 lbs/ft$^2$**

11

**CLOTHING**

**0.44 lbs**

12


**ALUMINUM CAN**

**0.03 lbs**

13

**WINE BOTTLE**
EMPTY

**1.10 lbs**

14

**REBAR**

**2.67 lbs/ft**

15

**PLASTIC TRASH CAN**

**20.00 lbs**

16

**PVC PIPE**
Schedule 40

**0.16 lbs/ft**

17

**METAL SHOPPING CART**

**58.00 lbs**

18

## Trash Library – Reference Sources


1. http://alumni.stanford.edu/get/page/magazine/article/?article_id=30162
2. http://www.justanswer.com/general/0i9ya-weight-average-daily-newspaper.html
3. https://www.reference.com/science/many-sheets-paper-together-weigh-1-ounce-c1ca54a7f8b5b2ef
4. https://www.reference.com/home-garden/much-2-x-4-weigh-576cff406ab6d292
5. http://www.bottledwater.org/news/weight-pet-bottled-water-containers-has-decreased-326-over-past-eight-years
6. http://www.aqua-calc.com/calculate/volume-to-weight
7. http://www.answers.com/Q/How_much_does_Aluminum_Foil_weigh?#slide=1
8. http://abcnews.go.com/Technology/story?id=97476
9. http://www.calrecycle.ca.gov/lgcentral/library/dsg/irecycl.htm
10. https://www.uline.com/Product/Detail/S-4166/Corrugated-Boxes-200-Test/16-x-16-x-16-Corrugated-Boxes
11. http://www.amefird.com/technical-tools/thread-size/fabric-weight/
12. https://www.cockeyed.com/science/weight/shirt-mens-polo.html (men's large polo shirt)
13. http://recycleusainc.com/aluminium-cans/how-many-aluminum-cans-equal-1-pound/
14. https://en.wikipedia.org/wiki/Wine_bottle
15. http://www.harrissupplysolutions.com/steel-rebar-sizes-stock.html (#8 rebar)
16. Toter Residential Heavy Duty, 32-Gallon Trash Can
17. https://flexpvc.com/Reference/PVCPipeSpecsRigid.shtml
18. http://premiercarts.com/ (Model 6240)

# Appendix E

# PROTOCOLS – IRO, HEPO, OBSERVATION FORMS AND SAMPLE TOP VIEW CHANNEL SKETCH

# Appendix E

In River Observation (IRO)

High Elevation Point Observation (HEPO) Protocols

Observation Forms

## In-River Observation Protocol (IRO)

The locations were selected to optimize the potential for capture of trash impacts from sources that could be hidden from bridge vantage points, such as homeless encampments, illicit dumping locations, and recreational areas. The protocol designed for these locations will allow for a closer inspection of the trash impacts to the river, and possibly better quantification of the floating, submerged, and partially submerged trash components present. For each location, a transect line across the river perpendicular to the river flow will be designated from one fixed point on the near bank to another fixed point on the opposing bank. This transect line will be the consistent line for trash observation as well as flow and trash measurements.

1. This protocol should always be conducted by at least two people, each equipped with working cell phones to allow for communication with each other and for outside parties for coordination, and in case of emergencies.

2. Drive to the closest available parking location for the designated in-river location. Park safely and call the project manager to alert that you are about to enter the river location.

3. Locate fixed point demarcations on the river or banks for beginning and end of 300 feet, so that repeated observations are made consistently in the same sight range and of the same observation area.

    a. If no demarcations are available, placement of paint stripes or other semi-permanent markers should be made during the initial visit.

4. Locate fixed demarcation point on river or river bank.

    a. Take an overview photographs of the entire 300-foot zone

    b. Walk along the 300 foot length of the bank and take as many additional photographs as necessary to capture all observable trash in the river and on the river banks. Photographs should capture any details of trash items for identifying information that can be cross-matched with LASAN's Trash Library and used for the data assessment.

5. After completion of the photographic record, observations of trash impacts should be recorded.

    a. Tablet-based observation record noting types, quantities, approximate locations (river, banks, floating, submerged, etc.).

6. Proceed to record the river flow velocity from the shoreline.

    a. Flow velocity measurements should be made from the center of the river. Use an extension rod to insert the meter into the river at the selected distance as needed to minimize disturbance to the natural flow patterns *

    b. Record the flow velocity measurement in the appropriate section of the data table on the tablet.

7. Initiate the suspended trash monitoring from the shoreline along the transect line.

a. Insert the portable net at a fixed location in the river flow just deep enough to fully submerge the entire net surface.

b. Hold this position for approximately 5 minutes to allow for trash particles to accumulate in the net.

c. After 5 minutes, remove the net and assess the accumulated material for trash components. Natural materials such as moss, algae, sticks, or twigs should be ignored.

d. Count each type of debris and record the findings in the appropriate data table on the tablet.

e. Using the same procedure, repeat the in-river collection at a point on the opposite side of the river.

f. If water depth is too shallow to sample for suspended trash, note this finding in the record.

8. When assessments are completed, gather all materials and return with partner to the vehicle. Call the project manager just before leaving the site to communicate your safe exit from the site.

*Velocity flow measurement: For sampling sites where water is deep enough (>0.1-foot) a velocity meter will be utilized. For these cases, velocity will be measured using a Marsh-McBirney Flo-Mate® velocity meter or equivalent, which uses an electromagnetic velocity sensor. A "flow pole" will be used to measure the water depth at the measurement point and to properly align the sensor so that the depth of the velocity measurement is approximately equal to 0.6 total depth, which is representative of the average velocity. The distance from shore to the velocity measurement point is dependent on the total width of the stream.

**Field QA/QC**

- First and second staff from the observation team should compare observations.
- Have third party staff review observation notes.

## High Elevation Point Observation (HEPO)

HEPO will be employed when there is no access or access is limited at the monitoring site. HEPO can also be implemented by field staff as an alternative protocol for designated IRO sites when monitoring at these sites are unsafe or the IRO site becomes inaccessible.

1. This protocol should be conducted by at least two people, each equipped with working cell phones to allow for communication with each other and for outside parties for coordination, and in case of the event of an emergency.
2. Drive to predetermined bridge location and park in a safe spot close to or on the bridge.
3. Walk to the designated observation point on bridge. If this is the first visit, record GPS coordinates.
4. Locate pre-selected fixed point demarcations on the river or banks at 300 feet point, so that repeated observations are made consistently in the same sight range and of the same observation area.
   a. If no demarcations are available, placement of paint stripes or other semi-permanent markers should be made during the initial visit.
   b. Take an overview photographs of the entire 300-foot zone
   c. Take as many additional photographs as necessary to unambiguously identify details of all observable trash in the river and on the river banks. Photographs should capture enough identifying information that can be cross-matched with LASAN's Trash Library and used for the data assessment.
5. After completion of the photographic record, observations of trash impacts should be recorded.
   d. Tablet-based observation record noting types, quantities, approximate locations (river, banks, floating, submerged, etc.)
6. When complete, return to vehicle and proceed to the next designated bridge observation location.

<u>Field QA/QC</u>

- First and second staff from the observation team should compare observations.
- Have third party staff review observation notes.

# Observation Forms

# TRASH RECEIVING WATER OBSERVATION FORM

**Site**: ____________________ **Date**: ______________________

**In-River Observation** ☐ **High Elevation Point Observation** ☐

Surveyor's Name(s): ______________________________

Surveyor's Title(s): ______________________________

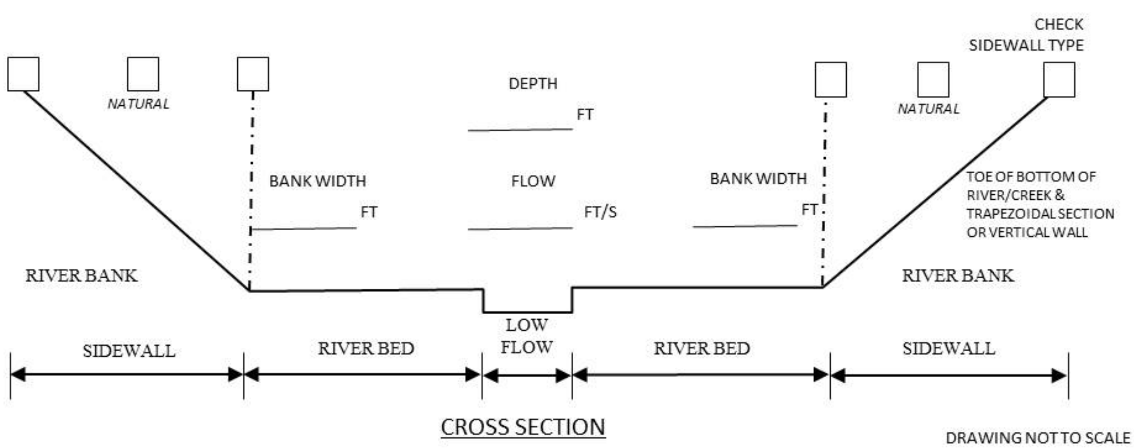
Survey Start Time: ____________________ Survey End Time: ____________________

| | | | |
|---|---|---|---|
| Weather | ❑ Sunny | ❑ Partly Cloudy | ❑ Windy/No Wind |
| Last Rain (Must be >72 hours prior to survey event) | | | |

| | | | |
|---|---|---|---|
| River Flow Conditions | ❑ No flow | ❑ Ponded | ❑ Flowing |
| Location of Measured Velocity/Flow Rate | ❑ Left Bank<br>*Note measurement on figure below* | ❑ Center | ❑ Right Bank |

| **Trash Categories** | **Number of Items Surveyed** | | |
|---|---|---|---|
| | River Bank (L/R) | Suspended/Floating[1] | On Vegetation *(soft bottom portion of waterbody)* |
| Plastic<br>❑ Bags ❑ Plastic<br>❑ Styrofoam ❑ Water bottle | | | |
| Paper<br>❑ Paper ❑ Newspaper<br>❑ Paper bag ❑ Cardboard box | | | |
| Metal<br>❑ Cans ❑ Rebar<br>❑ Scrap Plate ❑ Shopping Cart | | | |
| Wood<br>❑ 2x4 board | | | |
| Glass<br>❑ Beverage container<br>❑ Wine bottle | | | |
| Cloth<br>❑ Rags ❑ Clothing<br>❑ Blankets, other large | | | |
| Biohazard | | | |
| Illegal dumping | | | |
| Miscellaneous | | | |

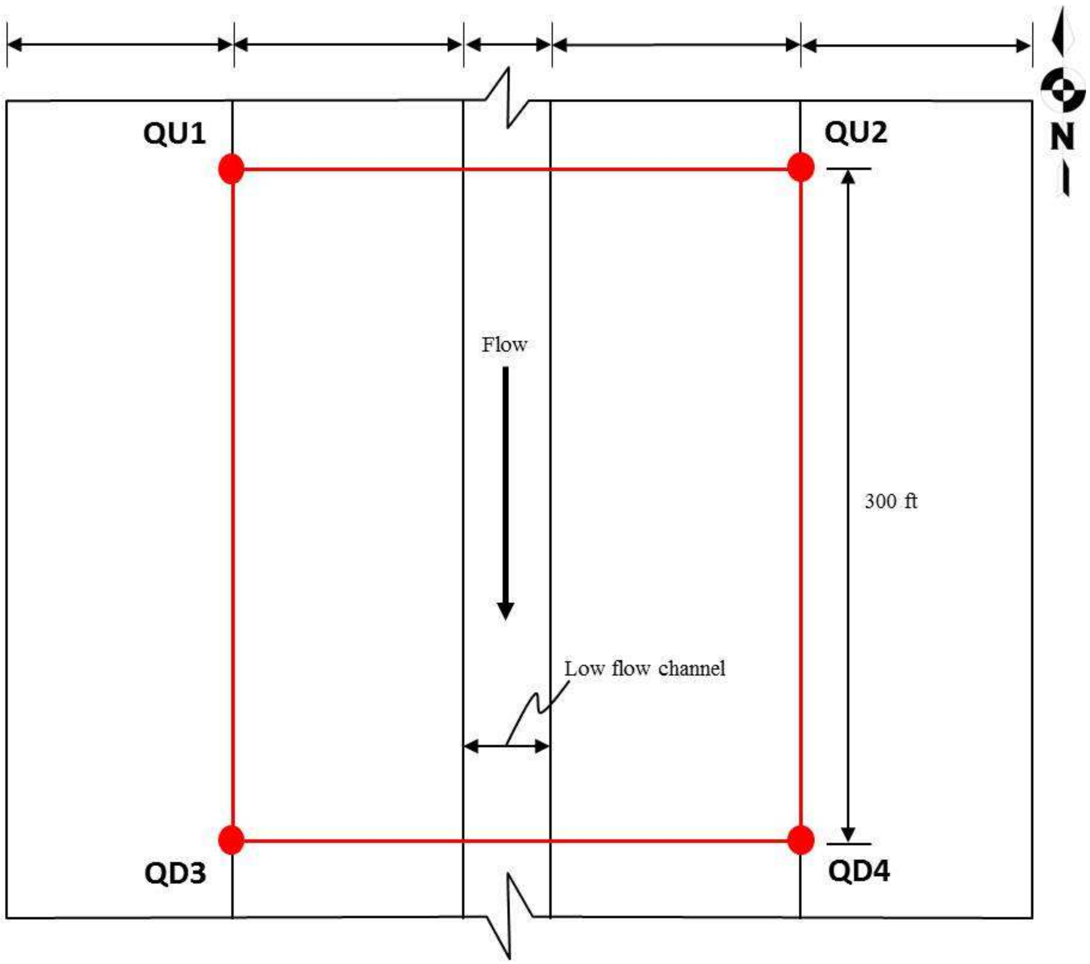
1. Sampled with submerged net.






**TURN PAGE, COMPLETE PAGE 2**

**NOTE ON FIGURE BELOW THE LOCATION OF TRASH OBSERVED IN SAMPLING SITE**




PLAN VIEW

LEGEND

B = Biohazard
C = Cloth
△ = Encampment
G = Glass
M = Metal
P = Paper
L = Plastic
W = Wood
X = Miscellaneous

**SD = Storm Drain ≥ 36"**

PHOTOGRAPH LOG

1. ______
2. ______
3. ______
4. ______
5. ______
6. ______

Remarks: ______

# Appendix F

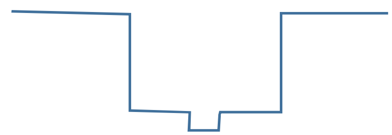
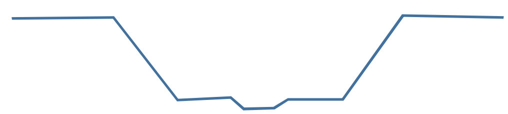
# CHANNEL CROSS-SECTION AND PROTOCOL - LAR

## Appendix F
## ULAR – Monitoring Sites, Channel Cross-Section and Protocol

**Los Angeles River Trash TMDL Receiving Water Monitoring Sites Description**

| Site Name | ID | Outfalls | Nearest Upstream Tributary to Monitoring Site | Geographical Coordinates | | | Sampling Frequency (year) | Protocol Type | Participating Agencies |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Point | Latitude | Longitude | | | |
| LAR2 Avenue 19 | 2 | 149 | Arroyo Seco | QU1<br>QU2<br>QD3<br>QD4 | -118.226614<br>-118.225895<br>-118.226441<br>-118.225755 | 34.078864<br>34.078933<br>34.07806<br>34.078113 | Even | IRO | La Canada Flintridge, Pasadena, South Pasadena, Alhambra, Monterey Park, LA County, Los Angeles |
| LAR3 Los Feliz | 3 | 166 | Verdugo Wash | QU1<br>QU2<br>QD3<br>QD4 | -118.27025<br>-118.269644<br>-118.269865<br>-118.26929 | 34.120848<br>34.121051<br>34.120117<br>34.120276 | Odd | IRO | Burbank, Glendale, La Canada Flintridge, LA County, Los Angeles, Pasadena, La Canada Flintridge |
| LAR4 Lankershim Blvd | 4 | 264 | Tujunga Wash | QU1<br>QU2<br>QD3<br>QD4 | -118.364728<br>-118.364725<br>-118.363741<br>-118.363737 | 34.143351<br>34.143689<br>34.143309<br>34.143661 | Even | IRO | LA County, Los Angeles, San Fernando, Glendale, Burbank |
| LAR5 Burbank Blvd | 5 | 4 | Bull Creek | QU1<br>QU2<br>QD3<br>QD4 | -118.477201<br>-118.47689<br>-118.476491<br>-118.476207 | 34.170144<br>34.170398<br>34.169618<br>34.169855 | Odd | IRO | LA County, Los Angeles, San Fernando, Glendale, Burbank |
| LAR6 Reseda Blvd | 6 | 92 | Aliso Canyon | QU1<br>QU2<br>QD3<br>QD4 | -118.534725<br>-118.534509<br>-118.533843<br>-118.533645 | 34.189518<br>34.189799<br>34.189135<br>34.189365 | Even | IRO | LA County, Los Angeles, Hidden Hills, Calabasas |
| Alternate Sites | | | | | | | | | |
| LAR3 Glendale Blvd | 3 | 166 | Verdugo Wash | QU1<br>QU2<br>QD3<br>QD4 | -118.2665<br>-118.266068<br>-118.265859<br>-118.265424 | 34.114486<br>34.114781<br>34.113845<br>34.114175 | Odd | IRO/HEPO (Limited Access) | Burbank, Glendale, La Canada Flintridge, LA County, Los Angeles, Pasadena, La Canada Flintridge |
| LAR4 Sepulveda Blvd | 4 | 264 | Bull Creek | QU1<br>QU2<br>QD3<br>QD4 | -118.467356<br>-118.467312<br>-118.466417<br>-118.466375 | 34.161954<br>34.162088<br>34.161681<br>34.161802 | Even | HEPO | LA County, Los Angeles, San Fernando, Glendale, Burbank |

**Los Angeles River Trash TMDL Receiving Water Monitoring Sites**

| Site Name | Reach | Cross Section | Protocol Type |
|---|---|---|---|
| LAR2 Avenue 19 | 2 | Trapezoidal  | IRO |
| LAR3 Los Feliz | 3 | Trapezoidal, Soft Bottom  | IRO |
| LAR4 Lankershim Blvd | 4 | Rectangular  | IRO |
| LAR5 Burbank Blvd | 5 | Natural  | IRO |
| LAR6 Reseda Blvd | 6 | Trapezoidal  | IRO |

| Alternate Sites | | | |
|---|---|---|---|
| LAR3 Glendale Blvd | 3 | Trapezoidal, Soft Bottom  | IRO/HEPO (Limited Access to the side of bank) |
| LAR4 Sepulveda Blvd | 4 | Square  | HEPO (No Access, Vertical Walls) |

# Appendix G

# SCORING FOR SELECTED MONITORING SITES - LAR

Appendix G

Scoring for Selected ULAR Monitoring Sites

Site Name: LAR2 Avenue 19 Evaluation Score

| Criteria | Score | | | | | |
|---|---|---|---|---|---|---|
| | Guidelines | 1 | 2 | 3 | 4 | 5 |
| Tributary adjacent to site[1] | ≤ 100 yds = 5; increasing distance lower points, Not determine=1 | | | | | 5 |
| Landuse distribution representative | All landuses = 5; all others, score equal to number of landuses | | | | | 5 |
| Number of upstream main stem outfalls[2] | ≥ 20 outfalls = 5; fewer outfalls lower score | | | | | 5 |
| Waterbody cross section configuration | Trapezoidal = 5; all others user Established, Rectangular=3, Square=4, Natural=1 | | | | | 5 |
| Ease of access | Drivable = 5, Walkable = 3; all others user established | | | | | 5 |
| Street bridge overpass | Adjacent to site = 5, No bridge overpass = 1 | 1 | | | | |

Site Name. LAR3 Los Feliz Evaluation Score

| Criteria | Score | | | | | |
|---|---|---|---|---|---|---|
| | Guidelines | 1 | 2 | 3 | 4 | 5 |
| Tributary adjacent to site[1] | ≤ 100 yds = 5; increasing distance lower points, Not determine=1 | 1 | | | | |
| Landuse distribution representative | All landuses = 5; all others, score equal to number of landuses | | | | | 5 |
| Number of upstream main stem outfalls[2] | ≥ 20 outfalls = 5; fewer outfalls lower score | | | | | 5 |
| Waterbody cross section configuration | Trapezoidal = 5; all others user Established, Rectangular=3, Square=4, Natural=1 | | | | | 5 |
| Ease of access | Drivable = 5, Walkable = 3; all others user established | | | 3 | | |
| Street bridge overpass | Adjacent to site = 5, No bridge overpass = 1 | | | | | 5 |

Site Name. LAR4 Lankershim Blvd Evaluation Score

| Criteria | Score | | | | | |
|---|---|---|---|---|---|---|
| | Guidelines | 1 | 2 | 3 | 4 | 5 |
| Tributary adjacent to site[1] | ≤ 100 yds = 5; increasing distance lower points, Not determine=1 | | 2 | | | |
| Landuse distribution representative | All landuses = 5; all others, score equal to number of landuses | | | | | 5 |
| Number of upstream main stem outfalls[2] | ≥ 20 outfalls = 5; fewer outfalls lower score | | | | | 5 |
| Waterbody cross section configuration | Trapezoidal = 5; all others user Established, Rectangular=3, Square=4, Natural=1 | | | 3 | | |
| Ease of access | Drivable = 5, Walkable = 3; all others user established | | | | | 5 |
| Street bridge overpass | Adjacent to site = 5, No bridge overpass = 1 | | | | | 5 |

Site Name. LAR5 Burbank Blvd Evaluation Score

| CRITERIA | SCORE | | | | | |
|---|---|---|---|---|---|---|
| | GUIDELINES | 1 | 2 | 3 | 4 | 5 |
| Tributary adjacent to site[1] | ≤ 100 yds = 5; increasing distance lower points, Not determine=1 | | 2 | | | |
| Landuse distribution representative | All landuses = 5; all others, score equal to number of landuses | | | | | 5 |
| Number of upstream main stem outfalls[2] | ≥ 20 outfalls = 5; fewer outfalls lower score | 1 | | | | |
| Waterbody cross section configuration | Trapezoidal = 5; all others user Established, Rectangular=3, Square=4, Natural=1 | 1 | | | | |
| Ease of access | Drivable = 5, Walkable = 3; all others user established | | | | | 5 |
| Street bridge overpass | Adjacent to site = 5, No bridge overpass = 1 | | | | | 5 |

Site Name. LAR6 Reseda Blvd Evaluation Score

| CRITERIA | SCORE | | | | | |
|---|---|---|---|---|---|---|
| | GUIDELINES | 1 | 2 | 3 | 4 | 5 |
| Tributary adjacent to site[1] | ≤ 100 yds = 5; increasing distance lower points, Not determine=1 | | | | 4 | |
| Landuse distribution representative | All landuses = 5; all others, score equal to number of landuses | | | | | 5 |
| Number of upstream main stem outfalls[2] | ≥ 20 outfalls = 5; fewer outfalls lower score | | | | | 5 |
| Waterbody cross section configuration | Trapezoidal = 5; all others user Established, Rectangular=3, Square=4, Natural=1 | | | | | 5 |
| Ease of access | Drivable = 5, Walkable = 3; all others user established | | | | | 5 |
| Street bridge overpass | Adjacent to site = 5, No bridge overpass = 1 | | | | | 5 |

Alternate Sites are presented below:

Site Name. LAR3 Glendale Blvd Evaluation Score

| CRITERIA | SCORE | | | | | |
|---|---|---|---|---|---|---|
| | GUIDELINES | 1 | 2 | 3 | 4 | 5 |
| Tributary adjacent to site[1] | ≤ 100 yds = 5; increasing distance lower points, Not determine=1 | 1 | | | | |
| Landuse distribution representative | All landuses = 5; all others, score equal to number of landuses | | | | | 5 |
| Number of upstream main stem outfalls[2] | ≥ 20 outfalls = 5; fewer outfalls lower score | | | | | 5 |
| Waterbody cross section configuration | Trapezoidal = 5; all others user Established, Rectangular=3, Square=4, Natural=1 | | | | | 5 |
| Ease of access | Drivable = 5, Walkable = 3; all others user established | | | 3 | | |
| Street bridge overpass | Adjacent to site = 5, No bridge overpass = 1 | | | | | 5 |

Site Name. LAR4 Sepulveda Blvd Evaluation Score

| Criteria | Score | | | | | |
|---|---|---|---|---|---|---|
| | Guidelines | 1 | 2 | 3 | 4 | 5 |
| Tributary adjacent to site[1] | ≤ 100 yds = 5; increasing distance lower points, Not determine=1 | 1 | | | | |
| Landuse distribution representative | All landuses = 5; all others, score equal to number of landuses | | | | | 5 |
| Number of upstream main stem outfalls[2] | ≥ 20 outfalls = 5; fewer outfalls lower score | | | | | 5 |
| Waterbody cross section configuration | Trapezoidal = 5; all others user Established, Rectangular=3, Square=4, Natural=1 | | | | 4 | |
| Ease of access | Drivable = 5, Walkable = 3; all others user established | | | | | 5 |
| Street bridge overpass | Adjacent to site = 5, No bridge overpass = 1 | | | | | 5 |

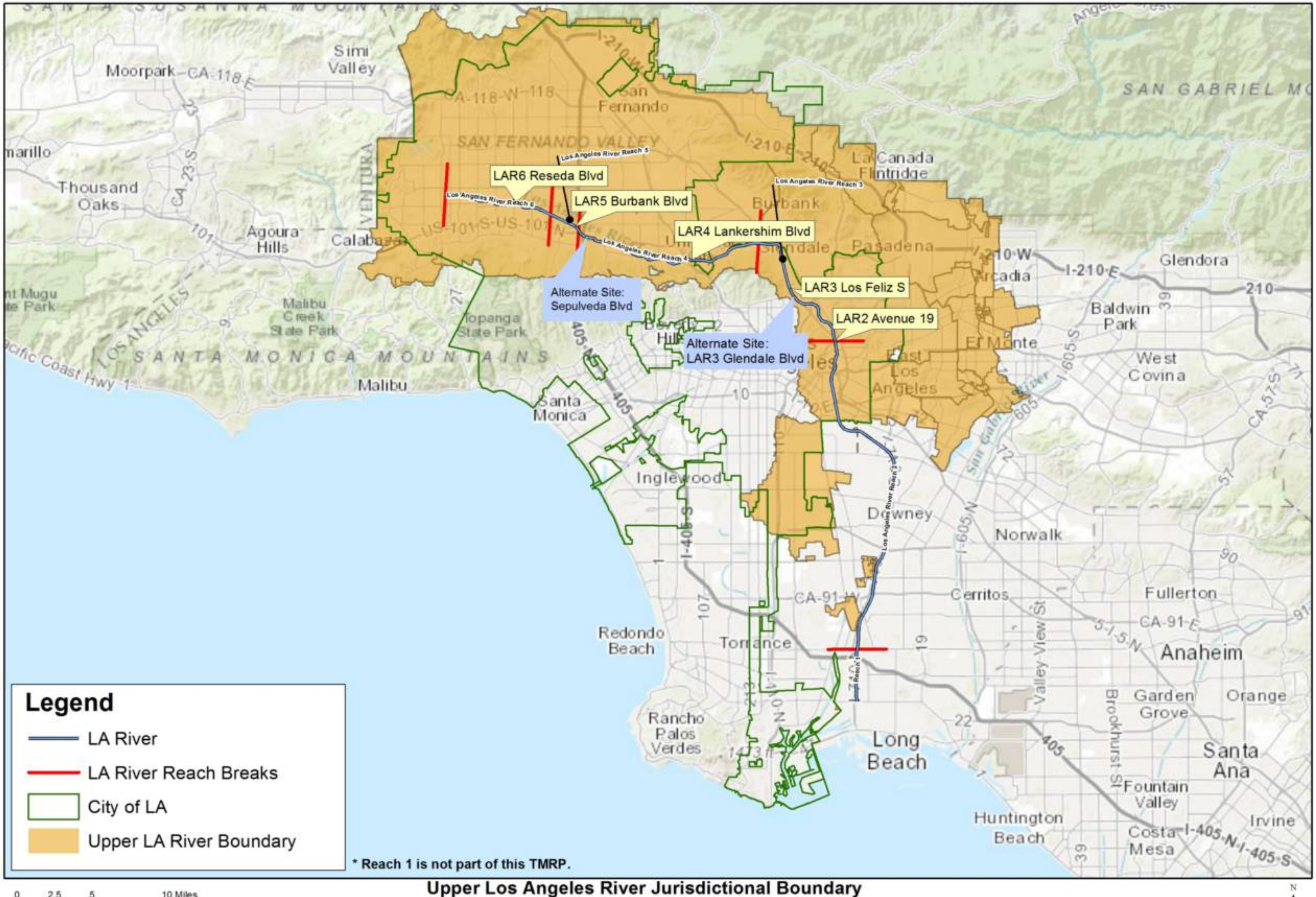
Notes:

| 1. Score | Distance from tributary (Yards) |
|---|---|
| 1 | ≥4,000 & Tributary not determine |
| 2 | 2,500 - 3,999 |
| 3 | 1,000 - 2,499 |
| 4 | 101 - 999 |
| 5 | 1 - 100 |

| 2. Score | Number of upstream main stem outfalls |
|---|---|
| 1 | 1 - 5 |
| 2 | 6 - 10 |
| 3 | 11 - 15 |
| 4 | 16 - 19 |
| 5 | ≥ 20 |

# Appendix H

# REACHES AND MONITORING SITES
# AERIAL VIEWS - LAR




## Upper Los Angeles River Jurisdictional Boundary
## Trash TMDL Receiving Water Monitoring

| DRAWN BY: | DATE CREATED: | CHECKED BY: | DATE REVISED: | |
|---|---|---|---|---|
| RZ | 10-04-2016 | AM | 12-2-16 | ENRIQUE C. ZALDIVAR<br>DIRECTOR<br>BUREAU OF SANITATION |
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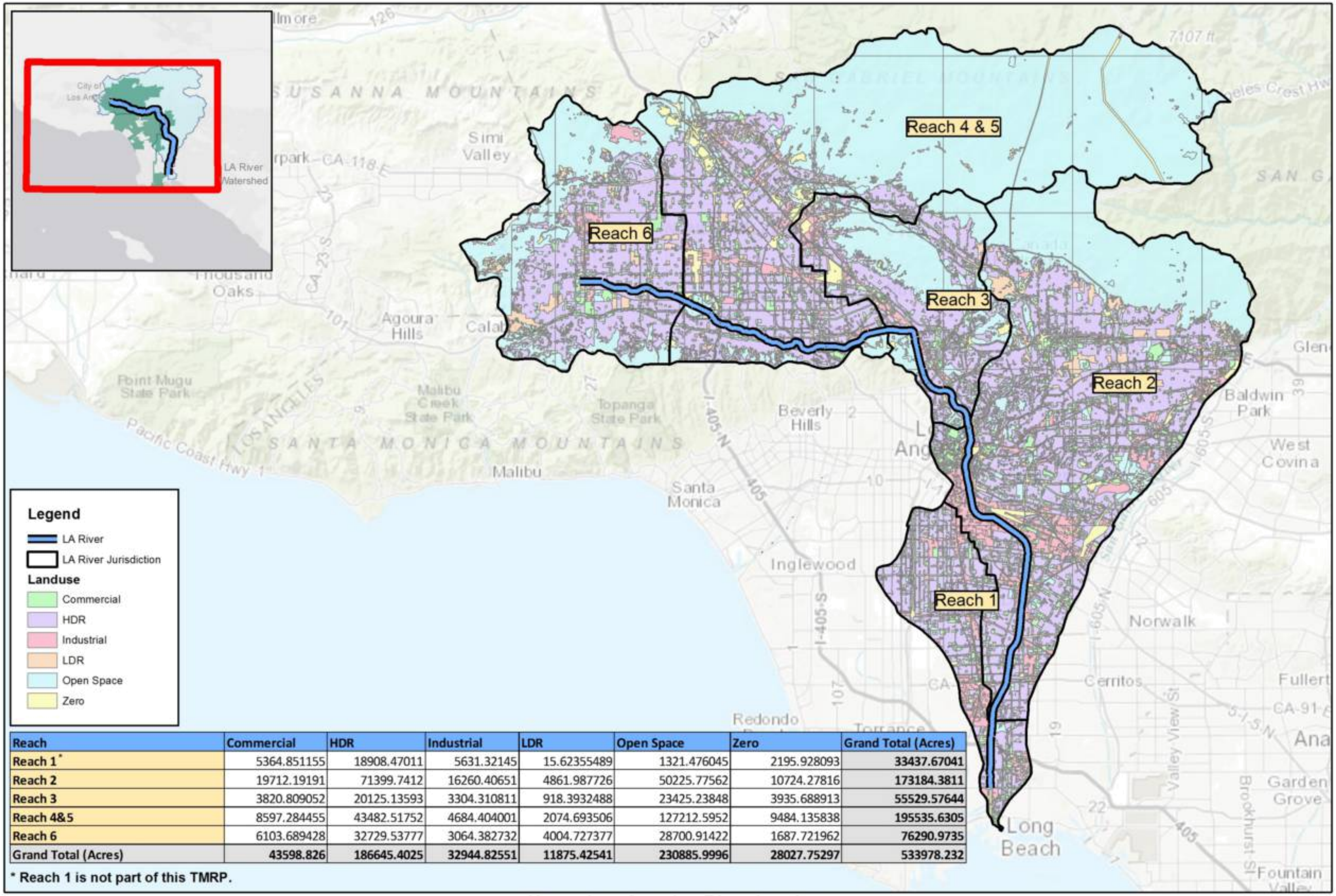


| Reach | Commercial | HDR | Industrial | LDR | Open Space | Zero | Grand Total (Acres) |
|---|---|---|---|---|---|---|---|
| Reach 1* | 5364.851155 | 18908.47011 | 5631.32145 | 15.62355489 | 1321.476045 | 2195.928093 | **33437.67041** |
| Reach 2 | 19712.19191 | 71399.7412 | 16260.40651 | 4861.987726 | 50225.77562 | 10724.27816 | **173184.3811** |
| Reach 3 | 3820.809052 | 20125.13593 | 3304.310811 | 918.3932488 | 23425.23848 | 3935.688913 | **55529.57644** |
| Reach 4&5 | 8597.284455 | 43482.51752 | 4684.404001 | 2074.693506 | 127212.5952 | 9484.135838 | **195535.6305** |
| Reach 6 | 6103.689428 | 32729.53777 | 3064.382732 | 4004.727377 | 28700.91422 | 1687.721962 | **76290.9735** |
| **Grand Total (Acres)** | **43598.826** | **186645.4025** | **32944.82551** | **11875.42541** | **230885.9996** | **28027.75297** | **533978.232** |

*** Reach 1 is not part of this TMRP.**

# Upper Los Angeles River Landuse
# Trash TMDL Receiving Water Monitoring

| DRAWN BY: | DATE CREATED: | CHECKED BY: | DATE REVISED: | ENRIQUE C. ZALDIVAR<br>DIRECTOR<br>BUREAU OF SANITATION |
|---|---|---|---|---|
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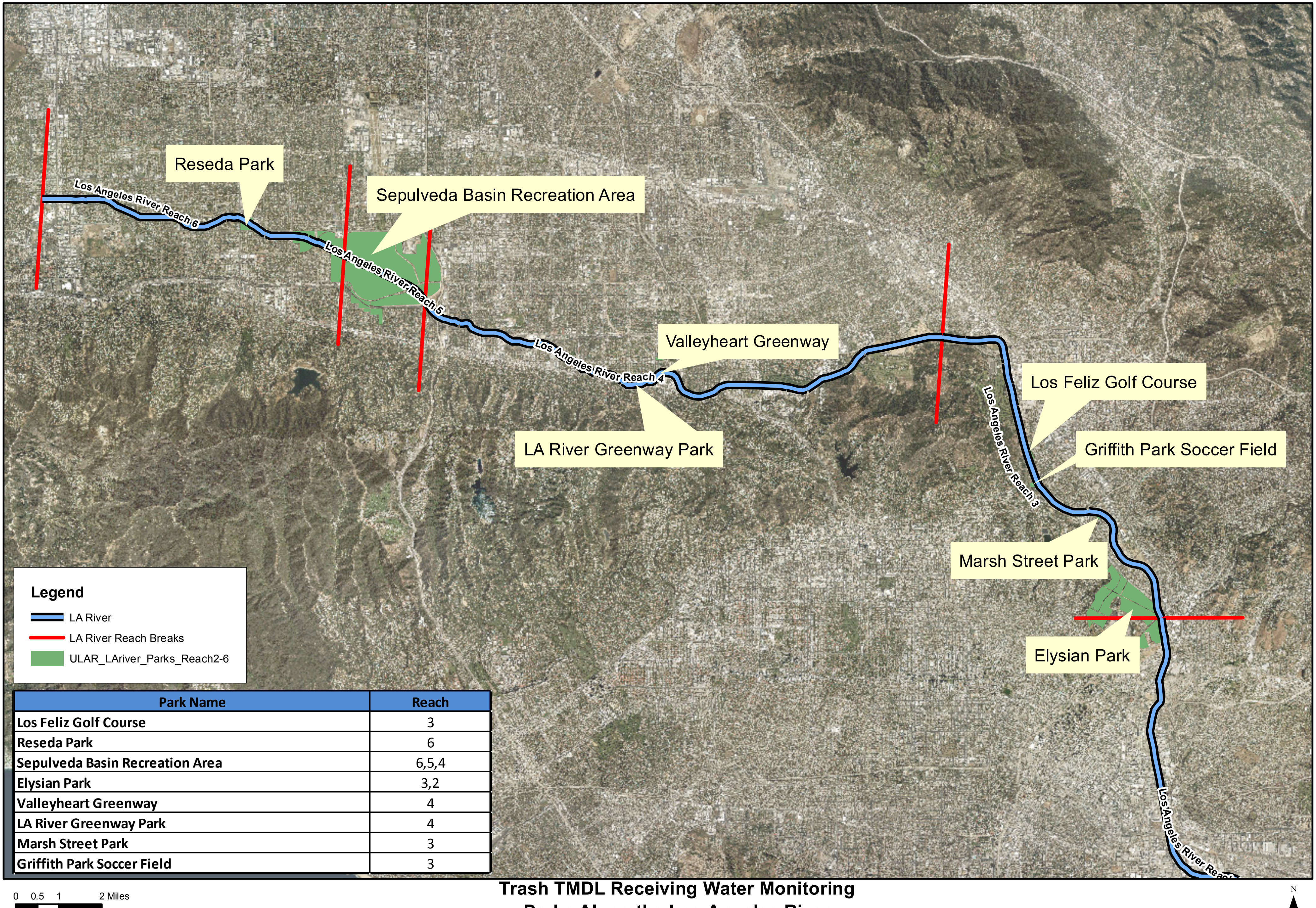



| Park Name | Reach |
|---|---|
| Los Feliz Golf Course | 3 |
| Reseda Park | 6 |
| Sepulveda Basin Recreation Area | 6,5,4 |
| Elysian Park | 3,2 |
| Valleyheart Greenway | 4 |
| LA River Greenway Park | 4 |
| Marsh Street Park | 3 |
| Griffith Park Soccer Field | 3 |

# Trash TMDL Receiving Water Monitoring
# Parks Along the Los Angeles River

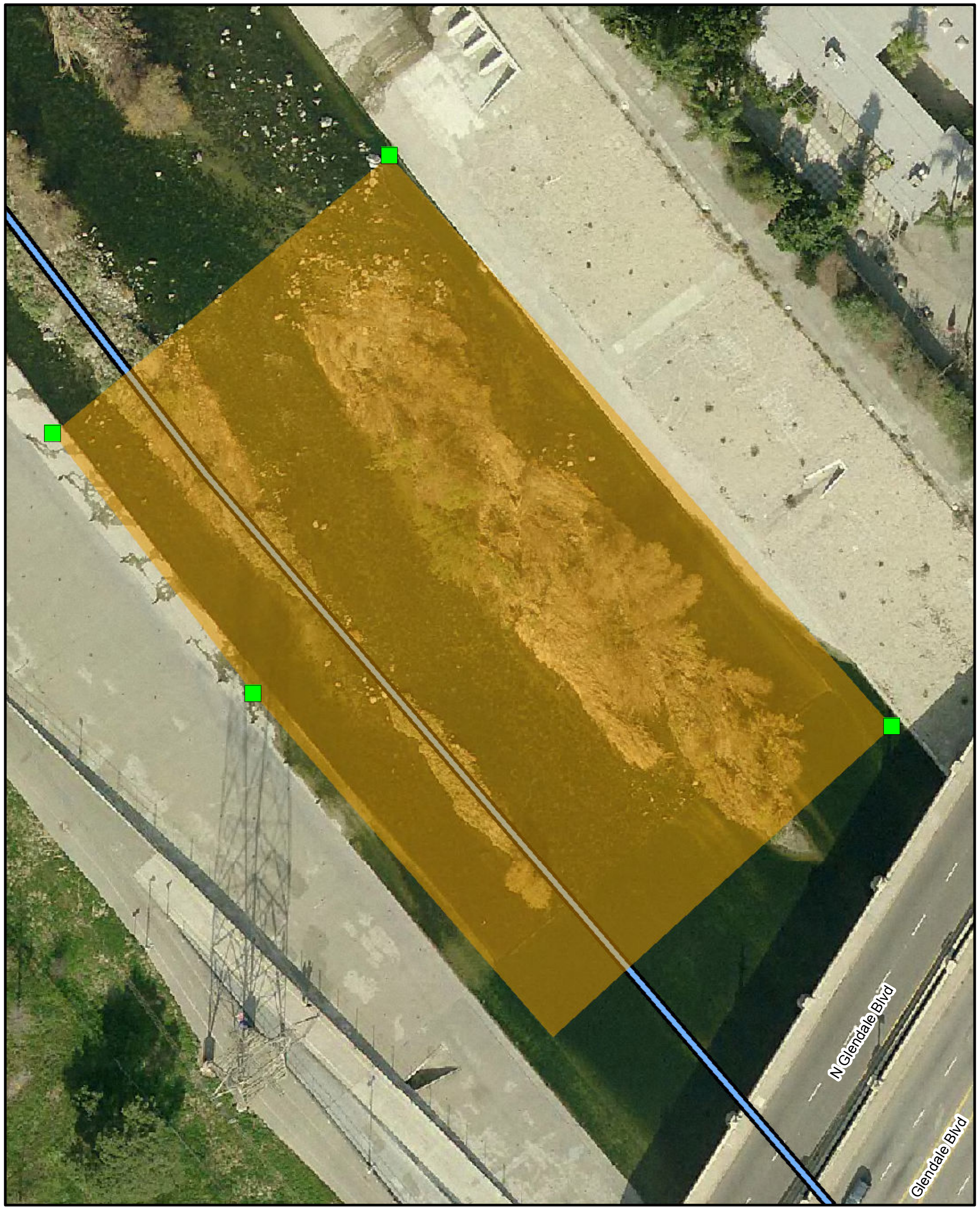
| DRAWN BY: | DATE CREATED: | CHECKED BY: | DATE REVISED: |
|---|---|---|---|
| RZ | 10-04-2016 | AM | |

FILE LOC:

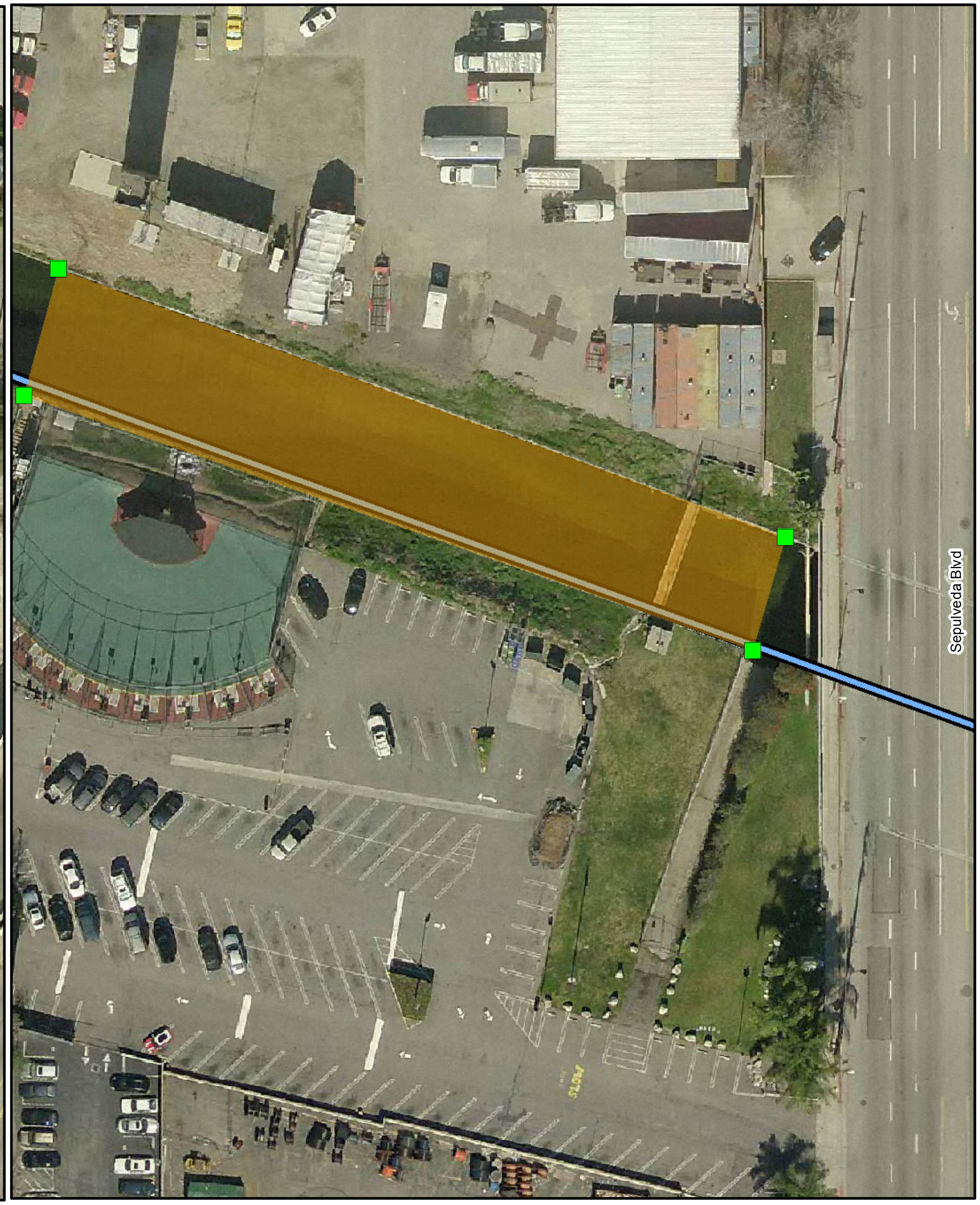


ENRIQUE C. ZALDIVAR
DIRECTOR
BUREAU OF SANITATION

SHAHRAM KHARAGHANI
PROGRAM MANAGER
WATERSHED PROTECTION DIVISION




**LAR3 Glendale Blvd**




**LAR4 Sepulveda Blvd**

## Los Angeles River Alternate Monitoring Sites
## Trash TMDL Receiving Water Monitoring

0 25 50 100 Feet

N

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**Los Angeles River Reach 2 Monitoring Site**
**Trash TMDL Receiving Water Monitoring**

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**Los Angeles River Reach 3 Monitoring Site**
**Trash TMDL Receiving Water Monitoring**

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# Los Angeles River Reach 4 Monitoring Site
# Trash TMDL Receiving Water Monitoring

0 30 60 120 Feet

N

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|---|---|---|---|---|
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0 25 50 100 Feet

**Los Angeles River Reach 5 Monitoring Site**
**Trash TMDL Receiving Water Monitoring**

N

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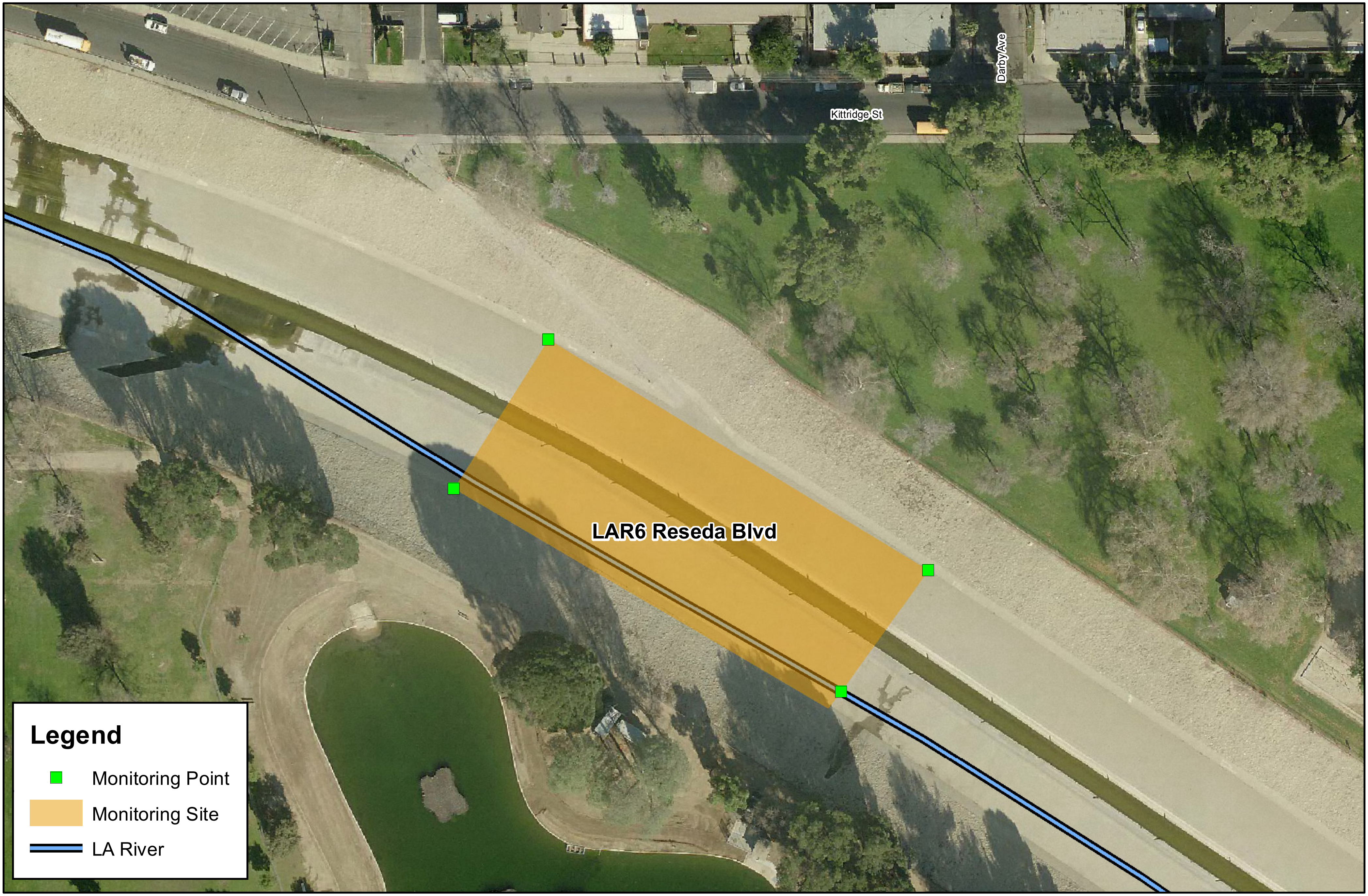


0 25 50 100 Feet

N

**Los Angeles River Reach 6 Monitoring Site**
**Trash TMDL Receiving Water Monitoring**

| DRAWN BY: RZ | DATE CREATED: 10-04-2016 | CHECKED BY: AM | DATE REVISED: | ENRIQUE C. ZALDIVAR<br>DIRECTOR<br>BUREAU OF SANITATION |
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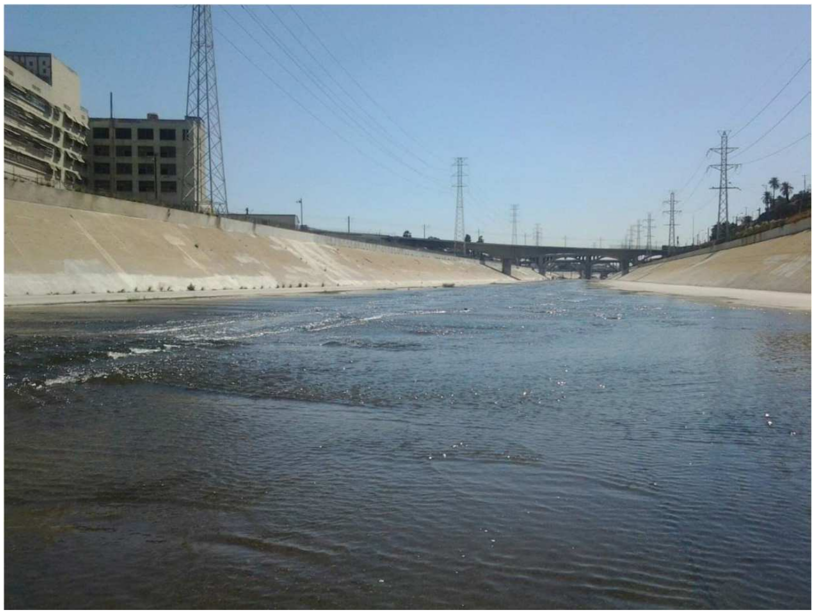
# Appendix I

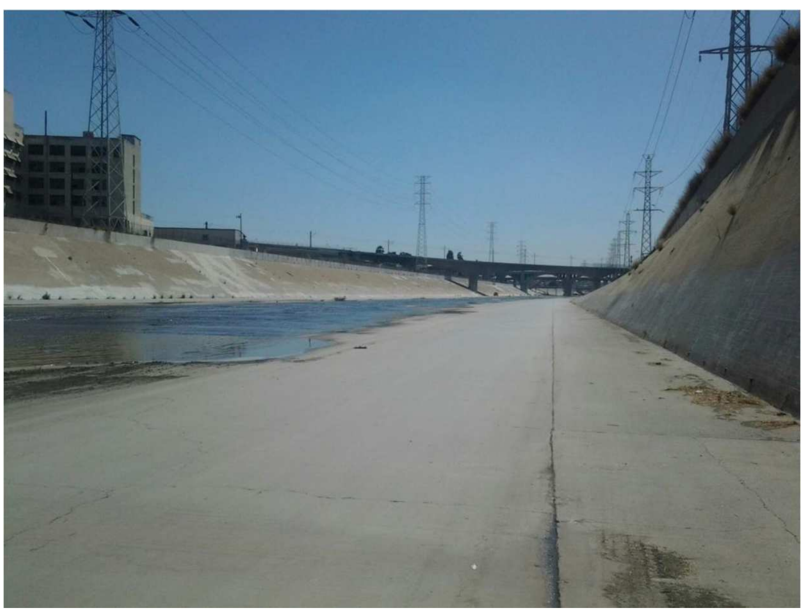
# PHOTOGRAPHS OF EACH MONITORING SITE - LAR

# Appendix I - Photos of ULAR Monitoring Sites

**Monitoring Site: LAR2 Avenue 19**
ID # 2



LAR2 Avenue 19, Facing South



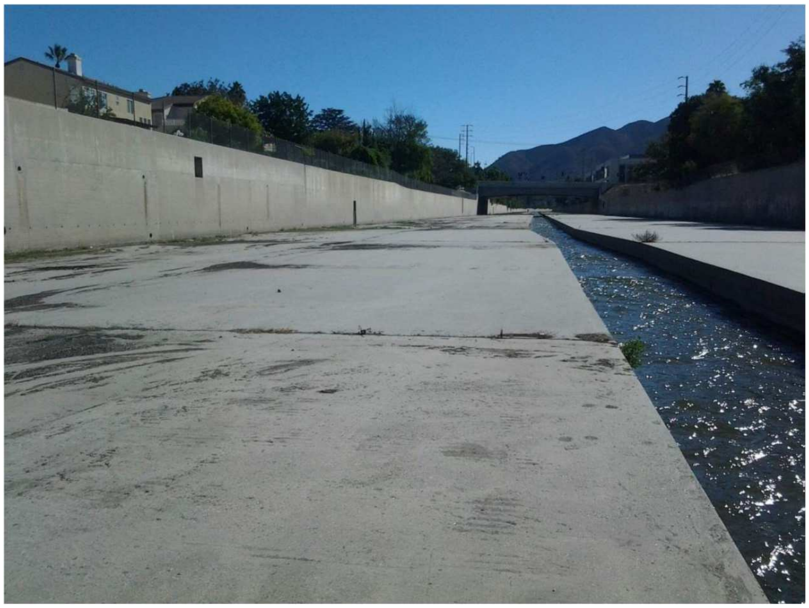
LAR2 Avenue 19, Facing South

Monitoring Site: LAR3 Los Feliz Blvd.
ID # 3

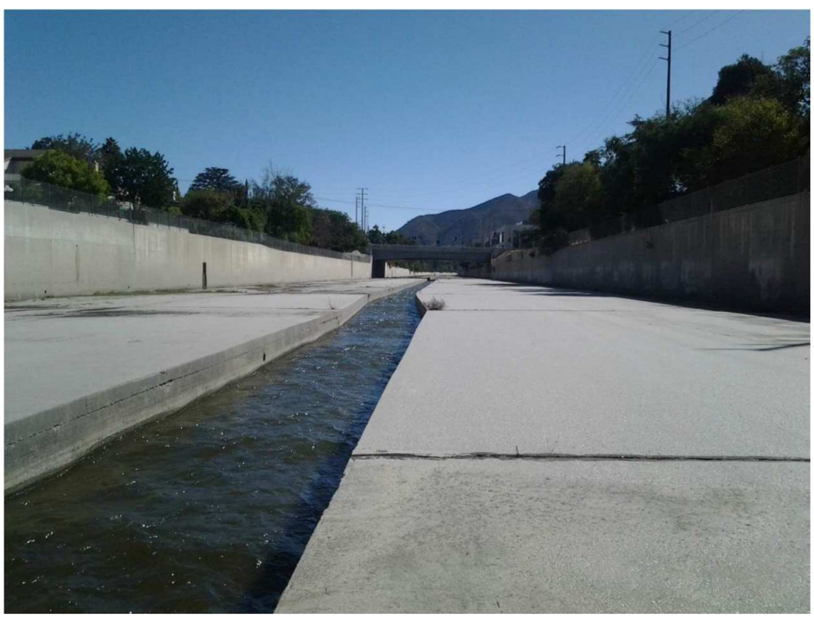
LAR3 Los Feliz Blvd., Facing South


LAR3 Los Feliz Blvd., Facing South

**Monitoring Site: LAR4 Lankershim Blvd.**
ID # 4



LAR4 Lankershim Blvd, Facing East



LAR4 Lankershim Blvd, Facing East

**Monitoring Site: LAR5 Burbank Blvd.**
ID # 5

LAR 5 Burbank Blvd., Facing East

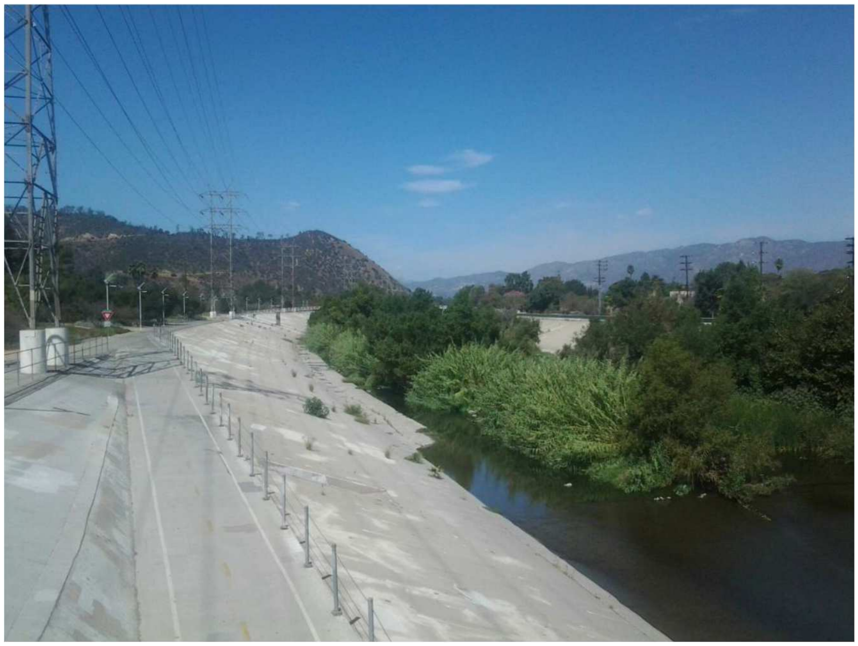
LAR 5 Burbank Blvd., Facing East

**Monitoring Site: LAR6 Reseda Blvd.**
ID # 6

LAR6 Reseda Blvd., Facing East

LAR6 Reseda Blvd., Facing East

**Alternate Monitoring Site: LAR3 Glendale Blvd.**
Alt. ID # 3



LAR3 Glendale Blvd., Facing North (Left Side Access ONLY)

**Alternate Monitoring Site: LAR4 Sepulveda Blvd.**
ID # 4

LAR4 Sepulveda Blvd., Facing West

LAR4 Sepulveda Blvd., Facing West

# Appendix J

# CHANNEL CROSS-SECTION AND PROTOCOL – BALLONA CREEK

# Appendix J
# BC – Monitoring Sites, Channel Cross-Section and Protocol

**Ballona Creek Trash TMDL Receiving Water Monitoring Sites Description**

| Site Name | ID | Outfalls | Nearest Upstream Tributary to Monitoring Site | Geographical Coordinates | | | Sampling Frequency (year) | Protocol Type | Participating Agencies |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Latitude | Longitude | | | |
| BC1 Fairfax Avenue | 1 | 103 | NA | QU1<br>QU2<br>QD3<br>QD4 | -118.367815<br>-118.367935<br>-118.368624<br>-118.368546 | 34.038819<br>34.038599<br>34.038441<br>34.038294 | Yearly | HEPO | West Hollywood, Beverly Hills, Culver City, Los Angeles, LA County |
| BC2 Overland Ave | 2 | 207 | NA | QU1<br>QU2<br>QD3<br>QD4 | -118.396261<br>-118.39622<br>-118.397199<br>-118.397157 | 34.00713<br>34.007051<br>34.00686<br>34.006777 | Yearly | IRO | Inglewood, Santa Monica, Beverly Hills, Culver City, Los Angeles, LA County, Unincorporated |
| BCE Marina Expy | E | 8 | Centinela | QU1<br>QU2<br>QD3<br>QD4 | -118.425939<br>-118.425442<br>-118.4267<br>-118.426243 | 33.979439<br>33.978962<br>33.978904<br>33.978415 | Yearly | IRO/HEPO (Limited Access) | Culver City, Los Angeles, Unincorporated |
| Alternate Sites | | | | | | | | | |
| BC2 Sepulveda Blvd | 2 | 207 | NA | QU1<br>QU2<br>QD3<br>QD4 | -118.401931<br>-118.401793<br>-118.402358<br>-118.402215 | 33.998478<br>33.998418<br>33.997727<br>33.997673 | Yearly | IRO | Inglewood, Santa Monica, Beverly Hills, Culver City, Los Angeles, LA County, Unincorporated |
| BC2 Centinela Ave | 2 | 207 | Sepulveda | QU1<br>QU2<br>QD3<br>QD4 | -118.41614<br>-118.415887<br>-118.416883<br>-118.416634 | 33.986634<br>33.986424<br>33.986079<br>33.985869 | Yearly | HEPO | Inglewood, Santa Monica, Beverly Hills, Culver City, Los Angeles, LA County, Unincorporated |

NA = No Association

**Ballona Creek Trash TMDL Receiving Water Monitoring Sites**

| Site Name | Reach | Cross Section | Protocol Type |
|---|---|---|---|
| BC1 Fairfax Avenue | 1 | Square  | HEPO |
| BC2 Overland Ave | 2 | Trapezoidal  | IRO |
| BCE Marina Expy | E | Trapezoidal  | IRO/HEPO (Limited Access) |
| **Alternate Sites** | | | |
| BC2 Sepulveda Blvd | 2 | Trapezoidal  | IRO |
| BC2 Centinela Ave | 2 | Trapezoidal  | HEPO |

# Appendix K

# SCORING FOR SELECTED MONITORING SITES – BALLONA CREEK

# Appendix K
# Scoring for Selected BC Monitoring Sites

## Site Name. BC1 Fairfax Ave Evaluation Score

| Criteria | Score | | | | | |
|---|---|---|---|---|---|---|
| | Guidelines | 1 | 2 | 3 | 4 | 5 |
| Tributary adjacent to site[1] | ≤ 100 yds = 5; increasing distance lower points, Not determine = 1 | 1 | | | | |
| Landuse distribution representative | All landuses = 5; all others, score equal to number of landuses | | | | | 5 |
| Number of upstream main stem Outfalls[2] | ≥ 20 outfalls = 5; fewer outfalls lower score | | | | | 5 |
| Waterbody cross section configuration | Trapezoidal = 5; all others user Established, Rectangular = 3, Square = 4, Natural = 1 | | | | 4 | |
| Ease of access | Drivable = 5, Walkable = 3; all others user established | | | | | 5 |
| Street bridge overpass | Adjacent to site = 5, No bridge overpass = 1 | | | | | 5 |

## Site Name. BC2 Overland Ave Evaluation Score

| Criteria | Score | | | | | |
|---|---|---|---|---|---|---|
| | Guidelines | 1 | 2 | 3 | 4 | 5 |
| Tributary adjacent to site[1] | ≤ 100 yds = 5; increasing distance lower points, Not determine = 1 | 1 | | | | |
| Landuse distribution representative | All landuses = 5; all others, score equal to number of landuses | | | | | 5 |
| Number of upstream main stem outfalls[2] | ≥ 20 outfalls = 5; fewer outfalls lower score | | | | | 5 |
| Waterbody cross section configuration | Trapezoidal = 5; all others user Established, Rectangular = 3, Square = 4, Natural = 1 | | | | | 5 |
| Ease of access | Drivable = 5, Walkable = 3; all others user established | | | | | 5 |
| Street bridge overpass | Adjacent to site = 5, No bridge overpass = 1 | | | | | 5 |

## Site Name. BCE Marina Expy Evaluation Score

| Criteria | Score | | | | | |
|---|---|---|---|---|---|---|
| | Guidelines | 1 | 2 | 3 | 4 | 5 |
| Tributary adjacent to site[1] | ≤ 100 yds = 5; increasing distance lower points, Not determine = 1 | | | | | 5 |
| Landuse distribution representative | All landuses = 5; all others, score equal to number of landuses | | | | | 5 |
| Number of upstream main stem outfalls[2] | ≥ 20 outfalls = 5; fewer outfalls lower score | | 2 | | | |
| Waterbody cross section configuration | Trapezoidal = 5; all others user Established, Rectangular = 3, Square = 4, Natural = 1 | | | | | 5 |
| Ease of access | Drivable = 5, Walkable = 3; all others user established | | | 3 | | |
| Street bridge overpass | Adjacent to site = 5, No bridge overpass = 1 | 1 | | | | |

Alternate Sites are presented below:

Site Name. BC2 Sepulveda Blvd Evaluation Score

| Criteria | Score | | | | | |
|---|---|---|---|---|---|---|
| | Guidelines | 1 | 2 | 3 | 4 | 5 |
| Tributary adjacent to site[1] | ≤ 100 yds = 5; increasing distance lower points, Not determine = 1 | 1 | | | | |
| Landuse distribution representative | All landuses = 5; all others, score equal to number of landuses | | | | | 5 |
| Number of upstream main stem outfalls[2] | ≥ 20 outfalls = 5; fewer outfalls lower score | | | | | 5 |
| Waterbody cross section configuration | Trapezoidal = 5; all others user Established, Rectangular = 3, Square = 4, Natural = 1 | | | | | 5 |
| Ease of access | Drivable = 5, Walkable = 3; all others user established | | | 3 | | |
| Street bridge overpass | Adjacent to site = 5, No bridge overpass = 1 | | | | | 5 |

Site Name. BC2 Centinela Ave Evaluation Score

| Criteria | Score | | | | | |
|---|---|---|---|---|---|---|
| | Guidelines | 1 | 2 | 3 | 4 | 5 |
| Tributary adjacent to site[1] | ≤ 100 yds = 5; increasing distance lower points, Not determine = 1 | | | 3 | | |
| Landuse distribution representative | All landuses = 5; all others, score equal to number of landuses | | | | | 5 |
| Number of upstream main stem outfalls[2] | ≥ 20 outfalls = 5; fewer outfalls lower score | | | | | 5 |
| Waterbody cross section configuration | Trapezoidal = 5; all others user Established, Rectangular = 3, Square = 4, Natural = 1 | | | | | 5 |
| Ease of access | Drivable = 5, Walkable = 3; all others user established | | | 3 | | |
| Street bridge overpass | Adjacent to site = 5, No bridge overpass = 1 | | | | | 5 |

Notes:

1.

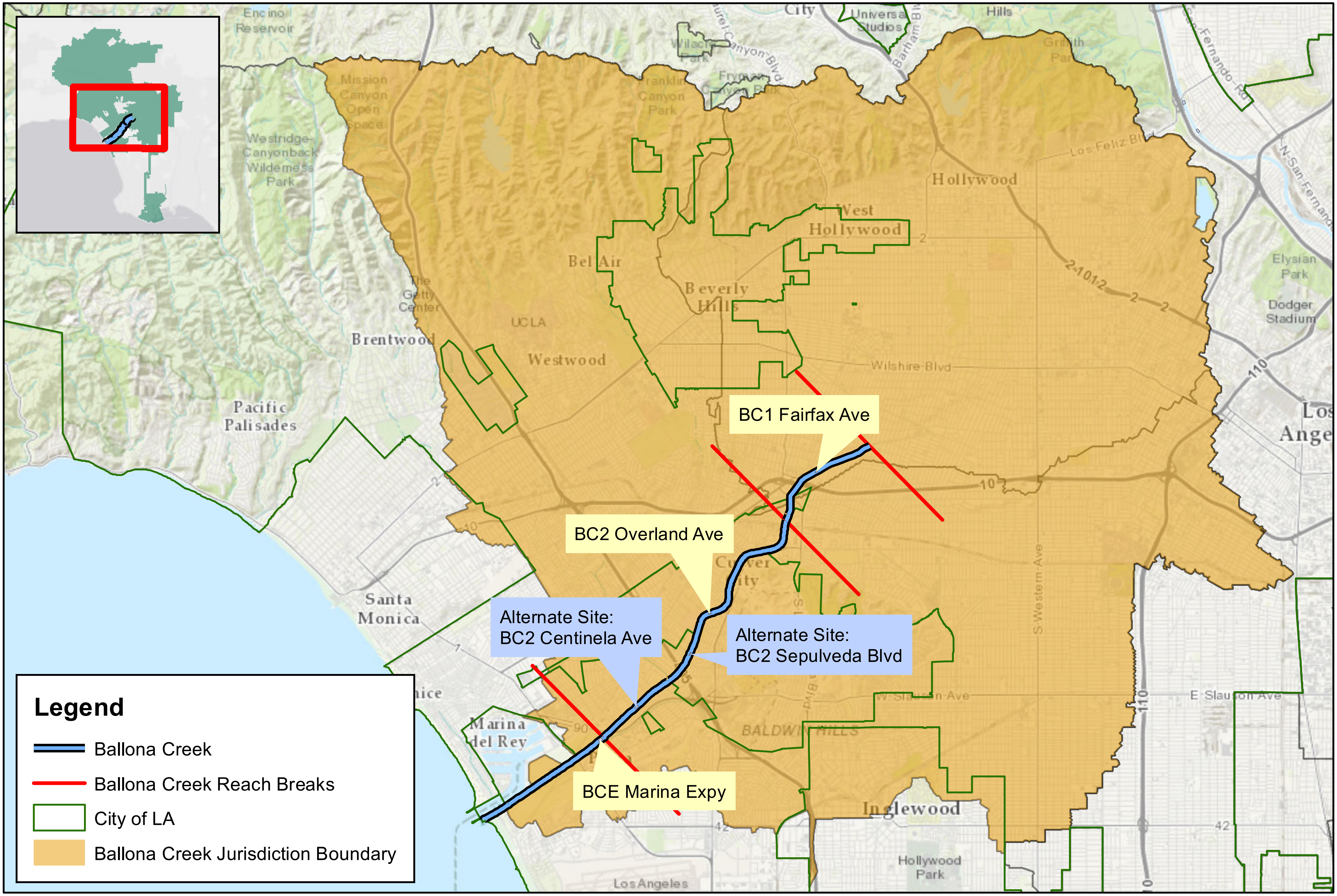
| Score | Distance from tributary (Yards) |
|---|---|
| 1 | ≥4,000 & Tributary not determine |
| 2 | 2,500 - 3,999 |
| 3 | 1,000 - 2,499 |
| 4 | 101 - 999 |
| 5 | 1 - 100 |

2.

| Score | Number of upstream main stem outfalls |
|---|---|
| 1 | 1 - 5 |
| 2 | 6 - 10 |
| 3 | 11 - 15 |
| 4 | 16 - 19 |
| 5 | ≥ 20 |

# Appendix L

# REACHES AND MONITORING SITES AERIAL VIEWS – BALLONA CREEK




0 0.5 1 2 Miles

N

# Ballona Creek Jurisdictional Boundary
# Trash TMDL Receiving Water Monitoring

| DRAWN BY: | DATE CREATED: | CHECKED BY: | DATE REVISED: | ENRIQUE C. ZALDIVAR DIRECTOR BUREAU OF SANITATION |
|---|---|---|---|---|
| RZ | 10-04-2016 | AM | | |
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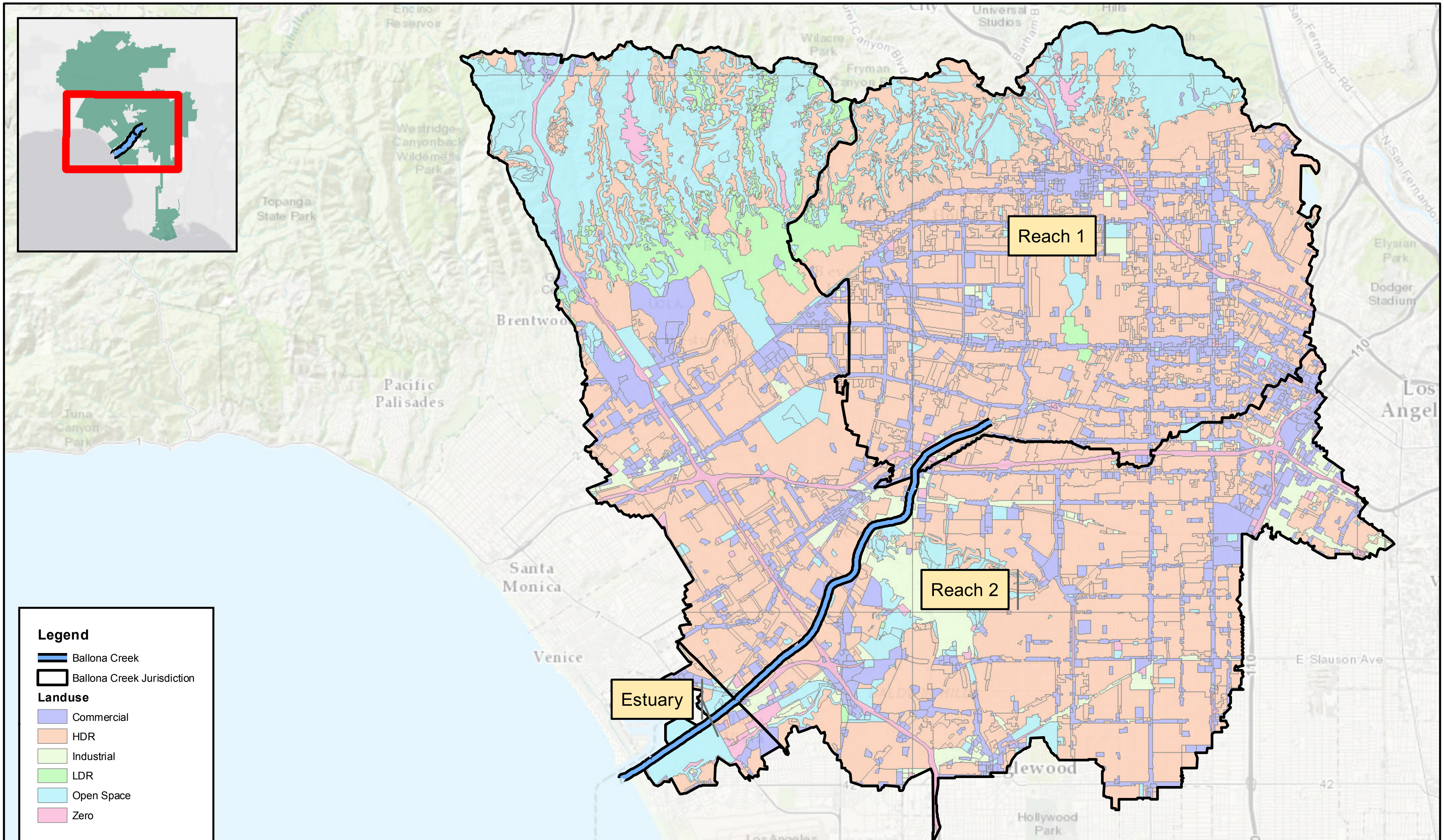


| Reach | Commercial | HDR | Industrial | LDR | Open Space | Zero | Grand Total (Acres) |
|---|---|---|---|---|---|---|---|
| Estuary | 246.694832 | 362.658143 | 37.846182 | | 608.948344 | 188.679698 | **1444.827199** |
| Reach 1 | 5297.218635 | 18174.50177 | 499.968096 | 553.061275 | 3943.414513 | 566.966984 | **29035.13128** |
| Reach 2 | 7550.884282 | 27118.2748 | 2930.659564 | 2133.590739 | 9387.624851 | 2021.423193 | **51142.45742** |
| **Grand Total (Acres)** | **13094.79775** | **45655.43471** | **3468.473842** | **2686.652014** | **13939.98771** | **2777.069875** | **81622.4159** |

0 0.5 1 2 Miles

N

# Ballona Creek Landuse
## Trash TMDL Receiving Water Monitoring

| DRAWN BY: | DATE CREATED: | CHECKED BY: | DATE REVISED: | ENRIQUE C. ZALDIVAR<br>DIRECTOR<br>BUREAU OF SANITATION |
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0 55 110 220 Feet

**Ballona Creek Estuary Monitoring Site**
**Trash TMDL Receiving Water Monitoring**

N

| DRAWN BY: | DATE CREATED: | CHECKED BY: | DATE REVISED: | ENRIQUE C. ZALDIVAR DIRECTOR BUREAU OF SANITATION |
|---|---|---|---|---|
| RZ | 10-04-2016 | AM | | |
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# Ballona Creek Reach 2 Monitoring Site
# Trash TMDL Receiving Water Monitoring

0 12.5 25 50 Feet

N

| DRAWN BY: | DATE CREATED: | CHECKED BY: | DATE REVISED: | ENRIQUE C. ZALDIVAR<br>DIRECTOR<br>BUREAU OF SANITATION |
|---|---|---|---|---|
| RZ | 10-04-2016 | AM | | |
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## Ballona Creek Reach 1 Monitoring Sites
## Trash TMDL Receiving Water Monitoring

0 15 30 60 Feet

N

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|---|---|---|---|---|
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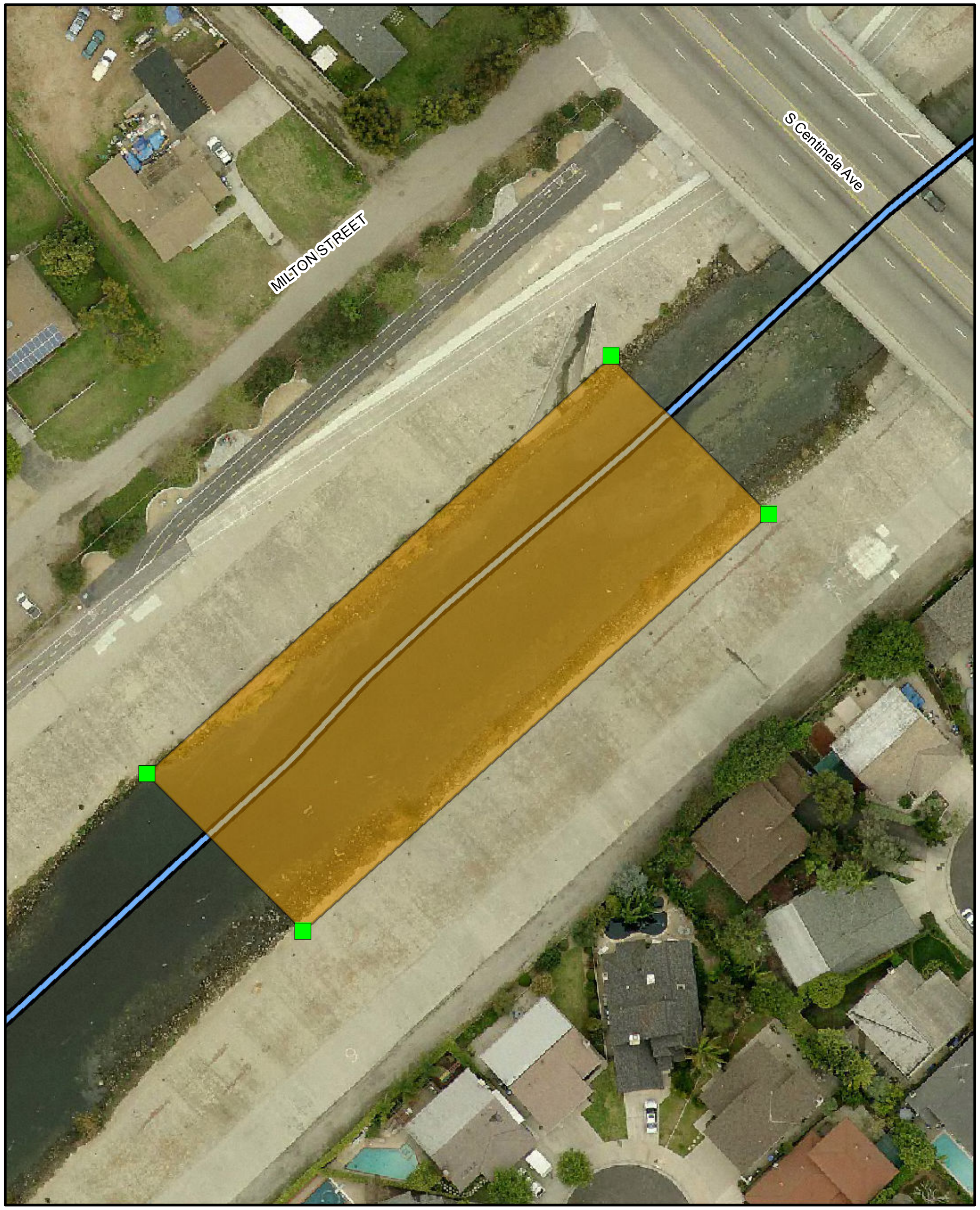
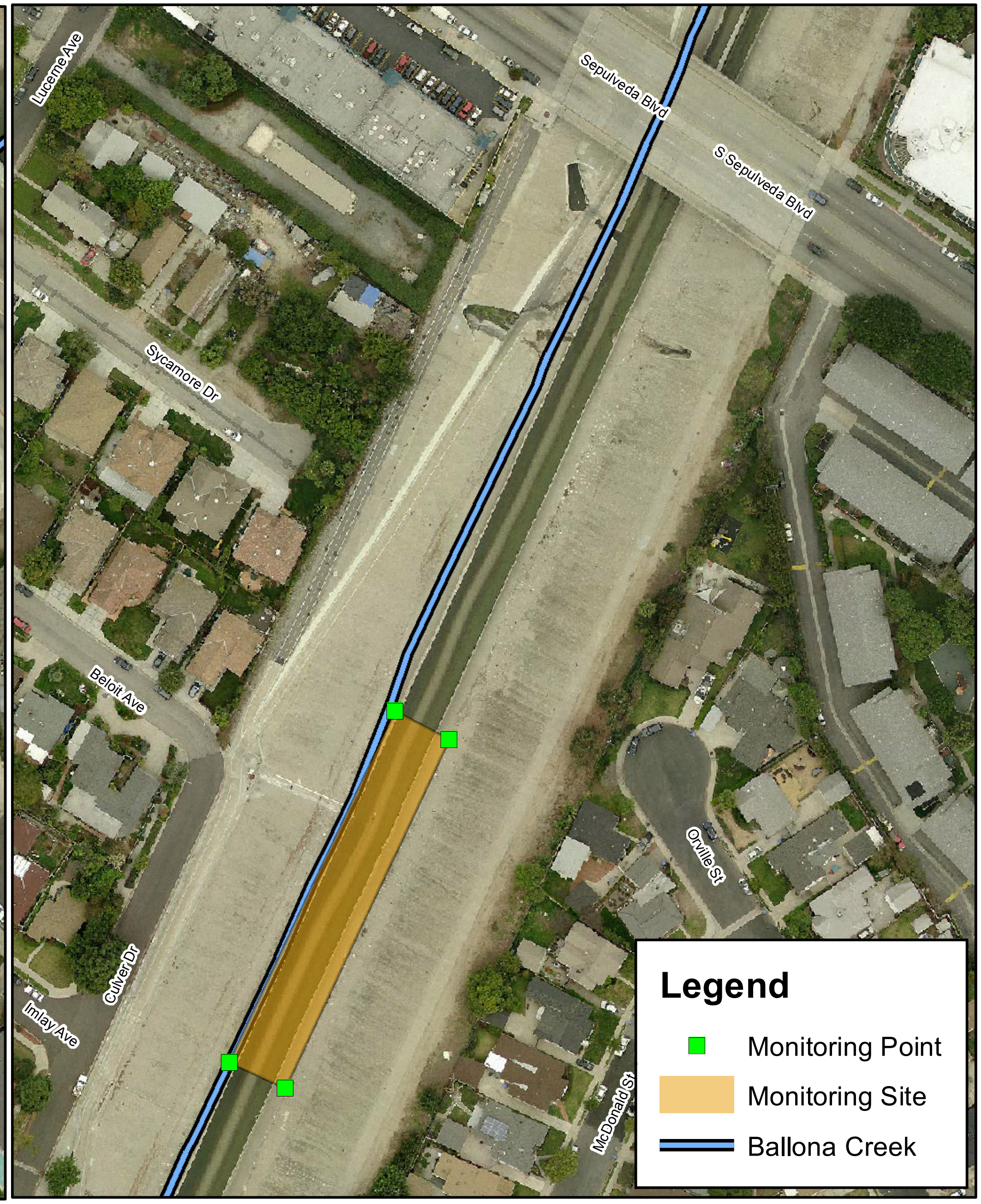



## BC2 Centinela Ave




## BC2 Sepulveda Blvd

# Ballona Creek Alternate Monitoring Sites
# Trash TMDL Receiving Water Monitoring

0 25 50 100 Feet

N

| DRAWN BY: RZ | DATE CREATED: 10-04-2016 | CHECKED BY: AM | DATE REVISED: | ENRIQUE C. ZALDIVAR DIRECTOR BUREAU OF SANITATION |
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# Appendix M

# PHOTOGRAPHS OF EACH MONITORING SITES – BALLONA CREEK

# Appendix M - Photos of BC Monitoring Sites

**Monitoring Site: BC1 Fairfax Avenue**
ID # 1

BC1 Fairfax Avenue, Facing East

BC1 Fairfax Avenue, Facing East

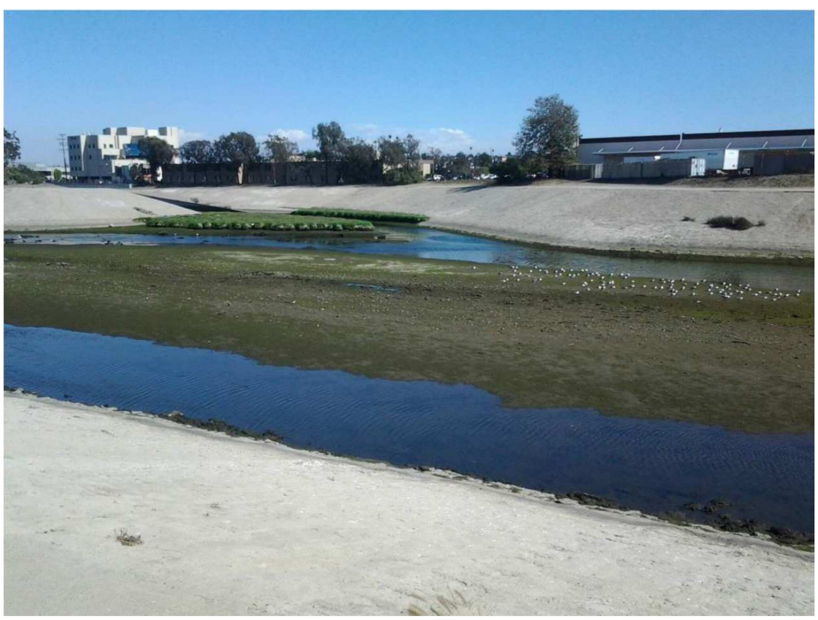
**Monitoring Site: BC2 Overland Ave.**
ID # 2

BC2 Overland Ave., Facing West

BC2 Overland Ave., Facing West

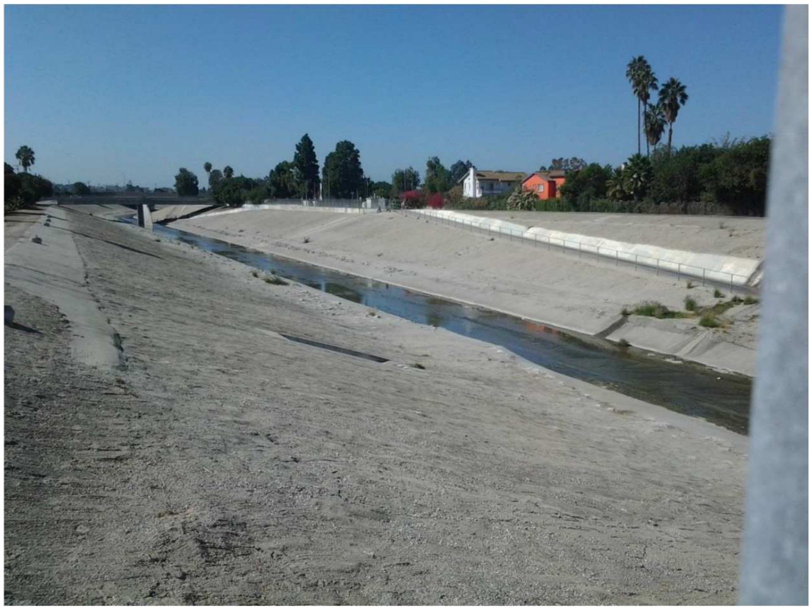
**Monitoring Site: BCE Marina Expy**
ID # E

BCE Marina Expy, Facing SW (Right Side Access ONLY)



BCE Marina Expy, Facing SW (Right Side Access ONLY)

**Alternate Monitoring Site: BC2 Sepulveda Blvd.**
Alt. ID # 2



BC2 Sepulveda Blvd., Facing SW


BC2 Sepulveda Blvd., Facing SW

**Alternate Monitoring Site: BC2 Centinela Ave.**

Alt. ID # 2


BC2 Centinela Ave., Facing SW

BC2 Centinela Ave., Facing SW

# Appendix N

# TRIBUTARY MONITORING SITES FOR LAR AND BC

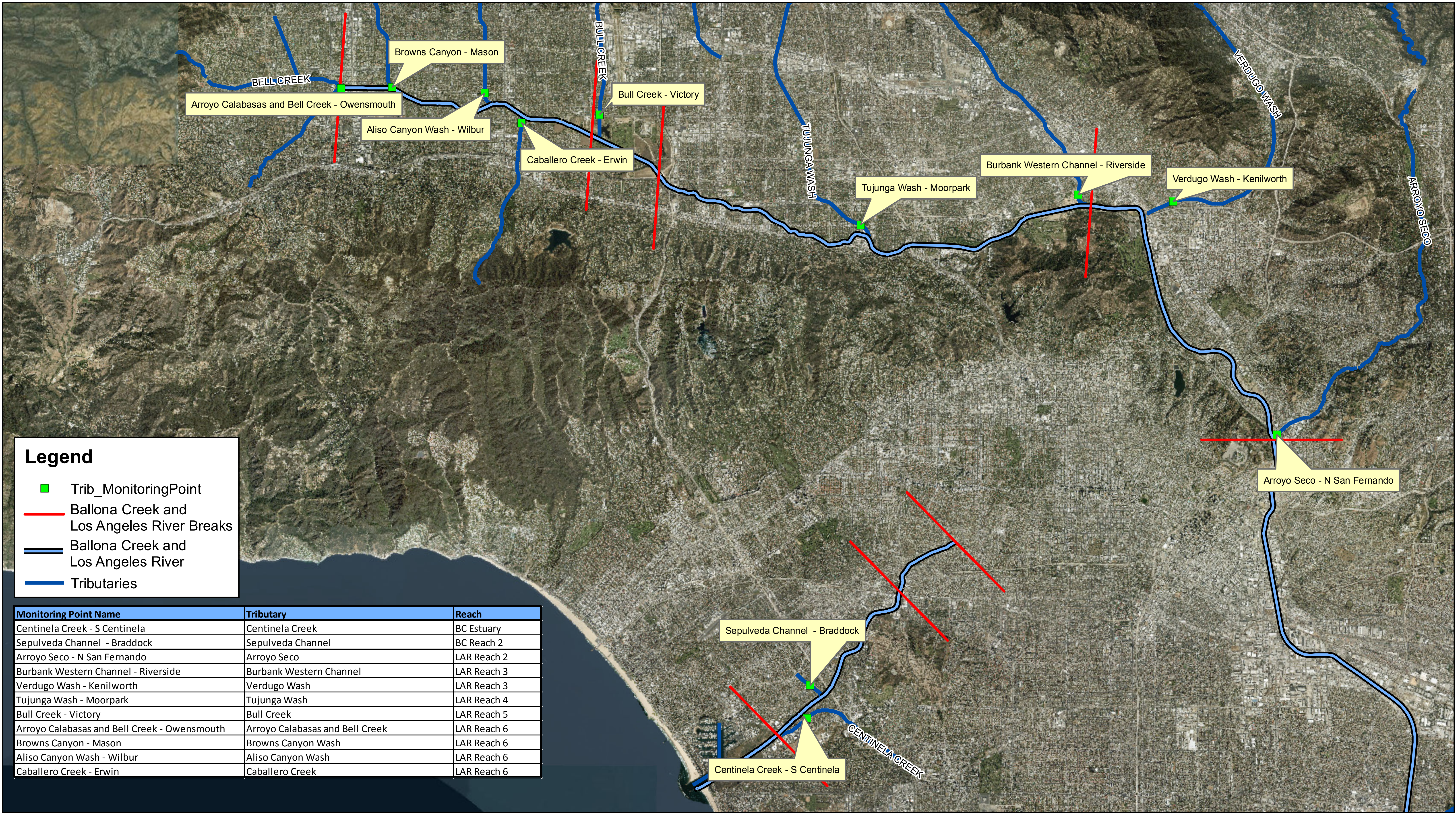
# Appendix N
# ULAR AND BC Tributary Monitoring Points

## Los Angeles River - Tributary Monitoring Points

| Monitoring Point Name | Tributary | Latitude | Longitude | Reach |
|---|---|---|---|---|
| Arroyo Seco - N San Fernando | Arroyo Seco | -118.225 | 34.080438 | LAR Reach 2 |
| Burbank Western Channel - Riverside | Burbank Western Channel | -118.3051 | 34.160586 | LAR Reach 3 |
| Verdugo Wash - Kenilworth | Verdugo Wash | -118.2669 | 34.158445 | LAR Reach 3 |
| Tujunga Wash - Moorpark | Tujunga Wash | -118.3926 | 34.150302 | LAR Reach 4 |
| Bull Creek - Victory | Bull Creek | -118.4978 | 34.186745 | LAR Reach 5 |
| Arroyo Calabasas and Bell Creek - Owensmouth | Arroyo Calabasas and Bell Creek | -118.6017 | 34.195209 | LAR Reach 6 |
| Browns Canyon - Mason | Browns Canyon Wash | -118.5813 | 34.195455 | LAR Reach 6 |
| Aliso Canyon Wash - Wilbur | Aliso Canyon Wash | -118.544 | 34.193767 | LAR Reach 6 |
| Caballero Creek - Erwin | Caballero Creek | -118.5292 | 34.183861 | LAR Reach 6 |

## Ballona Creek - Tributary Monitoring Points

| Monitoring Point Name | Tributary | Latitude | Longitude | Reach |
|---|---|---|---|---|
| Centinela Creek - S Centinela | Centinela Creek | -118.4133 | 33.985046 | BC Estuary |
| Sepulveda Channel - Braddock | Sepulveda Channel | -118.412 | 33.996065 | BC Reach 2 |




| Monitoring Point Name | Tributary | Reach |
|---|---|---|
| Centinela Creek - S Centinela | Centinela Creek | BC Estuary |
| Sepulveda Channel - Braddock | Sepulveda Channel | BC Reach 2 |
| Arroyo Seco - N San Fernando | Arroyo Seco | LAR Reach 2 |
| Burbank Western Channel - Riverside | Burbank Western Channel | LAR Reach 3 |
| Verdugo Wash - Kenilworth | Verdugo Wash | LAR Reach 3 |
| Tujunga Wash - Moorpark | Tujunga Wash | LAR Reach 4 |
| Bull Creek - Victory | Bull Creek | LAR Reach 5 |
| Arroyo Calabasas and Bell Creek - Owensmouth | Arroyo Calabasas and Bell Creek | LAR Reach 6 |
| Browns Canyon - Mason | Browns Canyon Wash | LAR Reach 6 |
| Aliso Canyon Wash - Wilbur | Aliso Canyon Wash | LAR Reach 6 |
| Caballero Creek - Erwin | Caballero Creek | LAR Reach 6 |

## Trash TMDL Receiving Water Monitoring
## Tributary Monitoring Points

| DRAWN BY: | DATE CREATED: | CHECKED BY: | DATE REVISED: |
|---|---|---|---|
| RZ | 11-03-2016 | AM | |

FILE LOC:

ENRIQUE C. ZALDIVAR
DIRECTOR
BUREAU OF SANITATION

SHAHRAM KHARAGHANI
PROGRAM MANAGER
WATERSHED PROTECTION DIVISION

# Appendix N - Photos of Tributary Monitoring Sites


**LAR 6: Arroyo Calabasas and Bell Creek - Owensmouth**
Facing Upstream

**LAR 6: Browns Canyon - Mason**
Facing Upstream

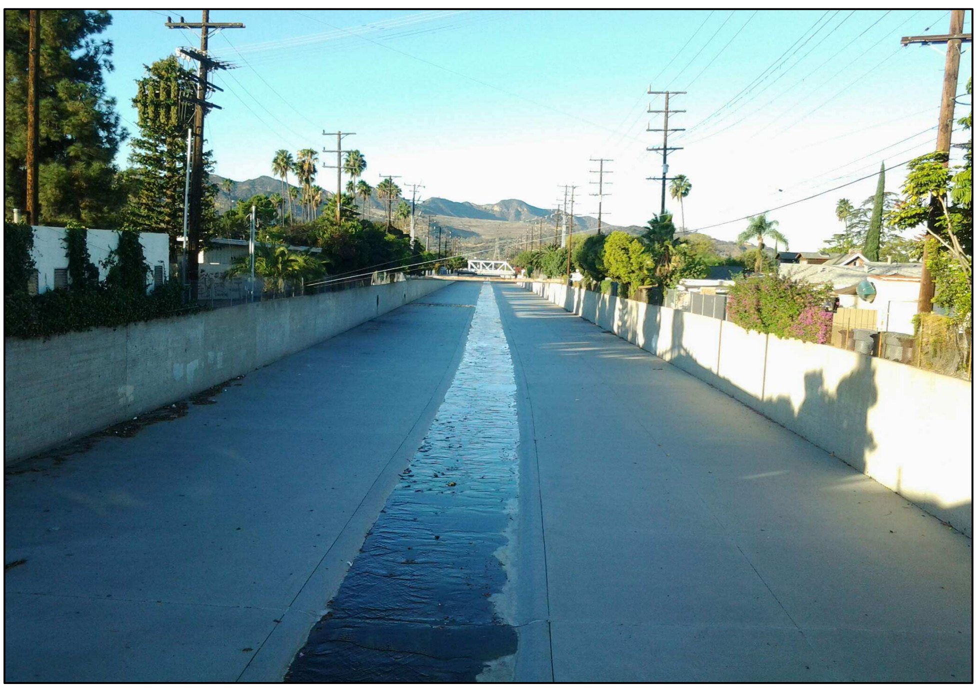
**LAR 6: Aliso Canyon Wash - Wilbur**
Facing Upstream


**LAR 6: Caballero Creek - Erwin**
Facing Downstream

**LAR 5: Bull Creek - Victory**
Facing Upstream


**LAR 4: Tujunga Wash – Moorpark**
Facing Downstream

**LAR 3: Burbank Western Channel – Riverside**
Facing Downstream



**LAR 3: Verdugo Wash – Kenilworth**
Facing Downstream

**LAR 2: Arroyo Seco – N San Fernando**
Facing Upstream


**BC 2: Sepulveda Channel – Braddock**
Facing Upstream

**BC Estuary: Centinela Creek – S Centinela**
Facing Upstream

# Appendix O

# List of LAR Parks Subject to MFAC Under ULAR WMG Jurisdiction

# Appendix O

## List of LAR Parks Subject to MFAC Under ULAR WMG Jurisdiction*

| Responsible Party | Park/Facility | Approximate Nonpoint Source Area (acres) | Nonpoint Source Area (miles$^2$) | Approximate Baseline Load Allocation (mi$^2$ x 640 gal/mi$^2$/yr = gal/yr) |
|---|---|---|---|---|
| City of Burbank | Campus Tree Park | 0.12 | 0.000 | 0.12 |
| City of Burbank | Buena Vista Park | 11.2 | 0.018 | 11.2 |
| City of Glendale | Glorietta Park | 8 | 0.013 | 8 |
| City of Glendale | Dunsmore Park | 9.63 | 0.015 | 9.63 |
| City of Los Angeles | Montecito Rec Center | 14.01 | 0.022 | 14.01 |
| City of Los Angeles | Hermon Park | 1.3 | 0.002 | 1.3 |
| City of Los Angeles | Elysian Park | 600 | 0.938 | 600 |
| City of Los Angeles | Los Feliz Golf Course | 15 | 0.023 | 15 |
| City of Los Angeles | Valleyheart Greenway | 2.36 | 0.004 | 2.36 |
| City of Los Angeles | Moorpark Park | 2.95 | 0.005 | 2.95 |
| City of Los Angeles | Hansen Dam Park | 45 | 0.070 | 45 |
| City of Los Angeles | Sepulveda Rec Center | 10.65 | 0.017 | 10.65 |
| City of Los Angeles | Paxton Park (Richie Valens Park) | 6.79 | 0.011 | 6.79 |
| City of Los Angeles | Sepulveda Basin Recreation Area | 2000 | 3.125 | 2000 |
| City of Los Angeles | Vanalden Park | 5.52 | 0.009 | 5.52 |
| City of Los Angeles | Northridge Rec Center | 18.56 | 0.029 | 18.56 |
| City of Los Angeles | Mae Boyer Rec Center | 2.03 | 0.003 | 2.03 |
| City of Los Angeles | West Hills Rec Center | 14.41 | 0.023 | 14.41 |
| City of Los Angeles | Reseda Park & Rec Center | 21.17 | 0.033 | 21.17 |
| City of Los Angeles | LA River Greenway Park | 4.05 | 0.006 | 4.05 |
| City of Los Angeles/Mountains Recreation & Conservation Authority | Marsh Street Park | 3.9 | 0.006 | 3.9 |
| City of Montebello | Grant Rea Park | 20.7 | 0.032 | 20.7 |
| City of Pasadena | Eaton Blanche Park | 5.5 | 0.009 | 5.5 |
| City of Pasadena | Gwinn Park | 2.5 | 0.004 | 2.5 |
| City of Pasadena | Lower Arroyo Park | 150 | 0.234 | 150 |
| City of Rosemead | Sally Tanner Park | 1.42 | 0.002 | 1.42 |
| County of Los Angeles | Whittier Narrows County Golf Course | 250 | 0.391 | 250 |
| County of Los Angeles | Pamela County Park | 3.17 | 0.005 | 3.17 |
| County of Los Angeles | Crescenta Valley Park | 18.5 | 0.029 | 18.5 |
| County of Los Angeles/Santa Anita Associates | Santa Anita County Golf Course | 140 | 0.219 | 140 |
| LA Equestrian Center/City of Los Angeles | LA Equestrian Center | 75 | 0.117 | 75 |
| San Gabriel Country Club | San Gabriel Country Club | 105.96 | 0.166 | 105.96 |

* TMRP will be coordinated only with parks contiguous to the main stem; not with parks adjacent to tributaries.