BMP Effectiveness Baseline Monitoring
Draft Monitoring Plan

For ~~Includes~~:
Southcrest Park and Recreation Center
Cabrillo Heights Park
Bannock Avenue Heights

Prepared For:

City of San Diego

June 30, 2009

BMP Effectiveness Baseline Monitoring for Southcrest Park

Draft Monitoring Plan

Prepared For:

City of San Diego

Prepared By:

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June 30, 2009

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1.0 INTRODUCTION

The City of San Diego (City) is taking an integrated tiered and phased approach to Best Management Practice (BMP) implementation as outlined in the ~~5-Year~~ *Strategic Plan for Watershed Activity Implementation* (~~5-Year Plan~~) (Weston, 2007a). The integrated approach considers the current and future priority water quality problems (PWQP) and Total Maximum Daily Loads (TMDL) reductions in the design and implementation of BMPs. The ~~5-Year~~ Plan prioritizes watershed activities and also serves as a planning document to meet the requirements of the San Diego County Municipal Storm Water Permit (Permit) (Final Order R9-2007-0001, 2007).

~~The~~ BMP Effectiveness Baseline Monitoring ~~Program (Program)~~ was initiated by the City in 2007 for the purpose of documenting site-specific baseline flow and determining initial condition pollutant concentrations in storm water at watershed sites designated for infiltration-based and/or treatment BMPs. These data ~~are necessary to~~ support the generation of BMP design calculations and predicted load reductions prior to BMP implementation starting in 2010. The *Tier II and Tier III Storm Water Best Management Practices Conceptual Designs* (Weston, 2007b) shows the specific BMP designs for projects that will be implemented by the City ~~in 2010. The 2007 Program focused on BMP sites in watersheds located within the City's jurisdiction that include, including the Tecolote watershed, Los Peñasquitos watershed and Chollas watershed.~~

1.1 Regulatory Framework

The City is planning to implement BMPs on City-owned properties to address Permit requirement and meet TMDL pollution reduction schedules within the Chollas Creek watershed and Lower San Diego River watershed. ~~As described in the 5-Year Plan, the Tier II BMPs will be predominantly infiltration-based (LID) designs and will be constructed on City-owned property in the identified priority sectors of these watersheds.~~

1.1.1 San Diego Regional Water Quality Control Board Municipal Stormwater Permit for the City of San Diego

According to the jurisdictional requirements presented in The San Diego County Municipal Storm Water Permit (Permit) (Final Order R9-2007-0001, 2007) each Copermittee is required to implement no less than two Watershed Water Quality Activities and two Watershed Education Activities each year that results in a "significant pollutant load reduction, source abatement, or other quantifiable benefits to discharge or receiving water quality in relation to the watershed's high priority water quality issues."

1.1.2 Clean Water Act 303(d) Listings and Total Maximum Daily Loads

1.1.2.1 Chollas Creek Watershed

The San Diego Regional Water Quality Control Board (Regional Board) adopted an amendment to the Water Quality Control Plan for the San Diego Basin (Basin Plan) on August 14, 2002 (Resolution No. R9-2002-01213) to incorporate a TMDL for Diazinon in the Chollas Creek

~~Sub~~watershed. This TMDL was developed to address acute and chronic toxicity to aquatic life in the Chollas Creek ~~Sub~~watershed associated with the organophosphate insecticide Diazinon.

The Regional Board adopted another amendment to the Basin Plan on June 13, 2007, (Resolution No. R9-2007-0043) to incorporate additional TMDLs for dissolved copper, lead, and zinc in the lowest 1.2 miles of the Chollas Creek. This TMDL addresses impairment to water quality due to levels of metals that exceed numeric targets as set forth in the California Toxics Rule (CTR).

1.1.2.2 Tecolote Creek Watershed

The Regional Board is currently in the adoption phase of a third TMDL addressing exceedances of indicator bacteria in Tecolote Creek which is located in the Mission Bay ~~watershed~~. Both the mouth of the Creek as well as the six-mile watershed reach of the Creek exceeds WQOs for indicator bacteria. These exceedances may impair the recreational water contact (REC-1) and recreational non-contact (REC-2) beneficial uses of Tecolote Creek and the shellfish harvesting (SHELL) beneficial uses of Mission Bay.

→ Talk about the larger effort regarding bacteria TMDL

1.1.2.3 La Jolla Watershed

The La Jolla coastal area, which is the receiving water for runoff from the La Jolla subwatershed, has been recognized as a unique biological community of flora and fauna since the early 1920s. In the mid-1970s, the State Water Resources Control Board (State Board) designated two areas along the La Jolla coastal area as ASBS. The California Ocean Plan (Ocean Plan) adopted by the State Board and approved by the United States Environmental Protection Agency (EPA), provides special protection to the ASBS in an effort to retain their unique biological characteristics.

In 2001, the State Board began to prohibit waste discharges into ASBS via provisions in the Ocean Plan. In accordance with this prohibition, the State Board notified dischargers to ASBS that they must either cease discharges of waste into ASBS, or obtain an exception to the waste discharge prohibition in the Ocean Plan. The City has embarked on a process to obtain an exception for storm water discharges to the ASBS and has been actively pursuing activities to both characterize the City's discharges to the ASBS and to formulate BMP strategies for the reduction of pollutant loading from storm water that may result in potential impacts to the biological community of the ASBS.

1.1.2.4 San Diego River Watershed

The San Diego River (lower) water body is listed on the State Board Section (§) 303(d) list for impairment due to elevated levels of fecal coliform, total dissolved solids (TDS), phosphorus, and depressed levels of dissolved oxygen (DO) (SWRCB, 2003).

Is this the correct list for 2006?

2006?

1.1.2.5 Los Peñasquitos Watershed

The Los Peñasquitos Watershed currently has two receiving water bodies listed on the Section (§) 303(d) list for impairment. Los Peñasquitos Lagoon is listed for sedimentation/siltation with

a TMDL currently under development. Los Peñasquitos Creek is listed for phosphorous and total dissolved solids.

1.1.2.6 Tijuana River Watershed

The Tijuana River Watershed currently has two receiving water bodies listed on Section (§) 303(d) list for impairment. The Tijuana River is currently listed for indicator bacteria, eutrophic conditions, low dissolved oxygen (DO), pesticides, solids, synthetic organics, trace elements, and trash. The Tijuana River Estuary is listed for indicator bacteria, eutrophic conditions, lead, low DO, nickel, pesticides, thallium, trash and turbidity.

1.2 Project Objective

This scope of work is developed to address BMP design questions by answering the following question:

1. **What are the baseline conditions (flow and constituents of concern) prior to implementation of ~~Tier II-III~~ Best Management Practices (BMPs) in the ~~Chollas Creek subwatershed~~?**

By assessing the pre-construction baseline conditions and continuing a post-construction monitoring program over the course of three (3) years, the City will be able to ~~answer~~ the following permit requirement:

- **What is the effectiveness of the ~~Tier II~~ activity as measured by load reductions (Level 4) and changes in urban runoff (Level 5) through implementation of this BMP?**

~~1.3 Project Team~~

~~The project organization contact information for the Project Team is listed in Table 1-1 below:~~

Table 1-1. Project Team Contact Information

Name	Organizational Affiliation	Title	Contact Information (Telephone number, fax number, email address.)
Stephanie Bracci	City of San Diego	Associate Planner	(858) 541-4314 (tel) (858) 541-4350 (fax) sbracci@sandiego.gov
		Client Manager/ Technical Advisor	
		Project Manager	
		Associate Engineer 1	
		Field Operations	
		Data Manager	
		GIS Manager	

How far ahead of time does this take place? It should be done well ahead of the sampling. Perhaps it should have been done already.

1.4 Site Reconnaissance

A field reconnaissance at sampling sites prior to the first wet weather sampling event will be performed by field scientists. The field team will take photos of the sites which will document potential safety issues due to traffic, the location of the sampling point and local land use. A visual assessment of the sampling site drainage area will be documented (Appendix A) and potential Multiple Separate Storm Sewer System (MS4) sites (e.g. catch basins, storm dry pipes) used for sampling will be examined to make sure it is accessible and free of debris.

2.0 CONTINUOUS FLOW MONITORING

Monitoring of flow will be measured continuously via *in-situ* area velocity and/or ultra sonic meters, such as the Sigma 920, in order to provide accurate continuous flow data to calibrate and validate the watershed hydrology models (see Figure 2-1). The data sondes can be programmed to log data in 5-15 minute intervals depending upon the observed episodic nature / flow variability. Monthly data downloads and maintenance should be performed by field staff for the duration of the project.

Flow Monitoring Equipment	
Sigma 920 Flow Meter	**Sigma 920 Area Velocity Sensor**
Dimensions: 6.625'' dia x 17.625'' L **Weight:** 16.5 lbs.	**Dimensions:** 1.0 x 1.5 x 5.5 in **Cable Diameter:** 0.5 in **Cable Length:** up to 100 feet
Description: Black PVC enclosure	
	

Flow Monitoring Equipment	
Sigma 920 Ultrasonic Level Sensor	

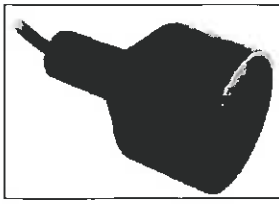
	**Dimensions:** 3 x 6 in Cable **Diameter:** 0.5 in Cable **Length:** up to 100 feet

Figure 2-1. Sigma 920 Flow Meter and Sensors

2.1 Conveyance System Ratings

Conveyance system ratings will be performed to identify suitable conveyance system location(s). Using a stable fixed cross-sectional area, the level of water at the flow monitoring location(s) will be determined at all the sites.

Why was so much more detail put into this plan than the FYOT plan on this subject?

Cross-Section Selection

The selection of a suitable conveyance monitoring location(s) is important for developing accurate flow data. Flow depends upon the cross-sectional area and slope of the bottom of the conveyance (bed slope). ~~Identifying a monitoring location(s) with a cross-sectional area and bed slope which results in uniform flow is the most important factor in obtaining accurate data.~~ The following characteristics are anticipated to result in uniform flow and have been used to define an ideal sampling site cross section:

in order to obtain the most accurate data.

1. The conveyance should be relatively straight and flowing for approximately 100 feet both upstream and downstream of the measurement site.
2. The conveyance should have no major transitions or obstructions (no large cobbles/boulders, baffles, sudden constrictions or expansions). Sites should be selected which consistently avoid turbulent conditions as much as feasible. Minor irregularities will be taken into account through the roughness coefficient ~~(Manning's "n" coefficient)~~ and stream rating.
3. The conveyance should be free of vegetation, algal growth, major seasonal scouring, and/or deposition of sediment.
4. The bed slope should be as uniform as possible. During low flow conditions the flow path should be confined to a single course.
5. The conveyance should be stable and able to contain the maximum measurable flow.

How does this selection process relate to the monitoring pts that were chosen? Where do they rank?

The different criteria used to rate conveyance monitoring locations have been defined in**Error! Reference source not found.**, which describes roughness coefficients, physical conveyance, and engineering metrics necessary to verify flow measurements.

Table 2-1. Ranking Criteria by Conveyance Characteristic

1. Flow Path	2. Transitions	3. Vegetation	4. Bed Slope (Method of Measure)	5. Stability
Straight and Clear	No Significant Transitions	No Vegetation	Uniform (Scoped,)	Concrete
Straight and Obstructed	Minor Transitions	Maintenance (algal growth,	Scoured (Scoped)	Earthen

How do I read this chart? Do I pick a row? Do I pick one criteria from each column?

		sediment trash, etc)		
Windy and Clear	Major Transitions	Maintained Vegetation (provide specie, density, and locations)	Non Uniform (Scoped)	Overbank Flow (define depth when system overflows)
Windy and Obstructed	Major Transitions	Wild Vegetation (provide specie, density, and locations)	Unknown	Earthen

Ideally the selected site(s) cross sections to be monitored will meet all five of these criteria, however, some do not. If a selected site(s) has excessive aquatic vegetation / algae, the presence of woody debris, or the cross sectional area has minor irregularities, an attempt should be made to minimize their impact on flow measurements. This may require physical removal of interferences and minor alterations of the conveyance in coordination with regulatory agencies (California Department of Fish and Game, and the California Regional Water Quality Control Board).

Rating Curves

A rating table or curve is a relationship between stage (water level or pressure head) and discharge at a cross section of a conveyance. To develop a rating curve, series of instantaneous level measurements are made using a continuous monitoring Sigma 920 Flow Meter. The conveyance systems are solid, relatively unchanging storm drain structures such as reinforced concrete pipes or concrete conveyance channels. Therefore the cross sectional area for each site was measured at the point where the flow sensor installed in the conveyance.

The rating curve is produced by plotting instantaneous flow measurements and stage heights (level). These instantaneous measurements should cover the entire range of stage heights measured during the year. At the time of this QAPP production, storm flow levels have not been measured. It should be verified that the conveyance system has been unaltered by sediment deposition, vegetation, or corrosion/scour.

Rating curves can be modeled by inserting site-specific survey information into the Manning Equation:

$$Q = (1.486/n)AR^{2/3}S^{1/2}$$

Where:

Q = Flow (ft^3/s)
n = Roughness coefficient
A= Cross sectional area (ft^2)
R = Hydraulic radius (ft), where equal to A/P (wetted area / wetted perimeter)
S= Hydraulic slope (ft/ft or in/in)

Manning's equation is most impacted by the hydraulic slope (also referred to as "bed slope" or simply "slope"). The slope determines how much energy is the in the system and slight variations may have a significant effect on flow estimates. Field staff measure conveyance slope using a survey scope and laser level for distances upstream and downstream of the monitoring

location, as far as conditions allow. Similarly cross section dimensions are measured in the field during the installation of monitoring equipment and periodically re-measured for accuracy.

material + composition of for laminar flow increase turbulence and

The roughness coefficient ~~(also referred to as the resistance coefficient or Manning's "n")~~ varies depending on the different types of boundary conditions in the conveyance. Smooth boundary conditions allow ~~runoff to flow linearly~~ which increases velocity. Rough boundary conditions such as degraded concrete, cobbles, or vegetation, reduce velocity. ~~These boundary conditions are influenced by the material and composition of the conveyance system identified in the field~~. Based on this field survey, an initial roughness coefficient is assigned to the site. The coefficient is the average value for a range of values (see Table 2-2). In the event that conditions change, the roughness coefficient may be adjusted.

Table 2-2. Roughness Coefficients According to Type of Conveyance

Material Making Up Conveyance	Roughness Coefficient (average)	Range of Roughness Coefficients	Reason for adjusting the roughness coefficient
Lined Channels/Pipes			
Smooth Concrete	0.011	0.010-0.014 (asphalt=0.016)	Material is degraded; Flow is low enough to be impacted by boundary layer
Vitrified Clay	0.015	0.013-0.018	
Corrugated Metal	0.023	0.014-0.031	
Unlined Channels			
Earth, Uniform, Clean but Weathered/Worn	0.019	0.018-0.020	If slightly winding, increase roughness coefficient by 0.01-0.02
Earth, Uniform, Clean, graveled soil	0.024	0.022-0.025	
Channel not maintained, uncut weeds and brush as high as flow depth	0.100	0.08-0.12	Plant die off, wash out, clearing, or other significant change.
Natural Channels			
Fairly regular section with some weeds and light brush on banks	0.045	0.04-0.05	If slightly winding, increase roughness coefficient by 0.01-0.02
Fairly regular section with dense willows on banks	0.070	0.06-0.08	

Why was dry weather monitoring proposed + done for FY07 monitoring but is not included in this plan?

3.0 WET WEATHER MONITORING

Why 0.15"? I thought we've been talking about using 0.25"?

Storm events will be monitored during the wet weather season from October 1, 2009 through April 30, 2010, which is the time period that defines the regulatory wet weather season for San Diego. A storm predicted to produce 0.15 inch of rain or greater in any 24-hour period will be considered viable for monitoring. There will be a minimum waiting period of 72 hours of dry weather after a storm that produces less than 0.15 inch of rain before a sampling event can occur. Field crews will ~~attempt to~~ monitor one storm event during the wet weather season.

Why one? I thought we've been talking about 3 events? Also, table 7-3 says 3.

3.1 Valid Storm Criteria

Sources of weather information to be used to track incoming storms include, but are not limited to, the following:

- National Weather Service
- Weather Watch Service
- Weather Network (WeatherNet)
- Public broadcast information available on the Weather Channel and local news stations
- Radar and satellite images downloaded from the Internet (e.g., www.weather.com)

Weather patterns in the San Diego area are highly variable and largely unpredictable. When monitoring sites and/or upstream areas contain large areas of impervious surfaces, field staff can expect immediate, flashy flow conditions which would require staff to be mobilized onsite immediately as rain begins to fall. Conversely, if upstream areas are characterized by large open space, as found in some canyons, and/or meandering tributaries, field staff can expect substantial delays in flow response during storm events. Generally, a viable storm event is defined as having a 70% chance or higher of achieving at least 0.15 inches of total rainfall for the whole duration of the wet weather event. National Weather Services' Quantitative Precipitation Forecast (QPF) at the appropriate reporting station, generally one closest to the monitoring location and/or watershed, will be used to select the actual monitoring events. Storm water staff will be notified and all field equipment will be mobilized 48 hours in advance of the forecast storm if it meets the storm monitoring event criteria. As the storm approaches closer to the study area, staff will monitor the trend of the QPF while making any necessary phone calls to the National Weather Service office. Twenty-four hours before the onset of the storm event, staff will make a recommendation to the City program manager for approval to initiate with the storm event monitoring or to stand down. A flow chart below describes to process for mobilizing and determining a "go / no-go" decision (Figure 4-1).

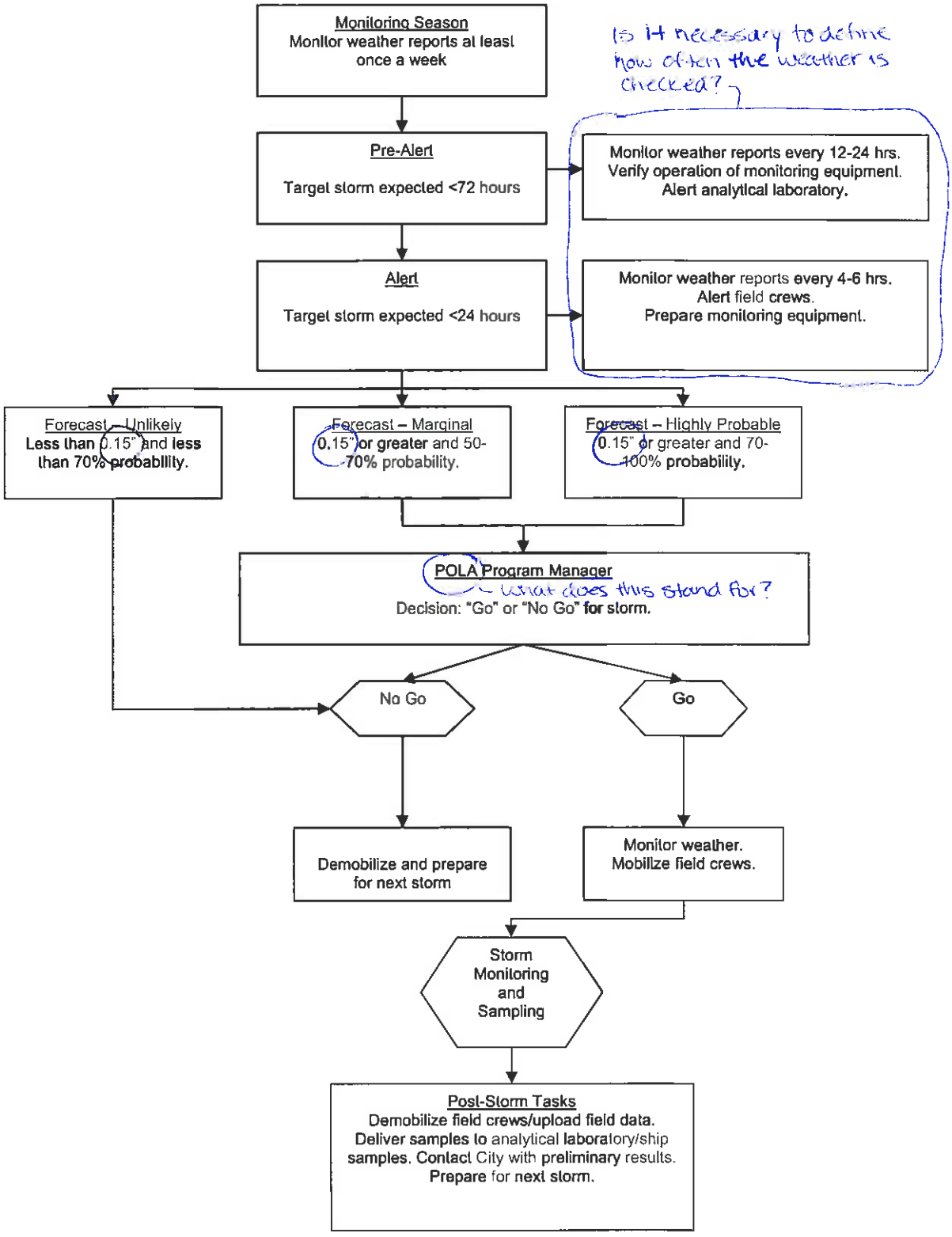


Figure 4-1. Flow Chart for Storm Monitoring "Go / No-Go" Decision

3.2 Wet Weather Sampling

3.2.1 Constituents of Concern

Based upon both current and proposed TMDLs for the Watershed and/or receiving water body, samples will be collected to assess baseline loads and concentrations of relevant constituents of concern (COC) at the project site prior to BMP implementation. This information will be necessary to assess BMP effectiveness post-construction with regard to improving water quality in discharges to receiving waters.

Samples should be analyzed for the appropriate suite of analytes that are direct measures of the constituents of concern and indicators of overall water quality (e.g. dissolved oxygen), as well as transport mechanisms (i.e. sediment) for the listed COCs.

3.2.2 Methods

Mob-list:

Isn't this a given? And, does it even belong here since it should be done well ahead of time?

• Train personnel in proper field sampling, sample handling techniques and chain of custody procedures. Document training and store records in project file.

•Calibrate Temperature/pH/Conductivity meter and record in meter logbook

•Check field sampling equipment for proper operation

• Storm Kit
  - Flashlights
  - Fine point and extra fine point Sharpie markers
  - Pens/pencils
  - Site access keys
  - Screwdriver
  - Wire cutters
  - Utility knife
  - Cable ties
  - Electrical tape
  - Spare sample labels
  - Ziploc bags
  - Nitrile gloves
  - Rope
  - Alcohol scrub

• Field Logbooks
• Temperature/pH/Conductivity meter

- Grab pole
- Sample bucket
- Paper towels
- Grab bottles (see site specifications)
- 500 ml plastic bottle)
- Chain of custody forms
- Coolers with ice
- Rain and safety gear
- Cell phone
- Bottle labels

Field list:

- Take triplicate temperature/pH/conductivity measurements and record in logbook
- Record empirical observations in logbook

3.2.3 Water Quality Sample Collection

General Sampling Techniques

- Avoid exposing storm water samples to human, atmospheric, and other potential sources of contamination whenever handling composite bottles, lids, sample tubing, and strainers.
- Samples should be collected upstream and upwind of sampling personnel to minimize introduction of contaminants.
- Always wear clean, powder-free nitrile gloves when handling composite bottles, lids, grab sample bottles, tubing or strainers.
- Never touch the inside surface of a sample bottle or lid, even with gloved hands.
- Never touch the exposed end of a sampling tube.
- Never allow the inner surface of a sample bottle, lid, or sampling tube to be contacted by any material other than the sample water.
- Never allow any object or material to fall into or contact the collected sample water.
- Avoid allowing rain water to drip from rain gear or other surfaces into sample bottles.
- No smoking.

Grab Sample Collection

- Grab samples should be collected by grab poles or other devices (e.g. buckets) which have been decontaminated before use and sealed. Open, fill and cap the sample bottle while submerged, to minimize exposure to airborne particulate matter, unless the sample bottle contains a preservative or other media that may wash out.
- Immediately prior to the filling of grab sample bottles, the bottle labels should be filled out using a Sharpie. Labeling the grab sample bottles after sample collection can be difficult because of wet labels.
- Take the sample from the horizontal and vertical center of the channel if possible.
- Keep the sample free from uncharacteristic floating debris.

- When taking grab samples use a grab pole from a fixed platform or bridge whenever possible--avoid stream banks and channel slopes.

Oil and Grease Sample Collection Techniques

When collecting samples for oil and grease, the sample must be collected directly into the bottle that will be sent to the laboratory. Because oil and grease and other petroleum hydrocarbons tend to float, grab samples should be collected at the air/water interface. Oil and grease samples are preserved with a concentrated acid (HCL) and must be handled carefully. Fill the sample bottles to just above the shoulder, below the neck. Be careful not to wash out the preservative by overfilling the bottle. A small amount of air space is required in the sample bottles to allow for expansion if the sample freezes.

Bacteria Sample Collection Techniques

Bacteria samples are preserved with a small amount of sodium thiosulfate. Fill the bottle to the shoulder. Be careful not to wash out the preservative by overfilling the bottle. After filling the bacteria sample place the bottle in a clean Ziploc bag.

Grab samples will be collected in pre-cleaned containers and transferred to appropriate laboratory-supplied sampling bottles. Grab samples will be collected by lowering a pre-cleaned transfer container from the designated manhole access at either the influent or effluent sampling points, therefore collecting the samples without personnel entering any confined spaces. Surface Water Ambient Monitoring Program (SWAMP) sampling protocol should be followed during sample collection. Each sample container will be affixed with a label with the station ID, sample code, matrix type, analysis type, project ID, and date and time of collection (in most cases, containers will be pre-labeled).

A field data log will be completed for each sampling site during each sampling event (Appendix A). The log will include empirical observations of the site and water quality characteristics. Observations will include parameters such as meteorological conditions at the time of sampling, odor, color, and general turbidity of the runoff.

3.3 Sample Tracking and Handling

Collected samples will be labeled with the following information:

- Project name
- Sample Date
- Sample Time
- Sampling location
- Preservative (if any)
- Collector's initials
- Sample I.D. number
- Analyte(s) to be analyzed
- Grab or composite sample
- Name of analytical laboratory

Each sample collected will receive a unique sample I.D. number for tracking purposes. This code will be standard for samples and contain information as to the station, date, and sequential monitoring event number. The following is an example of this code if the monitoring site was located at Southcrest Park:

SC-IN-112109

Where:
SC = Southcrest Park Monitoring Project

IN = Influent sampling point at the site; **EF** = effluent sampling point,

112109 = Month, day, and year (MMDDYY)

If multiple bottles are needed, the last data field will indicate the bottle number and the total bottles in that sampling event (i.e., 001-1/3, 001-2/3, 001-3/3 for a three-bottle collection scheme).

3.3.1 Sample Chain of Custody Procedures

Samples will be considered to be in custody if they are (1) in the custodian's possession or view, (2) retained in a secured place (under lock) with restricted access, or (3) placed in a container and secured with an official seal such that the sample could not be reached without breaking the seal. The principal documents used to identify samples and to document possession will be Chain of Custody records, field logbooks, and field tracking forms (Appendix A),. Chain of Custody procedures will be used for all samples throughout the collection, transport, and analytical process.

Chain of Custody procedures will be initiated during sample collection. A Chain of Custody record will accompany each sample or group of samples. Each person who will have custody of the samples will sign the form and ensure the samples are not left unattended unless properly secured. Documentation of sample handling and custody includes the following:

- Sample identifier
- Sample collection date and time
- Any special notations on sample characteristics or analysis
- Initials of the person collecting the sample
- Date the sample was sent to the analytical laboratory
- Shipping company and waybill information
- Constituents to be tested, preservatives, and temperature requirements

Completed Chain of Custody forms will be placed in a waterproof envelope and kept with the samples. Once delivered to the analytical laboratory, the Chain of Custody form will be signed by the person receiving the samples. The condition of the samples (i.e., confirming all samples are accounted for and properly labeled, the temperature of the samples, and integrity of the sample jars) will be noted and recorded by the receiver. Chain of Custody records will be

included in the final reports prepared by the analytical laboratories and are considered an integral part of the report.

Sample Preservation

All samples are kept on ice or refrigerated to 4° Celsius from the time of sample collection until delivery to the analytical laboratory. In addition to keeping samples cool, it is also important to minimize the exposure of the samples to direct sunlight. Sunlight may cause biochemical transformation of the sample, resulting in unreliable analytical results. Therefore, all samples are covered or placed in an ice chest with a closed lid immediately following collection or removal from the automatic sampler enclosure.

3.3.2 Post-Storm

Evaluation
Upon termination of a storm event monitoring, evaluation of the influent and effluent stations' performance will be documented and reviewed before the samples collected are deemed valid. Evaluation of a monitoring station's performance is based on the answers to the following questions:

- Was capture of peak flow or runoff achieved at ~~both~~ all sampling points?
- Did the equipment perform as designed throughout the duration of the storm event?
- Did the samplers accurately collect equal and reliable storm sample aliquots?

De-mob list:

- Fill out chain of custody forms (see sample)
- Deliver chemistry samples to analytical lab for analysis with appropriate chain of custody
- Copy field sheets and bottle labels ASAP
- Download flow data ASAP

Data management

- QA field logs
- QA analytical data reports
- Maintain original field sheets, analytical data reports and monitoring reports in project file
- Maintain database and copy and store offsite

3.4 Water Quality Analysis

Storm water samples collected during wet weather monitoring will be sent to for analysis to a certified analytical laboratory. The storm water samples will be analyzed for COCs and water quality parameters according to methods and standards shown in Table 3-1and Table 3-2. Field teams will coordinate the transfer of all analytical samples collected following standard chain of

custody practices. Analytical laboratory data reports will undergo a thorough QC evaluation by the data management staff prior to entry into the project's database.

Table 3-1. List of Constituents for Analysis during the 2009-2010 Sampling Events

Use whole words here

Water Matrix	Method	MDL	RL	Units	Volume/Container	Holding Time
Total and Dissolved Trace Metals in Water Analysis						
Aluminum (Al)	EPA 200.8(m)	5.0	10.0	µg/L	250-mL HDPE plastic	48 hours
Antimony (Sb)	EPA 200.8(m)	0.1	0.5	µg/L	250-mL HDPE plastic	48 hours
Arsenic (As)	EPA 200.8(m)	0.2	0.5	µg/L	250-mL HDPE plastic	48 hours
Barium (Ba)	EPA 200.8(m)	0.2	0.5	µg/L	250-mL HDPE plastic	48 hours
Beryllium (Be)	EPA 200.8(m)	0.2	0.5	µg/L	250-mL HDPE plastic	48 hours
Cadmium (Cd)	EPA 200.8(m)	0.2	0.4	µg/L	250-mL HDPE plastic	48 hours
Chromium (Cr)	EPA 200.8(m)	0.1	0.5	µg/L	250-mL HDPE plastic	48 hours
Cobalt (Co)	EPA 200.8(m)	0.1	0.5	µg/L	250-mL HDPE plastic	48 hours
Copper (Cu)	EPA 200.8(m)	0.4	0.8	µg/L	250-mL HDPE plastic	48 hours
Iron (Fe)	EPA 200.8(m)	5.0	10.0	µg/L	250-mL HDPE plastic	48 hours
Lead (Pb)	EPA 200.8(m)	0.1	0.5	µg/L	250-mL HDPE plastic	48 hours
Manganese (Mn)	EPA 200.8(m)	0.2	0.5	µg/L	250-mL HDPE plastic	48 hours
Molybdenum (Mo)	EPA 200.8(m)	0.2	0.5	µg/L	250-mL HDPE plastic	48 hours
Nickel (Ni)	EPA 200.8(m)	0.2	0.5	µg/L	250-mL HDPE plastic	48 hours
Selenium (Se)	EPA 200.8(m)	0.2	0.5	µg/L	250-mL HDPE plastic	48 hours
Silver (Ag)	EPA 200.8(m)	0.5	1	µg/L	250-mL HDPE plastic	48 hours
Strontium (Sr)	EPA 200.8(m)	0.1	0.5	µg/L	250-mL HDPE plastic	48 hours
Thallium (Tl)	EPA 200.8(m)	0.1	0.5	µg/L	250-mL HDPE plastic	48 hours
Tin (Sn)	EPA 200.8(m)	0.1	0.5	µg/L	250-mL HDPE plastic	48 hours
Titanium (Ti)	EPA 200.8(m)	0.2	0.5	µg/L	250-mL HDPE plastic	48 hours
Vanadium (V)	EPA 200.8(m)	0.2	0.5	µg/L	250-mL HDPE plastic	48 hours
Zinc (Zn)	EPA 200.8(m)	0.1	0.5	µg/L	250-mL HDPE plastic	48 hours
~~Vanadium (V)~~	~~EPA 200.8(m)~~	~~0.2~~	~~0.5~~	~~µg/L~~	~~250-mL HDPE plastic~~	~~48 hours~~
~~Zinc (Zn)~~	~~EPA 200.8(m)~~	~~0.1~~	~~0.5~~	~~µg/L~~	~~250-mL HDPE plastic~~	~~48 hours~~
Synthetic Pyrethroid Pesticides in Sample Extract Analysis by NCI-GCMS						
Allethrin	NCI-GCMS	0.5	2.0	ng/L	2-L amber	40 days
Bifenthrin	NCI-GCMS	0.5	2.0	ng/L	2-L amber	40 days
Cyfluthrin	NCI-GCMS	0.5	2.0	ng/L	2-L amber	40 days
Cypermethrin	NCI-GCMS	0.5	2.0	ng/L	2-L amber	40 days
Danitol	NCI-GCMS	0.5	2.0	ng/L	2-L amber	40 days
Deltamethrin	NCI-GCMS	0.5	2.0	ng/L	2-L amber	40 days
L-cyhalothrin	NCI-GCMS	0.5	2.0	ng/L	2-L amber	40 days
Permethrin	NCI-GCMS	0.5	2.0	ng/L	2-L amber	40 days
Prallethrin	NCI-GCMS	0.5	2.0	ng/L	2-L amber	40 days
Organophosphate Pesticides in Water Analysis						
Azinphos-methyl (guthion)	NCI-GCMS	10	10	ng/L	2-L amber	40 days
Bolstar (sulprofos)	NCI-GCMS	2	4	ng/L	2-L amber	40 days
Chlorpyrifos	NCI-GCMS	1	2	ng/L	2-L amber	40 days
Demeton	NCI-GCMS	1	2	ng/L	2-L amber	40 days
Diazinon	NCI-GCMS	2	4	ng/L	2-L amber	40 days

duplicates

Water Matrix	Method	MDL	RL	Units	Volume/Container	Holding Time
Dichlorvos	NCI-GCMS	3	6	ng/L	2-L amber	40 days
Dimethoate	NCI-GCMS	3	6	ng/L	2-L amber	40 days
Disulfoton	NCI-GCMS	1	2	ng/L	2-L amber	40 days
Ethoprop (ethoprofos)	NCI-GCMS	10	100	ng/L	2-L amber	40 days
Ethyl parathion	NCI-GCMS	1	2	ng/L	2-L amber	40 days
Fenchlorophos (ronnel)	NCI-GCMS	2	4	ng/L	2-L amber	40 days
Fenitrothion	NCI-GCMS	3	6	ng/L	2-L amber	40 days
Fensulfothion	NCI-GCMS	1	2	ng/L	2-L amber	40 days
Fenthion	NCI-GCMS	50	100	ng/L	2-L amber	40 days
Malathion	NCI-GCMS	10	20	ng/L	2-L amber	40 days
Merphos	NCI-GCMS	1	2	ng/L	2-L amber	40 days
Methamidophos (monitor)	NCI-GCMS	8	16	ng/L	2-L amber	40 days
Methidathion	NCI-GCMS	6	12	ng/L	2-L amber	40 days
Methyl parathion	NCI-GCMS	50	100	ng/L	2 L amber	40 days
Mevinphos (phosdrin)	NCI-GCMS	2	4	ng/L	2-L amber	40 days
Phorate	NCI-GCMS	3	6	ng/L	2-L amber	40 days
Phosmet	NCI-GCMS	1	2	ng/L	2-L amber	40 days
Tetrachlorvinphos (stirofos)	NCI-GCMS	10	100	ng/L	2-L amber	40 days
Tokuthion	NCI-GCMS	2	4	ng/L	2-L amber	40 days
General Chemistry in Water Analysis						
Total hardness as CaCO3 in water determination	SM 2340-B	1	5	mg/L	250-mL HDPE plastic	6 Months
TSS in water determination	SM 2540-D	0.5	0.5	mg/L	1-L HDPE plastic	7 Days
Total coliforms	SM 9221 B and E	20	20	MPN/ 100mL	120-mL HDPE plastic	6 hours
Fecal coliforms	SM 9221 B and E	20	20	MPN/ 100mL	120-mL HDPE plastic	6 hours
Enterococci	SM 9223	10	10	MPN/ 100mL	120-mL HDPE plastic	6 hours

Table 3-2. Field Measured Analytical Parameters

Analytical Parameter	Analytical Method	Sample Volume	Containers #, size, type	Preservation (chemical, temperature, light protected)	Maximum Holding Time: Preparation/ analysis
pH	YSI or similar multimeter	500 ml	Analyzed in Field	Immediate	Immediate
Temperature	YSI or similar multimeter	500 ml	Analyzed in Field	Immediate	Immediate
Conductivity	YSI or similar multimeter	500 ml	Analyzed in Field	Immediate	Immediate
Dissolved Oxygen	YSI or similar multimeter	500 ml	Analyzed in Field	Immediate	Immediate
Turbidity	YSI or similar multimeter	500 ml	Analyzed in Field	Immediate	Immediate

3.5 Sample Handling

Samples will be collected, kept under chain of custody, and delivered to the appropriate laboratory within the required holding time. Samples for bacteria specifically will be kept away from light, stored in a cooler on ice, and delivered to the Weston laboratory within six hours from the time the sample was taken.

Each field sample will be uniquely identified with sample labels in indelible ink. All sample containers will be identified with the project title, appropriate identification number, date and time of sample collection, and preservation method.

3.6 Quality Assurance / Quality Control (QA/QC)

A set of QA/QC samples will be provided with each type of sample. The analytical laboratory may also require additional QA/QC samples if one type of analysis is to be run in more than one batch. Duplicate and QA/QC samples will be analyzed for the same standard analytes as the field samples. Most field QA/QC samples are submitted blind to the analytical laboratory, however, additional sample volumes provided to the laboratory for laboratory replicates or matrix spikes and matrix spike duplicates will be clearly identified.

A set of QA/QC samples for each storm event must be provided with each type of sample to be analyzed. The analytical laboratory may also require more QA/QC samples if one type of analysis is to be run in more than one batch. The main types of QA/QC samples that will be used for this study are as follows:

Blank Samples—Sample bottles are filled with reagent-grade, analyte-free deionized water. The analytical laboratory is then required to perform a specific suite of analyses from these sample bottles. This helps verify that the equipment and the sample containers are not contaminated and also that the techniques used are non-contaminating.

Matrix Spike—The laboratory may require additional sample volumes for analyses that require matrix spikes (MS) and matrix spike duplicates (MSD) to evaluate precision and accuracy of the laboratory analytical method. MS/MSDs are analyzed for their known constituents and then spiked with a known amount of analyte. These results allow for the evaluation of analyte recovery and matrix effects on the sample

4.0 DATA MANAGEMENT

After the storm water monitoring event, the field data sheets will be removed from the field logbooks and will be checked for completeness and accuracy by the QA Officer or Project Manager. The field data sheets will then be scanned and placed into the electronic project file. Field data sheets and the field logbook will be placed into folders by data type, will be labeled with the data type, and will be filed in the appropriate filing cabinet.

For the Microbiology Laboratory analysis, technicians will document sample preparation activities in bound laboratory notebooks or on bench sheets. Data validation includes dated and signed entries by technicians on the data sheets and logbooks used for all samples, the use of sample tracking and numbering systems to track the progress of samples through the laboratory, and the use of QC criteria to reject or accept specific data.

The laboratory technician who generates the data will have prime responsibility for the accuracy and completeness of the data. Each technician will review the data to ensure the following:

- Sample description information is correct and complete.
- Analysis information is correct and complete.
- Results are correct and complete.
- Documentation is complete.

Data sheets will be turned into the project's QA Officer. A tracking sheet will be initialed when the data are ready for transmittal to a data entry operator. All data sheets will be copied before transmittal to the data entry operator. The copies will be kept by the QA Officer, and the originals will be delivered to the data entry operator. Copies will be checked for legibility, and these must be used for data entry should the originals be lost or destroyed.

Analytical data from designated laboratory will be submitted in both PDF and EDD format. The data will be checked by a QA Officer, and QA forms will be given to the Project Manager for approval. Upon completion of the QA check, the EDDs will be uploaded into the Data Management System. The PDFs will be electronically filed in the project data folder. The project's Data Manager will ensure that all project EDDs have been properly checked and will contact the Project Manager if any of the analytical data fail a QA check.

4.1 Data Analysis and Hydrology

Analytical data, rain gauge readings, and velocity measurements will be compiled in Excel spreadsheets and provided to the City in electronic and hardcopy formats. The Project Manager will ensure the accuracy and completeness of the data sheets prior to transmittal to the City.

5.0 REPORT

5.1 Draft/Final Report

A draft technical report for the BMP Effectiveness Baseline Monitoring will be submitted to the City ~~no later than two weeks upon receipt of~~ after receiving the final analytical data from the last sampling event. This report will summarize the wet weather sampling program, discuss analytical results and their significance, evaluate pollutant loading at the site during ~~the first~~ wet weather sampling event, present storm event hydrographs, and discuss the hydrologic modeling in terms of volume of wet weather runoff at the site. The report will include drainage site photos, GIS maps, hydrographs, hydrology calculations, and bacteria pollutographs.

After review of the draft report by the City and incorporation of comments and revisions, the final report will be issued to the City. ~~one week after receipt of the revised draft report.~~

6.0 PROJECT SCHEDULE

The Project Schedule for the BMP Effectiveness Baseline Monitoring for the proposed projects is shown in Appendix C. This schedule may be adjusted based on the occurrence of storm events that meet the wet weather sampling criteria. The program is scheduled for conclusion by June 15, 2010.

7.0 SITE-SPECIFIC MONITORING PLANS

7.1 Southcrest Park

This report

~~The 2009-2010 Program~~ focuses on establishing BMP effectiveness baseline assessment at a City property where the future installation of a Low Impact Development (LID) BMP is planned. The Southcrest Park and Recreation Center (Southcrest Park) was selected during the evaluation process presented in *Parcel Evaluation for BMP Implementation Study* (Weston, 2007c). A large infiltration BMP is planned for this site and will include: pervious pavement, ~~storm drains~~, hydrodynamic separators, ~~cleanouts,~~ and three infiltration areas.

7.1.1 Regulatory Drivers

7.1.1.1 San Diego Regional Water Quality Control Board Municipal Storm Water Permit for the City of San Diego

This is not site specific + repeats 1.1.1

According to the jurisdictional requirements presented in The San Diego County Municipal Storm Water Permit (Permit) (Final Order R9-2007-0001, 2007) each Copermittee is required to implement no less than two Watershed Water Quality Activities and two Watershed Education Activities each year that results in a "significant pollutant load reduction, source abatement, or other quantifiable benefits to discharge or receiving water quality in relation to the watershed's high priority water quality issues."

7.1.1.2 Clean Water Act 303(d) Listings and Total Maximum Daily Loads

The San Diego Regional Water Quality Control Board (Regional Board) adopted an amendment to the Water Quality Control Plan for the San Diego Basin (Basin Plan) on August 14, 2002 (Resolution No. R9-2002-01213) to incorporate a TMDL for diazinon in the Chollas Creek ~~sub~~watershed. This TMDL was developed to address acute and chronic toxicity to aquatic life in Chollas Creek due to the organophosphate insecticide diazinon.

Repeat of 1.1.2.1

The Regional Board adopted another amendment to the Basin Plan for the San Diego Basin on June 13, 2007, (Resolution No. R9-2007-0043) to incorporate TMDLs for dissolved copper, lead and zinc in the lowest 1.2 miles of Chollas Creek. This TMDL addresses impairment to water quality due to levels of metals that exceed numeric targets as set forth in the California Toxics Rule (CTR).

"As discussed in more detail in Section 1.1.2.1, the Chollas Creek Watershed has TMDL's for..."

7.1.2 Project Site Location

Southcrest Park is located within the Chollas Creek watershed, which is part of the San Diego Bay Watershed Management Area and within the jurisdictional boundaries of the City. This site is located adjacent to Chollas Creek and is bordered on the north by Newton Street, south by Alpha Street and on the east and west by S. 43rd Street and S. 40th Street respectively.

7.1.3 Drainage Area

The project drainage area is the tributary watershed which includes the Southcrest Park and storm drain system to which the proposed project BMPs are connected. The drainage area ~~for the entire area~~ is shown in Figure 7-1. ~~Please note that~~ baseline monitoring will be conducted in the right portion of the delineated drainage area, as this will be the location of infiltration basins.

7.1.4 Sampling Site Locations

These look like the same monitoring point

As shown in Figure 7-2, there is a storm drain system that runs both north and east of Southcrest Park and runoff collected by the storm drain system is discharged into Chollas Creek. Two sampling sites were selected in order to assess baseline water quality, one for capturing runoff that flows to the baseballs fields and the other for capturing runoff that flows across the south parking lots. The manhole located on Keeler Street that is accessible for storm water sampling and for installation of a flow meter in the main storm pipe for registering flows during storm events. The second sampling site is a drainage pipe that terminates at the south end of the baseball fields prior to the parking lot. A flow meter cannot be installed in this pipe due to the high probability of theft. However, the drainage pipe discharges to a small, concrete culvert and storm water flows can be manually measured in the culvert.

Go into more detail about how the monitoring pts were chosen and the drainage area that each is capturing. I don't think these points are capturing all the pollutants that need to be measured.

Both of the sampling sites are in low-traffic areas and orange cones surrounding each sampling site are sufficient to protect the safety of the field staff. If sampling is to occur during the operational hours of Southcrest Park, notification should be given to the Southcrest Recreation Center a day in advance.

7.1.5 Constituents of Concern

Based upon both current and proposed TMDLs for the Watershed and/or receiving water body, samples will be collected to assess baseline loads and concentrations of relevant constituents of concern (COC) (Table 7-1) at the project site prior to BMP implementation. This information will be necessary to assess BMP effectiveness post-construction with regard to improving water quality in discharges to receiving waters.

Samples should be analyzed for the appropriate suite of analytes that are direct measures of the constituents of concern and indicators of overall water quality, as well as transport mechanisms (i.e. sediment) for the listed COCs (Table 7-2).

Project components will be designed to remove priority COCs in the Chollas Creek Watershed. The ~~system~~ will be designed to achieve a 99% reduction in bacteria for the treated flow in accordance with the final wet weather objective in the TMDL for indicator bacteria (Bact-I TMDL) and meet or exceed the Chollas Creek TMDL requirements for dissolved metals (i.e. copper, lead and zinc), as well as comply with the water quality objectives of the California Toxics Rule.

Table 7-1. Constituents of Concern for the Chollas Creek Watershed

Watershed	Constituents of Concern
Chollas Creek Watershed	Bacteria
	Diazinon
	Cadnium
	Lead
	Copper
	Zinc
	Synthetic Pyrethroids

Table 7-2. Analyte List for Monitoring at Southcrest Park

Analytes	
Total and Dissolved Metals	Total Hardness
Organochlorine Pesticides	Organophosphorous Pesticides
Synthetic Pyrethroids	Total Organic Carbon
Ammonia	Total Suspended Solids
Turbidity	Indicator Bacteria
Dissolved Organic Carbon	

7.1.6 Proposed BMP

Below grade storage and infiltration basins will be installed within the grassy areas of Southcrest Park (Figure 7-3). Diversion structures will divert runoff from the existing storm drain system that runs through the parking area to the infiltration areas. Peak runoff rates in excess of the five-year, six-hour storm event will pass through the diversion structure and flow to the creek as in existing conditions. Prior to entering the infiltration areas, flows will pass through a hydrodynamic separator. When an infiltration basin is full, additional flows will pass through the system *via* an outflow pipe at the downstream end of the infiltration basin. This overflow pipe will connect to the existing storm drain system and convey flows downstream as in existing conditions. Existing lines, finished grades, and vegetation within the park will be restored after construction. Manholes will be constructed at several locations to be determined during ~~final~~ design. ~~These locations should minimize impacts to the playing fields.~~

Asphalt concrete paving will be removed at several locations near the baseball fields (Figure 7-4). Existing curb and gutters will be protected in place where possible. New pervious concrete paving and base will be installed in place of the old asphalt paving. Existing lines and grades will be maintained, as will existing parking striping to the extent that it complies with current code.

This project also has the option for restoration including approximately 500 linear feet of the reach of South Chollas Creek passing through the western portion of the site. This work would involve realignment of one of the park access roads, possible realignment of an existing sewer system, loss of a portion of turf covered park area, and extensive soil excavation but would result in new riparian habitat area, slowing of creek velocities through the 500-foot reach, and a new creek-side public trail similar to that constructed along other areas of South Chollas Creek. Project cost does not include this restoration work.

7.2 Flow Meter Installation, Maintenance and Data Downloads

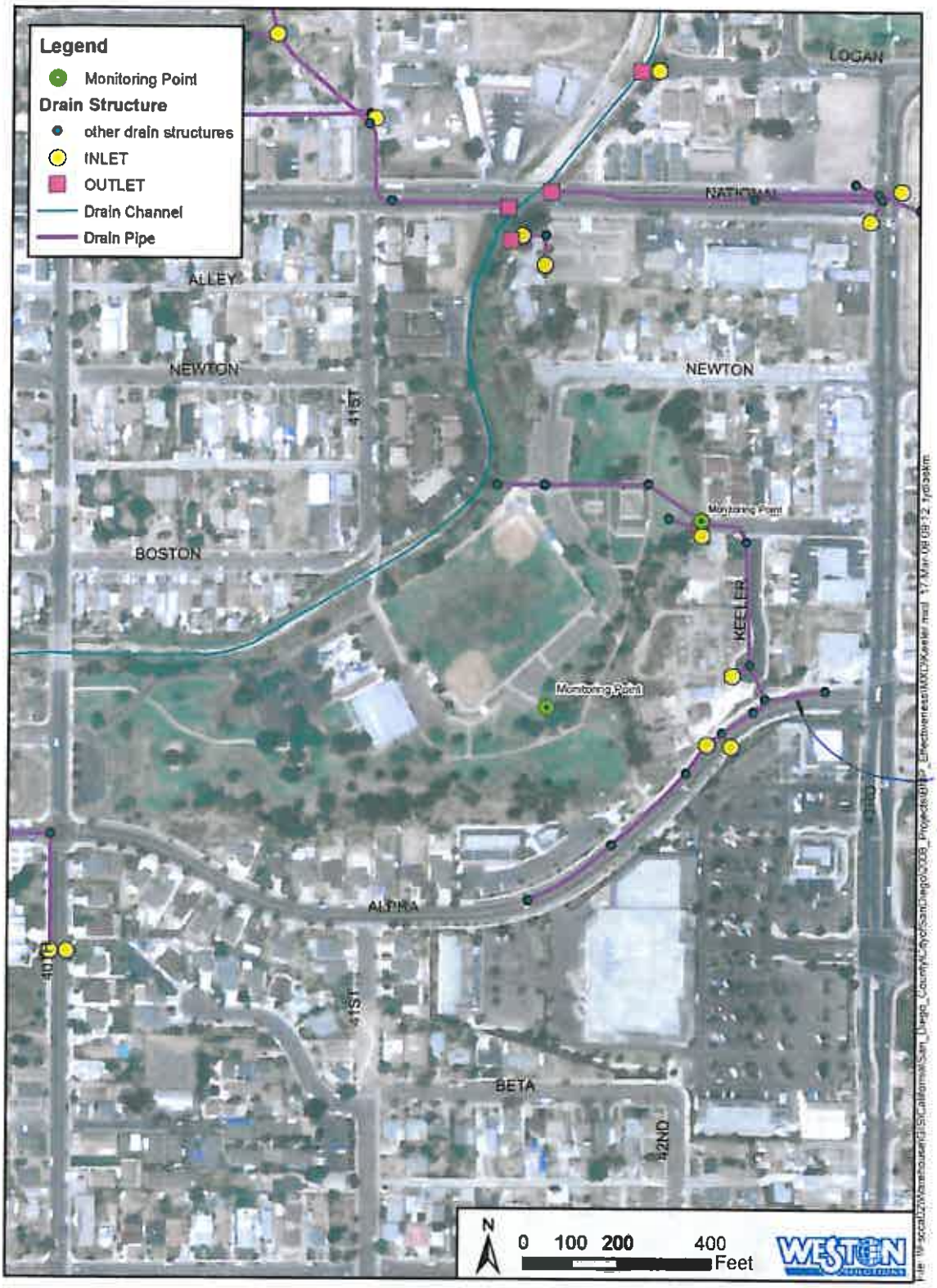
As described in subsection ~~2.1.3,~~ 7.1.4 a flow meter will be installed in storm drain pipe located at the manhole location on Keeler Street. A three-person crew will be necessary since the flow meter installation will occur within confined space (Appendix B). The field team will enter the manhole and inspect the integrity of the storm drain pipes and, if necessary, remove debris that could damage the flow meter during wet weather events. Photos of the flow meter installation will be taken and the physical measurements of the pipes and vault will be noted in the field notes. Since a flow meter cannot be installed within the drainage pipe located at the southern parking lot, this monitoring location will be assessed with regard to performing manual measurements at the concrete culvert located at the discharge point of the drainage pipe.

Field staff will visit each of the monitoring stations on a monthly basis in order to download flow data from the on-site instruments and to perform site-specific maintenance. Special attention will be paid due to the location of monitoring equipment where vandalism and large amounts of debris during high flows could possibly damage equipment.

Delete restoration area

Figure 7-1. Drainage Area for Southcrest Park

- Add north arrow + scale
- This is not the same drainage area turned in w the concept design



These are not all the pipes. The drainage map included w/ concept designs show more

Figure 7-2. Location of Southcrest Park Sampling Sites

Figure 7-3. Concept Design: Infiltration Basins and Hydrodynamic Separator

Figure 7-4. Concept Design: Pervious Pavement

7.3 Sampling Methods

The field team will arrive at the sampling site approximately one hour prior to the beginning of a storm event. Safety cones and orange flags will be placed around the manhole on Keeler Street to warn traffic of field activities. Two orange cones will be placed at the discharge culvert on the drainage pipe located by the Southcrest Recreation Center. Wet weather flow will be monitored at the Keeler Street site using a Sigma 920 flow meter with a pressure transducer to measure velocity and stage height. The flow sensor will be installed on the pipe bottom as near to the center of the pipe as possible. A Toughbook computer will be attached to the flow meter sensor for recording rainfall and following the site-specific storm hydrograph. Upon commencement of the storm and after run-off has begun, grab samples will be taken from the Keeler Street manhole vault by lowering a bucket into the vault and filling the bucket with storm water as it exits the storm pipe. Samples will also be taken from the drainage culvert near the recreation center as storm water flow exits the drainage pipe. For reasons of safety, wet weather sampling events will require a field team of two people. Samples will be collected more frequently during initial runoff (i.e., every 15 minutes for the first hour then hourly until cessation of the storm). Field staff will attempt to capture the rise and fall of the hydrograph from first flush until it returns to within 10% of base flow conditions. However, rainfall intensity and duration may vary the periodicity of sampling. The samples will be combined to produce a flow-weighted event mean concentration (EMC) of pollutants (Table 7-3).

Table 7-3. Number of Samples to be Collected during Wet Weather Sampling Events

Watershed	No. of Sampling Sites	No. of Storms	QA/QC Samples per Storm	Total No. of Composited Chemical Samples per Storm	Total No. of Bacterial Samples per Storm	COC
Chollas Creek	2	3	2	3	6	bacteria, heavy metals, pesticides

list all of them like Table 7-1

8.0 MONITORING SITE DESCRIPTION

8.1 Cabrillo Heights Park

8.1.1 Regulatory Drivers

8.1.1.1 San Diego Regional Water Quality Control Board Municipal Storm Water Permit for the City of San Diego

8.1.1.2 Clean Water Act 303(d) Listings and Total Maximum Daily Loads

8.1.2 Project Site Location
8.1.3 Drainage Area
8.1.4 Sampling Site Locations
8.1.5 Constituents of Concern
8.1.6 Proposed BMP
8.1.7 Flow Meter Installation
8.1.8 Sampling Methods

9.0 MONITORING SITE DESCRIPTION

9.1 Bannock Avenue Neighborhood

9.1.1 Regulatory Drivers

9.1.1.1 San Diego Regional Water Quality Control Board Municipal Storm Water Permit for the City of San Diego

9.1.1.2 Clean Water Act 303(d) Listings and Total Maximum Daily Loads

9.1.2 Project Site Location
9.1.3 Drainage Area
9.1.4 Sampling Site Locations
9.1.5 Constituents of Concern
9.1.6 Proposed BMP
9.1.7 Flow Meter Installation
9.1.8 Sampling Methods

10.0 REFERENCES

Weston (Weston Solutions, Inc.) 2007a. ~~*5-Year*~~ *Strategic Plan for Watershed Activity Implementation*. November, 2007.Weston Solutions, Inc., Carlsbad, CA.

Weston (Weston Solutions, Inc.) 2007b. *Tier II and Tier III Storm Water Best Management Practices Conceptual Designs*. May, 2008. Weston Solutions, Inc., Carlsbad, CA.

Weston (Weston Solutions, Inc.) 2007c. *Parcel Evaluation for BMP Implementation Study*. October, 2007. Weston Solutions, Inc., Carlsbad, CA.

U.S. Department of the Interior Bureau of Reclamation. 2001. *Water Measurement Manual.*

→ Add MWH concept design report

APPENDIX A

Field Forms

APPENDIX B

Confined Space Program

APPENDIX C

Project Schedule