MACTEC

September 1, 2005

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Watershed Protection Program
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Subject: **County of San Diego, Department of Public Works**
**Rainbow Creek Wet-Weather and Dry-Weather Sampling**
**MACTEC Project No. 5012-04-0011**

MACTEC Engineering and Consulting, Inc. (MACTEC), is pleased to submit this Letter Report for the Rainbow Creek Total Daily Maximum Load (TMDL) Study. This Letter Report includes a description of the methods used, the date the tasks were performed, and both the dry and wet-weather storm event data summarized in a County of San Diego Excel database with the laboratory analytical results. In addition, the dry-weather and the storm event hydrographs, are included with the sample dates and times.

**Scope of Work**

MACTEC conducted two dry-weather and two storm event flow-weighted composite sampling events at two Mass Loading Stations (MLS) located on Rainbow Creek in San Diego County. The sampling efforts included citing the locations of the two MLS on Rainbow Creek, installing sampling equipment, collecting the flow-weighted samples, and submitting the samples to CRG Marine Laboratories, Inc. for laboratory analysis. In addition, MACTEC conducted in-situ field measurements of temperature, pH, and conductivity.

**Methods**

The flow monitoring and sampling methods utilized during the dry weather and the wet weather events at Rainbow Creek are described below for each MLS.

Station 1

The Rainbow Creek Station 1 is located on the Highway 395-bridge at the Rainbow Creek Crossing. The water quality monitoring equipment was installed on County of San Diego Property, which extends about 20 feet east of the bridge along Rainbow Creek. The creek passes under Highway 395 through a 96-inch, concrete circular pipe, and through three, 8-foot rectangular conveyances. During dry-weather flow, all of the flow is conveyed under the Highway 395 Bridge through the 96-inch circular pipe. However, during storm flows, the flow is split between the circular pipe and the three rectangular conveyances.

Flow-weighted, dry-weather, 24-hour sampling at Station 1 was conducted using automated samplers and logging flowmeters. MACTEC field crews placed sandbags in the channel to divert water through a small flume. The flowmeter calculates flow by recording the stage in the 4-inch Palmer Bowles Flume. Flow-weighted samples were collected into a laboratory, protocol-cleaned, 19-liter Borosilicate jar. Sample aliquots are distributed over a 24-hour period into the jar in intervals that increase and decrease with flow.

Flow-weighted storm event 24-hour sampling at Station 1 was conducted using automated samplers and logging flowmeters. The flowmeter calculates flow by using stage and velocity data in the 96-inch concrete circular pipe. Flow-weighted samples were collected into a laboratory protocol cleaned 19-liter Borosilicate jar. The sample collection frequency is contingent upon the flow rate when composite samples are flow-weighted.

Station 2

The Rainbow Creek Station 2 is located at the Stagecoach Rainbow Creek Crossing. The water quality monitoring equipment installations were on County of San Diego Property, adjacent to Rainbow Creek.

Flow-weighted dry-weather 24-hour sampling at Station 1 was conducted using automated samplers and logging flowmeters. Sandbags were placed in the channel to divert water through a 2-inch 60-degree flume. The flowmeter calculates flow by recording stage in the trapezoidal flume. Flow weighted samples were collected into a protocol cleaned 19-liter Borosilicate jar.

Sample aliquots are distributed over a 24-hour period into the jar in intervals that increase and decrease with flow.

Flow-weighted storm event, 24-hour sampling at Station 2 was conducted using automated samplers and logging flowmeters. The flowmeter calculates flow by using stage and velocity data in the open channel. Flow-weighted samples were collected into a protocol cleaned 19-liter Borosilicate jar. The sample collection frequency is contingent upon the flow rate when composite samples are flow-weighted.

**Sampling Dates and In-situ Measurements**

The following table lists the sampling dates for the dry-weather and the wet-weather composite sampling and the water quality field measurements. Rainfall data was collected using an American Sigma tipping bucket rain gauge, connected to the flowmeter. Temperature, pH, and conductivity data was collected using a YSI Sonde 600XLM water quality probe. The YSI probe was calibrated as per the manufactures recommendations prior to the equipment installations.

| Location | Event | Rainfall (in) | Date | Time | pH | Temp. C | Conductivity (uS/cm) |
|---|---|---|---|---|---|---|---|
| **Station 1** | Dry 1 | 0.00 | 10/12/2004 | 11:50 | 7.32 | 12.9 | 457 |
| 395 Bridge | Wet 1 | 2.69 | 10/27/2004 | 16:00 | 7.47 | 16.3 | 1952 |
| | Wet 2 | 0.55 | 3/19/2005 | 15:20 | 7.15 | 13.7 | 2255 |
| | Dry 2 | 0.00 | 6/8/2005 | 13:30 | 7.5 | 12.1 | 512 |
| **Station 2** | Dry 1 | 0.00 | 10/12/2004 | 12:10 | 7.22 | 13.4 | 793 |
| Stagecoach | Wet 1 | 2.69 | 10/27/2004 | 16:45 | 8.03 | 11.8 | 1540 |
| | Wet 2 | 0.53 | 3/18/2005 | 15:50 | 7.8 | 14.2 | 2640 |
| | Dry 2 | 0.00 | 6/8/2005 | 14:00 | 7.45 | 12.9 | 652 |

**Results**

The dry weather and the wet weather hydrographs are in Attachment A. The laboratory analytical results are in Attachment B.

Please call us if you have any questions or if we may be of further service.

Sincerely,

**MACTEC Engineering and Consulting, Inc.**

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(1 copies submitted)

SP/NS/:pcc

Attachments: Dry Weather and Storm Event Hydrographs
Laboratory Analysis
County of San Diego Excel Database

ATTACHMENT A

DRY WEATHER AND STORM EVENT HYDROGRAPHS

ATTACHMENT B

LABORATORY ANALYSIS