

**Scope of Work, Budget and Schedule  
LONG PROFILE  
CARMEL RIVER CHANNEL**

**Introduction**

Most of the riverbed and streambanks along the alluvial section (the lower 18 miles) of the Carmel River in Monterey County, California are composed of loosely consolidated silts, sands, gravels and cobbles. Significant erosion along the lower 15.5 miles of river occurred at relatively low flows between the late 1970's and the late 1990's and several researches have noted that the channel is sediment starved. The Monterey Peninsula Water Management District (MPWMD) has carried out a stream restoration program since 1984 to stabilize and restore the streamside corridor and address other water-related problems along the Carmel River.

The material carried down from the upper watershed makes up the water-bearing alluvium in Carmel Valley that is pumped to supply Cal-Am and non-Cal-Am demand. Because the river channel changes in response to the amount of sediment that flows through it, an important aspect of managing and understanding this portion of the riparian corridor is long-term monitoring and documentation of changes in the elevation of the river bottom.

Gravel mining, main stem reservoirs, and streambank armoring have contributed to a sediment-starved condition in the river channel downstream of Los Padres Dam, which is located at approximately River Mile (RM, measured from the ocean) 25. A chronic lack of sediment from the watershed area above San Clemente Dam for more than 95 years has been a factor in aquatic habitat degradation, channel incision, streambank instability, infrastructure damage, loss of property, and episodes of bank erosion along the river. In addition, incision and removal of alluvial valley deposits reduces the volume of water that can be retained in storage in the Carmel Valley Alluvial Aquifer.

One of the results of sediment starvation in the alluvial reach is that in-channel supports for basic infrastructure (bridges with roads and utilities) have been undermined and compromised at several locations. In addition, there are areas along the river where scour at the base of slope protection installed to prevent bank erosion has caused bank slumping and/or the protection appears to be at risk of failure during high flows.

The focus of the work proposed in this scope is to complete a comprehensive thalweg survey (low point in the channel) to gather data between the Carmel River lagoon and Carmel Valley Village for use in maintaining a long-term record and to compare to past and future monitoring data. Previous work in 2014 and 2016 was completed in other portions of the alluvial aquifer. Comparisons of repeated surveys carried out over long periods can yield information about the long-term rate of aggradation (i.e., sediment build-up) or degradation (i.e., loss of sediment), effects of restoration projects along the river, and can inform decisions about infrastructure maintenance and repairs and proposed restoration projects.

Survey data will be used by MPWMD staff to adjust Carmel Valley Alluvial Aquifer parameters,

monitor effects to downstream areas from ongoing sediment retention at Los Padres Reservoir, and to set a baseline for comparison of potential effects of alternatives being studied for the long term management of Los Padres Dam.

It should be noted that San Clemente Dam at RM 18.6 was removed in 2015. The dam no longer traps 100% of the bedload sediment (the portion of the sediment load that tends to roll or saltate) and fine grained material and debris are now free to move past the dam at high flows. Thalweg profiles are one of the key monitoring methods in evaluating the effects on the streamside corridor from any increase in sediment flow. A potential change in sediment flow to the lower 15.5 miles is also an issue that must be evaluated with any alternative associated with long-term management of Los Padres Dam and Reservoir.

### **Previous MPWMD Survey Work**

MPWMD conducted the first detailed long profile thalweg survey (a survey of the lowest point along the channel) of the lower 15.5 miles of the Carmel River channel in 1984. This survey gathered data at approximately 100-foot intervals using a surveyor's level, but was not referenced to a spatial grid (i.e., a coordinate system). A follow-up survey referenced to the State Plane coordinate system was conducted in 1993 along the lower five miles of the river using an electronic distance meter and total station. The 1993 survey included data that defined the limits of vegetation and the beginning and ends of pools, riffles, and glides. Several shorter surveys (also on State Plane coordinates) with a similar data set have been conducted in association with MPWMD-sponsored restoration projects. In 2007, Graham Matthews and Associates profiled approximately 10 miles of the lower river.

In 1995, MPWMD contracted with Central Coast Surveyors to set 12 permanent survey control points in the vicinity of six different bridge locations<sup>1</sup>. The control points were set using Global Positioning System receivers and referenced to a control point in the CALTRANS High Precision Geodetic Network. These control points can serve as intermediate check points for surveys along the river.

It should be noted that due to limited access into the riverbed, gathering detailed survey work along the channel bottom may involve long hikes in difficult terrain. Vegetation along the channel bottom in some reaches has encroached toward the center of the channel and may obstruct direct line-of-sight views needed to set survey control and gather data. Portions of the stream corridor are densely vegetated along the streambanks. Poison oak, stinging nettle, and rattlesnakes are common throughout the streamside corridor.

### **Approach and Scope of Work**

Tasks and the percentage of the budget to be used for each task are shown below. MPWMD staff is requesting that up to \$45,000 be made available for this work. The portion of the budget to be used for each task is approximate and is intended to be a guide in carrying out tasks. The percentages shown may be modified based on field conditions and/or recommendations made by the Consultant for the work.

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1. MPWMD, May 20, 1995. Survey Control Points Established with GPS Methods, Lower Carmel River (Rivermile 1.0 to 15.5), Prepared for Monterey Peninsula Water Management District by Central Coast Surveyors, Seaside, California.

**Task 1 (85%) – Obtain Long Profile.** Gather thalweg data along the bottom of the river channel between the upstream end of the Schulte Restoration Project near RM 7 and RM 12.5, downstream of the Boronda Road Bridge. Data shall be of a sufficient density along the profile to show pools, riffle, glides, and other significant features. Where the channel bottom profile is relatively constant, data shall be gathered at intervals of no more than 50 feet between points. Work shall proceed from downstream (near the lagoon) and shall extend upstream. Horizontal accuracy shall be to +/- one foot and vertical accuracy shall be to +/- 0.1 foot.

Profile data shall be provided as a spatially referenced file (NAD 1983 and NAVD 1988) and in drawings at a horizontal scale of 1 inch = 200 feet and a vertical scale of 1 inch = five feet (all drawings no larger than 24 in. x 36 in.). Data should be in an Excel format, similar to previous thalweg profiles, with an ability to import new data into existing data files. Drawings may be in PDF format.

**Task 5 (15%) – Prepare Report.** A report shall be prepared that presents results and describes the equipment and methods used to gather and analyze data.

### **Project Deliverables**

Any reference articles, books, publications, or software purchased specifically for this study shall be provided to MPWMD. Data input and output files from computer analysis shall be provided. A final report shall be provided in an acceptable digital format (e.g., Word, PDF, Excel). All files are to be provided electronically.

### **Budget**

It should be noted that the scope of Tasks 1 and 2 may be amended in order to maintain project costs within the proposed budget.

### Professional Services

Up to \$45,000 to be expended on a time-and-materials basis.

### **Schedule**

It is anticipated that survey work would commence soon after issuance of a notice to proceed (i.e. during late September 2016). All field work shall be completed within four months of authorization to proceed and the project shall be completed within six months of authorization to proceed.