



## Kern Valley Sanitary Landfill Erosion Evaluation and Drop Structure Design

The Kern Valley Waste Management Facility (KVWMF), which consists of the Kern Valley Sanitary Landfill (KVSL) and Recycling/Transfer Station, is located southeast of Kernville on Cyrus Canyon in Kern County, California. The site is upstream of the Lake Isabella reservoir, in a mountainous region with high intensity storms. Unmitigated flood flows have the potential to cause extensive damage to the KVWMF and deliver eroded material from the sanitary landfill downstream to Lake Isabella. WEST Consultants, Inc. (WEST) was retained by the prime contractor to develop and evaluate designs to provide for embankment protection of the facility.

WEST conducted a qualitative geomorphic analysis and a detailed sediment transport/scour analysis for the entire study reach. The scour analysis was performed using the latest version of the HEC-6T sediment transport program (Sedimentation in Stream Networks, by William A. Thomas). The HEC-6T simulations were carried out with a long-term application of the channel forming discharge and for the 100-year flood event in order to provide a conservative estimate of scour. Field investigations confirmed that a severe headcut was advancing toward the landfill.

Eight scour protection alternatives were investigated and presented to the Kern County Waste Management Department (KCWMD). Based on the comparative scour results and detailed hydraulic analyses, three were selected for further preliminary cost investigation: Alternatives A2 (widening the restricted area of the wash), A6a (half drop structure with widening), and A6b (full drop structure with widening). WEST recommended and the KCWMD agreed on alternative A6b as the optimal solution to stop severe channel erosion in the wash and to protect the KVWMF from potential scour.



*Severe headcut on Cyrus Canyon*

WEST provided design details for the St. Anthony Falls (SAF) drop structure facility and embankment protection for the transfer station and the landfill using articulated concrete blocks. The drop structure facility consists of the crest, a sloping face of a long chute, and a SAF stilling basin with appurtenances for energy dissipation. A rock riprap mattress is placed downstream of the stilling basin to prevent possible scour downstream of the structure since there is not enough tailwater depth to fully submerge the hydraulic jump within the basin. The mattress ends with a stone trench that counters the potential downstream erosion and prevents scour from advancing toward the structure. The streambed immediately upstream of the drop structure crest is also protected by suitably sized rock riprap. The standard rock riprap gradation and filter blankets are specified in detail.

The stilling basin sidewalls are designed high enough to contain the fully developed hydraulic jump. Entrance wingwalls are tied to the upstream embankment protection berms that smoothly transition into the structure and protect the structure from flanking flow. Exit wingwalls are used as retaining walls to hold back the earth fill and to prevent scour around the end of the sidewalls. Cut-off walls are used both at the drop structure crest and at the stilling basin exit to prevent undermining of the structure.

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