

## San Luis Obispo County Proposition 1E Proposal Monitoring, Assessment, and Performance Measures

Attachment 6 describes the performance measures that will be used to quantify and verify the Zone 1/1A Waterway Management Program, Alternative 3a Project's performance. It includes a discussion of the monitoring system to be used to verify project performance with respect to the project benefits and objectives. Where the data will be collected and the types of analyses to be used is described and a discussion of how monitoring data will be used to measure the performance in meeting the overall goals and objectives is also included. The Project Performance Measures Table for the project is attached and serves as a preview of the information that would go into the monitoring plan for the project.

The planned monitoring, assessment and performance measures demonstrate that the Proposal will meet its intended goals, achieve measurable outcomes, and provide value to the State of California.

### *Project Goals*

The goals of the Alternative 3a Project are to:

- Increase the existing flood carrying capacity of the channel to provide 10-year flood protection for District Zone 1/1A residents and agriculture.
- Protect biological resources, enhance and protect riparian habitats supporting sensitive plant or animal species.
- Improve function of flood control facilities and reduce the need for future maintenance.

Each goal is described in detail below.

#### **Goal 1: Increase the existing flood carrying capacity of the channel to provide 10-year flood protection for the District Zone 1/1A residents and agriculture.**

Zone 1/1A is within the lower Arroyo Grande Creek floodplain, or Cienega Valley. The Cienega Valley is especially vulnerable to flooding because it lies at the downstream, lower gradient terminus of a highly erosive watershed. Much of the erosion occurring in the upper watershed results in sediment that is transported and delivered to the floodplains that make up the lower valley. Due to conversion of floodplain areas to agricultural and residential uses, and severe incision of Arroyo Grande Creek downstream of Lopez Dam, much of the sediment that was historically deposited on the floodplain ends up being deposited in backwater areas behind bridges, in small pocket flood plain areas, or in the lower gradient flood control reach which comprises Zone 1/1A.

Due to limited revenue sources and environmental restrictions, the County Public Works Department has not been able to perform maintenance, primarily vegetation and sediment removal, to sustain the channel's design capacity, so the existing channel has a severely reduced capacity and can only provide protection from the 2.8 year flow event (with 2 feet of freeboard). The current flood protection is inadequate. This was evidenced during the 2001 levee system breach on the south side which inundated hundreds of acres of farmland and several residences. The northern levee remained intact, thereby protecting several high density residential developments, as well as the regional wastewater treatment plant that services the communities of Arroyo Grande, Oceano and Grover Beach.

The Alternative 3a project begins with an initial vegetation and sediment management component that will improve the flow characteristics of the channel in the following ways:

1. Management of riparian vegetation to maintain a cross-sectional roughness of 0.04, and
2. Initial removal of accumulated sediment that will create secondary overflow channels.

The project will also implement the first phase of levee raise (average raise of 2 feet) that, in combination with the vegetation and sediment management, will provide protection from the 10-year flood (with 2 ft of freeboard) for the residents and agricultural areas of Zone 1/1A until additional revenues or funding sources are acquired to implement the final component of the adopted Waterway Management Program which includes a levee raise to restore the channel capacity to accommodate 20-year flood flows.

**Goal 2: Protect biological resources, including riparian habitats and habitats supporting sensitive plant or animal species.**

The goal of the vegetation management program is to maintain a balance between flood protection along lower Arroyo Grande Creek and protection of natural resources that rely on a healthy riparian corridor to protect important aquatic habitat. The vegetation management program as outlined in Attachment 3 accomplishes these objectives in the following ways:

1. Maintenance of a riparian buffer to create a continuous riparian canopy through the project area that provides benefit to terrestrial and aquatic species that rely on cover habitat, cool water temperatures, and other functions provided by a continuous and diverse riparian corridor.
2. Removal of invasive non-native species to improve the health of the riparian corridor.

**Goal 3: Improve function of flood control facilities and reduce the need for future maintenance.**

The goal of the sediment management activities is to increase flood capacity through the project reach while at the same time improving in stream aquatic habitat and reducing the need for sediment removal in the future. These goals will be achieved through an initial removal of previously built up sediment to create secondary overflow channels and integration of habitat enhancement structures consisting of large natural wood logs. The sediment management portion of this project will enhance geomorphic function, improve flood conveyance, and “set” the flood control channel to an initial condition that will enhance sediment transport and thereby reduce the need for future maintenance dredging.

*Performance Measures*

Performance measures will be used to quantify and verify the success of the project in meeting the established goals. The following performance measures have been selected for each respective project goal.

**Goal:** Increase the existing flood carrying capacity of the channel to provide 10-year flood protection for District Zone 1/1A residents and agriculture.

**Performance Measure:** The project will increase the level of flood protection by improving the channel flow characteristics and increasing the height of the levees. Therefore a suitable performance measurement is an assessment of the cross-sectional roughness and volume achieved after project completion, verification that elevations of the tops of the levees are consistent with the design plan for the project, as well as associated reduction in damage claims related to reduced frequency of flooding.

**Goal:** Protect biological resources, including riparian habitats and habitats supporting sensitive plant or animal species.

**Performance Measure:** The project will manage riparian vegetation to provide a continuous and diverse riparian corridor that will enhance water quality and special species habitat within the managed channel. Appropriate performance measures include

increase of riparian canopy cover, increase riparian species richness and density, and reduction of invasive non-native species throughout the project area.

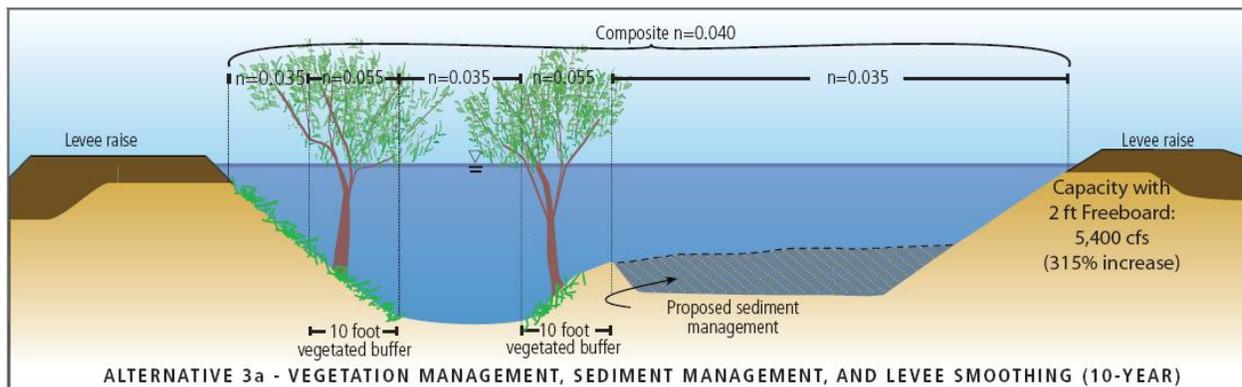
**Goal:** Improve function of flood control facilities and reduce the need for future maintenance.

**Performance Measure:** After initial sediment removal the system will be a self-maintaining system requiring only limited, periodic maintenance. Successful performance of the project would be achieved if future sedimentation in the project area does not reduce capacity in any one location beyond the defined freeboard at the baseline condition.

### Monitoring Program

Table 6-1 provides a summary of the specific performance measures and associated monitoring programs that have been identified to measure project performance in meeting the overall goals as described above. A graphic depiction of the improved channel is shown below. The graphic shows the channel features that will be monitored including the levee elevation, channel roughness, sediment management areas, and riparian corridor. The monitoring program is designed to verify:

1. Cross-sectional roughness, volume, and levee top elevations are consistent with the design plan;
2. Adequate riparian buffer and continuous riparian canopy are maintained and non-native invasive vegetation are eliminated; and
3. Sediment is not accumulating beyond the defined sediment management areas.



**Table 6-1: Project Performance Measures for the Flood Control Zone 1/1A Alternative 3a Project**

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
1. Increase the existing flood carrying capacity of the channel to provide 10-year flood protection for District Zone 1/1A residents and agriculture.	<ol style="list-style-type: none"> <li>Increase the flood carrying capacity of the existing channels to contain 10-year flood flows with 2 feet of freeboard</li> <li>Reduction in costs associated with flooding</li> </ol>	<ol style="list-style-type: none"> <li>Completion of construction to remove dense vegetation outside the buffer areas and accumulated sediment.</li> <li>Completion of construction to raise height of levees.</li> <li>Reduction in flood damages</li> </ol>	<ol style="list-style-type: none"> <li>Inspection of vegetation management to ensure adequate vegetation removal is achieved to improve channel cross-sectional roughness.</li> <li>Inspection of sediment removal during construction to ensure removal of accumulated sediment is per plan and adequately maintains the existing primary low-flow channel and establishes proposed secondary overflow channels.</li> <li>Comparison of elevations of top of levees after construction to those shown on the design plans</li> <li>Reduction in damage claims and overtopping sightings</li> </ol>	<ol style="list-style-type: none"> <li>Review of before and after photos as well as field surveying during and after construction to determine type and approximate roughness of vegetation cover at designated locations in the project area (Figure 6-1) Project Area and Proposed Monitoring locations to be used in evaluating the channel's composite roughness.</li> <li>Topographical survey equipment to determine as-constructed channel cross sections and comparisons to design elevations.</li> <li>Comparison of historic overtopping sightings and damage claims to post-construction sightings and claims</li> </ol>	<ol style="list-style-type: none"> <li>Removal of vegetation to achieve a channel cross-sectional composite roughness of 0.04.</li> <li>Removal of 21,330 cubic yards of accumulated sediment to provide secondary overflow channels and increase flood capacity, as designed.</li> <li>Elevations of tops of levees should be within 10 % of the designed levee raise at any location.</li> <li>Associated reduction in damage claims related to reduced frequency of flooding.</li> </ol>
2. Protect biological resources, including riparian habitats and habitats supporting sensitive plant or animal species.	<ol style="list-style-type: none"> <li>Maintenance of a riparian buffer to create a continuous riparian canopy through the project area that provides benefit to terrestrial and aquatic species that rely on cover habitat, cool water temperatures, and other functions provided by a continuous and diverse riparian corridor.</li> <li>Removal of invasive non-native species to improve the health of the riparian corridor.</li> </ol>	<ol style="list-style-type: none"> <li>Documentation of sensitive resources through the project area to include riparian canopy cover and riparian species diversity.</li> </ol>	<ol style="list-style-type: none"> <li>Issuance of environmental resource agency permits.</li> <li>Environmental monitoring provided during construction.</li> </ol>	<ol style="list-style-type: none"> <li>Measure canopy cover and species diversity throughout the project area.</li> <li>Map presence of non-native invasive vegetation that occurs within the project reach.</li> <li>Completion report submitted for Environmental Monitoring.</li> </ol>	<ol style="list-style-type: none"> <li>Practical minimization of impacts to biological resources.</li> <li>Maintenance of a continuous riparian canopy.</li> <li>Practical elimination of invasive species.</li> </ol>
3. Improve function of flood control facilities and reduce the need for future maintenance.	<ol style="list-style-type: none"> <li>Enhance geomorphic function, improve flood conveyance, and "set" the flood control channel to an initial condition that will enhance sediment transport and thereby become self maintaining.</li> </ol>	<ol style="list-style-type: none"> <li>Establishment of a primary low-flow channel and secondary overflow channels to promote a self maintaining system in which aggradation does not cause significant loss of capacity.</li> </ol>	<ol style="list-style-type: none"> <li>Inspection of sediment removal and habitat enhancement (log structures) during construction to ensure establishment of primary low-flow channel and secondary overflow channels is per plan.</li> </ol>	<ol style="list-style-type: none"> <li>Construction inspection and topographic surveying to complete as-constructed drawings and update channel cross-sections for input into hydraulic model.</li> <li>Post construction review of sediment at designated locations (Figure 6-1) using topographic surveying.</li> </ol>	<ol style="list-style-type: none"> <li>Completion of construction to improve scour velocities and reduce aggradation throughout the project area as verified by the updated hydraulic model.</li> <li>Reduced dredging / maintenance.</li> </ol>

Figure 6-1 Project Area and Proposed Monitoring Locations

