

*Attachment*

**6**

***Stormwater Flood Management Grant Proposal  
Santa Barbara County Flood and Water Conservation District  
Monitoring, Assessment, and Performance Measures***

Attachment 6 consists of the following items:

- ✓ **Monitoring, Assessment, and Performance Measures.** The purpose of this attachment is to describe the monitoring, assessment, and performance measures that will be used to evaluate the proposed project. These measures will ensure that this proposal meets its intended goals, achieves measurable outcomes, and provides value to the Region and the State of California.

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The purpose of this attachment is to provide a discussion of the monitoring system to be used to verify project performance with respect to the project benefits or objectives identified. This attachment will identify data collection and analysis method to be used by the proposed project, Las Vegas and San Pedro Creeks Union Pacific Railroad Bridge Replacement Project (UPRR Bridge Project).

This attachment will also discuss how monitoring data will be used to measure the performance in meeting the overall goals and objectives of the Santa Barbara County IRWM Plan. The project applicant has prepared a Project Performance Measures Table, **Table 6-1**. The table includes the following:

- Project goals
- Desired outcomes
- Targets – measureable targets that are feasible to meet during the life of the project
- Performance indicators – measures to evaluate change that is a direct result of the project being built
- Measurement tools and methods – effectively track performance

The project performance measures will be used to develop the project monitoring plan. The Santa Barbara County Flood Control and Water Conservation District (District) will implement a performance measures plan (as noted in Attachment 3) and continue to refine the project performance measures as the project continues to be developed. Project benefits are discussed in more detail in Attachments 7 and 8.

**Table 6-1: Performance Measures Table - Las Vegas and San Pedro Creeks Union Pacific Railroad Bridge Replacement Project**

Project Goals	Desired Outcomes	Targets	Performance Indicators	Measurement Tools and Methods
Increase flood flow conveyance capacity	Increase flood flow conveyance to 25-year storm event flows for increased flood protection	<ul style="list-style-type: none"> <li>• Reduction in amount of flood damage in project area caused by the 25-year storm event.</li> <li>• Las Vegas Creek capacity will increase by 800cfs</li> <li>• San Pedro Creek capacity will increase by 900cfs.</li> <li>• Reduction in creek overflows for events higher than 10-year storm event by increasing capacity to 800cfs for Las Vegas Creek and 900cfs for San Pedro Creek, effectively reducing flood plain boundaries.</li> </ul>	<ul style="list-style-type: none"> <li>• Quantification of the damage of historic flood events reduced in project area in future.</li> <li>• Quantification of the number of historic flood events reduced in project area in future.</li> <li>• Future FEMA concurrence of reduced flows by issuance of Conditional Letter of Map Revision (CLOMR) for revised 100 year flood plain boundary of 10-year storms and higher.</li> <li>• Increased capacity of Las Vegas Creek and San Pedro Creek</li> </ul>	<ul style="list-style-type: none"> <li>• Measurements of downstream flows.</li> <li>• A stream gage will be installed in the channel downstream of the project site to measure contained flows.</li> <li>• Reduction in flood damage reports and claims.</li> </ul>
Improve public safety during storm events	Increase flood protection to reduce the damage to private property, business and roadways.	<ul style="list-style-type: none"> <li>• Incremental increase in urban flooding protection, by reducing the number of homes, commercial structures and roadways subject to flooding.</li> </ul>	<ul style="list-style-type: none"> <li>• Quantification of the damage of historic flood events reduced in project area in future.</li> <li>• Number of Residents removed from flood zone: 25yr event: 36, 50yr event: 43, 100yr event: 39.</li> <li>• Miles of roadway removed from flood zone: 25yr event: 1.43 miles, 50yr event: 0.89 miles, 100yr event: 1.30 miles.</li> <li>• Commercial property area removed from flood zone: 25yr: 315,200sf, 50yr: 156,000sf; 100yr: 226,700.</li> <li>• FEMA will ultimately issue a Letter of Map Revision (LOMR) that will redraw floodplain boundaries.</li> </ul>	<ul style="list-style-type: none"> <li>• Record of historic and future flood events compared against flood damage during large storm events.</li> <li>• Reduction in storm damage reports and claims.</li> <li>• Monitoring calls and complaints</li> <li>• Mapping will be used to update the flood zone areas.</li> </ul>

Project Goals	Desired Outcomes	Targets	Performance Indicators	Measurement Tools and Methods
Improve natural habitat	Increase vegetation and fish habitat	<ul style="list-style-type: none"> <li>• Increase in natural vegetated riparian habitat and an increase in trout populations upstream of the site.</li> </ul>	<ul style="list-style-type: none"> <li>• Quantification of habitat increased as a result of the project</li> <li>• Increase combined channel riparian habitat area by 0.59 acres</li> <li>• Increase of anadromous fish passage habitat by 600 feet</li> </ul>	<ul style="list-style-type: none"> <li>• Visual and photogrammetric habitat monitoring of vegetation renewal</li> <li>• Visual siting of steelhead trout upstream of UPRR bridge and the Caltrans bridge</li> </ul>

The UPRR Bridge Project will consist of a suite of activities designed to improve flood flow conveyance capacity, public safety and natural habitat. These activities will be executed in order to meet project goals (listed below). Project goals will each have performance measures that will be used to quantify and verify project performance. The performance measures used to quantify and verify project performance are described in the Project Goals and Performance Measures section below.

## Project Goals and Performance Measures

### Increase Flood Flow Conveyance Capacity

The UPRR Bridge Project will improve flood flow conveyance capacity by expanding the stream passage under the UPRR bridges. The UPRR Bridge Project will increase the size of culverts and lower the channel bed level at the San Pedro Creek, to increase flood control capacity to a 25-year storm event from a 10-year storm event.

Flow measurements will be taken downstream of the UPRR bridges on both creeks to verify project performance as shown in **Figure 6-1**. Flow gauges will be installed and calibrated and data will be collected electronically. Stage/flow graphs will be created and compared against the pre-project creek stage/flow curves for storm events of the same magnitude as generated in HEC-RAS hydrologic modeling program. Hydrologic reports will be submitted to FEMA for the issuance of a CLOMR. The performance measures are consistent with the Santa Barbara County IRWM Plan objective of implementing flood control measures, which would be quantified by the number of historic flood events reduced in the future. The performance measures is consistent with the Santa Barbara County IRWM Plan objective of implementing flood control measures, which would be quantified from the reduction in flood damages.

**Figure 6-1: Flow Monitoring Locations Downstream of the UPRR Bridges**



### Improve Public Safety During Storm Events

The project will result in improving public safety during storm events by reducing the number of incidents of bridge blockages during storm events less than the 10-year event, and by reducing the limits of overflows during storm events greater than the 10-year storm event. During storm events, District staff and field crews will monitor calls for complaints of flooding and conduct field observations of the areas. The results of these observations will be logged, mapped and compared to historic data.

Hydrological data and reports will be submitted to FEMA for issuance of a LOMR.

The performance measures are consistent with the Santa Barbara County IRWM Plan objective of implementing flood control measures, which would be quantified from the reduction in flood damages.

### Improve Natural Habitat

The UPRR Bridge Project will improve natural habitat by restructuring the Las Vegas and the San Pedro Creeks. The UPRR Bridge Project - San Pedro Creek component will also improve fish passage for federally endangered steelhead trout. Currently, a grade control structures under the San Pedro UPRR bridge makes the creek impassible to steelhead. Removal of concrete

underneath both bridges, and re-grading the creek to mimic a natural stream bottom will remove barriers to fish passage and will increase habitat.

Preconstruction habitat assessments have been completed. Habitat monitoring will continue after each project phase is complete. The District has written a Mitigation Planting Plan that outlines the implementation, monitoring and reporting for the habitat restoration. The District will plant 0.84 acres of willow woodland, including 30 sycamore, 443 willows and 50 cottonwood. The restoration will provide channel shading for steelhead and adjacent habitat for birds and animals. Approximately 650 linear feet of the riparian corridor along San Pedro Creek will be widened by 10' to provide additional nesting and foraging habitat for wildlife. The UPRR Bridge Project - San Pedro Creek component will also result in the establishment of in-stream wetland habitat. Monitoring of the restoration and in-stream habitat will be done on a regular basis and an annual report will address success criteria that is set to demonstrate habitat health is being met. Success criteria such as percent survival, percent cover, species diversity and tree height will be measured.

Monitoring of vegetation renewal will be visual and photogrammetric. Replacement planting shall be monitored for a period of 5 years (pg 16 of Las Vegas – San Pedro Creeks Capacity Improvements - Final Mitigated Negative Declaration). The site will be visually inspected after the completion of the project during rainy seasons to ensure that the project is not causing excessive erosion or other water quality problems. Mitigation of erosion will be performed by District maintenance crews. Visual inspections of the steelhead trout will also be conducted upstream of the UPRR bridges. Annual reports of visual monitoring results which include project photos, quantification of vegetation growth and progress, problems incurred and actions taken will be submitted to environmental regulatory agencies (pg. 6 of the Central Coast Regional Water Quality Control Board, WQC 401 Certification No. 34212WQ05).

The performance measures is consistent with the Santa Barbara County IRWM Plan objective of protect, restore, and enhance natural processes and habitats, which would be quantified from the amount of habitat increased around each project area.