

2007/2008 Annual Monitoring Report

Arroyo De La Laguna
Alameda County, California

Project Identification

U.S. Army Corps of Engineers File Number: 30262S
California Department of Fish and Game Notification Number: 0600-2006-0272-3
Regional Water Quality Control Board Site No.: 02-01-C0903

Summary

The Arroyo de la Laguna Streambank Project has been monitored for two years since completion in November 2006. The site is geomorphically stable, the features are structurally sound and performing as expected, and vegetation, although struggling due to low water years, is becoming established. 100% ground cover has been established in seeded areas (except when covered by alluvial sediment buildup) and survival rates for planted woody species other than willows is 100%. Survival of the willow stakes installed during construction dropped below 80%, however the survival of additional willows planted in 2007 is very good and volunteer willows can be found throughout the site. Additional replanting of willows is planned for the winter of 2009/2010.

Project Description

The project site is approximately a 1000 foot reach of the Arroyo de la Laguna just north of the Hetch Hetchy Aqueduct. The watershed is approximately 405 square miles and includes the communities of Dublin, Pleasanton, Sunol and Livermore. As indicated by the name, the reach is incised with approximately 30 foot high, near vertical banks. The reach has two sharp bends in an "S" curve.

The overall project goals included:

- Protecting the streambank;
- Stabilizing the streamcourse;
- Reducing erosion; and
- Improving wildlife habitat.

The project was designed to encourage the natural creation of vegetated terraces along the toe of the banks to provide stability for moderate storm events. Further bed movement will be allowed for and the project is not expected to prevent erosion during very large storm events. The project should aid in the formation of edge habitat and eventually create shade that will reduce thermal loading to the stream water.

This demonstration project provides an opportunity to evaluate several cost-effective biotechnical practices for stream bank restoration and habitat enhancement in an urban/rural setting. The bank protection techniques utilized

on this site fall under the NRCS practice Streambank Protection (580) and include:

- Channel Modifications including:
 - Moving thalweg of channel away from banks,
 - Creation of terraces, and
 - Bank shaping and planting
- Vegetated Spur
- Eucalyptus Pin Dikes
- Christmas Tree Revetment
- Rock Barbs with Rootwads
- Critical Area Planting
- Control of Overland Flow and Gully Erosion on Banks

Figure 2 shows the overall project plan and the location of streambank protection practices not including vegetative practices. Figure 3 shows the As-Built Vegetation Plan.

Purpose

This annual Monitoring Report has been compiled for documentation and for submittal to permitting agencies. As required by permitting agencies, this report includes the following:

- Map of photo monitoring sites (Figure 1)
- Photos from photo monitoring sites (Appendix A)
- Comparison of data to previous years (see Monitoring Results)
- Evaluation of geomorphic stability of the Creek channel
- Assessment of progress towards meeting final re-vegetation success criteria in the Monitoring Plan and long-term planting plan.

Monitoring Methods

Alameda County Conservation Partnership staff performed photo-monitoring prior to construction (August 24, 2006), upon completion of construction (December 7 & 8, 2006), at the end of the 2007 rainy season (May 22, 2007) and at the end of the summer (October 1, 2007). In 2008, photo-monitoring was performed at the end of the summer (August 1, 2008), capturing both the effects of winter flows and the dry summer. During these monitoring visits, the staff utilized seven permanent photo-monitoring points.

Site visits were also performed after the largest flow event of the period, with a peak flow of 7,090 cubic feet per second (cfs) on January 7, 2008 and periodically during the year (February 2, 2008 and June 27, 2008). There were

no major storm events that would have triggered an additional required monitoring visit (flow greater than 2-year event or an estimated flow of 3,000 cfs) during the 2007/2008 winter.

All physical features including vegetative features were physically assessed and compared to the “As Built” condition. These inspections document the integrity of the structures, health of the vegetative plantings and effectiveness of the practice based on its intended purpose. Additional photographs were taken to document changes to individual features as necessary. The results of the inspections are summarized below.

Monitoring Results

Photo Monitoring

Figure 1 shows a map of the permanent photo points and directions. The photographs from this monitoring period are included in Appendix A. Each photo is labeled with location point or feature name, purpose of photo, and date. Pre-Project photographs from the photo points are also included for comparison.

Structural Features

For the most part, the structural features (not including vegetative plantings) were stable, had no issues with seating or scour, and require no maintenance. The following exceptions were noted:

- Pipe Outfall near Rock Barb 6 – erosion below pipe has unseated some of the rocks in the rock barb in 2007. Rock barb will still function as designed but measures are being planned to control gulying when funding or volunteer labor is available.
- Downstream Christmas Tree Revetment – the revetment was washed away in the January 2008 storm event (see photos). As the Christmas tree revetments are a temporary practice meant to provide toe protection for a few years until they degrade, we are not planning to replace the revetment.

Vegetation

The “As Built” Vegetation Map (Figure 3) shows the vegetation plantings as of June 2007 including type, number and locations. In addition, over 100 willow stakes were installed in November 2007 to further enhance the site and replace stakes lost during the year. These stakes were installed in Zone 1, mostly along the Rock Barbs and the channel edge.

The terraces (Planting Zone 1) are within the alluvial zone of the creek and have varying rates of vegetative cover and diversity depending on the season and depth of recent sediment deposition. Ground cover varies between 20 and 100%. Disturbed areas seeded for erosion control have achieved some cover (although natives are being out-competed by annual grasses) while the areas near the stream channel are heavily vegetated. A variety of native (mugwort, rushes, sedges, juncus, coyote brush, willow, and cottonwood seedlings, grasses and forbs) and non-native (cocklebur, sweet clover, annual grasses, stinkwort, hemlock, and thistle) vegetation is present. The terraces adjacent to the stream channel are dominated by: cattails, rushes, sedges, cocklebur and sweet clover. Willow stake survival in Zone 1 is over 80%. The new willow stakes installed in November 2007 replaced any willows lost since construction in this zone and natural willows have begun establishing on the terraces closer to the stream.

In Planting Zone 2, California buckeyes achieved 100% survival (18 trees). Buckeyes are being disrupted by rodents due to slight erosion that has allowed a gap to form between the ground and the fence. Willow stakes in Zone 2 and along the toe of the banks have not survived well in most of the project (less than 20%) as many were installed too high on the terraces to survive the drought years. New willow stakes are planned in conjunction with an irrigation system in order to establish willows in Zone 2, especially along the toe of the banks.

Geomorphic Stability

Overall the stream channel through the reach of the project appeared geomorphically stable during the monitoring period. According to USGS Stream Gauge data collected near the project site, the peak flow during this monitoring period was 7,090 cfs, from a storm on January 7, 2008 (see photo). The channel forming, bankfull flow is estimated to be 3,000 cfs and the 25-year design flow is estimated to be 13,000 cfs.

No headcuts or nick points are visible in the channel reach. No evidence of significant incision or aggradation of the channel bed was seen. Some erosion of the terrace toe occurred between Rock Barb 2 and Rock Barb 3 but the erosion has not impacted the bank (see Photo Monitoring Point 3 photo). This erosion occurred during the first winter after construction (2006/07) and did not worsen during the 2007/08 winter, even following the major storm event January 7, 2008.

Sediment build up is evident on the constructed terraces between rock barbs (this is desirable for the project) and on the inside stream curves.

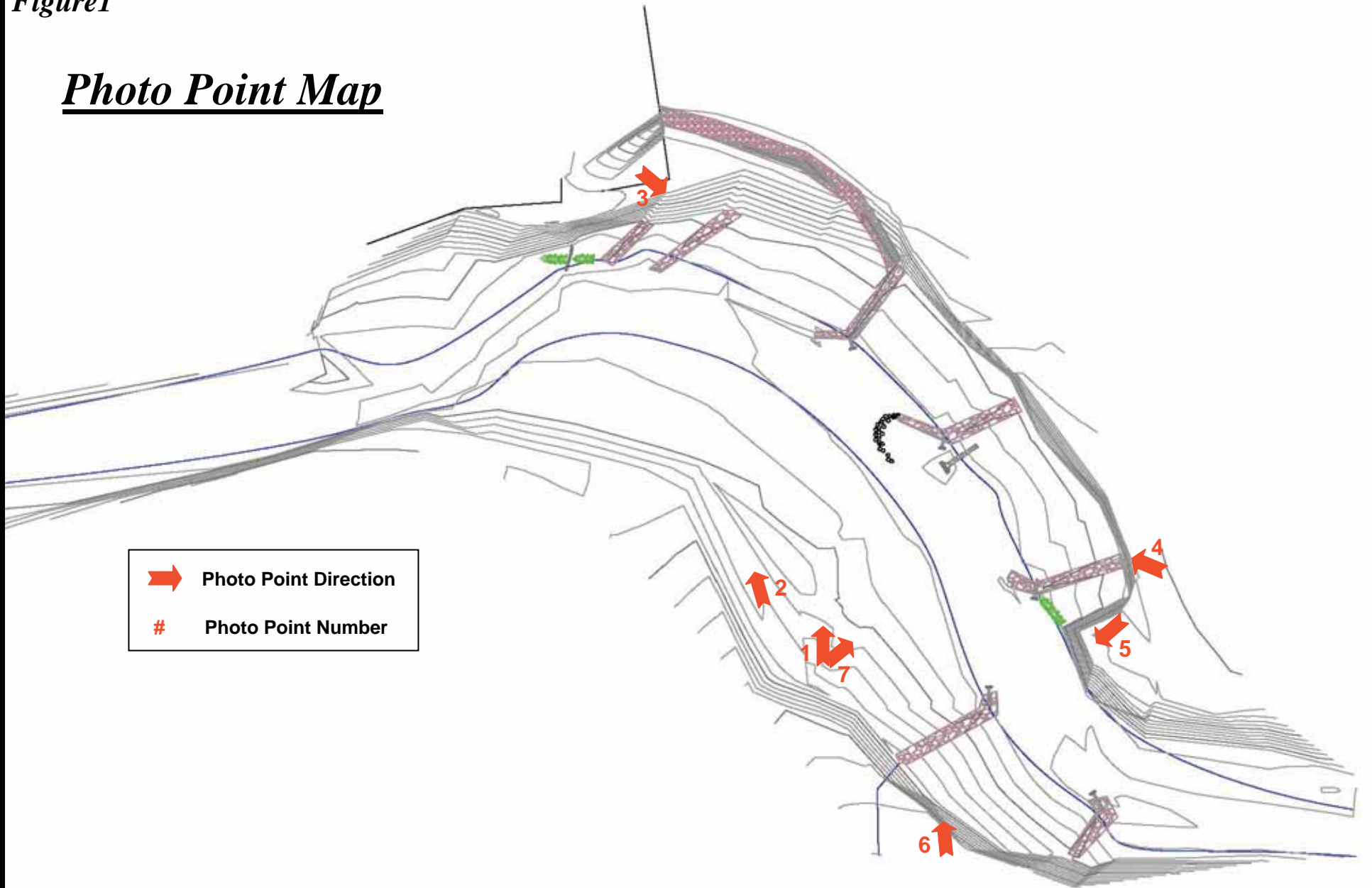
Bank erosion did occur during this monitoring period, chiefly in the form of sloughing of soil from the vertical banks near Rock Barbs 4 and 5. The sloughing occurred following the January 7, 2008 storm flows and the sloughed soil remains on the terrace where it may be stabilized by vegetation before the next large storm. The pattern of flow around the "point" of bank near Rock Barb 5

continued to scour the terrace in this area, as described in the 2006/2007 Annual Monitoring Report. However, a depositional bar also formed in this area during lower flows (see photo). The Christmas tree revetment here, which was a temporary practice and will not be replaced, was swept away during the January 7, 2008 storm. Overall, the erosion appeared to impact less than a foot of soil on the banks and no trees on the tops of the banks were impacted.

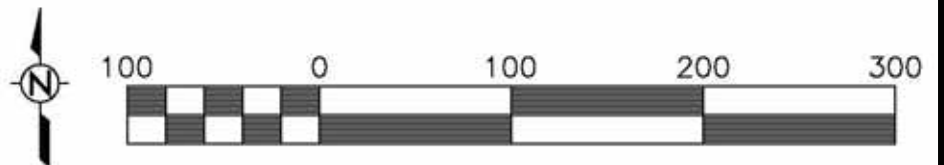
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Figure 1

Photo Point Map



➔ Photo Point Direction
Photo Point Number



Scale 1" = 100'

Figure 2

Overall Project Plan Map

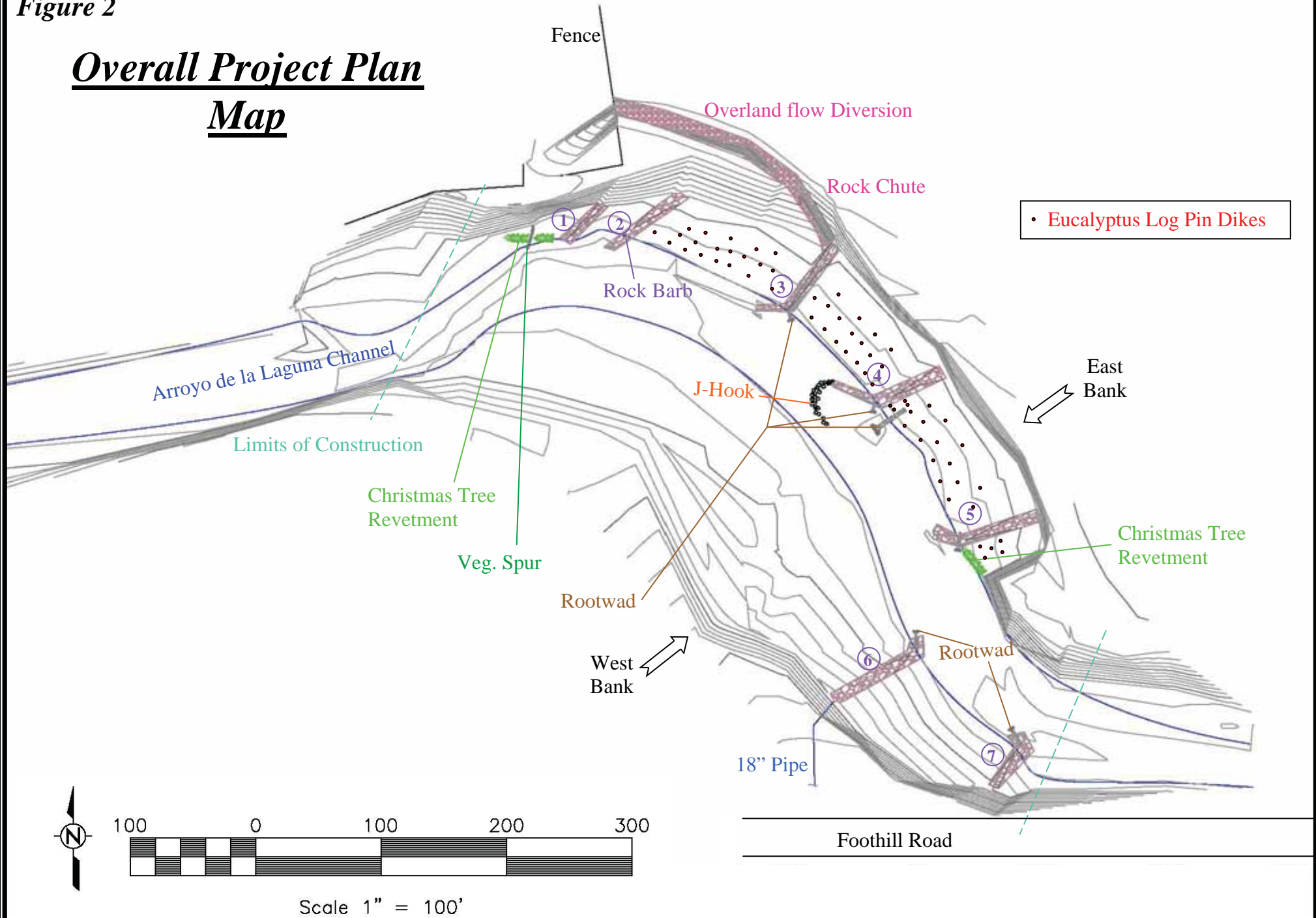
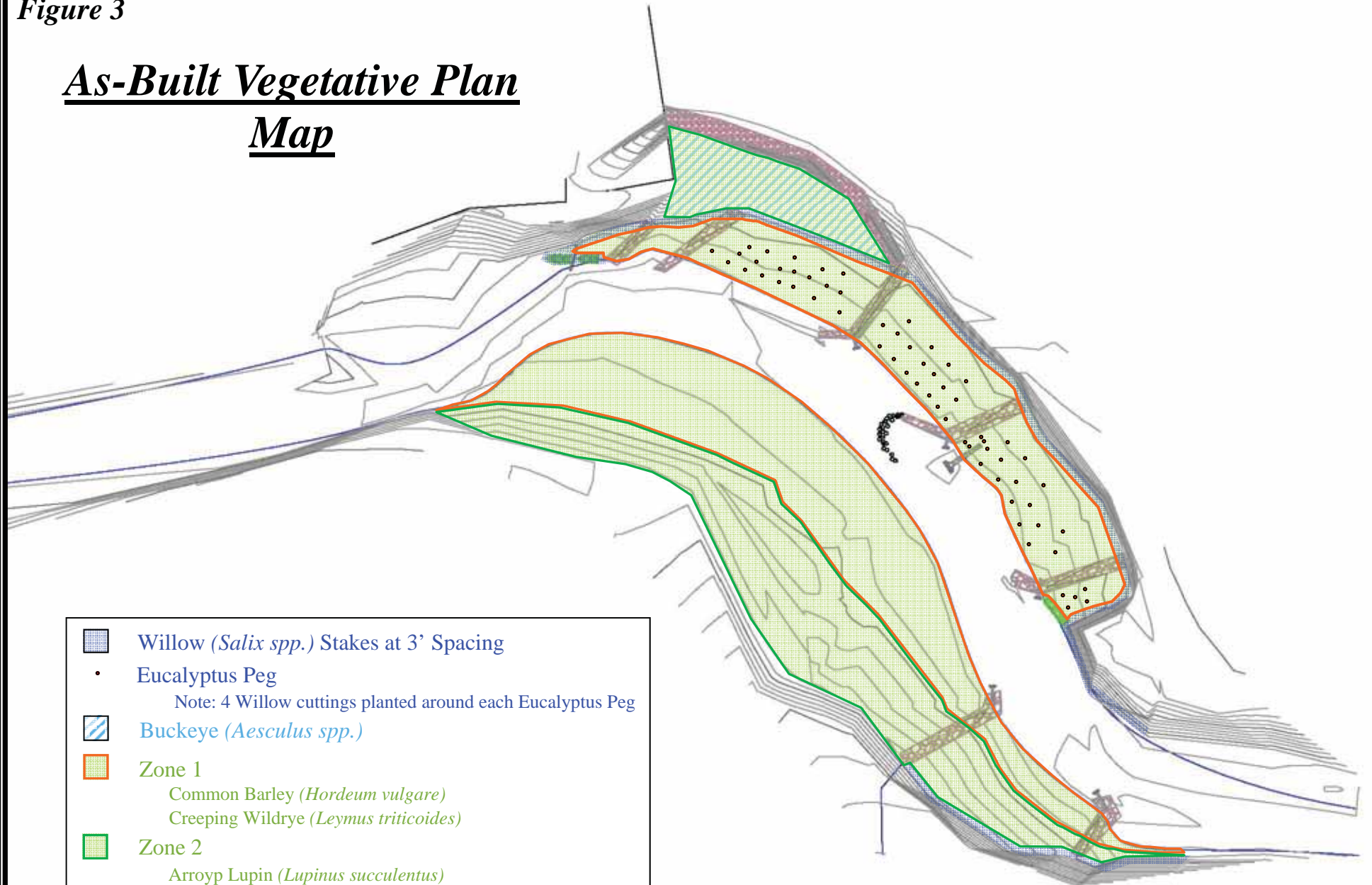
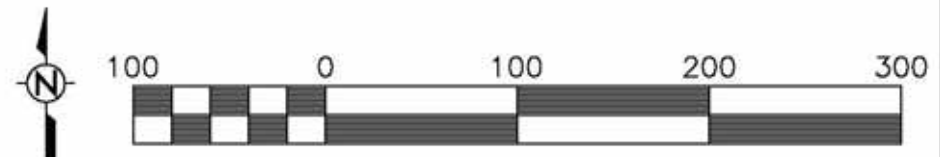


Figure 3

As-Built Vegetative Plan Map



-  Willow (*Salix spp.*) Stakes at 3' Spacing
-  Eucalyptus Peg
Note: 4 Willow cuttings planted around each Eucalyptus Peg
-  Buckeye (*Aesculus spp.*)
-  Zone 1
 - Common Barley (*Hordeum vulgare*)
 - Creeping Wildrye (*Leymus triticoides*)
-  Zone 2
 - Arroyo Lupin (*Lupinus succulentus*)
 - California Brome (*Bromus carinatus*)
 - Common Barley (*Hordeum vulgare*)
 - Creeping Wildrye (*Leymus triticoides*)
 - Hykon Rose Clover (*Trifolium hirtum*)



Scale 1" = 100'

APPENDIX A PHOTOGRAPHS

BEFORE CONSTRUCTION PHOTOGRAPHS: PHOTO-MONITORING POINTS

2007/2008 PHOTOGRAPHS: PHOTO-MONITORING POINTS

2007/2008 PHOTOGRAPHS: STORM EVENT, FEATURES AND VEGETATION



August 2006 Photo Monitoring Point 1



August 2008 Photo Monitoring Point 1



August 2006 Photo Monitoring Point 2



August 2008 Photo Monitoring Point 2



August 2006 Photo Monitoring Point 3



August 2008 Photo Monitoring Point 3



August 2006 Photo Monitoring Point 4



August 2008 Photo Monitoring Point 4



August 2006 Photo Monitoring Point 5



August 2008 Photo Monitoring Point 5



August 2006 Photo Monitoring Point 6



August 2008 Photo Monitoring Point 6



August 2006 Photo Monitoring Point 7



August 2008 Photo Monitoring Point 7



January 2008 - Storm Event 7,090 cubic feet per second peak flow



January 2008 – Post Storm Event Deposition on Terrace



January 2008 – Storm Event – Point and Former Christmas Tree Revetment



August 2008 – Inland pool formed at Barb 5 at former Christmas Tree Revetment Site



May 2008 - California Buckeye plantings



August 2008 – Deposition at Barb 4 and Inland Pool