

2009/2010 Annual Monitoring Report
Arroyo De La Laguna 2006 Streambank Project
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 four years since completion in November 2006. The site is geomorphically stable, the features are structurally sound and performing as expected, and vegetation is becoming established. 95-100% ground cover has been established in seeded areas 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, bringing the overall survival of willows planted to date to 80%. Volunteer willows can be found throughout the site. Additional replanting of willows is planned for the winter of 2010/2011.

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. In 2009, photo-monitoring was performed April 6, 2009. In 2010, photo-monitoring was performed July 14 and 21, 2010. During these monitoring visits, the staff utilized seven permanent photo-monitoring points.

The largest flow events since the last monitoring were provisionally reported peak flows of 6,600 cfs on October 13, 2009 and 7,000 cfs on January 21, 2010.

The site was visited after each of these events. These peak discharge values were later adjusted downwards by USGS and final approved values have not been released. The site was also visited periodically (May 13, August 13 and November 18, 2009 and March 5, April 5, April 15, and June 25, 2010).

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. Exceptions noted in past monitoring reports (e.g. practices that have been covered by sediment deposition or experienced slight movement due to erosion) have not worsened and none are considered to threaten the success of the project. Several soil anchors were loose and will be tightened in Summer 2010.

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. Terraces and other areas seeded for erosion control had 80-100% cover during the monitoring event and the areas near the stream channel were 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, Harding grass, smilo grass, other annual grasses, stinkwort, hemlock, mustard, fennel and thistle) vegetation

is present. Although annual grasses are still prevalent, native grasses and other native species such as creeping wildrye, purple needlegrass and mugwort were relatively much more successful this year than in past years. An inventory of plant species identified at the site in April 2009 is included in Appendix B. The edges of the stream channel are dominated by: willows, 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 (see photo).

In Planting Zone 2, California buckeyes achieved 100% survival (18 trees). Elderberry, coast live oak and buckeye seedlings have begun to grow on the banks, especially where sloughing or grading during the project has decreased the slope. Several non-native tobacco plants are also growing on the banks. 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 provisional USGS Stream Gauge data collected near the project site, the peak flow during this monitoring period was between 4,500 and 7,000 cfs, from storms on October 13, 2009 and January 21, 2010. 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.

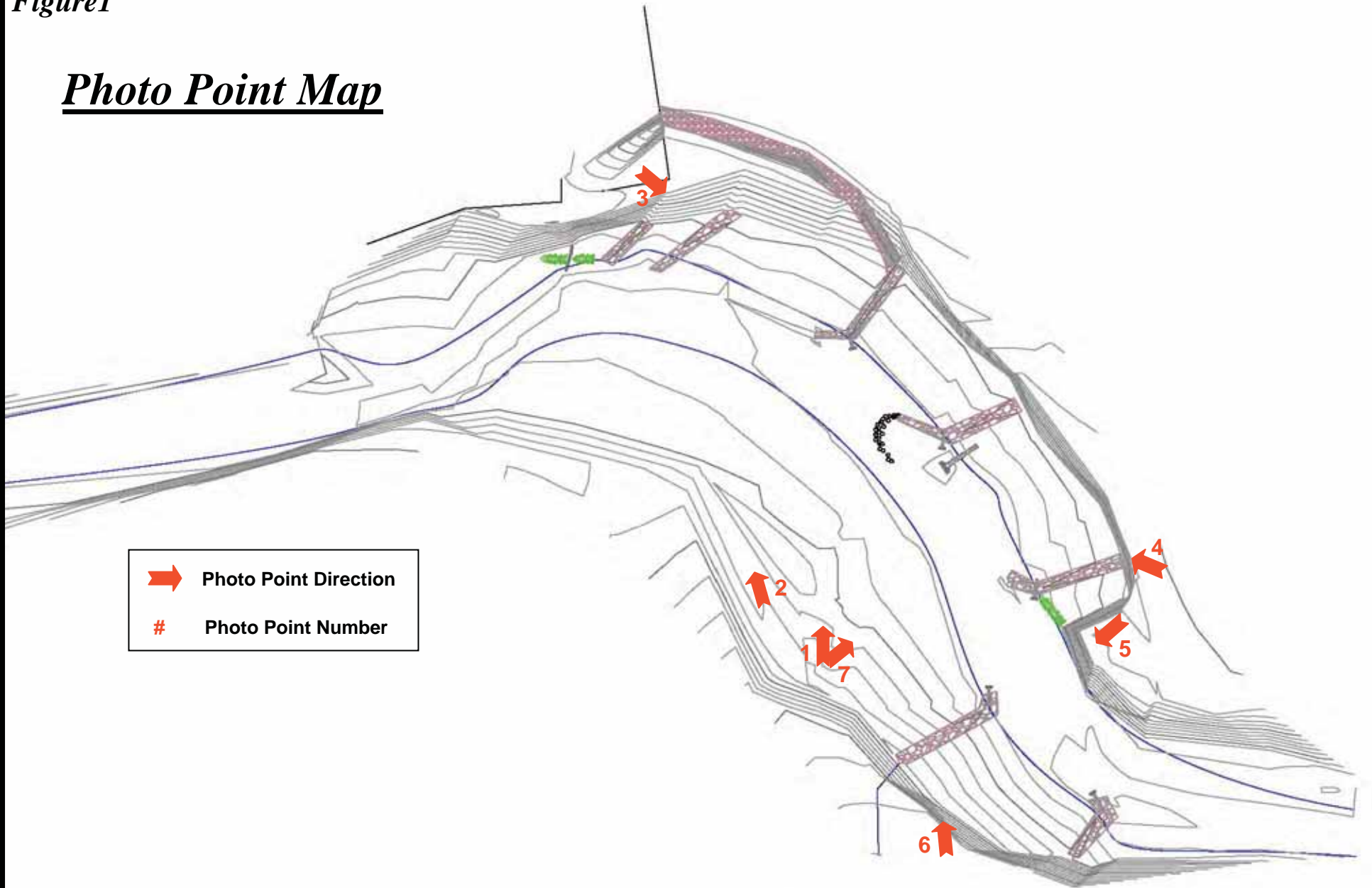
No headcuts or nick points are visible in the channel reach. No evidence of significant incision or aggradation of the channel bed was seen. Some erosion of the terrace toe occurred between Rock Barb 2 and Rock Barb 3 in 2006/2007, but the erosion has not impacted the bank and there has been some recent deposition along the toe of the terrace where the scalloping had occurred. Rootwads, other large woody debris and willow brush spurs will be installed in this area in 2010 in order to provide additional roughness and toe stability as well as aquatic habitat. 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 in the form of bank sloughing during drawdown after storm events. One small buckeye tree was lost from the bank (see photograph). Vegetation has established on the soil sloughed during storm events during previous winters.

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Figure 1

Photo Point Map



-  Photo Point Direction
-  Photo Point Number

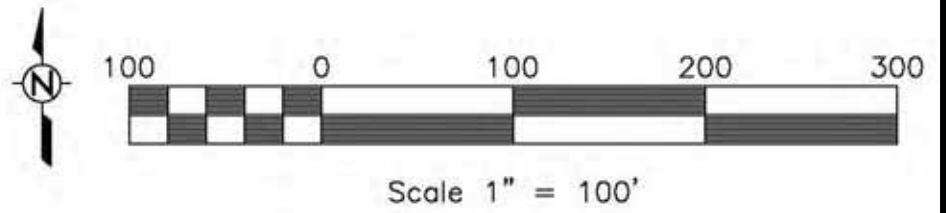


Figure 2

Overall Project Plan Map

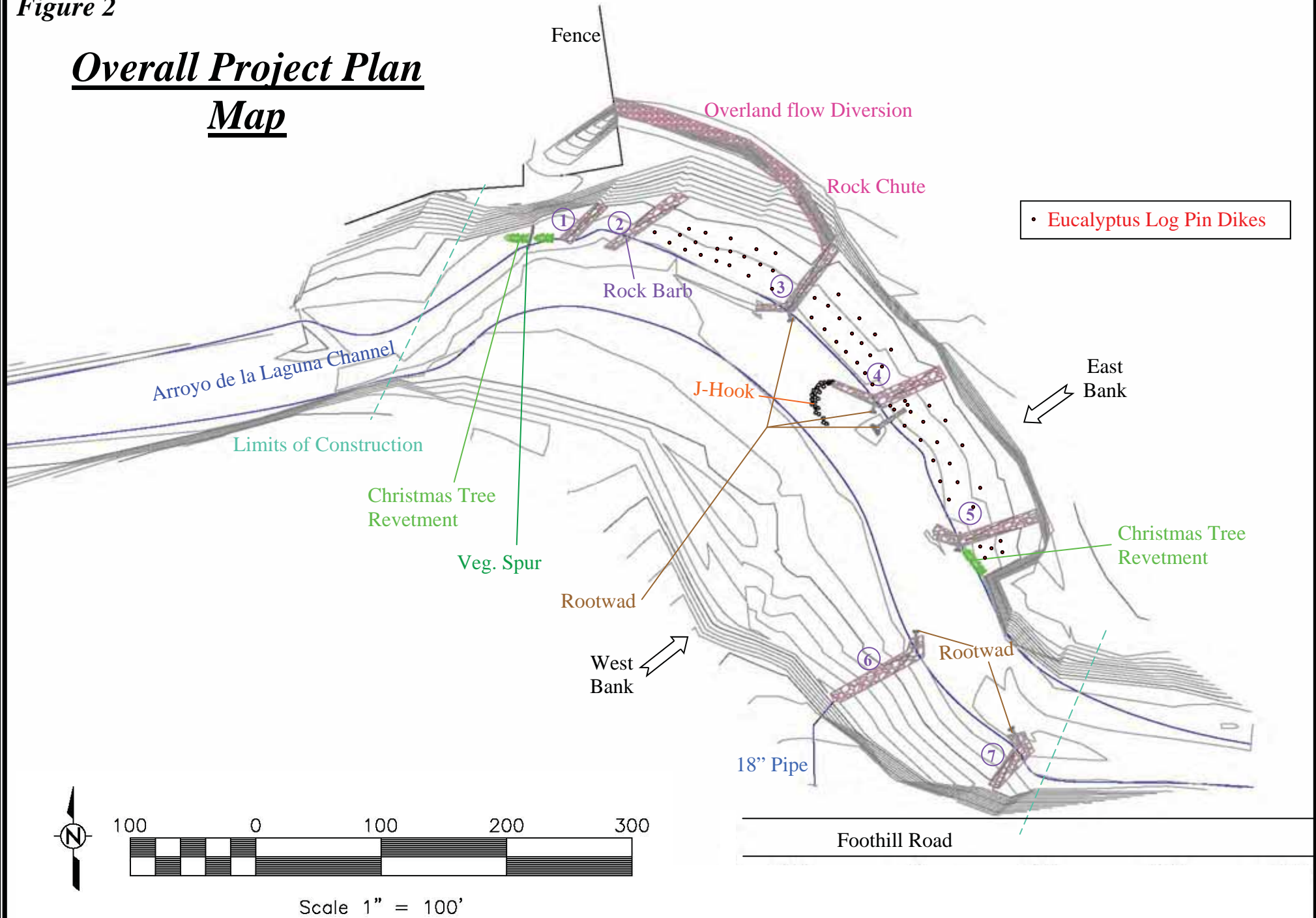
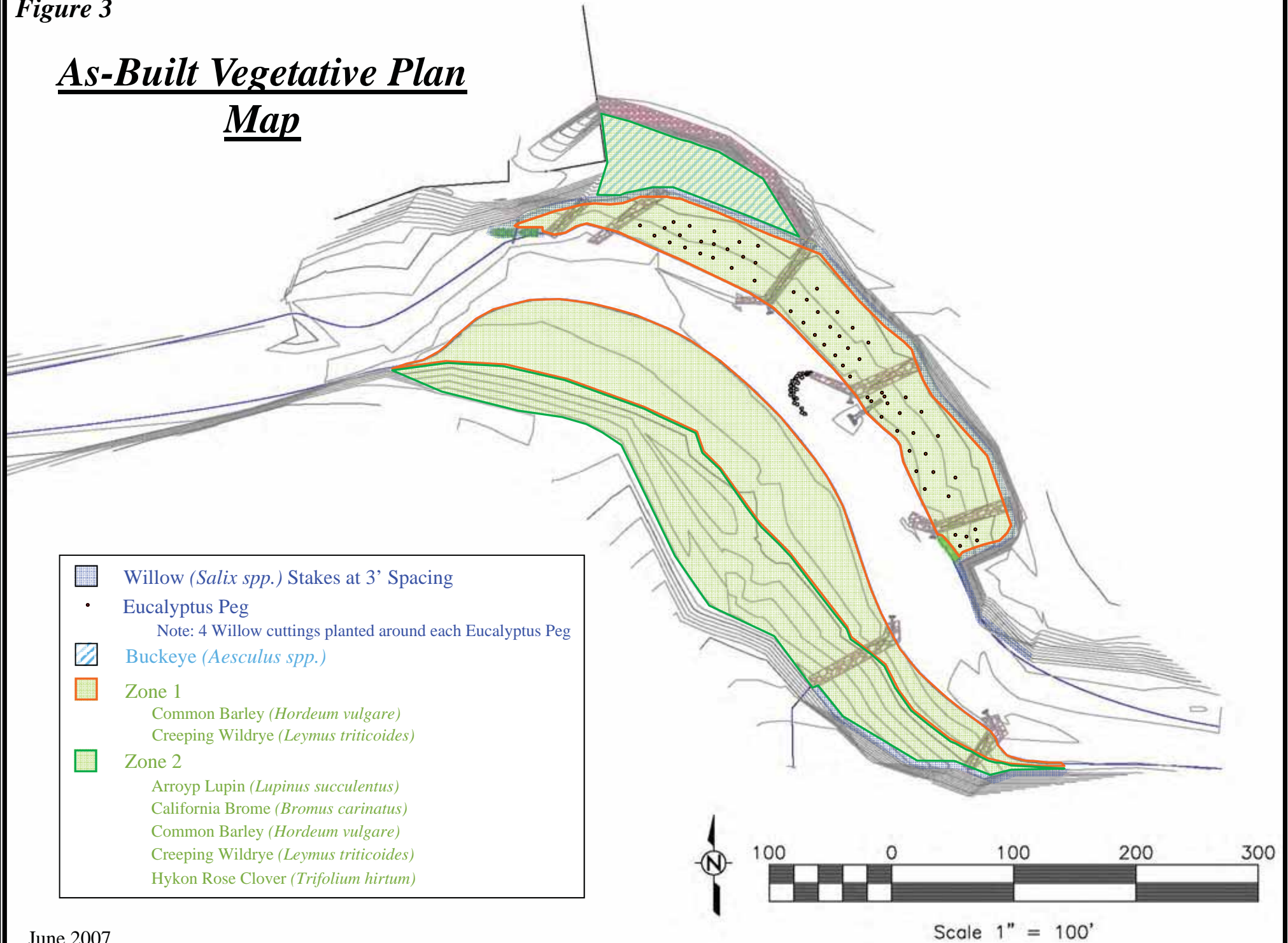


Figure 3

As-Built Vegetative Plan Map



APPENDIX A PHOTOGRAPHS

BEFORE CONSTRUCTION PHOTOGRAPHS: PHOTO-MONITORING POINTS

2009/2010 PHOTOGRAPHS: PHOTO-MONITORING POINTS

2009/2010 PHOTOGRAPHS: FEATURES, STORM EVENTS AND VEGETATION

2009/2010 PHOTOGRAPHS: STORM EVENTS



August 2006 Photo Monitoring Point 1



July 2010 Photo Monitoring Point 1



August 2006 Photo Monitoring Point 2



July 2010 Photo Monitoring Point 2



August 2006 Photo Monitoring Point 3



July 2010 Photo Monitoring Point 3



August 2006 Photo Monitoring Point 4



July 2010 Photo Monitoring Point 4



August 2006 Photo Monitoring Point 5



July 2010 Photo Monitoring Point 5



August 2006 Photo Monitoring Point 6



July 2010 Photo Monitoring Point 6



August 2006 Photo Monitoring Point 7



July 2010 Photo Monitoring Point 7



October 2009: Site After 10-13-2009 Storm Event (provisionally 6,600 cfs, later lowered)



January 2010: Site After 1-21-2009 Storm Event (provisionally 7,000 cfs, later lowered)



March 2010 – Vegetation Growth (left: elderberry, right: buckeye, background aquatic vegetation)



July 2010 – Willow Growth and Large Wood Recruitment Near Willow Brush Spur



July 2010 – Small buckeye (roots shown) lost from top of bank due to sloughing



2009-2010 Aerial – Shows areas of deposition and formation of pools and riffles