



## **Plowright Property Watercourse Restoration and Monitoring Plan**

**April 29, 2011**

### **Introduction**

A Cleanup and Abatement Order (CAO) #R1-2011-0014 was issued by the California Regional Water Quality Control Board on January 18, 2011 for watercourse discharges at property owned by Patricia Plowright located at 3500 Little Mill Creek Road, near Booneville, California. The CAO and various agency reports detail conditions of Little Mill Creek resulting from grading and bulldozing activities on the property. The grading and bulldozing activities were determined to have resulted in a discharge and threatened discharge of sediment to waters of the Navarro River Watershed.

The CAO requires that all activities that are causing or threatening to cause the discharge of sediment to Little Mill Creek or any other waters of the State or United States cease and that a watercourse restoration plan that addresses the following be prepared:

- The removal and stabilization of excess earthen fill materials and woody debris;
- A plan for restoration of the stream segments impacted with sediment and woody debris;
- A monitoring plan for all restored areas that evaluates the restoration to determine the success of the restoration plantings and sediment remediation efforts

This plan is intended to satisfy the requirements of the CAO.

### **Restoration Work Plan**

As required by the CAO, the following restoration actions shall be conducted prior to October 15<sup>th</sup> 2011. These activities will require the approval of a California Department of Fish and Game 1600 series permit prior to operations.

#### Site #1

This site is at an existing 48" culvert crossing of Little Mill Creek, a Class I watercourse at this point. Previous agency inspection reports indicate that this is the location where a Caterpillar tractor had been stuck in the watercourse. As of the date of the site inspection conducted in association with the preparation of this plan (3/8/11) the tractor had been removed and several remediation actions had been conducted. Perched material below the culvert outlet had been pulled back and the exposed soils were mulched with straw. Straw wattles had also been placed parallel to the slope at the outlet of the pipe and willow sprigs had been planted adjacent to the stream. In addition, horse tail and grasses were sprouting helping to stabilize the site. It appears

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as if a majority of the sediment noted in previous agency reports had been removed from this site or had been flushed downstream as the channel bottom consisted of gravel and cobble with only minor to moderate amounts of stored sediment.

There are several additional activities that shall be conducted at this site to prevent further sediment delivery as follows:

- Perched fill at the pipe outlet shall be sloped back and the exposed soil shall be rock armored for 15' on either side of the pipe from the road surface to the culvert outlet. (See Photo #1 below.)
- Approximately 1-2 yards of loose sediment located on the west bank of the creek at the pipe outlet shall be removed by hand while protecting the planted willow. (See Photo #2 below.)
- The road surface shall be rocked for 50' on both sides of the pipe to prevent sediment runoff.
- A small amount of sediment perched above the pipe inlet shall be pulled back and stabilized. (See Photo #3 below.)
- The fill piled to the west of the pipe inlet shall be spread along the hillside below the driveway. This material shall be compacted and seeded and mulched to prevent runoff to the watercourse. (See Photo #4 below.)

Although the existing pipe is slightly undersized for a 100 year flood flow and the pipe alignment currently diverts water into the east bank of the watercourse, this bank has remained stable, the pipe is in good condition and it does not appear that it has been overtopped due to its size. Therefore, it would not be appropriate to replace or realign this functioning pipe at this time.

#### Site #2

Site #2 shall be considered the entire driveway/access road between Site #1 and Site #3. This road is poorly drained and runoff is concentrated and is directed to the low spots at Site #1 and Site #3. Rolling dips shall be created along the length of this road segment where appropriate, dispersing the flow of water and directing runoff into vegetated areas. These dips shall be placed a minimum of every 50' where slopes exceed 10%.

#### Site #3

An existing pipe on Little Mill Creek, which is a Class II at this location, is undersized, rusted out and shotgunned. (See Photos 5-7 below.) The existing pipe shall be removed and replaced with a 54" pipe. The new pipe shall be installed to grade and have rock rip rap installed at both the inlet and outlet to protect fill and act as an energy dissipater. There is stored sediment currently located at the pipe inlet causing the stream to be diverted to the northeast into the road fill. This sediment shall be removed during the installation of the new pipe and the pipe shall be placed in line with the stream.

There is a significant amount of loose soil located on the road surface and adjacent to the road at this location. This soil shall be removed and placed in a stable location away from the watercourse (see site #7 for potential storage location). The road surface shall then be rocked for

100' to the south of the crossing and 50' to the north. The road shall also be outsloped and/or dipped to ensure drainage does not collect on the road above the crossing.

Site #4

Between sites #3 and #5 there has been loose fill material pushed up adjacent to the watercourse from grading activities on a parking area below the house. In addition, a significant amount of vegetation has been cut and placed into the watercourse at this location. With the exception of the larger 20"+ diameter logs spanning the creek or logs imbedded in the creek that are acting to meter sediment or are creating habitat, the vegetative matter shall be removed from the stream channel and shall be chipped and spread on the recently graded parking area.

The perched fill material adjacent to the watercourse shall be pulled back to no greater than 2:1 slope and the fill material shall be spread on the parking area and compacted or placed in a stable location away from the watercourse (see site #7 for potential storage location). Where the fill material is pulled back and the stream banks are exposed, native plant species such as Tan Oak, Redwood, Douglas fir, huckleberry or sword fern shall be planted to stabilize the soil and provide future shade and nutrients for the watercourse. Where possible, new plantings shall be obtained from on site sources. There shall be a minimum of one planting for every 10 square feet of exposed soil. All exposed soil between plantings shall be mulched.

In addition, there is scattered residential debris in this area. All debris that has the potential to enter the watercourse, and particularly any debris containing fuel, solvents, petroleum products or any other substance which could be hazardous to aquatic life shall be removed and placed in an area away from the watercourse where there is no potential for delivery.

Site #5

At this location a short, improperly installed 50" diameter pipe is in place. (See Photos 8-10 below.) The pipe is located at the confluence of two watercourses and perched eroding fill material is present at both the inlet and outlet of the pipe. A significant amount of fill material has also been deposited in the western fork of the watercourse and is currently diverting the flow of this watercourse. The existing pipe shall be removed and all perched fill and residential debris shall be removed from the channel. The side slopes of the watercourse shall be pulled back to no greater than a 2:1 slope and shall be stabilized. The removed fill material shall be spread on the parking area and compacted or placed in a stable location away from the watercourse (see site #7 for potential storage location). The western fork of the watercourse shall be returned to its original channel configuration and grade. Should the landowner desire a crossing at this location, a properly aligned 54" pipe with 45 degree elbow on the outlet or a rocked ford crossing shall be installed.

Site #6

At this location a small Class III drainage is being diverted by the existing truck road. An inside ditch shall be installed to capture drainage from this watercourse and shall direct the water to the Class II below, near an existing 6" redwood tree. (See Photo 10 below.) All perched fill material shall be removed from where the inside ditch will direct water into the Class II watercourse and the outlet of the ditch shall be stabilized with rock rip rap.

Site #7

This is an existing landing located away from all watercourses that would be a suitable site to deposit removed fill material and vegetative matter. All fill material deposited in this location shall be compacted, shaped and evenly drained.

Following use of the road accessing this site it should be properly drained by installing waterbars or rolling dips and should have any outside berms removed where possible.

Site #8

This is an existing 18” pipe on a Class III watercourse that is shotgunned at the outlet and has become plugged at the inlet. The inlet shall be cleaned and a downspout shall be installed at the outlet.

**Restoration Plan Mitigations**

Backhoes, excavators, front end loaders, graders and/or crawler tractors shall be utilized to perform the restoration activities described in this plan. The restoration activities proposed will entail modifications to the bed, bank and channel of several watercourses and will therefore require a California Department of Fish and Game Lake and Streambed Alteration Agreement (LSAA) prior to operations. In addition to any mitigation measures that may be required by the LSAA, all operations conducted under this restoration plan shall be conducted to the following standards:

- Work within the stream/riparian corridor shall be restricted to the period of June 15 to October 15 of each year.
- If operations cannot be completed by October 15<sup>th</sup>, 2011 an extension shall be requested in writing to the California Regional Water Quality Control Board as described in the CAO.
- No phase of the project may be started if that phase cannot be completed prior to the onset of a storm event. Seventy-two-hour weather forecasts from the National Weather Service shall be consulted prior to start up of any phase of the project.
- Refueling of construction equipment and vehicles may not occur within 300 feet of any water body, or anywhere that spilled fuel could drain to a water body. Tarps or a similar material shall be placed underneath the construction equipment and vehicles, when refueling, to capture incidental spillage of fuels. Equipment and vehicles operated in the project area shall be checked and maintained daily to prevent leaks of fuels, lubricants or other liquids.
- No equipment shall be operated in a wetted stream channel. Vehicles will not be driven or equipment operated in water covered portions of the stream, or where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed, except as otherwise provided for in the plan. Should water be present during operations, a temporary check dam constructed of sand bags or other similar items shall be placed upstream of the operations area and water shall be pumped around the construction site.
- Erosion control measures such as silt fencing, hay bales and straw wattles, shall be utilized throughout all phases of operation where sediment runoff from exposed

- slopes threatens to enter waters of the State. At no time shall silt laden runoff be allowed to enter the stream or directed to where it may enter the stream.
- Building materials and/or construction equipment shall not be stockpiled or stored where they could be washed into the water or where they will cover aquatic or riparian vegetation.
  - The contractor shall not dump any litter or construction debris within the riparian/stream zone. All such debris and waste shall be picked up daily and properly disposed of at an appropriate site.
  - All work shall be overseen by a qualified professional with expertise in streambank stabilization work.

### **Monitoring Plan**

Truck road drainage, rock structures & culvert crossings:

The rock structures and culvert crossings proposed have been designed to withstand 100 year flood flows. A qualified professional shall monitor the site for a period of 5 years following installation to ensure the structures are functioning properly. Monitoring visits shall occur a minimum of three times per year with two of the visits occurring in the winter period (between November 15<sup>th</sup> – April 1<sup>st</sup>). During the first year following operations, monitoring visits shall also be conducted following each rain event greater than 1 inch of rainfall in any 48 hour period. The survey visits shall be to determine the effectiveness of the structures and if any new sediment discharges have developed. If the structures show any sign of erosion or if any new sites have developed, the property owners shall be responsible for repairing or installing new structures prior to the next winter period. If the road drainage structures, rock rip rap and crossings do not show any sign of erosion after a period of 5 years, the project shall be determined to have met the stated performance standards and shall be deemed complete.

Vegetation plantings:

The restoration activities described above include proposed vegetation plantings as well as plantings that have already occurred at Site #1. To ensure a successful revegetation/stabilization effort, plantings shall be monitored and maintained (including irrigation if necessary) for five years. All tree and shrub plantings shall have a minimum of 85% success of thriving growth at the end of five years with a minimum of two consecutive years (2 growing seasons) of monitoring after the removal of irrigation. In the fall of each year beginning with initial plantings, a qualified professional shall monitor the survival of the plants installed in each planting area and prepare a status report. During each inspection any non-native weed species growing within the planting area shall be removed. Browse protectors shall be maintained on all plants.

If the survival in any area is below the 85% survival requirement, a qualified professional shall determine the number of individual plants by species per planting area that will need to be replanted to meet the replacement planting requirements. A qualified professional shall determine if any species and size substitutions are desirable. The Applicant is responsible for replacement planting, additional watering, weeding, invasive exotic eradication, or any other practice to achieve these goals. Replacement plants shall be monitored with the same survival success for an additional five years from the year of installation. If the plantings have an 85%

survival success after five years, the project shall be determined to have met the stated performance standards and shall be deemed complete.

**Reporting**

A monitoring report covering both the drainage structures and vegetation plantings shall be completed and submitted to the California Regional Water Quality Control Board by December 31<sup>st</sup> of each year for a period of 5 years. The report shall include photos and state the current conditions of both the drainage structures and plant survival and shall include any repairs, corrective actions or additional plantings required or completed. During the first year following operations, reports shall be filed following each monitoring visit.

Respectfully submitted,



Jeff Longcrier  
North Coast Resource Management



Estelle Clifton  
North Coast Resource Management

**Photos**



**Photo 1** shows the outlet of the 48" culvert crossing of Mill Creek and the restoration activities that have already taken place. The slumping fill at the outlet shall be pulled back and rock armored. (See Site #1 description above)



**Photo 2** shows the 1-2 yards of loose sediment on the west bank of the stream at the pipe outlet to be removed by hand. The photo also shows the willow plantings in place. (See Site #1 description above)



**Photo 3** shows the small amount of sediment perched above the pipe inlet to be pulled at Site #1. (See Site #1 description above)



**Photo 4** shows the fill piled to the west of the pipe inlet at Site #1. This material shall be spread along the hillside, then shall be compacted and seeded. (See Site #1 description above)



**Photo 5** shows the inlet of the undersized culvert at Site #3.



**Photo 6** shows the outlet of the undersized culvert at Site #3.



**Photo 7** shows the road above the undersized culvert at Site #3. The undersized pipe shall be removed and replaced with a properly installed 54" pipe. The loose soil on the road above the pipe shall be removed and the road surface shall be rocked. (See Site #3 description above)



**Photo 8** shows the inlet of the 50" culvert and diverted watercourse at Site #5.



**Photo 9** shows the outlet of the 50" culvert at Site #5.



**Photo 10** shows the road above the 50" culvert at Site #5. The short, improperly installed pipe shall be removed. The fill material and residential debris to be removed from the western fork can be seen in Photo 8. The Class III watercourse referenced in the Site #6 description above shall be directed down an inside ditch to be created along the left hand side of the road shown in Photo 10. The 6" redwood referenced can be seen on the left of Photo 10. (See Site #5 & #6 description above)



**Photo 11** shows the parking area with perched fill, residential debris and vegetation at Site #4. The perched fill, debris and vegetation shall be removed. Vegetation planting shall occur on exposed soils in this area. (See Site #4 description above.)



**Photo 12** shows the parking area with perched fill, residential debris and vegetation at Site #4. The perched fill, debris and vegetation shall be removed. Vegetation planting shall occur on exposed soils in this area. (See Site #4 description above.)

# Determination of 100-Year Flood Flow

**Location: Plowright**

*(Enter data in fields with red-colored headings. Other data fields will be calculated automatically.,*

## Magnitude and Frequency Method for 100-year flood flow

No.	Crossing	Area (acres) A	Basin maximum elevation (ft)	Crossing elevation (ft)	Area (mi <sup>2</sup> ) A	Precipitation (in/yr) P	Elevation (ft/1000) H	100-yr flood flow Q <sub>100</sub> (cfs)			
								North Coast <sup>(1)</sup> (NC)	Sierra <sup>(2)</sup> (S)	North-east <sup>(3)</sup> (NE)	Central Coast <sup>(4)</sup> (CC)
1	<b>3</b>	135	1360	570	0.211	40	0.965	<b>85.4</b>	<b>207.1</b>	<b>49.9</b>	<b>112.3</b>
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3											
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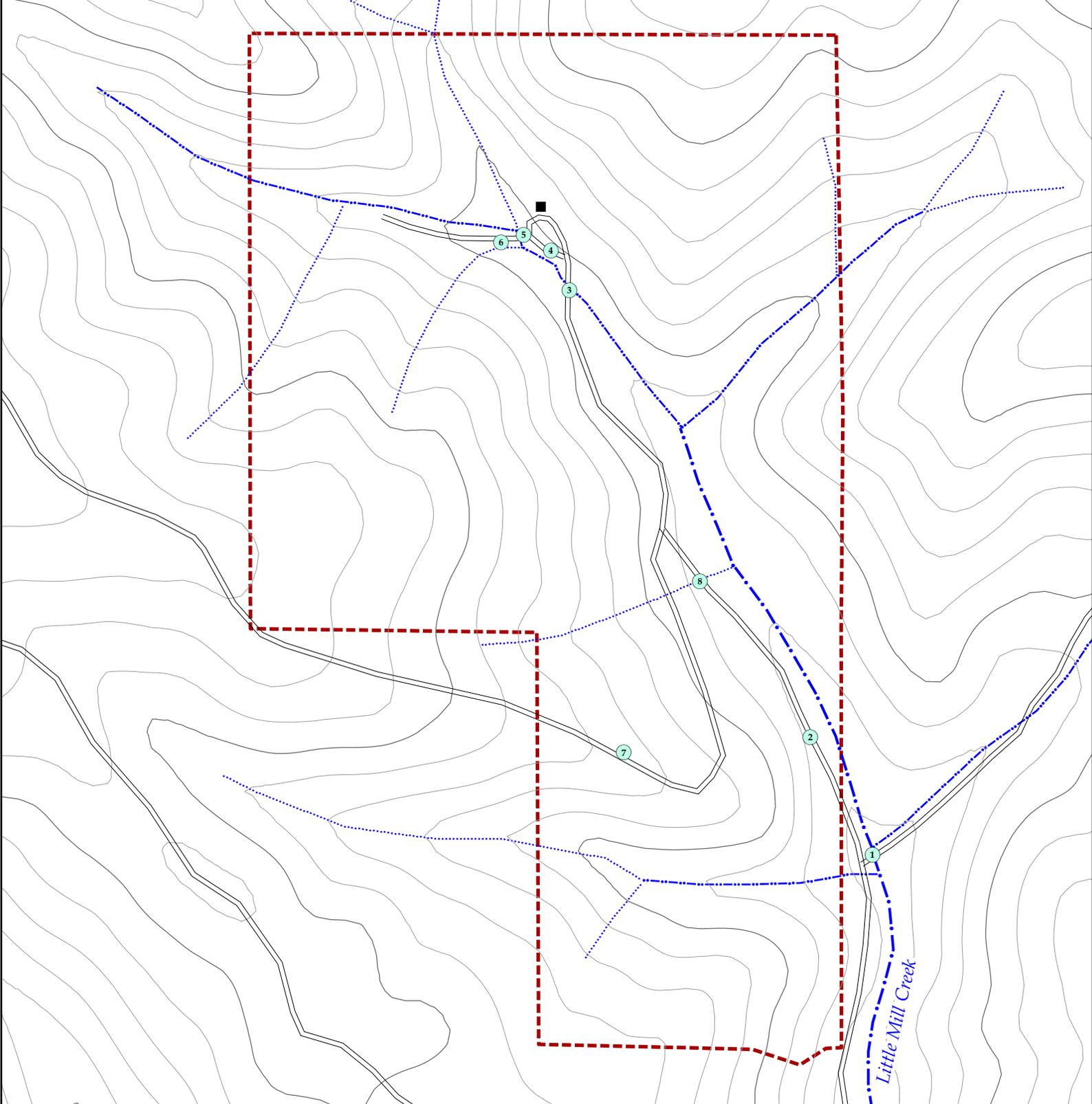
**Culvert Size:**  
54" dia

*See below for M&F equations*

## Rational Method for 100-year flood flow

No.	Crossing	$T_c = 60((11.9 \times L^3)/H)^{0.385}$			$Q_{100} = CIA$				Magnitude & Frequency Q <sub>100</sub> equations
		Channel length (to top of basin) (mi) L	Elevation difference (ft) H	Concentration time (min) T <sub>c</sub>	Runoff coefficient C	Precipitation (in/hr) I	Area (acres) A	100-yr flood flow (cfs) Q <sub>100</sub>	
1	<b>3</b>	0.6	790	7	0.3	2	135	<b>81.0</b>	<b>NC</b> (1) $Q_{100} = 9.23 (A)^{0.87} (P)^{0.97}$ <b>S</b> (2) $Q_{100} = 15.7 (A)^{0.77} (P)^{1.02} (H)^{-0.43}$ <b>NE</b> (3) $Q_{100} = 125 (A)^{0.59}$ <b>CC</b> (4) $Q_{100} = 19.7 (A)^{0.88} (P)^{0.84} (H)^{-0.33}$
2									
3									
4									
5									
6									
7									
8									
9									
10									

*Template prepared by:*  
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June 14, 2001



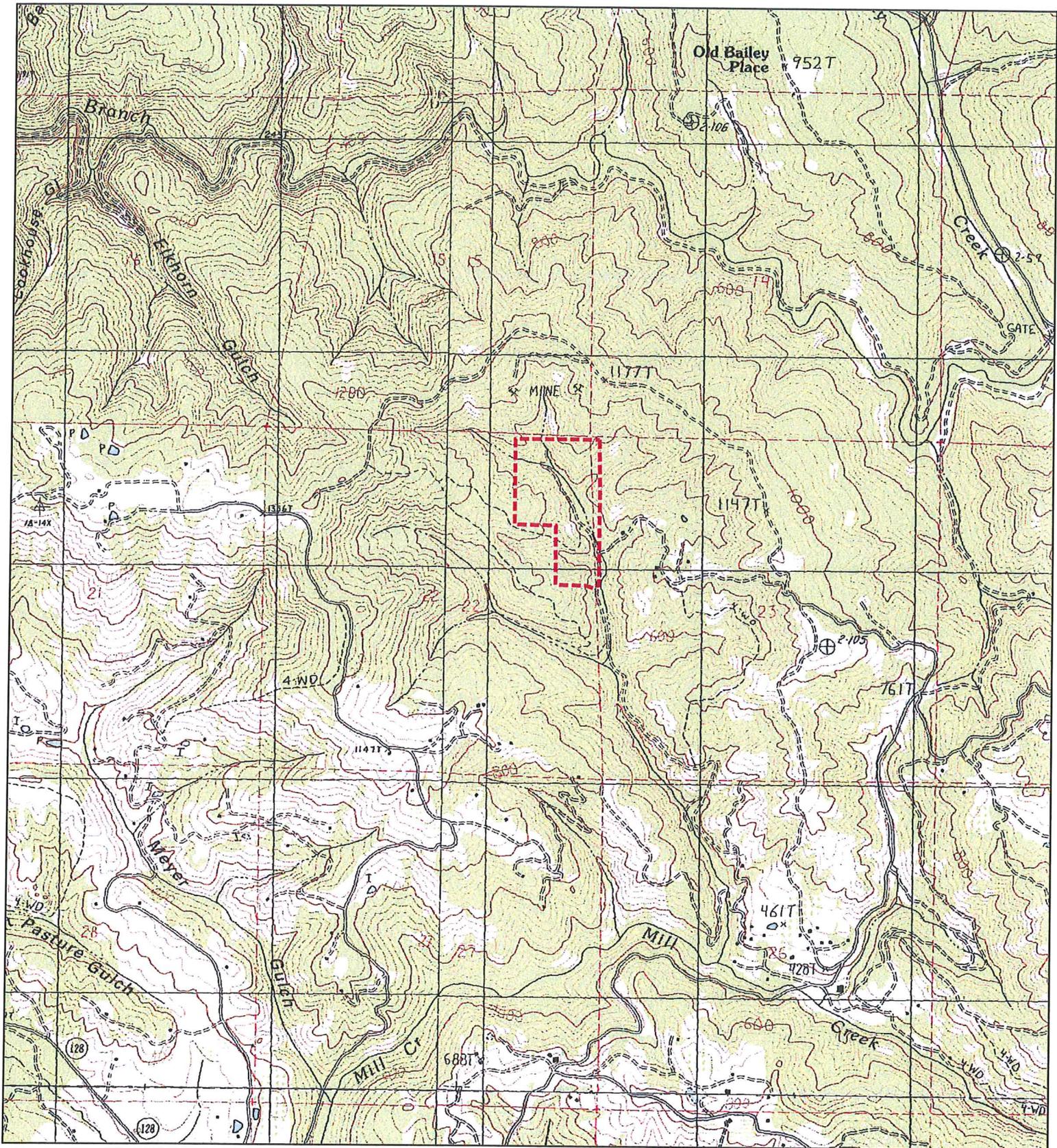
**Plowright Property  
Watercourse Restoration Map**

March 16, 2011

- Property Boundary: 
- Road: 
- Restoration Site: 
- Class I Watercourse: 
- Class II Watercourse: 
- Class III Watercourse: 
- House: 

Scale 1:3,600  
1" = 300 feet





**Plowright Property  
Vicinity Map**

March 16, 2011

Property Boundary: 

Scale 1:24,000  
1" = 2,000 feet

