

**APPENDIX A**  
**EROSION CONTROL**  
**AND RESTORATION PLAN**

**For Disturbed Areas of the  
Proposed Lakeville-Sonoma 115 kV Transmission Line Project**

Sonoma County, California

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## TABLE OF CONTENTS

1.0	INTRODUCTION .....	1
2.0	RECOMMENDED EROSION CONTROL MEASURES.....	2
2.1	Specific Erosion Control Measures .....	3
2.2	Erosion Control within Land Cover/Land Use Zones .....	10
3.0	REVEGETATION PROCEDURES .....	12
3.1	Role of Natural Revegetation.....	13
3.2	Seed Mixes and Seeding Method .....	13
3.3	Sterile Grass Nurse Crop .....	16
3.4	Acorn Collection and Planting .....	16
3.5	Planting of Other Trees .....	17
4.0	NOXIOUS WEEDS <u>AND CONTROL METHODS</u> .....	17
5.0	PERFORMANCE STANDARDS, MONITORING AND REMEDIAL MEASURES .....	23
5.1	Revegetation .....	23
5.2	Erosion and Sediment Control .....	24
5.3	Invasive noxious weeds.....	24
6.0	REFERENCES .....	25

### LIST OF TABLES

Table A-1	Seed Mix A: Recommended for Ungrazed Areas that are Primarily Used for Wildlife Habitat. ....	14
Table A-2	Seed Mix B: Recommended for Grasslands that are Used Mainly for Livestock Grazing and are Dominated by Non-Native Grasses.....	15
Table A-3	Noxious Weeds Found within the Lakeville-Sonoma Transmission Upgrade Project Area....	19

### LIST OF FIGURES

Figure A-1	Installation of Soil Stabilization Blankets .....	5
Figure A-2	Installation of Straw Bale Barriers.....	7
Figure A-3	Installation of Straw Wattles .....	8
Figure A-4	Installation of Silt Fencing.....	9

### LIST OF ATTACHMENTS

Attachment A-1: Representative Photographs

## I.0 INTRODUCTION

This plan provides recommendations for erosion control and restoration for the Lakeville-Sonoma 115 kV Transmission Line Project. The project's design and construction details are described in Chapter 2 and Appendix I of the Proponent's Environmental Assessment (PEA). Activities associated with installation or use of the following project components will result in the need for erosion control and/or restoration in some locations:

- construction of substation improvements;
- construction of new access roads and improvement of existing roads;
- installation of stream crossing structures on access roads;
- vegetation clearing and grading of landing zones, staging areas, and conductor pull sites;
- operation of project vehicles, helicopters, and heavy equipment;
- installation of new transmission poles and removal of existing poles; and
- installation of new conductors.

The recommendations of this erosion control and restoration plan are based on field reconnaissance of all sites where ground disturbance is expected to occur as a result of project activities.

The goals of the erosion control and restoration plan are to:

- control soil erosion and reduce sedimentation;
- minimize adverse impacts from erosion and sedimentation to sensitive biological resources, including special-status plants and animals, streams and other high-value wetlands and native vegetation;
- minimize impacts from erosion and sedimentation to non-native grasslands and pasturelands;
- control locally established weed species to pre-project levels and prevent the establishment of new weed species;
- promote the natural re-establishment of native vegetation and non-native grasslands; and
- restore pasturelands to pre-project productivity.

Erosion control and revegetation measures are recommended to reduce erosion along permanent roads, to restore selected temporary roads, and to protect streams, special-status plants, vernal pools, wetlands, and riparian habitat from the potential adverse effects of increased erosion and sedimentation. The majority of construction-related disturbances will occur on non-native grasslands, which are expected to revegetate naturally. Performance standards, monitoring and remedial measures are included in this plan.

## **2.0 RECOMMENDED EROSION CONTROL MEASURES**

The following general recommendations (ABAG 1995, Goldman et al. 1986, Goldman et al. 2002) are applicable to the proposed project, and, where practicable, have been incorporated into the project design:

- minimize the size of cleared areas;
- retain existing vegetation wherever feasible;
- locate facilities away from biologically important resources;
- avoid steep slopes and highly erosive soils;
- align roads along contours;
- minimize soil exposure during the rainy season;
- promptly revegetate and mulch denuded areas;
- divert runoff from denuded areas;
- trap sediment-laden runoff;
- control noxious weeds; and
- inspect sites frequently.

Implementing these general recommendations at all appropriate project locations will significantly reduce erosion and sedimentation.

Recommended erosion control measures are described below in Section 2.1 along with basic implementation methods for specific erosion control measures and procedures. Diagrams showing proper installation methods for selected erosion control measures are also included. In addition,

many valuable suggestions for improving ranch roads can be found in the *Handbook for Forest and Ranch Roads* (Weaver and Hagans 1994).

Section 2.2 describes appropriate erosion control measures for the land cover/land use zones found within the project area, including: pasturelands and Non-native Grasslands; Oak Forests Woodlands and Mixed Evergreen Forest; wetlands, riparian areas and other natural drainages; vineyards; access roads; and roadside ditches.

Erosion control recommendations were developed after field examinations in January and February, 2004, of all proposed project construction and stream crossing sites. The recommendations for land cover/land use zones are based on physical and biological characteristics including soil characteristics, slope aspect and degree, vegetation type, proximity to streams and other wetlands, proximity to special-status plants, and access constraints.

## 2.1 SPECIFIC EROSION CONTROL MEASURES

The recommended erosion control measures are based on current understanding of site conditions and construction methods. Modification of these recommendations may be appropriate in response to changes in site conditions or construction methods, or as a result of improvements in erosion control technologies. Because the project sites are mainly small, discreet sites, many located in hilly terrain and in remote areas, hydromulching and hydroseeding are not generally recommended (unless specified for a specific location by a professional erosion control/revegetation specialist). These techniques are more appropriate for large-scale sites with easy access. Other more effective techniques described below are recommended in this document.

**Weed-free straw mulch:** Many project components are located in areas of level or nearly level terrain that are currently vegetated by non-native grassland or planted pasture. In most cases, these sites are expected to recover rapidly through natural revegetation (see 3.2.1 below). In areas of this type, weed-free straw is recommended as a mulch to protect open ground from the erosive impacts of rain and to enhance seed germination and seedling growth. Loose straw mulch is not recommended for use alongside paved roads, where it poses a fire hazard. For the project area, with its many relatively small construction sites, weed-free straw can be spread most efficiently by hand from bales transported in small trucks.

The following application method is recommended by the Association of Bay Area Governments (ABAG 1995) and others: apply the straw by breaking the bales apart and spreading the straw with rakes at a rate of about 3,000 to 4,000 pounds per acre (approximately 1 to 2 bales per 1,000 square feet, depending on straw type). In practice, this provides a covering 1 to 3 inches thick, with 25 percent or less of the ground surface visible. A thicker, denser mulch can impede plant growth. For

areas that are reseeded, apply the straw after seeding has taken place. Do not apply straw during windy conditions.

The straw will be held in place with a tackifier or by crimping. Recommended tackifiers are non-toxic and are derived from plant materials. Examples include those made from plantago gum (including from organic psyllium husk powder), starch, or guar gum (*Cyanopsis tetragonoba*). Mix the tackifier according to package directions and apply by hand using a backpack sprayer or a sprayer mounted on a small pickup truck. The tacking agent should be applied in quantities sufficient to hold the straw in place. Straw can also be crimped by hand using shovels; however, hand-crimping is difficult in areas that are rocky or where the soil is dry and compacted, which is the case in some locations within the project area.

Straw will be effective as erosion control and mulch for about six months to one year. The effectiveness of straw in protecting the soil surface and enhancing revegetation may be reduced in areas where cattle or other livestock are actively grazing.

Weed-free straw is specified to reduce the likelihood of introducing new species of noxious weeds to the project area. Straw does not need to be “certified” weed-free, but should be purchased from a supplier that has used growing and harvesting methods that reduce broad-leaved weeds to a minimum. One local source of weed-free straw (oat, rice or wheat, depending on seasonal availability) is: Brocco’s Old Barn, 19660 Arnold Drive, Sonoma, 707/938-2291.<sup>1</sup>

**Straw blankets:** The ABAG Manual (1995) and other sources (Goldman et al. 1986, Goldman et al. 2002) recommend the use of soil stabilization blankets where the erosion hazard is higher than average, for example, on short, steep slopes and/or where plant growth is inadequate to provide protective cover, on slopes where immediate protection is needed, and in windy areas. For the project area, straw blankets are more durable and effective than loose or crimped straw and are recommended for sites located on steeper slopes, especially in wind-prone areas, and in areas where regrowth of grasses is expected to be slow. Straw blankets are composed of layers of straw that are stitched together using cotton or plastic to form a flat blanket that is transported in a roll.

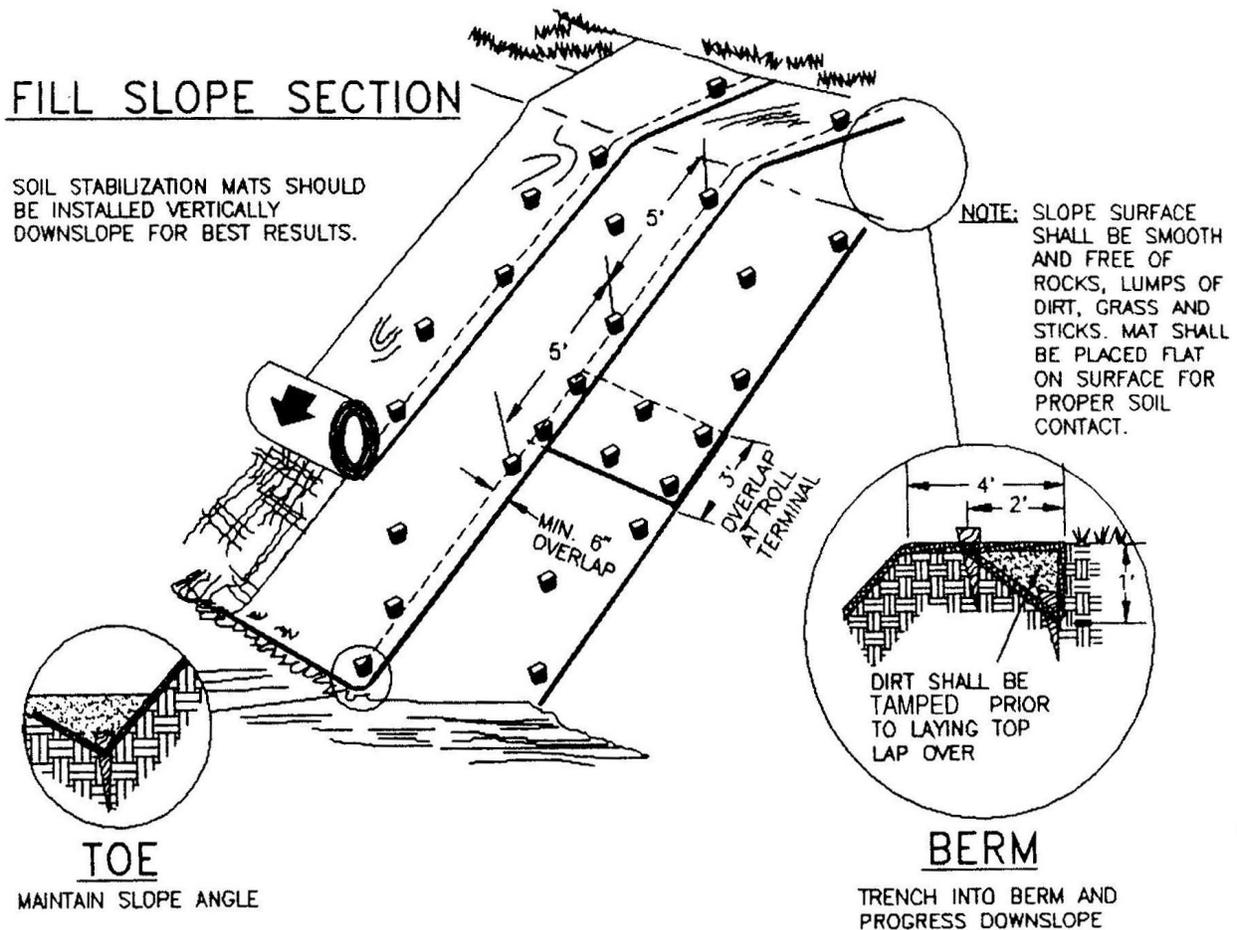
These blankets can be cut to fit any shape or size of area. Proper installation includes the use of metal staples (available in a variety of lengths) to hold the blanket in place. Appropriate staple length is determined by local conditions. For example, in rocky soil like that found in some of the project area, the use of staples longer than 6-8 inches generally is not feasible. When more than one width of straw blanket is used, the edges should be overlapped by a minimum of 6 inches and secured with staples along the seam every 12 inches. The blankets should be placed parallel to the slope, not

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<sup>1</sup> Other local sources may be available and should be consulted for competitive pricing.

parallel to the contours, and should be installed from the top of the slope to the bottom. The top of the blanket should be buried in an anchor slot 6 inches deep or more. The ABAG Manual (1995) includes additional information on installation technique. See Figure A-1 for a diagram of proper installation technique. Straw blankets that are properly installed will provide protection for about one to two years.

**Figure A-1 Installation of Soil Stabilization Blankets**



Source: *Manual of Standards for Erosion and Sediment Control Measures*, ABAG 1995.

Although straw blankets have several advantages for the proposed project, other erosion control blankets or fabrics could be used, including those made from coir (coconut fiber) or jute netting. Many types and brands of coconut fiber blankets and netting are available. One of the lighter-weight types would provide adequate protection for the project area. Jute netting is very effective in windy areas and can retain effectiveness for as long as five years; however, it is quite bulky and heavy, and

can be pulled apart by large wildlife (pigs and deer) and livestock. Installation methods for coir blankets and jute netting are similar to those described above for straw blankets. Excelsior netting (wood shavings in a plastic net) is not recommended for the project area due to its light weight and tendency to trap small animals. Blankets and netting can be ordered directly from the manufacturer. Sources include: BonTerra® America (at [www.bonterraamerica.com](http://www.bonterraamerica.com)) and North American Green® at ([www.nagreen.com](http://www.nagreen.com)).<sup>2</sup>

**Straw bale barriers (also called straw bale dikes):** Straw bale barriers can be used around culverts to prevent sediments from reaching drainages. Straw bale barriers must be installed correctly to be effective in reducing the transport of sediment. Proper installation includes obtaining a tight fit between adjacent bales and securing each bale with wooden stakes or pieces of rebar to maintain the tight fit during runoff events (Goldman et al. 1986). Bales should be placed in a shallow (4 inches deep) trench and each bale should be secured with two 2-inch by 2-inch thick wooden stakes driven through the bale and into the ground. See Figure A-2 for a diagram of proper installation technique. Weed-free straw bales should be used.

**Straw wattles:** Straw wattles are cylindrical bundles of rice straw held together by plastic netting. They can be used successfully to trap sediment where runoff amounts and velocities are low, and where sediment volume is low. They can be installed more quickly than silt fencing. Proper installation includes placing the wattles in a shallow trench, 4 inches deep and about 10 inches wide (as wide as the straw wattle) and staking them firmly in place with wooden stakes spaced every 2-3 feet. When installed on slopes, they should run parallel to the contours. Figure A-3 includes a diagram of the recommended installation method. One producer of straw wattles is California Straw Works, 916/453-1456 ([www.strawwattles.com](http://www.strawwattles.com)). They can be purchased locally from: Stevenson Supply and Tractor Company, Santa Rosa, California, 707/575-3335 or 800/750-3335.<sup>3</sup>

**Silt fencing:** Silt fencing has been specified in the construction details for some locations (see PEA Appendix I Construction Plan) and is proposed here as a means of protecting streams and other high-value wetlands.

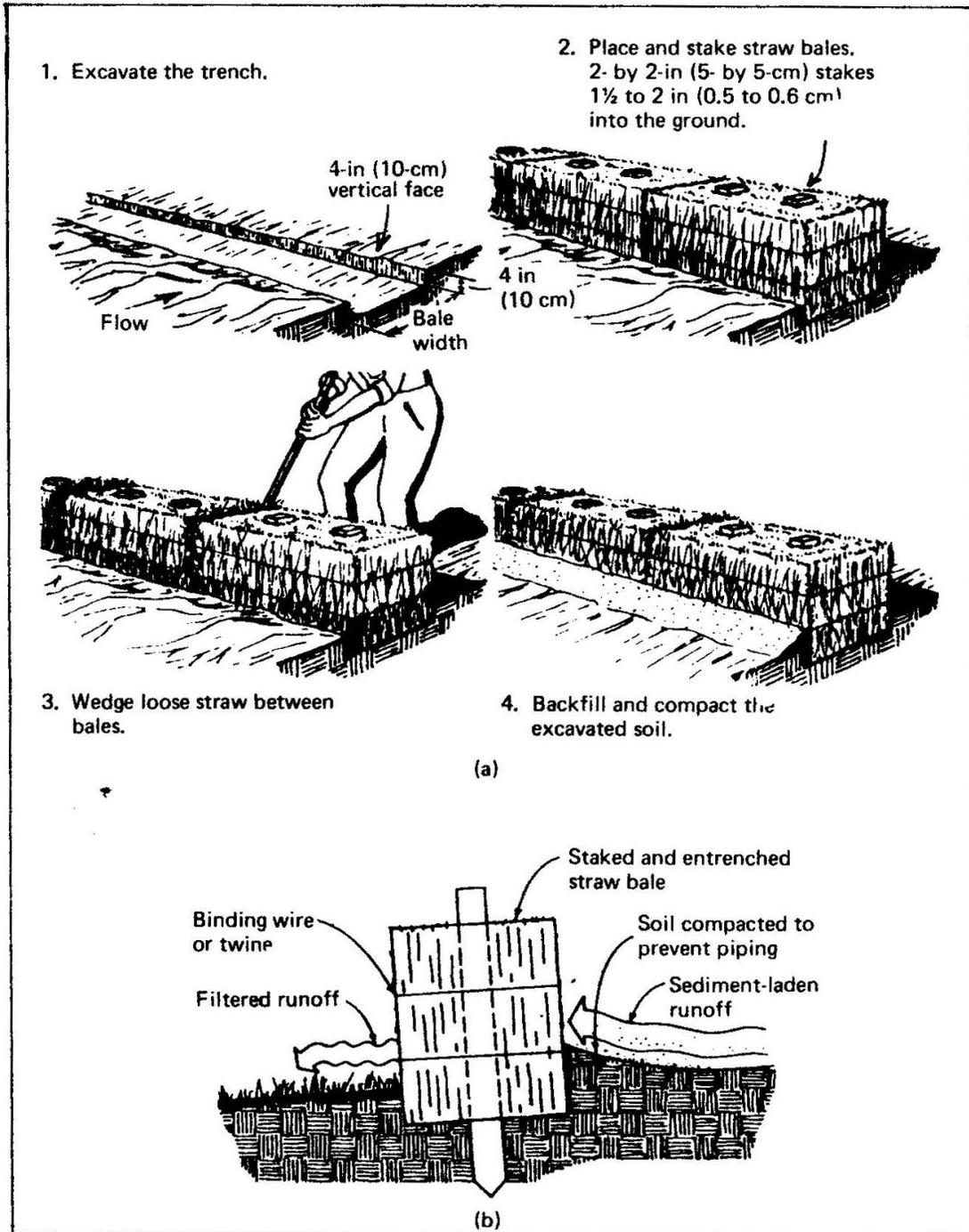
Silt fencing is composed of entrenched filter fabric (also called geotextile) that is supported by stakes and/or heavy wire fencing. Silt fencing must be installed correctly to be effective in reducing the transport of sediment (Goldman et al. 1986). Improperly installed silt fencing can concentrate runoff and result in increased erosion and sedimentation. Silt fencing should be installed along the contour of the slope. The filter fabric should be properly supported with stakes or wire so that it will remain taut during operation.

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<sup>2</sup> Other local sources may be available and should be consulted for competitive pricing.

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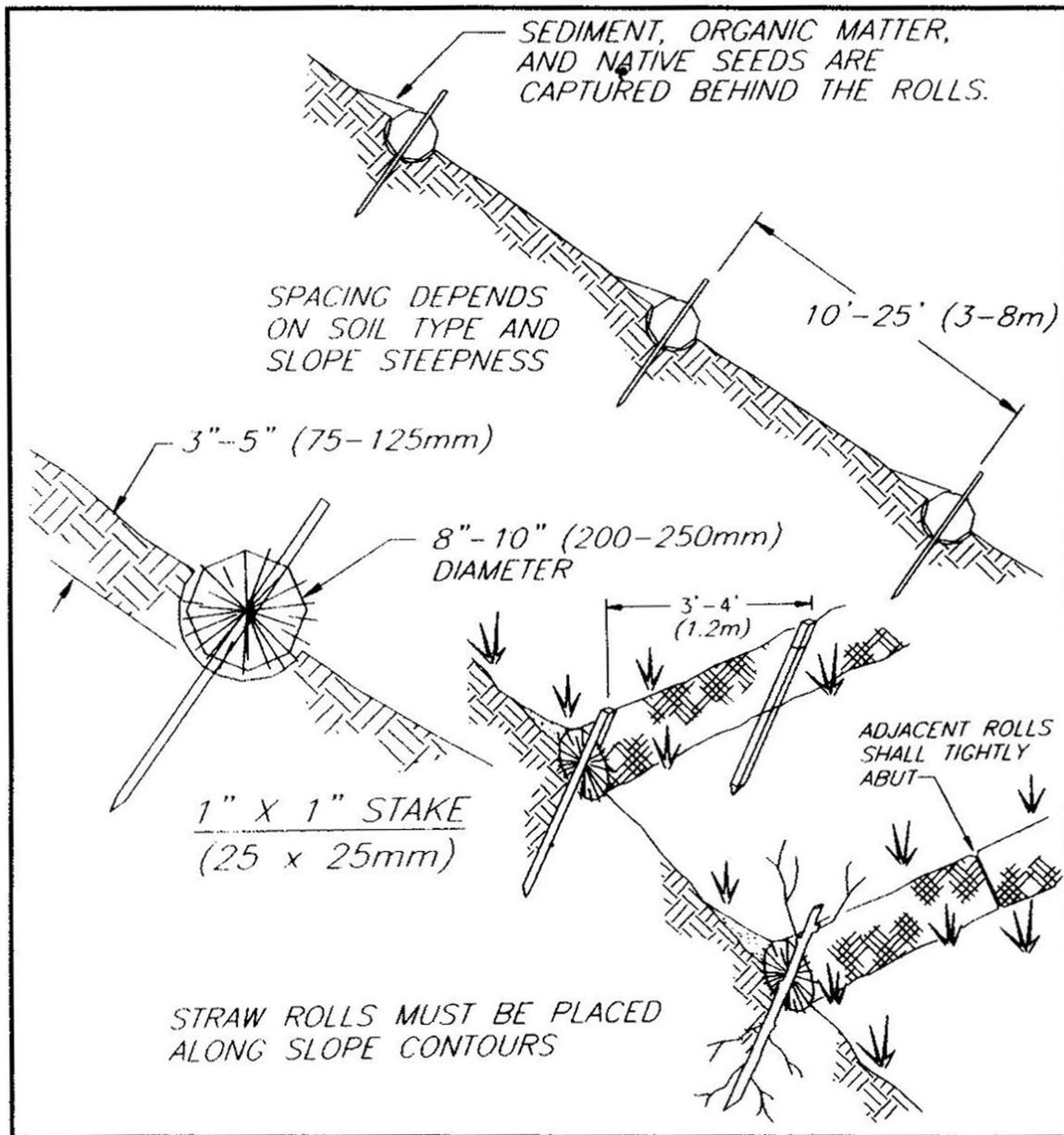
**Figure A-2 Installation of Straw Bale Barriers**



(a) Installation sequence. (b) Cross section of a properly installed straw bale.

Source: *Erosion and Sediment Control Handbook*, Goldman et al. 1986.

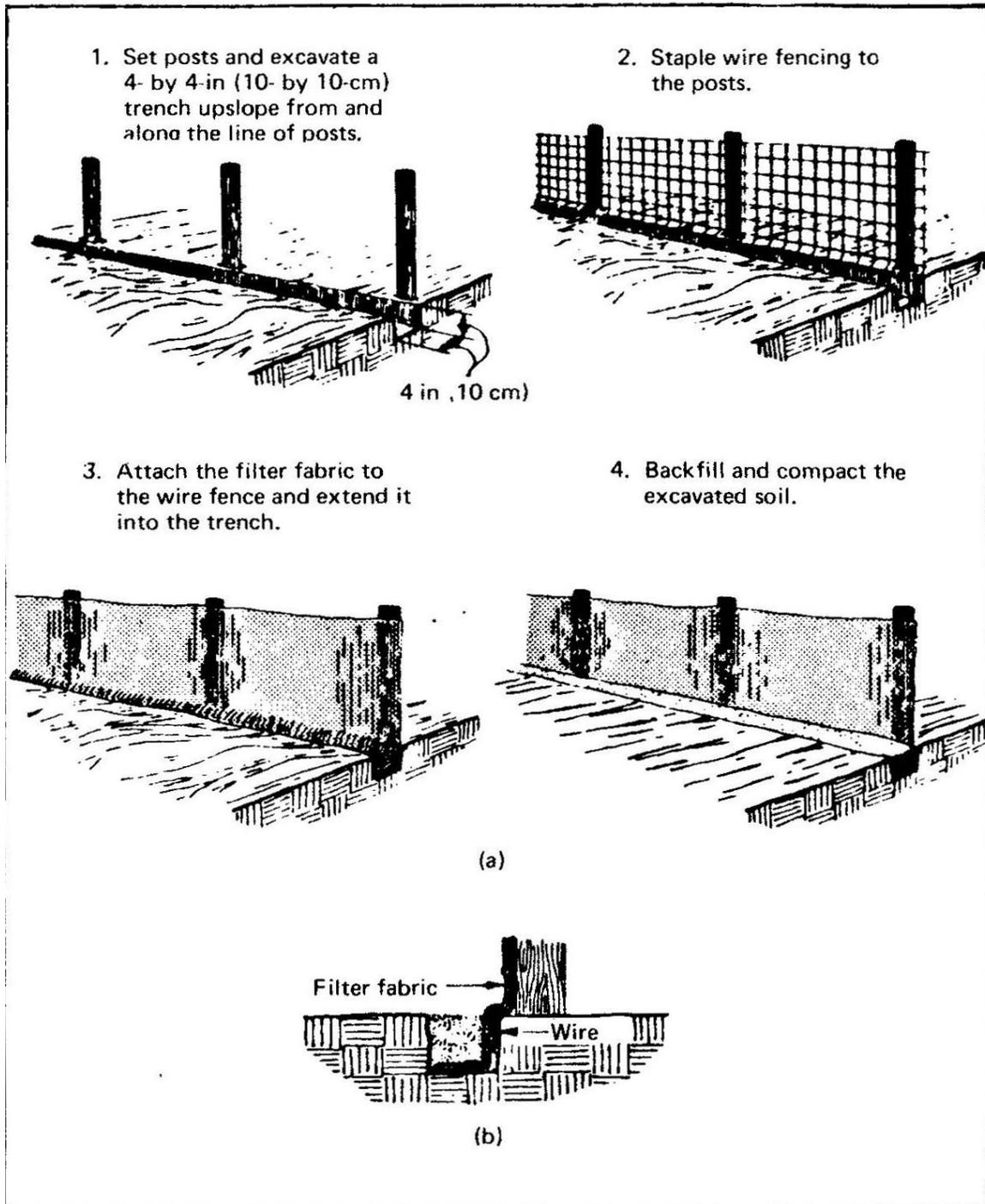
**Figure A-3**      **Installation of Straw Wattles**



Source: California Straw Works

The bottom edge of the fabric should be buried at least 4 inches deep along the entire fence. If the fabric is not entrenched, sediment-laden water will be able to run beneath the fencing, greatly reducing its effectiveness and possibly resulting in erosion. In addition, silt fencing will be installed as specified in the project SWPPP. Figure A-4 shows the proper installation of silt fencing.

Figure A-4 Installation of Silt Fencing



a) Installation sequence. (b) Extension of fabric and wire into the trench.

Source: *Erosion and Sediment Control Handbook*, Goldman et al. 1986.

**Aggregate and graded bedding:** The use of aggregate (also called gravel or angular crushed rock) is proposed in the construction details (PEA Appendix I Construction Plan) to prevent erosion on some unpaved ranch roads. Some additional uses of aggregate are recommended. These include: 1) as a paving material at the expansion area of the Lakeville Substation; 2) as a lining material for areas of roadside ditches along Adobe and Leveroni roads disturbed by construction activities; and 3) as a stabilizer of some additional ranch roads that will be used on a permanent basis. Aggregate is proposed as a liner for man-made roadside ditches in preference to loose straw or straw blankets because these materials pose a fire hazard along heavily traveled paved roads. Use of aggregate in roadside ditches alongside Leveroni and Adobe roads does not require a stream alteration agreement (1600 permit) from the CDFG (Cox, personal communication), nor do these roadside ditches have an ordinary high water mark or meet the Corps definition of wetlands. Aggregate used to stabilize ranch roads should be applied at a depth appropriate to the situation, generally 4 to 5 inches.

The use of graded bedding, which consists of layers of successively larger aggregate, is a possible means of reducing sedimentation at the road crossing of an unnamed runoff channel between poles 68 and 69. An existing access road runs through this channel, which drains to Felder Creek. The use of graded bedding will allow all-season access while minimizing sedimentation of Felder Creek. Installation of graded bedding at the proposed location is unlikely to be subject to California Fish and Game Code (CFG) Section 1600 (Cox personal communication), however, this should be determined conclusively at least six months prior to construction. Installation of graded bedding may be subject to CWA Section 404 permitting requirements. This should be conclusively determined at least six months prior to initiation of construction to allow adequate time for obtaining any required authorizations. The use of graded bedding is unnecessary in the event that a bridge is constructed at this stream crossing.

## **2.2 EROSION CONTROL WITHIN LAND COVER/LAND USE ZONES**

The erosion control measures most appropriate to the land cover/land use zones found within the project area are discussed below. Land cover/land use zones in the project area include: pasturelands and Non-native Grasslands; oak forests and woodlands, and Mixed Evergreen Forest; wetlands, riparian areas and other natural drainages; vineyards; access roads; and roadside ditches. Once the project has been approved, final decisions about erosion control will be made on a site-by-site basis to assure that the measures used are the most appropriate and effective for the local site.

**Pasturelands and Non-native Grasslands** (Attachment A-1, representative photos: 1, 2, 9 and 12): Crimped or tacked weed free straw is recommended for areas that are level to gradually sloping and therefore not highly susceptible to erosion, and for areas not subject to high winds. For windy areas, steep slopes, and other sites more susceptible to erosion, straw blankets or an

alternate type of geotextile is recommended. Seeding with a mixture of grasses may be needed in addition (see Section 3.2). Hydromulch and hydroseeding are not as effective and are not generally recommended (unless specified for a specific location by a professional erosion control/revegetation specialist).

**Oak Forests and Woodlands and Mixed Evergreen Forest** (Attachment A-1, representative photos: 2, 3 and 9): The recommendations made for pasturelands and Non-native Grasslands are also applicable to these land cover types. In addition, replacement of oak trees is recommended if trees are removed during construction (see Section 3.4).

**Wetlands, riparian areas and other natural drainages** (Attachment A-1, representative photos: 5, 6, 13, 14, 20, 21 and 22): Sedimentation of wetlands, riparian areas and other natural drainages can usually be prevented most effectively through the use of silt fencing. Straw wattles can be used in areas with low levels of disturbance where sediment production is expected to be very low. Silt fencing is recommended for protection of the vernal marsh south of poles 41 and 42 (Attachment A-1: photo 4) and the vernal pool near poles 43 and 44 (Attachment A-1: photo 8). Silt fencing is also recommended to protect Sonoma Creek during construction in the vicinity of poles 107 and 108.

Four small, ephemeral drainages, located along the eastern portion of segment 1, will be crossed by access roads for project purposes (see Figures 6-1a and b). One of these drainages is crossed by an existing road south of pole 44 (Attachment A-1: photo 7). Another ephemeral drainage is intersected by a proposed temporary access road south of pole 47 (Attachment A-1: photos 10 and 11). Two additional drainages are crossed by an existing vineyard road between poles 68-69 (Attachment A-1: photo 16) and 69-70 (Attachment A-1: photos 17 and 18). The most effective protection measures for the unnamed drainages are best determined after the crossing method for each is finalized. If small bridges are constructed in the dry season for the drainages between poles 68 and 69 and poles 69 and 70, the likelihood of increased sedimentation is low, and straw wattles may be effective. However, if sediment production is likely due to construction methods, or construction occurs during the wet season, then silt fencing would be more likely to provide effective control.

**Vineyards** (Attachment A-1, representative photo: 15): Vineyards in the project area are usually planted with a cover crop to control erosion during the winter, so no additional erosion control measures may be needed. In areas near existing unpaved vineyard roads, aggregate may be the most effective material.

**Access roads:** New permanent roads and existing roads that will be upgraded to permanent should, in general, be protected with a 4 to 5-inch covering of aggregate. New temporary roads, pull sites, and landing zone/staging areas (Attachment A-1: photo 23) that will be abandoned after

construction should be protected with loose, crimped or tacked straw in level or nearly level, non-windy sites. Straw blankets or other geotextiles should be used on slopes and in windy areas. Seeding may be necessary in areas that are slow to revegetate naturally.

**Roadside ditches:** These are man-made ditches along paved roads that are not natural drainages and do not meet the Corps definition of wetlands. Loose straw and straw blankets are not recommended because they may pose a fire hazard. Some roadside ditches in the project area are currently lined with aggregate, and this method is recommended for use in ditch areas susceptible to erosion. Some roadside ditches drain to natural streams. Sediment produced from project activities in or near ditches should be prevented from entering natural streams through the installation of silt fencing. Straw wattles may be considered for sites where sediment production is expected to be very low.

### **3.0 REVEGETATION PROCEDURES**

The project area includes ten vegetation types. The six upland types are: Coast Live Oak Forest and Woodland, Mixed Evergreen Forest, Non-native Grassland, Oregon Oak Woodland, Upland Redwood Forest, and vineyards and other agricultural lands. The four wetland types include: Coastal and Valley Freshwater Marsh, North Coast Riparian Forest, Northern Vernal Pool and Vernal Marsh. Descriptions of these types are provided in Section 6.3.1 of the PEA.

Most of the components of the proposed project are located within Non-native Grassland, in ruderal areas with weedy grasses, or in or near vineyards. Some are located in or near Coast Live Oak Woodland, Oregon Oak Woodland, Mixed Evergreen Forest, North Coast Riparian Forest, and vineyards. A few sites are located in or near Upland Redwood Forest, Coastal and Valley Freshwater Marsh, Northern Vernal Pool or Vernal Marsh.

The proposed project has been designed to minimize impacts to vegetation. Most sites will be used on a temporary basis during construction, operations, or both, and are expected to recover, in most cases, without reseeding or replanting. In Non-native Grassland, monitoring is recommended to determine whether natural revegetation is occurring at an acceptable rate. Disturbed sites in planted pasturelands should be reseeded as specified by the landowner or using a seed mix that is compatible with adjacent vegetation. A few oak trees may need to be removed; these would be replaced at a rate of 10:1 (discussed below in Section 3.4). One landowner has stabilized some unpaved ranch roads by planting a sterile hybrid grass used for short-term erosion control. These areas should be replanted with the same type of plant material, if requested by the landowner.

### **3.1 ROLE OF NATURAL REVEGETATION**

Project sites that experience light to moderate levels of disturbance on a temporary basis during construction, and are dominated by Non-native Grassland or by woodland or forest types with a grass understory, are expected to revegetate largely by natural means. For example, work areas around pole bases, at pull sites, crane pad sites, and other areas where the topsoil will remain intact following construction, should recover pre-project densities and cover of grassland species within one to two years after construction. These results are expected because the disturbed areas are relatively small, the topsoil will remain in place, and the surrounding vegetation as well as the soil seedbank are likely to provide an adequate seed source for natural revegetation. Most of the grasses in Non-native Grassland are introduced species that reproduce from seed with exceptional efficiency. Native forbs are abundant in some areas of Non-native Grassland, and these are expected to recover through similar means. Grazing is the predominant land use in some sections of the project area, and grazed areas may recover more slowly than ungrazed areas. However, grazed areas are likely to recover a higher level of cover of native forbs than ungrazed areas due to decreased competition from introduced annual grasses.

This scenario of natural revegetation may be slowed or prevented by one or more factors. Low rainfall during the rainy season following construction could result in low rates of seed germination and seedling growth, and reduced seed production. If soils are left unprotected and topsoil is eroded by runoff, regrowth could be delayed by several to many years. Uncontrolled proliferation of noxious weeds can prevent regrowth of desired vegetation as a result of shading, competition for water, or chemical inhibition. Intense use of an area by cattle can result in trampling of young vegetation, loss of topsoil, and other impacts that slow the recovery of desired vegetation.

Areas where recovery is expected to occur through natural revegetation should be monitored on a regular basis to determine whether supplemental seeding or other remedial measures are needed. If supplemental seeding is needed, the seed mix used should be either that recommended by the landowner or one of the two mixes described below.

### **3.2 SEED MIXES AND SEEDING METHOD**

Landowners should be consulted to determine if they have a preferred seed mix for their grasslands or pasturelands. As an alternative, the following seed mixes are suitable for use in Non-native Grassland within the project area. Seed Mix A includes a mixture of native and non-native grasses (Table A-1) and is designed for areas that are ungrazed and are primarily used for wildlife habitat, such as at the Moon Ranch (poles 34-38). Seed Mix B is designed for grasslands that are used mainly for livestock grazing and are mainly dominated by non-native grasses (Table A-2). The introduced annual grasses recommended in these mixes are already present within the project area and are not rated as invasive noxious weeds (California Department of Food and Agriculture [CDFA] 2004, Cal-

EPPC 1999). Annual ryegrass (*Lolium multiflorum*) should never be used because of its adverse impacts on native plants and wetlands.

**Table A-1**  
**Seed Mix A: Recommended for Ungrazed Areas that are Primarily Used for Wildlife Habitat.**

Scientific/Common Name	Erosion Rating	Fuel Rating	Recommended Seeding Rates (lbs/acre)	Comments
Blue wildrye <i>Elymus glaucus</i>	excellent	low to moderate	5	Native perennial; good stabilizer; tolerates full sun; requires good drainage.
California brome <i>Bromus carinatus</i>	excellent	low	5	Native perennial bunchgrass; provides good cover.
Purple needlegrass <i>Nassella pulchra</i>	poor to good	low to moderate	5	Native perennial bunchgrass; adapted to clay soils, tolerant of summer drought and heat; tolerant of poor soils.
Blando brome <i>Bromus hordeaceus</i>	good	moderate	20	Introduced annual; rapid spring growth; does well on compacted soils.
Zorro fescue <i>Vulpia myuros</i>	good	low	10	Introduced annual; adapted to dry sites and shallow soils; less invasive than rye and bando brome.

Sources: *Manual of Standards For Erosion and Sediment Control Measures (ABAG 1995)* and *Rehabilitation of Disturbed Lands in California: A Manual For Decision-making (Newton and Claassen 2003)*.

**Table A-2**  
**Seed Mix B: Recommended for Grasslands that are Used Mainly for Livestock Grazing**  
**and are Dominated by Non-Native Grasses**

Scientific/Common Name	Erosion Rating	Fuel Rating	Recommended Seeding Rates (lbs/acre)	Comments
Blando brome <i>Bromus hordeaceus</i>	good	moderate	40	Introduced annual; rapid spring growth; does well on compacted soils.
Zorro fescue <i>Vulpia myuros</i>	good	low	20	Introduced annual; adapted to dry sites and shallow soils; less invasive than rye and blando brome.
Blue wildrye <i>Elymus glaucus</i>	excellent	low to moderate	5	Native perennial; good stabilizer; tolerates full sun; requires good drainage.
Purple needlegrass <i>Nassella pulchra</i>	poor to good	low to moderate	5	Native perennial bunchgrass; adapted to clay soils, tolerant of summer drought and heat; tolerant of poor soils.

Sources: *Manual of Standards For Erosion and Sediment Control Measures (ABAG 1995)* and *Rehabilitation of Disturbed Lands in California: A Manual For Decision-making (Newton and Claassen 2003)*.

The inclusion of non-native legumes in these seed mixes or other seed mixes used in the project area is not recommended. Non-native legumes are invasive. They out-compete native forbs, and encourage weed growth by creating high levels of soil nitrogen. Native species of clover (*Trifolium* spp.) and lupine (*Lupinus* spp.) are already present within the grasslands of the project area, so they do not need to be added to the seed mixes. Native legumes provide similar soil benefits to those of invasive non-native legumes, but do not impede the recovery of other native forbs. Avoid the use of the following non-natives: rose clover (*Trifolium hirtum*), crimson clover (*T. incarnatum*), white clover (*T. repens*), and subterranean clover (*T. subterraneum*).

The application for seed mix A is 45 lbs/acre. The application rate for seed mix B is 70 lbs/acre.

Grass seed can be purchased from: Pacific Coast Seed, Livermore, California, 510/373-4417, or from S and S Seeds, Carpinteria, California, 805/684-0436, or from other local suppliers. To obtain best results from native grass seed, the location where the native seed was collected in the wild should be a site with ecological conditions similar to those of the project area, and should be located as close to the project area as possible.

For maximum effectiveness, seeding should take place in late summer, no later than September 31, and prior to the commencement of the rainy season. Since seeding will take place in disturbed areas, no special seedbed preparation is recommended. The use of supplemental fertilizer promotes

the growth of broad-leaved weeds, and is not recommended (Goldman et al. 2002, Newton and Claassen 2003).

Since all of the sites of the project area are relatively small, a hand-operated seed distributor (“belly grinder”) is the most effective and efficient way to spread grass seed. Seeds can be evenly distributed by a person walking back and forth across the area to be seeded, while turning the hand crank to disperse the seeds. One example of these small-scale seed spreaders is the Seed Slinger™, made by the Truax Company, Minneapolis, Minnesota, 612/537-6639.<sup>4</sup>

### **3.3 STERILE GRASS NURSE CROP**

Some ranch roads on the Moon Ranch have been planted with a grass that appears to be a wheat-wheatgrass sterile hybrid (*Triticum aestivum* X *Agropyron* sp. or *Elymus* sp.). This sterile hybrid grass (marketed under the brand name ReGreen™ and others) has been planted on unpaved ranch roads, probably to protect them from erosion during the winter rainy season. The seeds produced by hybrid grasses of this type are sterile, so they do not reseed. This product provides a cover crop that germinates and grows rapidly for temporary erosion control and soil stabilization, which allows slower-growing species to become established as the sterile grass dies out. If the landowner requests it, access roads on the Moon Ranch should be returned to their pre-project condition by reseeding them with ReGreen™ or a similar product. For maximum soil stabilization, use 40 to 50 lbs per acre, planted in a firm seed bed, 1 inch beneath the soil surface. ReGreen™ can be purchased from Pacific Coast Seed, Livermore, California, 510/373-4417.

### **3.4 ACORN COLLECTION AND PLANTING**

It is unlikely that many oak trees will be removed during the project. However, if any oak trees of 8 inches diameter at breast height or greater are removed from natural habitat, such as Coast Live Oak Woodland (not within paved road rights-of-way), it is recommended that they be replaced at a ratio of 10:1. A 10:1 ratio is recommended to partially compensate for the loss of habitat value that results from the loss of mature trees. Mature trees provide higher levels of ecological habitat values (e.g., providing food, nesting sites) than newly planted saplings. In addition, the survival rate of replacement trees is typically low, and is very difficult to predict (California Oak Foundation 2004). Replacement trees should be grown from locally-collected acorns to reduce the chance of spreading Sudden Oak Death, and for successful establishment. Acorns should be collected from the trees in August or September, as soon as the current year’s crop is ripe. Acorns should be float-tested to determine viability. Replacement trees can be grown off-site or near the removal site, except that in the latter case they shall be planted sufficiently distant from the transmission line such that there is no possibility that trees at maturity could impact the transmission line. If grown off-site, young trees

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<sup>4</sup> Other sources may be available and should be consulted for competitive pricing.

should be grown in planting tubes (DeepRoot® or similar, 20" long minimum) that encourage proper root development for one to two years, then replanted on-site in properly prepared holes (without fertilizer) at the beginning of the rainy season. On-site propagation requires that, for each replacement tree, a group of 5 acorns be planted. Planted acorns must be protected from predation by squirrels, scrub jays and other wildlife. Small wire cages (closed at the top) with buried lower rims that are secured with 3 wire staples, should be used. For areas that are not grazed by livestock, all young trees must be protected from deer browsing by heavy-duty wire cages secured with rebar or t-posts. The cages should be left in place until the young trees have grown tall enough to escape the deer-browse zone, which is usually about 5 feet in height. In grazed areas, the regeneration of young oaks is unlikely to be successful unless cattle are restricted from the propagation area until the trees are large enough to survive the effects of cattle grazing, meaning as long as five to ten years. If individual cages are used in grazed areas, they must be very sturdy and large enough to protect the young trees until they can successfully resist the effects of livestock trampling and grazing. Additional information on growing and protecting oaks can be obtained from the California Oak Foundation (2004).

### **3.5 PLANTING OF OTHER TREES**

Young cottonwood trees have been planted recently by the landowner near the pull sites on either side of pole 24. During construction at these pull sites, any cottonwood trees located within either pull site, or which at maturity could impact the transmission line, will be removed. If cottonwoods are removed during construction, PG&E will work with the landowner to replant vegetation appropriate to the ROW.

One or more California bay trees are likely to be removed as a result of construction of a new permanent road from pole 39 to 41, through Mixed Evergreen Forest, and at the pole 107 site in the riparian zone west of Sonoma Creek. Replacement of bay trees is not proposed unless the trees removed are designated Landmark or Heritage trees. Any such replacement would occur outside of the ROW at a distance where mature trees could not impact the transmission line.

## **4.0 NOXIOUS WEEDS AND CONTROL METHODS**

Weed control is an important element in determining the success of revegetation, especially at sites where recovery is expected to result mainly from natural revegetation (see Section 3.1). Weeds that are listed by the California Department of Agriculture (2004) and/or designated as invasive in wildlands by the California Invasive Plant Council (Cal-EPPC 1999) were cataloged within the project area during field surveys. Table A-3 lists weeds by segment and provides information on their status.

The use of straw mulch and straw blankets for erosion control may also have the effect of inhibiting weed growth. However, these materials are not always completely effective in preventing weed infestations. Additional weed control is recommended for construction sites in which noxious weeds have become established and are inhibiting the regrowth of desirable vegetation. Post-construction monitoring will be used to determine whether weeds are present in numbers or amount of cover such that recovery of vegetation to pre-project conditions is significantly inhibited. For those areas, additional weed control measures are proposed below on a species-by-species basis.

The following recommended weed control methods are considered to be the most effective and least environmentally harmful for the project area. Control methods are described for most of the noxious weeds that could invade recovery areas, however, control methods for poison hemlock, pampas grass and Himalayan blackberry are not provided for reasons described below.

**Table A-3**  
**Noxious Weeds Found within the Lakeville-Sonoma Transmission Upgrade Project Area.**

Scientific name/ Common name	Cal-IPC Rating <sup>1</sup>	CDFA Rating <sup>2</sup>	Segment <sup>3</sup>		
			1	2	17
<i>Arundo donax</i> Arundo or giant reed	A-I	Q			X
<i>Carduus pycnocephalus</i> Italian thistle	B	C	X	X	X
<i>Centaurea calcitrapa</i> Purple starthistle	B	B	X		
<i>Centaurea solstitialis</i> Yellow starthistle	A-I	C	X		X
<i>Cirsium vulgare</i> Bull thistle	B	Q	X	X	
<i>Conium maculatum</i> Poison hemlock	B	no rating	X		
<i>Cortaderia jubata</i> Pampas grass or jubata grass	A-I	Q			X
<i>Foeniculum vulgare</i> Wild fennel	A-I	no rating	X	X	X
<i>Phalaris aquatica</i> Harding grass	B	no rating	X	X	
<i>Rubus discolor</i> Himalayan blackberry	A-I	no rating	X	X	X
<i>Silybum marianum</i> Milk thistle	CNL	no rating	X		
<i>Taeniatherum caput-medusae</i> Medusahead	A-I	C	X		
<i>Vinca major</i> Periwinkle	B	no rating			X

1. From: Cal-EPPC 1999. Exotic pest plants of greatest ecological concern in California.

**Cal-EPPC List Definitions:**

A = Most invasive wildland pest plants. Documented as aggressive invaders that displace natives and disrupt natural habitat.

Sublist A-1: Widespread pests that are invasive in more than 3 Jepson bioregions.

B = Wildland pest plants of lesser invasiveness. Plants spread less rapidly and cause a lesser degree of habitat disruption.

CNL = Considered but not listed. (These species are currently being re-evaluated for listing.)

2. From: CDFA 2003. Pest ratings of noxious weed species and noxious weed seed.

**CDFA Rating Definitions:**

A = An organism of known economic importance subject to state (or county agricultural commissioner when acting as a state agent) enforced action involving: eradication, quarantine, containment, rejection, or other holding action.

B = An organism of known economic importance subject to eradication, containment, control or other holding action at the discretion of the individual county agricultural commissioner or, an organism of known economic importance subject to state-endorsed holding action and eradication only when found in a nursery.

C = An organism subject to no state-enforced action outside of nurseries except to retard spread. Action is at the discretion of the commissioner.

Q = A temporary "A" action outside of nurseries at the state-county level pending determination of a permanent rating.

3. Plants observed within or immediately adjacent to one or more specific project sites within checked segments.

All weed control activities should be performed by persons who are able to identify the weeds targeted for treatment in the field during vegetative (non-flowering) and flowering stages of growth. Herbicides should be applied according to label instructions by persons who are certified pest control applicators. Herbicides range from broad-spectrum, which control most plants, to selective herbicides, which target plants within specific groups (e.g., thistles, legumes, grasses).

**Arundo (*Arundo donax*):** Arundo is found only in segment I7 at the Sonoma Creek crossing, upstream from the pole I07 replacement site. After construction, any disturbed ground should be closely monitored for arundo. If a new arundo infestation is detected during post-construction monitoring, it should be treated with a 2% solution of glyphosate (as Aquamaster®), which is formulated for use near water. The Sonoma Ecology Center has implemented a long-term arundo removal project using glyphosate treatment and replanting that will eventually replace the arundo in this area with bank-stabilizing native vegetation.

**Italian thistle (*Carduus pycnocephalus*):** Italian thistle is widespread in all segments of the proposed project. It can form dense stands in moist grasslands that overtop and out-compete desirable grasses and forbs. Post-construction control of Italian thistle is proposed only for areas disturbed by project activities, and only if those areas support Italian thistle in larger numbers or greater densities than found in adjacent sites that were not disturbed during project activities, as described in Section I.0. The herbicide Transline® is recommended for use in controlling Italian thistle within the project area (Bossard and Lichti 2000). Transline® is a selective herbicide that works mainly on members of the sunflower and pea families, without harming grasses (Dow AgroSciences 1999). Transline® should be applied only to target weeds using a back-pack sprayer, and using nozzles and pressures that create large droplets and minimize drift. Plants can be treated during both the non-flowering and flowering stages. Repeat treatments are likely to be necessary. Transline® will kill desirable native plants in the sunflower and pea families, so care must be taken to apply this herbicide only to target weeds.

**Purple starthistle (*Centaurea calcitrapa*):** Purple starthistle occurs in segment I, on the west-facing slopes of Sonoma Mountain, usually near ranch roads or in other areas within grasslands that are heavily disturbed by livestock grazing. It forms dense stands that out-compete desirable vegetation. It is not grazed by livestock. The herbicide Transline® is recommended for use in controlling purple starthistle within the project area (Randall 2000a) due to its selectivity. Use the methods described above for Italian thistle.

**Yellow starthistle (*Centaurea solstitialis*):** Yellow starthistle is very common in segment I and is found in a few locations within segment I7. Yellow starthistle occurs in many locations in grazed grasslands within the project area. It forms dense stands that eliminate desirable vegetation, spreads rapidly, and can be difficult to eradicate in dense stands (DiTomaso and Gerlach 2000). The plant is

grazed by livestock in its early growth stages, but grazing can increase seed production by causing the plant to produce multiple flowering stalks. The herbicide Transline® is recommended for use in controlling yellow starthistle within the project area (DiTomaso and Gerlach 2000) due to its selectivity. Use the methods described above for Italian thistle.

**Bull thistle (*Cirsium vulgare*):** Bull thistle is widely scattered in segments 1 and 2, in both grazed and ungrazed grasslands. Bull thistle spreads rapidly, but in the project area it generally does not form dense stands except in areas that are heavily used by cattle. The herbicide Transline® is recommended for use in controlling bull thistle within the project area (Randall 2000b) due to its selectivity. Use the methods described above for Italian thistle.

**Poison hemlock (*Conium maculatum*):** Poison hemlock is found in a few ruderal locations in wet soil near roadside ditches along Adobe Road. Since it occurs only as a roadside weed in the project area, poison hemlock is not expected to invade adjacent grasslands or vineyards as a result of project activities. Poison hemlock is toxic and can be fatal to humans (and livestock) if eaten in sufficient quantities. No control methods are proposed for poison hemlock.

**Pampas grass or jubata grass (*Cortaderia jubata*):** Pampas grass was observed in only one location, in landscaping along Leveroni Road (segment 17). Although it has the capacity to spread rapidly and dominate natural habitat under certain conditions, it is not expected to be invasive within the project area. No control methods are proposed for pampas grass.

**Wild fennel (*Foeniculum vulgare*) (Attachment A-1: Photo 19):** Wild fennel is found in all three segments of the project area. Most of the sites with wild fennel are located on the margin of Riparian Forest habitat in the Felder Creek area at the east base of Sonoma Mountain, and in ruderal habitat along Leveroni Road. Wild fennel is a perennial herb that establishes large colonies in moist grasslands and riparian areas within the project area. Control of fennel in the project area is recommended only for areas with native riparian habitat in the vicinity of Felder Creek. Established fennel stands are difficult to control, but seedlings can be eradicated by hand-pulling or with herbicides. Garlon 3A® and Garlon4® have been effective on wild fennel when used in southern California grasslands (Klinger 2000). Early spring application at a rate of 6 pounds per 100 gallons of water (1 pound active ingredient per acre) is recommended. It should be applied following the methods described for Italian thistle.

**Harding grass (*Phalaris aquatica*):** Harding grass is a large perennial bunchgrass found in segments 1 and 2 of the project area. In segment 1 it occurs in the understory of Mixed Evergreen Forest on the upper west-facing slopes of Sonoma Mountain. In segment 2 it occurs on the edge of Riparian Forest habitat near Felder Creek. Seedlings and young plants can be treated effectively with a 2 percent solution of glyphosate (as Roundup®) applied as a foliar spray to actively growing plants

(Parsons 1992). Glyphosate, while effective, is a broad-spectrum herbicide that controls many species of plants, including desirable native grasses and forbs. Fluazifop (as Fusilade®) is a grass-specific herbicide that will control young Harding grass plants when applied as a foliar spray at a rate of 0.25 to 0.375 pounds of active ingredient per acre (Harrington and Lanini 2000). Apply either of these herbicides using a back-pack sprayer, and using nozzles and pressures that create large droplets and minimize drift. Avoid non-target species during application.

**Himalayan blackberry (*Rubus discolor*):** Himalayan blackberry is found in all three segments of the project area, but its distribution is limited to a few highly localized sites on and near the banks of Felder, Sonoma and Fryer creeks. It is unlikely that Himalayan blackberry will colonize project sites near Fryer and Sonoma creeks because conditions at these sites are unsuitable for its persistence. Himalayan blackberry may invade project sites in the vicinity of Felder Creek. However, control is not proposed because it is unlikely to be successful without a long-term, watershed-based control program. Additionally, Himalayan blackberry provides environmental benefits in the form of wildlife habitat (food, nesting sites) and bank stabilization along creeks.

**Milk thistle (*Silybum marianum*):** Milk thistle occurs in scattered locations in grazed grassland in segment I, where it forms dense patches under oaks in sites that are heavily used by livestock. It is not grazed by livestock. With sparse infestations of milk thistle, the plants can be controlled by cutting individual plants beneath the rosette with a shovel or pulaski. Cut plants will not resprout. For denser infestations, plants up to the bud stage can be controlled with Transline® applied as a foliar spray at rates of 0.09 to 0.375 pound of active ingredient per acre (PNW Weed Management Handbook 2003). Apply Transline® using a back-pack sprayer, and using nozzles and pressures that create large droplets and minimize drift. Avoid non-target species during application.

**Medusahead (*Taeniatherum caput-medusae*):** Medusahead is an introduced annual grass that reduces the quality of rangelands because of its invasiveness and its ability to form dense stands that create a thick thatch (layer of dead grass stems and seedheads) that impedes seedling growth of desirable grasses and forbs. Medusahead is currently found in scattered locations within segment I of the project area. Medusahead can be difficult to control; however, control attempts are worthwhile because of its potential impacts on grassland diversity and pastureland quality. Medusahead matures later than most grasses so that mowing or cutting prior to seed set is an effective means of control (Kan and Pollak 2000). For the project area, use of a hand-operated string cutter (“weed-eater”) may be the most effective tool. Timing is critical. Medusahead should be cut as late as possible, but before seed set, to allow seed production by desirable grasses that set seed earlier in the season. Grass-specific herbicides are not recommended because of their effects on desirable grass species.

**Periwinkle (*Vinca major*):** Periwinkle is a well-established groundcover in the riparian zone on both sides of the Sonoma Creek crossing in segment 17. No disturbance is expected in the riparian zone and periwinkle is not expected to invade sites beyond its current area of establishment. No control methods are proposed for periwinkle.

## 5.0 PERFORMANCE STANDARDS, MONITORING AND REMEDIAL MEASURES

Separate performance standards, monitoring methods and remedial measures are proposed for: revegetation, erosion and sediment control, and invasive noxious weeds.

### 5.1 REVEGETATION

These measures are proposed for grasslands, including Non-native Grassland, woodlands with grassland understories, and planted pasturelands. No revegetation standards or monitoring are proposed for ruderal areas or for vineyards.

**Revegetation Performance Standard:** Grassland vegetation will recover 80 percent or more of pre-project cover within two years following the construction period. Pre-project cover in grassland areas was estimated as approximately 100 percent throughout the project area during surveys conducted during the peak of the growing season.

**Revegetation Monitoring:** Post-construction monitoring by a qualified professional botanist will be conducted in April of the first year following construction. The monitor will visually assess the percent cover of vegetation using standard methods (Elzinga et al., no date). A written record will be made of conditions observed during monitoring. For sites that have met the performance standard, no further monitoring is required. For sites that have not met the performance standard, the monitor will assess the possible causes and will propose remedial measures, such as reseeding or weed control. A second year monitoring in April will be used to assess the success of the remedial measures. For sites that do not meet the performance standard after the second year, additional remediation and monitoring is proposed.

**Revegetation Remedial Measures:** Depending on the cause of revegetation failure, the following should be considered:

- Reseed the area with an appropriate seed mix (as recommended by the landowner or Seed Mix A or B, as described above);
- Control erosion using weed-free straw mulch, straw blankets, or other means;
- Control noxious weeds that are limiting regrowth of desirable plant species; or
- Protect area from trampling or other livestock impacts.

## 5.2 EROSION AND SEDIMENT CONTROL

Performance standards, monitoring methods and remedial measures are proposed for all sites with the potential to experience increased levels of erosion or sedimentation as a result of project activities.

### **Erosion/Sedimentation Performance Standard:**

- No landslides, gully formation, rill or sheet erosion;
- No sediment produced on-site or transported off-site; and
- Vandalism to erosion or sedimentation control installations is corrected.

**Erosion/Sedimentation Monitoring:** A qualified erosion control monitor will visually examine all sites within the project area that are potentially subject to accelerated erosion or sedimentation as a result of project activities. A written record will be made of conditions observed during monitoring. Erosion control monitoring will comply with the scheduling and procedures that are specified in the SWPPP. If erosion or sedimentation problems are found, remedial actions will be taken and monitoring will be continued. Findings that call for remediation include: landslides, mass wasting, gully formation, rill or sheet erosion, sediment produced on-site or transported off-site, and vandalism-caused erosion or sedimentation. At the end of the monitoring period specified in the SWPPP, remove and dispose of erosion control structures (e.g., silt fences, straw wattles, straw bale barriers) when no longer needed.

**Erosion/Sedimentation Remedial Measures:** Repair or replace erosion control structures; if needed, replace failed structure with a more effective structure (e.g., replace straw wattles with silt fencing if sediment is produced at levels that are too high for straw wattles to control).

## INVASIVE NOXIOUS WEEDS

**Noxious Weed Performance Standard:** Invasive noxious weeds listed by the California Invasive Plant Council (Cal-IPC)<sup>5</sup> and CDFA (Cal-EPPC 1999; CDFA 2004) present in numbers and percent cover that is no greater than that found in adjacent areas not utilized during the project. No new species of invasive noxious weeds are found in areas disturbed during project construction.

**Noxious Weed Monitoring:** A qualified professional botanist will conduct post-construction monitoring during April or May of the first year following construction. Visual examination will be made of all sites in and adjacent to natural vegetation, high-value wetlands, special-status plant populations, and planted pasturelands. A written record will be made of conditions observed during monitoring. Remedial actions will be recommended for any sites where new species of invasive

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<sup>5</sup> The California Exotic Pest Plant Council changed its name in 2003 to the California Invasive Plant Council (Cal-IPC).

noxious weeds are identified (i.e., species not present in the vicinity prior to project construction), and for any sites where pre-existing weed species are present in numbers and percent cover that is greater than that found in adjacent areas not utilized during the project.

**Noxious Weed Remedial Measures:** Use species-specific methods, as described in section 4.0, to control invasive noxious weeds at sites where the performance standard has not been met.

## 6.0 REFERENCES

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## ATTACHMENT A-1: REPRESENTATIVE PHOTOGRAPHS



Photo 1. Pole 11 in foreground, looking east along existing line toward Sonoma Mountain. Non-native Grassland and vineyards in the foreground. (April 2004)



Photo 2. Pull site east of pole 29 --grazed Non-native Grassland in foreground, Coast Live Oak Woodland in background -- looking northeast. (February 2004)



Photo 3. Mixed Evergreen Forest, looking east from pole 35 to pole 36. (February 2004)



Photo 4. Vernal Marsh south of poles 41 and 42. Proposed temporary access road along shoreline; Upland Redwood Forest on right side of photo, looking east. (February 2004)



Photo 5. Rodgers Creek, a perennial stream with dense Riparian Forest, approximately 500 feet downstream from proposed spanned crossing site. (February 2004)



Photo 6. Rodgers Creek spanned crossing site, exhibiting dense Riparian Forest, between poles 42 and 43, looking west. (February 2004)



Photo 7. Existing access road to poles 43 and 44 proposed for temporary use during construction. Slope on east side of Rodgers Creek; Riparian Forest, looking north. (February 2004)



Photo 8. Vernal Pool in vicinity of pole 44, looking west toward pole 43 on ridge in distance. (February 2004)



Photo 9. Grazed Non-native Grassland, Coast Live Oak Woodland, looking east toward pole 45. (February 2004)



Photo 10. Proposed new temporary access road between poles 47 and 48 will cross unnamed ephemeral drainage tributary to Rodgers Creek (looking east). (February 2004)



Photo 11. Proposed new temporary access road in vicinity of poles 46 to 53, crossing site of unnamed ephemeral drainage tributary to Rodgers Creek, close-up, looking northeast. (February 2004)



Photo 12. High-quality grassland in the vicinity of poles 58 and 59. Special-status plant population (*cotula navarretia*) found here during 2003 and 2004 surveys. Proposed new permanent access road avoids this area. (February 2004)



Photo 13. Pole 59 in foreground, special-status plant habitat and unnamed ephemeral drainage tributary to Rodgers Creek in background. Proposed new access route avoids this area. (February 2004)



Photo 14. Riparian Forest along Felder Creek in middleground, looking northeast from vicinity of pole 63, toward Mayacamas Mountains in background. (February 2004)



Photo 15. Poles 64 to 66 (in vineyard) in middleground. Looking east along existing line; Felder Creek on left side of photo. (February 2004)



Photo 16. Proposed permanent access road between poles 68 and 69 crosses unnamed drainage tributary to Felder Creek (looking west to pole 68). (February 2004)



Photo 17. Proposed permanent access road between poles 69 and 70 crosses unnamed drainage tributary to Felder Creek (close-up looking southwest). (February 2004)



Photo 18. Proposed permanent access road between poles 69 and 70 crosses unnamed drainage tributary to Felder Creek (close-up looking northeast). (February 2004)



Photo 19. Riparian Forest with patches of the noxious weed wild fennel. Looking west along the existing line from the vicinity of pole 86. (February 2004)



Photo 20. Felder Creek crossing site at Leveroni Road, near pole 96, looking northwest, upstream; small native Oregon ash, valley oak on banks. (February 2004)



Photo 21. View to the north of an unnamed drainage, tributary to Felder Creek, which runs under Leveroni Road between poles 98 and 99. The line spans this drainage. (February 2004)

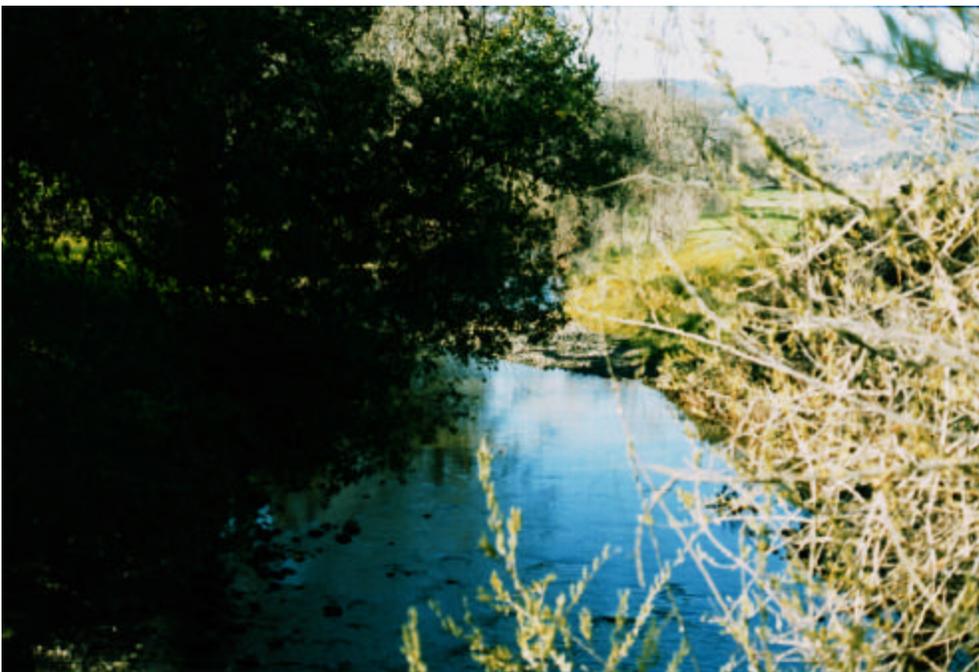


Photo 22. Carriger Creek crossing site at Leveroni Road, between poles 101 and 102, looking northwest, upstream; oaks and willows on banks. (February 2004)



Photo 23. Proposed location of new temporary road, pull site, and portion of landing zone/staging area in planted pasture. Looking east from entrance to house near pole 103. (February 2004)