TRUCKEE RIVER WATERSHED COUNCIL

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April 2, 2013

Request for Proposals
Negro Canyon Restoration Design

The Truckee River Watershed Council (TRWC) seeks to hire a consultant to complete a restoration design plan for several sites within Negro Canyon, a tributary to Donner Lake in the Truckee River watershed. The goals of the project are to reduce erosion, improve water quality, and restore native riparian and upland habitat. Final plans and specifications must be certified by a California Registered Civil Engineer.

The project is located in a "backcountry" setting. Restoration approaches that consider challenging access, lack of water, and need to minimize the project footprint are encouraged.

Proposal Deadline

Proposals are due by 5 PM on Tuesday, April 23rd.

Proposal Submission

Submit proposals electronically to:

Beth Christman: bchristman@truckeeriverwc.org

1.0 Introduction and Background

1.1 Project Overview

The Negro Canyon watershed has experienced significant impacts through past land use including intense logging, fire, and construction of Interstate 80. These impacts have led to the development of a poorly constructed road network that has disrupted natural drainage patterns and is causing significant erosion. Restoration work will primarily consist of restoring abandoned road alignments, revegetating areas with native plants, restoring eroded stream channels, and re-establishing natural drainage patterns. Significant habitat and water quality improvements are expected to result from project implementation.

Specific effects of past land use include:

Construction of road network for timber harvest. By 1952, the main system of logging roads had been constructed, causing many direct channel impacts. Where the main roads crossed larger perennial

channels, crossings were constructed with fill and culverts. Culverts were often undersized, resulting either in erosion or aggradation and abandonment of the culvert. Culverts were typically not installed on roads crossing ephemeral drainages. In most cases, the fill is actively eroding and the resulting sediment is moving downstream, impacting habitat and causing channel instability. Due to the steep nature of the watershed instability is able to propagate through the length of the stream channels. In the eastern half of the watershed, roads have captured and diverted ephemeral channels causing even more significant erosion.

Changes to hydrologic function. Nearly the entire watershed was deforested between 1940 and 1980. Timber harvest on this scale has inevitable hydrologic consequences, primarily resulting in flashier and more concentrated runoff periods. These changes to the natural runoff patterns are a result of the removal of the forest canopy, compaction of soils, and decreased infiltration due to harvesting. The road network amplifies the impacts to hydrologic function by capturing drainages at sites where culverts have failed.

The effects of past land use are particularly significant in the eastern half of the Negro Canyon watershed, our project location. This is due to the relatively steep slopes, the somewhat drier conditions, and poorer soils as compared to the western half of the watershed.

A watershed assessment was completed in 2010 (Integrated Environmental Restoration Services (IERS), 2010a; available at: http://www.truckeeriverwc.org/images/documents/Negro_Canyon_Watershed_Assessment.pdf). The watershed assessment examined past land use, hydrologic function, geomorphic processes, and identified restoration opportunities within the watershed.

The current phase of the Negro Canyon Restoration project restores the eastern portion of Negro Canyon – sites D, E, F, G, H, and I on Attachment 1, Overview Map. Sites E, F, G, H, and I are located on property owned by the Truckee Donner Land Trust (TDLT) and Site D is located on property owned by Tahoe Donner Association (TDA).

1.2 Existing Studies and Previous Work

A watershed assessment was completed in 2010 and is available at: http://www.truckeeriverwc.org/images/documents/Negro_Canyon_Watershed_Assessment.pdf). The assessment identified degraded areas in the watershed and potential restoration actions for each degraded site.

A design plan has been completed for two of the six sites included in the current project, Sites G&H (IERS, 2010b). The design plan for G&H is included as Attachment 2 of this RFP. These previously produced design plans will be incorporated into the final project design by the selected Consultant.

1.3 Design Considerations

Access to sites within Negro Canyon is limited. Only two accepted motorized routes exist within the canyon and do not provide access to the restoration locations. Some limited quad access may be

possible, with consent of the landowners (TDLT & TDA). A non-motorized trail network and abandoned roads provide access to all the proposed restoration areas. Access to water for construction will be difficult and this limitation should be incorporated into project design.

Construction approaches that favor a cost-effective, low disturbance approach and limited footprint will be favored. Volunteer labor will be available to help with revegetation activities through Truckee River Day, held in October of each year. Project design should incorporate the effective use of volunteer labor.

2.0 Work to be completed

2.1 Project Work Tasks

Task 1. Meetings

At the onset of the project a meeting will be held with TRWC and TDLT to finalize the scope of work and discuss any landowner constraints on project design. Review meetings will be held at the 60% and 90% design plans. A community meeting will be held to present the final design plans.

Task 2. Data Review and Collection

Consultant will review existing data and collect additional site specific data necessary to complete project design. It is anticipated that field surveys will be necessary for project design and to determine permit quantities, limits of bed & bank, and floodplain area. Field data will include monumented cross sections of project sites and long profiles sited appropriately for pre- and post-project geomorphic monitoring.

Task 3. Conceptual Design Review

Consultant will participate in a field design review with TRWC, TDLT, and TDA to discuss project design elements. Field review will be completed at all six sites (D, E, F, G, H, and I) to discuss proposed project elements, landowner constraints, construction considerations, access, stockpiling, and staging. The Consultant should have completed sufficient analysis to propose treatments, access routes, water quality considerations, and some materials estimates. The goal of the field review meeting is to gain consensus to move forward into engineering design.

Task 4. 60% Restoration Design Plans

Consultant will produce 60% restoration design plans for four of the sites (D, E, F, and I; Attachment 1 Overview Map) and incorporate previously produced plans for sites G & H (Attachment 2, Design plans). The 60% design should include (but are not limited to) all major project features, access routes, stockpile and staging areas. Any required analyses should be completed. Estimates of cut and fill quantities and area of disturbance by habitat type should be provided at a sufficient level of detail for permitting.

Task 5. 90% and 100% Restoration Design plans

Consultant will produce 90% Restoration Design plans for all six of the sites. The 90% Design plan will also incorporate a trail alignment developed by TDLT. The 90% Restoration Design plans will be a draft version of the final plan. Complete plans and specifications will be produced at this stage, and a detailed itemized cost estimate will be included. The final design plans will include an erosion control plan and revegetation plan.

Consultant will produce 100% restoration design plans incorporating feedback from TRWC, TDLT, and TDA. Final 100% design plans must be stamped by a California Registered Civil Engineer and will be of sufficient detail for project construction.

Task 6. Permit Assistance, Including Stormwater Pollution Prevention Plan

Consultant will provide cut and fill quantities and disturbance areas needed to complete environmental permitting, including 401 Water Quality Certification (Lahontan Regional Water quality control board), Nationwide 27 Authorization (US Army Corps of Engineers), 1600 Lakebed and Streambed Alteration agreement (CA Dept. of Fish & Wildlife), and Nevada County grading permit.

The volume, linear length, and surface area of disturbance by habitat type will be provided. Amount of disturbance in the 100 year floodplain will be calculated. Consultant will also provide construction drawings showing areas of wetland/Waters of the U.S. impacts (extent of WOUS provided by TRWC), construction access routes, stockpile and staging areas, and 100-year floodplain to be included in permit applications.

Consultant will develop a Stormwater Pollution Prevention Plan required for Construction General Permit/NPDES application to the State Water Resources Board. The SWPPP will be completed by a Qualified SWPPP Developer (QSD).

Task 7. Construction As-builts and Final Engineer's inspection

The Consultant will complete construction as-built drawings of the project after construction is completed. The as-builts will include repeating cross sectional and long profile measurements to compare to pre-project conditions. The consultant will also provide TRWC with a map and shapefile showing the location of the completed project. The Consultant will complete a final engineer's inspection and certification by a California Registered Civil Engineer that the project has been completed in accordance with submitted final plans and specifications.

Task 8. Coordination and reporting

Consultant will coordinate with TRWC staff regarding the status of the project, as well as design issues. Consultant will produce quarterly invoices and progress reports and submit to TRWC by the 25th of the last month of the calendar quarter (with the exception of December: March 25th, June 25th, Sept. 25th, and Dec. 15th). Copies of all survey or other data collected and analyses will be provided to TRWC in electronic form (Word, Excel, or Adobe pdf).

Future work

A separate contract may be developed for construction supervision. The scope and budget for such work will be developed at a future date.

2.2 Deliverables

- Field Review Meeting
- 60% Design plans including quantities needed for permitting
- 90% Design plans
- Final 100% design plans, stamped by a registered California Civil Engineer
- Participation in meetings at 60% and 90% plan completion
- Public presentation of final project plan
- Digital copies of all data collected and analyses performed

2.3 Schedule

Activity	Completion Date
Proposals Due	April 23rd, 2013
Interviews with top 2-3 applicants	April 30th – May 1st, 2013
Kickoff planning meeting	May 17th, 2013
Final scope and contract	May 24th, 2013
Concept Design Field Review Meeting	July 8th, 2013
60% Design & Review Meeting	August 8th, 2013
Permit Drawings	August 8th, 2013
90% Design & Review Meeting	October 30th, 2013
100% Design and Construction Documents	December 15th, 2013
Public Presentation	January 2014
Quarterly Invoicing and Reporting	March 25th, June 25th, Sept. 25th, and Dec. 15th, through March 2014

2.4 Desired Qualifications

- Licensed Civil Engineer, currently registered in the State of California
- Licensed Qualified SWPPP Developer
- A minimum of three constructed projects with similar objectives
- Experience in geomorphology and hydrology
- Experience with restoration project design
- Experience with developing construction plans for similar projects
- Ability to work with diverse stakeholder group
- Proven ability to design cost effective projects with challenging access considerations

3.0 Proposal Format

3.1 Detailed work plan

Scope: Define specifically the scope of services to be provided to perform the above described completion of restoration design and construction documents for the Negro Canyon Restoration project. The contractor may elect to suggest modifications to the scope above or include optional tasks to be considered or negotiated. Include estimated time schedule of the major tasks to be accomplished.

Objectives: Identify and discuss briefly the specific objectives you will achieve through the conduct of the services within the project, as defined and specified above.

Detailed work approach: Discuss in detail each of the activities you will conduct to achieve the scope and objectives defined and identified above. List personnel that will be available to work on the project. Please specifically address work components outlined in the Work to be Completed section above, and elaborate as needed. Please specifically address what further studies will be conducted to develop final design plans and construction documents. Modifications to the components listed in the work statement can be included. Technical merit, details of work, and experience of team proposed will be heavily weighted in proposal evaluation.

There is no page limit, but concise writing and graphics are greatly appreciated.

3.2 Background and References

- List current and previous experience in geomorphic assessment and restoration project design
- Include a duty statement and resume of each key person to be assigned to the project, by name and title, with experience in pertinent fields. Include a breakdown of personnel assigned to each subtask and estimated hours
- If subcontractors may be used, include a description of those persons or firms listing qualifications
- Provide a minimum of three references for similar projects, with name and phone number

3.3 Project Cost

Travel and per diem are NOT allowed under this funding source, and cannot be included in the proposal cost estimate.

The maximum budget available for design work is $37,500, however cost effectiveness will be considered during proposal evaluation.

Once a contractor is selected, TRWC will attempt to negotiate a satisfactory contract and reasonable fee for the services needed. In the event a satisfactory agreement cannot be negotiated with the top ranked qualified firm, the negotiations shall be terminated with the firm and the negotiations continued with the remaining qualified firms in order of their ranking.

Overhead not directly related to project costs will not be allowed.

4.0 Contract Terms and Agreements

When the contract for the Negro Canyon Design is awarded, the following terms will apply.

4.1 Payments

Progress payments for services performed shall be made in arrears upon receipt and approval of contractor's detailed invoices indicating costs and obligations incurred and services rendered to date. Payment to the Contractor will be dependent upon TRWC receiving payment from the project funder (State of California - Department of Water Resources). Payments will be made quarterly.

4.2 Mileage and Per Diem

Mileage and per diem expenses are not allowed under this contract.

4.3 Changes in Personnel

Contractor's key personnel as indicated in contractor's response to the RFP may not be substituted without the written consent of the TRWC Project Manager. This will be monitored and enforced by TRWC.

4.4 Termination for Convenience

TRWC may, at its option, terminate the contract at any time upon thirty (30) day written notice to contractor. Contractor may submit written request to terminate only if TRWC should substantially fail to perform its responsibilities as provided in the contract. If terminated, contractor will be compensated for costs incurred up to the time of the termination notice for work satisfactorily completed. In no event shall payment of such costs exceed the contract price.

4.5 Unique Billing of Work

All work produced for the Negro Canyon Design will be original for TRWC, and will not have been billed to other clients previously. Work produced under the contract with TRWC will be billed only to the contract with TRWC and not to other clients or funders.

4.6 Liability Insurance

Contractor shall provide before entering the premises and shall maintain in force during the term of this contract the following liability insurance:

General Liability
Motor Vehicle Liability

Each policy of liability insurance described above shall be in an amount of not less than One Million Dollars ($1,000,000) per occurrence for bodily injury and property damages combined.

4.7 Quarterly Reports

Contractor to provide quarterly progress reports and meet with TRWC representatives upon reasonable notice to allow TRWC to determine if the contract is on the right track, whether the project is on schedule, provide communication of interim findings, and afford occasions for airing difficulties or special problems encountered so that remedies can be developed.

Quarterly Invoicing will include detail of task, delineated staff by name, hours, rate, total for the period, and remaining amount. Reports will be submitted in Microsoft Word/Excel or Adobe.

4.8 Drug Free Work Place

Contract must comply with the requirements of the Drug-Free Workplace Act of 1990 (Government Code 8350 *et seq*.).

4.9 Retention of Records

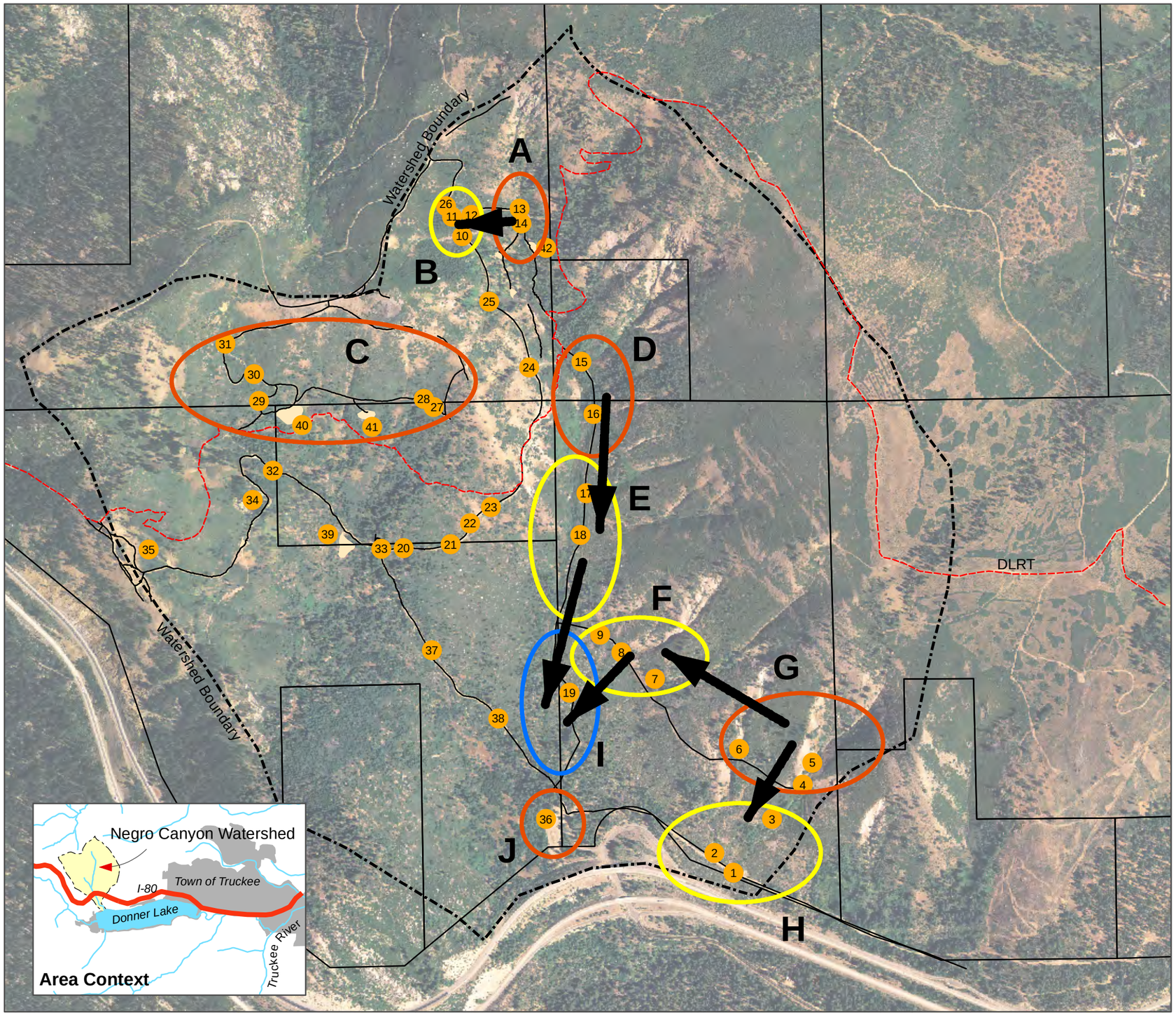
All records pertaining to this contract shall be preserved for at least three (3) years after Project completion.

4.10 Non-discrimination

Contractor shall not unlawfully discriminate, harass, or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, physical disability (including HIV and AIDS), mental disability, medical condition (cancer), age (over 40), marital status, and denial of family care leave. Contractor shall ensure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment. Contractor shall comply with the provisions of the Fair Employment and Housing Act (Government Code Section 12990 (a-f) *et seq*.) and the applicable regulations promulgated there under (California Code of Regulation, Title 2, Section 7285 *et seq*.).

ATTACHMENTS
Attachment 1. Overview Map
Attachment 2. Design plans for Sites G&H

Attachment 1. Overview Map



Negro Canyon Watershed Assessment

Figure 5-3 Projects

The purpose of this map is to locate projects and suggest a method for linking projects.

Initial Projects

These projects can be started any time in the future.

Subsequent Projects

These projects should begin construction after completion of any related initial projects.

It is possible that projects can be combined, provide they follow the above sequence.

Area of High Erosion

1

The number corresponds to the text in Chapter 4. Please see text for details.

0 0.125 0.25 Miles

0 250 500 Meters

N

Scale: 1:12,000

January, 2009

Integrated Environmental Restoration Services, inc
River Run Consulting, LLC
Map Drawn by Gerald Dion

Negro Canyon Restoration Plan: Phase I – Projects G and H

Prepared by

Kevin Drake and Michael Hogan

Integrated Environmental Restoration Services

Matt Kiesse

River Run Consulting

Prepared for

Beth Christman

Truckee River Watershed Council

August 2010

Introduction

Negro Canyon is located within the Gregory Creek watershed just west of Truckee, California. Gregory Creek drains into Donner Lake and eventually the Truckee River. Negro Canyon has been impacted for more than 150 years by many types of human use including logging, grazing and off-highway vehicle use. These impacts (particularly road building) have led to accelerated erosion and sediment transport from Negro Canyon.

In 2008, an erosion-focused watershed assessment was conducted to evaluate geomorphic conditions, stream channels and upland sediment sources and define specific actions to improve watershed conditions. This assessment identified specific problem areas and grouped these into manageable projects for future implementation. The projects described in this restoration plan are based on this watershed assessment and represent the first major step toward improving watershed conditions in Negro Canyon.

Overview

This restoration plan encompasses five inter-related projects, which are shown on the Overview Map (Sheet 1):

- Project G1 (Sheet 2) involves removal of fill material associated with past road construction as well as broadening, regrading and stabilizing the existing stream channel.
- Project G2 (Sheet 3) is very similar to G1 but smaller in scale.
- Project G3 (Sheet 4) includes outsloping, functionally decommissioning and revegetating an old road that currently captures and channelizes runoff, directing sediment to Gregory Creek. The section proposed to be removed runs between projects G1 and G2. However, road decommissioning could continue further to the west if desired.
- Projects H1 and H2 (Sheet 5) include rock armoring and revegetation to stabilize eroding gullies and ephemeral drainages.

Goals

- Reduce erosion created by past road construction
- Reduce impacts to hydrologic function (particularly concentration of flows)
- Maximize use of onsite materials and minimize import/export

Construction Quantity Estimates

The following quantity estimates have been prepared to help scope the level of effort that will be required to complete the construction project. Quantities presented below are

estimates and were derived using a combination of field measurements and analysis tools in ArcGIS.

Table 1. Treatment area estimates by project, broken down by in-channel and upland areas.

Project	Channel	Upland (SF)	Total (SF)
G1	2,978	5,985	8,963
G2	770	1,574	2,344
G3	0	17,500	17,500
H1	750	50	800
H2	250	25	275
Total	**4,748**	**25,134**	**29,882**

Table 2. Treatment area estimates by project and treatment type.

Project	Treatment Type A: Upland Revegetation (SF)	Treatment Type B: Road Decommiss-ioning (LF)	Treatment Type C: Biotechnical Channel Bank Stabilization (LF)	Treatment Type D: Channel Grading (LF)	Treatment Type E: Drainage Stabilization (LF)
G1	5,985	0	165	65	0
G2	1,574	0	40	25	0
G3	0	17,500	0	0	0
H1	750	0	0	0	150
H2	25	0	0	0	25
Total	**8,334**	**17,500**	**205**	**90**	**175**

Table 3. Estimated cut and fill volumes by project. No cut or fill for projects H1 and H2.

Project ID	Area ID	Area (sq ft)	Avg Cut Depth (ft)	Volume (CY)
G1	A	200	2	12
G1	B	1,000	3	89
G1	C	800	3	71
			G1 Subtotal	***172***
G2	A	450	3	40
G2	B	600	1	18
G2	C	200	3	18
			G2 Subtotal	***76***
G3	n/a	17,500	3	1,556
			G3 Subtotal	***1,556***
			TOTAL	**1,803**

This document is organized into the following sections:

Section 1. Introduction
Section 2. Treatment Types
Section 3. Treatment Elements
Section 4. Construction BMP Plan

Treatment Types

There are four distinct treatment types that will be applied as part of this restoration plan. Each treatment type is a combination of specific treatment elements, which are described in the Treatment Elements section. The five treatment types are described below and summarized in the Treatment Matrix (**Table 4**).

Treatment Type A: Upland Revegetation

This treatment includes soil nutrient testing, soil loosening, application of salvaged topsoil or duff (and/or wood chips, if available), fertilizer, seeding and mulch (salvaged pine needles and brush). This treatment type is intended to reduce erosion by decompacting soil, increasing soil nutrients and water-holding capacity, and re-establishing an appropriate and self-sustaining native plant community.

Treatment Type B: Road Decommissioning

This treatment type includes recontouring (outsloping) the existing road followed by full upland revegetation (Treatment Type A). This treatment type is intended to functionally remove the road in order to eliminate concentration and channeling of surface runoff by creating an outsloping, roughened and discontinuous surface. Application of upland revegetation treatment will establish soil and vegetation conditions that will stabilize the treatment area, minimize erosion and maximize long-term ecological function.

Treatment Type C: Biotechnical Channel Bank Stabilization

This treatment type includes layering and staking of live salvaged willows and alders along channel banks ("brush matressing") and installation of pine needle wattles at the toes of slopes. This treatment type is intended to immediately reduce erosion by protecting stream channel banks from raindrop impacts and reducing the erosive force of surface runoff. Over time, some of the willow and alder will sprout, capture sediment and develop a strong network of interlocking roots and plant stems to provide longer-term slope stability.

Treatment Type D: Channel Grading

This treatment type includes localized channel grading to re-establish more continuous grades in existing stream channels, similar to those that existed prior to road construction. All graded sections of channel will be rock-lined with screened, salvaged rock at the end of each work day.

Treatment Type E: Drainage Stabilization

This treatment type includes rock armoring and spot revegetation to stabilize eroding gullies and smaller drainages.

Table 4. This treatment matrix summarizes treatment elements associated with each treatment type.

Treatment Elements	Treatment Type A: Upland Revegetation	Treatment Type B: Road Decommiss-ioning	Treatment Type C: Biotechnical Channel Bank Stabilization	Treatment Type D: Channel Grading	Treatment Type E: Drainage Stabilization
Topsoil, Duff and Mulch Salvage and Reuse	X	X			X
Soil Nutrient Testing	X	X			X
Wood Chip Amendment	X	X			X
Recontouring		X	X		
Soil Loosening	X	X			X
Fertilizer	X	X			X
Seed	X	X			X
Mulch	X	X			X
Channel Grading				X	
Rock Salvage and Channel Armoring				X	X
Pine Needle Wattles			X		
Brush Matressing			X		
Treatment Area Protection	X	X			

Treatment Elements

This section describes each of the specific treatment elements that are the building blocks of the restoration treatment process for the Negro Canyon Restoration Project. All treatment elements referenced in the Treatment Types section are described in detail below. This section includes the following treatment elements:

1. Topsoil, Duff and Mulch Salvage and Reuse
2. Soil Nutrient Testing
3. Wood Chip Amendment
4. Recontouring
5. Soil Loosening/Surface Roughening
6. Fertilizer
7. Seed
8. Mulch
9. Rock Salvage and Channel Armoring
10. Pine Needle Wattles
11. Brush Matressing
12. Treatment Area Protection

Topsoil, Duff and Mulch Salvage and Reuse

Prior to reshaping and/or soil loosening, the top 4-6 inches of topsoil, duff and mulch shall be removed and stockpiled in designated areas. Although nutrient-rich topsoil is sparse at this site, the surface soil and associated duff and mulch material contains native seeds and beneficial soil microorganisms. Following reshaping and/or soil loosening, surface soil shall be reapplied in areas receiving revegetation treatment.

Soil Nutrient Testing

Soil samples will be taken in all revegetation treatment areas prior to implementation of restoration treatments. Soil samples will be sent to a lab to be analyzed for (at a minimum) organic matter and total Kjeldhal nitrogen. Fertilizer application rates will be determined based on the results of these soil tests.

Wood Chip Amendment

Wood chips are not planned to be imported due to poor access and the remote nature of this project. If wood chips are able to be generated at or near the project site, the following specifications will be applied.

Material

Wood chips shall consist of chipped, shredded or ground wood materials produced by a chipper or hammer mill-type tub grinder. Wood chips shall be derived from clean, disease-

free trees, branches or stumps. No wood chips or tub grindings derived from building materials shall be used.

Application

Aged wood chips shall be placed on the soil surface to a depth of 2-6 inches (depending on availability of material and soil conditions) prior to final tilling. Wood chips shall be mixed during the soil loosening process such that amendments are stratified with the greatest concentration of material toward the surface and becoming less concentrated at greater depths.

Recontouring

Recountouring refers to physical methods of altering the angle of a slope. On this project, recontouring will be applied to both stream channel banks and road cut and fill slopes to achieve restoration goals.

Stream Banks

Recontouring shall be used to "lay back" or reduce the steepness of stream channel banks marked on plans. Recontouring of channel banks will generate cut material that shall be used as fill to decommission and outslope the existing road (Project G3). All cut material shall be staged, sorted to remove large rocks for channel armoring, then screened through a 2-inch screen to remove all small rock for lining the stream channel bottom.

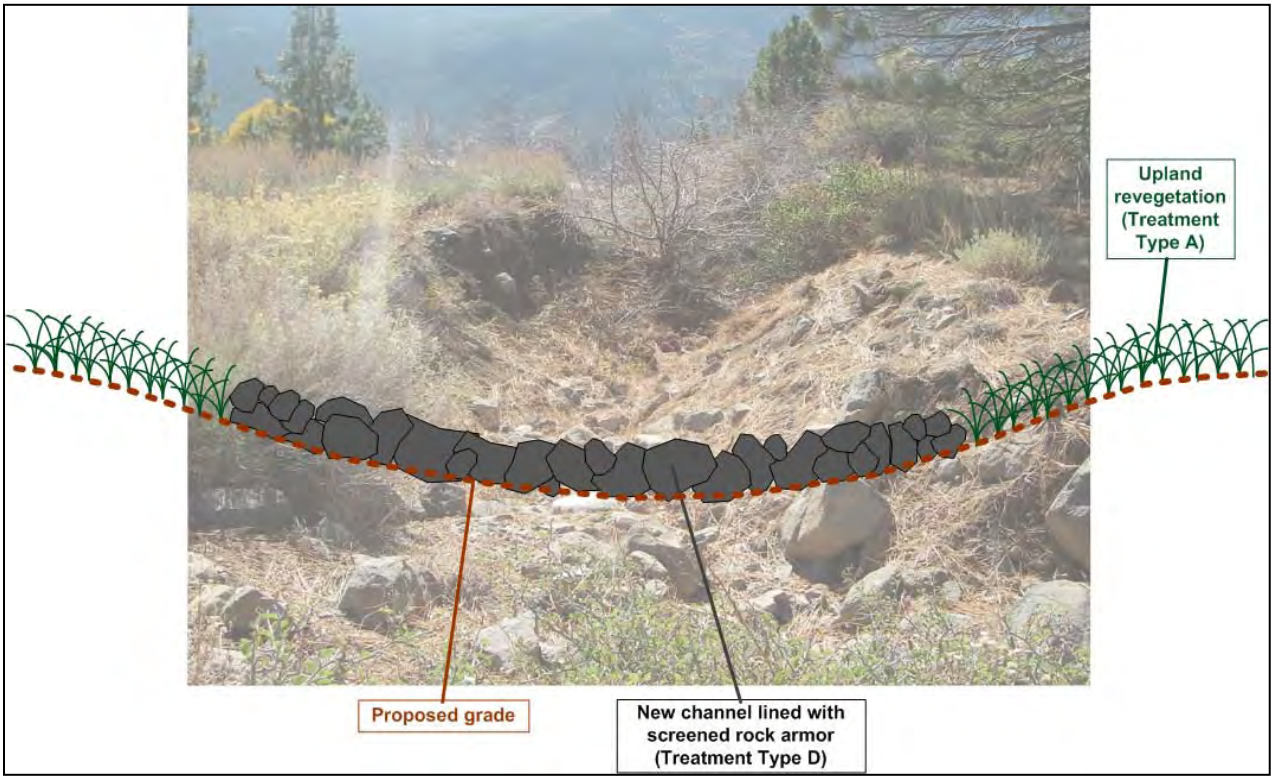


Figure 1. Detail illustrating stream bank recontouring.

Road Cut and Fill Slopes

Recontouring shall also be used to decommission existing roads. Cuts and fills exist along most of the length of the road to be decommissioned. Where possible, the road will be recontoured such that fill is brought back to the cut area so that the road surface is outsloped and the cut is at least partially buried. However, where there is not enough fill material to achieve this configuration (either from adjacent fill slopes or imported from Projects G1 or G2) or where the fill area is fully stabilized by mature vegetation and disturbance would result in less environmental benefit than no treatment, the cut and fill slopes and existing road surface will be treated in place using full upland revegetation treatment (Treatment Type A). Recontouring of roads is intended to functionally remove the road in order to reduce concentration and channeling of surface runoff by creating an outsloping, roughened and discontinuous surface.

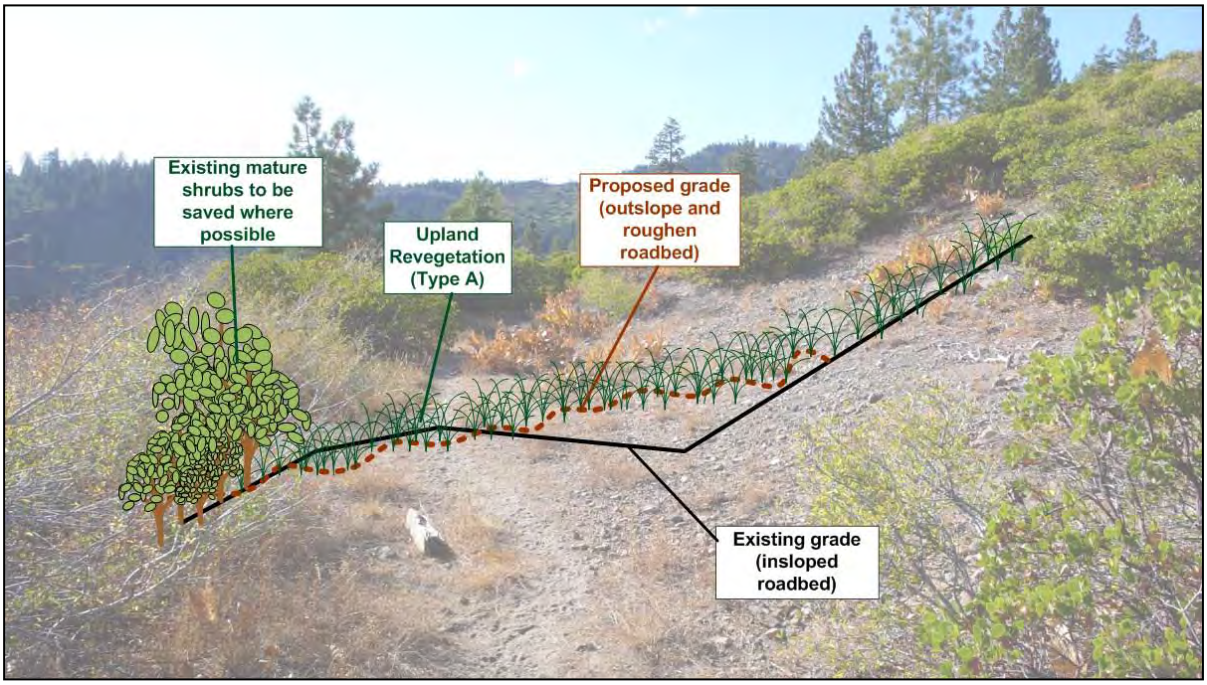


Figure 2. Detail illustrating road recontouring.

Soil Loosening/Surface Roughening

The term "soil loosening" (or decompaction) refers to a number of techniques (e.g. tilling, ripping) that remove compaction from the soil prior to implementation of surface treatments (fertilization, seeding and mulching). Following soil reshaping and/or prior to surface treatments, ALL disturbed soil shall be loosened or decompacted unless otherwise noted. Wherever equipment has traveled during the construction process, those areas shall receive loosening treatment whether the soil was intentionally compacted or not. Soil shall be loosened using a backhoe or excavator equipped with a bucket capable of mixing in topsoil and amendments and loosening the soil to a minimum depth of 12 inches. Soil may be loosened with a backhoe bucket equipped with cutting teeth if loosening is done such

that clods remain and soil is not pulverized. Soil may also be loosened by hand-tilling using implements such as pick mattocks or Pulaskis in areas where use of mechanized equipment is not practical or possible.

Soil tilling shall be conducted in a manner that mixes the subsurface material with the topsoil-amendment material and leaves the subsurface irregular or "scalloped" (i.e. rough, not smooth). See Figure 1 for a visual depiction of scalloping compared to typical topsoil-amendment application. Higher subsurface roughness decreases the chance of slumping or slope failures by "anchoring" the loosened soil and amendments near the surface until plant roots are established well enough to provide adequate soil strength. Soil conditions immediately following tilling shall be such that a cone penetrometer can penetrate to the specified loosening depth with a resistance pressure of no greater than 200 pounds per square inch.

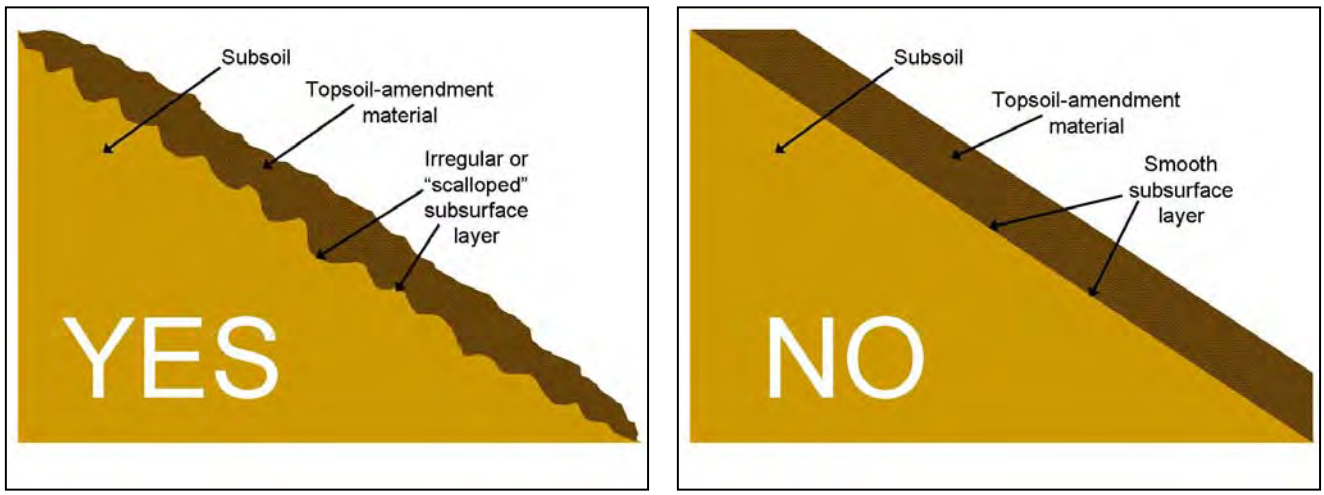


Figure 3. Comparison of tilling-scalloping (left) to typical topsoil-amendment application (right).

Following soil loosening, all further equipment traffic (and foot traffic to the greatest extent possible) shall be excluded from treatment areas. Wherever soil loosening is to take place, tree roots and existing plants shall be avoided wherever possible. Generally, no machine loosening shall take place within the drip line of mature trees or shrubs. Where tree roots are encountered, loosening shall take place by hand implements such as pick mattocks or Pulaskis to approximately six inches (6").

Following all treatment, soil shall be left in a roughened condition which mimics native soil roughness. Specifically, soil shall not be highly smoothed but instead, rocks will be left protruding from the surface and soil relief will be between four and eight inches (4-8") over a twenty-four inch (24") distance.

Fertilizer

Slow-release organic fertilizer shall consist of material (Biosol 6-1-3 or equivalent) containing no more than 10% total nitrogen of which no more than 1.5% is in mineral form. Preferred

material is derived from fungal mycelium byproduct with 5.5-7% total nitrogen (0.5% mineral form as $NH_4 + NO_3$), 1-3% available phosphoric acid (P_2O_5) and 3% soluble potash (K_2O).

Appropriate fertilizer application rate(s) will be determined by the soil-revegetation specialist based on the results of soil nutrient testing. Fertilizer shall be applied to the soil surface and incorporated into the soil to a depth of no more than two inches (2") by raking. Raking shall be done on contour (across the slope) or from the slope bottom to the slope top. Fertilizer shall not be raked from the slope top to the bottom or in a downward manner.

Seed

The seed mix described in Table 5 shall be used for all revegetation treatment areas on this project. Seed mixes shall be ordered pre-mixed. Seed shall be certified weed-free.

Following soil loosening, seed shall be spread by hand or hand applicator evenly across the treatment areas. Seed shall then be raked into the soil using the flat side of a steel rake so that seed is covered by a minimum of one-quarter inch (1/4") and a maximum one-half inch (1/2") of soil material. Hydroseed application is not acceptable since it makes raking in seed difficult and may cause premature germination.

Table 5. Seed mix

Species (Common Name)	*Species (Botanical name)*	PLS lbs per acre
Squirreltail (high-elevation collection)	*Elymus elymoides ssp. elymoides (Sierra)*	40
Mokelumne or El Dorado Brome (or other high-elevation Tahoe collection)	*Bromus carinatus (Mokelumne)*	20
Antelope Bitterbrush (+5500 ft. Sierra collection)	*Purshia tridentata*	8
Greenleaf Manzanita	*Ceanothus velutinus*	5
Sulfur-flower Buckwheat	*Eriogonum umbellatum*	3
Currant, Wax or Sierra	*Ribes spp. (cereum or nevadense)*	3
Western Needlegrass (or other high-elevation Tahoe collection)	*Achnatherum occidentale*	2
Common Sagebrush	*Artemisia tridentata*	1
TOTAL PLS POUNDS PER ACRE RATE		**82**

Mulch

Mulch shall consist of salvaged pine and fir needles and associated duff material, branches or wood chips. Any mulch material that is not salvaged from onsite shall contain no more than 0.5% garbage material by volume. Following seeding, all exposed soil shall be protected with one or more of the materials described above. Mulch materials shall be applied evenly to a depth of one to two inches (1-2") so that at least 98% of the soil surface is covered.

Channel Grading

The focus of channel grading and excavation is to remove existing grade breaks and head cuts in order to re-establish more continuous grades in existing stream channels, similar to those that existed prior to road construction. Existing grade breaks associated with roads have caused excess deposition and channel migration into unstable areas, resulting in large-scale erosion. Grading will be localized and cut and fill material shall be redistributed in the channel to achieve the target grade wherever possible. No import or export of spoils is expected to be necessary as part of channel grading. Both drainage channels where grading is planned are ephemeral. Channel grading shall not begin until all surface water has stopped flowing in the channel. All graded sections of channel will be rock-lined with screened, salvaged rock at the end of each work day.

Rock Salvage and Channel Armoring

All cut material shall be staged, sorted to remove large rocks for channel armoring, then screened through a 2-inch screen to remove all small rock. Small (2-inch minus) rock material will be used line the channel bottoms while larger sorted rock will be used to armor channels in both newly graded areas and areas of existing channel down-cutting.

For Project H1, soil shall be loosened and amended (per treatment type A - upland revegetation) prior to placement of a single layer of 4-8 inch rock to armor the drainages. Seed shall be distributed over the rock and swept into the cracks to encourage vegetation establishment between the rock armor.

Pine Needle Wattles

Pine needle wattles are constructed by loosely wrapping pine needles in high tensile strength coir fabric. Pine needle wattles are designed to maintain high surface contact on uneven terrain and to function as a sediment filtration device rather than a hydrologic barrier. Coir fabric shall consist of coir (coconut) DeKoWe 900 or equivalent. Pine needles shall be free of garbage, sediment and other deleterious materials. Pine needle wattles shall be secured along the seam a minimum of every 12 inches using rebar ties. Pine needle wattles shall be 12 inches in diameter and shall provide at least 8 inches of surface contact when placed on the soil. Pine needle wattles shall be secured with wooden stakes a minimum of every 24 inches in length.

Brush Matressing

Brush matressing is a biotechnical slope stabilization technique that involves layering and staking of salvaged willows and alders along stream channel banks.

Slope Prep

Soil on banks where brush matressing is being applied shall be smoothed to ensure consistent soil-stem contact. However, soil shall be left loose and not be compacted.

Brush Matress Construction

Brush used shall consist of 2-3 year old willow or alder branches (willow is preferable) that are flexible and 5-10 feet in length. Branches shall be harvested from dormant live willow or

alder and kept moist and cold until installation. Basal ends should range from 0.5 inches and 1.5 inches in diameter. Brush is placed perpendicular to slope with the basal ends buried in a shallow trench at the bottom of the slope below the channel bottom so that basal ends are buried in wet or moist soil. A 4-8 inch thick layer of brush is placed on the slope and held in place by either coir bristle twine or tie-wire attached securely to wedge-shaped wooden stakes. Stakes are 2 inches by 4 inches by 24-36 inches in length and diagonally cut. Tie-wire used shall be No. 12 galvanized annealed or equivalent. If bristle coir twine is used, it should be machine spun bristle coir, thickness 0.2 - 0.25 inch, with a breaking strength of 70-100 lb. Twine or wire is run perpendicular to the branches and diagonally from stake to stake and tied to the stakes with clove hitches.

Securing a brush mattress with stakes and wire.

Pine Needle Wattle Installation

After burying the basal ends of the brush in soil, place a pine needle wattle over the backfilled trench. Check to make sure the wattle has high surface contact. Stake wattle using 24-36 inch wooden stakes every 24-36 inches in length.

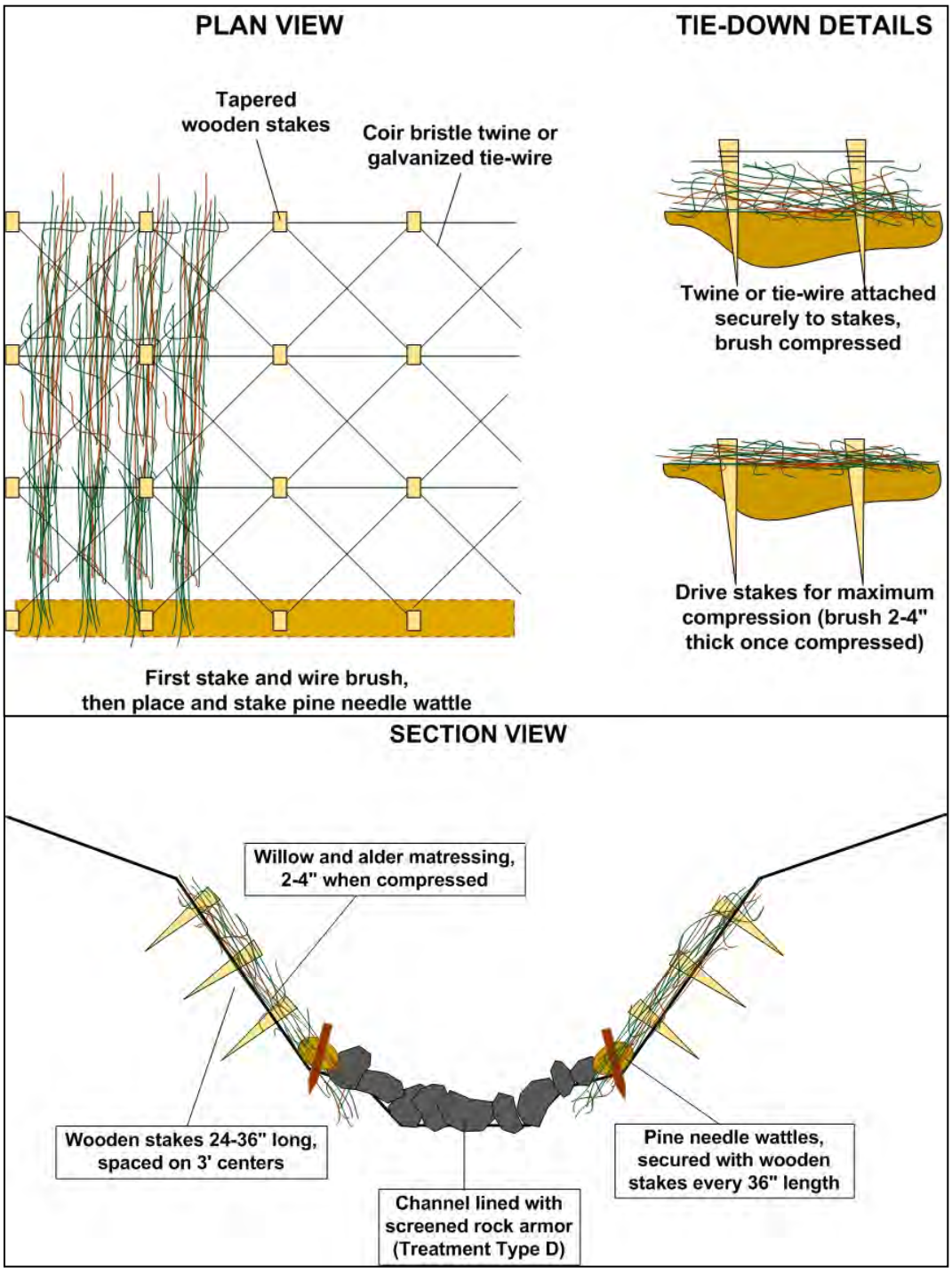


Figure 4. Brush matressing construction details

Treatment Area Protection

Following completion of soil and revegetation treatments, all further vehicle and equipment traffic (and foot traffic to the greatest extent possible) shall be excluded from treatment areas. Immediately following completion of soil and revegetation treatments, all treatment areas shall be made impassable by off highway vehicles using natural physical barriers such as logs, stumps and rocks.

Construction BMP Plan

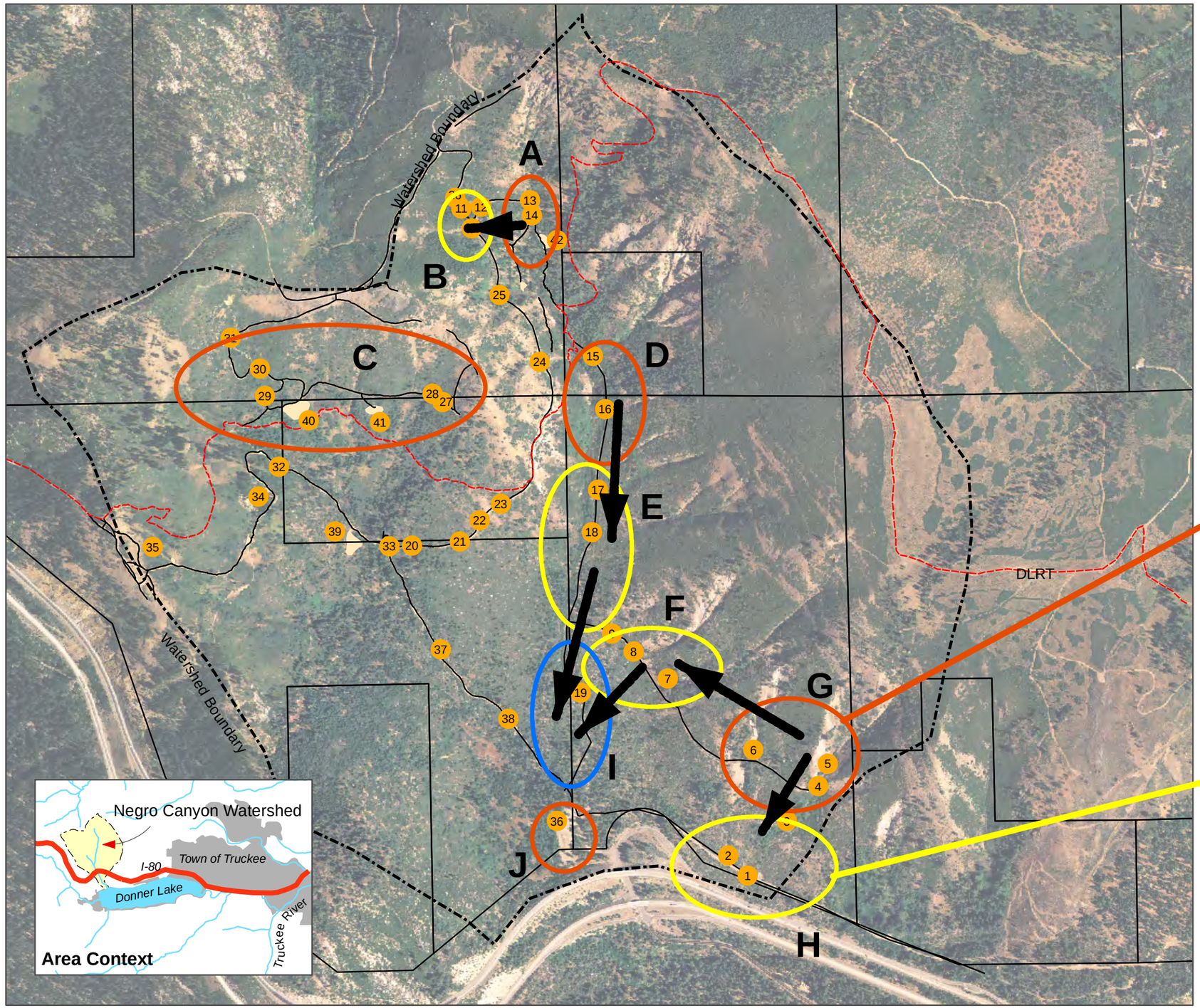
Protection of water quality is a top priority during the construction of the Negro Canyon Restoration Project. The following measures will be implemented to address potential water quality threats and to ensure the highest level of water quality protection possible during construction:

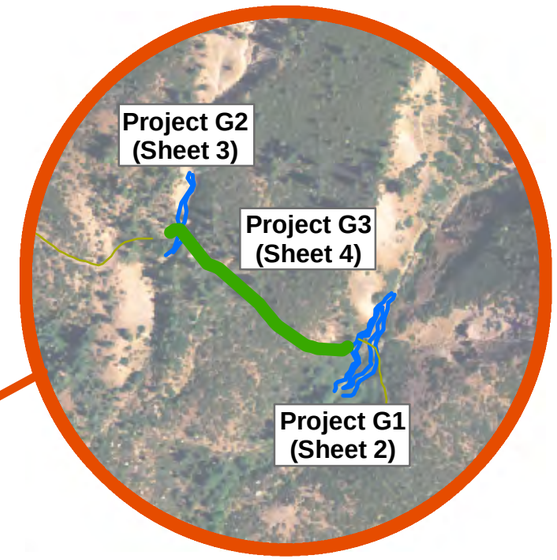
- **Seasonal Timing of Construction –** construction will take place during mid-summer (July-August) in order to minimize the chance of late-summer thunderstorms and fall rain.
- **Compressed Construction Period** – the project will be completed as quickly as possible with crews working full-time from the beginning to the end of the project. Expected project duration is 3-4 weeks.
- **Daily Stabilization of Disturbed Soil** – all disturbed soil will be fully stabilized at the end of each work day. Graded segments of channel will be lined with rock by the end of each day. Disturbed upland areas will receive revegetation treatment (including surface mulch) by the end of each work day. Overburden material will be stockpiled and surrounded with perimeter protection (pine needle wattle) by the end of each work day.
- **Hazardous Materials and Spill Protection** – hazardous materials planned to be used onsite include gasoline, diesel fuel and hydraulic oil. All hazardous materials shall be kept in sealed containers in a pick-up truck that leaves the job site at the end of each day. Any hazardous materials that must be stored onsite shall be stored in a containment area constructed of wattle berms lined with reinforced plastic. The containment area shall be completely leak-proof and shall provide capacity for 1.5 times the volume of all stored products. A spill kit will also be kept onsite at all times during working hours.
- **Tree Protection** – all trees larger than 12 inches shall be protected from equipment damage using wooden planks and/or perimeter fencing.
- **Minimize Areas of Disturbance** –vehicle and equipment travel paths shall be established and maintained in order to minimize the extent of soil disturbance.

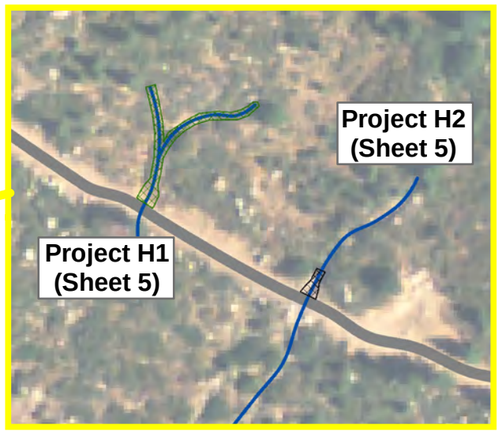
- **Stockpile Protection** – pine needle wattles shall be installed around all erodible stockpiles. All erodible stockpiles shall also be covered with reinforced plastic prior to any forecast precipitation.
- **On-Site BMP Supplies** – A BMP stockpile consisting of gravel bags, reinforced plastic and pine needle wattles shall be established. These BMP materials shall be located on-site in a readily accessible location that can be easily accessed in the case of an emergency.
- **Inspections and Reporting** – a daily BMP check list will be used to document site conditions, BMP installation and BMP maintenance actions on a daily basis (on working days). Pre-storm inspections will be conducted 24 hours prior to forecast storm events to identify and address any water quality threats and to ensure that BMPs are installed and functioning properly. Post-storm inspections will be conducted within 24 hours of storm events to document site conditions, storm damage and actions taken to respond to water quality threats.

Sheet 1
Negro Canyon Restoration Plan
Phase I Overview Map

The purpose of this map is to show the location of proposed projects relative to other projects identified in the Negro Canyon Watershed Assessment







0 0.125 0.25 Miles

0 250 500 Meters

N

Scale: 1:12,000

Map Drawn by Kevin Drake
August 2010

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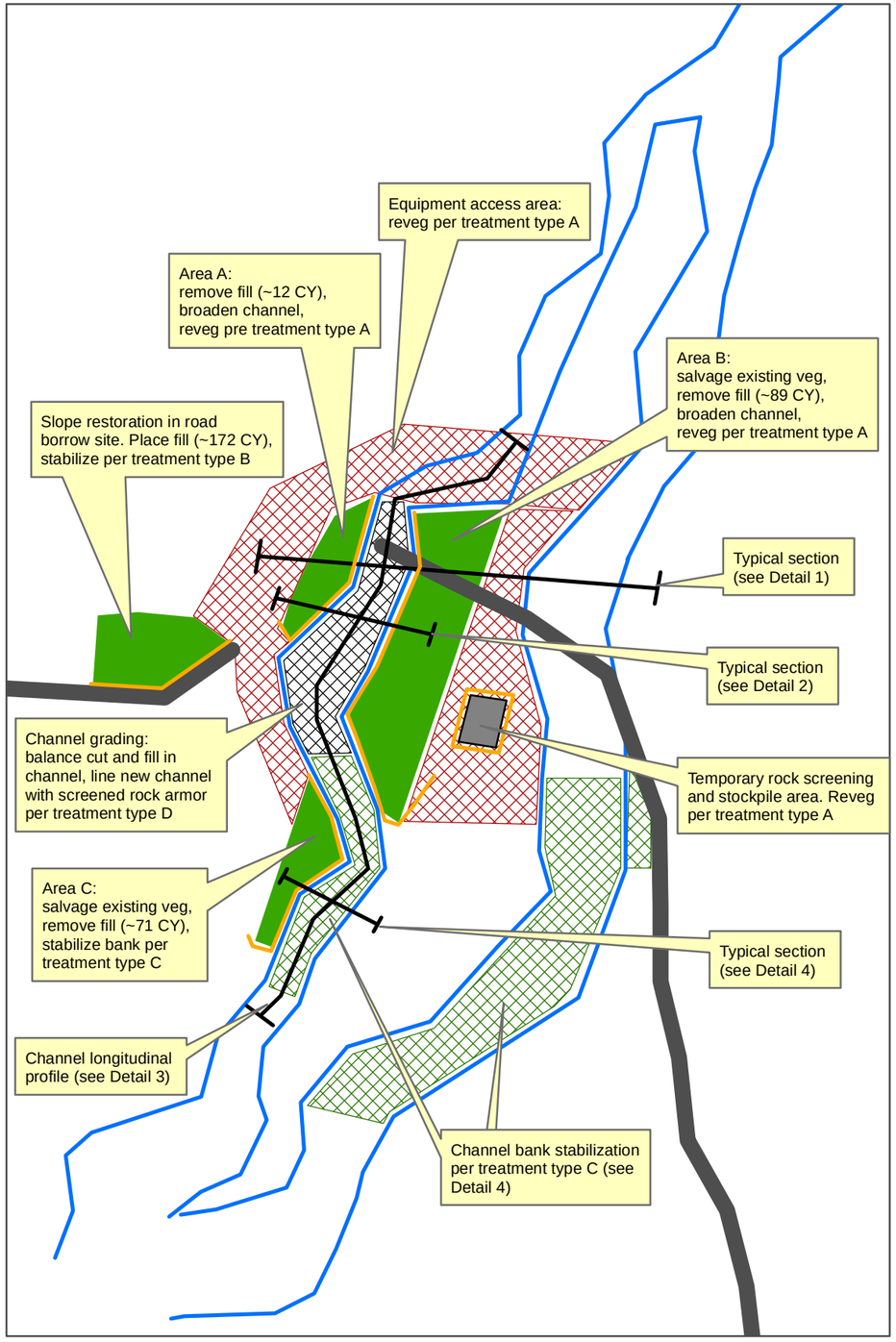
Sheet 2 - Negro Canyon Restoration Plan - Project G1



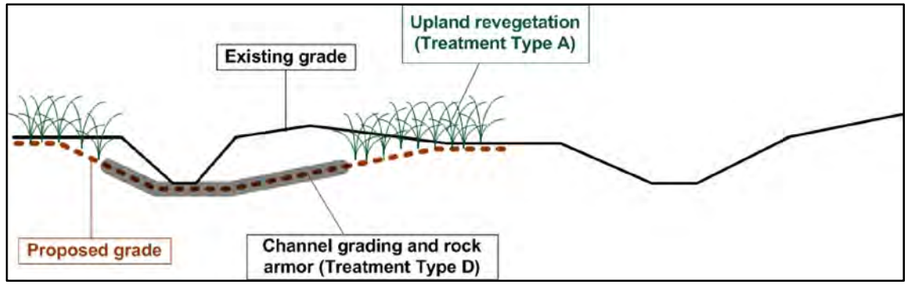
N

0 25 50 100 Feet

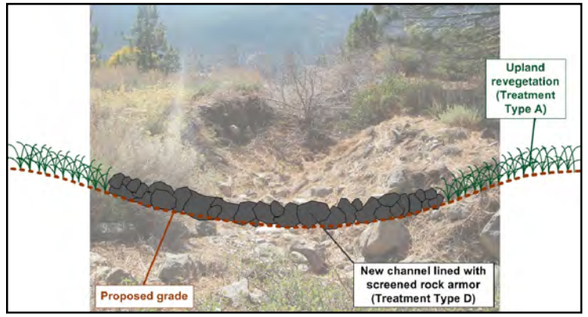
1 inch = 33 feet

Plans Drawn By Kevin Drake, IERS May 2010

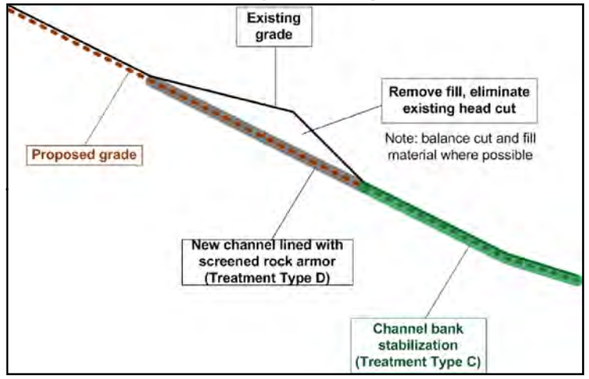
Detail 1. Double channel section



Detail 2. Main channel section



Detail 3. Channel longitudinal profile



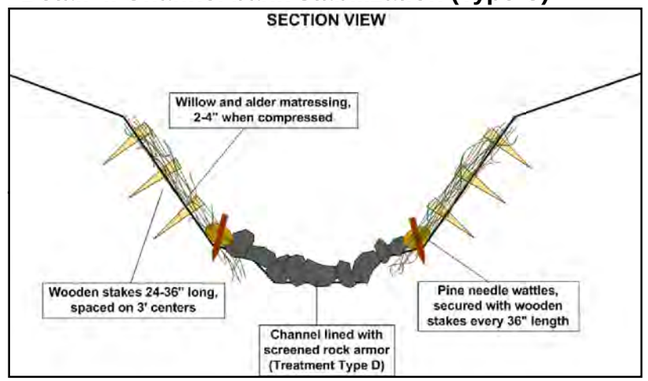
Cut/Fill Volume Estimates

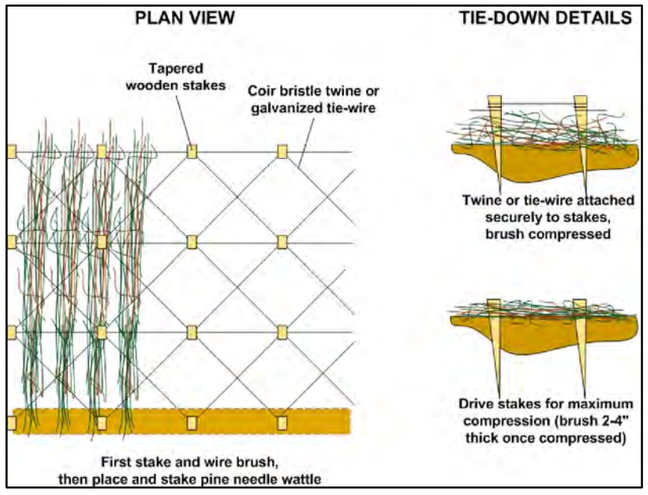
Project ID	Area ID	Area (sq ft)	Avg Cut Depth (ft)	Volume (CY)
G1	A	200	2	12
G1	B	1000	3	89
G1	C	800	3	71
			TOTAL	172

Legend

- Cut/Fill Areas
- Channel Bank Stabilization
- Equipment Access Area
- Channel Grading Area
- Existing Road
- Existing Drainages (top banks)
- Pine Needle Wattles

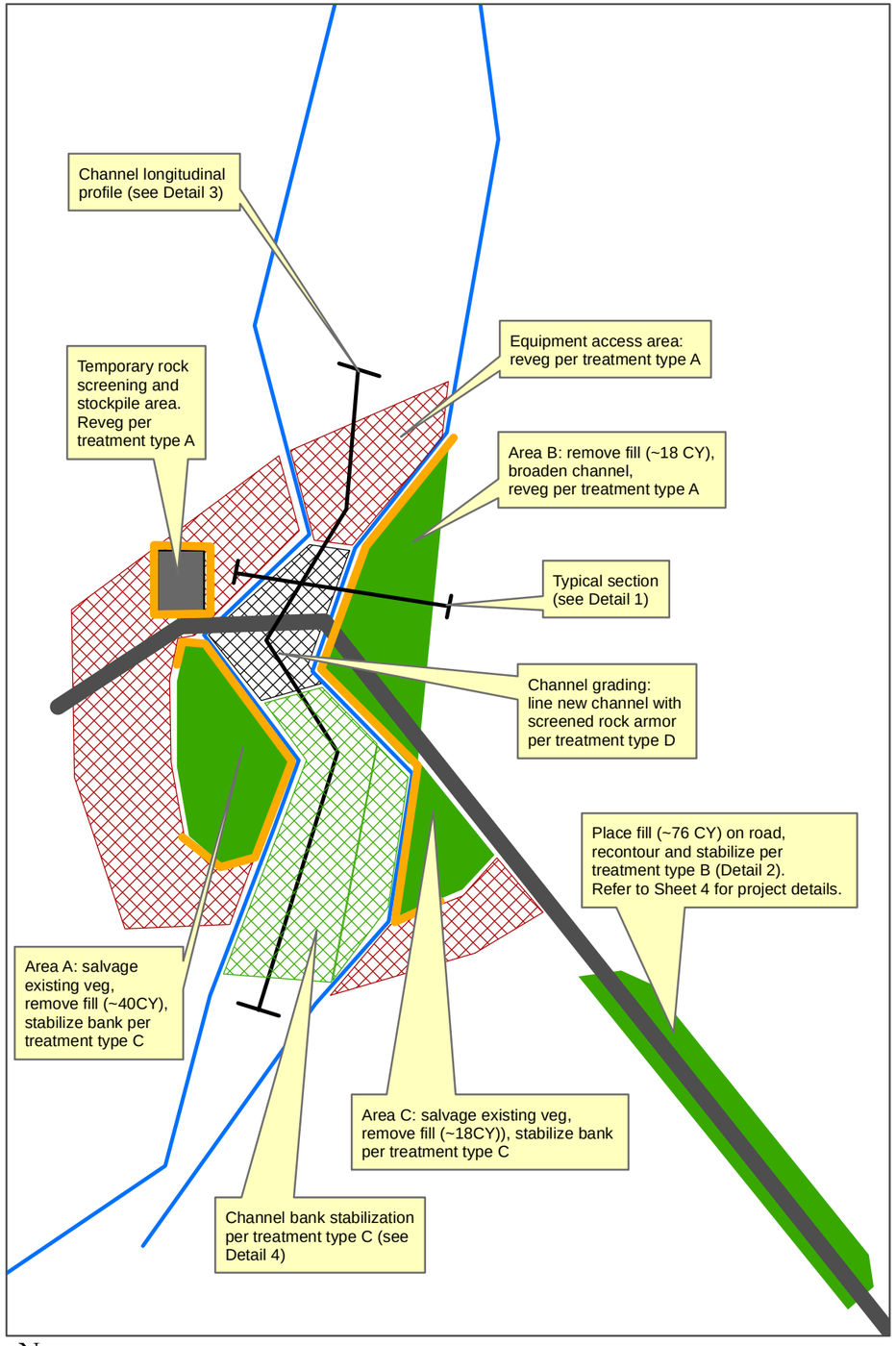
Detail 4. Channel bank stabilization (Type C)





Note: Design details not to scale

Sheet 3 - Negro Canyon Restoration Plan - Project G2



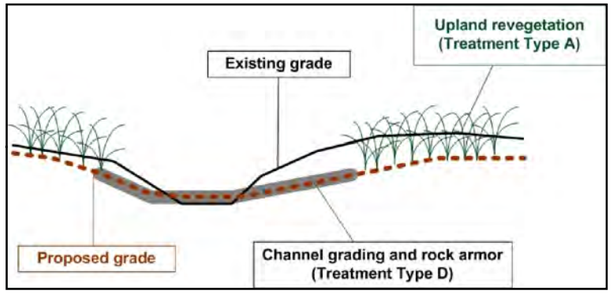
N

0 12.5 25 50 Feet

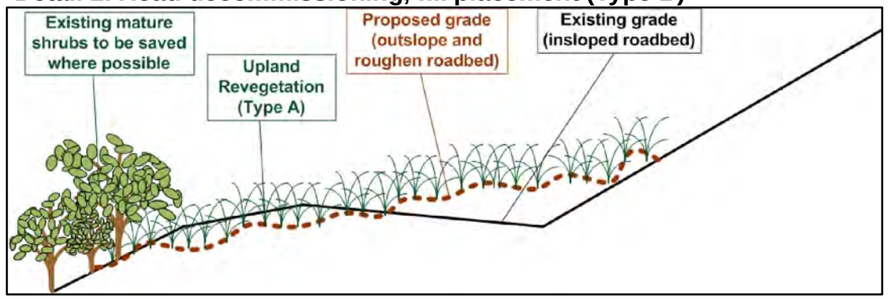
1 inch = 17 feet

Plans Drawn By Kevin Drake, IERS May 2010

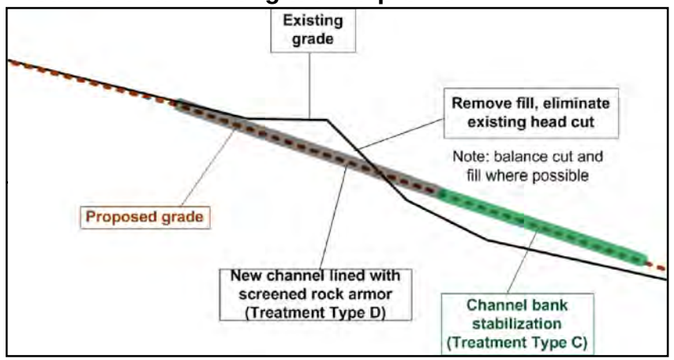
Detail 1. Channel section



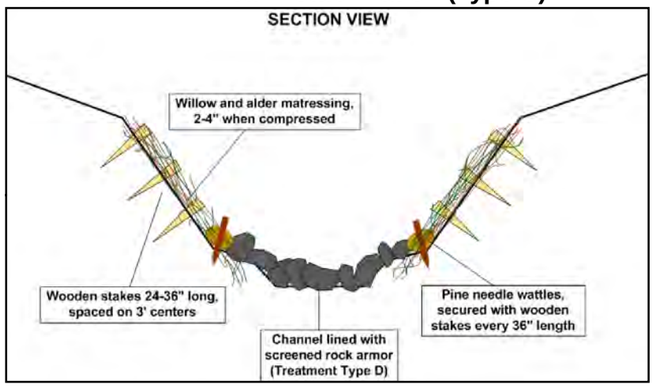
Detail 2. Road decommissioning, fill placement (Type B)



Detail 3. Channel longitudinal profile



Detail 4. Channel bank stabilization (Type C)

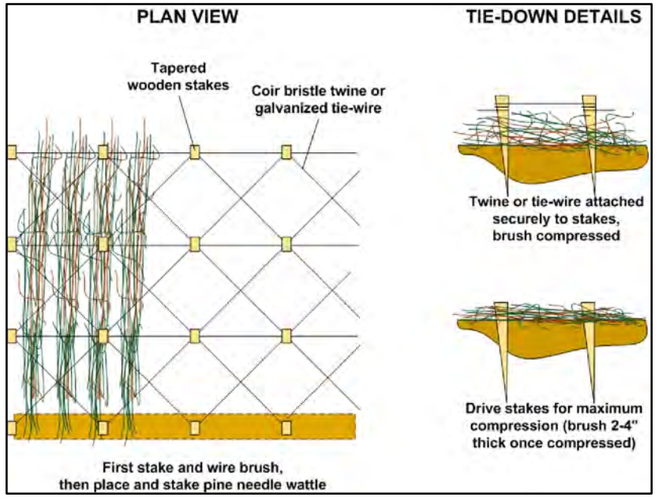


Cut/Fill Volume Estimates

Project ID	Area ID	Area (sq ft)	Avg Cut Depth (ft)	Volume (CY)
G2	A	450	3	40
G2	B	600	1	18
G2	C	200	3	18
			TOTAL	**76**

Legend

- Cut/Fill Areas
- Channel Bank Stabilization
- Equipment Access Area
- Channel Grading Area
- Existing Road
- Existing Dainages (top banks)
- Pine Needle Wattles



Note: Design details not to scale

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INTEGRATED ENVIRONMENTAL RESTORATION SERVICES, INC.

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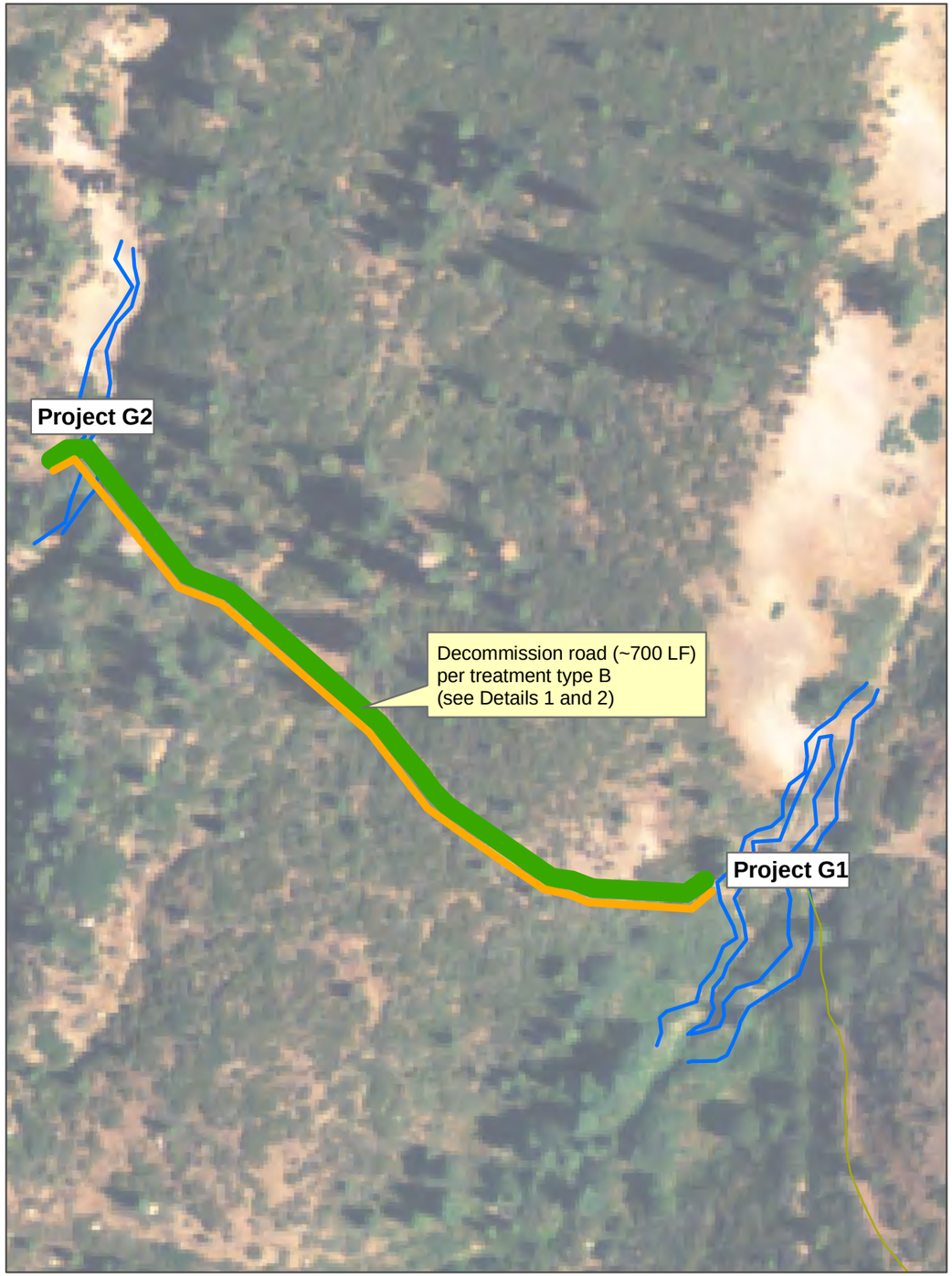
Sheet 4 - Negro Canyon Restoration Plan - Project G3



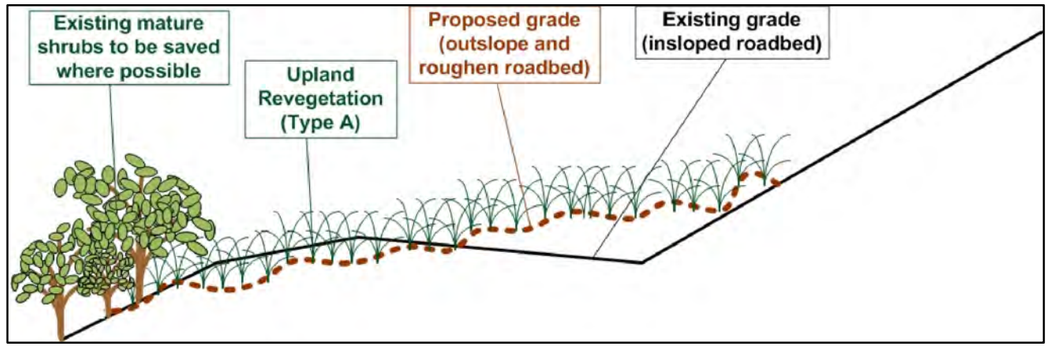
N

0 100 200 400 Feet

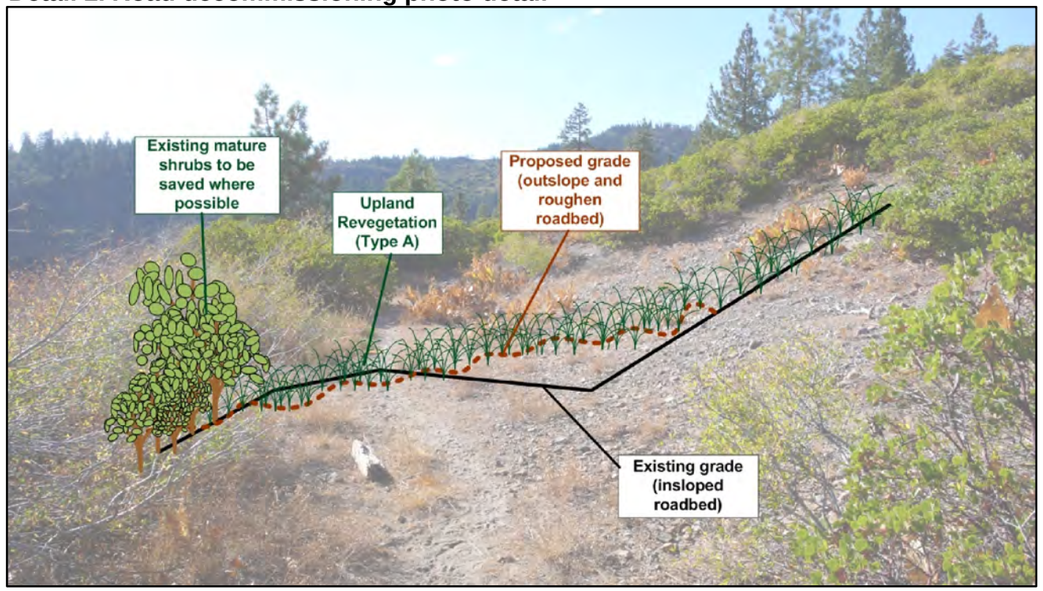
1 inch = 117 feet

Plans Drawn By Kevin Drake, IERS May 2010

Detail 1. Road decommissioning (Type B)



Detail 2. Road decommissioning photo detail



Legend

- Road Decommissioning/Restoration
- Existing Dainages (top banks)
- Pine Needle Wattles

Treatment Area Estimate

Project ID	Length (ft)	Avg width (ft)	Total sq ft	Avg Cut-Fill Depth (ft)	Volume (CY)
G3	700	25	17500	3	1556

Notes

- Design details not to scale.
- Fill material from projects G1 and G2 will be utilized to outslope road.
- Pine needle wattles will be installed downslope of active treatment areas until all bare soil is mulched.
- Road decommissioning could continue further west if desired.

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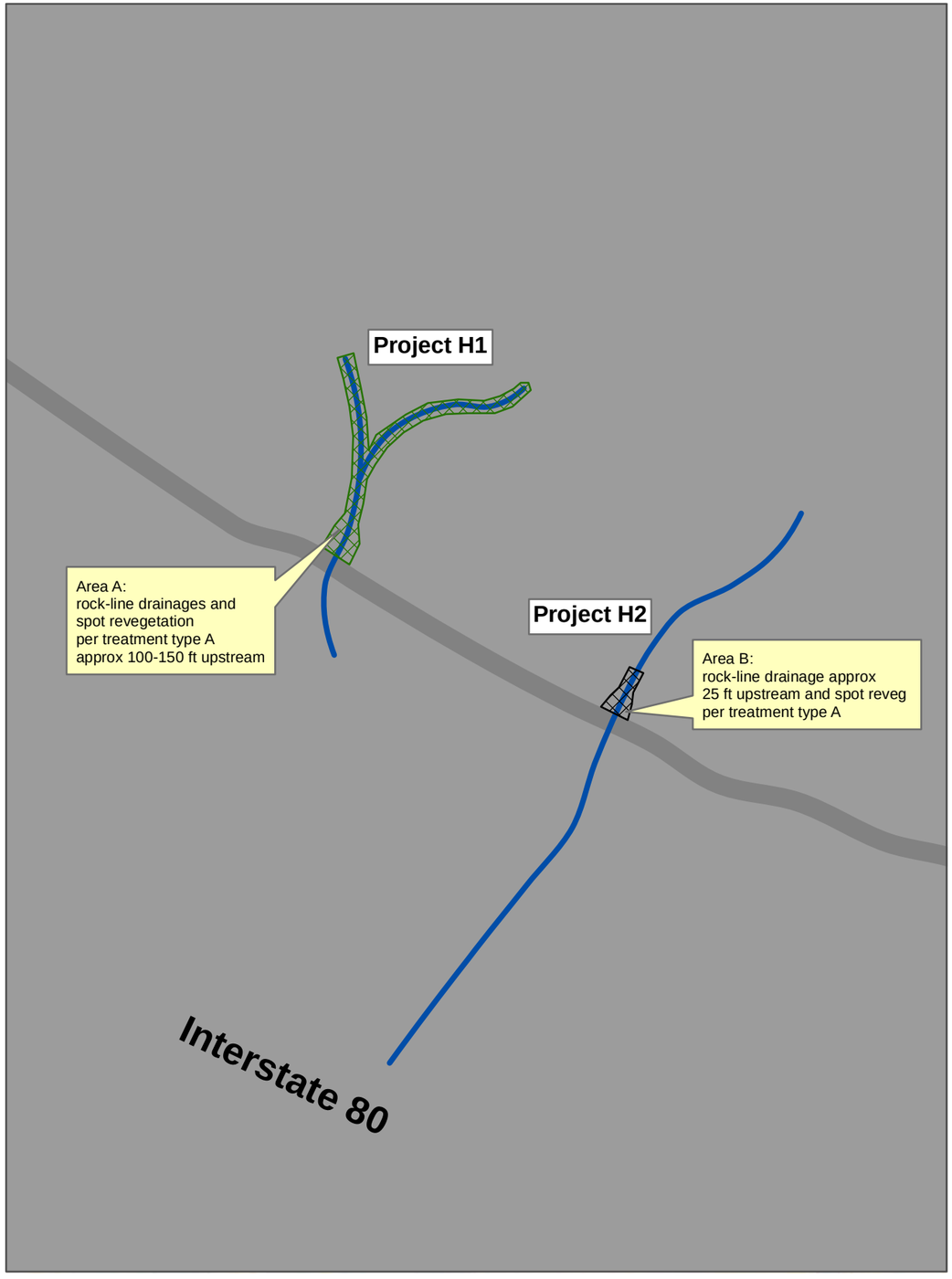
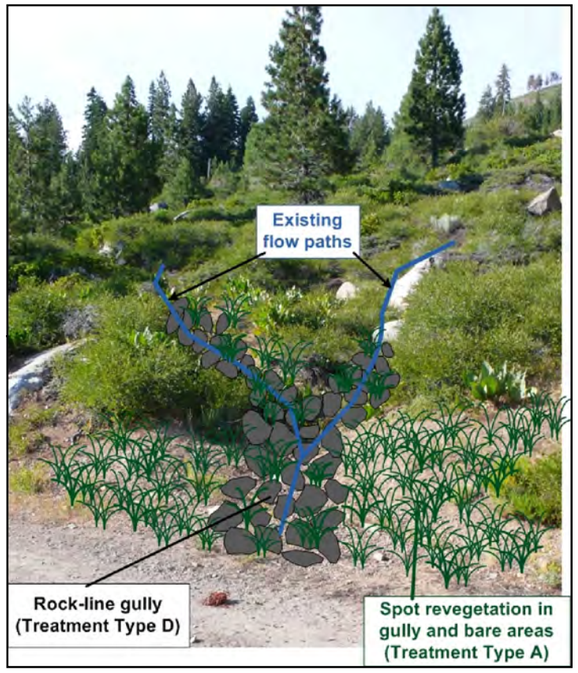
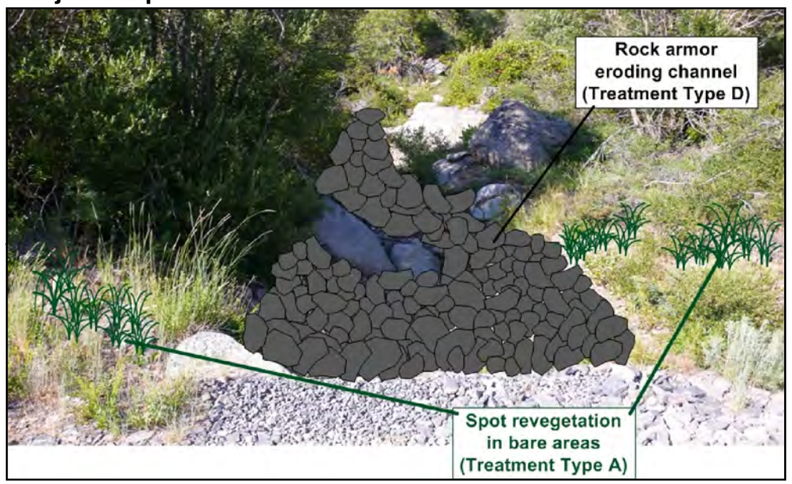
Sheet 5 - Negro Canyon Restoration Plan - Projects H1/H2



Project H1 photo detail.



Project H2 photo detail.



Legend

- Access Road
- Existing Drainages
- Rock armor and reveg drainage
- Rock armor drainage and spot reveg bare areas

N

0 75 150 300 Feet

1 inch = 75 feet

Plans Drawn By Kevin Drake, IERS August 2010

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Notes

- *Design details not to scale*
- *No cut or fill is anticipated*