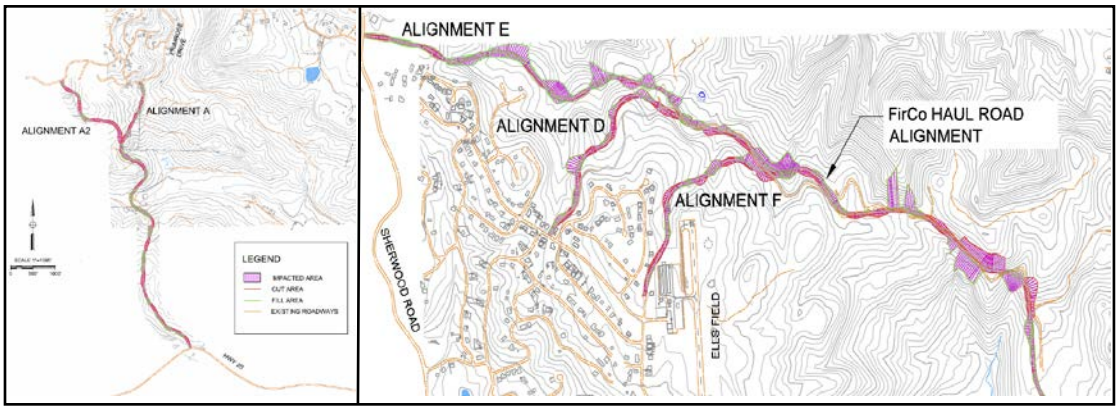
SUPPLEMENTAL FEASIBILITY STUDY

FOR THE
BROOKTRAILS SECOND ACCESS PROJECT



PREPARED FOR:

County of Mendocino
Department of Transportation
OCTOBER 6, 2011

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This report has been prepared under the direction of the following Registered Civil Engineer. The Registered Civil Engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

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Principal Engineer

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Executive Summary

This report is a supplement to the "Brooktrails Second Access Feasibility Study" dated September 15, 2009, prepared by KOA Corporation for the Mendocino County Department of Transportation (DOT). The KOA study was conditionally accepted by the Mendocino County Board of Supervisors on September 22, 2009, provided that further studies for the second access include a southern alignment (Alignment A) and a northern alignment (FirCo Haul Road Alignment). This supplemental study report presents the analysis of those two additional alignments, and compares those two new alignments with the original set of five alignments studied in the KOA report.

These two alignments, designated as Alignment A and the FirCo Haul Road Alignment are studied to the same level of detail as the prior five. When applicable, information and data from the KOA report has been applied to the two new alignments. Likewise, new information that affects the existing five alignments is incorporated into the study.

Overall, the objective of the study remains as it was before; that is to identify routes that are feasible from an engineering and environmental perspective. The goal of the study is to determine the route or routes that are best suited for further study and to eliminate those routes that are not feasible through fatal flaws or clear deficiencies. The result is a recommendation of a reasonable, prudent and practical alternative or alternatives that will be formally studied and documented through the required environmental study process.

The project purpose and need statement has been revised to put more emphasis on providing a practical and useful alternative access route to accommodate existing traffic volumes, with less emphasis on providing additional capacity for "future traffic demands" as the current purpose and need statement reads. This supplemental feasibility study uses the following project purpose and need statement:

The purpose and need of this project is to:

- *Provide a reliable collector road into the Brooktrails Township to improve public safety service and emergency response times, provide a detour around incidents on Sherwood Road and serve as an evacuation route in case of natural or manmade disasters.*
- *Complete a needed segment of the regional road system as identified in the Mendocino County General Plan, consistent with the Brooktrails Township Specific Plan Goals and Policies.*

The selection criteria and ranking factors have been updated in this supplemental report to better reflect the project purpose and need in terms of emergency services access and emergency evacuation route. Emergency access and emergency evacuation are included as separate criterion to differentiate between those two needs.

Of the seven routes studied and compared, five of the routes score very low and can be dismissed from further study. The remaining two alignments, Alignment I and the FirCo Haul Road Alignment both have similar magnitude of scoring and should be taken to the next level of study in the environmental process. Both alignments are reasonable, prudent and practical alternatives that satisfy the project purpose and need.

Introduction

Supplemental Study Description

This report is a supplement to the "Brooktrails Second Access Feasibility Study" dated September 15, 2009 (KOA study), prepared by KOA Corporation for the Mendocino County Department of Transportation (DOT). The KOA study was conditionally accepted by the Mendocino County Board of Supervisors on September 22, 2009, provided that further studies for the second access include a southern alignment (Alignment A) and a northern alignment. At its meeting of January 11, 2011, the Mendocino County Board of Supervisors confirmed the directive to study Alternative A, and directed that the FirCo Haul Road Alignment be studied as the northern alignment.

This supplemental study report presents conceptual roadway layouts and profiles for Alignment A and the FirCo Haul Road Alignment. It also contains the technical information gathered for the environmental constraints, geotechnical features and traffic descriptions of those two additional alignments, developed to the same level as in the KOA study.

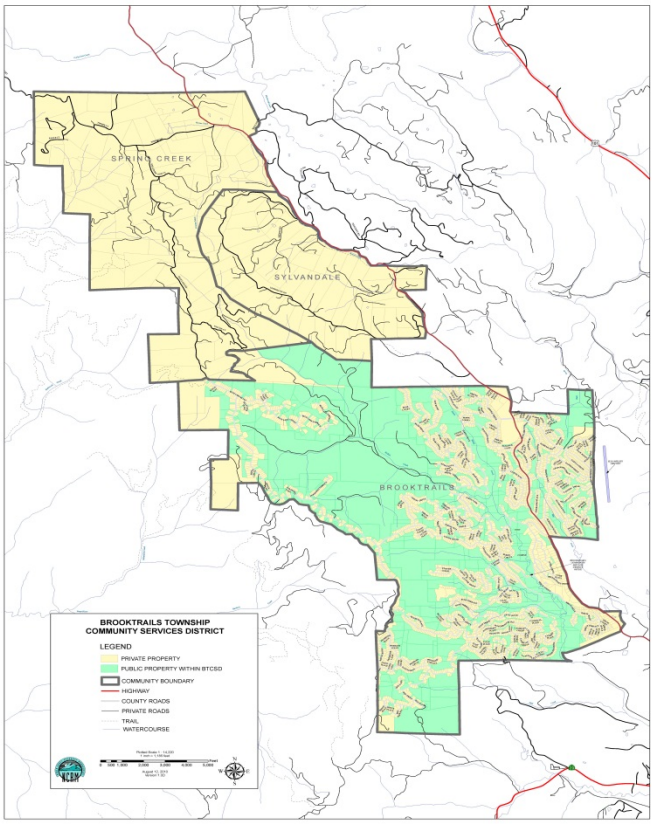


Figure 1: Brooktrails Township

The project purpose and need statement has been revised from the KOA study to better clarify the project purpose, which is needed to help highlight differences between the alignments. Based on the revised purpose and need statement, a set of scoring criteria are presented and all seven alignments are then scored according to each criterion. The results are summarized and a recommendation is made concerning the alignments suitable for further study.

This report does not replace the KOA study, but presents only information specific to the two additional alignments. Therefore, the KOA study should be consulted for information and detailed descriptions of the five prior study alignments B, C, G, H and I.

History of the Brooktrails Second Access Route

The Brooktrails Specific Plan, initially developed in the early 1990's, recognized the need for a second access route, and specifically identified the southern alignment (now called Alignment A) as the preferred location for the second access. However, the specific plan was very clear that the preference for the southern alignment was based entirely on the assumption that a Willits bypass would not be constructed in the foreseeable future. The specific plan stated that if a bypass was built, a road connecting directly to Highway 101 north of Willits would be the preferred route. Figure 2 shows a schematic layout of the second access taken from the original Brooktrails Specific Plan. Figure 2 also shows a "Third" access route that is in the approximate location of Alignment I. The specific plan states that the third connection would be needed when build out reached the range of 3300 to 3500 housing units.

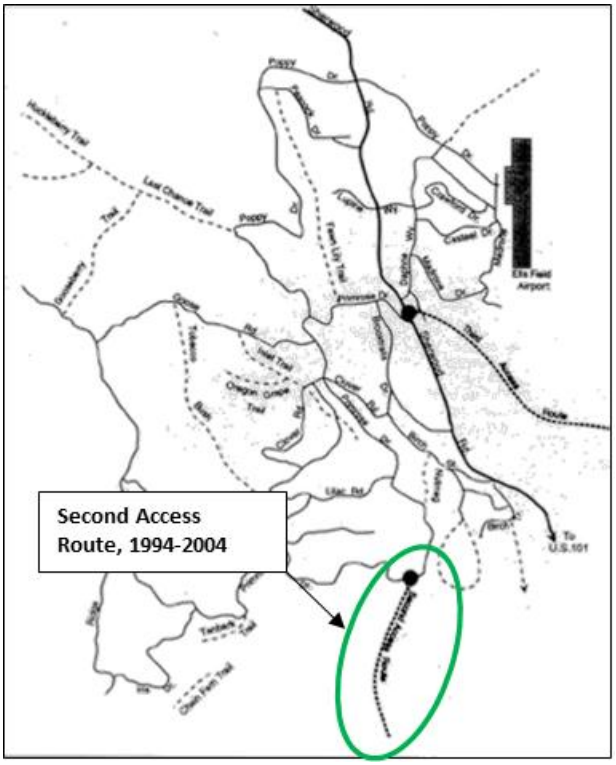


Figure 2: Original Brooktrails Specific Plan Circulation. Note Second Access to South

When the Willits Bypass Project began, the Brooktrails Board of Directors issued an amendment to the Specific Plan that was approved by the Mendocino County Planning Commission on May 20, 2004. This amendment changed the preferred second access route to a northern alignment as shown in Figure 3 and changed the previously designated second route to the preferred third route. Note that the second route is in the approximate location of what is now called the FirCo Haul Road Alignment in this study. The line now designated as the third route is Alignment A of this study.

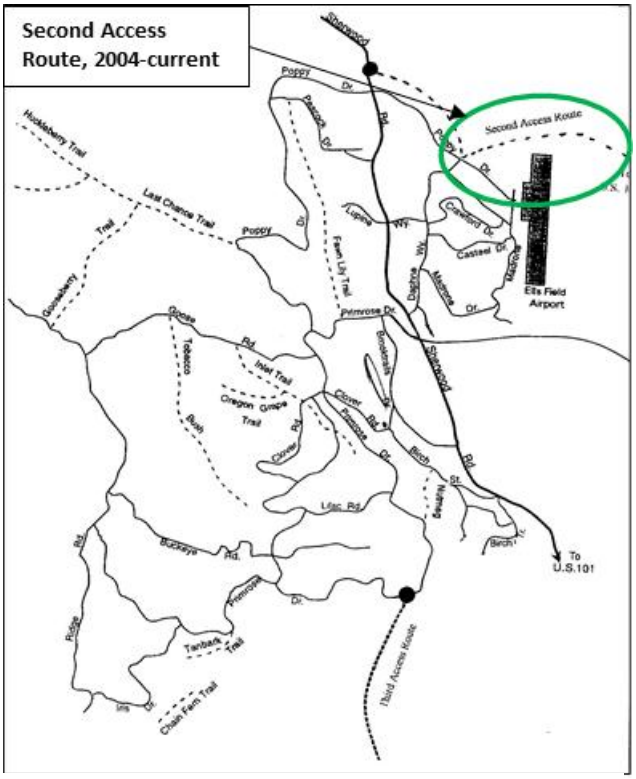


Figure 3: Brooktrails Specific Plan Update 2004. Note the Second Access to Northeast

Summary of Brooktrails Second Access Feasibility Study (KOA Study)

In late 2007, the Mendocino County Department of Transportation began work on the KOA study with the intention of reducing the numerous and varied alignments proposed by numerous studies over the years down to a manageable number of viable, realistic alignments.

Based on the stated project goals and objectives, the results of past studies, and budget constraints, the Project Development Team (PDT) decided to evaluate those alternatives which would:

- produce the maximum benefit to the Brooktrails Township,
- reduce traffic congestion on Sherwood Road, and
- provide the most direct access for emergency vehicles.

In order to evaluate the project alternatives, the PDT established evaluation criteria for comparing the alignments, such as alignment geometry, the effectiveness of the alignments at serving traffic, potential environmental impacts and geologic constraints, right of way impacts, perceived public support, constructability, and construction costs. These criteria items were assigned a weighting factor based on their perceived significance as it relates to the actual implementation of the project.

The following alignments were included in the KOA study evaluation:

- Alternative B (Quail Meadows Extension)
- Alternative C (Brooktrails Drive Extension)
- Alternative G (Wild Oat Canyon Alignment)
- Alternative H (Truck Scales Alignment)
- Alternative I (Upp Valley Alignment)

Alignments A and FirCo Haul Road were not included in the KOA study final evaluation, but they were considered during the initial screening of routes. According to the Brooktrails Specific Plan, Alignment A was rejected as a second access route in favor of an alignment that would tie into the Willits Highway 101 bypass. The FirCo Haul Road Alignment was not specifically addressed by KOA, but the northern alignments D, E and F were considered in the initial scope of work for the KOA study. Alternatives D, E and F (which are essentially the same as the FirCo Haul Road Alignment) were dropped from further consideration because they were not seen as beneficial to enough residents for normal traffic or as an emergency evacuation route. There was also concern that these alternatives would have the undesired effect of rerouting traffic through residential neighborhoods on narrow local roads to reach the new second connection.

The KOA studies ranked the five study alignments, and concluded that Alignments I and B were substantially superior to the other three study alignments and were recommended for further detailed environmental and engineering studies. The final ranking from the KOA study is shown in Figure 4.

Alternatives	Total Score	Ranking
Alternative I: UPP Valley	41.8	1st
Alternative B: Quail Meadows Extension	40.3	2nd
Alternative H: Truck Scales	26	3rd
Alternative G: Wild Oat Canyon	25.5	4th
Alternative C: Brooktrails Drive Extension	23.6	5th

Figure 4: Final Alignment Rankings from KOA Study

Purpose and Need Statement

The Purpose and Need Statement sets the foundation for the evaluation of project alternatives. A well written Purpose and Need Statement clearly identifies the transportation problem or deficiency that needs to be corrected. Each proposed solution (or alternative) must first satisfy the project Purpose and Need, or it must be rejected.

The Purpose and Need Statement as presented in the KOA study is as follows:

> **Project Need (KOA Study)**
>
> *The purpose of providing a Second Access to Brooktrails is to provide an alternate route to Sherwood Road during natural or manmade disasters, to improve safety, and to create additional capacity for existing and future traffic demands as the community moves toward build out.*
>
> *From an evacuation perspective, a second access route into Brooktrails is needed because of the predominate wind direction in the area creates a likelihood that a major fire would cut off Sherwood Rd. to the south, and also major sections of the entire Township. Also, in the event of a major fire or earthquake any one exit route would quickly become congested with vehicles. Either of these scenarios would seriously hinder fire fighting or paramedic equipment and access into the area.*
>
> *From traffic capacity perspective, a second or third access route will eventually be needed into Brooktrails with any substantial future growth. Given the current level-of-service standards and configuration of Sherwood Rd., a second access road into the community is warranted now.*
>
> *Although an alternate access directly south of Brooktrails Township (connecting to State Route 20) is also envisioned in the long term, the project under the current study addresses an egress to the east, connecting with US101 or the US101 Bypass at Willits (which is currently being programmed and designed by Caltrans District 1).*

The first paragraph of this statement contains the essence of the project purpose and need. The next three paragraphs attempt to further define the project need, but may have inadvertently confused the issues by setting up competing goals of disaster evacuation against traffic safety and capacity needs. Consequently, the Purpose and Need statement has set up the goals of evacuation and traffic so that no one alignment can satisfy both needs.

The first part of the Purpose and Need Statement to “provide an alternate route to Sherwood Road during natural and manmade disasters” has been construed to mean only those alternatives that provide a “back door” to the community for evacuation during a wildfire or earthquake can satisfy this need, (see the second paragraph of the P&N). While there is no question that a back door evacuation route is highly desirable for the wildfire scenario, the more common emergency needs are not discussed at all.

The most pressing need is that Brooktrails relies solely on Sherwood Road as the only access road into the community. There is a real, immediate need for emergency access around Sherwood Road when there are weather related problems such as slides or downed trees and power lines that can and do block Sherwood Road for hours at a time. Traffic accidents also block the road so that emergency responders cannot get into or out of Brooktrails efficiently. The key to the public safety need is “alternate route”, which for the vast majority of emergencies means an easily accessible and viable alternative to Sherwood Road to ensure rapid response times.

Of course, the significance of an additional evacuation route for the wildfire scenario cannot be ignored, but a collector road built to current standards at any location will considerably enhance most evacuation situations. A report produced by the National Fire Protection Association (NFPA) after the Oakland Hills Fire noted that the narrow roads leading into the neighborhoods were blocked by abandoned cars and downed power lines, and that most of the casualties were found trapped in traffic jams on these blocked narrow roads. The implication is that the most dangerous roads in that fire were the narrow residential streets.

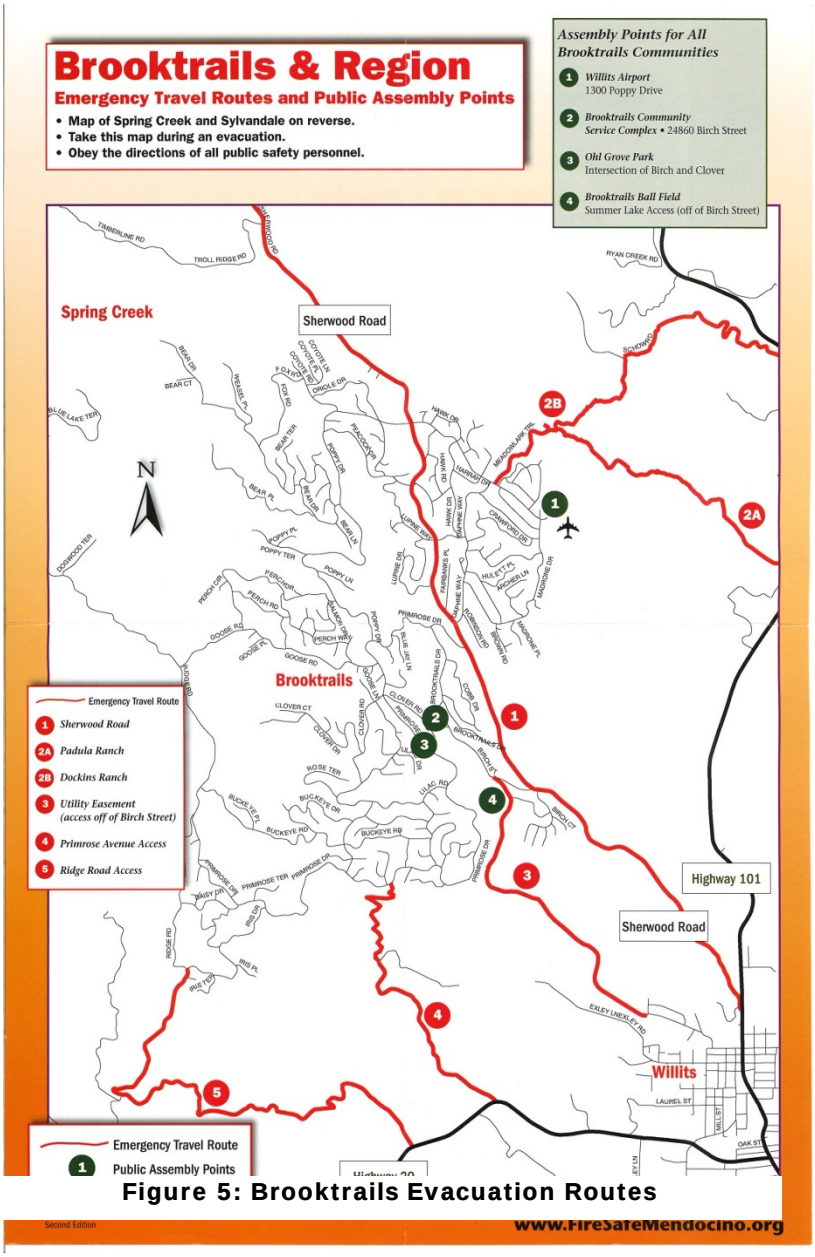


Figure 5: Brooktrails Evacuation Routes

In the analysis of the alternatives, the presence of unimproved (but passable) roads in the area should be acknowledged. There were comments made at the Board of Supervisors September 22, 2009 meeting that five roads are already in place that can be used to access Brooktrails, and Sherwood Road itself eventually gets back to Highway 101 farther north of the area. The Brooktrails CSD has published a map (Figure 5) that is distributed to all residents that shows where these emergency evacuation routes are. Also, the CSD holds regular drills to practice the procedures for opening the emergency routes.

As for the traffic circulation aspect of the project purpose and need, the statement should be revised to put more emphasis on providing a practical and useful alternative access route to accommodate existing traffic volumes, with less emphasis on providing additional capacity for "*…future traffic demands as the community moves toward build out.*" Any of the proposed alternatives will have the side effect of providing future capacity, but there is no urgent reason to make that a feature of the purpose and need statement. In fact, the Specific Plan already addresses the need to accommodate future growth by planning for third connection when the number of developed units gets to the 3300 - 3500 range.

Therefore, the purpose and need statement is revised from the previous study to:

The purpose and need of this project is to:

- Provide a reliable collector road into the Brooktrails Township to improve public safety service and emergency response times, provide a detour around incidents on Sherwood Road and serve as an evacuation route in case of natural or manmade disasters.
- Complete a segment of the regional road system as identified in the Mendocino County General Plan, consistent with the Brooktrails Township Specific Plan Goals and Policies.

This Purpose and Need Statement will be used to develop the scoring criteria and evaluation of the alternatives in this supplemental study.

Supplemental Study Alignments

Two following two alignments are included in this supplemental feasibility study. These alignments will be studied to the same level of detail as the original five alignments from the KOA study.

Alternative A: State Route 20 Access

This alternative proposes a second connection from Primrose Drive just west of Acacia Place connecting to State Route 20 at Exley Lane, near the KOA campground. A variation of this alignment tie-in to Brooktrails would swing to the west and connect to Willow Lane, generally following an existing emergency access route (the "#4 - Primrose Access" route, see Figure 5). The total length of Alignment A is 1.4 miles over rolling terrain. Grades approaching 16% are encountered as the alignment drops down into a valley and then up and over a ridge. At either end of the alignment, where it connects to Primrose Drive and Highway 20, the grades are approximately 4% and 10% respectively.

Figure 6 shows the layout of Alignment A, and the roadway profile is shown in Figure 7

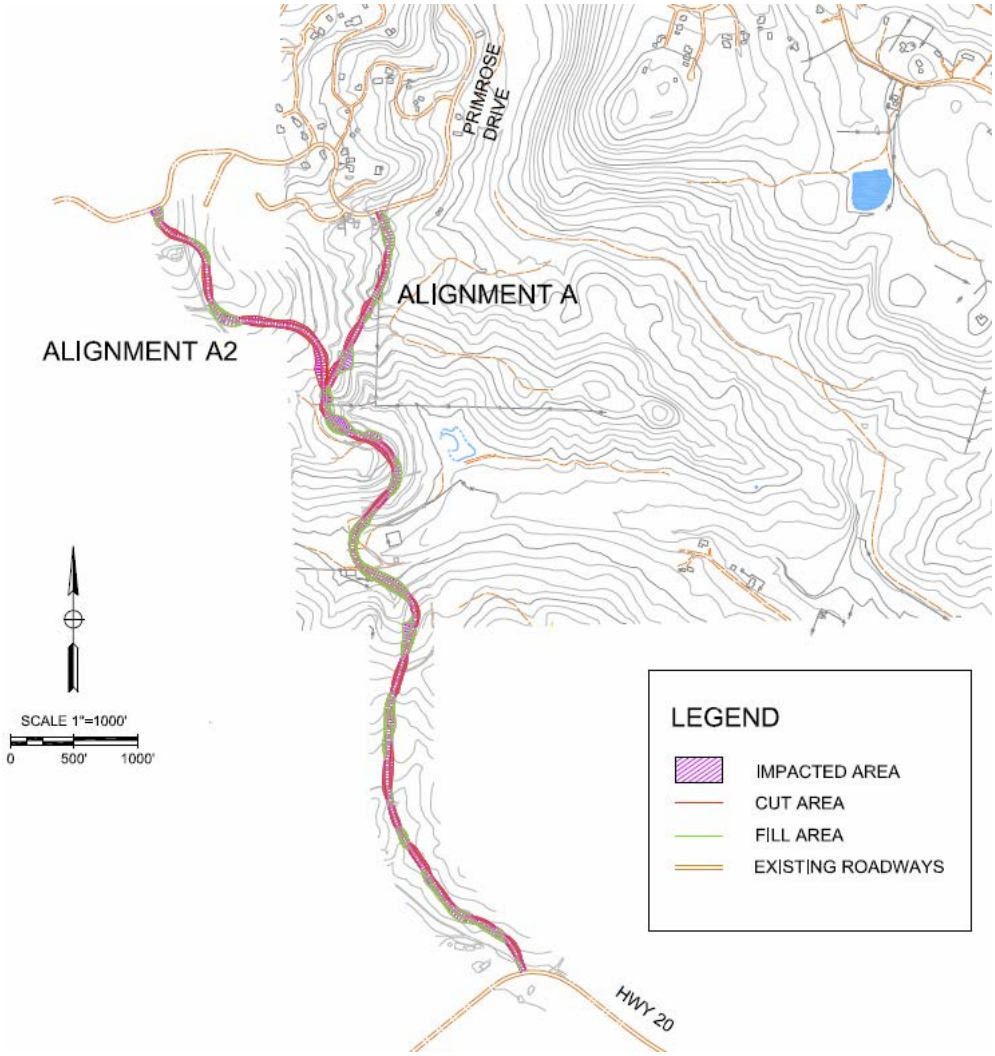


Figure 6: Alignments A & A2

FirCo Haul Road Alignment

This alignment proposes a second connection from near the intersection of Poppy Drive and Madrone Drive, wrapping around the north side of Ells Field (Willits Municipal Airport) before turning towards the southeast to descend approximately 700 feet in elevation, turning south and connecting to the U.S. 101 frontage road that would be constructed as part of the Willits Bypass project, near the truck scales. Variations of this alignment would extend the alignment west connecting to Poppy Drive near Daphne Way, similar to Alternative D of the KOA study, generally following an existing emergency access route (the "#2A – Padula Ranch" route, see Figure 4) and connecting to Sherwood Road north of Poppy Drive, similar to Alternative E of the KOA study. The total length of these alignments is between 2.7 miles and 3.3 miles. With the exception of a sustained grade of 16% for approximately 800' as Alternative E descends from Sherwood Road to intersect Alternative D, the remaining grades that approach 16% are less than 500' in length in conformance with the County's Roadway Design Guidelines.

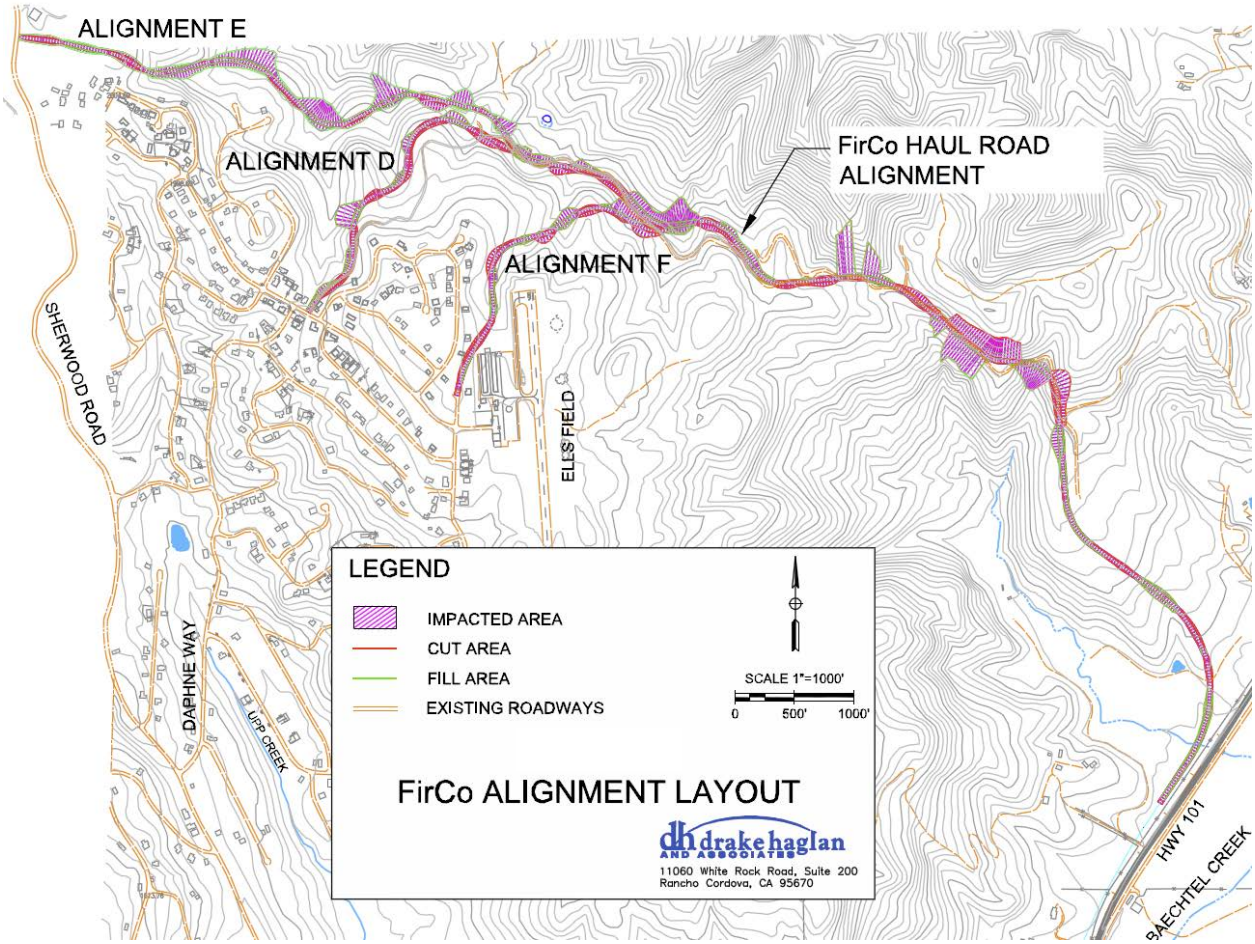


Figure 7: FirCo Haul Road Alignment Variations

KOA Study Alignments

The five alignments from the KOA study are described below, and illustrated in the map from the KOA study shown in Figure 8. These alignments will be scored against the scoring criteria developed for the revised Purpose and Need Statement.

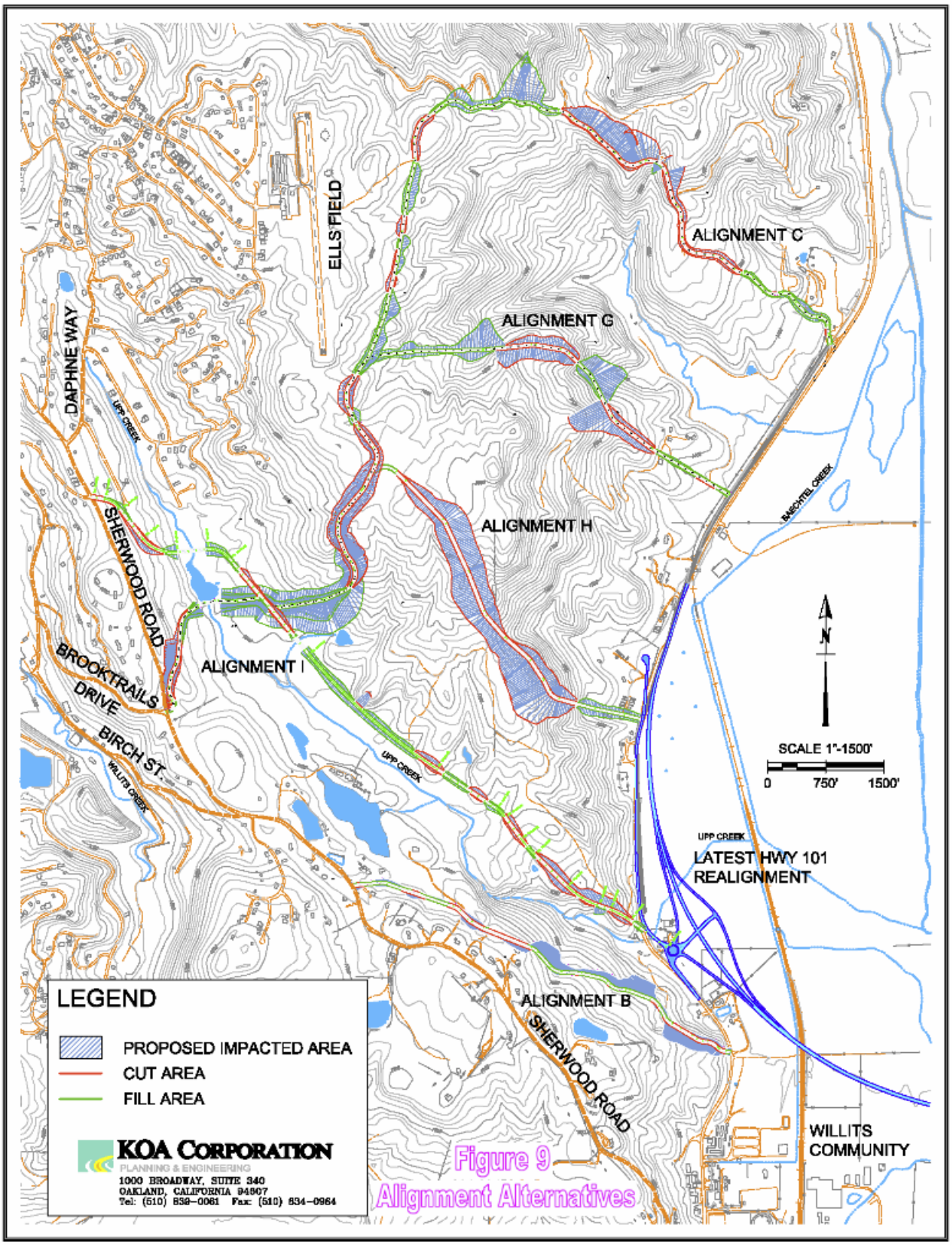


Figure 8: KOA Study Alignments

Alternative B: Quail Meadows Extension

This alternative proposes to start the second access alignment south of the Birch Street intersection with Sherwood Road. The new alignment shifts in the northeast direction and after some mild vertical grades between 2 and 3 percent quickly, descends at a grade of over 9 percent for most of the length of the alignment until it terminates at the Old U.S. 101 Highway just south of the proposed new U.S. 101 interchange, and about one-half mile north of Willits High School. This will be the shortest of all alignments with a total length of approximately 1.1 miles. Though this is the shortest alignment, it will not provide much relief in traffic congestion as it does not relieve the choke point congestion on Sherwood Road.

Alternative C: Brooktrails Drive Extension

This alignment begins at the intersection of Brooktrails Drive and Sherwood Road, and after connecting the intersection at the right angle it shifts directly northward. After bridging over Upp Creek and traversing a distance of approximately 1,200 feet, it turns east and finally circles around and follows the existing Wild Oak Canyon dirt road and terminates at U.S. 101, approximately 1.8 miles north of the proposed new interchange. Total length of this alignment is about 3.2 miles and the steepest grade is 9.5%. At 3.2 miles, this will be the longest of all alignments studied. This alignment provides an alternate route for emergency purposes and for Brooktrails community as they can bypass the traffic congestion on Sherwood Road and use this as an alternate route. However, the length of this alignment and its termination point on U.S. 101 could be a discouraging factor and could minimize the application of this alternate route for daily commute.

Alternative G: Wild Oat Canyon

This alignment is similar to Alternative “C” at the beginning with intersection of Brooktrails Drive and Sherwood Road. However, once the alignment reaches near the local airport it turns east and follows the topography that requires the road to climb and descend from the hill with grades of around 12%. The alignment is proposed to terminate at the frontage road that runs parallel to U.S. 101. Similar to Alternative “C”, this alignment also provides an alternate route for emergency purposes and for routine use by Brooktrails community to bypass the traffic congestion on Sherwood Road. However, the steep grades on this alignment, particularly in the uphill direction (which slows larger vehicles including trucks and RV’s thus causing long queues) could be a discouraging factor in its application.

Alternative H: Truck Scales

This alignment begins with the similar path as Alternative “C” but turns eastward before it reaches the airport and traverses the topography to terminate at the frontage road near the existing truck scales. This alignment ascends with a grade of 10% and after peaking the hillside it drops with a grade of 15% before it terminates at the frontage road. Similar to Alternative “G”, this alignment also provides an alternate route for emergency purposes and for routine use by the Brooktrails community to bypass the traffic congestion on Sherwood Road. Similar to alternative G, the steep grades on this alignment, particularly in the uphill direction (slowing larger vehicles including trucks and RV’,s thus causing long queues) could be a discouraging factor in its application.

Alternative I: UPP Valley

This alignment is proposed to begin at the intersection of Primrose Drive and Sherwood Road, and after bridging over Upp Creek the alignment will traverse a path along the north side of the Creek. This alignment can be constructed as a straight tangent for most of its length with a maximum vertical grade of 11%. Though the grade is steep it is sustained over a shorter distance than the other alignments. This alignment will be designed to

terminate at the new roundabout being considered by Caltrans at the new U.S. 101 SB Ramps Intersection. Detailed design at the roundabout and for other intersections for this project will be prepared when the project moves into the environmental clearance phase.

Environmental Considerations, Alignments A and FirCo Haul Road

Introduction

Sycamore Environmental has prepared this supplemental analysis to identify potential biological and regulatory constraints for two additional alternative alignments for the Brooktrails Second Access project. This biological constraints analysis supplements the September 2009 Feasibility Study by adding two additional alignments. Biological constraints were analyzed for the following alternatives:

1. Alternative A: Alternative A connects Brooktrails to U.S. Route 20, to the south of Brooktrails.
2. FirCo Haul Road Alternative: The FirCo Haul Road Alternative connects Brooktrails to U.S. Route 101, to the east of Brooktrails. The FirCo Haul Road Alternative contains three potential connection points to Brooktrails (Alternatives D, E, and F). The FirCo Haul Road Alternative partially overlaps the previously considered Alternative C. The FirCo Haul Road Alternative is longer than Alternative A.

The two alternatives are in the Upper Eel River hydrologic unit (hydrologic unit code 18010103). Aerial photographs of the alternative alignments are in Appendix C.

Methods

Data on known special-status species and habitats in the area was obtained from state and federal agencies. A search of the California Natural Diversity Database (CNDDB; 30 January 2011 commercial version) was conducted for the Burbeck, Willits, and 10 adjacent USGS quads to determine known records of special-status species in or near the alternative alignments. The 8th Edition of the CNPS Online Inventory of Rare and Endangered Plants was queried for all CNPS-listed plants on the Burbeck, Willits, and 10 adjacent USGS quads to determine known records of special-status plants in or near the alternative alignments. A summary of the CNDDB records and CNPS list for the 12 quads is in Appendix C. Sycamore Environmental obtained a list from the U.S. Fish and Wildlife Service (USFWS), Arcata Field Office that identifies federal-listed species that potentially occur on or could be affected by projects on the Burbeck and Willits USGS quads as well as in Mendocino County (Appendix C).

Maps and aerial photographs of the alternative alignments and surrounding area were reviewed. The records search, map review, and a review of the biology of special-status species, as necessary, were used to determine biological constraints and regulatory requirements that would likely be encountered by the alternative alignments.

State and federal statutes that may be applicable to the proposed project are listed below:

- National Environmental Policy Act (NEPA) (42 U.S.C. 4321 et seq.);
- Section 404 of the Clean Water Act (33 U.S.C. 1251-1376);
- Section 401 Water Quality Certification (33 U.S.C. 1341);
- Section 402 of the Clean Water Act (33 U.S.C. 1342)
- Section 10 of the Rivers and Harbors Act (33 U.S.C. 401 et seq.);
- Section 1602 of the California Fish and Game Code pertains to streambed alterations;
- Federal Endangered Species Act (16 U.S.C. 1531-1543);
- Fish and Wildlife Coordination Act (16 U.S.C. 661-666);
- National Wild and Scenic Rivers Act (16 U.S.C. 1271-1287);
- Executive Order 11990, Protection of Wetlands (May 24, 1977);
- California Environmental Quality Act (P.R.C. 21000 et seq.);
- California Endangered Species Act (California Fish and Game Code 2050 et seq.);
- Native Plant Protection Act (California Fish and Game Code 1900-1913);
- California Wild and Scenic Rivers Act (P.R.C. 5093.50 et seq.);
- California Coastal Act (P.R.C. 30000 et seq.);
- Porter-Cologne Water Quality Control Act (California Water Code, Division 7, §13000 et seq.);
- Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-711);
- Magnuson-Stevens Fishery Conservation and Management Act (as amended through 11 October 1996);
- Executive Order 13112, Invasive Species (3 February 1999).

Environmental Setting

Description of the Existing Biological and Physical Conditions

A brief discussion of the existing biological and physical conditions for each alternative alignment is provided below. A soils map for both alternatives is in Attachment A. The USFWS National Wetland Inventory (NWI) maps were used to identify larger wetlands and waters near the alternative alignments. The NWI maps do not identify all wetlands and waters that may be subject to federal Clean Water Act or state Porter-Cologne Waster Quality Control Act jurisdiction.

Alternative A

Alternative A traverses annual grassland, montane hardwood, douglas fir, and urban communities; and a small amount of redwood community (CDF 2004). This alternative is not located in the California Coastal Zone. This alternative crosses Mill Creek, which is classified as a palustrine, forested, saturated and semi-permanent/ seasonal wetland (USFWS 2011b, NHD 2011).

Soil types traversed include Casabonne-Wohly loams (30 to 50 percent slopes), Hopland-Witherell-Squawrock complex (30 to 50 percent slopes) and Yorkville-Squawrock-Witherell complex (30 to 50 percent slopes). None of the soil series are generally hydric or derived from serpentine parent material. Elevation ranges from approximately 1,445 to 1,645 ft above sea level.

FirCo Haul Road Alternative

The Fir Co Haul Road Alternative traverses annual grassland, douglas fir, montane hardwood, and urban communities; and small amounts of barren landscapes and montane

hardwood conifer communities (CDF 2004). This alternative is not located in the California Coastal Zone. The FirCo Haul Road alternative crosses Wild Oat Canyon Creek near its most downstream reach, and one other unnamed intermittent creek. Alternative E also crosses Bull Creek near its most upstream reach, and one other unnamed intermittent creek (NHD 2011).

Soil types traversed include Casabonne-Wohly loams (9 to 30 percent slopes), Casabonne-Wohly loams (30 to 50 percent slopes), Casabonne-Wohly-Pardaloe complex (50 to 75 percent slopes), Dingman-Beaughton complex (5 to 50 percent slopes), fluvaquents (0 to 1 percent slopes), Hopland-Sanhedrin-Kekawaka complex (30 to 50 percent slopes), Nashmead-Updegraff-Woodin complex (30 to 50 percent slopes), Pinole gravelly loam (2 to 8 percent slopes), pits and dumps, Shortyork-Yorkville-Witherell complex (15 to 30 percent slopes), urban land, Wohly-Casabonne loams (30 to 50 percent slopes), Wohly-Casabonne-Pardaloe complex (50 to 75 percent slopes), and Xerochrepts-Haploxeralfs-Argixerolls complex (9 to 30 percent slopes). None of the soil series are generally hydric. The Dingman-Beaughton complex is derived from serpentine parent material. Elevation ranges from approximately 1,340 to 2,050 ft above sea level.

Regional Species and Habitats of Concern

File data from CNDDB and USFWS were used to generate a list of special-species that could occur in the alternative alignments. Federal and state listed, candidate, and proposed species as well as special-status sensitive natural communities for which potentially suitable habitat is present are listed in Table 1. Additional non-listed special-status species that occur or may have the potential to occur along the alternative alignments are not listed in Table 1 but are listed in Appendix C. Maps in Appendix C depict the CNDDB records of special-status species and sensitive natural communities in and near the alternative alignments.

Table 1. Federal and state listed **s**pecies for which potentially suitable habitat is present.

Scientific Name	Common Name	Federal Status [a]	State Status [a]
Fish			
Oncorhynchus kisutch	Southern Oregon and Northern California Coho salmon	T, CH	T
Oncorhynchus mykiss (*irideus*)	Northern California steelhead	T, CH	SSC
Oncorhynchus tshawytscha	California coastal chinook salmon	T, CH	--
Birds			
Brachyramphus marmoratus	Marbled murrelet	T, CH	E
Coccyzus americanus	Western yellow-billed cuckoo	C	E
Strix occidentalis caurina	Northern spotted owl	T, CH	SSC
Mammals			
Martes pennanti	Pacific fisher	C	SSC
Plants			**/ CNPS [b]**
Astragalus agnicidus	Humboldt milk-vetch	--	E/ 1B.1
Fritillaria roderickii	Roderick's fritillary	--	E/ 1B.1
Limnanthes bakeri	Baker's meadowfoam	--	R/ 1B.1
Lupinus milo-bakeri	Milo Baker's lupine	--	T/ 1B.1
Pleuropogon hooverianus	North Coast semaphore grass	--	T/ 1B.1
Trifolium amoenum	Two-fork clover	E	--/ 1B.1
Natural Communities			
Valley oak woodland		--	--/ --

[a] **Status**: Candidate (C); Candidate Endangered (CE); Candidate Threatened (CT); Delisted (D); Endangered (E); Federal Critical Habitat (FCH); DFG Fully Protected (FP); Proposed (P); Proposed Critical Habitat (PCH); Proposed Endangered (PE); Proposed Threatened (PT); Species of Special Concern (SSC); Species of Local Concern (SLC); State Rare (R); Threatened (T);
NOTE: Critical Habitat [CH] - Project footprint is located within a designated critical habitat unit, but does not necessarily mean that appropriate habitat is present.

[b] **CNPS List**. 1A = Presumed Extinct in CA; 1B = Rare or Endangered in CA and elsewhere; 2 = R/E in CA and more common elsewhere. **CNPS List Decimal Extensions**: .1 = Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat); .2 = Fairly endangered in California (20-80% occurrences threatened); .3 = Not very endangered in California (<20% of occurrences threatened or no current threats known).

Discussion of Biological Resource Constraints

Natural Communities of Special Concern

Sensitive natural communities include rare communities, communities that are adversely affected by minimal disturbance, wetlands, riparian areas, and communities that provide habitat for special-status plant or wildlife species. Listed below are the sensitive natural communities known to occur along the alternative alignments. There are likely smaller unnamed drainages and wetlands, and possibly other potential sensitive natural communities along the alternative alignments. A biological survey and a wetland delineation of the alternatives would be needed to determine the presence or absence of other potential sensitive natural communities.

Alternative A

- Mill Creek and associated riparian corridor (HUD 2011, USFWS 2011b).
- An area near the connection point with Acacia Place (a surface street in Brooktrails) could likely meet wetland criteria based on the aerial photograph. Alternative A crosses a smaller drainage in the south that also likely meets wetland or waters criteria.
- Special-status plant and wildlife habitat.

FirCo Haul Road Alternative

- Wild Oat Canyon Creek and associated riparian corridor (HUD 2011). An unnamed tributary to Wild Oat Canyon Creek.
- Bull Creek and an unnamed tributary to Bull Creek are on Alternative E (HUD 2011).
- Several areas along the segment of the alternative that parallels Highway 101 could likely meet wetland characteristics based on the aerial photograph.
- Special-status plant and wildlife habitat.

Special-Status Plant and Animal Species Occurrences

The CNDDB has records for special-status species located near the alternative alignments. CNDDB is a database of positive sightings, and the lack of records in a particular area does not mean special-status species are absent. Known occurrences and potential habitat for special-status plant and wildlife habitat are listed under each alternative alignment below. Some of the species listed below are not included in Table 1 because they are not federal or state listed, candidate, or proposed. Both alternative alignments are in the watersheds defined as Southern Oregon/ Northern California coast Coho salmon Evolutionarily Significant Unit (ESU), the Northern California steelhead ESU, and the California coastal Chinook salmon ESU (CalFish 2011, NMFS 1996).

Alternative A

- There are no CNDDB records on Alternative A.
- Mill Creek where Alternative A crosses is designated critical habitat for Northern California steelhead (NMFS 2005), and also likely critical habitat for Southern Oregon/ Northern California Coho salmon. Coho salmon critical habitat is not geographically precise, but rather defined qualitatively in certain large-scale watersheds, including the Eel River (NMFS 1999). The identification of Coho salmon critical habitat at particular points will require an assessment of on-the-ground conditions and review by NMFS (pers. comm., T. Daugherty). Approximately 0.84 mi downstream of the Alternative A crossing, beginning at the confluence with Willits Creek, Mill Creek is designated as critical habitat for California coastal Chinook salmon (USFWS 2011c).
- NMFS (2000) identifies previous reports of Chinook salmon, Coho salmon, and steelhead in Mill Creek between 1991 and 1999.

- There are five northern spotted owl occurrences within 3 mi of Alternative A. The closest occurrence is two miles away.

FirCo Haul Road Alternative

- There are four CNDDB records on or very near the FirCo Haul Road Alternative.
    1. A yellow warbler (*Dendroica petechia brewsteri*; State species of special concern) CNNDB record covers much of the northern end of the Little Lake Valley, up to and including the segment of the alternative that parallels Highway 101. There is patchy but substantial cover of Oregon ash (*Fraxinus latifolia*) in this area, which is a predictor of high yellow warbler abundance in northern California (Shuford and Gardali 2008).
    2. A yellow breasted chat (*Icteria virens*; State species of special concern) CNNDB record covers much of the northern end of the Little Lake Valley, up to and including the segment of the alternative that parallels Highway 101.
    3. A Valley oak woodland CNNDB record covers much of the northern end of the Little Lake Valley, up to and including the segment of the alternative that parallels Highway 101.
    4. A Baker's meadowfoam (*Limnanthes bakeri*; State rare; CNPS List 1B.1) CNNDB record covers much of the northern end of the Little Lake Valley, up to the eastern edge of Highway 101. Sycamore Environmental observed Baker's meadowfoam close to where the FirCo Haul Road alternative crosses Wild Oat Canyon Creek, on the east side of Highway 101. A second special-status plant, Davy's semaphore grass (*Pleuropogon californicus* var. *davyi*; CNPS List 4.3) was observed at the same location.
- Wild Oat Canyon Creek and Bull Creek are not designated critical habitat for Northern California steelhead or California coastal Chinook salmon (NMFS 2005, USFWS 2011c). Outlet Creek, approximately 0.23 mi downstream of the FirCo Haul Road crossing of Wild Oat Canyon Creek, and 1.25 mi downstream of FirCo Haul Road crossing of Bull Creek, is designated as critical habitat for steelhead, Chinook salmon, and Coho salmon.
- Wild Oat Canyon Creek could be critical habitat for Southern Oregon/ Northern California Coho salmon (NMFS 1999). Coho salmon critical habitat is not geographically precise, but rather defined qualitatively in certain large-scale watersheds, including the Eel River. The FirCo Haul Road Alternative crosses Wild Oat Canyon Creek near its downstream reach, where it is more likely to provide potential salmonid habitat. Bull Creek could also be critical habitat for Southern Oregon/ Northern California Coho salmon, but it is less likely because the FirCo Haul Road Alternative crosses it at a reach far upstream.
- The area of Dingman-Beaughton complex soils is derived from serpentine parent material. Serpentine soils and/or rock outcrops are more likely to provide habitat for special-status plants. Part of Alternative D crosses Dingman-Beaughton complex soils.
- There are two northern spotted owl records within 3 mi of the FirCo Haul Road Alternative. Both are less than 0.3 mi away. In mixed conifer areas of the Coast Range, USFWS (2011a) uses a 1.3 mile radius as a general limit of the potential home ranges of northern spotted owls.

Technical Studies, Regulatory Consultations, Environmental Documents, and Permits

Road construction projects funded entirely with local or State funds will need to comply with the California Environmental Quality Act (CEQA). Some road improvement projects receive federal funds and need to comply with requirements of the National Environmental Policy Act (NEPA). Caltrans oversees and disperses federal funds through its Local Assistance

program. Where Caltrans is involved, it ensures that the requirements of the NEPA are met. The County is responsible for compliance with CEQA regardless of Caltrans involvement. If the federal funding passes through Caltrans Local Assistance, the following reports would be needed. The length of time to complete the environmental process, including consultations and permitting, could vary depending on the alternative.

Technical Studies

- Preliminary Environmental Study (PES)
- Natural Environment Study (NES)
  - Botanical survey (spring–late summer)
- Delineation of Wetlands and Waters
- Northern spotted owl protocol survey (possibly required; 2 years of surveys)
- Biological Assessment (BA) for endangered species consultation
- Water Quality Assessment Report
- Compensatory Mitigation Plan(s)

Regulatory Consultations

- Section 7 Endangered Species Act consultation with USFWS (Likely formal for FirCo Haul Road Alternative)
- Section 7 Endangered Species Act consultation with NMFS for listed fish species (Likely formal for Alternative A)
- Essential Fish Habitat Evaluation with NMFS
- California Endangered Species Act (Possible for FirCo Haul Road Alternative)

Environmental Documents

- CEQA Initial Study/Mitigated Negative Declaration or Environmental Impact Report
- NEPA Categorical Exclusion or Environmental Assessment/Finding of No Significant Impact

Permits

- Section 404 Clean Water Act Nationwide Permit, Letter of Permission, or Individual Permit from U.S. Army Corps of Engineers
- Section 401 Clean Water Act Water Quality Certification from RWQCB
- California Fish and Game Code 2081 Incidental Take Permit
- California Fish and Game Code 1602 Streambed Alteration Agreement

Discussion of Cultural Resources

The Cultural Resources discussion in Appendix C of the original Feasibility Study that was prepared by Impact Sciences, Inc. is applicable to Alternative A and the FirCo Haul Road Alternative:

> Cultural Resources
>
> A records search was conducted by the Northwest Information Center (NWIC) by reviewing relevant data maps, historic period maps, and literature for Mendocino County on file. The NWIC found that the project study area contains nine recorded Native American archaeological resources and two resources with both Native American and historic period components. These resources include lithic scatters, quarries, petroglyphs, village sites, and farmsteds. The NWIC recommends that a professional archaeologist assess the locations of the proposed alignments in regard to the recorded archaeological resources and evaluate those resources that may be affected by the proposed project.

The NWIC has record of eight cultural resource studies covering approximately 40% of the study area. The records search also found one Native American resource in or adjacent to the proposed project area referenced in the ethnographic literature: the ethnographic Mitom village of *Tsaka*. Due to the number of recorded sites in the study area, there is a high possibility of identifying additional Native American and historic era cultural resources in the unsurveyed portions of the study area. The NWIC recommends a qualified archaeologist conduct further archival and field study to identify cultural resources.

State and federal inventories list two properties within the proposed project. Both of these properties are listed with a status code of 6Y, meaning that they have been determined ineligible for the National Register by consensus through the Section 106 process but not evaluated for the California Register or local listing. Additionally, the 1922 15 minute Willits, CA, topographic quadrangle shows the presence of numerous historic period buildings and/or structures within the study area. These historic period buildings meet the Office of Historic Preservation's minimum age standards that buildings, structures, and objects 45 years or older may be of historic value.

According to the NWIC, the review for possible historic structures included limited sources and should not be considered comprehensive. The Office of Historic Preservation has determined that buildings, structures, and objects 45 years or older may be of historic value. Since the study area contains two historic resources, as well as additional buildings and structures that meet the age threshold, the NWIC recommends that the study area be assessed by an architectural historian before construction of the proposed project.

Based on the evaluation of the environmental setting and features associated with known sites, Native American cultural resources in this part of Mendocino County have been found near sources of water including perennial and intermittent streams and springs, along ridgelines and associated spurs, on midslope terraces, and near ecotones or other productive environs. The MWIC concluded that the study area for the Brooktrails Secondary Access project contains all of these environments. Given the similarity of these environmental factors, coupled with the known archaeological and ethnographic sensitivity, there is a high likelihood that unrecorded Native American cultural resources exist in the study area. Review of historical literature and maps indicated the possibility of additional historic -period archaeologica resources within the project area. Additionally, there is a high possibility that unrecorded historic era cultural resources exist in the study area.

The NWIC recommends that if cultural resources are encountered during the project, avoid altering the materials and their context until a cultural resource consultant has evaluated the situation. Project personnel should not collect cultural resources.

According to the MWIC, prehistoric resources include chert or obsidian flakes, projectile points, mortars, and pestles; and dark friable soil containing shell and bone dietary debris, heat affected rock, or human burials. Historic period resources include stone or adobe foundations or walls; structures and remains with square nails; and refuse deposits or bottle dumps, often located in old wells or privies. The NWIC recommends that any identified cultural resources be recorded on DPR 523 historic resource recordation forms.

In summary, it is in the best interest of the County to have a professional archaeologist assess all proposed alignments for the Brooktrails Secondary Access project. This assessment would aid the County in deciding which route would cause the least amount of impact to archaeological and cultural resources. In addition, a

qualified archaeologist should conduct further archival and field study to identify cultural resources in the project area. Finally, the study area should be assessed by an architectural historian before construction of the proposed project.

Summary

The FirCo Haul Road alternative may have a greater adverse effect on northern spotted owl than Alternative A. Alternative A crosses less forested landscape then the FirCo Haul Road alternative. The FirCo Haul Road alternative has two northern spotted owl occurrences less than 0.30 mi away. There is more potential northern spotted owl habitat along the FirCo Haul Road alternative than Alternative A.

Alternative A is likely to have greater potential listed salmonid impacts than the FirCo Haul Road alternative. Mill Creek on Alternative A is designated critical habitat for steelhead, and is likely to be determined critical habitat for Coho salmon. On-the-ground surveys of creek conditions would be required to determine the upstream limits of accessibility for Coho salmon.

The FirCo Haul Road alternative is likely to have greater potential special-status plant impacts, due to the proximity of its eastern segment to the Little Lake Valley floor and known special-status plant records, and due to the presence of known serpentine soils on Alternative D.

The two alternatives have comparable potential impacts to wetlands and waters subject to Section 404 of the Clean Water Act in terms of acreage, based on interpretations of aerial photographs.

We recommend that the County consider the biological constraints discussed above during the planning efforts to provide the Brooktrails area community with improved traffic flow and emergency access.

Survey and Mapping Information

Aerial surveys were conducted in April 2011 along the Alternative A and FirCo Haul Road corridors to supplement the mapping previously prepared for the original Feasibility Study. The aerial survey data was used to develop mapping at 1"=100' horizontal scale with 5-foot vertical contour intervals. The mapping included a coordinate rectified high resolution color aerial photo of the mapped area.

Geological Features

Taber Consultants has studied the available information for the area, and has also researched their own databases for the study area bordered by Highway 20 at the south, Interstate 101 on the east, the former FirCo Haul Road on the north and Sherwood Road on the west. The area has varying terrain with moderately steep rolling hills and valleys. The Maacama Fault trace trends northwest through the center of the project area and landslides are shown extensively throughout the project area on published geologic mapping. As part of the original Feasibility Study, the geologic map produced by RGH Consultants showed a large landside near the convergence of the majority of the alternatives including the recommended Alignment I. Springs are also prevalent in the hillsides indicating shallow groundwater and the potential for additional landslide movement. The geohazards in the area are numerous and may affect selection of the preferred roadway alignment.

Site Review

The project area is bordered by Highway 20 at the south, Interstate 101 on the east, the FirCo Haul Road alignment on the north and the Primrose Drive West tie-in on the west. This report is limited to review of the FirCo Haul Road and Alternative A alignments that are within the greater project area.

Office review materials include the documents in the attached selected references list. Field review included site observations along the existing FirCo Haul Road. A field review along Alternative A was not conducted due to right-of-entry restrictions. The alignments, field photo locations, and noted geologic/geohazard features are shown on our figures. Each alignment is described separately below.

FirCo Haul Road

The FirCo Haul Road alignment roughly follows the existing FirCo Haul Road with three connection locations to the existing streets within the Brooktrails subdivision, as described above. This route begins westbound at Hwy 101, ascending a 10±% grade for 0.3±mile, then climbs across a steep slope (overall Horizontal±:Vertical±, but with very steep sections up to 1H±:1V±) to where it crosses a ridge-top. West of the ridge-top, the alignment traverses moderate to gentle slopes (3H±:1V± maximum) near the top of several minor drainages north of Ells Field - Willits Municipal Airport. The field review noted above was conducted by Glen G. Wade, a Professional Geologist.

An inferred recent fault trace, likely related to the Maacama Fault, is shown on the most detailed available fault and landslide mapping (Pampeyan, 1981) to run roughly along the eastern 1.5±miles of the proposed alignment. Rock along faults is typically highly fractured and distorted and evidence of this was noted along the alignment. This fault trace is not shown on the state Fault Activity Map (Jennings 2010) or on the most detailed geologic map of the area (Durham 1979).

This disturbed ground typically has lower strength and a higher probability of failure than the same materials outside of the fault zone. This noted disturbance includes some evidence of larger slides and frequent small slides in the steep road cuts.

The portion of the slope immediately upslope (west) of Hwy 101 is mapped as an older large landslide by Pampeyan, 1981, but is shown as an older river terrace by Durham, 1979. Based on the limited site review it is not clear whether large scale sliding has taken place in the lower slope area, but hummocky terrain and other evidence of possible shallow slope movement was noted. This area is also crossed by the previously noted potentially active fault trace.

Additional smaller slide features and evidence of slope movement were found where the existing FirCo Haul Road climbs across a steep slope, including areas not previously mapped as landslide. Features observed included hummocky terrain and recent small landslides/slumps. The potentially active fault trace is downslope 500 ft or less from the existing FirCo haul road in this section, running roughly parallel to the road.

The same inferred fault trace that crosses the slope directly west of Highway 101 also intersects the existing FirCo Haul Road where it crosses the ridge-top. This location includes a "notch" feature, which reflects increased erosion of crushed and broken rock of the fault zone (Pampeyan, 1981). This feature was also observed in our field review.

West of the ridge-top and "notch" along the existing FirCo Haul Road there is a road cut into somewhat intact moderately hard rock on the south side of the road. The out board side of the road at this location is above an approximately 15±foot high fill slope that is armored with rip-rap crushed rock. A waterbar (diagonal drainage swale) was also observed at this location. Despite the steep slope at this location, no slide activity was apparent in the fill materials or the immediately surrounding slopes.

There is a mapped landslide approximately 1,600±ft east of the Sherwood Road tie-in that measures approximately 1,000±ft wide, along the north edge of the FirCo Haul Road alignment (Durham 1979). Our field review did not include this area, as there was no right-of-entry. The terrain in this area appears hummocky and disturbed in aerial photos and on topographic mapping.

A landslide that was mapped based on aerial photo interpretation (Durham 1979) is shown north of the intersection of the Daphne Drive tie-in and the FirCo Haul Road alignment. This fault was not observed in our field review, but is apparent in the aerial photos reviewed. It appears that the proposed alignment would be able to avoid this possible slide area with a minor adjustment to the south.

No surface water was observed in the several drainages crossed by the existing FirCo haul road and no active seepage was observed in slopes along the alignment. Seasonal water in the drainages and seasonal groundwater in the slopes should be anticipated throughout the alignment.

Alternative A Alignment

The Alternative A alignment is shown running north from Hwy 20 with two potential tie-ins to the Brooktrails subdivision. This alignment traverses a gently ascending slope north of Hwy 20 and then roughly follows topographic contour across several small ridges before tying in to the Brooktrails subdivision. This alignment intersects Exley Road (gated and private) approximately halfway between Hwy 20 and Primrose drive. Rights-of-entry were not available for this alignment, and, consequently, our review is based only on available published information and aerial photos.

Several areas are described by Kilbourne, 1984, as "disrupted ground" consisting of irregular ground surfaces that are too small to show on the map, including complex landsliding, downslope creep, expansive soils, and/or gully erosion (Kilbourne 1984). These areas appear to be hummocky on available aerial photographs, but no obvious major slide features were observed during our aerial photo review. The "disrupted ground" areas are generally indicative of shallow ground movement, which appears reasonable based on aerial photo interpretation and the relatively gentle slopes along this route.

An inactive (no activity within the past 1.6 million years per Jennings, 2010) fault (reverse-thrust) is shown running along the ridge near the tie-ins for Primrose Drive. This fault is intersected by two separate steeply-dipping faults near the west tie-in (Kilbourne 1984). These faults may have distorted and weakened rocks along their traces and there is a possibility of localized slope stability issues in the areas adjacent to the faults. But, as mentioned above, no major slope failures have been noted along the alignment in published mapping or during our aerial photo review.

Small streams / drainages crossed by this alignment include Mill Creek (adjacent to Exley Road) and the northern tributary of Mill Creek. A spring is mapped near the Primrose West tie-in, at one of the above-noted fault intersections. Groundwater should be anticipated in excavations near this spring and seasonally throughout the alignment.

Discussion and Recommendations

Due to the relative lack of major geologic hazard concerns, Alternative A appears to be the more geotechnically feasible of the two reviewed alignments. Each alignment is discussed individually below.

FirCo Haul Road Alternative

The major challenge for construction and maintenance of the proposed FirCo Haul Road Alignment is the crossing of the steep slope area near the 1700 foot contour. Slope movement in cut and fill slopes was apparent in this area, and it is in close proximity to a possibly active fault splay that likely increases the potential for slope movement. Some very steep slopes are also present upslope and downslope of the alignment in this area that may add extra difficulty during construction. Road construction in this area appears that it would require large cut and fill areas and/or reinforced soil and retaining walls.

Culverts and/or small bridges will be needed for crossing each of the drainages. Large excavations will likely encounter groundwater throughout the year and all excavations are likely to encounter groundwater seasonally.

The large landslide mapped near the Highway 101 end of the alignment may be active. If the slide is determined to be active it is likely economically unfeasible to remediate the entire slide. This portion of the roadway is also crossed by the potentially active splay of the Maacama Fault, which could potentially cause periodic damage to the roadway. However, improving the stability of minor slopes and pavement subgrade within the slide area could reduce the amount of pavement distress to manageable levels.

Construction also appears feasible without major challenges westward from approximately photo location 4 through the rest of the alignment. The slide features in this portion of the alignment appear to be avoidable through minor alignment adjustment or can be remediated during grading of the roadway. The fault trace crossing at photo location 5 would require pavement repair following fault movement. Several culverts and other surface drainage features will be needed along this section of the alignment.

Alternative A

Alternative A crosses relatively gentle slopes and while areas of "disrupted ground" are shown on available mapping, these areas are limited in extent and can likely be remediated with relative ease.

This alignment might require some small culverts or possibly a bridge structure to cross local drainages. Nothing was noted during our review of available information or aerial photographs that would present abnormal difficulty for construction of these types of crossings.

The potential for groundwater near the spring at the Primrose Drive west tie-in should not pose a major grading concern.

Traffic Considerations

This transportation impact analysis was prepared by Whitlock & Weinberger Transportation, Inc (W-Trans) for inclusion in this report.

Preliminary Traffic Analysis

The study from 2008 included various evaluation criteria, but this evaluation focused on the subcategories of “Out of Direction Travel” and “Compatibility with US 101 Project.” The following evaluation factors were considered when evaluating the new alignments:

> *Out of Direction Travel is a measure of the level of directness for the second access and how the traffic load, in terms of ADT, can be shared by the new alternative*

Alternatives Evaluation Matrix							
Evaluation Criteria	**2009 Brooktrails Second Access Feasibility Study Alternative**					**New Alignment Alternative**	
	B	**C**	**G**	**H**	**I**	**FirCo Haul Rd**	**Alignment A**
Out of Direction Travel	3	2	3	4	5	2	2
Compatibility with US 101 Project	4	1	2	3	5	1	0
Average Scoring	3.5	1.5	2.5	3.5	5	1.5	1

route. This would also determine how attractive it will be for the Brooktrails Community to use the alternative route.
Compatibility with the US 101 Project was determined based on which alignment has a logical termination point that fits with the Caltrans US 101 Realignment project. An alignment that connects well with US 101 and would be acceptable to Caltrans would score the highest.

FirCo Haul Road Alternative

The FirCo Haul Road alternative, as proposed, is located the farthest north when compared to the other alignments, but is similar to Alternative C. This alternative includes a connection point to US 101, but it does not tie in directly. To the east, the proposed alignment turns and runs south, parallel to US 101, resulting in a longer, less direct route. For travelers whose final destination is to the north, it would result in a longer out of direction travel and be less “attractive” to the Brooktrails community.

Under the “Out of Direction Travel” category the proposed FirCo Haul Road alignment was given a score of 2 and for “Compatibility with US 101 Project” it is assigned a score of 1, resulting in an average score of 1.5. Note that this is the same score as was assigned to Alternative C, which is a fairly similar route.

Alternative Alignment A

As proposed, Alignment A is located the farthest west of all the proposed alignments. This alternative does not connect directly to US 101 or have tie-ins to the Caltrans realignment project. However, this route does connect directly to SR 20 and provides the most direct access to the regional roadway system. Given that the proposed alignment is the most direct, it is expected to have some “attractiveness” to the Brooktrails community, especially for those accessing the coast via SR 20.

Alternative Alignment A was therefore given a score of 2 for “Out of Direction Travel” but because it does not tie into US 101, under the “Compatibility with US 101 Project” criteria it was assigned a score of 0. The average score for this Alternative is therefore 1.

The scores for all of the Alternatives, including FirCo Haul Road and Alternative Alignment A, are summarized in Table 1. The scores for the alternatives that were previously analyzed are reported from the 2009 Brooktrails study.

Conclusions

- When Considering “Out of Direction Travel” and “Compatibility with the US 101 Project” the FirCo Haul Road Road Alignment Alternative is scored at 1.5.
- When Considering “Out of Direction Travel” and “Compatibility with the US 101 Project” the Alternative A Alignment is scored at 1.

- Both of these new alternatives score as low as or lower than any of the five alternatives included in the 2009 study.

Right-of-Way Considerations

County of Mendocino DOT standards require a 60-foot wide right-of-way for a rural minor collector as planned for the Second Access route. This right-of-way will contain a 36-foot paved roadway with 2-foot graded gravel shoulders on each side of the pavement, resulting in a 40-foot wide base roadway. This 40-foot wide base roadway is typically centered in the right-of-way. The additional 20-foot of right-of-way (10-feet each side) is used for roadside ditches and side slopes. If cut or fill slopes extend beyond the right-of-way, slope maintenance easements are usually secured for those areas where the roadway slope cannot be contained within the 60-foot wide right-of-way.

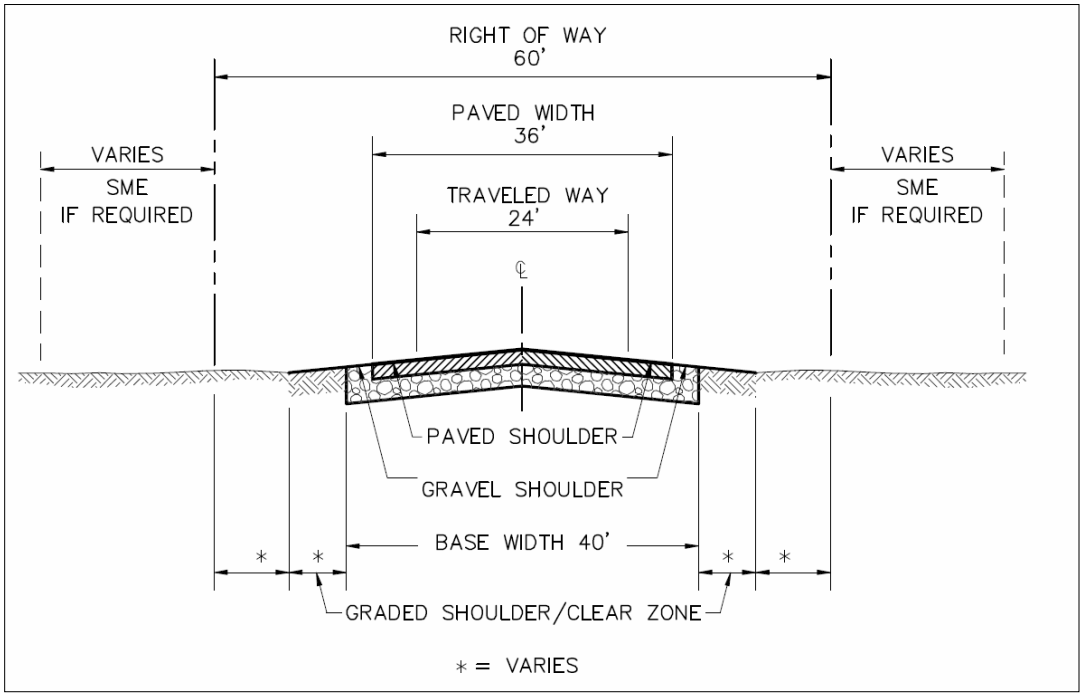


Figure 9: Typical Section and Right-of-Way Width

Public Outreach

The County of Mendocino DOT hosted a community workshop on October 11, 2011 for the Brooktrails Second Access.

The primary goal of this community meeting was to solicit input from the community regarding the conceptual alignments for the Second Connection Supplemental Study. Typically, roadway improvement projects such as this would not have a public input meeting until a formal notice of preparation of environmental documents is issued. However, this is an important project to the residents that live in the community, and particularly to the residents that may live close to a potential alignment, so the County wanted to engage the public in the earliest stages of the project to help determine the best overall project for the community.

TO BE COMPLETED FOLLOWING THE PUBLIC WORKSHOP

Alignment Comparisons Using Performance Criteria

A two-step process is used to score and rank the seven basic alignment corridors proposed for the project. As a decision making tool, this process is designed to be an objective evaluation of the alternatives with respect to the relative importance of critical project features.

A "Performance Criteria" matrix and "Scoring" matrix are used to assist in determining which of the alternatives should be recommended for further study. A list of project objectives, impacts and alignment characteristics were used as the criteria to rank each alternative. For the performance criteria matrix, each criterion is weighed one against the other to determine the relative importance of each criterion with respect to the overall project. The result of the criteria comparisons is a relative weight or percentage that each criterion will contribute to the actual alignment alternatives scoring matrix. This approach helps to ensure that the preferred alternatives are those alternatives that best reflect the priorities of the County, the stakeholders, and ultimately the public.

For the alignment alternatives scoring matrix, each alternative was evaluated independently for each of the categories and are given a score from 0 to 100, with 0 being very negative to 100 being very positive.

Performance Criteria

The following criteria are used to score each study alternative. The criterion are selected to represent how well each alternative will satisfy the project objectives as stated in the project Purpose and Need statement. Additional criteria address project impacts such as environmental and traffic, as well as engineering and construction feasibility. The criteria used in this study are listed below, with a description of the intention of each criterion.

- **Regular Use as a Secondary Access Route** – As defined in project purpose and need statement, the new roadway should serve as a reliable collector road into the Brooktrails Township. This category acknowledges that the second access route is identified as a planned traffic circulation element in the County General Plan and the Brooktrails Specific Plan. A high score here indicates a route that is easily accessible and would be used regularly by residents in the community.
- **Emergency Access Detour Route** - During times when Sherwood Road is blocked from accidents or storm debris, the new roadway should provide a viable detour route for emergency response vehicles to get around the incident. A higher score in this category indicates a larger area that can be accessed by the new route if Sherwood Road is blocked. This is also related to response times for emergency vehicles, with shorter response times to the more densely populated areas having a higher score.
- **Evacuation Route** – Based on the alternative's ability to provide an evacuation route for residents in case of a disaster such as wildfires, flooding, landslides or other events that make travel on Sherwood Road dangerous. This category acknowledges that disasters are unpredictable so it is not possible to define a "best route" for evacuation, but a route that provides a "back way out" or opposite direction of travel from Sherwood Road will receive a higher score.
- **Engineering & Construction Feasibility** – Based on the nature of the improvements needed to provide a roadway designed and built to current County standards. Alternatives that require significant earthwork such as deep cuts and large fills will score lower. Also, alignments that traverse geological hazards such as earthquake faults and active (or potentially active) landslides will score low.

- **Right of Way** – Based on the amount and type of right-of-way needed for each alternative. Alignments that displace residents or businesses score low. Alignments that require significant slope easements also are graded lower.
- **Public Support** – Based on comments and opinions from the local residents as received from public meetings. Alternatives that are consistent with the desires of the public will be assigned a higher score.
- **Environmental Impacts** – Based on potential environmental impacts caused by the alternatives. A higher score is given to those alternatives that avoid significant impacts and minimize potential mitigation measures.
- **Traffic Impacts** – Based on the impacts to existing traffic patterns, as well as character of existing roads. Higher score given to those alternatives that provide better circulation and least change in the character of the roadway. This criterion looks at traffic from the perspective of those that live near the affected roads; as compared to the "Regular Use as a Secondary Access Route," that considers traffic circulation from a driver's perspective.

Table 2 shows the evaluation results for criteria ranking. Each criterion is compared one at a time against all the others, with the more important criterion entered into the table at the intersection of two being compared, as the table shows. The relative importance of each criterion is then calculated as a percentage of the total number of instances a criterion is entered into the table.

Table 2: Brooktrails Second Access Performance Criteria Matrix

Screening Criteria	B	C	D	E	F	G	H	Total	Weight (%)
Regular Use as Secondary Route	A	A	A	A	A	A	A	7	25%
Emergency Access Detour Route		B	B	B	B	B	H	5	18%
Evacuation Route			C	C	F	G	H	2	7%
Engineering & Construction Feasibility				D	D	G	H	2	7%
Right of Way					F	G	E	1	4%
Public Support						F	F	4	14%
Environmental Impacts							G	4	14%
Traffic Impacts								3	11%
							Total	28	100%

According to the Performance Criteria Matrix, each criterion is ranked in the order of importance or "weight" as follows:

Rank of Each Criterion	
1	Regular Use as Secondary Route
2	Emergency Access Detour Route
3	Environmental Impacts
3	Public Support
5	Traffic Impacts
6	Evacuation Route
6	Engineering & Construction Feasibility
8	Right of Way

Once the weighting of each criterion is determined, each of the study alignments is given a score that represents how well (or poorly) that alignment satisfies the criteria. The score ranges from 0 to 100 with 0 indicating that the alignment does not satisfy the criterion, and 100 indicating that the alignment fully satisfies that criterion. Intermediate scores in 10 point increments are assigned to indicate varying levels of satisfaction.

Described below are the categories used to score the alternatives and the reasoning behind each alternative's score:

Regular Use as a Secondary Access Route	Score
• **Alternative A (Highway 20)** – This alignment provides quick and easy access from Primrose Drive to Highway 20 and could be an effective secondary access route for those residents living southwest of Sherwood Road. However, due to the circuitous route through the residential streets to the Primrose Drive intersection, this route would only be used regularly by those residents living southwest of Sherwood Road.	**20**
• **Alternative B (Quail Meadows)** – This alternative provides a short connection from Sherwood Road to existing Highway 101 at the north end of Willits, but does not differentiate itself from the existing Sherwood Road enough to be considered for regular use as a secondary access route since it does not tie-in directly to the 101 and converges with Sherwood Road south of the Brooktrails Township.	**60**
• **Alternative C (Brooktrails Drive Extension)** – This alignment requires drivers to travel north for a substantial distance before turning east and connecting to the proposed Highway 101 Frontage Road, longer than Alternatives G and H.	**10**
• **Alternative D/E/F (FirCo Haul Road)** – Although this combination of alignments are the longest routes considered, the connections to Poppy Drive and Sherwood Road make these alignments an effective secondary access route for those residents north and west of the airport.	**70**
• **Alternative G (Wild Oat Canyon)** – This alignment requires drivers to travel north for a substantial distance before turning east and connecting to the proposed Highway 101 Frontage Road, although shorter than Alternatives C but longer than Alternative H.	**20**
• **Alternative H (Truck Scales)** – This alignment requires drivers to travel north for a substantial distance before turning east and connecting to the proposed Highway 101 Frontage Road, although shorter than Alternatives C and G.	**30**
• **Alternative I (Upp Valley)** – Due to the direct connection to the proposed Highway 101 Bypass, and the location of the connection to Sherwood Road, this alternative appears to provide the best option for regular use as a secondary access into and out of the Brooktrails Township.	**100**

Emergency Access Detour Route	Score
• **Alternative A (Highway 20)** –Alignment A will have the shortest travel times for first responders coming from Highway 20. Once within Brooktrails, emergency equipment and personnel will use Primrose Drive to access Sherwood Road and the rest of the township. Likewise, the Brooktrails CSD emergency equipment is positioned on the southwest side of Sherwood Road.	**70**

• **Alternative B (Quail Meadows)** – This alternative provides quick access from existing Highway 101, but relies on Sherwood Road to access into Brooktrails township. A blockage of Sherwood Road above the connection point of Alternative B with Sherwood Road will reduce the effectiveness of this alternative as an access route for emergency equipment and personnel.	**10**
• **Alternative C (Brooktrails Drive Extension)** – The overall length of this alternative and the lack of connection to any roads within Brooktrails except to Sherwood Road at Brooktrails Drive reduces the effectiveness of this alternative as an emergency access route.	**20**
• **Alternative D/E/F (FirCo Haul Road)** – Serves well as an alternative route in terms of service area and does not rely on Sherwood Road to reach Brooktrails. By entering the upper end of Brooktrails, this route will bypass most incidents on Sherwood Road, but response times would be longer due to the overall length of the alignments.	**80**
• **Alternative G (Wild Oat Canyon)** – Similar to Alternative C, the overall length of this alternative and the lack of connection to any roads within Brooktrails except to Sherwood Road at Brooktrails Drive reduces the effectiveness of this alternative as an emergency access route.	**30**
• **Alternative H (Truck Scales)** – Similar to Alternative C, the overall length of this alternative and the lack of connection to any roads within Brooktrails except to Sherwood Road at Brooktrails Drive reduces the effectiveness of this alternative as an emergency access route.	**40**
• **Alternative I (Upp Valley)** – This route offers very good emergency response times from Willits via existing Highway 101 as well as the proposed Bypass. Upon reaching Brooktrails, emergency equipment and personnel can use Sherwood Road or Primrose Drive to access the rest of the township.	**70**

Evacuation Route	**Score**
• **Alternative A (Highway 20)** – Provides a good alternative to Sherwood Road as an evacuation route in the event of a natural disaster, although it requires traversing long segments of residential streets to reach the Primrose Drive intersection.	**60**
• **Alternative B (Quail Meadows)** – This alternative does not offer a "back door", forces residents to rely on Sherwood Road for a good portion of the evacuation route, and could be cut off by the same disaster (wildfire or landslide) due to its proximity to Sherwood Road.	**10**
• **Alternative C (Brooktrails Drive Extension)** – Similar to Alternative B, does not provide a "back door" and could be cut off by the same disaster (wildfire or landslide) due to its proximity to Sherwood Road.	**30**

• **Alternative D/E/F (FirCo Haul Road)** – Provides a good alternative to Sherwood Road as an evacuation route in the event of a natural disaster, good opposite direction travel for most Brooktrails residents.	**80**
• **Alternative G (Wild Oat Canyon)** – Similar to Alternative B, does not provide a "back door" and could be cut off by the same disaster (wildfire or landslide) due to its proximity to Sherwood Road.	**40**
• **Alternative H (Truck Scales)** – Similar to Alternative B, does not provide a "back door" and could be cut off by the same disaster (wildfire or landslide) due to its proximity to Sherwood Road.	**40**
• **Alternative I (Upp Valley)** – Similar to Alternative B, does not provide a "back door" and could be cut off by the same disaster (wildfire or landslide) due to its proximity to Sherwood Road.	**40**

Engineering & Construction Feasibility	**Score**
• **Alternative A (Highway 20)** – Although the alignment follows generally the path of an existing trail or dirt road, it is essentially new construction. Steep grades of up to 16% are encountered for short stretches throughout much of the alignment. Even so, this is this least challenging of all routes.	**50**
• **Alternative B (Quail Meadows)** – The horizontal and vertical alignment are straight forward, although some challenges are presented by crossing the Alquist-Priolo Earthquake Fault.	**40**
• **Alternative C (Brooktrails Drive Extension)** – Requires a bridge over Upp Creek through a potential landslide zone and earthquake fault. Extensive cuts and fills are required with the proposed alignment. The profile includes a 1 mile long descending grade of 9.5% with limited run out where the alignment connects to existing Highway 101.	**10**
• **Alternative D/E/F (FirCo Haul Road)** – Although the alignment follows generally the path of an existing trail or dirt road, it is essentially new construction. Steep grades of up to 16% are encountered for short stretches throughout much of the alignment. The supplemental geotechnical assessment prepared as part of this report shows this alignment passing through a potential landslide area, but no bridges for this alignment.	**50**
• **Alternative G (Wild Oat Canyon)** – Requires a bridge over Upp Creek through a potential landslide zone and earthquake fault. Extensive cuts and fills are required with the proposed alignment. The profile includes a nearly 1 mile long descending grade of 12% with limited run out where the alignment connects to existing Highway 101.	**10**
• **Alternative H (Truck Scales)** – Requires a bridge over Upp Creek through a potential landslide zone and earthquake fault. Extensive cuts and fills are required with the proposed alignment. The profile includes a nearly 1 mile long descending grade of 15% with limited run out where the alignment connects to existing Highway 101.	**10**

• **Alternative I (Upp Valley)** – Requires two bridges over Upp Creek through a potential landslide zone and over earthquake faults, introducing significant challenges. Profile includes a steep grade with limited run out length where it connects to the proposed roundabout that would be constructed with the Highway 101 Bypass. A redesign of the lower end of the alignment is proposed to flatten the grade and increase the run out length.	**10**

Right-of-Way	**Score**
• **Alternative A (Highway 20)** – A portion of this alignment follows an existing unpaved road, although it appears that there are existing structures that could be impacted by its construction. May result in acquisition of parcels on Primrose Drive.	**20**
• **Alternative B (Quail Meadows)** – This alternative is constructed on a new alignment, with the property owners objecting to the project, and have indicated that the County would be required to use eminent domain to obtain the necessary right of way.	**20**
• **Alternative C (Brooktrails Drive Extension)** – The majority of this alternative is constructed on a new alignment, with the property owners objecting to the project, and have indicated that the County would be required to use eminent domain to obtain the necessary right of way.	**20**
• **Alternative D/E/F (FirCo Haul Road)** – Alignment follows the existing "FirCo" haul road. The property owner has indicated that he is willing to work with the County to provide the necessary right of way for its construction.	**80**
• **Alternative G (Wild Oat Canyon)** – This alternative is constructed on a new alignment, with the property owners objecting to the project, and have indicated that the County would be required to use eminent domain to obtain the necessary right of way.	**20**
• **Alternative H (Truck Scales)** – This alternative is constructed on a new alignment, with the property owners objecting to the project, and have indicated that the County would be required to use eminent domain to obtain the necessary right of way.	**20**
• **Alternative I (Upp Valley)** – This alternative is constructed on a new alignment, with the property owners objecting to the project, and have indicated that the County would be required to use eminent domain to obtain the necessary right of way. Upper end is very close to properties, mat result in individual parcels at the end of Robinson Road.	**20**

Public Support	**Score**
• **Alternative A (Highway 20)** – Historically, Alternative A has been designated as an alternative access, but current Brooktrails specific plan has it as the third connection.	**50**

• **Alternative B (Quail Meadows)** – Based on public input received during the previous feasibility study, there is little support for Alternative B as it is not believed to provide significant traffic relief nor function effectively as an emergency evacuation route.	**20**
• **Alternative C (Brooktrails Drive Extension)** – Based on public input received during the previous feasibility study, there is little support for Alternative C as it is not believed to provide significant traffic relief nor function effectively as an emergency evacuation route.	**20**
• **Alternative D/E/F (FirCo Haul Road)** – There appears to be broad support for improving the FirCo Haul Road as an additional access, but there have been doubts expressed in meetings that it would attract enough traffic to provide traffic relief for Sherwood Road.	**70**
• **Alternative G (Wild Oat Canyon)** – Based on public input received during the previous feasibility study, there is little support for Alternative G as it is not believed to provide significant traffic relief nor function effectively as an emergency evacuation route.	**20**
• **Alternative H (Truck Scales)** – Based on public input received during the previous feasibility study, there is little support for Alternative H as it is not believed to provide significant traffic relief nor function effectively as an emergency evacuation route.	**20**
• **Alternative I (Upp Valley)** – Based on public input received during the previous feasibility study, there is broad support for Alternative I. It is supported by the Brooktrails CSD but also has major opposition from affected landowner.	**50**

Environmental Impacts	**Score**
• **Alternative A (Highway 20)** – Alternative A crosses less forested land than the other alternatives. Alternative A crosses Mill Creek, which is designated critical habitat for steelhead, and is likely to be determined critical habitat for Coho salmon.	**60**
• **Alternative B (Quail Meadows)** – Alternative B does not cross any wetlands or waters and impacts are likely to be less than the other alternatives.	**80**
• **Alternative C (Brooktrails Drive Extension)** – Alternative C crosses potential wetland habitat in the meadow areas and below the dam on Upp Creek. Upp Creek is also considered Steelhead critical habitat. Alternative C is also within 1.3 km of known spotted owl territory. Alternative C also passes through an area of mapped serpentine soils.	**40**
• **Alternative D/E/F (FirCo Haul Road)** – The FirCo Haul Road alternative has two northern spotted owl occurrences less than 0.30 miles away. There is potential for impacts to special-status plants, due to the proximity of its eastern segment to the Little Lake Valley floor and known special-status plant records, and due to the presence of known serpentine soils on Alternative D.	**40**

• **Alternative G (Wild Oat Canyon)** – Similar to Alternative C, Alternative G crosses potential wetlands and Steelhead habitat on Upp Creek and known spotted owl territory. Alternative G also passes through an area of mapped serpentine soils.	**40**
• **Alternative H (Truck Scales)** – Similar to Alternative C, Alternative H crosses potential wetlands and Steelhead habitat on Upp Creek and known spotted owl territory. Alternative H also passes near an area of mapped serpentine soils.	**40**
• **Alternative I (Upp Valley)** – Alternative I crosses potential wetland habitat in the meadow areas and below the dam on Upp Creek. Upp Creek is also considered Steelhead critical habitat. Alternative I is also within 1.3 km of known spotted owl territory.	**30**

Traffic Impacts	**Score**
• **Alternative A (Highway 20)** – The construction of an access road to Highway 20 could cause some impacts to traffic levels on Primrose Drive and other streets in the southwest portion of Brooktrails as traffic is diverted from Sherwood Road to this new access road.	**20**
• **Alternative B (Quail Meadows)** – Due to the location of the connection point with Sherwood Road, below most of the developed areas of the Brooktrails township, Alternative B should not alter traffic patterns within Brooktrails.	**90**
• **Alternative C (Brooktrails Drive Extension)** – Due to the location of the connection point with Sherwood Road, below most of the developed areas of the Brooktrails township, Alternative C should not alter traffic patterns within Brooktrails.	**70**
• **Alternative D/E/F (FirCo Haul Road)** – The construction of an access road that roughly follows the alignment of the FirCo Haul Road could cause some impacts to traffic levels on streets north and west of Ells Field as traffic is diverted from Sherwood Road to this new access road. Unless the side tie-in roads are built with the new road, this alignment running from Sherwood Road should not appreciably alter traffic patterns in Brooktrails.	**90**
• **Alternative G (Wild Oat Canyon)** – Due to the location of the connection point with Sherwood Road, below most of the developed areas of the Brooktrails township, Alternative G should not alter traffic patterns within Brooktrails.	**70**
• **Alternative H (Truck Scales)** – Due to the location of the connection point with Sherwood Road, below most of the developed areas of the Brooktrails township, Alternative H should not alter traffic patterns within Brooktrails.	**70**
• **Alternative I (Upp Valley)** – Due to the location of the connection point with Sherwood Road, below most of the developed areas of the Brooktrails Township, Alternative I should not alter traffic patterns within Brooktrails.	**90**

Alignment Comparisons – Scoring Matrix

The scores for each criterion for each alignment are adjusted according the relative weight of each criterion, as determined from the Performance Criteria Matrix. The total weighted scores are then summed for each alternative. Table 3 shows the results of the weighted scores, and the total scores for each alternative are shown graphically below.

As can be seen in the graph, the top two alignments are similar in scoring, and are clearly separated from the other five alignments. Therefore, based on these rankings the lower five alignments should be eliminated from further consideration

Table 3: Brooktrails Second Access - Alignment Scoring Matrix

Criteria	Alternative A - Highway 20			Alternative B - Quail Meadows			Alternative C - Brooktrails Drive Extension			Alternative D/E/F - FirCo Haul Road			Alternative G - Wild Oat Canyon			Alternative H - Truck Scales			Alternative I - Upp Valley		
	Category Score	Weight	Weighted Score	Category Score	Weight	Weighted Score	Category Score	Weight	Weighted Score	Category Score	Weight	Weighted Score	Category Score	Weight	Weighted Score	Category Score	Weight	Weighted Score	Category Score	Weight	Weighted Score
Regular Use as Secondary Route	20	25%	5.0	60	25%	15.0	10	25%	2.5	70	25%	17.5	20	25%	5.0	30	25%	7.5	100	25%	25.0
Emergency Access Detour Route	70	18%	12.5	10	18%	1.8	20	18%	3.6	80	18%	14.3	30	18%	5.4	40	18%	7.1	70	18%	12.5
Evacuation Route	60	7%	4.3	10	7%	0.7	30	7%	2.1	80	7%	5.7	40	7%	2.9	40	7%	2.9	40	7%	2.9
Engineering & Construction Feasibility	50	7%	3.6	40	7%	2.9	10	7%	0.7	50	7%	3.6	10	7%	0.7	10	7%	0.7	10	7%	0.7
Right of Way	20	4%	0.7	20	4%	0.7	20	4%	0.7	80	4%	2.9	20	4%	0.7	20	4%	0.7	20	4%	0.7
Public Support	50	14%	7.1	20	14%	2.9	20	14%	2.9	70	14%	10.0	20	14%	2.9	20	14%	2.9	50	14%	7.1
Environmental Impacts	60	14%	8.6	80	14%	11.4	40	14%	5.7	40	14%	5.7	40	14%	5.7	40	14%	5.7	30	14%	4.3
Traffic Impacts	20	11%	2.1	90	11%	9.6	70	11%	7.5	90	11%	9.6	70	11%	7.5	70	11%	7.5	90	11%	9.6
TOTALS			**43.9**			**45.0**			**25.7**			**69.3**			**30.7**			**35.0**			**62.9**

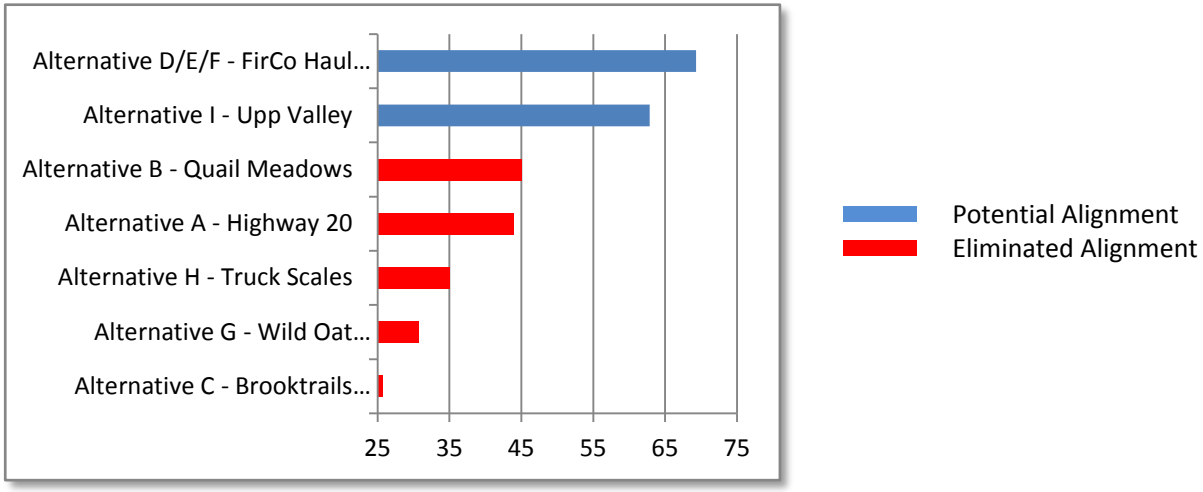


Figure 10: Alignment Scoring Results

Concept Construction Costs

The cost of the alternatives is evaluated independent of the other performance criteria since it can "make-or-break" a project alternative. The County DOT will factor cost into alignment selection after consideration of the other factors. The County DOT must work within realistic budget constraints for each project.

Cost estimates have been prepared for Alignment A and the FirCo Haul Road Alignment. Details of these estimates are in the Appendix. For the other five alignments, the cost estimates are taken from the KOA study. The KOA study assumptions for the cost of bridges and retaining walls may have underestimated the impact of geology on those alignments that cross Upp Creek. Also, it appears that the estimate for Alignment I was missing one of the two bridges that will be needed for that alignment.

There is a very large mapped landslide feature that affects Alignments C, G, H and I, as well as known earthquake faults that traverse those same alignments. The layouts for these alignments indicate very large cuts into the toe of the slide that may need retaining walls. The bridge design and construction can be significantly difficult on these alignments due to potential landslide creep and seismic activity from the faults running directly under the bridges. Therefore, the unit cost of retaining walls and bridges on these alignments have been adjusted to account for geotechnical issues on those alignments. Alignments C, G & H have been increased by 10% and Alignment I by 15% to account for these difficulties.

Table 7: Concept Construction Costs Summary

	Construction	Right of Way	Project Development	Total
Alternative A – Highway 20	$4,620,000	$500,000	$1,620,000	$6,740,000
Alternative A2– Highway 20	$4,640,000	$550,000	$1,620,000	$6,810,000
Alternative B – Quail Meadows	$5,564,000	$800,000	$1,498,000	$7,862,000
Alternative C – Brooktrails Drive Extension	$21,727,000	$3,200,000	$5,850,000	$30,776,000
Alternative D – FirCo Haul Road	$12,020,000	$620,000	$4,210,000	$22,190,000
Alternative E – FirCo Haul Road	$17,360,000	$970,000	$6,080,000	$24,410,000
Alternative F – FirCo Haul Road	$13,050,000	$980,000	$4,570,000	$18,600,000
Alternative G – Wild Oat Canyon	$17,753,000	$2,450,000	$4,780,000	$24,982,000
Alternative H – Truck Scales	$20,306,000	$3,250,000	$5,467,000	$29,023,000
Alternative I – Upp Valley	$11,366,000	$1,100,000	$3,060,000	$15,526,000

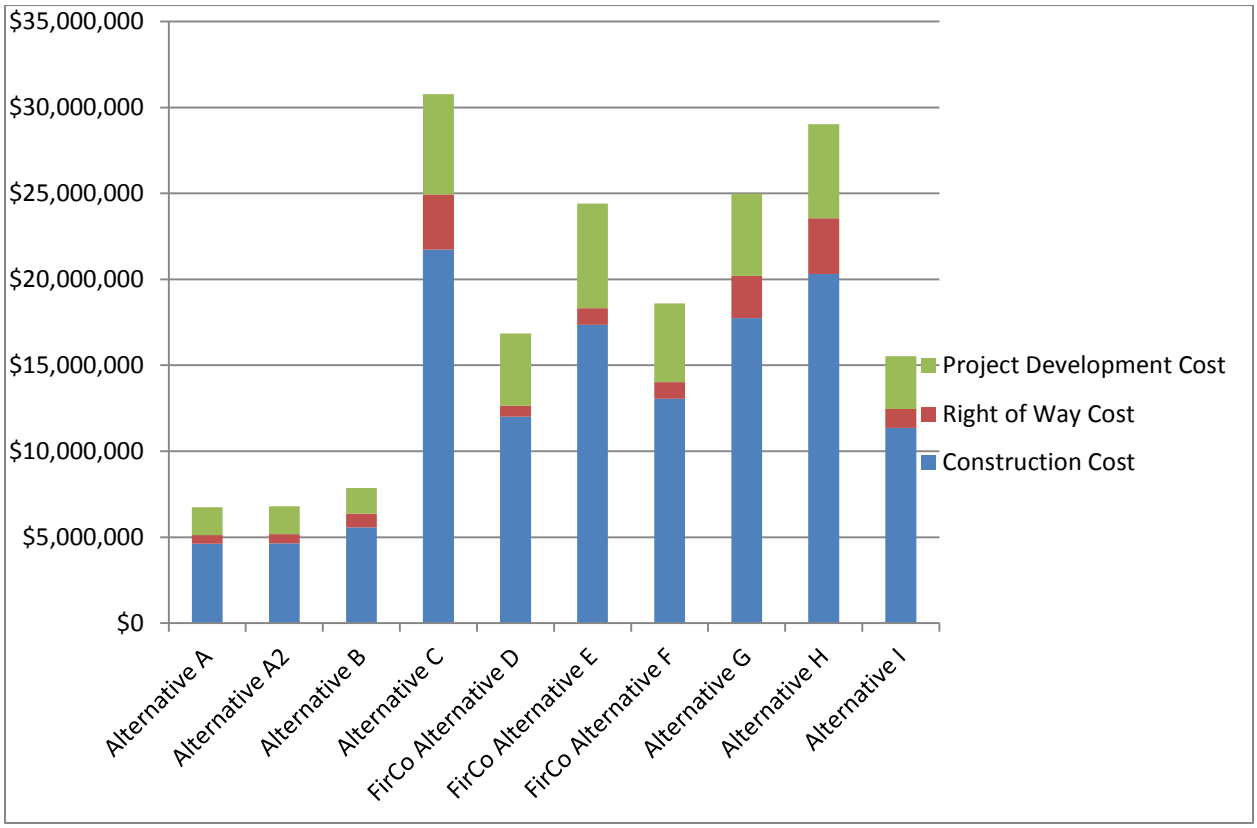


Figure 11: Cost Comparisons of each Alternative

As can be seen from the table and charts, the lowest cost alternatives are A and B which are also the shortest routes. The most costly alternative is Alternative C, the longest route.

Notes regarding the cost analysis:

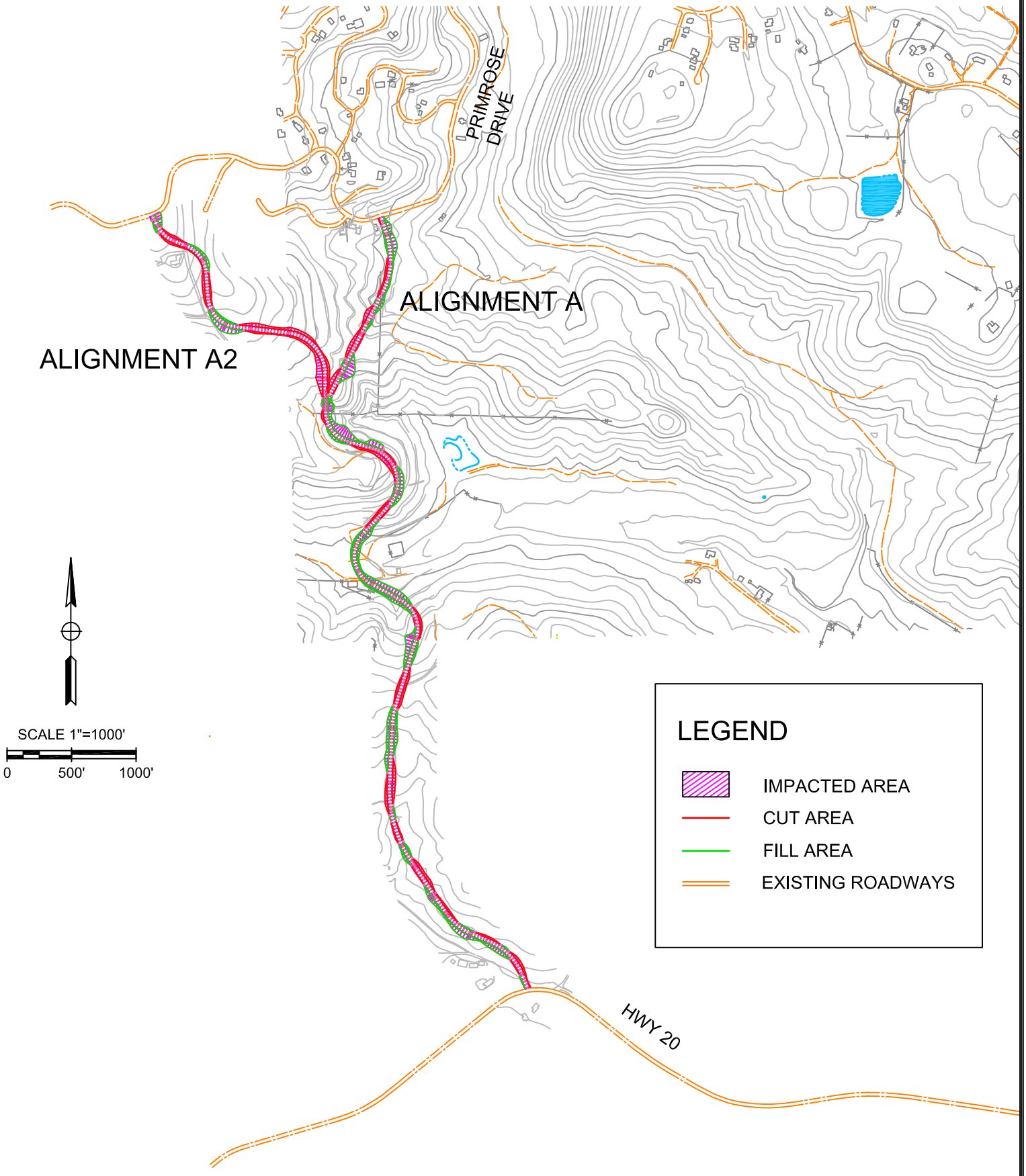
1. The baseline costs for Alignments B, C, G, H and I are taken from the KOA study.
2. The costs for Alignments C, G, H and I are increased from the KOA study to account for difficult geotechnical conditions due to evidence of landslides and earthquake faults.
3. Project development costs assumed to be 15% for engineering, 10% for environmental clearance and 10% for construction management and administration. These cost assumptions are consistent with the assumptions used in the KOA study.
4. Planning level contingencies (30%) have been added to construction cost estimates, also consistent with the KOA study assumptions.

Recommendations

Based on the finding of this supplemental feasibility study, Alignment I and the FirCo Haul Road Alignment should both be included for further study in the Project Approval and Environmental Documentation phase of the project development process. These alternatives both meet the project Purpose and Need, and provide the best combination of engineering and construction feasibility with the best balance of overall benefits for the community. The Brooktrails Second Access project using either of these recommended alignments is certainly feasible, and as a project of local significance, it should be advanced into the environmental assessment and preliminary engineering phase as soon as funding can be secured.

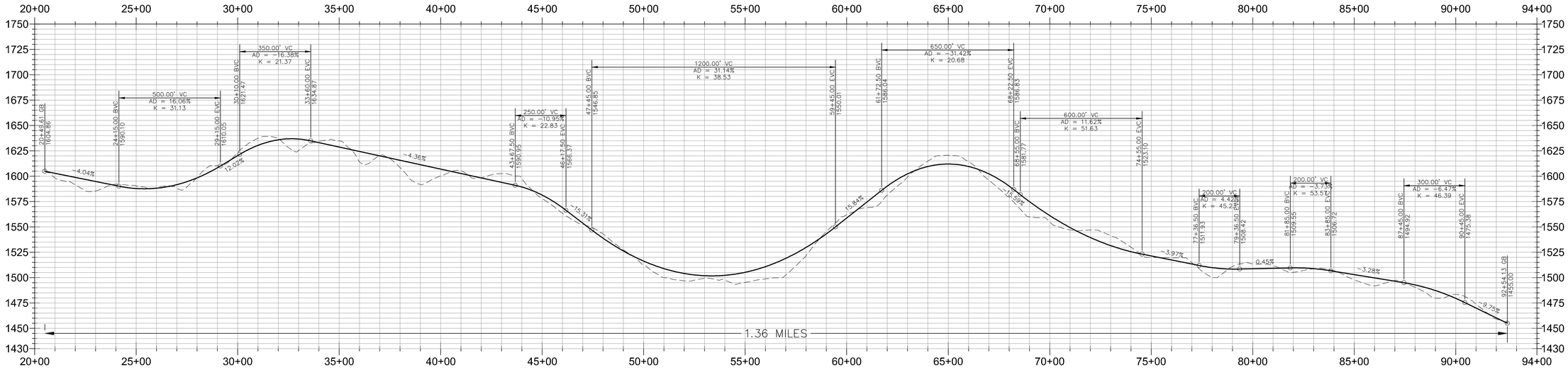
APPENDIX A

ALIGNMENT ALTERNATIVE A



ALIGNMENT A & A2 LAYOUTS

drake haglan AND ASSOCIATES
11060 White Rock Road, Suite 200
Rancho Cordova, CA 95670



MENDOCINO COUNTY

DEPARTMENT OF TRANSPORTATION

ALIGNMENT A - VERTICAL PROFILE

500' 250' 0' 500' 1000'

GRAPHIC SCALE: 1"=500'

HOR.=1:500
VERT.=1:100

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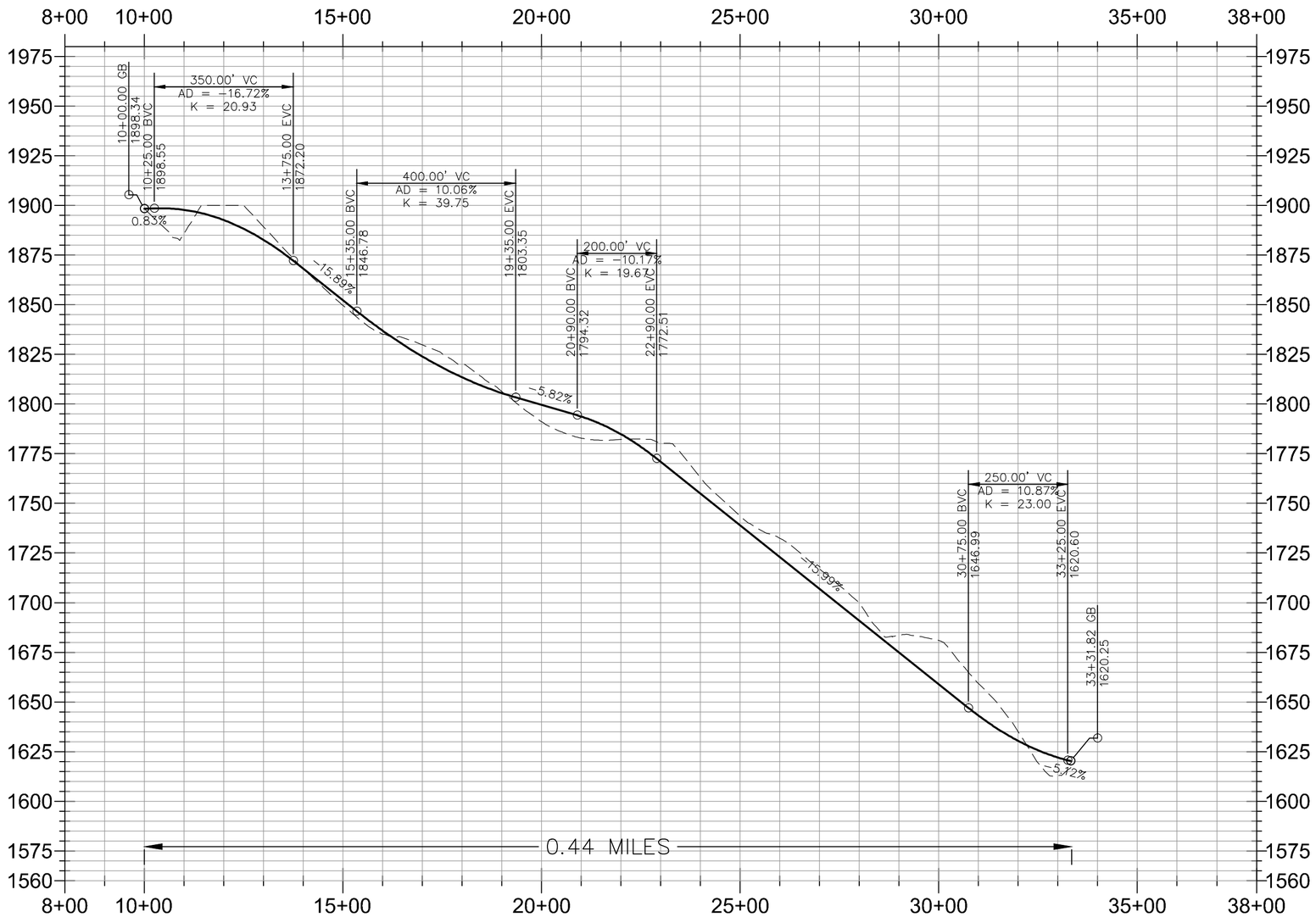
11060 White Rock Road, Suite 200
Rancho Cordova, CA 95670



MENDOCINO COUNTY

DEPARTMENT OF TRANSPORTATION

ALIGNMENT A2
VERTICAL PROFILE

500' 250' 0' 500' 1000'

GRAPHIC SCALE: 1"=500'

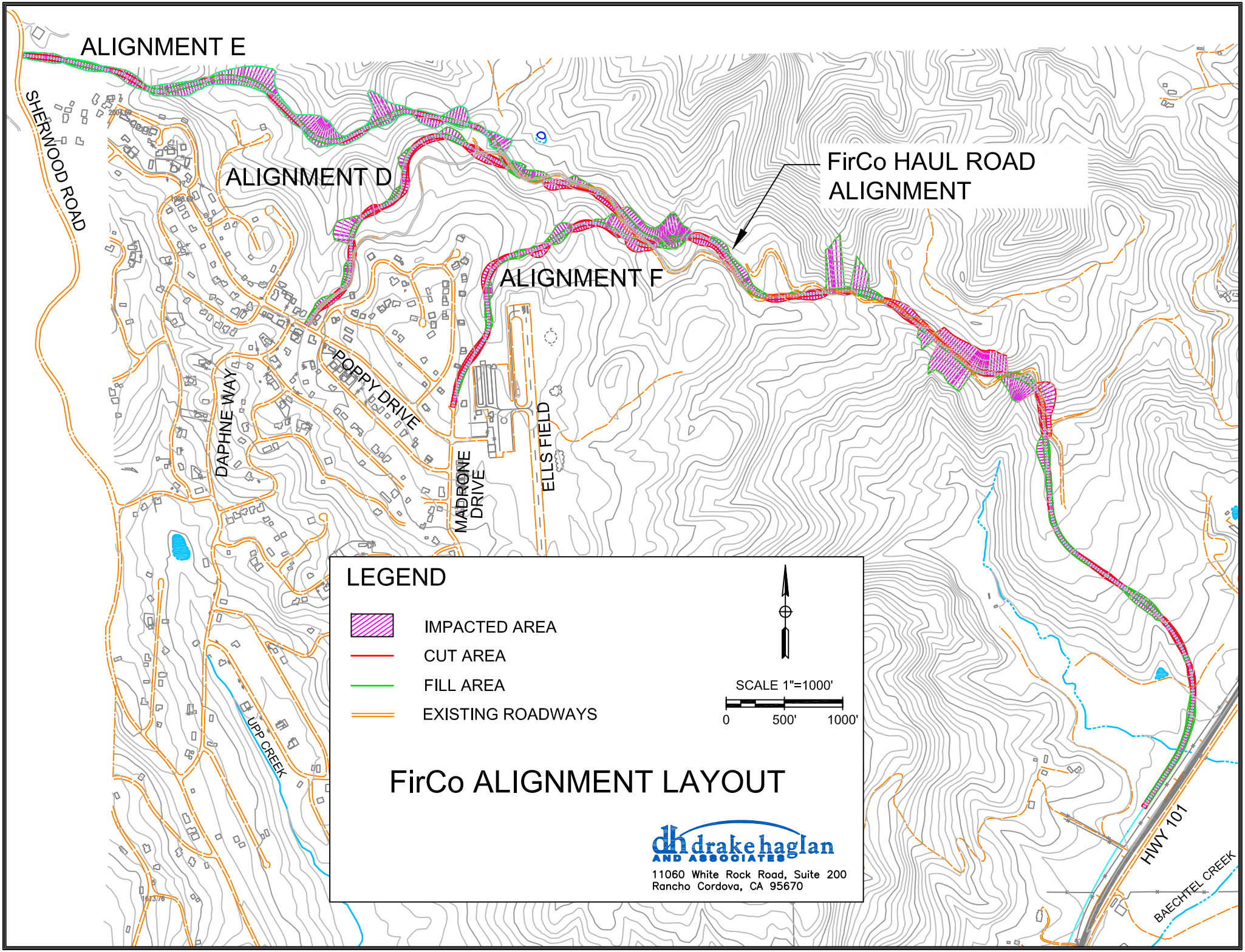
HOR.=1:500
VERT.=1:100

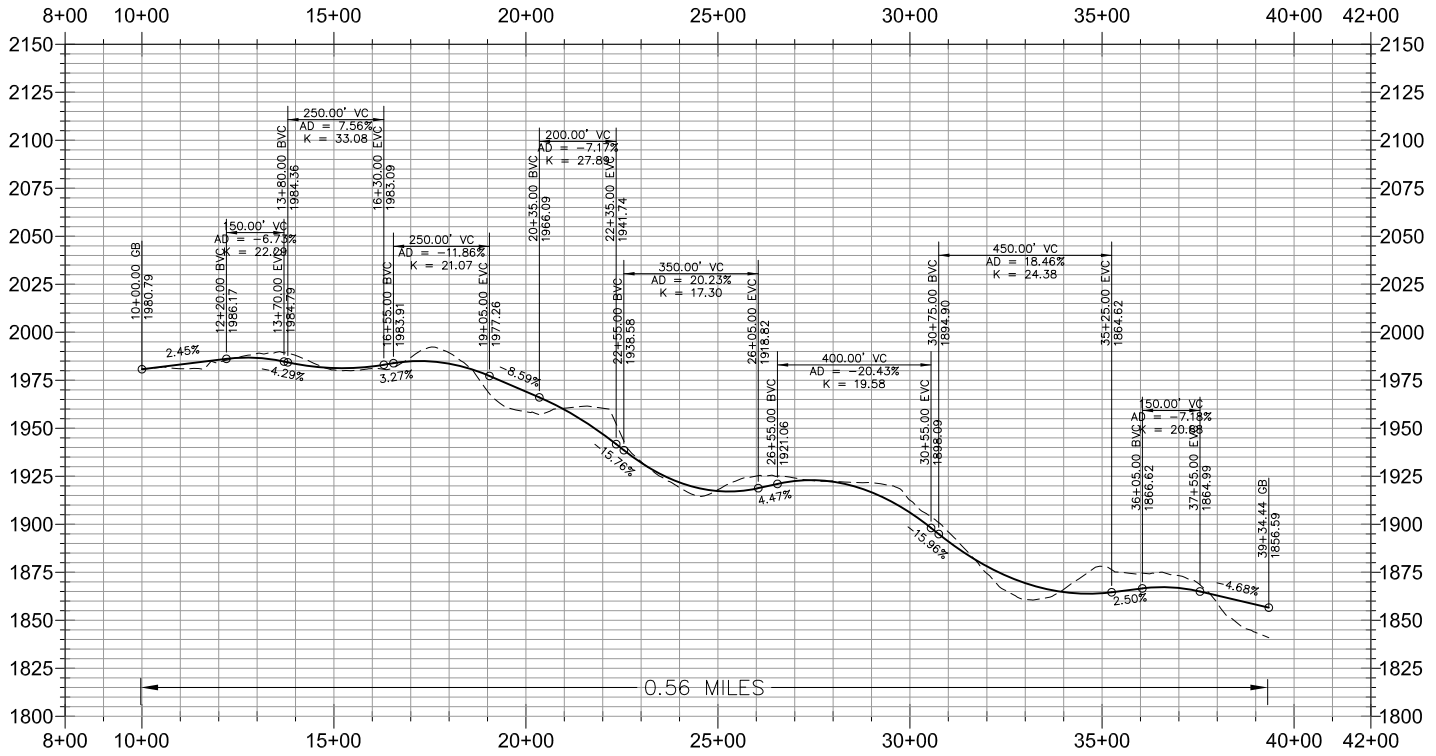
drake haglan AND ASSOCIATES

11060 White Rock Road, Suite 200
Rancho Cordova, CA 95670

APPENDIX B

FIRCO HAUL ROAD ALIGNMENTS


ALIGNMENT E
SHERWOOD ROAD
ALIGNMENT D
FirCo HAUL ROAD
ALIGNMENT
ALIGNMENT F
POPPY DRIVE
DAPHNE WAY
MADRONE DRIVE
ELLS FIELD
UPP CREEK
HWY 101
BAECHTEL CREEK
LEGEND
IMPACTED AREA
CUT AREA
FILL AREA
EXISTING ROADWAYS
SCALE 1"=1000'
0
500'
1000'
FirCo ALIGNMENT LAYOUT
drake haglan AND ASSOCIATES
11060 White Rock Road, Suite 200
Rancho Cordova, CA 95670



MENDOCINO COUNTY

DEPARTMENT OF TRANSPORTATION

ALIGNMENT D
VERTICAL PROFILE

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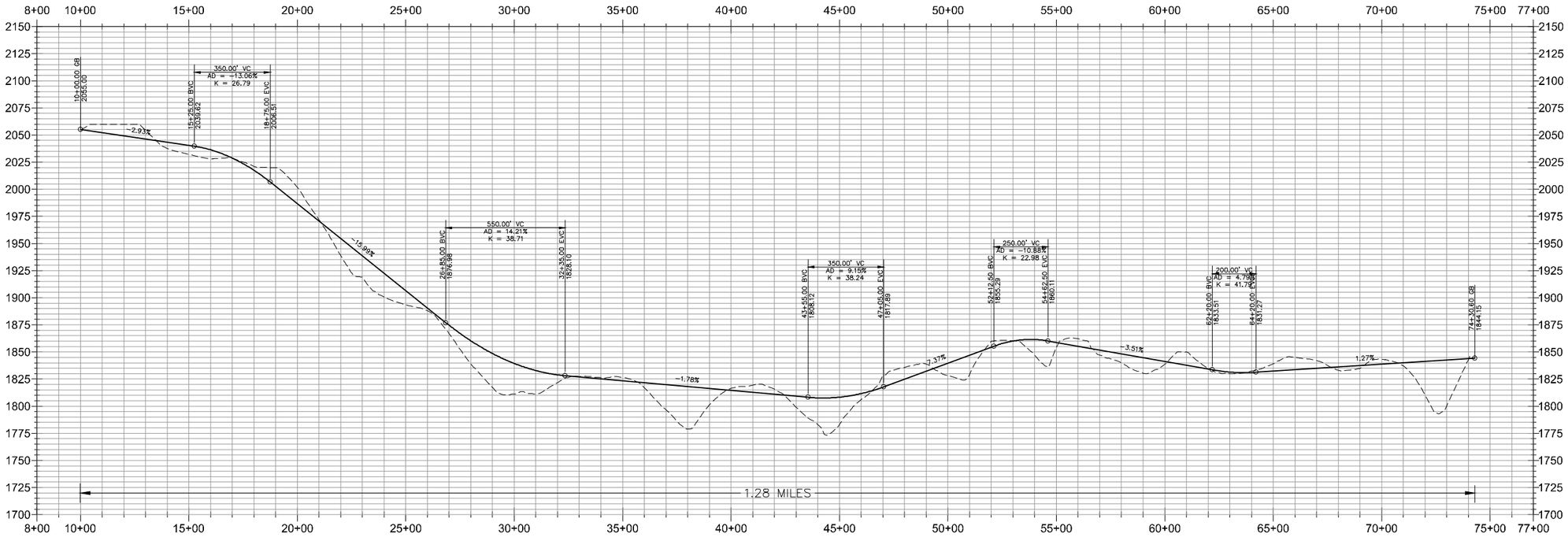
GRAPHIC SCALE: 1"=500'

HOR.=1:500
VERT.=1:100

drake haglan AND ASSOCIATES
11060 White Rock Road, Suite 200
Rancho Cordova, CA 95670



MENDOCINO COUNTY

DEPARTMENT OF TRANSPORTATION

ALIGNMENT E - VERTICAL PROFILE

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GRAPHIC SCALE: 1"=500'

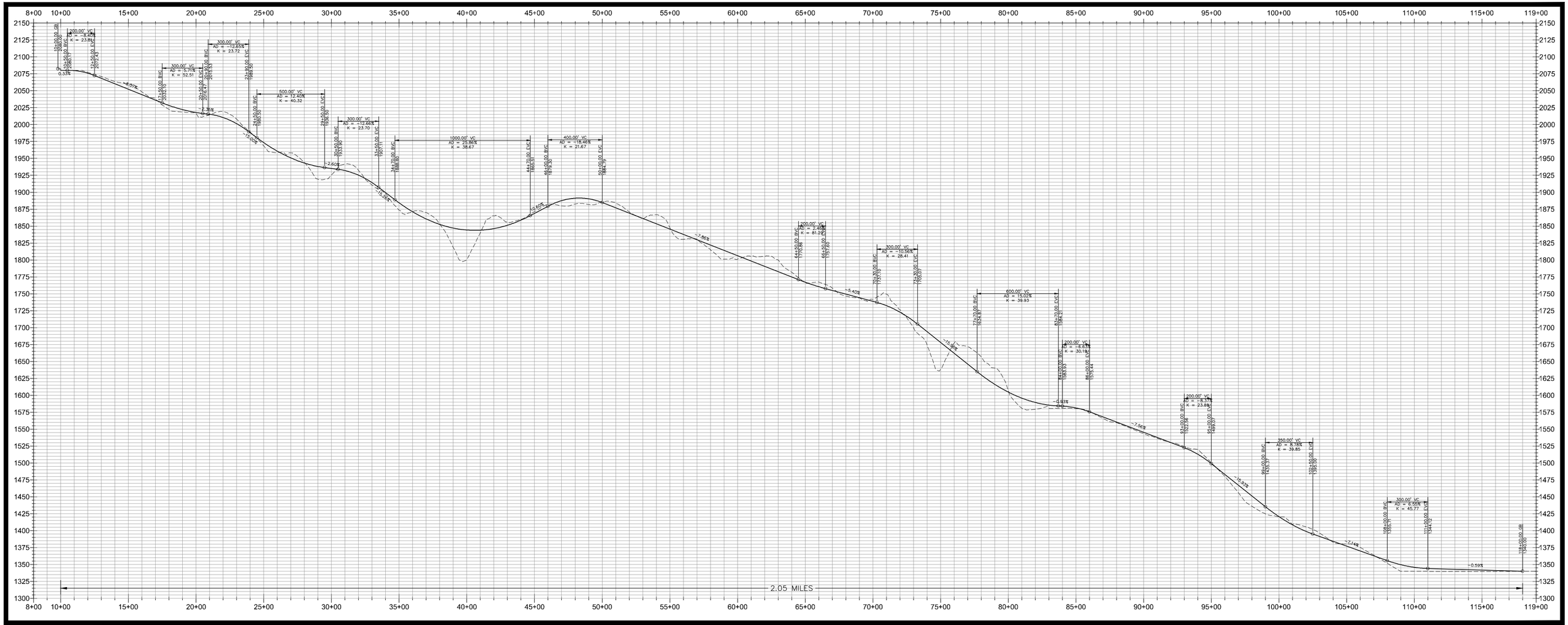
HOR.=1:500

VERT.=1:100

drake haglan AND ASSOCIATES

11060 White Rock Road, Suite 200

Rancho Cordova, CA 95670



MENDOCINO COUNTY

DEPARTMENT OF TRANSPORTATION

ALIGNMENT F - VERTICAL PROFILE

500' 250' 0' 500' 1000'

GRAPHIC SCALE: 1"=500'

HOR.=1:500

VERT.=1:100

drake haglan AND ASSOCIATES

11060 White Rock Road, Suite 200

Rancho Cordova, CA 95670

APPENDIX C

ENVIRONMENTAL REPORT

SYCAMORE ENVIRONMENTAL CONSULTANTS, INC.
6355 Riverside Blvd., Suite C, Sacramento, CA 95831
916/ 427-0703 Fax 916/ 427-2175

27 September 2011

Mr. Craig Drake
Drake Haglan & Associates
11060 White Rock Road, Suite 200
Rancho Cordova, CA 95670
Phone: 916/ 363-4210

Subject: Biological Resource Constraints Analysis for the Brooktrails Second Access Project, Mendocino County, CA.

Dear Craig:

Enclosed is a copy of our "Biological Resource Constraints Analysis." Sycamore Environmental has prepared this report to identify potential biological and regulatory constraints for Alternative A and the FirCo Haul Road Alternative for the Brooktrails Second Access project.

Please contact me with any questions.

Yours truly,

Jeffery Little
Vice President

Enclosure

Biological Resources Constraints Analysis
Brooktrails Second Access Project
Mendocino County, CA

Introduction

Sycamore Environmental has prepared this analysis to identify potential biological and regulatory constraints for two alternative alignments for the Brooktrails Second Access project. Mendocino County's second access project to the community of Brooktrails is roughly northwest of the City of Willits. Brooktrails has one public, all weather access road, namely Sherwood Road, which connects the community to Highway 101 near downtown Willits. A feasibility study was completed by KOA Corporation (15 September 2009). This biological constraints analysis supplements the 2009 study by adding two additional alignments. Biological constraints were analyzed for the following alternatives:

1. Alternative A: Alternative A connects Brooktrails to U.S. Route 20, to the south of Brooktrails (Location Map in Appendix A).
2. FirCo Haul Road Alternative: The FirCo Haul Road Alternative connects Brooktrails to U.S. Route 101, to the east of Brooktrails (Location Map in Appendix A). The FirCo Alternative contains three potential connection points to Brooktrails (Alternatives D, E, and F). The FirCo Alternative partially overlaps the previously considered Alternative C. The FirCo Alternative is longer than Alternative A.

The two alternatives are in the Upper Eel River hydrologic unit (hydrologic unit code 18010103). Aerial photographs of the alternative alignments are in Appendix A.

Methods

Data on known special-status species and habitats in the area was obtained from state and federal agencies. A search of the California Natural Diversity Database (CNDDB; 30 January 2011 commercial version) was conducted for the Burbeck, Willits, and 10 adjacent USGS quads to determine known records of special-status species in or near the alternative alignments. The 8th Edition of the CNPS Online Inventory of Rare and Endangered Plants was queried for all CNPS-listed plants on the Burbeck, Willits, and 10 adjacent USGS quads to determine known records of special-status plants in or near the alternative alignments. A summary of the CNDDB records and CNPS list for the 12 quads is in Appendix B. Sycamore Environmental obtained a list from the U.S. Fish and Wildlife Service (USFWS), Arcata Field Office that identifies federal-listed species that potentially occur on or could be affected by projects on the Burbeck and Willits USGS quads as well as in Mendocino County (Appendix B).

Maps and aerial photographs of the alternative alignments and surrounding area were reviewed. The records search, map review, and a review of the biology of special-status species, as necessary, were used to determine biological constraints and regulatory requirements that would likely be encountered by the alternative alignments.

State and federal statutes that may be applicable to the proposed project are listed below:

- National Environmental Policy Act (NEPA) (42 U.S.C. 4321 et seq.);
- Section 404 of the Clean Water Act (33 U.S.C. 1251-1376);
- Section 401 Water Quality Certification (33 U.S.C. 1341);
- Section 402 of the Clean Water Act (33 U.S.C. 1342)
- Section 10 of the Rivers and Harbors Act (33 U.S.C. 401 et seq.);
- Section 1602 of the California Fish and Game Code pertains to streambed alterations;
- Federal Endangered Species Act (16 U.S.C. 1531-1543);
- Fish and Wildlife Coordination Act (16 U.S.C. 661-666);
- National Wild and Scenic Rivers Act (16 U.S.C. 1271-1287);
- Executive Order 11990, Protection of Wetlands (May 24, 1977);
- California Environmental Quality Act (P.R.C. 21000 et seq.);
- California Endangered Species Act (California Fish and Game Code 2050 et seq.);
- Native Plant Protection Act (California Fish and Game Code 1900-1913);
- California Wild and Scenic Rivers Act (P.R.C. 5093.50 et seq.);
- California Coastal Act (P.R.C. 30000 et seq.);
- Porter-Cologne Water Quality Control Act (California Water Code, Division 7, §13000 et seq.);
- Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-711);
- Magnuson-Stevens Fishery Conservation and Management Act (as amended through 11 October 1996);
- Executive Order 13112, Invasive Species (3 February 1999).

Environmental Setting

Description of the Existing Biological and Physical Conditions

A brief discussion of the existing biological and physical conditions for each alternative alignment is provided below. A soils map for both alternatives is in Attachment A. The USFWS National Wetland Inventory (NWI) maps were used to identify larger wetlands and waters near the alternative alignments. The NWI maps do not identify all wetlands and waters that may be subject to federal Clean Water Act or state Porter-Cologne Waster Quality Control Act jurisdiction.

Alternative A

Alternative A traverses annual grassland, montane hardwood, douglas fir, and urban communities; and a small amount of redwood community (CDF 2004). This alternative is not located in the California Coastal Zone. This alternative crosses Mill Creek, which is classified as a palustrine, forested, saturated and semi-permanent/ seasonal wetland (USFWS 2011b, NHD 2011).

Soil types traversed include Casabonne-Wohly loams (30 to 50 percent slopes), Hopland-Witherell-Squawrock complex (30 to 50 percent slopes) and Yorkville-Squawrock-Witherell complex (30 to 50 percent slopes). None of the soil series are generally hydric or derived from serpentine parent material. Elevation ranges from approximately 1,445 to 1,645 ft above sea level.

FirCo Haul Road Alternative

The Fir Co Haul Road (FCHR) Alternative traverses annual grassland, douglas fir, montane hardwood, and urban communities; and small amounts of barren landscapes and montane hardwood conifer communities (CDF 2004). This alternative is not located in the California Coastal Zone. The FCHR alternative crosses Wild Oat Canyon Creek near its most downstream reach, and one other unnamed

intermittent creek. Alternative E also crosses Bull Creek near its most upstream reach, and one other unnamed intermittent creek (NHD 2011).

Soil types traversed include Casabonne-Wohly loams (9 to 30 percent slopes), Casabonne-Wohly loams (30 to 50 percent slopes), Casabonne-Wohly-Pardaloe complex (50 to 75 percent slopes), Dingman-Beaughton complex (5 to 50 percent slopes), fluvaquents (0 to 1 percent slopes), Hopland-Sanhedrin-Kekawaka complex (30 to 50 percent slopes), Nashmead-Updegraff-Woodin complex (30 to 50 percent slopes), Pinole gravelly loam (2 to 8 percent slopes), pits and dumps, Shortyork-Yorkville-Witherell complex (15 to 30 percent slopes), urban land, Wohly-Casabonne loams (30 to 50 percent slopes), Wohly-Casabonne-Pardaloe complex (50 to 75 percent slopes), and Xerochrepts-Haploxeralfs-Argixerolls complex (9 to 30 percent slopes). None of the soil series are generally hydric. The Dingman-Beaughton complex is derived from serpentine parent material. Elevation ranges from approximately 1,340 to 2,050 ft above sea level.

Regional Species and Habitats of Concern

File data from CNDDB and USFWS were used to generate a list of special-species that could occur in the alternative alignments. Federal and state listed, candidate, and proposed species as well as special-status sensitive natural communities for which potentially suitable habitat is present are listed in Table 1. Additional non-listed special-status species that occur or may have the potential to occur along the alternative alignments are not listed in Table 1 but are listed in Appendix B. Maps in Appendix A depict the CNDDB records of special-status species and sensitive natural communities in and near the alternative alignments.

Table 1. Federal and state listed **s**pecies for which potentially suitable habitat is present.

Scientific Name	Common Name	Federal Status [a]	State Status [a]
Fish			
Oncorhynchus kisutch	Southern Oregon and Northern California Coho salmon	T, CH	T
Oncorhynchus mykiss (*irideus*)	Northern California steelhead	T, CH	SSC
Oncorhynchus tshawytscha	California coastal chinook salmon	T, CH	--
Birds			
Brachyramphus marmoratus	Marbled murrelet	T, CH	E
Coccyzus americanus	Western yellow-billed cuckoo	C	E
Strix occidentalis caurina	Northern spotted owl	T, CH	SSC
Mammals			
Martes pennanti	Pacific fisher	C	SSC
Plants			**/ CNPS [b]**
Astragalus agnicidus	Humboldt milk-vetch	--	E/ 1B.1
Fritillaria roderickii	Roderick's fritillary	--	E/ 1B.1
Limnanthes bakeri	Baker's meadowfoam	--	R/ 1B.1
Lupinus milo-bakeri	Milo Baker's lupine	--	T/ 1B.1
Pleuropogon hooverianus	North Coast semaphore grass	--	T/ 1B.1
Trifolium amoenum	Two-fork clover	E	--/ 1B.1
Natural Communities			
Valley oak woodland		--	--/ --

[a] **Status**: Candidate (C); Candidate Endangered (CE); Candidate Threatened (CT); Delisted (D); Endangered (E); Federal Critical Habitat (FCH); DFG Fully Protected (FP); Proposed (P); Proposed Critical Habitat (PCH); Proposed Endangered (PE); Proposed Threatened (PT); Species of Special Concern (SSC); Species of Local Concern (SLC); State Rare (R); Threatened (T);
NOTE: Critical Habitat [CH] - Project footprint is located within a designated critical habitat unit, but does not necessarily mean that appropriate habitat is present.

[b] **CNPS List**. 1A = Presumed Extinct in CA; 1B = Rare or Endangered in CA and elsewhere; 2 = R/E in CA and more common elsewhere. **CNPS List Decimal Extensions**: .1 = Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat); .2 = Fairly endangered in California (20-80% occurrences threatened); .3 = Not very endangered in California (<20% of occurrences threatened or no current threats known**).**

Discussion of Biological Resource Constraints

Natural Communities of Special Concern

Sensitive natural communities include rare communities, communities that are adversely affected by minimal disturbance, wetlands, riparian areas, and communities that provide habitat for special-status plant or wildlife species. Listed below are the sensitive natural communities known to occur along the alternative alignments. There are likely smaller unnamed drainages and wetlands, and possibly other potential sensitive natural communities along the alternative alignments. A biological survey and a wetland delineation of the alternatives would be needed to determine the presence or absence of other potential sensitive natural communities.

Alternative A

- Mill Creek and associated riparian corridor (HUD 2011, USFWS 2011b).
- An area near the connection point with Acacia Place (a surface street in Brooktrails) could likely meet wetland criteria based on the aerial photograph. Alternative A crosses a smaller drainage in the south that also likely meets wetland or waters criteria.
- Special-status plant and wildlife habitat.

FirCo Haul Road Alternative

- Wild Oat Canyon Creek and associated riparian corridor (HUD 2011). An unnamed tributary to Wild Oat Canyon Creek.
- Bull Creek and an unnamed tributary to Bull Creek are on Alternative E (HUD 2011).
- Several areas along the segment of the alternative that parallels Highway 101 could likely meet wetland characteristics based on the aerial photograph.
- Special-status plant and wildlife habitat.

Special-Status Plant and Animal Species Occurrences

The CNDDB has records for special-status species located near the alternative alignments. CNDDB is a database of positive sightings, and the lack of records in a particular area does not mean special-status species are absent. Known occurrences and potential habitat for special-status plant and wildlife habitat are listed under each alternative alignment below. Some of the species listed below are not included in Table 1 because they are not federal or state listed, candidate, or proposed. Both alternative alignments are in the watersheds defined as Southern Oregon/ Northern California coast Coho salmon Evolutionarily Significant Unit (ESU), the Northern California steelhead ESU, and the California coastal Chinook salmon ESU (CalFish 2011, NMFS 1996).

Alternative A

- There are no CNDDB records on Alternative A.
- Mill Creek where Alternative A crosses is designated critical habitat for Northern California steelhead (NMFS 2005), and also likely critical habitat for Southern Oregon/ Northern California Coho salmon. Coho salmon critical habitat is not geographically precise, but rather defined qualitatively in certain large-scale watersheds, including the Eel River (NMFS 1999). The identification of Coho salmon critical habitat at particular points will require an assessment of on-the-ground conditions and review by NMFS (pers. comm., T. Daugherty). Approximately 0.84 mi downstream of the Alternative A crossing, beginning at the confluence with Willits Creek, Mill Creek is designated as critical habitat for California coastal Chinook salmon (USFWS 2011c).

- NMFS (2000) identifies previous reports of Chinook salmon, Coho salmon, and steelhead in Mill Creek between 1991 and 1999.
- There are five northern spotted owl occurrences within 3 mi of Alternative A. The closest occurrence is two miles away.

FirCo Haul Road Alternative

- There are four CNDDB records on or very near the FCHR Alternative.
    1. A yellow warbler (*Dendroica petechia brewsteri*; State species of special concern) CNNDB record covers much of the northern end of the Little Lake Valley, up to and including the segment of the alternative that parallels Highway 101. There is patchy but substantial cover of Oregon ash (*Fraxinus latifolia*) in this area, which is a predictor of high yellow warbler abundance in northern California (Shuford and Gardali 2008).
    2. A yellow breasted chat (*Icteria virens*; State species of special concern) CNNDB record covers much of the northern end of the Little Lake Valley, up to and including the segment of the alternative that parallels Highway 101.
    3. A Valley oak woodland CNNDB record covers much of the northern end of the Little Lake Valley, up to and including the segment of the alternative that parallels Highway 101.
    4. A Baker's meadowfoam (*Limnanthes bakeri*; State rare; CNPS List 1B.1) CNNDB record covers much of the northern end of the Little Lake Valley, up to the eastern edge of Highway 101. Sycamore Environmental observed Baker's meadowfoam close to where the FCHR alternative crosses Wild Oat Canyon Creek, on the east side of Highway 101. A second special-status plant, Davy's semaphore grass (*Pleuropogon californicus* var. *davyi*; CNPS List 4.3) was observed at the same location.
- Wild Oat Canyon Creek and Bull Creek are not designated critical habitat for Northern California steelhead or California coastal Chinook salmon (NMFS 2005, USFWS 2011c). Outlet Creek, approximately 0.23 mi downstream of the FCHR crossing of Wild Oat Canyon Creek, and 1.25 mi downstream of FCHR crossing of Bull Creek, is designated as critical habitat for steelhead, Chinook salmon, and Coho salmon.
- Wild Oat Canyon Creek could be critical habitat for Southern Oregon/ Northern California Coho salmon (NMFS 1999). Coho salmon critical habitat is not geographically precise, but rather defined qualitatively in certain large-scale watersheds, including the Eel River. The FCHR Alternative crosses Wild Oat Canyon Creek near its downstream reach, where it is more likely to provide potential salmonid habitat. Bull Creek could also be critical habitat for Southern Oregon/ Northern California Coho salmon, but it is less likely because the FCHR Alternative crosses it at a reach far upstream.
- The area of Dingman-Beaughton complex soils is derived from serpentine parent material. Serpentine soils and/or rock outcrops are more likely to provide habitat for special-status plants. Part of Alternative D crosses Dingman-Beaughton complex soils.
- There are two northern spotted owl records within 3 mi of the FCHR Alternative. Both are less than 0.3 mi away. In mixed conifer areas of the Coast Range, USFWS (2011a) uses a 1.3 mile radius as a general limit of the potential home ranges of northern spotted owls.

Technical Studies, Regulatory Consultations, Environmental Documents, and Permits

Road construction projects funded entirely with local or State funds will need to comply with the California Environmental Quality Act (CEQA). Some road improvement projects receive federal funds and need to comply with requirements of the National Environmental Policy Act (NEPA). Caltrans

oversees and disperses federal funds through its Local Assistance program. Where Caltrans is involved, it ensures that the requirements of the NEPA are met. The County is responsible for compliance with CEQA regardless of Caltrans involvement. If the federal funding passes through Caltrans Local Assistance, the following reports would be needed. The length of time to complete the environmental process, including consultations and permitting, could vary depending on the alternative.

Technical Studies

- Preliminary Environmental Study (PES)
- Natural Environment Study (NES)
  - Botanical survey (spring−late summer)
- Delineation of Wetlands and Waters
- Northern spotted owl protocol survey (possibly required; 2 years of surveys)
- Biological Assessment (BA) for endangered species consultation
- Water Quality Assessment Report
- Compensatory Mitigation Plan(s)

Regulatory Consultations

- Section 7 Endangered Species Act consultation with USFWS (Likely formal for FCHR Alternative)
- Section 7 Endangered Species Act consultation with NMFS for listed fish species (Likely formal for Alternative A)
- Essential Fish Habitat Evaluation with NMFS
- California Endangered Species Act (Possible for FCHR Alternative)

Environmental Documents

- CEQA Initial Study/Mitigated Negative Declaration or Environmental Impact Report
- NEPA Categorical Exclusion or Environmental Assessment/Finding of No Significant Impact

Permits

- Section 404 Clean Water Act Nationwide Permit, Letter of Permission, or Individual Permit from U.S. Army Corps of Engineers
- Section 401 Clean Water Act Water Quality Certification from RWQCB
- California Fish and Game Code 2081 Incidental Take Permit
- California Fish and Game Code 1602 Streambed Alteration Agreement

Summary

The FCHR alternative may have a greater adverse effect on northern spotted owl than Alternative A. Alternative A crosses less forested landscape then the FCHR alternative. The FCHR alternative has two northern spotted owl occurrences less than 0.30 mi away. There is more potential northern spotted owl habitat along the FCHR alternative than Alternative A.

Alternative A is likely to have greater potential listed salmonid impacts than the FCHR alternative. Mill Creek on Alternative A is designated critical habitat for steelhead, and is likely to be determined critical habitat for Coho salmon. On-the-ground surveys of creek conditions would be required to determine the upstream limits of accessibility for Coho salmon.

The FCHR alternative is likely to have greater potential special-status plant impacts, due to the proximity of its eastern segment to the Little Lake Valley floor and known special-status plant records, and due to the presence of known serpentine soils on Alternative D.

The two alternatives have comparable potential impacts to wetlands and waters subject to Section 404 of the Clean Water Act in terms of acreage, based on interpretations of aerial photographs.

We recommend that the County consider the biological constraints discussed above during the planning efforts to provide the Brooktrails area community with improved traffic flow and emergency access. A table summarizing the primary biological constraints for all of the previously considered alternatives is below.

Table of Primary Biological Constraints for Brooktrails Second Access Alternatives

Constraint	FCHR[1]	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G	Alt. H	Alt. I
Waters & Wetlands	X	X	[2]	X	X	X	X	X	X	X
Within 1.3 mi of known spotted owl territory	X		X [4]	X	X	X	X	X	X	X
Steelhead Critical Habitat		X		X				X	X	X
Chinook Critical Habitat										
Coho Critical Habitat [5]	TBD	TBD		TBD	TBD	TBD	TBD	TBD	TBD	TBD
Serpentine Soil (Plants)	X			X	X			X	[3]	
Valley Floor Habitat (Plants & Birds)	X			X	X	X	X	X		

[1] The FirCo Haul Road (FCHR) Alternative is considered to include all the constraints of its wholly incorporated component alternatives (D, E, and F) for the purposes of this table.

[2] Alternative B does not cross any wetlands or waters that are clearly present on the aerial photographs or quad map. Small seasonal wetlands and ephemeral channels generally are not apparent on such maps but usually require permitting. Although Alternative B may still require wetlands and waters permitting, the Alternative B impacts are likely to be substantially less than the other alternatives.

[3] Alternative H comes very close to mapped serpentine soils. The soil maps are not precise at the scale necessary to determine if Alternative H absolutely avoids serpentine soils.

[4] Most of Alternative B is not within 1.3 miles of a known spotted owl territory.

[5] Coho critical habitat is "to be decided" in Mills Creek, Upp Creek, and Wild Oat Canyon Creek. Coho critical habitat is not precisely geographically defined and depends on an on-the-ground assessment of conditions and review by NMFS. Alternatives that already contain steelhead critical habitat are more likely to also provide Coho critical habitat.

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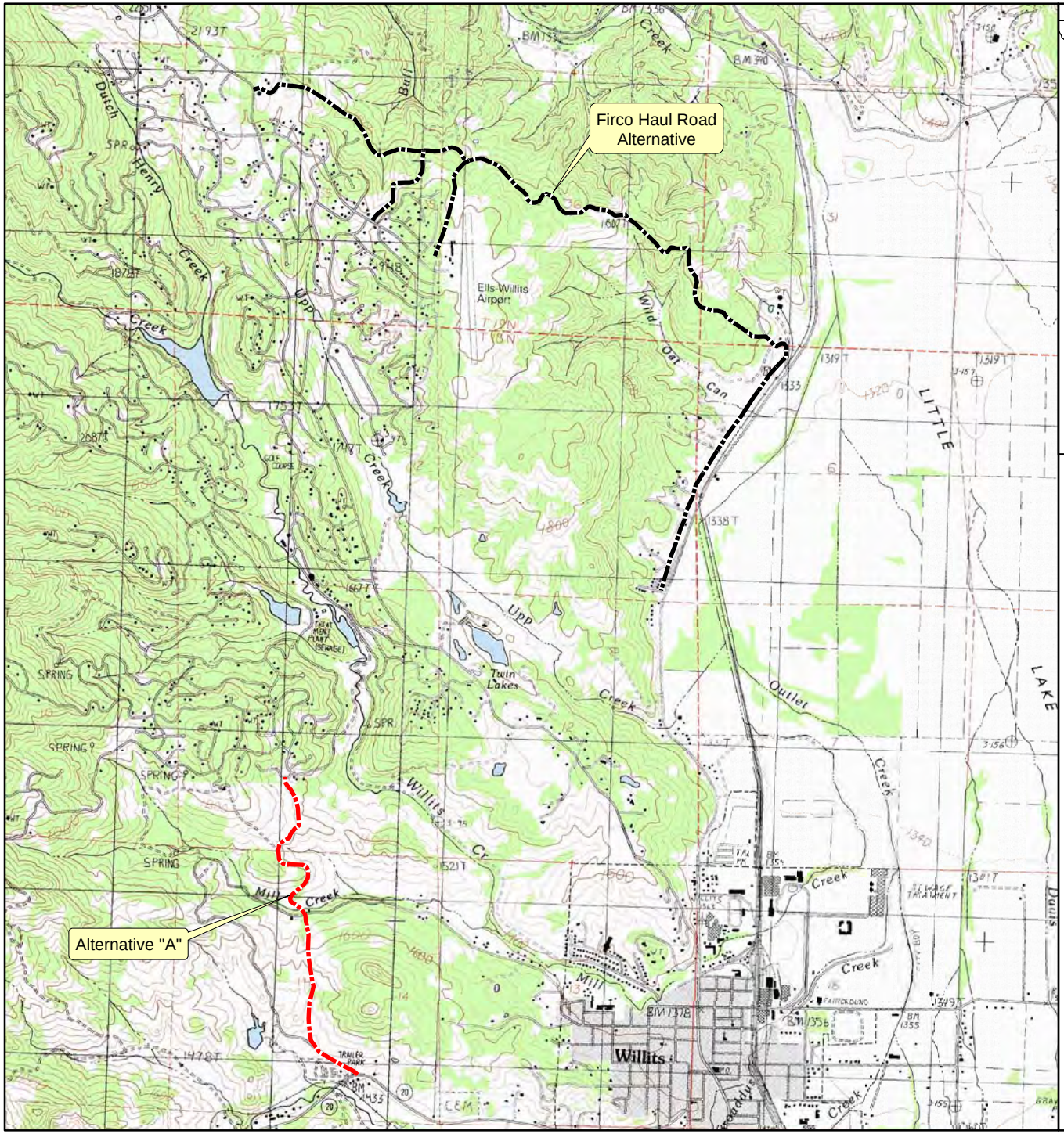
Personal Communications

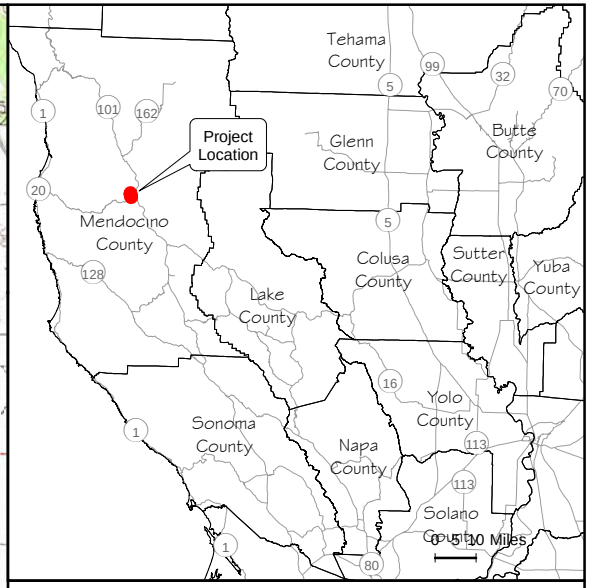
Mr. Tom Daugherty. Biologist. National Marine Fisheries Service (NMFS). 26 September 2011. Phone Conversation

APPENDIX A.

Maps

Mendocino County, CA





Brooktrails Second Access
Mendocino County, CA
27 September 2011

Location Map

Alternative "A"

FirCo Haul Road Alternative

3,000 1,500 0 3,000 Feet

Scale: 1 inch = 3,000 feet

N

Willits and Burbeck, CA (1991)
USGS 7.5' Quadrangle Topographic DRG
7.5 Minute (C) Series, Albers Nad83 Mosaics (MrSID)
CA Spatial Library (CASIL)

11013Brooktrails2ndAccess_AltAFircoLocationMap.mxd

Brooktrails Second Access
Mendocino County, CA
27 September 2011

Alternative "A"

1,000 500 0 1,000 Feet

N

Scale: 1 inch = 1,000 feet

Alternative "A"
Aerial Photograph

Aerial Photograph: 17 June 2009
NAIP USDA FSA
ESRI ArcGIS Basemap layer

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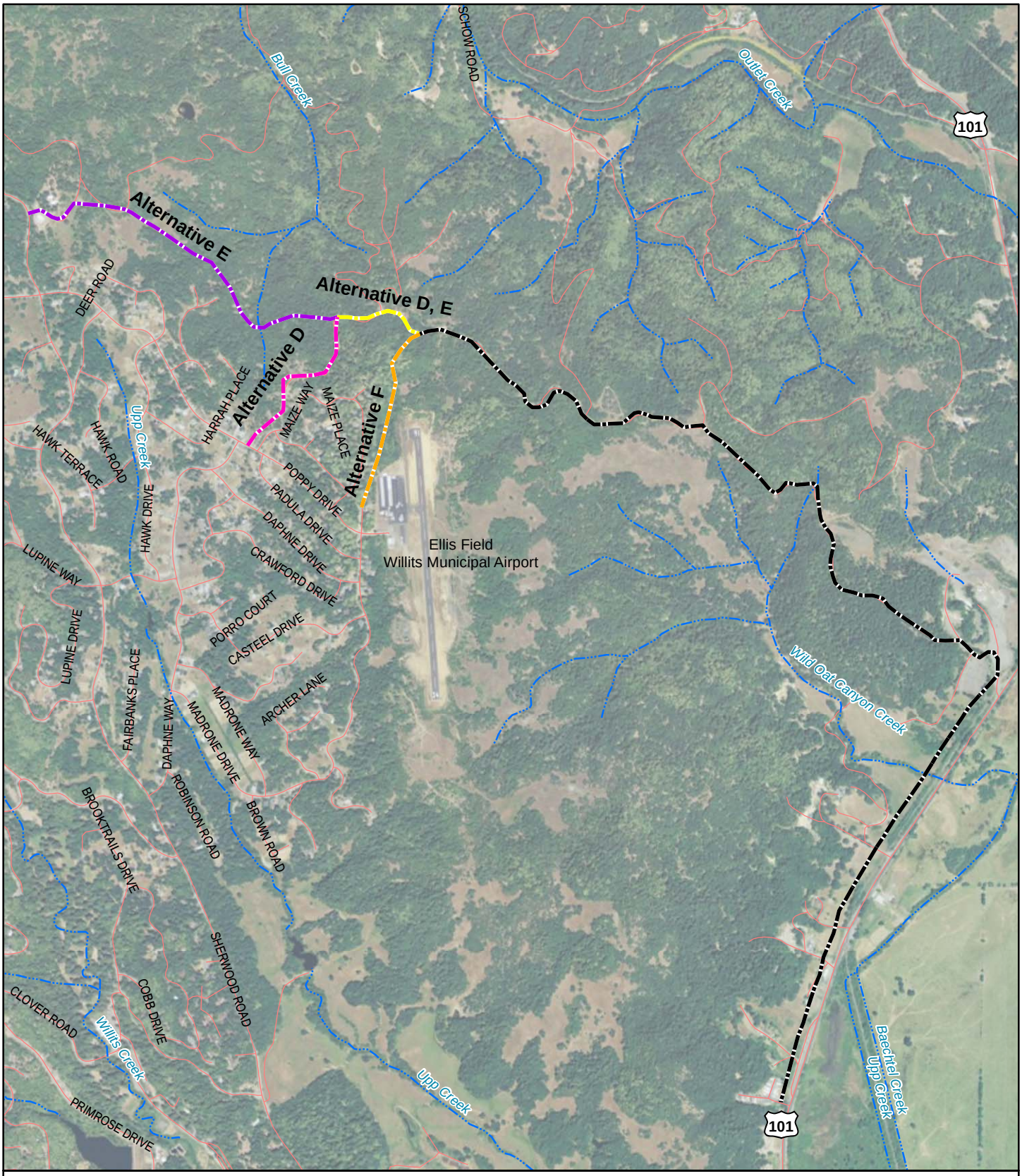

Brooktrails Second Access
Mendocino County, CA
27 September 2011

FCHR Alternative
Aerial Photograph

FCHR Alternative
Alternative "D"
Alternative "D & E"
Alternative "E"
Alternative "F"

1,500 750 0 1,500 Feet

N

Scale: 1 inch = 1,500 feet

Aerial Photograph: 17 June 2009
NAIP USDA FSA
ESRI ArcGIS Basemap layer

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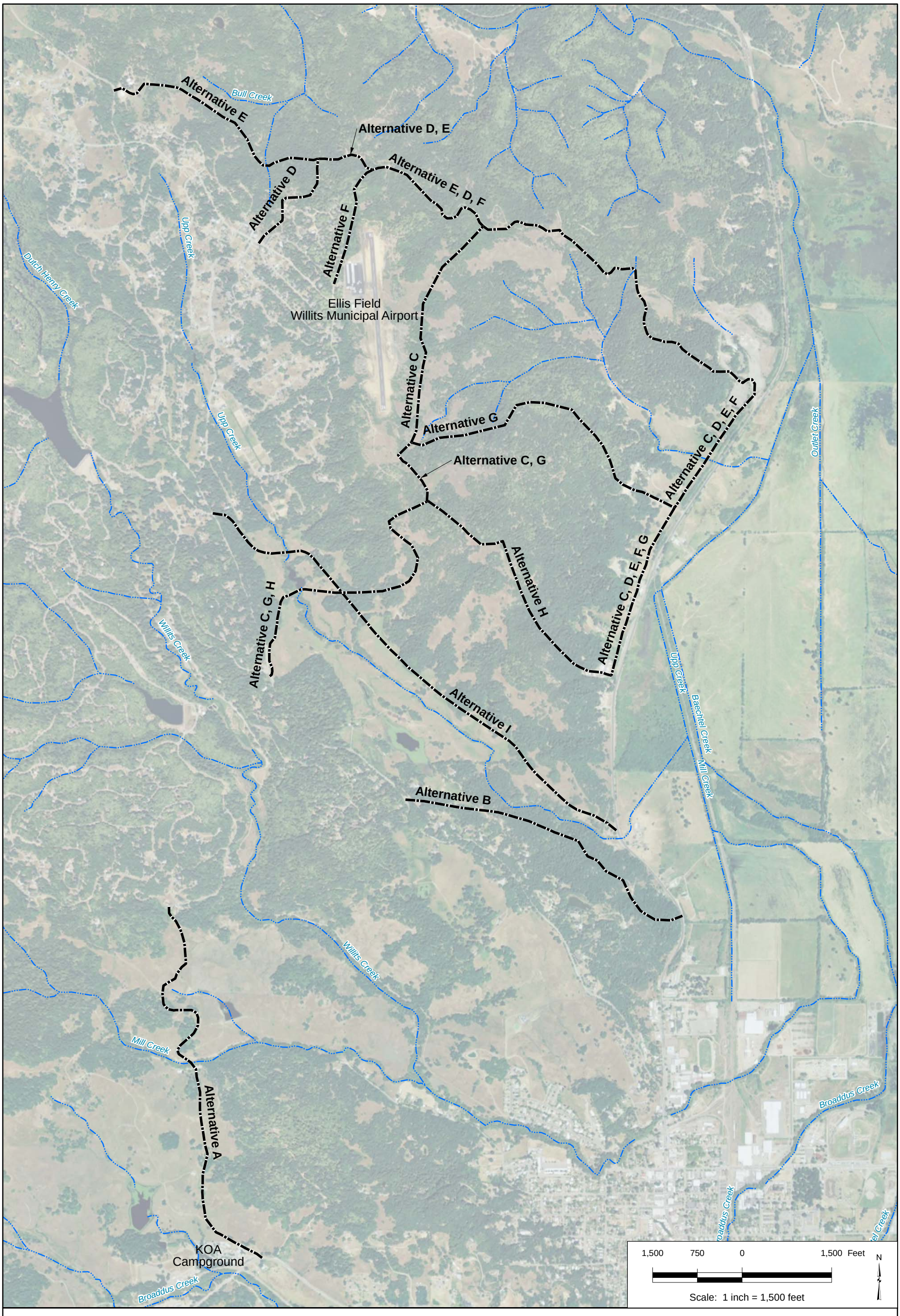

Brooktrails Second Access
Mendocino County, CA
27 September 2011

Past Alternatives

Aerial Photograph: 17 June 2009
NAIP USDA FSA
ESRI ArcGIS Basemap layer

Past Alternative - Feasibility Study

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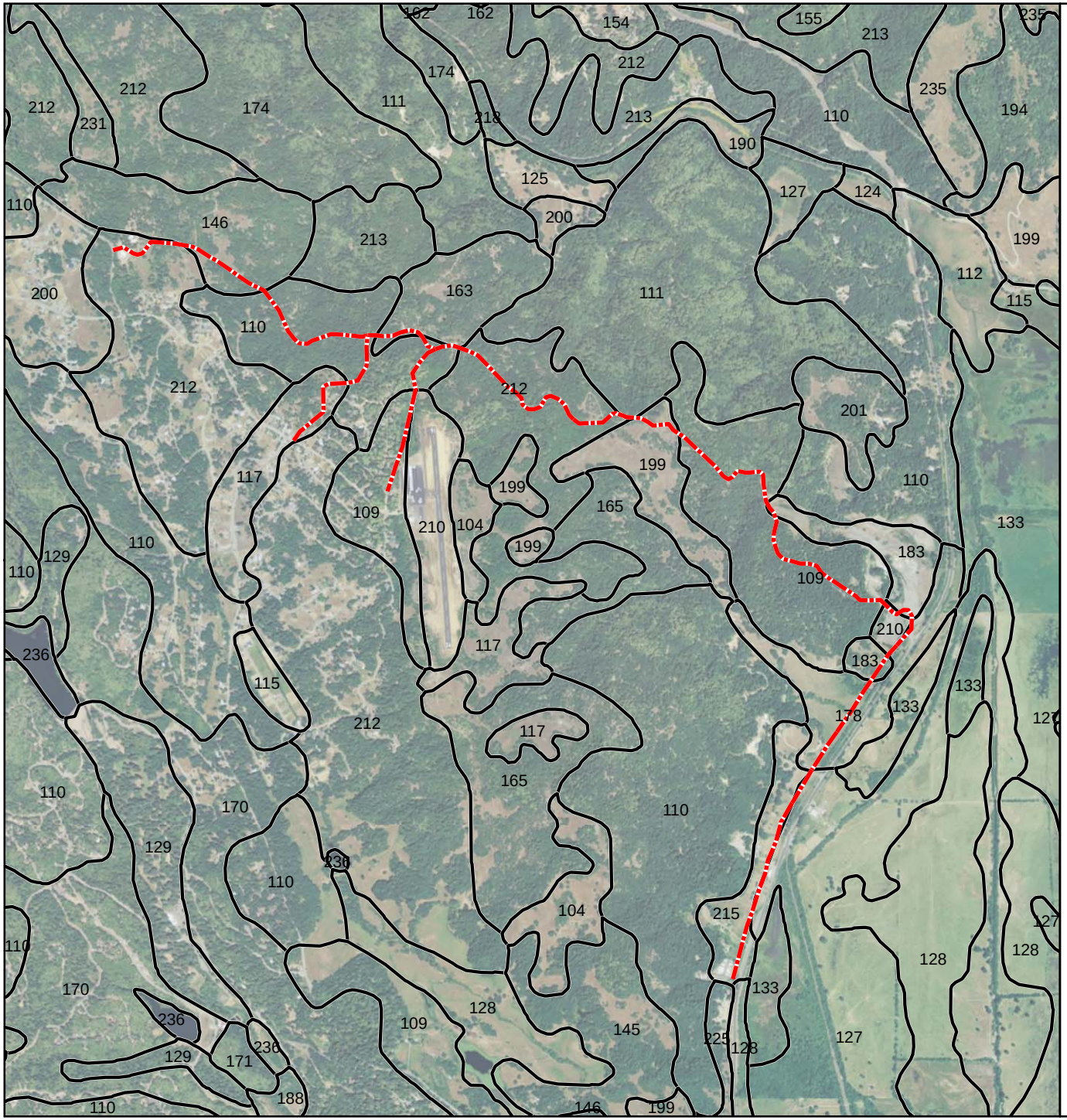


Brooktrails Second Access
Mendocino County, CA
27 September 2011

FCHR Alternative Soils Map

FCHR Alternative

Soil boundary

Symbol	Description
109	CASABONNE-WOHLY LOAMS, 9 TO 30 PERCENT SLOPES
110	CASABONNE-WOHLY LOAMS, 30 TO 50 PERCENT SLOPES
111	CASABONNE-WOHLY-PARDALOE COMPLEX, 50 TO 75 PERCENT SLOPES
117	DINGMAN-BEAUGHTON COMPLEX, 5 TO 50 PERCENT SLOPES
127	FLUVAQUENTS, 0 TO 1 PERCENT SLOPES
146	HOPLAND-SANHEDRIN-KEKAWAKA COMPLEX, 30 TO 50 PERCENT SLOPES
163	NASHMEAD-UPDEGRAFF-WOODIN COMPLEX, 30 TO 50 PERCENT SLOPES
178	PINOLE GRAVELLY LOAM, 2 TO 8 PERCENT SLOPES
183	PITS AND DUMPS
199	SHORTYORK-YORKVILLE-WITHERELL COMPLEX, 15 TO 30 PERCENT SLOPES
210	URBAN LAND
212	WOHLY-CASABONNE LOAMS, 30 TO 50 PERCENT SLOPES
213	WOHLY-CASABONNE-PARDALOE COMPLEX, 50 TO 75 PERCENT SLOPES
215	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 9 TO 30 PERCENT SLOPES

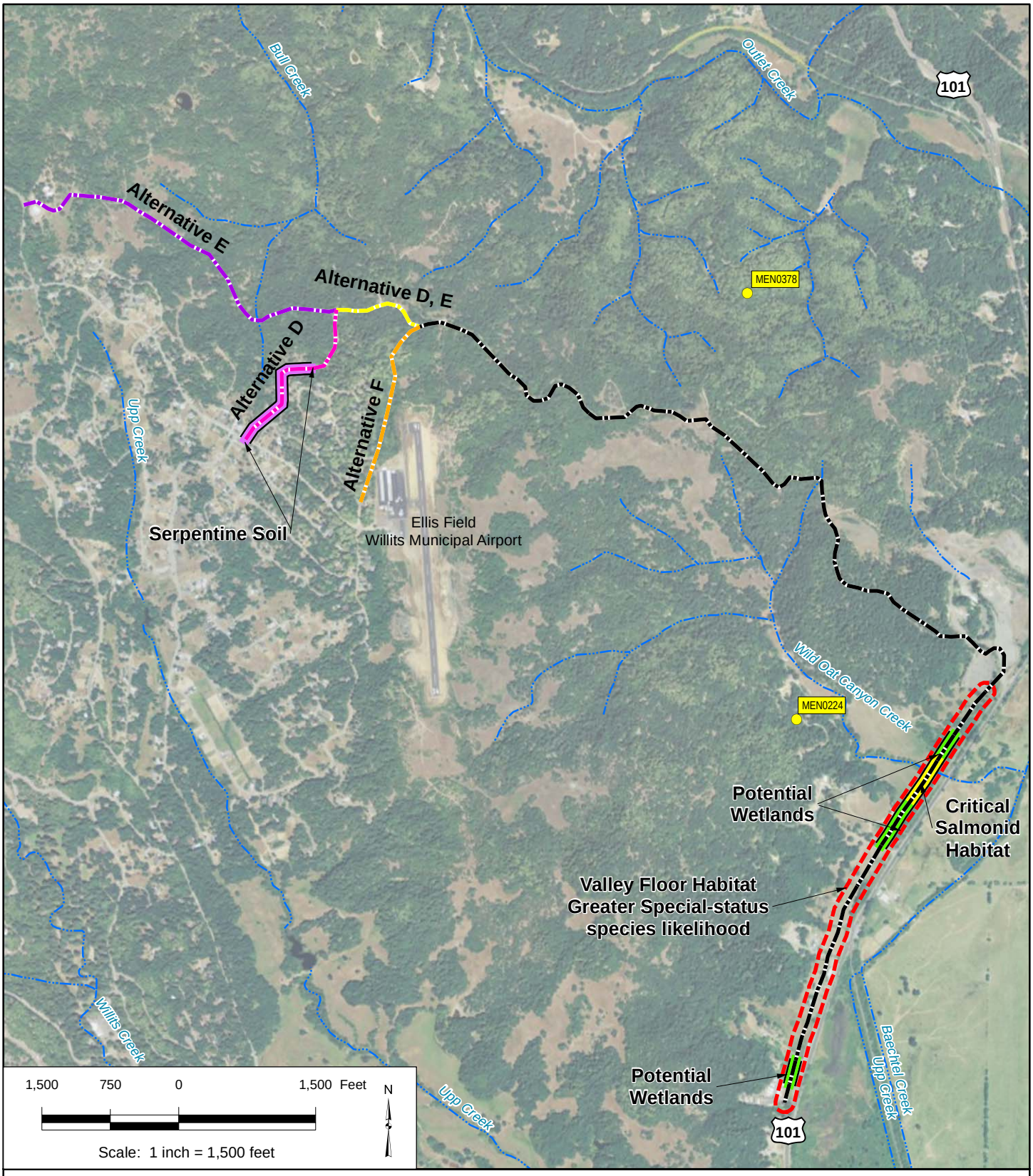
2,000 0 2,000 Feet

N

Scale: 1 inch = 2,000 feet

Soil data:
Soil Survey Geographic (SSURGO) database
for Mendocino County, Eastern (4 January 2008)
U.S.D.A., N.R.C.S.
http://SoilDataMart.nrcs.usda.gov/
Aerial Photograph: 17 June 2009
NAIP USDA FSA
ESRI ArcGIS Basemap layer

11013Brooktrails2ndAccess_FirCoSoilsMap(8x10).mxd



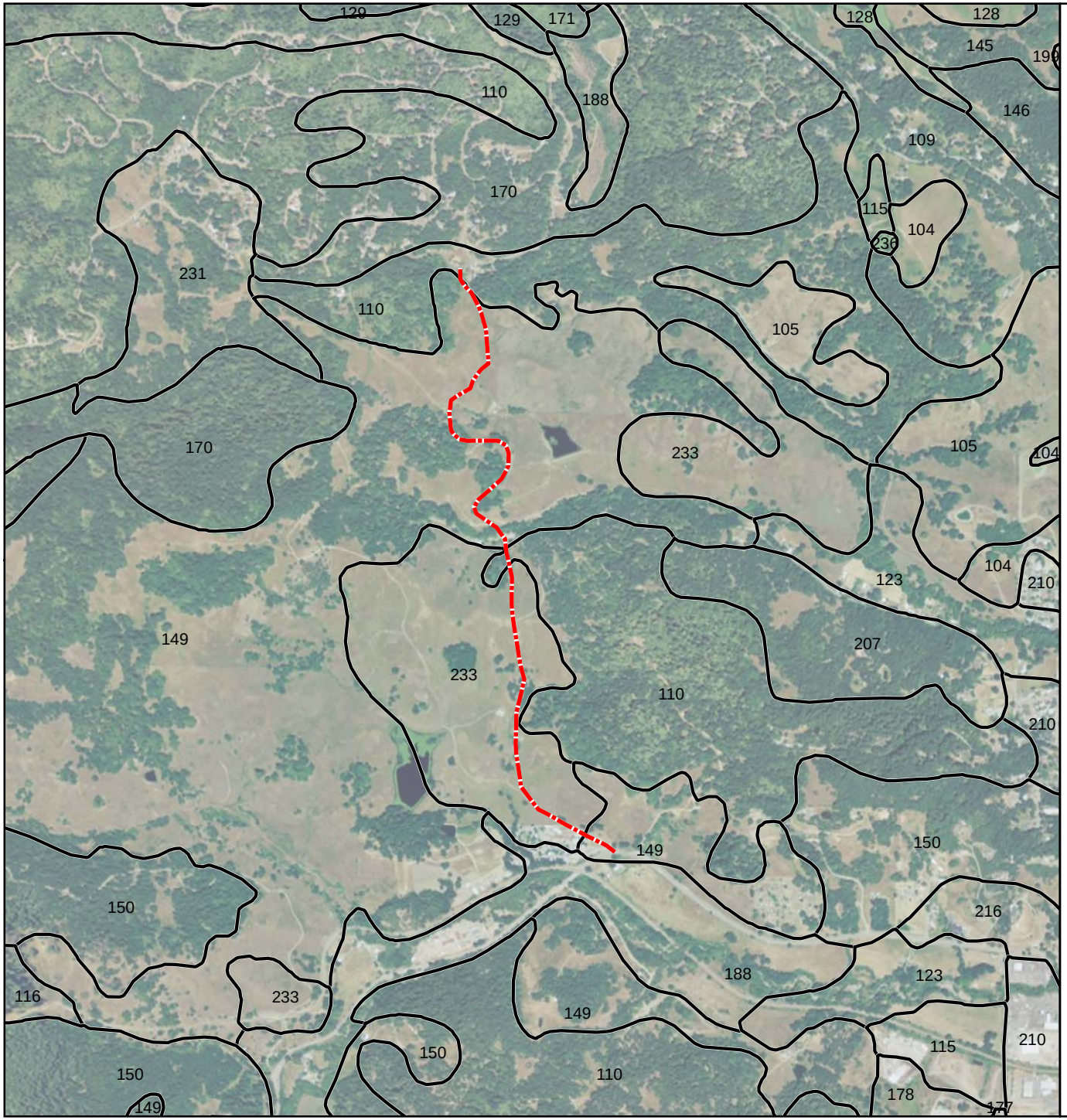
Brooktrails Second Access
Mendocino County, CA
27 September 2011

FCHR Alternative
Constraints Summary

- FCHR Alternative
- Alternative "D"
- Alternative "D & E"
- Alternative "E"
- Alternative "F"
- Serpentine Soil
- Salmonid Critical Habitat
- Greater Special-status species likelihood
- Spotted Owl Territory and Master ID (MEN0468)

Aerial Photograph: 17 June 2009 NAIP USDA FSA ESRI ArcGIS Basemap layer

11013Brooktrails2ndAccess_FirCoConstraintsMap(8x11).mxd



Brooktrails Second Access
Mendocino County, CA
27 September 2011

Alternative "A" Soils Map

Alternative "A"

Soil boundary

Symbol	Description
110	CASABONNE-WOHLY LOAMS, 30 TO 50 PERCENT SLOPES
149	HOPLAND-WITHERELL-SQUAWROCK COMPLEX, 30 TO 50 PERCENT SLOPES
233	YORKVILLE-SQUAWROCK-WITHERELL COMPLEX, 30 TO 50 PERCENT SLOPES

1,500 0 1,500 Feet

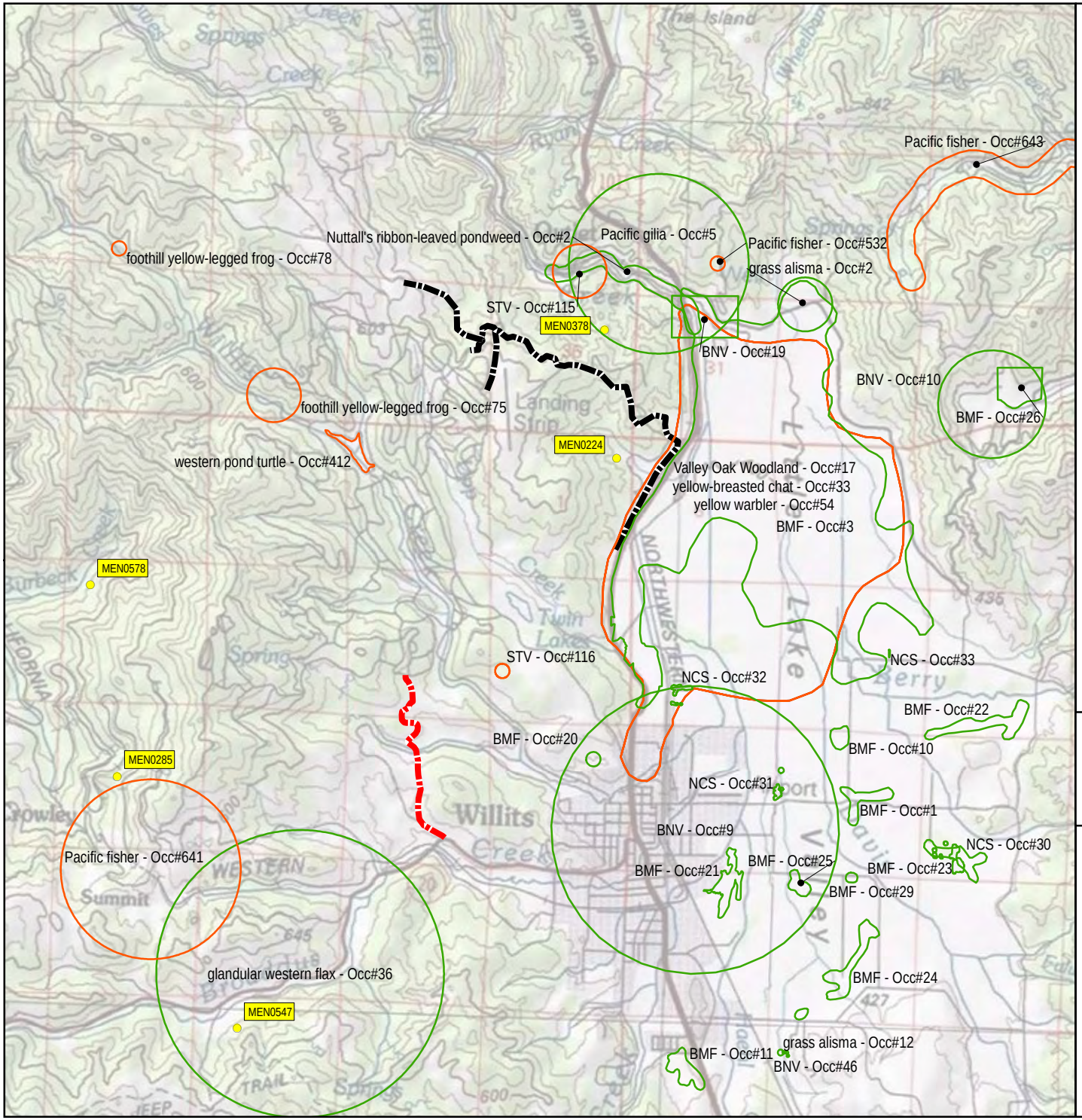
N

Scale: 1 inch = 1,500 feet

Soil data:
Soil Survey Geographic (SSURGO) database
for Mendocino County, Eastern (4 January 2008)
U.S.D.A., N.R.C.S.
http://SoilDataMart.nrcs.usda.gov/

Aerial Photograph: 17 June 2009
NAIP USDA FSA
ESRI ArcGIS Basemap layer

11013Brooktrails2ndAccess_AltASoilsMap(8x10).mxd



Brooktrails Second Access
Mendocino County, CA
27 September 2011

CNDDB Occurences

- Plant
- Animal
- Aquatic Community
- MEN0468 Spotted Owl Territory and Master ID
- Alternative "A"
- FirCo Haul Road Alternative

ABBR.	Common Name
BMF	Baker's meadowfoam
BNV	Baker's navarretia
HMV	Humboldt milk-vetch
NCS	North Coast semaphore grass
STV	Sonoma tree vole

1 0.5 0 1 Miles

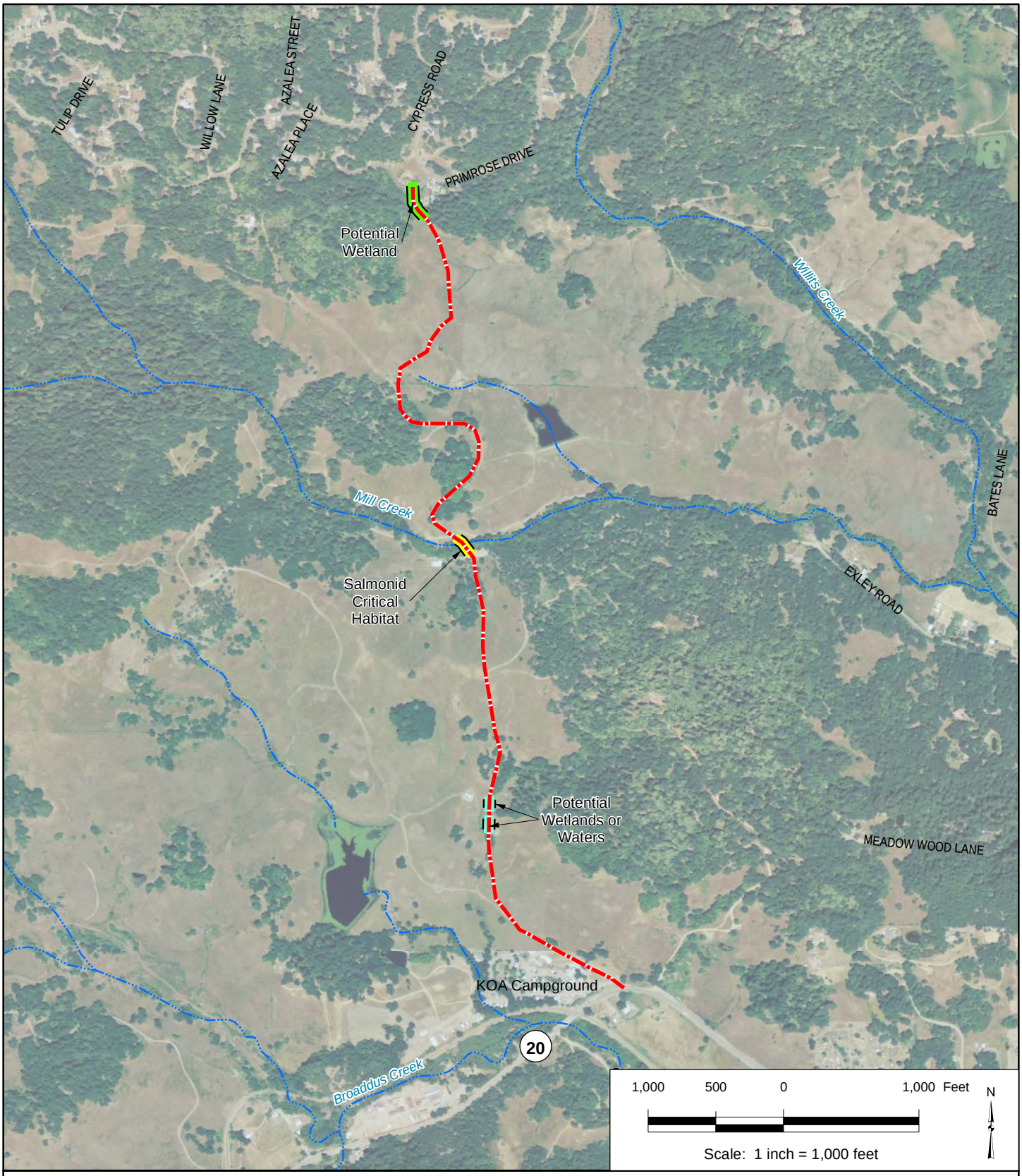
Scale: 1 inch = 1 mile

N

CNDDB:
DFG CA Natural Diversity Database (3 Sept. 2011)

National Geographic TOPO!
Copyright:© 2008 National Geographic Society
Seamless USGS DRG 1:100,000
ArcGIS Resource Center

11013Brooktrails2ndAccess_AltAFircoCNDDB(8x10).mxd



Brooktrails Second Access
Mendocino County, CA
27 September 2011

Alternative "A"
Constraints Summary

Alternative "A"
Potential Wetland
Potential Wetlands or Waters
Salmonid Critical Habitat

Aerial Photograph: 17 June 2009
NAIP USDA FSA
ESRI ArcGIS Basemap layer

11013Brooktrails2ndAccess_AltAConstraints(8x11).mxd

APPENDIX B.

USFWS, CNDDB and CNPS Lists

Mendocino County, CA

APPENDIX D

BROOKTRAILS SECOND ACCESS GEOTECHNICAL FEASIBILITY REPORT

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September 6, 2011

Mr. Craig Drake, P.E.
Drake Haglan and Associates
11060 White Rock Road, Suite 200
Rancho Cordova, California 95670

Subject: FirCo Haul Road and Alternative A Preliminary Evaluation 2011-0028
Brooktrails Subdivision 39123-D3:240N;330W
Secondary Access Feasibility Study
Mendocino County, California

Dear Mr. Drake:

Per your request, we are pleased to submit this draft preliminary evaluation report of two proposed secondary access alignments for the Brooktrails; including the proposed FirCo Haul Road and Alternative A alignments. Limitations of this study are discussed in the attached "General Conditions."

PROJECT DESCRIPTION

This project is a continuation of a previous feasibility study (completed by RGH consultants) for secondary access routes to the Brooktrails subdivision. The purpose of the secondary access is to provide additional ingress/egress between the town of Willits and the Brooktrails subdivision via Highway 20 or via Interstate 101. Previous study documents provided to us for this project are as follows:

- KOA Corporation, Brooktrails Second Access Feasibility Study (40 page electronic document), dated September 15, 2009, (Appendices of this report were provided separately);

- RGH Consultants, Feasibility Consultation, Planned Second Access Routes, Brooktrails , Willits, California, dated May 5, 2009 (Appendix B of the KOA September 15, 2009 report);
- KOA Corporation, Brooktrails Second Access Feasibility Study (24 page electronic document of presentation slides), dated September 22, 2009.

Several alignments (10 alignments – Alternatives A through I) were previously proposed, beginning in 1991. Studies prior to the 2009 reports noted above were not made available to us for this study, but were discussed in the reviewed 2009 reports. The alignments were evaluated by KOA Corporation and RGH Consultants, Inc. and the study recommended alignment Alternatives B and I based on criteria such as roadway geometry, geohazards, environmental impacts, etc. Less information was presented for other alignments, as they were not the recommended alignments.

It is understood that two of the alignments not recommended or discussed in detail in the previous reports are now being reconsidered, and that updated geotechnical information for these alignments is desired. These two alignments include Alternative A, which is a generally north-south trending alignment that connects Highway 20 with the south edge of the Brooktrails subdivision, and also the FirCo Haul Road alignment (Alternative C, but with different westward extensions). Alternative A and the FirCo Haul Road alignment are shown in our Figures.

Alternative A connects to two separate points on Primrose Drive, along the south edge of the Brooktrails subdivision. Primrose Drive provides direct access to Sherwood Road approximately 3 miles to the east of the tie-ins and access to Sherwood Road approximately 8 miles north of the tie-ins via Ridge Road.

The FirCo Haul Road alignment is similar to Alternative C from the intersection with Highway 101 westward to where Alternative C makes a 90-degree turn to the south, towards Alternatives G and H. From the 90-degree turn in Alternative C, the FirCo Haul Road Alignment continues west past the north end of Ells Field - Willits Municipal Airport, connecting to a point on Sherwood Road approximately 4 miles northwest of Highway 101. The FirCo Haul Road Alignment includes two separate forks southward, connecting with the north end of Madrone Court and Daphne Way, respectively.

The FirCo Haul Road Alignment and the Alternative A Alignment are the subject of this study.

SITE REVIEW

The project area is bordered by Highway 20 at the south, Interstate 101 on the east, the FirCo Haul Road alignment on the north and the Primrose Drive West tie-in on the west. This report is limited to review of the FirCo Haul Road and Alternative A alignments that are within the greater project area.

Office review materials include the documents in the attached selected references list. Field review included site observations along the existing FirCo Haul Road. A field review along Alternative A was not conducted due to right-of-entry restrictions. The alignments, field photo locations, and noted geologic/geohazard features are shown on our figures. Each alignment is described separately below.

FirCo Haul Road

The FirCo Haul Road alignment roughly follows the existing FirCo Haul Road with three connection locations to the existing streets within the Brooktrails subdivision, as described above. This route begins westbound at Hwy 101, ascending a 10±% grade for 0.3±mile, then climbs across a steep slope (overall

3Horizontal±:1Vertical±, but with very steep sections up to 1H±:1V±) to where it crosses a ridge-top. West of the ridge-top, the alignment traverses moderate to gentle slopes (3H±:1V± maximum) near the top of several minor drainages north of Ells Field - Willits Municipal Airport. The field review noted above was conducted by Glen G. Wade, a Professional Geologist.

An inferred recent fault trace, likely related to the Maacama Fault, is shown on the most detailed available fault and landslide mapping (Pampeyan, 1981) to run roughly along the eastern 1.5±miles of the proposed alignment. Rock along faults is typically highly fractured and distorted and evidence of this was noted along the alignment. This fault trace is not shown on the state Fault Activity Map (Jennings 2010) or on the most detailed geologic map of the area (Durham 1979).

This disturbed ground typically has lower strength and a higher probability of failure than the same materials outside of the fault zone. Site photo locations 1-6 and 8-10 include conditions that may be related to such disturbance. This noted disturbance includes some evidence of larger slides and frequent small slides in the steep road cuts.

The portion of the slope immediately upslope (west) of Hwy 101 (photo locations 1-3 and 10) is mapped as an older large landslide by Pampeyan, 1981, but is shown as an older river terrace by Durham, 1979. Based on the limited site review it is not clear whether large scale sliding has taken place in the lower slope area, but hummocky terrain and other evidence of possible shallow slope movement was noted. This area is also crossed by the previously noted potentially active fault trace.

Additional smaller slide features and evidence of slope movement were found where the existing FirCo Haul Road climbs across a steep slope, including areas not previously mapped as landslide. These areas are shown on Figures 2

and 4 in photo locations 3a, 3b, 8, and 9. Features observed included hummocky terrain and recent small landslides / slumps. The potentially active fault trace is downslope 500 ft or less from the existing FirCo haul road in this section, running roughly parallel to the road.

The same inferred fault trace that crosses the slope directly west of Highway 101 also intersects the existing FirCo Haul Road where it crosses the ridge-top, approximately at photo location 5. This location includes a "notch" feature, which reflects increased erosion of crushed and broken rock of the fault zone (Pampeyan, 1981). This feature was also observed in our field review and can be seen in Figure 4 photo locations 4 and 5.

West of the ridge-top and "notch" along the existing FirCo Haul Road there is a road cut into somewhat intact moderately hard rock at photo location 6 on the south side of the road. The out board side of the road at this location is above an approximately 15±foot high fill slope that is armored with rip-rap crushed rock. A waterbar (diagonal drainage swale) was also observed at this location. Despite the steep slope at this location, no slide activity was apparent in the fill materials or the immediately surrounding slopes.

The section of the alignment west of photo location 6 to photo location 7 includes relatively moderate slopes with no apparent major geologic hazards. Our field review did not extend beyond photo location 7 due to lack of right-of-entry for this area.

Photo locations 11, 12, and 13 represent the tie-ins at Daphne Way, Ells Field - Willits Municipal Airport (Madrone Court), and Sherwood Road, respectively. No geologic hazards were observed at these sites.

There is a mapped landslide approximately 1,600±ft east of the Sherwood Road tie-in that measures approximately 1,000±ft wide, along the north edge of the FirCo Haul Road alignment (Durham 1979). Our field review did not include

this area, as there was no right-of-entry. The terrain in this area appears hummocky and disturbed in aerial photos and on topographic mapping.

A landslide that was mapped based on aerial photo interpretation (Durham 1979) is shown north of the intersection of the Daphne Drive tie-in and the FirCo Haul Road alignment. This fault was not observed in our field review, but is apparent in the aerial photos reviewed. It appears that the proposed alignment would be able to avoid this possible slide area with a minor adjustment to the south.

No surface water was observed in the several drainages crossed by the existing FirCo haul road and no active seepage was observed in slopes along the alignment. Seasonal water in the drainages and seasonal groundwater in the slopes should be anticipated throughout the alignment.

Alternative A Alignment

The Alternative A alignment is shown running north from Hwy 20 with two potential tie-ins to the Brooktrails subdivision. This alignment traverses a gently ascending slope north of Hwy 20 and then roughly follows topographic contour across several small ridges (Figure 3) before tying in to the Brooktrails subdivision. This alignment intersects Exley Road (gated and private) approximately halfway between Hwy 20 and Primrose drive. Rights-of-entry were not available for this alignment, and, consequently, our review is based only on available published information and aerial photos.

Several areas are described by Kilbourne, 1984, as "disrupted ground" consisting of irregular ground surfaces that are too small to show on the map, including complex landsliding, downslope creep, expansive soils, and/or gully erosion (Kilbourne 1984). These areas appear to be hummocky on available aerial photographs, but no obvious major slide features were observed during

our aerial photo review. The "disrupted ground" areas are generally indicative of shallow ground movement, which appears reasonable based on aerial photo interpretation and the relatively gentle slopes along this route.

An inactive (no activity within the past 1.6 million years per Jennings, 2010) fault (reverse-thrust) is shown running along the ridge near the tie-ins for Primrose Drive. This fault is intersected by two separate steeply-dipping faults near the west tie-in (Kilbourne 1984). These faults may have distorted and weakened rocks along their traces and there is a possibility of localized slope stability issues in the areas adjacent to the faults. But, as mentioned above, no major slope failures have been noted along the alignment in published mapping or during our aerial photo review.

Small streams / drainages crossed by this alignment include Mill Creek (adjacent to Exley Road) and the northern tributary of Mill Creek. A spring is mapped near the Primrose West tie-in, at one of the above-noted fault intersections. Groundwater should be anticipated in excavations near this spring and seasonally throughout the alignment.

DISCCUSION AND RECOMMENDATIONS

Due to the relative lack of major geologic hazard concerns, Alternative A appears to be the more geotechnically feasible of the two reviewed alignments. Each alignment is discussed individually below.

Firco Haul Road

The major challenge for construction and maintenance of the proposed FirCo Haul Road Alignment is the crossing of the steep slope area near photo locations 3a, 3b, 8, and 9. Slope movement in cut and fill slopes was apparent in this area, and it is in close proximity to a possibly active fault splay that likely increases the potential for slope movement. Some very steep slopes are also

present upslope and downslope of the alignment in this area that may add extra difficulty during construction. Road construction in this area appears that it would require large cut and fill areas and/or reinforced soil and retaining walls. Culverts and/or small bridges will be needed for crossing each of the drainages. Large excavations will likely encounter groundwater throughout the year and all excavations are likely to encounter groundwater seasonally.

The large landslide mapped near the Highway 101 end of the alignment may be active. If the slide is determined to be active it is likely economically unfeasible to remediate the entire slide. This portion of the roadway is also crossed by the potentially active splay of the Maacama Fault, which could potentially cause periodic damage to the roadway. However, improving the stability of minor slopes and pavement subgrade within the slide area could reduce the amount of pavement distress to manageable levels.

Construction also appears feasible without major challenges westward from approximately photo location 4 through the rest of the alignment. The slide features in this portion of the alignment appear to be avoidable through minor alignment adjustment or can be remediated during grading of the roadway. The fault trace crossing at photo location 5 would require pavement repair following fault movement. Several culverts and other surface drainage features will be needed along this section of the alignment.

Alternative A

Alternative A crosses relatively gentle slopes and while areas of "disrupted ground" are shown on available mapping, these areas are limited in extent and can likely be remediated with relative ease.

This alignment might require some small culverts or possibly a bridge structure to cross local drainages. Nothing was noted during our review of

available information or aerial photographs that would present abnormal difficulty for construction of these types of crossings.

The potential for groundwater near the spring at the Primrose Drive west tie-in should not pose a major grading concern.

* * * * *

Additional information regarding the recommendations discussed above is available from the data in-hand, if desired. Please call if you have any questions regarding the foregoing or earth materials and foundation conditions at the site. We appreciate this opportunity to be of service.

TABER CONSULTANTS

David A. Kitzmann
C.E.G. 2412

Glen G. Wade
P.G. 8822

GGW/DAK
Attachments:

"General Conditions"
"References"
Figure 1 "Vicinity Map"
Figure 2 "FirCo Haul Road Alignment"
Figure 3 "Alternative A Alignment"
Figure 4 "Site Photos"

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GENERAL CONDITIONS

The conclusions and recommendations of this study are professional opinion based upon the indicated project criteria and the limited data described herein. It is recognized there is potential for sufficient variation in subsurface conditions that some modification of conclusions and recommendations might emerge from further, more detailed study.

This report is intended only for the purpose, site location and project description indicated and assumes design and construction in accordance with applicable codes.

As changes in appropriate standards, site conditions, and technical knowledge cannot be adequately predicted, review of recommendations by this office for use after a period of two years is a condition of this report.

A review by this office of any foundation and/or grading plans and specifications or other work product insofar as they rely upon or implement the content of this report, together with the opportunity to make supplemental recommendations as indicated therefrom is considered an integral part of this study and a condition of recommendations.

Subsequently defined construction observation procedures and/or agencies are an element of work that may affect supplementary recommendations.

Should there be significant change in the project, or should earth materials or conditions different from those described in this report be encountered during construction, this office should be notified for evaluation and supplemental recommendations as necessary or appropriate.

Opinions and recommendations apply to current site conditions and those reasonably foreseeable for the described development--which includes appropriate operation and maintenance thereof. They cannot apply to site changes occurring, made, or induced, of which this office is not aware and has not had opportunity to evaluate.

The scope of this study specifically excluded sampling and/or testing for, or evaluation of the occurrence and distribution of hazardous substances. No opinion is intended regarding the presence or distribution of any hazardous substances at this or nearby sites.

The professional opinions presented in this letter have been developed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities and at similar times. No other warranty, expressed or implied, is made as to the professional advice included in this report.

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SELECTED REFERENCES 2011-0028

Pampeyan, E.H., Harsh, P.W., and Coakley, J.M., 1980, Preliminary map showing recently active breaks along the Maacama fault zone between Laytonville and Hopland, Mendocino County, California: U.S. Geological Survey, Open-File Report OF-80-662, scale 1:24000._

Pampeyan, E.H., Harsh, P.W., and Coakley, J.M., 1981, Preliminary map showing recently active breaks along the Maacama Fault zone between Hopland and Laytonville, Mendocino County, California: U.S. Geological Survey, Miscellaneous Field Studies Map MF-1217, scale 1:24000.

Jennings, Charles W., and Bryant, William A., 2010, "2010 Fault Activity Map of California:" Geologic Data Map No. 62010: California Geological Survey, available electronically at: http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html.

Simon, R.B., Pampeyan, E.H., and Stover, C.W., 1978, The Willits, California, magnitude - 4.8 earthquake of November 22, 1977: U.S. Geological Survey, Open-File Report OF-78-1075, scale 1:34000.

Durham, J.B. 1979, Geology and landslides of the Willits 15' Quadrangle, CA, California Dept of Forestry, Title II Data Compilation Project, scale 1:62500, unpublished.

Cardwell, G.T., 1965, Geology and ground water in Russian River valley areas and in Round, Laytonville, and Little Lake Valleys, Sonoma and Mendocino Counties, California: U.S. Geological Survey, Water-Supply Paper 1548, scale 1:62500 (Plate 6: Geologic Map of Little Lake Valley, Mendocino County, California, Showing Location of Wells).

Kilbourne, R.T., 1984, DMG Open-File Report 84-19, Geology and Geomorphic Features Related to Landsliding, Burbeck 7.5' Quadrangle, Mendocino County,California, Scale 1:24,000

SELECTED REFERENCES (continued)

Digital reproduction of some features of: Kilbourne, R.T., 1984, DMG Open-File Report 84-19, Geology and Geomorphic Features Related to Landsliding, Burbeck 7.5' Quadrangle, Mendocino County, California, Scale 1:24,000, titled "Geology," dated December 17, 1998, downloaded from: ftp://ftp.consrv.ca.gov/pub/dmg/pubs/ofr/ws/geomp/cbg_burb.pdf

Digital reproduction of some features of: Kilbourne, R.T., 1984, DMG Open-File Report 84-19, Geology and Geomorphic Features Related to Landsliding, Burbeck 7.5' Quadrangle, Mendocino County, California, Scale 1:24,000, titled "Geomorphic Features related to Landsliding," dated December 17, 1998, downloaded from: ftp://ftp.consrv.ca.gov/pub/dmg/pubs/ofr/ws/geomrfmp/cbgm_bur.pdf

Aerial Photos

FirCo Alignment

Black and White Vertical, Stereopaired, #MEN 3-160 & MEN 3-161; Approximate Scale 1:20,000, August 4, 1963.

Black and White Vertical, Stereopaired, # WAC-00-CA 2-96, 2-97, and 2-98; Approximate Scale 1:30,000, April 3, 2000.

Alternative A Alignment

Black and White Vertical, Stereopaired, #MEN 3-162 & MEN 3-163; Approximate Scale 1:20,000, August 4, 1963.

Black and White Vertical, Stereopaired, # WAC-00-CA 2-94 and 2-95; Approximate Scale 1:30,000, April 3, 2000.

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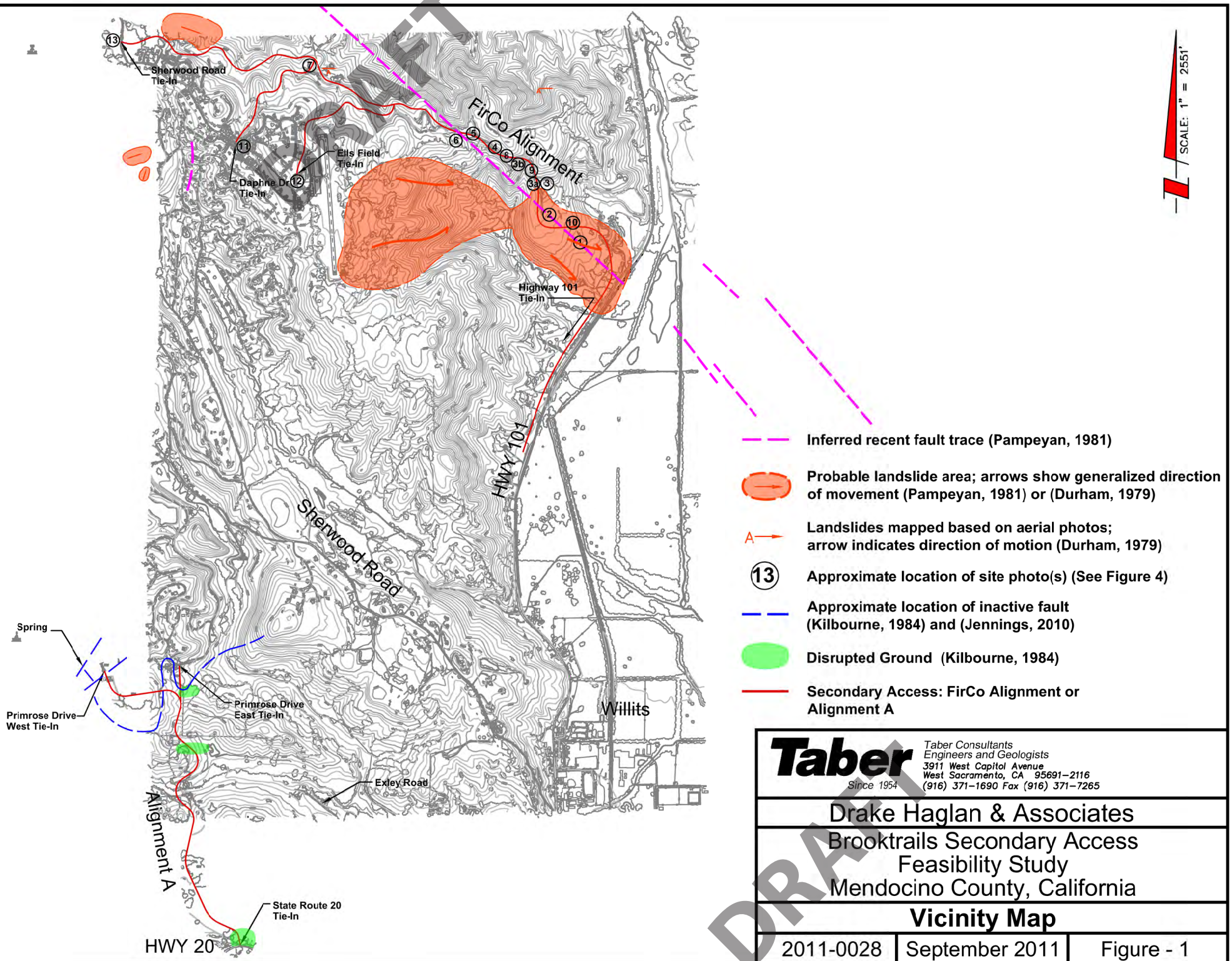

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Brooktrails Secondary Access
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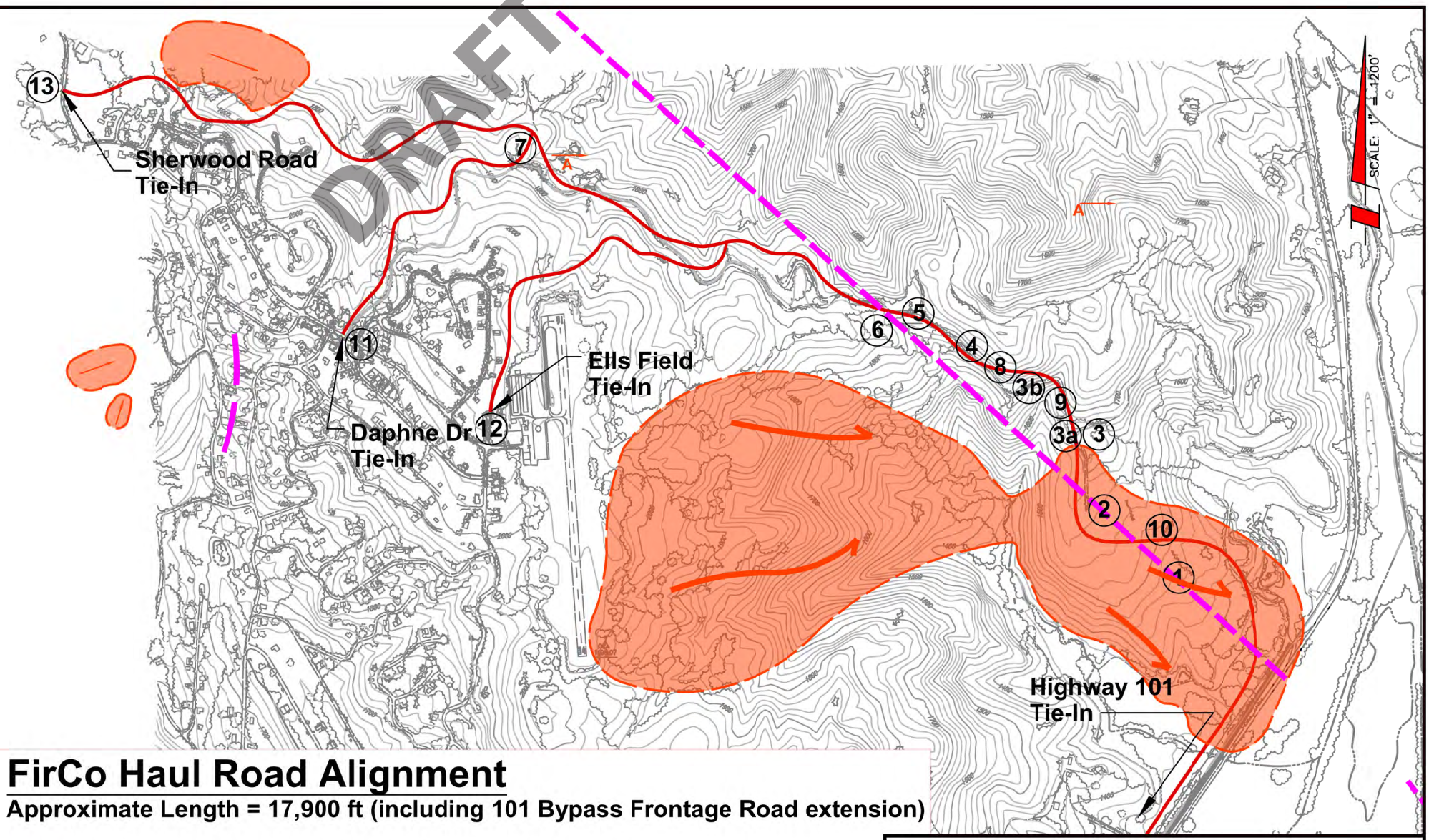
Vicinity Map

2011-0028	September 2011	Figure - 1



FirCo Haul Road Alignment

Approximate Length = 17,900 ft (including 101 Bypass Frontage Road extension)

- Inferred recent fault trace (Pampeyan, 1981)
- Probable landslide area; arrows show generalized direction of movement. (Pampeyan, 1981) or (Durham, 1979)
- A→ Landslides mapped based on aerial photos; arrow indicates direction of motion (Durham, 1979)
- (13) Approximate location of site photo(s) (See Figure 4)
- Secondary Access: FirCo Haul Road Alignment

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FirCo Haul Road Alignment

2011-0028	September 2011	Figure - 2

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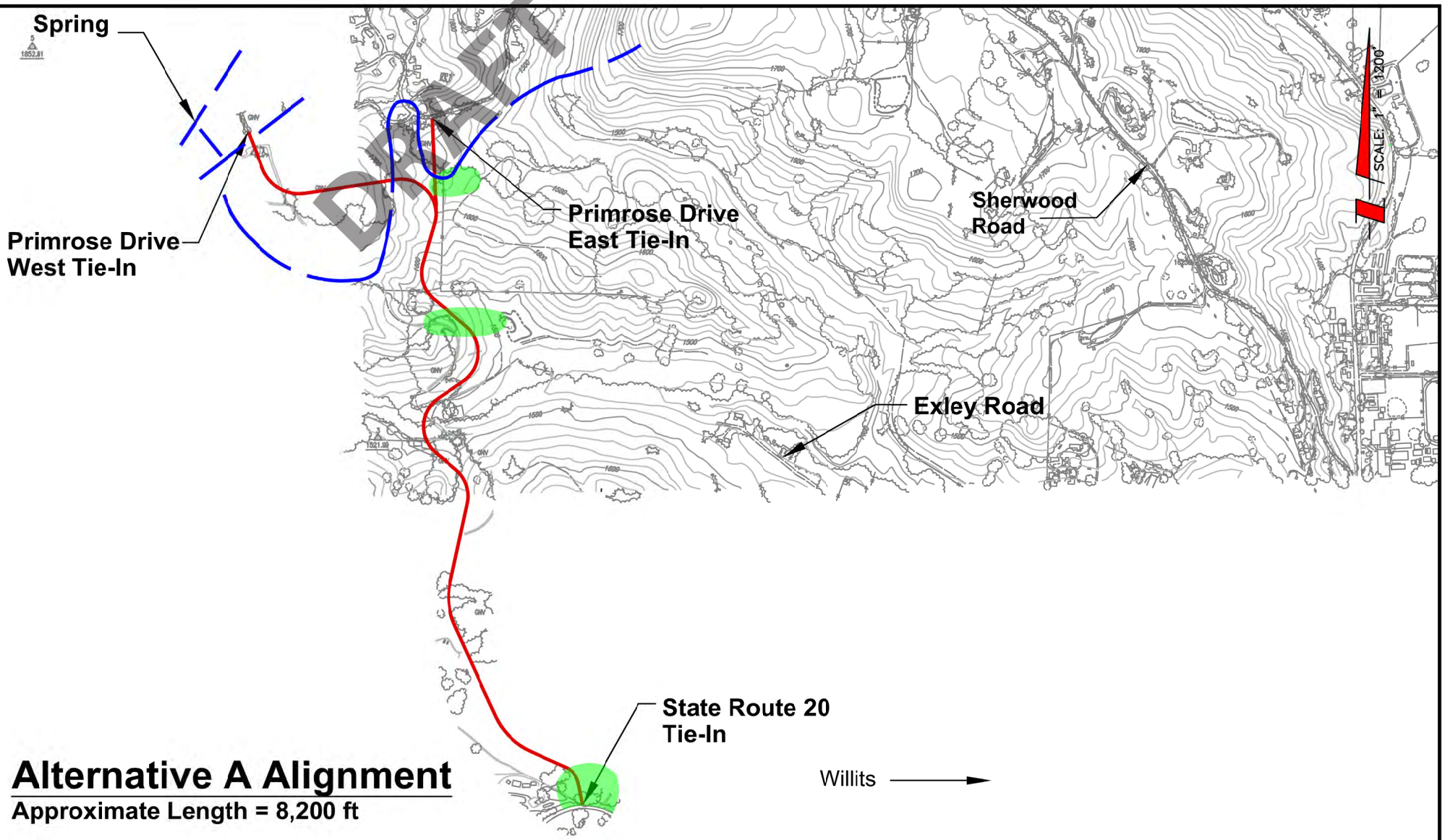

Alternative A Alignment

Approximate Length = 8,200 ft

- Approximate location of inactive fault (Kilbourne, 1984) and (Jennings, 2010)
- Disrupted Ground (Kilbourne, 1984)
- Secondary Access: Alignment A

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Alternative A Alignment

2011-0028	September 2011	Figure - 3

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9/2/11 8.5X11SHEET.dwg 1=1

Photo Location 1: Looking north; ditch, cut slope and small young trees.

Photo Location 2: Looking north towards location 3; recent slide activity and southeast end of existing FirCo haul road crossing steep terrain.

Photo Location 3: Looking south; fresh slide scarps, location 10 in the upper right corner of lower picture.

Photo Location 3a: Photos of debris flow along road cut.

Photo Location 3b: Photo of landslide along road cut.

Photo Location 4: Looking west towards location 5; 'Notch' and fault trace (Pampeyan 1981).

Photo Location 5: Looking southeast towards northwest end of existing FirCo haul road crossing steep terrain.

Photo Location 5: Looking northwest; existing FirCo Haul Road.

Photo Location 5: Looking southeast from 'Notch' along fault (Pampeyan 1981).

Photo Location 5: Looking southeast.

Photo Location 5: Looking west.

Photo Location 6: Looking southeast, angular bedrock exposed in road cut, drainage ditch on inboard side of road uphill of waterbar.

Photo Location 6: Looking east; angular crushed rock armoring 15' high fill on outboard slope, waterbar crossing road.

Photo Location 7: Looking east. Bedrock exposed in road surface.

Photo Location 7: Looking northeast along the top of a minor ridge on the outboard side of the road.

Photo Location 8: Looking northeast; typical road cut material.

Photo Location 9: Looking north; photos of landslide(s) in and above road cut.

Photo Location 10: Looking southeast.

Photo Location 10: Looking northwest along lineation of dead grass and very loose soil (possible fault disturbance). Possibly graded grass slope.

Photo Location 11: Looking northeast from north end of existing Daphne Road; private gate.

Photo Location 12: Looking north down gentle slope from north end of Madrone Court at Ells Field tie-in.

Photo Location 12: Looking south and west; road cut consisting of intensely weathered rock / residual soil.

Photo Location 13: Looking east at ditch and exposed intensely weathered rock on east side of Sherwood Road immediately north of tie-in.

Photo Location 13: Looking east at Sherwood Road tie-in location.

APPENDIX E

CONCEPT COST ESTIMATES

PROJECT LOCATION:	Brooktrails Second Access Study				
PROJECT DESCRIPTION:	Alternative A - State Route 20 Access				
ROAD CLASSIFICATION:	Minor Collector				
IMPROVEMENT DESCRIPTION:	0		LANES TO	2	LANES
PROJECT LENGTH:	7,205		L.F.	1.36	MILES
EXISTING PAVEMENT WIDTH	0		PROPOSED WIDTH	36	FT
EXISTING ROW WIDTH	0		PROPOSED ROW WIDTH	60	FT
EXISTING MEDIAN (Y/N)	N		BIKE ROUTE (Y/N)	N	
			AB (CL 2) AREA- SEE TYP	51.32	SF/LF
ITEM	UNIT		QUANTITY	UNIT COST	TOTAL COST
Clearing & Grubbing	SY		48,030	$ 1.00	$48,030
Import Barrow	CY		55,992	$ 13.00	$727,896
Roadway Excavation	CY		34,281	$ 13.00	$445,653
HMA (Type A)	TON	0.33	6,340	$ 100.00	$633,998
AB (Class 2)	CY	1.25	13,694	$ 45.00	$616,227
Roadway Drainage	LS	0.05	1	$ 121,189	$121,189
Signing/Striping	LF		7,205	$ 10.00	$72,045
Erosion Control	SQ YD		19,212	$ 10.00	$192,121
Traffic Control	LS		1	$ 50,000	$50,000
				Subtotal Roadway Work	**$2,907,158**
Bridge	SF			$ 125.00	$0
				Subtotal Structures Work	**$0**
Miscellaneous Items (10%)					$290,716
				Subtotal Construction	**$3,197,874**
				Mobilization (10%)	$355,319
				Subtotal	**$3,553,193**
				Construction Contingencies (30%)	$1,065,958
				Total improvement cost	**$4,619,151**
				(15% Eng, 10% Env, 10% CM)	$1,616,703
				Total cost w/o R/W	$6,235,854
Right-of-Way	Acre		10	$ 50,000.00	$496,000
				Final Improvement Cost	$6,731,854

PROJECT LOCATION:	Brooktrails Second Access Study				
PROJECT DESCRIPTION:	Alternative A2 - State Route 20 Access (Willow Lane)				
ROAD CLASSIFICATION:	Minor Collector				
IMPROVEMENT DESCRIPTION:	0		LANES TO	2	LANES
PROJECT LENGTH:	7,916		L.F.	1.50	MILES
EXISTING PAVEMENT WIDTH	0		PROPOSED WIDTH	36	FT
EXISTING ROW WIDTH	0		PROPOSED ROW WIDTH	60	FT
EXISTING MEDIAN (Y/N)	N		BIKE ROUTE (Y/N)	N	
			AB (CL 2) AREA- SEE TYP	51.32	SF/LF

ITEM	UNIT		QUANTITY	UNIT COST	TOTAL COST
Clearing & Grubbing	SY		52,775	$ 1.00	$52,775
Import Barrow	CY		54,177	$ 13.00	$704,301
Roadway Excavation	CY		36,873	$ 13.00	$479,349
HMA (Type A)	TON	0.33	6,966	$ 100.00	$696,632
AB (Class 2)	CY	1.25	15,047	$ 45.00	$677,105
Roadway Drainage	LS	0.05	1	$ 127,869	$127,869
Signing/Striping	LF		7,916	$ 10.00	$79,163
Erosion Control	SQ YD		21,110	$ 2.50	$52,775
Traffic Control	LS		1	$ 50,000	$50,000
				Subtotal Roadway Work	**$2,919,969**
Bridge	SF			$ 125.00	$0
				Subtotal Structures Work	**$0**
Miscellaneous Items (10%)					$291,997
				Subtotal Construction	**$3,211,966**
				Mobilization (10%)	$356,885
				Subtotal	**$3,568,851**
				Construction Contingencies (30%)	$1,070,655
				Total improvement cost	**$4,639,506**
				(15% Eng, 10% Env, 10% CM)	$1,623,827
				Total cost w/o R/W	$6,263,334
Right-of-Way	Acre		11	$ 50,000.00	$545,000
				Final Improvement Cost	$6,808,334

PROJECT LOCATION:	Brooktrails Second Access Study				
PROJECT DESCRIPTION:	Alternative D - FirCo Haul Road to Poppy Drive/Daphne Way				
ROAD CLASSIFICATION:	Minor Collector				
IMPROVEMENT DESCRIPTION:	0		LANES TO	2	LANES
PROJECT LENGTH:	8,945		L.F.	1.69	MILES
EXISTING PAVEMENT WIDTH	0		PROPOSED WIDTH	36	FT
EXISTING ROW WIDTH	0		PROPOSED ROW WID	60	FT
EXISTING MEDIAN (Y/N)	N		BIKE ROUTE (Y/N)	N	
			AB (CL 2) AREA- SEE T	51.32	SF/LF
ITEM	UNIT		QUANTITY	UNIT COST	TOTAL COST
Clearing & Grubbing	SY		59,631	$ 1.00	$59,631
Import Barrow	CY		244,378	$ 13.00	$3,176,914
Roadway Excavation	CY	1.58	171,370	$ 13.00	$2,227,810
HMA (Type A)	TON	0.33	7,871	$ 100.00	$787,131
AB (Class 2)	CY	1.25	17,001	$ 45.00	$765,067
Roadway Drainage	LS	0.05	1	$ 347,846	$347,846
Signing/Striping	LF		8,945	$ 10.00	$89,447
Erosion Control	SQ YD		23,852	$ 2.50	$59,631
Traffic Control	LS		1	$ 50,000	$50,000
				Subtotal Roadway Work	**$7,563,477**
Bridge	SF			$ 125.00	$0
				Subtotal Structures Work	**$0**
Miscellaneous Items (10%)					$756,348
				Subtotal Construction	**$8,319,825**
				Mobilization (10%)	$924,425
				Subtotal	**$9,244,250**
				Construction Contingencies (30%)	$2,773,275
				Total improvement cost	**$12,017,525**
				(15% Eng, 10% Env, 10% CM)	$4,206,134
				Total cost w/o R/W	$16,223,659
Right-of-Way	Acre		12	$ 50,000.00	$616,000
				Final Improvement Cost	$16,839,659

PROJECT LOCATION:	Brooktrails Second Access Study				
PROJECT DESCRIPTION:	Alternative E - FirCo Haul Road to Sherwood Road/Poppy Drive				
ROAD CLASSIFICATION:	Minor Collector				
IMPROVEMENT DESCRIPTION:	0		LANES TO	2	LANES
PROJECT LENGTH:	14,093		L.F.	2.67	MILES
EXISTING PAVEMENT WIDTH	0		PROPOSED WIDTH	36	FT
EXISTING ROW WIDTH	0		PROPOSED ROW WIDTH	60	FT
EXISTING MEDIAN (Y/N)	N		BIKE ROUTE (Y/N)	N	
			AB (CL 2) AREA- SEE TYP	51.32	SF/LF

ITEM	UNIT		QUANTITY	UNIT COST	TOTAL COST
Clearing & Grubbing	SY		93,950	$ 1.00	$93,950
Import Barrow	CY		403,575	$ 13.00	$5,246,475
Roadway Excavation	CY		181,019	$ 13.00	$2,353,247
HMA (Type A)	TON	0.33	12,401	$ 100.00	$1,240,142
AB (Class 2)	CY	1.25	26,786	$ 45.00	$1,205,380
Roadway Drainage	LS	0.05	1	$ 502,262	$502,262
Signing/Striping	LF		14,093	$ 10.00	$140,925
Erosion Control	SQ YD		37,580	$ 2.50	$93,950
Traffic Control	LS		1	$ 50,000	$50,000
				Subtotal Roadway Work	**$10,926,332**
Bridge	SF			$ 125.00	$0
				Subtotal Structures Work	**$0**
Miscellaneous Items (10%)					$1,092,633
				Subtotal Construction	**$12,018,965**
				Mobilization (10%)	$1,335,441
				Subtotal	**$13,354,405**
				Construction Contingencies (30%)	$4,006,322
				Total improvement cost	**$17,360,727**
				(15% Eng, 10% Env, 10% CM)	$6,076,254
				Total cost w/o R/W	$23,436,981
Right-of-Way	Acre		19	$ 50,000.00	$970,500
				Final Improvement Cost	$24,407,481

PROJECT LOCATION:	Brooktrails Second Access Study				
PROJECT DESCRIPTION:	Alternative F - FirCo Haul Road to Poppy Drive/Madrone Drive				
ROAD CLASSIFICATION:	Minor Collector				
IMPROVEMENT DESCRIPTION:	0		LANES TO	2	LANES
PROJECT LENGTH:	14,176		L.F.	2.68	MILES
EXISTING PAVEMENT WIDTH	0		PROPOSED WIDTH	36	FT
EXISTING ROW WIDTH	0		PROPOSED ROW WIDTH	60	FT
EXISTING MEDIAN (Y/N)	N		BIKE ROUTE (Y/N)	N	
			AB (CL 2) AREA- SEE TYP	51.32	SF/LF

ITEM	UNIT		QUANTITY	UNIT COST	TOTAL COST
Clearing & Grubbing	SY		94,504	$ 1.00	$94,504
Import Barrow	CY		229,305	$ 13.00	$2,980,965
Roadway Excavation	CY		155,136	$ 13.00	$2,016,768
HMA (Type A)	TON	0.33	12,475	$ 100.00	$1,247,456
AB (Class 2)	CY	1.25	26,944	$ 45.00	$1,212,490
Roadway Drainage	LS	0.05	1	$ 372,884	$372,884
Signing/Striping	LF		14,176	$ 10.00	$141,756
Erosion Control	SQ YD		37,802	$ 2.50	$94,504
Traffic Control	LS		1	$ 50,000	$50,000
				Subtotal Roadway Work	**$8,211,328**
Bridge	SF			$ 125.00	$0
				Subtotal Structures Work	**$0**
Miscellaneous Items (10%)					$821,133
				Subtotal Construction	**$9,032,461**
				Mobilization (10%)	$1,003,607
				Subtotal	**$10,036,067**
				Construction Contingencies (30%)	$3,010,820
				Total improvement cost	**$13,046,888**
				(15% Eng, 10% Env, 10% CM)	$4,566,411
				Total cost w/o R/W	$17,613,298
Right-of-Way	Acre		20	$ 50,000.00	$976,500
				Final Improvement Cost	$18,589,798