

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

Pacific Southwest Regional Office

1323 Club Drive, Vallejo, CA 94592

Geologic and Flood Hazard Assessment

Cabin Sites within the Caldor Fire

Phase 2 Report

Eldorado National Forest



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By

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INTRODUCTION

This report supplements the Phase 1 Geology and Flood Hazard Report, dated March 28, 2023, by (1) assessing and providing recommendations for the remaining 29 recreational residence cabin sites burned in the Caldor Fire, and (2) providing explanations for the geologic hazard assessment, generally, as it involves dry cabins, gray water systems, existing septic systems, and soil depth descriptions. The Phase 2 Report follows the geologic hazard and cabin site assessment methods described in the Phase 1 Report, with few noted exceptions.

See the Phase 1 Report for details and discussions involving Background, Geology, Policy, Methodology, and Geologic Hazard and Cabin Site Assessment Criteria.

METHODOLOGY

This Phase 2 Report followed the assessment method used during the Phase 1 assessment, except for the use of a digital Survey 123 form that allowed the direct input of assessment notes into a tablet (Gallegos & Annis, 2023). The survey data and notes were later downloaded and used in ArcGIS PRO, as a part of this analysis.

GEOLOGIC HAZARD ASSESSMENT - EXPLANATION

Septic Feasibility

Since the completion of the Phase 1 Report, we have received several questions regarding the septic suitability findings. These questions center around (1) dry cabins, (2) gray water systems, (3) existing septic systems, and (4) soil depth descriptions. In response, we provide the following discussion involving Dry Cabins, Gray Water Systems, Existing Septic Systems, and Soil Depth Class descriptions that form the basis for our recommendations. See below for further discussion.

Dry Cabins

Dry cabins are recommended for sites that cannot achieve minimum setbacks (e.g. creeks, wetlands, wells), or sites that are entirely comprised of rock (no soil).

The Phase 1 Report included the following description:

***Dry Cabin Only** is assigned to cabins where the cabin can be rebuilt but must be a dry cabin. Meaning that the cabin cannot have an onsite wastewater treatment system (also known as a septic system) because required setbacks cannot be achieved (see Septic Exclusion Zone in Attachments).*

Gray Water Systems

To help the Forest Service review and respond to gray water system questions, we provide a summary of the key requirements to assist in this effort. Key components are broken out as follows: 1) Definition and Regulations, 2) Definition of System Types, 3) Setbacks, and 4) Groundwater Separation.

Graywater is untreated wastewater from bathroom sinks, bathtubs, showers and clothes washers but does not include wastewater from toilets, kitchen sinks or dishwashers. A graywater system is a type of onsite wastewater treatment system that utilizes trenches, subsurface drip irrigation systems, and mulch basins for wastewater disposal but can have the added benefit of using the wastewater as an irrigation source. Regulations for the use of graywater can be found in Chapter 15 of the California Plumbing Code (CPC).

Soils evaluations must be performed and gray water system designs must be prepared by a qualified professional. **If the required groundwater separation and setbacks to streams, lakes, and wells cannot be met, a graywater system cannot be installed. If the system is already installed, and groundwater separation is not met at a later date, the graywater system must be removed.**

System Types – “Simple” and “Complex” – A simple system has a discharge capacity less than 250 gallons per day, and a complex system has a discharge capacity over 250 gallons per day.

The design of simple and complex systems shall meet generally accepted gray water system design criteria.

Setbacks – The graywater system must maintain certain setbacks to structures, existing septic systems, water lines, water wells and surface waters. These setbacks are summarized below. The setback for gray water system tanks, subsurface and subsoil irrigation fields and mulch basins, and disposal fields is equivalent to the required setbacks for onsite-wastewater treatment systems, unless the gray water has been filtered prior to entering the distribution piping.

Filters – Filters used in a graywater irrigation system shall be as specified by the manufacturer’s installation instructions for the design flow rate and intended use. Filter backwash water and flush water shall not be used for any purpose. Sanitary procedures shall be followed when handling filter backwash and flush discharge or graywater.

Groundwater Separation – No excavation for an irrigation field, disposal field, or mulch basin shall extend within 3 feet vertical of the highest known seasonal groundwater level, nor to a depth where gray water contaminates the groundwater or surface water.

**TABLE 1503.4
LOCATION OF GRAY WATER SYSTEM⁷**

MINIMUM HORIZONTAL DISTANCE IN CLEAR REQUIRED FROM	SURGE TANK (feet)	SUBSURFACE AND SUBSOIL IRRIGATION FIELD AND MULCH BASIN (feet)	DISPOSAL FIELD
Building structures ¹	5 ^{2, 9}	2 ^{3, 8}	5
Property line adjoining private property	5	5 ⁸	5
Water supply wells ⁴	50	100	100
Streams and lakes ⁴	50	100 ^{5, 10}	100 ⁵
Sewage pits or cesspools	5	5	5
Sewage disposal field ¹⁰	5	4 ⁶	4 ⁶
Septic tank	0	5	5
On-site domestic water service line	5	0	0
Pressurized public water main	10	10 ⁷	10 ⁷

For SI units: 1 foot = 304.8 mm

Notes:

- ¹ *Building structures do not include porches and steps, whether covered or uncovered, breezeways, roofed carports, roofed porte cocheres, roofed patios, carports, covered walks, covered driveways, and similar structures or appurtenances.*
- ² *The distance shall be permitted to be reduced to 0 feet for aboveground tanks where first approved by the Authority Having Jurisdiction.*
- ³ *Underground tanks shall not be located within a 45 degree angle from the bottom of the foundation, or they shall be designed to address the surcharge imposed by the structure. The distance may be reduced to six (6) inches (153 mm) for aboveground tanks when first approved by the Enforcing Agency.*
- ⁴ *Where special hazards are involved, the distance required shall be increased as directed by the Authority Having Jurisdiction.*
- ⁵ *These minimum clear horizontal distances shall apply between the irrigation or disposal field and the ocean mean higher high tide line.*
- ⁶ *Add 2 feet (610 mm) for each additional foot of depth more than 1 foot (305 mm) below the bottom of the drain line.*
- ⁷ *For parallel construction or crossings, approval by the Authority Having Jurisdiction shall be required.*
- ⁸ *The distance shall be permitted to be reduced to 1½ feet (457 mm) for drip and mulch basin irrigation systems.*
- ⁹ *The distance shall be permitted to be reduced to 0 feet for surge tanks of 75 gallons (284 L) or less.*
- ¹⁰ *The minimum horizontal distance may be reduced to 50 feet (15 240 mm) for irrigation or disposal fields utilizing gray water which has been filtered prior to entering the distribution piping.*

Existing Septic Systems

Many of the burned cabins contained existing septic systems. Many of these systems predate all building codes, which was evident during our site visits where we observed self-made septic tanks ranging from 5 gallons to >1,000 gallons, constructed using wood, rocks, metal, and other materials (See Photos 20 to 22 in the Phase I Report).

To reuse the existing system¹, the existing system must be evaluated by a qualified professional and determined to be sufficiently sized (e.g. septic tank volume, leach line sizing) for the proposed use and meets all setbacks to streams, lakes, wells (See Septic Exclusion Zone Map), and required groundwater separation. These setbacks are important to protect water quality. Provide documentation/certification to the forest that demonstrates the existing systems meets these requirements. Documentation requirements include: (1) the existing systems permit, soil evaluation, design, and as-built drawing; (2) Septic System Inspection Report, dated after the fire, and includes the septic tank material (e.g. plastic, concrete) and volume; and (3) an accurate plot plan is an important component of this review.

If these required setbacks to streams, lakes, wells, and required groundwater separation cannot be met, a septic system cannot be installed. If the system is already installed, and these conditions are not met, the system must be removed and replaced.

Soil Depth

An observational based soil depth class (Table 1) was determined for each cabin site, as it relates to septic system leach field suitability (see Table 4). These observational based soil depths are provided for ancillary purposes only, and do not replace or supersede the requirement for county soil profiles, nor do they represent precise soil depths. Thus, soil depths are provided for information purposes for Forest Service Staff and permittees. Unless the site is comprised of bedrock (surface rock).

Soil depth was determined based on the presence of rock outcrop at or near a cabin site and soil depth estimates at the nearest road cut to the cabin site. In addition, the geology was a key indicator of soil depth. For example, areas that had highly weathered glacial moraine deposits were assumed to have deep to very deep soils.

Table 1 - Soil Depth Classes

Soil Depth Class	Shallow	Moderately Deep	Deep	Very Deep
Soil Depth (in)	0-24	>24-48	>48-60	>60

¹ Septic Tank and/or Leach Field

CABIN SITE ASSESSMENT

For simplicity, we included a copy of the Cabin Site Assessment description from the Phase 1 Report (see below).

Each cabin site was reviewed and given geologic hazard ratings including flood, debris flow, rockfall, and landslide hazards. Recommendations are based on policy, and professional and industry standards. For a brief overview of each tract, see the Tract-Level Summary below (see Table 3). For a detailed Cabin Level Assessment see Tables 4. We provide detailed notes on what was found at each cabin site, as well as geologic hazard ratings and recommendations.

Other site characteristics observed at the cabin sites are described. These characteristics include the presence of wet areas or wetlands, the presence of riparian vegetation, and the presence of channels and the flow regime in channels (perennial or ephemeral) at or near the cabin sites. Potential conflicts with land management plan objectives are also described and were taken into consideration in the recommendation to build or not build the cabin.

Other site characteristics not considered include cabin setbacks to the CA-Highway (Hwy) 50 right-of-way (ROW), and appropriate line-of-sight visibility distance from cabin site access roads to ingress/egress onto CA Hwy 50. These characteristics are beyond the scope of our report, but we recommend they should be considered as a fundamental safety component for the rebuild determination.

In or Out of Lot

An assessment was conducted to determine cabin site locations with respect to their lot boundaries. This determination was based on field work (GIS) and best available geospatial parcel data, the cabin site is in or out of the lot parameters assigned by the Forest Service.

Eleven out of 29 cabin sites were located outside of their designated lot boundaries (see Table 4). Tables 4, column 2 indicate in or out of lot boundary.

TRACT-LEVEL SUMMARY

We summarize each tract as follows:

36 Milestone

Four cabin sites were assessed in Lots 18, 19, 20, and 21. All four cabin sites are in an area mapped as a landslide modified by post failure erosion (Spittler and Wagner, 1998). These four cabin sites are in the toe of this large landslide. The landslide was mapped and classified by

Spittler and Wagner (1998) as dormant. However, CalTrans did some work on Highway 50, years ago attempting to stabilize this section of state Highway 50. Furthermore, there is evidence of instability in the form of two smaller, yet active landslides in this area. The evidence of active landslide processes includes the presence of lateral shear zones, headscarps and wet areas within the landslide. In addition, a surface deformation study using InSAR data conducted in 2018 concluded that this area has deformed 1.5 to 2.0 cm per year, which means that the landslide is active and not dormant, as classified by Spittler and Wagner in 1998. Other evidence of instability is the cabin in Lot 23 appears to have had problems with their foundation shifting. There appeared to be repair and substantial bracing of the raised foundation. It is recommended not to approve the rebuilding of all four cabins in 36 Milestone Tract.

39 Milestone

Six cabin sites were assessed and include cabin sites in Lots 44, 46, 47, 48, 49 and 52. Cabin sites 44 and 48 are recommended to approve. Cabin sites 46 and 47 are too close to the SFAR and it is recommended to approve the rebuilding of cabins at these sites with 50' structure setbacks. Cabin site 49 has a 3' high rock retaining wall that needs to be evaluated by a Geotechnical engineer to determine if the wall is structurally sound for the fill and cabin. It is recommended to approve rebuilding Cabin 49 with additional review by a geotechnical engineer. Additionally, these five cabin sites and lots (Lots 44, 46, 47, 48, and 49) were determined to be located proximal to the SFAR making it difficult to achieve the required 100-foot setback for septic system leach lines to perennial streams (e.g. SFAR). If this setback cannot be achieved, then a dry cabin is required (See Flood Maps for Septic Exclusion Zone). Cabin 52 is located on bedrock with few places comprised of shallow soils. It is recommended to approve the rebuilding of this cabin as a dry cabin.

42 Milestone

The cabin site in Lot 17 was assessed in this tract. This area is mostly bedrock with shallow soils. There is a low rock fall hazard. Because of a lack of soils in this lot it is recommended to approve the rebuilding of a cabin as a dry cabin.

46 Milestone

Eight cabin sites were assessed in Lots 15, 25, 116, 121, 122, 122.5, 124, and 128. Three (3) cabin sites were determined to have no concerns for geologic hazards and are recommended to be rebuilt without further geologic review. These cabin sites include: 15, 124, and 128. However, Lot 124 also contained a garage. We recommend the rebuilding of the garage is denied because FS Policy does not allow garages. The garage is located proximal to the perennial channel in the west side of the lot. Cabin 121 was damaged (damage estimated at <50%), but not destroyed in the fire. There is a moderate rockfall and flood hazard and a very low hazard for debris flows. The cabin is 5' away from an ephemeral channel and there is evidence of channel flow that has gone under the cabin through the raised foundation. It is recommended to approve the repair of

Cabin 121 with an additional assessment by a geologist/geotechnical engineer and mitigation for rockfall and flood hazards. However, if Cabin 121 is torn down and rebuilt, the new cabin will need to be setback 25' from the channel and mitigate flood and rockfall hazards. The cabin in Lot 25 is located about 40' from a perennial channel. We recommend this cabin site is setback 50' from perennial channel to mitigate and approve the rebuilding of this cabin. The cabins at Lots 116, 122, and 122.5 are located below an extensive highly fractured rock outcrop somewhat protected from a dead stand of trees. As the trees start to fall rocks could fall and roll toward the cabin sites. These lots have a Moderate rockfall hazard. Additionally, Lot 116 has not been cleaned up, and cabins in Lots 122 and 122.5 have either ground water or surface water issues that need to be mitigated. It is recommended to approve these cabin sites with a geotechnical review for the rockfall hazard and other listed hazards by a geologist or geotechnical engineer.

Additionally, cabins in Lots 116 and 122 were determined to have slopes >30% requiring a slope stability assessment to determine if a septic systems are allowed. If not, then a dry cabin is required.

Bryant Creek

Eight cabin sites were assessed in Lots 29, 30, 31, 32, 33, 34, 35, and 36. Six (6) cabin sites were determined to have no concerns for geologic hazards and are recommended to be rebuilt without further geologic review. These cabin sites include: 29, 31, 33, 34, 35, and 36. Cabins in Lots 30 and 32 have Moderate RF hazards. It is recommended to approve cabins in Lots 30 and 32 pending a geotechnical review of site conditions for rock fall hazards by a geologist or geotechnical engineer.

Forni Creek

The cabin site in Lot 6 was assessed in this tract. Most of Lot 6 has a high flood and moderate debris flow hazard within the 100-yr flood zone. It is recommended to deny the rebuilding of a cabin in this lot.

Sciots

The cabin site in Lot 1A was assessed in this tract. This cabin site does not appear to be in any lot associated with Sciots Tract or any other tract. The site is on a flat 2% slope and no geologic hazards were observed at the cabin site. However, the main access road (FR 11N23) and the cabin access road could get flooded in a 100-yr flood event. It is recommended to approve the rebuilding of a cabin at this site.

RECOMMENDATIONS

This project assessed 29 cabin sites for rebuilding destroyed cabins and geologic hazards that could be a threat to life and property on the cabin site.

We provide a summary of recommendations in Table 3. Out of the twenty-nine (29) cabin sites, fourteen (14) cabin sites have no geologic hazards to be concerned about. It is recommended to approve the building of cabin structures at these sites without any further geologic assessment. Five (5) sites were identified as having high geologic hazards and avoidance cannot be achieved. Therefore, it is recommended to deny approval of the building of cabin structures at these cabin sites. Ten (10) cabin sites were identified as having moderate to high geologic hazards and hazards can be mitigated. Therefore, it is recommended to setback three (3) cabin sites a short distance from where they were previously located, and require additional studies for seven (7) cabin sites to determine and mitigate the level of risk that a geologic hazard may pose on a building site. See Tables 4 for site specific descriptions and recommendations on cabin sites.

In the cases where cabin sites are recommended for denial, we identified several lots that we recommended as practical alternatives (in-lieu lots), in the event the owners of the select lots decide they want a cabin site. These in-lieu lots are in the Sayles Canyon Tract, Fir Tract, and others. Contact the Eldorado National Forest for additional information.

Seven (7) cabin sites are recommended for further assessment by private consultants (qualified professionals) hired by the permittee. Several of these permittees may decide to rebuild and will need to hire private consultants who will produce reports with conclusions on their assessment of geologic hazards and recommendations to mitigate and/or provide design measures for the cabin structures or cabin sites. These reports should be reviewed by an in-house Forest Service engineer or geologist to verify qualifications of the authors of these reports and adequacy of the report findings, conclusions, and recommendations.

In the cases where cabin sites are recommended for rebuilding or further assessment, we reviewed the sites preliminary suitability for onsite wastewater treatment systems (septic systems). Two (2) cabin sites are recommended as dry cabins because of the sites inability to meet required setbacks to perennial streams or the lack of soils. Several more sites are questionable, which will be resolved through the appropriate permitting process. We modeled the 10-yr flood area to form the basis for 100' setbacks to perennial streams and 50' setbacks to ephemeral streams (see Flood Maps for Septic Exclusion Zone). We provided a summary of policy (see Review of Policy - Septic section in Phase 1 report) and updated setback maps to help the agency review future septic systems designs prepared by qualified professionals. Failure to meet water quality and sanitation requirements is a requirement of their special use permit, and state and local regulation.

In the cases where permittees decide not to rebuild their cabins, proper rehabilitation of all existing septic tanks will need to be conducted. Abandoned barrels, sewage tanks and sewage pipe will need to be removed from National Forest lands and properly disposed and any excavation conducted to pull out the tanks needs to be properly graded using standard best management practices.

Several cabin sites are not located within their lot boundaries and are recommended to move or set back (see Table 4, column 2). If the cabin site is moved or set back outside the existing footprint, the cabin should be moved within the lot boundary, pursuant to the description of the Special Use Permit.

Other site characteristics not considered include cabin setbacks to the CA-Highway (Hwy) 50 right-of-way (ROW), and appropriate line-of-sight visibility distance from cabin site access roads to ingress/egress onto CA Highway 50. These characteristics are beyond the scope of our report, but we recommend they should be considered as a fundamental safety component for the rebuild determination.

Table 3 – Tract Summary

Tract	# of Cabin Sites	Recommendations			
		Approve	Deny	Mitigate	
				Move/Setback	Additional Studies Req.
36 Milestone	4		4		
39 Milestone	6	3		2	1
42 Milestone	1	1			
46 Milestone	8	3		1	4
Bryant Tract	8	6			2
Forni Tract	1		1		
Sciots	1	1			
Total	29	14	5	3	7

CONCLUSIONS

Geologic hazards were evaluated for the last of 29 cabin sites (28 destroyed cabin sites and 1 partially burned and damaged cabin). Recommendations are provided for either approval to build without additional geologic review, denial to rebuild, set back, or requires additional studies to determine and mitigate the level of risk that a geologic hazard may pose on a building site.

LIST OF ATTACHMENTS

The flood data presented in the Phase 2 Report updates and supersedes the Phase 1 and associated flood data. However the Phase 2 Maps do not show the Phase I areas, except for Pyramid Tract. Detailed and Updated Maps should be prepared by the Eldorado NF GIS Department, or others.

Maps (Box\GeologicHazard\20230328_Final_Report\20231016_PhaseII_FinalReport\Maps)

- General Location Map
 - Maps 1-7: Tract Level Geologic Maps and Flood Maps
- <https://usfs.box.com/s/zj51qu80uju8683jo5433dxb3ub0lcju>

GIS Data

(Box\GeologicHazard\20230328_Final_Report\20231016_PhaseII_FinalReport\GIS_Data)

➤ **Cabin Location Data, Recommendations, and Summary, and Layer File**

<https://usfs.box.com/s/larquo58lwe0hs2uw98d37odfaw3vedg>

➤ **Flood Data – 20230921_Flood.gdb**

<https://usfs.box.com/s/3n3qpaof187yk02z2j54xdz3310vnhtt>

TABLE 4												
SITE DATA			HAZARDS									
Tract	Lot	In/Out Lot	Flood	Debris Flow	Rockfall	Landslide	Soils	Wet Areas	Septic System Suitability	Cabin Site Suitability	Comments	Recommendation
36 MS	18	Out	None	None	None	Moderate	Moderately deep, landslide soils with boulders up to 3' in diameter.	No	Not evaluated, because site is unsuitable for rebuilding.	No, because located on active landslide. See Comments Column.	Cabin located in active landslide within mapped large deep-seated landslide mapped by Wagner and Spittler, and InSAR study. Cabin site is on 30% slopes below the road and within inner gorge of SFAR..	Deny. It is recommended not to rebuild this cabin because located on mapped, active landslide.
36 MS	19	In	None	None	None	Moderate	Likely moderately deep soils (very steep) with boulders (6''-6'+)	No	Not evaluated, because site is unsuitable for rebuilding.	No, because located on active landslide. See Comments Column.	Cabin site located on active landslide and could be subject to damage if landslide moves. Cabin site is on 45% slopes below the road and within inner gorge of SFAR. Unstable rockwall is retaining slope above cabin on very steep slope.	Deny. It is recommended not to rebuild this cabin because located on mapped, active landslide.
36 MS	20	In	None	None	None	Moderate	Deep colluvial landslide soils with boulders up to 6' diameter.	No	Not evaluated, because site is unsuitable for rebuilding.	No, because located on active landslide. See Comments Column.	Cabin site located in a mapped an active deep-seated landslide. A cabin at this site could be damaged from movement of the landslide. Cabin site is located within 25' of a perennial side channel on the west and above SFAR.	Deny. It is recommended not to rebuild this cabin because located on mapped, active landslide.
36 MS	21	In	Low	Low	None	Moderate	Deep soils with some boulders (6''-2.5').	No	Not evaluated, because site is unsuitable for rebuilding.	No, because located on active landslide. See Comments Column.	Cabin located in active landslide within mapped large deep-seated landslide mapped by Wagner and InSAR study. Cabin is close to perennial channel on east side and SFAR on south side. Debris flow risk in channel is mitigated by Caltrans basin above. Deep (25' depth) incised drainage (below culvert) on east side of cabin. Channel bank slope gradient >60%. Possible adequate site for septic system assuming setback distances can be achieved from side channel and SFAR.	Deny. It is recommended not to rebuild this cabin because located on mapped, active landslide.

TABLE 4												
SITE DATA			HAZARDS									
Tract	Lot	In/Out Lot	Flood	Debris Flow	Rockfall	Landslide	Soils	Wet Areas	Septic System Suitability	Cabin Site Suitability	Comments	Recommendation
39 MS	44	Out	None	None	None	Low	Shallow with rock. Likely glacial moraine with large boulders.	No	<p>Cabin site and lot are likely not suitable for conventional septic system because of setbacks and shallow soils. Cabin site and lot are within septic exclusion zone. Will have to setback leach field outside of septic exclusion zone.</p> <p>If tenable, it may be possible to install the leach field on other side of the access road – outside the lot boundary to meet setbacks. If not tenable outside lot boundary, then a dry cabin is required.</p> <p>Use of septic must (1) maintain a 100' setback from SFAR and the unnamed perennial stream to the leach field (See Flood Maps for Septic Exclusion Zone), and (2) require a slope stability assessment because the slopes exceed 30%.</p> <p>The existing septic tank is not suitable for use because it's <30' from the SFAR.</p>	Yes.	<p>Other than 30% slope gradient there are no geologic hazards. Slope appears stable. Site has shallow soils with several large boulders. The 50' structure setback to the river and creek mitigate any slope stability issues on the steep slope above SFAR.</p> <p>The Cabin site is located about 80' from the unnamed perennial channel on the west and 80' from the SFAR on the south. The Cabin site has 30% slope gradient, just over 100' from break in slope from SFAR.</p>	<p>Approve.</p> <p>Continue to maintain 50' structure setbacks to unnamed perennial stream and SFAR.</p> <p>See Septic System Suitability Column for septic requirements.</p>

TABLE 4												
SITE DATA			HAZARDS									
Tract	Lot	In/Out Lot	Flood	Debris Flow	Rockfall	Landslide	Soils	Wet Areas	Septic System Suitability	Cabin Site Suitability	Comments	Recommendation
39 MS	46 in Lot 47	Out	None	None	None	None	Shallow soils, lot within weathered bedrock.	No	<p>Cabin site and lot are likely not suitable for conventional septic because of setbacks and shallow soils. Cabin site and lot are within septic exclusion zone. Will have to setback leach field outside of septic exclusion zone.</p> <p>If tenable, it may be possible to install the leach field within or above the access road - outside the lot boundary to meet setbacks. If not tenable outside lot boundary, then a dry cabin is required.</p> <p>Use of septic must maintain a 100' setback from SFAR (See Flood Maps for Septic Exclusion Zone).</p>	Yes, with setbacks.	<p>There are no geologic hazards at this cabin site.</p> <p>The lower side of the cabin footprint is within 50' of 10-yr flood zone. Would need to setback to meet the 50' structure setback to the SFAR.</p>	<p>Setback and Approve.</p> <p>Setback to meet 50' structure setback to SFAR.</p> <p>See Septic System Suitability Column for septic requirements.</p>
39 MS	47 in Lot 48	Out	None	None	None	None	Shallow	No	<p>Cabin site and lot are likely not suitable for conventional septic system because of setbacks and shallow soils. Cabin site and lot are within septic exclusion zone. Will have to setback leach field outside of septic exclusion zone.</p> <p>Setbacks will be difficult to achieve. If setbacks cannot be achieved, then a dry cabin is required.</p> <p>Use of septic must maintain a 100' setback from SFAR (See Flood Maps for Septic Exclusion Zone).</p>	Yes, with setbacks.	<p>There are no geologic hazards. Slopes are 15%. Cabin footprint may be within 50' of channel.</p> <p>The existing septic system is too close to the river and doesn't meet required setbacks.</p>	<p>Setback and Approve.</p> <p>Setback/Maintain 50' structure setback to SFAR.</p> <p>See Septic System Suitability Column for septic requirements.</p>

TABLE 4												
SITE DATA			HAZARDS									
Tract	Lot	In/Out Lot	Flood	Debris Flow	Rockfall	Landslide	Soils	Wet Areas	Septic System Suitability	Cabin Site Suitability	Comments	Recommendation
39 MS	48 in Lot 49	Out	None	None	None	None	Shallow	No	<p>Cabin site and lot are likely not suitable for conventional septic system because of setbacks and shallow soils. Cabin site and lot are within septic exclusion zone. Will have to setback leach field outside of septic exclusion zone.</p> <p>If tenable, it may be possible to install a leach field above the cabin location - outside the lot. If not tenable outside lot boundary, then a dry cabin is required.</p> <p>Use of septic must maintain a 100' setback from SFAR (See Flood Maps for Septic Exclusion Zone).</p>	Yes	There are no geologic hazards. Cabin footprint is approximately 80' from the river.	<p>Approve.</p> <p>See Septic System Suitability Column for septic requirements.</p>
39 MS	49	In	Low	None	None	Low for retaining wall.	Shallow	No	<p>Cabin site and lot are likely not suitable for conventional septic system because of setbacks and shallow soils. Cabin site and lot are within septic exclusion zone. Will have to setback leach field outside of septic exclusion zone.</p> <p>If tenable, it may be possible to install a leach field above the cabin location - outside the lot. If not tenable outside lot boundary, then a dry cabin is required.</p> <p>Use of septic must maintain a 100' setback from SFAR (See Flood Maps for Septic Exclusion Zone).</p>	Yes, if retaining wall supporting fill is repaired.	<p>Rock retaining wall, 3' high needs to be evaluated by a Geotech to determine if the wall is structurally sound for the fill and cabin. An ephemeral channel exists directly above the lot and has been highly disturbed when it intersects the roads, and could cause flooding to the cabin site. Appropriate site drainage must be incorporated into the cabin rebuild process.</p>	<p>Mitigate.</p> <p>Requires additional Geotechnical Engineer review for the retaining wall.</p> <p>Recognize and provide appropriate site drainage from uncontrolled runoff coming out of the channel.</p> <p>Maintain 50' structure setback to SFAR.</p> <p>See Septic System Suitability Column for septic requirements.</p>

TABLE 4												
SITE DATA			HAZARDS									
Tract	Lot	In/Out Lot	Flood	Debris Flow	Rockfall	Landslide	Soils	Wet Areas	Septic System Suitability	Cabin Site Suitability	Comments	Recommendation
39 MS	52	Out	None	None	Very Low	None	Bedrock and very shallow soils.	No	No, because cabin site is on bedrock with few places with very shallow soil (<18"). The use of a Gray Water system is questionable - explore options. If gray water is not feasible, they may want to consider requesting an in-lieu lot.	Yes, if dry cabin.	Site is located on bedrock and below rock outcrop on 26% slope. Highly fractured bedrock and loose boulders on slope. Slope is not steep enough for boulders to roll down slope and be a hazard to a cabin. Therefore there are no geologic hazards. There is bedrock and very shallow soils on the cabin site that are not suitable for conventional septic system.	Approve as dry cabin.
42 MS	17	In	None	None	Low	None	Very shallow and bedrock	No	No - A conventional septic system is not feasible because cabin site and lot is on bedrock with very shallow soil (<18"). The use of a Gray Water will be a challenge and is questionable - explore options, if gray water is not feasible, they may consider requesting an in-lieu lot. Explore possibility of modifying the existing septic system into a gray water system. Existing wood septic tank was installed in a soil/rock mound and leach field in mounded soils about 18" deep on bedrock.	Yes, if dry cabin.	Rockfall hazard is low. There are some rocks up to 5' diameter on 40% bedrock slope deposited on slope around cabin. Rock outcrop is massive with few fractures. Cabin site is located 35' from powerline. Lack of soil will preclude conventional septic system. Existing wood septic tank is elevated (mounded) and surrounded by rock due to shallow soil conditions.	Approve as dry cabin. Suitability for a gray water system is questionable. See Septic System Suitability Column for additional discussion.

TABLE 4												
SITE DATA			HAZARDS									
Tract	Lot	In/Out Lot	Flood	Debris Flow	Rockfall	Landslide	Soils	Wet Areas	Septic System Suitability	Cabin Site Suitability	Comments	Recommendation
46 MS	15	In	None	None	Very low	None	Deep with few boulders	No	Cabin site is likely suitable for a conventional septic system because soils may be deep enough. Cabin site is near septic exclusion zone. Use of septic must maintain a 100' setback from SFAR (See Flood Maps for Septic Exclusion Zone).	Yes	Located below fractured rock outcrop with 70% slopes and evidence of rockfall deposition. However, the slope above the cabin site has an approximate 700' deposition zone and is somewhat protected by the highway. Therefore, there is a very low rockfall hazard. Soils are deep with few boulders.	Approve. See Septic System Suitability Column for septic requirements.
46 MS	25	In	None	None	None	None	Deep	No	Cabin site is likely suitable for a conventional septic system because soils may be deep enough. However, cabin site is within septic exclusion zone - located about 40' from a perennial channel to the eastside, and about 110' from the SFAR. Will have to setback leach field outside of septic exclusion zone. Use of septic must maintain a 100' setback from the unnamed perennial channel and SFAR (See Flood Maps for Septic Exclusion Zone).	Yes, with setbacks.	There are no geologic hazards. Perennial channel located 40' to east of edge of cabin site. Cabin site and septic are too close to channel.	Setback and Approve. Setback to meet 50' structure setback to unnamed perennial channel on east. See Septic System Suitability Column for septic requirements.
46 MS	116	In	None	None	Moderate	Low	Deep soils with large boulders. 4 to 12' boulders on surface, 35% slope gradients.	No	Cabin site is likely suitable for a conventional septic system assuming soil depth is adequate, and slopes are stable (>30%). Slope >30% utilized for septic-leach fields require a slope stability analysis by a qualified professional.	Yes, if rockfall hazard is mitigated and slopes are determined to be stable.	Moderately steep 35% slopes immediately above cabin site with low landslide hazard. There is a steep and highly fractured rock outcrop above dead stand of trees 200' above cabin site and with slopes of 60-90%. As trees fall, cabin site will be exposed to rockfall. This cabin site has a moderate RF hazard. This site has not been cleaned up after the fire. There is household hazardous waste exposed at this site.	Mitigate Requires assessment and mitigation of rockfall hazard by geologist/Geotechnical engineer and conduct slope stability assessment for 30%+ slopes for the septic system. See Septic System Suitability Column for additional septic requirements.

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Tract	Lot	In/Out Lot	Flood	Debris Flow	Rockfall	Landslide	Soils	Wet Areas	Septic System Suitability	Cabin Site Suitability	Comments	Recommendation
46 MS	121	In	Moderate	Very Low	Moderate	None	Moderately deep w large boulders (2'-12').	Yes, Shallow ground water was visible at nearby Lot 122 and may impact septic suitability.	Cabin site is likely not suitable for a conventional septic system because of setbacks and soils may not be deep enough. Cabin is within septic exclusion zone. Will have to setback leach field outside of septic exclusion zone. Use of septic must maintain a 50' from ephemeral channel (See Flood Maps for Septic Exclusion Zone).& appropriate distance from drainage ditch along highway.	Yes, is suitable for repair. Cabin was burnt and damaged. If demolished and rebuilt - requires a 25' structure setback from ephemeral channel on the east side of the cabin. Mitigate rockfall hazard.	Rockfall hazard is moderate and will need an additional assessment. The cabin is about 5' from an ephemeral channel and there was evidence of previous flooding into the foundation. This cabin site has a moderate flood hazard. Cabin is partially burnt and appears to be less than 50% damaged. There are moderately deep soils, and cabin may be within Highway 50 right-of-way. There is an existing septic system. The cabin site is on a 28% slope gradient. Cabin requires approve repair of existing cabin with rockfall assessment and appropriate mitigation. If cabin is torn down and rebuilt, cabin will have to be setback 25' away from the ephemeral channel to the east.	Existing Cabin – Minor Damage If existing Cabin is to be Repaired - approve repair with evaluation for rockfall and flood hazard and mitigated by geologist/Geotech. If existing cabin is torn down, new cabin will need to be setback 25' from channel and mitigated for flood and rockfall hazards.
46 MS	122	In	None	None	Moderate	None	Deep with boulders (10" to 3').	Yes	Cabin site is likely not suitable for a conventional septic system because of shallow ground water. If shallow groundwater can be mitigated it is possible to build conventional septic system. Slope >30% utilized for septic-leach fields require a slope stability analysis by a qualified professional Use of septic must maintain a 50' from ephemeral channel (See Flood Maps for Septic Exclusion Zone).	Yes, with noted mitigations.	Rockfall hazard is moderate and will need an additional assessment. The cabin site is located on the eastern edge of the lot. There is flowing surface water emitting from the excavation of cabin site. Evidence of shallow groundwater will require mitigation. Cabin site is on 30% slopes.	Mitigate Requires assessment and mitigation of (1) rockfall hazard, (2) shallow groundwater, and (3) conduct slope stability assessment for 30%+ slopes for the septic system by geologist or geotechnical engineer. See Septic System Suitability Column for additional septic requirements.

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Tract	Lot	In/Out Lot	Flood	Debris Flow	Rockfall	Landslide	Soils	Wet Areas	Septic System Suitability	Cabin Site Suitability	Comments	Recommendation
46 MS	122.5	In	Low	None	Moderate	None	Deep with boulders (1ft to 5ft).	No	Cabin site is likely suitable for a conventional septic system assuming soil depth is adequate and the wet area southwest of the cabin site is not a problem for a conventional septic system.	Yes, with mitigation for rockfall hazard and surface runoff.	<p>This cabin site has a moderate rockfall hazard. There is an extensive rock outcrop above a dead stand of trees. This rock outcrop is highly fractured and steep. Rocks could fall toward cabin site after stand of dead trees fall and be a hazard to a cabin.</p> <p>There is surface drainage runoff flowing onto cabin site from the slope above. There is extensive surface erosion on the site. Appropriate site drainage should be included in preparation of the site for construction of a cabin.</p>	<p>Mitigate</p> <p>Requires assessment and mitigation of (1) rockfall hazard, and (2) site drainage/flooding by geologist or geotechnical engineer.</p> <p>See Septic System Suitability Column for additional septic requirements.</p>
46 MS	124	In	Very Low	None	Low	None	Deep with boulders.	No	<p>Cabin site is likely suitable for a conventional septic system assuming soil depth is adequate.</p> <p>Use of septic must maintain a 100' from perennial channel (See Flood Maps for Septic Exclusion Zone).</p>	<p>Yes, for cabin. However, the Garage (outbuilding) located proximal to the perennial channel on the westside is not suitable. Garages are not allowed pursuant to FS Policy.</p>	<p>This cabin site has a low rockfall hazard. The rock outcrop directly above this cabin site is not that extensive and steep.</p> <p>The cabin site has an 8% slope gradient and a channel to the west is about 100' from cabin site. Garage site is located to the west, and too close to perennial channel. If outbuilding is rebuilt it would have a low flood hazard, but must maintain a 50' setback from channel.</p>	<p>Approve Cabin Rebuild and Deny Garage Rebuild.</p> <p>See Septic System Suitability Column for additional septic requirements.</p>
46 MS	128	In	None	None	Very Low	None	Deep with boulders.	No	Cabin site is likely suitable for a conventional septic system because soils may be deep enough.	Yes	<p>Rock outcrop above cabin site has very low potential for rockfall. The site has 26% slope gradient,</p> <p>No geologic hazards and cabin can be rebuilt without further assessment.</p>	Approve

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Tract	Lot	In/Out Lot	Flood	Debris Flow	Rockfall	Landslide	Soils	Wet Areas	Septic System Suitability	Cabin Site Suitability	Comments	Recommendation
Bryant Creek	29	In	None	None	Low	None	Moderately deep with few boulders (10"-3').	No	Cabin site is likely not suitable for conventional septic because soils may not be deep enough and restrictive to septic design. Slope gradient downslope of cabin site is less than 30%. Use of septic must maintain a 100' from SFAR (See Flood Maps for Septic Exclusion Zone).	Yes	No geologic hazard concerns. Slope gradient above cabin site has 45% slopes with loose boulders on the slope. Rock fall hazard is low. There is no evidence of rocks around site. Upper cut to building site has 3-4' high loose rock retaining wall. Appears to be stable. Slope gradient below cabin site is less than 30% and 40-45% above building site. Soils are shallow and rock is exposed for ~200' above cabin site. Dead forest stand around and above building site.	Approve.
Bryant Creek	30	In	None	None	Moderate	None	Likely moderately deep with few boulders.	No	Cabin site is likely not suitable for conventional septic because soils may not be deep enough. The slope gradient below the cabin site is less than 30%. Use of septic must maintain a 100' from SFAR (See Flood Maps for Septic Exclusion Zone).	Yes, with rockfall mitigation.	Moderate rockfall hazard. Visible rocks and rockfall accumulation near cabin site. Slope gradient is 35% for 100', 55% for 100'-300' above cabin site. Slope gradient is less than 30%.	Mitigate Requires assessment and mitigation of rockfall hazard by geologist or geotechnical engineer. See Septic System Suitability Column for additional septic requirements.
Bryant Creek	31	In	None	None	Low	None	Moderately deep with boulders 3"-18" in diameter.	No	Cabin site is likely not suitable for conventional septic because soils may not be deep enough. The slope gradient below the cabin site is less than 30%. Use of septic must maintain a 100' from SFAR (See Flood Maps for Septic Exclusion Zone).	Yes	Low RF hazard. No visible rock from rockfall or depositional zone. No visible boulders or highly fractured rock present upslope. 40% slope gradient.	Approve See Septic System Suitability Column for additional septic requirements

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Tract	Lot	In/Out Lot	Flood	Debris Flow	Rockfall	Landslide	Soils	Wet Areas	Septic System Suitability	Cabin Site Suitability	Comments	Recommendation
Bryant Creek	32	In	None	None	Moderate	None	Likely moderate deep with boulders.	No	Cabin site is likely not suitable for conventional septic because soils may not be deep enough. The slope gradient below the cabin site is less than 30%. Use of septic must maintain a 100' from SFAR (See Flood Maps for Septic Exclusion Zone).	Yes, with rockfall mitigation.	Moderate rockfall hazard. Steep slopes (>40% upslope) with shallow soils and rock outcrop. Loose rocks on slope that could be mobilized onto cabin site.	Mitigate Requires assessment and mitigation of rockfall hazard by geologist or geotechnical engineer. See Septic System Suitability Column for additional septic requirements.
Bryant Creek	33	Out	None	None	Low	None	Likely moderate to deep. In a colluvial soils wedge that is deeper than surrounding areas.	No	Cabin site is likely not suitable for conventional septic because soils may not be deep enough. Additionally, the cabin site is within the septic exclusion zone. Will have to setback leach field outside of septic exclusion zone. Use of septic must maintain a 100' from SFAR (See Flood Maps for Septic Exclusion Zone).	Yes	Low rockfall hazard with up to 3'-4' diameter rocks observed on the slope. Could result in moderate damage to cabin. Too shallow of soils for conventional septic system and cabin is located within septic exclusion zone.	Approve See Septic System Suitability Column for additional septic requirements.
Bryant Creek	34	Out	None	None	Very Low	None	Likely moderately deep.	No	Cabin site is likely not suitable for conventional septic because soils may not be deep enough. The slope gradient below the cabin site is less than 30%. Additionally, the cabin site is located near the septic exclusion zone. Use of septic must maintain a 100' from SFAR (See Flood Maps for Septic Exclusion Zone).	Yes	Very low rockfall hazard. Slope gradient above cabin is 40% slope with no visible rock or rockfall accumulation. Soils are likely too shallow for conventional septic system and cabin is located near septic exclusion zone. Cabin footprint is about 115 ft to SFAR. Cabin footprint is located near septic exclusion zone. Cabin can be rebuilt without additional geologic review.	Approve See Septic System Suitability Column for additional septic requirements.

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Tract	Lot	In/Out Lot	Flood	Debris Flow	Rockfall	Landslide	Soils	Wet Areas	Septic System Suitability	Cabin Site Suitability	Comments	Recommendation
Bryant Creek	35	Out	None	None	None	None	Likely moderately deep	No	Cabin site is likely not suitable for a conventional septic because soils may not be deep enough. Additionally, the cabin site is within the septic exclusion zone. Will have to setback leach field outside of septic exclusion zone. Use of septic must maintain a 100' from SFAR (See Flood Maps for Septic Exclusion Zone).	Yes	There are no geologic hazards. Cabin site is located on 20% slope gradient, 50' outside of lot, and within septic exclusion zone. There are no geologic hazards. Soils are moderately deep and likely too shallow for a leach field. Cabin site is located in septic exclusion zone.	Approve See Septic System Suitability Column for additional septic requirements.
Bryant Creek	36	Out	None	None	None	None	Moderately deep	No	Cabin site is likely not suitable for conventional septic because soils may not be deep enough, and cabin site is located near septic exclusion zone. Use of septic must maintain a 100' from SFAR (See Flood Maps for Septic Exclusion Zone).	Yes	There are no geologic hazards. Located on 33% slopes up gradient. Soils are likely not deep enough for a conventional septic system without mitigation. Cabin footprint is near septic exclusion zone.	Approve See Septic System Suitability Column for additional septic requirements.
Forni	6	In	High	Mod	None	None	Predominately bedrock with limited areas with shallow soils.	Yes	No. Bedrock and shallow soils/groundwater is prominent on the building site. Additionally, the cabin site is within the septic exclusion zone, and setbacks cannot be achieved within the cabin site, lot, or nearby area.	No, because located within a flood area. See comments column.	Cabin site has potential for flooding and debris flows and is in the 100-year flood zone of perennial Forni Creek. A debris flow deposit was observed near the cabin site footprint. Cabin site and lot is on shallow soils/bedrock and within structure setback and septic exclusion zone of Forni Creek. Most of lot is in high flood and moderate debris flow hazard area and within septic exclusion zone of Forni Creek. Alternative sites are wet areas.	Deny It is recommended not to rebuild this cabin because cabin site and lot are in a high flood and moderate debris flow hazard area.

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Tract	Lot	In/Out Lot	Flood	Debris Flow	Rockfall	Landslide	Soils	Wet Areas	Septic System Suitability	Cabin Site Suitability	Comments	Recommendation
Sciot	1A	Out	Low	None	None	None	Likely deep soils with boulders (4-12”).	No	Site is likely suitable for a conventional septic system because soils may be deep enough. Additionally, the cabin site is located near the septic exclusion zone. Use of septic must maintain a 100' from Cody Creek (See Flood Maps for Septic Exclusion Zone).	Yes	No geologic hazards for cabin site. However, main road and cabin access road could get flooded in 100-year flood event. Flat 2% gradient slope approximately 90' from Cody Creek. This site is not located in a lot and there is no lot in this area.	Approve. See Septic System Suitability Column for additional septic requirements.

1. SFAR – South Fork American River

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