

# Rough Fire North Zone (SNF) BAER Roads Report

**Resource Specialty:** Roads / Engineering

**Fire Name:** Rough Fire North Zone (SNF) CA-SNF-001746

**Month and Year:** September 2015

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## I. Potential Values at Risk (identified prior to the on-the-ground survey)

### A. Critical Values:

Risk to Life and Safety to Road Users of the Rodgers Ridge Rd 11S007, Black Rock Rd 11S012, and Garnet Dike Rd 12S001.

Property damage to Forest Service Road Values, loss of access to Forest Service Admin personnel, Recreation Opportunities, and other Road users.

### B. Resource Condition Assessment

#### (a) Resource Setting:

Appendix A shows an overview of the burn severity with the roads for the Rough Fire North Zone.

National Forest Service System Roads (NFSR) within the burn perimeter are listed in INFRA as Maintenance Level (ML) 1, 2, and 3, single lane with native and aggregate surfacing. ML 1 are closed. ML 2 roads are maintained for High Clearance Vehicles. ML 3 are maintained for Passenger Cars. Road designs are both in-slope and out-slope with road way ditch lines, rolling dips with associated led off ditches. Most road segments are constructed with culvert cross drains and culverts at perineal drainages varying in size from 18" to 72" in diameter.

There are approximately 53.35 miles of NFSR within the Burn Perimeter of this mileage 26.41 miles of NFSR were accessible and surveyed for purposes of this report, of this mileage 15.73 miles are proposed for BAER road treatments.

**Table 1 Transportation System inside the Burned Perimeter**

Maintenance Level	Definition	Miles
1	Basic Custodial Care (Closed)	9.39
2	High Clearance Vehicles	39.84
3	Suitable for Passenger Cars	4.12
4	Moderate Degree of User Comfort	0
5	High Degree of User Comfort	0
	<b>TOTAL</b>	<b>53.35</b>

**Table 1 Roads Inside the Burned Perimeter and Associated Mileage**

Road #	Name	Miles
11S007	RODGERS RIDGE	15
11S007B	PEN	0.6
11S007C	TRIANGLE	0.3
11S007D	4TH OF JULY CAMP	0.3
11S007E	JULY CREEK	0.4
11S007F	ASKEW	0.8
11S007G	CHELEO	0.3
11S007J	6K - CLAIM	1.1
11S007K	MEAGER	0.8
11S007M	WASTED	0.5
11S007P	SPIRIT	0.5
11S012	BLACKROCK	3.12
11S012C	FERGUSON	1.63
11S012T2.94	BLACKROCK T3	0.04
11S020	SUGARPINE HILL	1.9
11S020A	WIENIE MEADOW	0.3
11S020B	HILL	1.01
11S020BX	SUGAR	0.2
11S024	TALUS	0.8
11S044	SMITH MEADOW	2.35
11S044B	SHIPROCK	0.8
11S044C	BURLY	0.6
11S045	GARLIC	2
11S045A	MARGIN	1.21
11S045AX	GARLIC MDW CR.	0.3
11S045B	MIDDLE GARLIC	2.5
11S045C	LOWER GARLIC	1.4
11S046	LIMESTONE	0.8
11S046A	HAZELNUT	0.2
11S048	BURN	0.9
11S048A	SLOPE	0.4
12S001	GARNET DIKE	7
12S001A	GARNET DIKE A SPUR	2.79
12S001B	GARNET DIKE B SPUR	0.1
12S001C	GRANET DIKE C SPUR	0.1
12S001D	GARNET DIKE D SPUR	0.1
12S001E	GARNET DIKE E SPUR	0.1
12S001F	GARNET DIKE F SPUR	0.1
	<b>TOTAL</b>	<b>53.35</b>

**Table 2 Miles Surveyed**

Road #	Name	Miles
11S007	RODGERS RIDGE	10
11S007G	CHELEO	0.3
11S012	BLACKROCK	3.12
11S012C	FERGUSON	1.63
11S044	SMITH MEADOW	2.35
11S044B	SHIPROCK	0.8
11S045A	MARGIN	1.21
12S001	GARNET DIKE	7
	<b>TOTAL</b>	<b>26.41</b>

**Table 3 Road Miles for Proposed Treatment**

Road #	Name	Miles
11S007	RODGERS RIDGE	3.6
11S012	BLACKROCK	3.12
11S044B	SHIPROCK	0.8
11S045A	MARGIN	1.21
12S001	GARNET DIKE	7
	<b>TOTAL</b>	<b>15.73</b>

**Table 4 Further Assessment Needed**

Road #	Name	Miles
11S007B	PEN	0.6
11S007C	TRIANGLE	0.3
11S007D	4TH OF JULY CAMP	0.3
11S007E	JULY CREEK	0.4
11S007F	ASKEW	0.8
11S007J	6K - CLAIM	1.1
11S007K	MEAGER	0.8
11S007M	WASTED	0.5
11S007P	SPIRIT	0.5
11S012T2.94	BLACKROCK T3	0.04
11S020	SUGARPINE HILL	1.9
11S020A	WIENIE MEADOW	0.3
11S020B	HILL	1.01
11S020BX	SUGAR	0.2
11S024	TALUS	0.8
11S044C	BURLY	0.6
11S045	GARLIC	1.48
11S045B	MIDDLE GARLIC	2.5
11S045C	LOWER GARLIC	1.4
11S045AX	GARLIC MDW CR.	0.3
11S046	LIMESTONE	0.8
11S046A	HAZELNUT	0.2
11S048	BURN	0.9
11S048A	SLOPE	0.4
12S001A	GARNET DIKE A SPUR	2.79
12S001B	GARNET DIKE B SPUR	0.1
12S001C	GRANET DIKE C SPUR	0.1
12S001D	GARNET DIKE D SPUR	0.1
12S001E	GARNET DIKE E SPUR	0.1
12S001F	GARNET DIKE F SPUR	0.1
	<b>TOTAL</b>	<b>21.42</b>

(b) **Findings of the On-The-Ground Survey:** The Rough Fire North Zone Burned approximately 30,822 Acres of which the Burn Severity consisted of 1,840 Acres of High,

8,250 Acres of Moderate, 15,793 Acres of Low, and 4,940 Acres of Unburned. Appendix A shows an overview of the burn severity with the roads for the Rough Fire North Zone. The field survey was conducted over September 4, 5, and 6, by the roads engineering team along with field coordination with team hydrologist, geologist and botanist. Dominate NFSR segments within the fire perimeter are 11S007 Rogers Ridge, ML-3/2 collector, 11S012 Black Rock, ML-3 collector and 12S001 Garnet Dike ML-2 local. Rogers Ridge 11S007, provides access to two popular trailheads, administrative access for timber management, and dispersed recreation. Black Rock 11S012 provides access to the PGE Balch Camp and to 11S012C Ferguson road which assesses the PGE after bay and penstock. INFRA records shows the Forest Service has jurisdiction and is the primary maintainer of 11S012 and PGE is the primary maintainer of 11S012C with Forest Service jurisdiction. Garnet Dike 12S001, is at the bottom of the watershed, parallels the Kings River and provides access to several Forest Service trailheads, day-use sites and river access for rafting, there is also a reclaimed mining site accessed by road 12S001A. Approximately 4.6 miles of secondary ML-2 high clearance local spur roads were surveyed for purposes of this report, some of these road segments in the high to moderate burn severity are proposed for treatments.

**(c) Consequences of the fire on values at risk**

**Life and Safety:** As a result of the burned watersheds it was determined through the BAER Risk Assessment process that it's possible that users along the Garnet Dike road 12S001 is considered very likely due to the light to moderate burned slopes above the road creating the potential for rock slides and debris flows the first winter season or until the post burn watershed stabilizes. Risk to road users along the Black Rock road 11S012 access to the PGE Balch Camp are considered very likely due to the potential for rock fall and debris flows from the steep burned watershed above the road. Major consequences along these road segments are considered high due to rock fall and debris flows, denying road access and entrapment.

**Property:** It has been determined through the BAER Risk Assessment process that damage to Rogers Ridge road 11S007 and associated secondary spur roads 11S044B and 11S45A are considered likely with major consequences to the invested road improvements, loss of road function and denial of access.

**Resource Values / Cultural Resources:** It has been determined by the Archaeological assessment team that there is not an emergency for cultural resources. The determination was made that road related flooding would not be a risk to cultural resources.

II. BAER Risk Assessment Refer to: Chapter 2520 - Watershed Protection and Management

Value (Life/Property/ Resources)	Value At Risk	Probability of Damage or Loss	Magnitude of Consequences	Risk	Types of Treatments
<ul style="list-style-type: none"> <li>Life and Safety, Injury to Humans by Use of Road During Storms and Possible Loss of Access.</li> <li>Property, Road Investment.</li> </ul>	<u>Road</u> <ul style="list-style-type: none"> <li>11S012</li> </ul>	<ul style="list-style-type: none"> <li>Likely, Rock Fall and Flooding.</li> </ul>	Major	Very High	Install BAER Warning Signs.
					Storm Inspection and Response.
<ul style="list-style-type: none"> <li>Life and Safety, Injury to Humans by Use of Road During Storms and Possible Loss of Access.</li> <li>Property, Road Investment.</li> </ul>	<u>Road</u> <ul style="list-style-type: none"> <li>12S001</li> </ul>	<ul style="list-style-type: none"> <li>Likely, Rock Fall and Flooding.</li> </ul>	Major	Very High	Install Standard Traffic Control Gate.
					Install Closure and Information Signs
					Install Flash Flooding Signs.
					Install BAER Warning Signs.
<ul style="list-style-type: none"> <li>Life and Safety, Injury to Humans by Use of Roads During Storms and Possible Loss of Access.</li> <li>Property, Road Investment.</li> </ul>	<u>Road</u> <ul style="list-style-type: none"> <li>11S007</li> </ul>	<ul style="list-style-type: none"> <li>Likely, Debris and Flooding.</li> </ul>	Moderate	High	Storm Inspection and Response.
					Install BAER Warning Signs.
					Install Rock Fall Warning Signs.
					Install Critical Dip w/ Armor.
					Install Drainage Armor (Class 2).
					Install Metal End Section 18"-36".
					Restore Drainage Function.
Replace Burned Drop Inlet Covers.					
<ul style="list-style-type: none"> <li>Property, Road Investment.</li> </ul>	<u>Roads</u> <ul style="list-style-type: none"> <li>11S044B</li> <li>11S045A</li> </ul>	<ul style="list-style-type: none"> <li>Likely, Debris and Flooding.</li> </ul>	Moderate	High	Storm Inspection and Response.
					Install Critical Dip w/ Armor.
					Install Drainage Armor (Class 2).
					Replace Burned Drop Inlet Covers.
					Restore Drainage Function.
					Remove and Disposed Culvert 24".
Install Low Water Crossing.					
					Install Drainage Armor (Class 3).

\*These costs do not include Overhead. See Appendix B

## Summary:

### C. Emergency Determination:

This assessment determines an emergency and very high risk related to life and safety and property as related to the Forests developed road system.

**1. Life and safety** - Risk to road users is determined to be very high with major consequences along roads 11S012 Black Rock, PGE access to Balch camp and 11S012C Ferguson road PGE access to the after bay and penstock. 12S001 Garnet Dike, potential for rock slides and debris flows are considered to be very likely with major consequences the first winter due to the burned watershed on steep slopes above these road segments. Rodgers Ridge road 11S007 is not recommended for closure outside of Travel Management; therefore proposed treatments include BAER warning signs at main entry points and rock fall signs on both side of an existing rock slide area. Loss of control of water on the road system poses a major to moderate risk due to road prism wash-outs, debris flows and rock slides denying access and creating entrapment.

**2. Property** - risk to invested road improvements, and loss of road functions is considered to be likely with major consequences on some road segments along road 11S007 Rogers Ridge and associated secondary spurs 11S044B and 11S045A. When uncontrolled water is diverted from road drainage courses and on to the road surface the road is degraded resulting in unacceptable erosion, loss of road function and denial of access.

**3. Cultural resources** – it has been determined by the Archaeological assessment team that there is not an emergency for cultural resources. The determination was made that road related flooding would not be a risk to cultural resources.

### D. Treatments to Mitigate the Emergency:

**Life and Safety:** Proposed acceptable and economical BAER road treatments to mitigate the emergency for Black Rock road 11S12 and Ferguson road 11S012C, are to install Baer warning signs at main entry points on road 11S12, inspect road after damaging storms for rock fall and debris flows identify problem areas respond as needed with personnel and heavy equipment. Proposed emergency Baer road treatments for the Garnet Dike road 12S001 include installing a new gate with associated road closure and information signs near the bridge at the beginning of the road, install Baer warning signs at entry points and flash flooding signs both sides at identified road crossings, inspect road after damaging storms for rock fall and debris flows identify problem areas and respond as need with personnel and heavy equipment. Proposed Baer road treatments as related to life and safety along the Rogers Ridge road 11S007 are to install Baer warning signs at main entry points and install rock fall signs on both sides of potential rock fall areas. Inspect roads after damaging storms when able and safe to access, identify problem areas respond as needed with personnel and heavy equipment.

- 1. Property:** Road segments in high severity burned areas along the Rogers Ridge road 11S007 and associated secondary ML-2 spurs 11S044B and 11S045A are proposed for BAER road

treatments, to mitigate the emergency to invested road improvements and assure access. Road treatments include installing culvert inlet modification, installing critical dips, installing drainage armor (rock), replacing culvert drop inlet covers, culvert removal, installing armored low water crossings, restoring drainage function and storm inspection and response. Deferred road maintenance of drainage features has resulted in many culverts inlets to be functioning at less than full design capacity. Although it is recognized that BAER is not intended to correct past maintenance deficiencies, the changed post fire condition has created an emergency for correction and storm proofing of some of these drainage features along the roads in the high severity burned watershed above the road.

**Resource Values / Cultural Resources:** It has been determined the road related emergency and consequences described above will not affect cultural resources and other downstream values.

**Accepted BAER road treatments along these road segments include:**

- ❖ Install Standard Traffic Control Gate.
- ❖ Install Road Closure and Information signs.
- ❖ Install Flash Flooding signs.
- ❖ Install Rock Fall signs.
- ❖ Install Baer Warning signs.
- ❖ Install drop inlet wooden covers ( replace damaged covers ).
- ❖ Install culvert inlet modifications ( metal end sections ).
- ❖ Install low water crossing with drainage armor ( class 3 rock ).
- ❖ Install critical dip with drainage armor ( class 2 rock ).
- ❖ Restore drainage function ( culvert inlets and outlets, roadway ditch lines rolling dips and run-outs, maintain cross slopes of roads ).
- ❖ Remove and dispose existing 24" culvert.
- ❖ Storm Inspection and Response.

(a) Treatment Type – Accepted and economical BAER road treatments as described but not limited to chapter 4 BAER catalog.

(b) Treatment Objective – mitigate risks to life and safety and the invested Sierra National Forest road improvements.

(c) Treatment Description – Install accepted and economical BAER road treatments as described above and outlined in chapter 4 of the BAER catalog.

(d) Treatment Cost – estimated treatment cost by road:

Cost per Road	
Road #	BAER Cost (REDACT)
11S007	
11S012	
11S044B	
11S045A	
12S001	
<b>TOTAL Estimate</b>	
Estimate Includes Mob & Overhead (contract prep, administration, implementation)	

- There are approximately 15.73 miles of FS Roads proposed for treatment. Treatment cost is estimated at \$REDACT. Estimated cost for treatments per mile is \$REDACT. The average value and replacement cost of the roads is estimated at \$REDACT per mile for a total cost of \$REDACT.

Cost Benefit Matrix					
Road #	Name	Miles Treated	Treatment Cost	Cost/Mile	Road Value/Mile
11S007	RODGERS RIDGE	3.6	\$ REDACT	\$ REDACT	\$ REDACT
11S012	BLACKROCK	3.12	\$ REDACT	\$ REDACT	\$ REDACT
11S044B	SHIPROCK	0.8	\$ REDACT	\$ REDACT	\$ REDACT
11S045A	MARGIN	1.21	\$ REDACT	\$ REDACT	\$ REDACT
12S001	GARNET DIKE	7	\$ REDACT	\$ REDACT	\$ REDACT

**Appendix – B** of this report includes the detailed cost break down of proposed BAER road treatments.

(e) The proposed BAER road treatments are suitable for either force account road crews or private contractors. The probability of completing treatment in first year prior to damaging storms or events is considered to be high and achievable.

(f) The proposed BAER road treatments will restore drainage features to full capacity, storm inspection and response ( storm patrol ) will inspect and respond as needed before during and after major storm events to assure invested BAER road treatments continue to function and roads remain accessible and passible. The probability of the proposed road treatments is considered to be at the 80 to 95 percent success rate depending on the 2015/16 winter storm cycle.

### III. Discussion/Summary/Recommendations

- ❖ Implement BAER road treatments before the first damaging storm events of the season.
- ❖ Coordinate BAER warning signs, size, wording, and exact locations on the ground with the Forest Engineer from the Sierra National Forest.
- ❖ Install Gate and Install Closure and Information Signs for the Garnet Dike Rd 12S001.
- ❖ Identify and Fall Hazard trees in work areas in Rd 11S045A.
- ❖ Further Road Assessment on un-accessible roads. See table (Further Assessment Needed).
- ❖ Send Letter to PG&E for Access to 11S012 and 11S012C.
- ❖ Refer to the North Zone Suppression and Repair Plan for the Roads that need repair.

### IV. Contacts and References

- ❖ INFRA Travel Routes Inventory, and Quad Maps.
- ❖ Federal standards for the construction of Roads and Bridges.
- ❖ Culvert Nomograph
- ❖ BAER Catalog (chapter 4 )
- ❖ BAER Team meetings and discussions.
- ❖ Antonio Cabrera, Forest Engineer, Sierra National Forest.
- ❖ Tom Lowe, Road Engineer, Sierra National Forest.

### V. Appendices

- A. Burn severity map for the Rough Fire North Zone
- B. Treatment cost estimate table
- C. Road treatment specifications
- D. Road treatment map for the Rough Fire North Zone BAER.
- E. Road Condition Surveys ( Road Logs )
- F. Roads Implementation Strategy
- G. Road Pictures