

**Burned Area Emergency Response
Roads/Engineering Report
Stafford Fire
Shasta-Trinity National Forest
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Submitted by: _____

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I. Resource Condition Assessment

A. Resource Setting -Figure A-1 shows an overview and the burn severity For the Stafford Fire.

1. National Forest Service System Roads (NFSR) within the burn perimeter are in the maintenance level – 1 & 2 category single lane native surface either closed or maintained for high clearance vehicles. Road designs vary the majority of the road segments surveyed were constructed outsloped with rolling dips and associated lead off ditches some small diameter culverts are present with the largest being 60" in diameter. There are no designated trails, or recreation sites within the burn perimeter.
2. There are approximately 18.0 miles of National Forest System Roads within the burn perimeter. All of the NFSR are located on the Shasta-Trinity National Forest and are under the jurisdiction of the Forest Service. Of this 18 miles, 8.3 miles were accessible and surveyed for purposes of this report. Wildwood Road located on the eastern flank of the fire along Hayfork Creek is listed as Trinity County Road 302 with the County as the primary maintainer.

B. Findings of the On-The-Ground Survey

1. The Stafford Fire burned approximately 4,404 acres. Of this acreage, burn severity was determined to be 903 acres high, 1146 acres moderate, 1555 acres low and 798 acres unburned.
2. On the ground reconnaissance of roads within and adjacent to the fire perimeter were assessed by BAER team road engineers to determine any threats to life and safety, risks to cultural resources (property) and which roads held the highest potential for water diversion, and fire related flood damage.
3. The Stafford Fire Suppression Rehabilitation strategies identified roads impacted by the fire both in and outside the burn perimeter . These strategies will restore drainage function to the NF road system, including grading and reshaping of roadway dips and associated run-outs, clearing of roadside ditchlines, and checking and cleaning of culvert inlets and catch basins. This will provide a significant level of protection from the anticipated increased runoff, and reduce the risk of water diversion.
4. *Values at Risk: Life and safety:* as a result of the severely burned watersheds threats to the life and safety of Forest visitors and personnel entering certain areas of the burn are likely, due to rock

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and tree fall along roadways. **Property:** there is a likelihood that post burn conditions will increase runoff and movement of sediment into drainage features such as culvert inlets, overside drains, roadway dips and runouts along some road segments, this occurrence causes drainage features to plug and uncontrolled water to divert , resulting in likelihood of damage to invested road improvements loss of road function and denial of access. **Resource Values / Water Quality:** Hayfork Creek has aquatic habitat and supports Steelhead Salmon as a listed sensitive species. Roads located upslope of Hayfork Creek with culvert crossing at tributaries into Hayfork Creek pose a likely risk to the aquatic and fishery habitat. As a result of the severely burned watersheds upslope of the creek it is likely that sediment and debris could plug culvert inlets causing water to divert onto the roadway wash out fill slopes and increase sediment loads into Hayfork creek.

5. Condition of Values at Risk: On roads 31N13, 31N51, 31N51A, 31N51B, Severely burn watersheds have created a risk to life and safety for users of these road segments, because of the likelihood of large burned trees along these roadways falling. Road 31N13 is located upslope of Hayfork Creek the road traverses through a severely burn watershed. Located within this watershed on a tributary to Hayfork Creek there is a 60 inch culvert crossing under the road with a 30 foot fill slope on the downstream side of the road. Due to increased post fire run off the segment and debris to plug the inlet of this culvert creating the risk of washing out the crossing and depositing large amount of sediment into Hayfork Creek. Road 31N17 this road serves as the main access for a road system within the burn perimeter this road starts at the intersection with Morgan Hill road at the fires north west edge there are two 36 inch culvert crossing located in a switchback in the first quarter mile of the road it is likely these culverts inlets could plug causing water to divert onto the road creating a risk of loss of road function and denial of access to the entire road system above.

II. Emergency Determination

This assessment identifies an emergency and risk related to the road system based on the following threats.

- A. Life and Safety—** Roadside hazard trees, rolling boulders, debris flows.
- B. Water Quality and Soil Productivity—** both on and off site.
- C. Loss of Control of Water—** blocked or plugged drainage features causing water to divert and over top road crossing and erode fill slopes.
 - 1. NFSR 31N13, 31N51, 31N51A & B** These road segments travers through high severity burn watersheds with numerous roadside trees

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that are totally burn through, post fire entry into these areas by the public and FS personnel are likely to be at risk of life and safety because of falling trees dislodge boulders and debris flows.

2. NFSR 31N17 ,31N17A&B, 31N13 These road segments are likely to be at risk of the drainage features of the road failing due to increase water flow and the movement of sediment into culvert inlets, overside drains, rolling dips and runouts. This is a threat to the infrastructure of the road (property) when drainage feature fail and water diverts, road fills are likely to wash out, as a result there is a loss of function of the road and denial of access.

3. NFSR 31N13 This road segment traverse through a severely burned water shed and is located upslope of Hayfork Creek. There is a risk to Hayfork Creek's aquatic and fisheries habitat. It is likely that a 60 inch culvert located in a tributary drainage upslope of Hayfork Creek could be effected by increased water and debris flow causing the culvert inlet to plug diverting water onto the road and washing out the fill slope.

D. Treatment to Mitigate the Emergency-

Accepted and economical BAER treatments to mitigate the threat to life and property in severely burn water sheds along roads 31N13 , 31N51, and 31N51A&B. Install traffic control gates , BAER Warning and Information signs at strategic locations entering these areas. Roads 31N13, 31N17, 31N17A&B, 31N23 and 31N51A are located in moderate to severely burned watershed and are likely to be at risk of roads drainage features failing due to the increased flows of water and sediment moving into culvert inlets, overside drains, rolling dips and runouts. To mitigate the risk to invested road improvements (property) install vertical riser pipes, metal end sections, armored relief dips with associated armored fill slope spillways, intercepting rolling dips and storm inspection and response (monitoring). Road 31N13 is located in a severely burn watershed upslope of Hayfork Creek, there is a 60 inch culvert on a tributary to Hayfork Creek it is likely this culvert inlet will plug due to the post fire increase flow of water and sediment. Install a vertical riser pipe (snorkel) at the inlet, construct and armored relief dip down grade of the crossing with associated armored spillway over the fill slope reconnect to channel. This structure needs to be inspected and maintained between storm events.

1. Cost of standard Shasta Trinity traffic control gate
\$XXXXX each. Total \$XXXXX
2. BAER Warning and Information signs.
Warning sign \$XXXXX each need 4 \$XXXXX
Information signs \$XXXXX each need 4 \$XXXXX
Total \$XXXXX

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3. Inlet Treatments.		
Vertical Riser Pipe (snorkel)		\$XXXXX
Metal End Sections (MES)		\$XXXXX
	Total	\$XXXXX
4. Install Drainage armor.		
Rip/ Rap rock 6" to 24"		
for road crossings, relief dips		
and fill slope spillways.		
Delivered and place	\$XXXXX / ton	Total \$XXXXX
5. Install intercepting and rolling dips.		
32 dips needed at \$XXXXX each.	Total	\$XXXXX
6. Storm inspection and response		
(monitoring) 10 storm events		
At \$XXXXX / event	Total	\$XXXXX
	Grand Total	\$XXXXX

III. Discussion/Summary/Recommendations

- A. Implement accepted BAER road treatments as described for roads 31N13, 31N17, 31N17 A&B, 31N23, 31N51A, and 31N42
- B. Install gates and BAER warning signs at strategic locations on roads 31N13, and 31N42 at 31N51 to mitigate the threat to life and safety from falling trees, rolling boulders and debris.
- C. Roads 31N13 and 31N17 inspect and monitor conditions of BAER treatments on these roads between major storm events respond as needed to assure the function of these treatments.

IV. Contacts and References

- A. INFRA Travel Routes Inventory, quad maps.
- B. BAER Team meetings and discussions.
- C. Dennis Fullerton Trinity County Public Works
- D. Mitch Wilkensen District Ranger Hayfork Ranger District

V. Appendices

- A. Fire Burn Severity Map
- B. Cost Estimates
- C. Road Treatment Specifications
- D. Roads Assessment summary