

Date of Report:9/10/2021**BURNED-AREA REPORT****PART I - TYPE OF REQUEST****A. Type of Report**

- ☒ 1. Funding request for estimated emergency stabilization funds  
☐ 2. No Treatment Recommendation

**B. Type of Action**

- ☒ 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)  
☐ 2. Interim Request #\_\_\_\_\_  
☐ Updating the initial funding request based on more accurate site data or design analysis

**PART II - BURNED-AREA DESCRIPTION****A. Fire Name:** Cub Creek 2**B. Fire Number:** WA-NES-000373**C. State:** WA**D. County:** Okanogan**E. Region:** R6**F. Forest:** Okanogan – Wenatchee NF**G. District:** Methow Valley RD**H. Fire Incident Job Code:** PNN53Z**I. Date Fire Started:** 7/16/2021**J. Date Fire Contained:** est. 10/1/21**K. Suppression Cost:** \$26,193,000 (09/04/21)**L. Fire Suppression Damages Repaired with Suppression Funds (estimates):**

1. Fireline repaired (miles):  
2. Other (identify):

**M. Watershed Numbers:***Table 1: Acres Burned by Watershed*

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
<b>1702000803</b>	<b>Upper Chewuch River</b>	<b>145,002</b>	<b>4,287</b>	<b>3%</b>
170200080305	Lake Creek	34,232	4,271	12%
170200080306	Thirtymile Creek-Chewuch River	18,072	16	>1%
<b>1702000804</b>	<b>Lower Chewuch River</b>	<b>191,388</b>	<b>66,505</b>	<b>35%</b>
170200080401	Twentymile Creek	26,382	4,036	15%
170200080402	Falls Creek	17,193	11,099	65%

170200080403	Doe Creek-Chewuch River	25,078	22,612	90%
170200080404	Eightmile Creek	29,642	14,114	48%
170200080405	North Fork Boulder Creek	38,682	3,005	8%
170200080406	Boulder Creek	13,189	7,774	59%
170200080407	Cub Creek	15,465	565	4%
170200080408	Pearrygin Creek-Chewuch River	25,756	3,300	13%
<b>1702000806</b>	<b>Middle Methow River</b>	<b>248,595</b>	<b>26</b>	<b>&gt;1%</b>
170200080601	Goat Creek	22,929	26	>1%

## N. Total Acres Burned:

Table 2: Total Acres Burned by Ownership

Land Ownership	Total Acres
Private Land	1,036.97
State Land	809.96
U.S. Forest Service	68,971.39
<b>Grand Total</b>	<b>70,818.33</b>

O. **Vegetation Types:** Shrub steppe, Riparian Plant Communities. Hot and Dry Upland Forested Communities, and Dry and Wet Mixed Conifer Forested Communities.

P. **Dominant Soils:** Sandy-skeletal, isotic, frigid Vitrandic Haploxerepts (3,754 ac.), Loamy-skeletal, isotic, frigid Vitrandic Haploxerepts (3,391 ac.), Sandy-skeletal, isotic Haploxerandic Haplocryepts (2,124 ac.) Loamy-skeletal, isotic, frigid Andic Palexeralfs (1,908 ac.), Ashy-skeletal over loamy-skeletal, glassy over isotic Xeric Vitricryands (1,549 ac.), Lithic Haploxerepts (1,387 ac.)

Q. **Geologic Types:** Mesozoic intrusive rocks, Mesozoic orthogneiss, Quaternary alluvium, and Mesozoic marine sedimentary rocks. Dominant surficial geology includes Tertiary and Cretaceous diorite, Pre-Tertiary orthogneiss cut by tonalite dikes and sills, granodioritic and tonalitic orthogneiss, Quaternary unconsolidated or semi-consolidated clay, silt, sand, gravel, and cobble deposits of glacial and fluvial origin.

## R. Miles of Stream Channels:

Table 3: Miles of Stream Channels

Stream Type	Soil Burn Severity				Grand Total
	High	Moderate	Low	Unburned	
Artificial Path	0	< 1	3	14	17
Canal-Ditch	0	< 1	1	< 1	1
Intermittent	37	48	74	31	190
Perennial	14	15	28	18	75

<b>Grand Total</b>	<b>51</b>	<b>63</b>	<b>106</b>	<b>63</b>	<b>283</b>
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**S. Transportation System:****Trails:** National Forest (miles): 52.7

Other (miles): unknown

**Roads:** National Forest (miles): 325.0

Other (miles): 1.6 (Okanogan County)

Operational Maintenance Level	Soil Burn Severity				Grand Total
	High	Moderate	Low	Unburned	
1 - Basic Custodial Care (Closed)	19.97	25.3	47.77	22.07	115.11
2 - High Clearance Vehicles	10.51	20.25	45.94	25.88	102.58
3 - Suitable for Passenger Cars	1.21	3.33	10.43	19.21	34.18
4 - Moderate Degree of User Comfort	2.61	4.32	14.37	16.6	37.9
No Value Listed	6.18	6.53	15.31	7.21	35.23
<b>Grand Total</b>	<b>40.48</b>	<b>59.73</b>	<b>133.82</b>	<b>90.97</b>	<b>325.00</b>

**PART III - WATERSHED CONDITION****A. Burn Severity (acres):**

Table 4: Burn Severity Acres by Ownership

Land Ownership	Soil Burn Severity				Grand Total
	High	Moderate	Low	Unburned	
Private Land	7.20	365.06	404.89	259.82	1036.97
State Land	5.27	111.16	449.07	244.47	809.96
U.S. Forest Service	10,496.34	18,001.24	28,487.62	11,986.20	68,971.39
<b>Grand Total</b>	<b>10,508.80</b>	<b>18,477.45</b>	<b>29,341.59</b>	<b>12,490.49</b>	<b>70,818.33</b>

**B. Water-Repellent Soil (acres):** All moderate and high soil burn severity and 10% of low soil burn severity (31,920 ac.)

**C. Soil Erosion Hazard Rating:**

Slight	19201.5
Moderate	46117.1
Severe	4447.6
Not rated	1089.2

**D. Erosion Potential:** pre-fire 0.1 tons/ac, post-fire 8.56 tons/ac

**E. Sediment Potential:** pre-fire 0.1 yds<sup>3</sup>/mi<sup>2</sup>, post-fire 4,908 yds<sup>3</sup>/mi<sup>2</sup>

## Debris Flow Potential

The USGS provides estimates of debris-flow probability, approximate volume, and combined hazard for several storms with a range of 15-minute peak intensities. The peak 15-minute intensity of 32 mm/hr was used to evaluate risk to critical values in this BAER assessment. This rainfall intensity corresponds roughly to a 20% probability (five-year return interval) rain event.

Debris flow estimates are calculated at two scales: individual stream segments and drainage basins. The USGS debris flow model uses several parameters, including soil burn severity (SBS) data provided by the BAER team.

Additional information on the USGS debris flow model used for the Cub Creek 2 Fire is available at:

[https://www.usgs.gov/natural-hazards/landslide-hazards/science/scientific-background?qt-science\\_center\\_objects=0#qt-science\\_center\\_objects](https://www.usgs.gov/natural-hazards/landslide-hazards/science/scientific-background?qt-science_center_objects=0#qt-science_center_objects)

The model outputs are posted on the USGS public-facing webpage: [https://landslides.usgs.gov/hazards/postfire\\_debrisflow/](https://landslides.usgs.gov/hazards/postfire_debrisflow/) which has an interactive map and downloadable geospatial data. The interactive map on the USGS website only allows the display of the 24 mmh<sup>-1</sup> peak 15-minute rainfall intensity rain event.

### Summary of Observations:

- A storm event of 32 mm/h was predicted to have greater than 80% probability of debris flows in several drainages, including but not limited to many of the tributaries to Falls Creek, several tributaries to Eightmile Creek, several tributaries to the Chewuch River, and a few tributaries to Boulder Creek.
- The probability of debris flows is even higher in the Cub Creek 2 burned area in response to a 15-minute intensity of 40 mm/h, a rain event with roughly a 10-year recurrence interval.
- Most of these watersheds are roughly estimated to produce more than 1,000 m<sup>3</sup> of debris, resulting in a high debris flow hazard.
- Several Forest Service campgrounds lie partly or entirely on debris fans, and many are in areas where a large debris flow event has the potential to flow through the campground. Debris flow and flood pathways on large debris fans are difficult to predict due to dynamic damming and rerouting of flow during an event. This uncertainty makes it difficult to assign probabilities to campground inundation.
- Non-FS values within and downstream of the burned area may also be threatened by inundation from flooding and debris flows, including but not limited to recreation residences on the Brevicomis Creek debris fan, and the State campground near the confluence of Boulder Creek and the Chewuch River.
- People and infrastructure near headwater channels with higher probability of debris flow occurrence are at risk of injury or damage from direct impact of debris and flood flows, as well as loss of egress from damaged roads.
- People and infrastructure along mainstem streams are vulnerable to flooding and debris flows as well, but are also vulnerable to elevated flooding when mainstem streams are blocked by debris flows from tributary drainages. A temporary debris dam can cause upstream flooding as waters pool behind the dam, and can cause catastrophic flooding downstream when the dam breaches. Streamflow flowing around a debris dam can also cause extensive lateral scour and incision elsewhere on the floodplain as water finds its way past the obstruction.
- The increased probability of debris flow activity will likely subside within 3-5 years following fire containment, as conditions within the burned watershed recover and hillslopes stabilize.

**F. Estimated Vegetative Recovery Period (years):** Estimated recovery of vegetation (sufficient to provide effective ground cover to significantly reduce hillslope runoff and erosion to levels closer to pre-fire conditions) is 3-5 years. Natural recovery of trees will take several decades.

**G. Estimated Hydrologic Response (brief description):** The fire has reduced or eliminated canopy and ground cover and has altered soil structure and caused varying degrees of hydrophobicity across extensive areas within the fire perimeter. These changes will lead to reduced precipitation interception and soil infiltration capacity, as well as elevated runoff compared to pre-fire conditions.

Watershed response will likely include an initial flush of ash and fine sediment, rill and gully erosion in headwater drainages and in small, steeper drainages within the burned area, debris-laden flash floods and debris flows in

response to high-intensity rain events, as well as elevated snowmelt peak flows. Preliminary hydrologic modeling indicates flow increases in many headwater channels of >100X the pre-fire flow rates for a given storm. Water quality will be diminished during seasonal peak runoff, as well as after high-intensity summer rains, due to elevated ash, fine sediment, and nutrient loading. Elevated post-fire response will gradually diminish over time as vegetation and groundcover levels recover over the next several years, although some impacts are likely to persist for a decade or longer.

## **PART V - SUMMARY OF ANALYSIS**

### **Introduction/Background**

The Cub Creek 2 Fire began on July 16, 2021. As of the date of this report the Cub Creek 2 fire perimeter includes roughly 71,000 acres primarily on the Okanogan-Wenatchee National Forest. The fire left a mosaic of fire severity on USFS land, and included some large contiguous areas that burned with moderate to high soil burn severity. The BAER assessment was initiated on August 25, 2021.

The fire has burned almost entirely within the Chewuch River drainage. Major tributaries with extensive burned area include Eightmile, Falls, and Doe Creeks on the west side of the Chewuch River, and Butte, Spring, Leroy, Junior and Brevicomis Creeks on the river's east side.

Critical BAER values were assessed for post-fire threats to identify where an emergency exists that warrants treatment, and to identify the most cost effective treatments to minimize or mitigate post-fire threats. The critical value spreadsheet in the project file summarizes the values assessed and the level of risk to those values.

### **A. Describe Critical Values/Resources and Threats (narrative):**

*Table 5: Critical Value Matrix*

Probability of Damage or Loss	Magnitude of Consequences		
	Major	Moderate	Minor
	<b>RISK</b>		
Very Likely	<b>Very High</b>	<b>Very High</b>	<b>Low</b>
Likely	<b>Very High</b>	<b>High</b>	<b>Low</b>
Possible	<b>High</b>	<b>Intermediate</b>	<b>Low</b>
Unlikely	<b>Intermediate</b>	<b>Low</b>	<b>Very Low</b>

#### **1. Human Life and Safety (HLS):**

Human life and safety is at risk from threats associated with burned trees, rock fall, debris flows, flooding, and loss of egress/access throughout the burned area.

Probability of post-fire threats to life and safety were determined for several trails, roads and developed recreational facilities within the burned area. Separate ratings were determined for hazard trees and flooding/debris flows to better inform temporary closure treatment recommendations and future decisions about re-opening the closed roads, trails and facilities. For both hazard trees and flooding/debris flows, the BAER risk ratings for the roads, trails and facilities listed below generally ranged from possible to likely. In all cases, the magnitude of consequences was considered to be major, resulting in a *high* or *very high* risk rating.

Roads with *high* or *very high* BAER risk ratings for human life and safety due to the threat of direct injury or death or loss of egress from falling hazard trees and rocks as well as flash flooding and debris flows include all road segments within or immediately downslope of the burned area.

Trails with *high* or *very high* BAER risk ratings for human life and safety due to the threat of direct injury or death or loss of egress from falling hazard trees and rocks as well as flash flooding and debris flows include all trail segments within or immediately adjacent to or downslope from areas of low, moderate, or high soil burn severity.

Developed Recreational Facilities with a *high* or *very high* BAER risk ratings for human life and safety due to the threat of falling hazard trees and rocks as well as flash flooding and debris flows: Falls Creek, Chewuch, Camp 4, Buck Lake, and Nice campgrounds. The threat of flood or debris flow inundation at Flat, Ruffed Grouse, and Honeymoon campgrounds was estimated to be *intermediate*. In all cases the magnitude of consequences for potential impacts on life and safety was considered to be major.

Table XX. Developed Recreation Facility Life and Safety Risk Ratings

Facility	Threat - Life-Safety Risk Rating
Falls Creek Campground	Flooding and Debris Flows – High Risk
Chewuch Campground	Flooding and Debris Flows – High Risk
Camp 4 Campground	Flooding and Debris Flows – High Risk
Buck Lake Campground	Flooding and Debris Flows – High Risk
Flat Campground	Flooding and Debris Flows – Intermediate Risk
Nice Campground	Flooding and Debris Flows – High Risk
Ruffed Grouse Campground	Flooding and Debris Flows – Intermediate Risk
Honeymoon Campground	Flooding and Debris Flows – Intermediate Risk
Eightmile Sno-Park	Flooding and Debris Flows – Low Risk
Falls Creek Falls Trail 518.1	Flooding, Debris Flows, Hazard Trees – High Risk
Summer and Winter Trails in burned area	Hazard Trees, Rock Fall, Flooding, Debris Flows, Hazard Trees – High Risk

Dispersed Camping sites: several sites were estimated to have a *high* or *very high* life and safety BAER risk ratings due to the threat of falling hazard trees, rocks and/or the occurrence of flash flooding or debris flows. Risk ratings have not been completed for all dispersed camping locations within or immediately downstream from the burned area.

An emergency was determined for life/safety and BAER response actions, described in the treatments section of this report, are recommended.

## 2. Property (P):

Loss of road and trail prisms and drainage system function could occur from increased runoff, erosion, flooding, and debris flows for road and trail sections within and downstream of areas of moderate and high soil burn severity. Risk ratings were determined for trails, roads and developed recreational facilities within the burned area. The probability of damage or loss was determined based on the likelihood and magnitude of damage from increased hillslope runoff to the road or trail drainage system as well as elevated flooding and debris flows leading to failure of stream-crossing structures. The magnitude of consequences was based on the degree and extent of potential property damage. Several road segments were judged to be at *high* or *very high* risk of damage or loss due to post-fire conditions, and treatments have been recommended to reduce those risks. Trails in the burned area were judged to be at *low* risk of damage or loss due to post-fire conditions either because of low probability of post-fire threats, or because of the already poor condition of the trails. Details on the roads and road infrastructure risk assessment are in the BAER engineering and trails reports.

## 3. Natural Resources (NR):

Soil Productivity and Hydrologic Function: While post-fire erosion will have a negative effect on soil productivity and vegetative recovery, burned area soils will likely support the recovery of native vegetation, provided noxious invasive weeds do proliferate in the burned area. Hydrologic function will initially be impaired, particularly in areas of moderate to high soil burn severity. However, hydrophobicity will substantially diminish during spring snowmelt in the first year following the fire, and conditions affecting movement and storage of water will gradually recover in the coming years.

Emergency Determination: The probability of loss of soil productivity was estimated to be *very likely*, the magnitude of consequences was estimated to be *major*, and the risk *very high*. Nonetheless, BAER treatments are not recommended for soil productivity as landscape treatments across much of the burned area were determined not to be feasible or cost-effective. Treatments to maintain native plant communities will however contribute towards addressing post-fire impacts on soil productivity. The probability of loss of hydrologic function was estimated to be *very likely*, the magnitude of consequences was estimated to be *minor*, and the risk *low*.

Water Quality: Soil erosion and subsequent sedimentation increases are predicted throughout and downstream from the burned area. The cumulative effect of increased peak flows and sediment-laden runoff from the burned area increases the risk of degraded water quality within and downstream from the burned area. Beneficial uses of water include aquatic habitat as well as irrigation and other agricultural uses on private land, among others. The probability of loss of water quality was estimated to be *very likely*, the magnitude of consequences was estimated to be *moderate*; and the risk *high*. Given the risk rating, a variety of erosion/sedimentation control treatments were considered. However, no BAER treatments were recommended, as the low probability that such treatments would successfully reduce the risk to an acceptable level did not support treatment. Forest Service personnel will collaborate with partners to share information about burned area conditions to aid in informing local agencies and water managers about potential water quality degradation.

Native or Naturalized Plant Communities: Invasive plant infestations have been documented throughout the burned area prior to the fire. Noxious weeds, present throughout the road and trail corridors, may potentially spread on disturbed soils throughout the burned area. The potential for spread of invasive plants is highest in areas disturbed by suppression activities in areas with moderate to high soil burn severity. These areas are highest priority for treatment. Treatments are to limit the expansion of existing invasive plants within the fire perimeter.

The spread of noxious weeds would adversely affect multiple resources including native plant communities, the degradation of which in turn affects threatened and endangered species habitat for wildlife and fisheries, as well as soil productivity and hydrologic function. Forest Service policy mandates the Forest to minimize the establishment of non-native invasive species to prevent unacceptable degradation of the burned area.

Emergency Determination: The probability of loss of native plant communities was estimated to be *very likely* and the magnitude of consequence was estimated to be *moderate*; the BAER risk rating is *very high*.

Wildlife: Critical TES Habitat or Suitable Occupied Habitat

An assessment of post-fire threats to wildlife critical TES habitat was not completed at the time of the initial BAER request. Critical and suitable occupied habitat for NSO exist within the burned area. A BAER risk assessment will be completed on these resources as soon as is practicable in the fall of 2021.

Fisheries: Critical TES Habitat or Suitable Occupied Habitat

An assessment of post-fire threats to aquatic critical TES habitat was not completed at the time of the initial BAER request. Critical and suitable occupied habitat for Bull Trout (*Salvelinus confluentus*), Chinook Salmon (*Oncorhynchus tshawytscha*) and Steelhead (*Oncorhynchus mykiss*) exist within the burned area. A BAER risk assessment will be completed on these resources as soon as is practicable in the fall of 2021.

**4. Cultural and Heritage Resources:**

An assessment of post-fire threats to cultural and heritage resources was not completed at the time of the initial BAER request. Several cultural or historic properties exist within the burned area. A BAER risk assessment will be completed on these resources as soon as is practicable in the fall of 2021.

**B. Emergency Treatment Objectives:**

- a. Reduce the post-fire risks to life and safety through administrative and physical closures of trails and roads, site-specific removal of hazard trees in certain areas of focused use or congregation, warning signs, and monitoring.
- b. Storm-proof and stabilize roads where feasible to protect the property investment and maintain access for administration and the public. Patrol roads during and immediately after rain events to clear debris from drainage structures to reduce risk of road failure.
- c. Promote revegetation of native plant communities and soil stabilization through early detection/rapid response surveys and treatment to minimize the spread of State-listed noxious weeds

**C. Probability of Completing Treatment Prior to Damaging Storm or Event:**

Land: 90%

Channel: NA



**Roads/Trails:** 70%  
**Protection/Safety:** 90%

#### D. Probability of Treatment Success

Table 6: Probability of Treatment Success

	<b>1 year after treatment</b>	<b>3 years after treatment</b>	<b>5 years after treatment</b>
<b>Land</b>	80	75	70
<b>Channel</b>	-	-	-
<b>Roads/Trails</b>	70	80	90
<b>Protection/Safety</b>	85	90	95

**E. Cost of No-Action (Including Loss):** >\$1 million, dependent primarily on number of assumed road failures (see engineering report for details). The cost to human life and safety was not quantified.

**F. Cost of Selected Alternative (Including Loss):** \$422,264

#### G. Skills Represented on Burned-Area Survey Team:

☒ Soils      ☒ Hydrology      ☒ Engineering      ☒ GIS      ☐ Archaeology  
☒ Weeds      ☒ Recreation      ☐ Fisheries      ☐ Wildlife  
☒ Other: PIO

**Team Leader:** Dave Callery

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**Forest BAER Coordinator:** Molly Hanson

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#### Team Members: Table 7: BAER Team Members by Skill

<b>Skill</b>	<b>Team Member Name</b>
<b>Team Lead(s)</b>	Dave Callery, Kit MacDonald
<b>Soils</b>	Kit MacDonald, Rob Ballard
<b>Hydrology</b>	Molly Hanson, Greg Kuyumjian, Dave Callery
<b>Engineering</b>	Ken Bigelow, Lori McAllister
<b>GIS</b>	David Keenum, Susy Campbell
<b>Archaeology</b>	
<b>Weeds</b>	Kelly Baraibar, Kolbie Daley
<b>Recreation</b>	Suzanne Cable
<b>Other</b>	PIO: Jess Clark, Kevin Carns WA GS: Trevor Contreras, Kate Mickelson NWS: Robin Fox

#### H. Treatment Narrative:

**Land Treatments:** Early detection/rapid response (EDRR) surveys will focus on areas of unimpaired native plant communities that burned at high or moderate soil burn severity and are adjacent to known state-listed noxious weeds, as well as areas disturbed by suppression activities. EDRR will be used to minimize the potential for new noxious weed infestations and ensure the natural recovery of native perennial grasses and forbs. Heavy equipment used for suppression activities travelled through areas of known weed populations to unaffected areas, which has substantially increased the risk of noxious weed spread in these disturbed areas. If new weed populations are found they would be promptly treated to minimize the potential to spread and resulting degradation of native plant communities. Chemical treatment of new and existing noxious weed infestations will reduce the likelihood of spread to disturbed areas and help re-establish high-quality wildlife and habitat within the burn.



Treatment	Units	Unit Cost	# of Units	Total Cost
L1a - Invasives EDRR	Acres	\$60	240	\$14,400
L1b- Invasives EDRR-Suppression	Acres	\$60	360	\$21,600

**Channel Treatments:** None

**Roads and Trail Treatments:** Treatments will reduce the risk of damage from elevated post-fire runoff on trails and roads by improving the number and efficiency of drainage features along segments within and below areas of moderate and high SBS. Stream crossings where there is a high probability of failure due to debris and sediment-laden flood flows will be modified to reduce the risk of damage to roads in the post-fire environment.

**R1. Road Drainage (stormproofing existing drainage features):** Road stormproofing involves cleaning or armoring of drainage structures to remove accumulated sediment and expand existing features to ensure drainage capacity prior to seasonal storms.

Treatment	Units	Unit Cost	# of Units	Total Cost
Road Drainage	mile	\$750	4	\$3,000

**R2a. New Drainage Dip:** Work will include the construction of drainage dips where gravel or native-surface roads were judged to be vulnerable to erosion due to inadequate drainage features.

Treatment	Units	Unit Cost	# of Units	Total Cost
Drainage Dip	each	\$3,100	19	\$58,900

**R3: Storm Inspection and Response:** Storm Inspection and Response will keep culverts and drainage features functional by clearing sediment and debris between storms to retain the effectiveness of these features.

Treatment	Units	Unit Cost	# of Units	Total Cost
Storm Inspection and Response (Light equipment)	mile	\$3,000	24.9	\$74,700
Storm Inspection and Response (Heavy equipment)	mile	\$5,760	7	\$40,320
<b>TOTAL</b>				<b>\$115,020</b>

**R5. Critical (Armored) Dip:** Work will include the addition of armored relief dips where culverts at stream crossings were judged to be vulnerable to plugging and failure. The dips will direct overflow across the road with minimal damage to the road surface and prism.

Treatment	Units	Unit Cost	# of Units	Total Cost
Armored Critical Dip	site	\$4,300	8	\$34,400

**R6. Culvert Modification:** Work will consist of adding a drop inlet structure to allow culvert to function even if inlet is plugged in peak flow event.

Treatment	Units	Unit Cost	# of Units	Total Cost
Drop Inlet	each	\$1,500	1	\$1,500

**R14. Other Road Treatment:** Road drainage is impaired in several locations where stumps or other woody material were buried in the road fill and burned out, leaving holes that could capture flow and lead to road failure.

Treatment	Units	Unit Cost	# of Units	Total Cost
Drainage restoration at stump holes	each	\$1,000	30	\$30,000

**Protection/Safety Treatments:**

**S1a. Road Hazard Signs:** This treatment will install burned area warning signs at key road entry points to caution forest users of burned area hazards and/or closures.

Treatment	Units	Unit Cost	# of Units	Total Cost
Burned Area Hazard signs, posts, hardware and installation	sign	\$700	8	\$5,600

**S1b: Trail/Recreation Hazard Signs:** This treatment will install burned-area warning signs at trailheads, boat ramps, and on trails intersecting the fire perimeter.

Treatment	Units	Unit Cost	# of Units	Total Cost
Signs for campgrounds and trailheads	sign	\$250	36	\$9,000
Signs for dispersed sites	sign	\$250	80	\$2,500
<b>Total</b>				<b>\$23,444</b>

**S2. Road Closure Devices (gate, berm, boulders, etc.):** This treatment will install temporary closure gates with required signage to implement access restrictions to campgrounds in the period immediately following the fire. The Okanogan – Wenatchee NF will determine when risk has subsided sufficiently to lift these closures, to balance public access with safety. Pipe gates were specified to accommodate snow loading and to withstand potential abuse.

Treatment	Units	Unit Cost	# of Units	Total Cost
Closure gates, posts, hardware, reflective signs and installation	gate	\$9,000	12	\$108,000

**S3. Hazard Tree Falling:** This treatment will cover the removal of fire-killed trees at risk of falling and damaging campground and trailhead infrastructure, as well as reducing safety risk where visitor use is concentrated.

Treatment	Units	Unit Cost	# of Units	Total Cost
Hazard tree falling at certain trailheads and campgrounds	site	\$1,474	6	\$8,844

**S7. Infrastructure Protection:** This treatment will remove pump jacks and cap wells in campgrounds at risk of inundation from flooding or debris flows, in order to protect the groundwater source from contamination by surface water.

Treatment	Units	Unit Cost	# of Units	Total Cost
Pump jack removal and well capping at campgrounds	unit	\$800	5	\$4,000

**I. Monitoring Narrative:** Treatment monitoring will occur as part of the treatments for weeds, roads, and trails. No additional funding is requested for monitoring.

**PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS**

Line Items	Units	Unit Cost	# of Units	BAER \$	Other \$
<b>A. Land Treatments</b>					
L1a-Invasives EDRR	ac	60	240	\$14,400	\$0
L1b-EDRR-Suppression	ac	60	360	\$21,600	\$0
<i>Insert new items above this line!</i>					\$0
<i>Subtotal Land Treatments</i>				<i>\$36,000</i>	<i>\$0</i>
<b>B. Channel Treatments</b>					
<i>Insert new items above this line!</i>					\$0
<i>Subtotal Channel Treatments</i>				<i>\$0</i>	<i>\$0</i>
<b>C. Road and Trails</b>					
R1-Road Drainage	miles	750	4	\$3,000	
R2a-Drainage Dip	each	3,100	19	\$58,900	
R3-Storm Insp/Resp, light	miles	3,000	24.9	\$74,700	
R3-Storm Insp/Resp, heavy	miles	5,760	7	\$40,320	
R5 Armored Critical Dip	each	4,300	8	\$34,400	
R6 Culvert Drop Inlet	each	1,500	1	\$1,500	
R14 Stump Hole Repair	miles	1,000	30	\$30,000	
<i>Insert new items above this line!</i>					\$0
<i>Subtotal Road and Trails</i>				<i>\$242,820</i>	<i>\$0</i>
<b>D. Protection/Safety</b>					
S1a-Road Hazard Signs	sign	700	8	\$5,600	
S1b-Trail/CG Hazard Signs	sign	250	36	\$9,000	
S1b-Dispersed Site Warning Signs	sign	250	80	\$20,000	
S2-Road Closure Gates	gate	9,000	12	\$108,000	
S3-Hazard Tree Falling	site	1,474	6	\$8,844	
S7-Well Floodproofing	site	800	5	\$4,000	
<i>Insert new items above this line!</i>					\$0
<i>Subtotal Protection/Safety</i>				<i>\$143,444</i>	<i>\$0</i>
<b>E. BAER Evaluation</b>					
Initial Assessment		\$60,000	1	\$60,000	\$0
<i>Insert new items above this line!</i>				---	\$0
<i>Subtotal Evaluation</i>				<i>\$60,000</i>	<i>\$0</i>
<b>F. Monitoring</b>					
				\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0
<i>Subtotal Monitoring</i>				<i>\$0</i>	<i>\$0</i>
<b>G. Totals</b>					
Previously approved					
Total for this request				<b>\$434,264</b>	

**PART VII - APPROVALS**

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Forest Supervisor

Date