

Date of Report: **9/05/2014****BURNED-AREA REPORT**  
(Reference FSH 2509.13)**PART I - TYPE OF REQUEST****A. Type of Report**

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

**B. Type of Action**

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

**PART II - BURNED-AREA DESCRIPTION**

1. Fire Name: **Chiwaukum Creek Fire**
2. Fire Number: **WA-OWF-000356**                      6. Forest: **Okanogan-Wenatchee** (17)
3. State: **Washington**                      7. Fire Incident Job Code: **0617 P6H8JU14**
4. County: **Chelan**                      8. Date Fire Started: **7/15/2014**
5. Region: **PNW (06)**
9. Date Fire Contained: **8/26/2014**
10. Suppression Cost: **Through 8/27/2014 - \$28,517,000**
- Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): **UNKNOWN**
2. Fireline seeded (miles): **UNKNOWN**
3. Roads: **UNKNOWN**
11. Total Acres Burned: **13,893 Total Acres**
- NFS Acres **(11,656)** Other Federal **(0)** State **(0)** Private **(2,237)**

12. Watershed Numbers:

Watershed (HUC10)	Watershed Name	Subwatershed (HUC12)	Subwatershed Name
1702001102	Nason Creek	170200110203	Lower Nason Creek
1702001107	Wenatchee River	170200110702	Chiwaukum Creek
		170200110703	Tumwater Canyon – Wenatchee River

13. Vegetation Types: Approx. 75% forested with Subalpine, Grand fir, Western hemlock and other mixed fir communities. Approximately 25% open grass and shrub communities.

14. Dominant Soils: Ashy, sandy loams and rock outcrop complexes

15. Geologic Types:

Landtypes found within the Chiwaukum Fire perimeter are Glacial Troughs, Scoured Glacial Troughs, Glaciated Valley Bottoms, Structurally Controlled Mountain Slopes on the northeastern edge of the fire near Skinney Creek and, Fault Escarpments.

1. Glacial Troughs are the till mantled lobes of glacially eroded valleys. They are typically dissected by a high density network of perennial and intermittent streams. Tributaries are high gradient. Avalanche chutes and debris flow tracts are common in low order channels.
2. Scoured Glacial Troughs are the extremely steep, rocky and irregular slopes and ridges with numerous cliffs and ledges. Bedrock outcrops are typical. Bouldery talus accumulates on ledges and lower margins. Avalanche and debris chutes are common. Residual soils are thin and poorly developed. Slopes are dissected by high gradient, low order streams.
3. Glaciated Trough Valley Bottoms occur in the bottoms of glacially eroded troughs. Glacial till deposits, debris fan deposits, outwash deposits, and overridden bedrock all occur.

4. Miles of Stream Channels by Order or Class: **33 miles total**

Stream Type	Total
Artificial Path	0
Intermittent	16
Perennial	17
<b>Total</b>	<b>33</b>

5. Other Structures

1. Tumwater Campground including water tank within the burn and sewage lagoons across Highway 2 from the campground and day use area
2. Recreation Residences along Hatchery Creek immediately downstream of the fire
3. Private homes in Chiwaukum Canyon and on the hillside north of Chiwaukum Creek
4. Transportation System

Trails: **15 miles**

Roads: **32 miles**

Maintenance Level	Description	Miles	High SBS	Moderate SBS	Low SBS
1	Basic custodial care	4	0	0	2
2	High Clearance vehicles	9	0	2	5
3	Suitable for passenger cars	-	-	-	-
4	Moderate degree of user comfort	-	-	-	-
5	High degree of user comfort	-	-	-	-
Road	Non-FS System	19	3	7	4
Trail	Hiking	0	-	0	0
	Motorcycle	-	-	-	-
	Pack and Saddle	13	3	5	4
	Not FS	2	0	1	1

### **PART III - WATERSHED CONDITION**

A. Burn Severity (acres): **Very Low (1,777 – 13%); Low (2,657 – 19%); Moderate (6,395 – 46%); High (3,064 – 22%)**

Soil Burn Severity Mapping was conducted from July 31 – August 2 and again August 23rd. Validation of the Burned Area Reflective Classification (BARC) occurred from ground visits to locations on August 23rd. The ground visits confirmed or adjusted spatial boundaries. BARC values were validated or adjusted based on pre-identified site locations for BARC values of low, moderate and high.

Watershed	Subwatershed	Total Acres	Burned Acres and (%)	Low Severity Acres and (%)	Moderate Severity Acres and (%)	High Severity Acres and (%)
Wenatchee River	Chiwaukum Creek	30,870	10,832 (35 %)	2074 (7 %)	4756 (15 %)	2,568 (8 %)
	Tumwater Canyon-Wenatchee	21,199	2624 (12 %)	459 (2 %)	1408 (7 %)	486 (2 %)

Watershed	Subwatershed	Total Acres	Burned Acres and (%)	Low Severity Acres and (%)	Moderate Severity Acres and (%)	High Severity Acres and (%)
	River					
Nason Creek	Lower Nason Creek	31,671	435 (1 %)	124 (0 %)	231 (1 %)	11 (0 %)

B. Water-Repellent Soil (acres): **Total Burned Area (6,417) FS Ownership (677)**

C. Soil Erosion Hazard Rating (acres):

<b>Total Burned Area</b>	<b>(1,308 low<sup>1</sup>)</b>	<b>(437 moderate)</b>	<b>(12,146 high)</b>
<b>Forest Service Ownership</b>	<b>(1,172 low<sup>2</sup>)</b>	<b>(264 moderate)</b>	<b>(10,219 high)</b>

D. Erosion Potential: **Prefire: 0-1 tons/acre Post Fire: 38 tons/acre**

There is very high potential for accelerated erosion from the effects of the fire. Modeling shows that rates of post fire hillslope erosion could potentially increase 20 to 50X times over prefire erosion rates. The increased erodible soil can result in downstream sediment, which can bulk flows resulting in increased flooding impacts. The loss of soil can impair soil productivity in the short and potentially long term future.

E. Sediment Potential: **2,112 cubic yards/square mile**

#### **PART IV - HYDROLOGIC DESIGN FACTORS**

A. Estimated Vegetative Recovery Period, (years):	<b><u>3-5</u></b>
B. Design Chance of Success, (percent):	<b><u>70%</u></b>
C. Equivalent Design Recurrence Interval, (years):	<b><u>25</u></b>
D. Design Storm Duration, (hours):	<b><u>1</u></b>
E. Design Storm Magnitude, (inches):	<b><u>1.15</u></b>
F. Design Flow, (cubic feet / second/ square mile):	<b><u>25</u></b>
G. Estimated Reduction in Infiltration, (percent):	<b><u>20</u></b>
H. Adjusted Design Flow, (cfs per square mile):	<b><u>340</u></b>

<sup>1</sup> Low Soil Erosion Hazard Rating includes "not rated" areas such as rock outcrop.

<sup>2</sup> Low Soil Erosion Hazard Rating includes "not rated" areas such as rock outcrop.

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

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

#### **EMERGENCY DETERMINATION**

Following identification of potential Values-at-risk (VAR), the BAER team evaluated increased risk post-fire using the risk matrix outlined Forest Service Manual 2500 Watershed and Air Management; Chapter 2520 Watershed Protection and Management; 2523.1 Exhibit 02 – BAER Risk Assessment . The team's evaluation is noted in the table below:

#### **Chiwaukum Creek BAER Risk Assessment**

<b>Probability of Damage or Loss</b>	<b>Magnitude of Consequences</b>		
	<b>Major</b> (loss of life or injury to humans; substantial property damage; irreversible damage to critical natural or cultural resources)	<b>Moderate</b> (Injury or illness to humans; moderate property damage; damage to critical natural or cultural resources resulting in considerable or long term effects.)	<b>Minor</b> (Property damage is limited in economic value and/or to few investments; damage to critical natural or cultural resources resulting in minimal, recoverable or localized effects)
<b>Very Likely</b> (near certain occurrence 90-100%)	<u>Very High</u>	<u>Very High</u>	<u>Low</u>
<b>Likely</b> (50-89%)	<u>Very High</u>	<u>High</u>	<u>Low</u>
<b>Possible</b> (10-49%)	<u>High</u>	<u>Intermediate</u>	<u>Low</u>
<b>Unlikely</b> (0-9%)	<u>Intermediate</u>	<u>Low</u>	<u>Low</u>

## HUMAN LIFE/SAFETY and PROPERTY

### **Evaluation of Values At Risk From Flooding and Debris Flows**

<b>Values at risk</b>	<b>Risk and emergency</b>
<p><i>Human life and safety on National Forest System (NFS) roads.</i></p> <p>Several debris flows have occurred in Chiwaukum Creek in response to relatively small rain events. Similar debris flows are expected from Thompson and Hatchery Creeks and to occur again from Chiwaukum Creek. Flooding and debris could cause culvert blockage and failure; portions of road prism could be lost with the culvert failures. Egress could be lost.</p>	<p>Probability of damage or loss = likely</p> <p>Magnitude of consequence = major</p> <p>Risk = very high</p> <p>Emergency treatment needed = yes</p> <p>Emergency actions needed = likely</p>
<p><i>Human life and safety in Tumwater Campground.</i></p> <p>Several debris flows have occurred in Chiwaukum Creek upstream of the campground. One storm produced an ash-laden flow that affected relief channels adjacent to the campground. The campground is on an alluvial fan. Terrain analysis using LiDAR data highlights a number of alternate flow paths across the fan and through the campground. Modeling shows an order of magnitude increase in peak and bulked flow. The campground could be affected by additional flooding and/or debris flows from Chiwaukum Creek.</p>	<p>Probability of damage or loss = very likely</p> <p>Magnitude of consequence = major</p> <p>Risk = very high</p> <p>Emergency treatment needed = no</p> <p>Emergency actions needed = yes</p>
<p><i>Human life and safety on National Forest System trails.</i></p> <p>Burned trees adjacent to trails present a hazard to the user. BAER hazard tree funding is only available to mitigate hazards to BAER teams.</p> <p>There is the possibility of debris flows catching hikers unawares and without areas of escape. Loss of egress is possible.</p>	<p>Probability of damage or loss = possible</p> <p>Magnitude of consequence = major</p> <p>Risk = high</p> <p>Emergency treatment needed = no</p> <p>Emergency actions needed = yes</p>
<p><i>Human life and safety at the backcountry Chiwaukum Creek campsite.</i></p> <p>The campsite is adjacent to Chiwaukum and burn severity of the adjacent slopes is largely moderate. Debris flows develop quickly and could catch hikers unawares and without areas of escape. Loss of egress is possible.</p>	<p>Probability of damage or loss = possible</p> <p>Magnitude of consequence = major</p> <p>Risk = high</p> <p>Emergency treatment needed = no</p> <p>Emergency actions needed = yes</p>

Values at risk	Risk and emergency
<p><i>Human life and safety at private residences, including access, in Chiwaukum Canyon.</i></p> <p>Several debris flows have occurred following the Chiwaukum Fire in Chiwaukum Creek in response to relatively small rain events. Additional debris flows are expected to occur again from Chiwaukum Creek. One residence in Chiwaukum Canyon is accessed by a bridge across the creek. Culvert blockage and failure is anticipated; portions of road prism could be lost with the culvert failures. There is no alternative egress from these areas.</p>	<p>Probability of damage or loss = very likely</p> <p>Magnitude of consequence = major</p> <p>Risk = very high</p> <p>Emergency treatment needed = no</p> <p>Emergency actions needed = yes</p>
<p><i>Human life and safety at private residences, including access, in Chiwaukum Estates on the slopes above Thompson Creek.</i></p> <p>Much of the area in and adjacent to the Estates is burned at high to moderate severity. Many of the residences are not primary residences and are not occupied full time; however, at least two are. Road erosion and culvert blockage and failure is anticipated; portions of road prism could be lost with the culvert failures. There is no alternative egress from the area. A portion of the access road is a National Forest System Road.</p>	<p>Probability of damage or loss = possible</p> <p>Magnitude of consequence = moderate to major</p> <p>Risk = intermediate to high</p> <p>Emergency treatment needed = yes</p> <p>Emergency actions needed = yes</p>
<p><i>Human life and safety at the Hatchery Creek recreation residences tract.</i></p> <p>This tract is located on an alluvial fan on both sides of Hatchery Creek downslope of the Hatchery Creek Road. The unnamed tributary south of Hatchery Creek has produced at least one debris flow in the recent past. Debris flows are expected in the Hatchery Creek drainage, a tributary within Tumwater Subwatershed.</p>	<p>Probability of damage or loss = very likely</p> <p>Magnitude of consequence = major</p> <p>Risk = very high</p> <p>Emergency treatment needed = no</p> <p>Emergency actions needed = yes</p>

Values at risk	Risk and emergency
<p><i>Property, including structures and water lines, at the Hatchery Creek recreation residences tract.</i></p> <p>This tract is located on an alluvial fan on both sides of Hatchery Creek downslope of the Hatchery Creek Road. The unnamed tributary south of Hatchery Creek has produced at least one debris flow in the recent past. Debris flows are expected in the Hatchery Creek subwatershed.</p> <p>The permit has a clause specifying that the permit holder assumes all risk of loss to the authorized improvements including loss from fire, fire fighting, and natural events.</p>	<p>Probability of damage or loss = very likely</p> <p>Magnitude of consequence = moderate to major</p> <p>Risk = very high</p> <p>Emergency treatment needed = no</p> <p>Emergency action needed = yes</p>
<p><i>Private property in Chiwaukum Canyon and in Chiwaukum Estates on the slopes above Thompson Creek.</i></p> <p>Debris flows threaten property in Chiwaukum Creek canyon.</p> <p>Erosion and increased runoff could affect the areas around the structures and the access road in Chiwaukum Estates.</p> <p>Access could be lost at both areas.</p>	<p>Probability of damage or loss = very likely to likely</p> <p>Magnitude of consequence = major to moderate</p> <p>Risk = very high</p> <p>Emergency treatment needed = no</p> <p>Emergency action needed = yes</p>
<p><i>Damage to National Forest System roads.</i></p> <p>All roads in the burned area may be affected in some way – ravel; rock fall or trees blocking the roadway; culverts blocked and overtopped with and without embankment failure; debris flows depositing on the roadway or removing portions of the road prism.</p>	<p>Probability of damage or loss = very likely</p> <p>Magnitude of consequence = moderate to major</p> <p>Risk = very high</p> <p>Emergency treatment needed = yes</p>
<p><i>Damage to infrastructure supporting the Tumwater Campground including the water tank and sewage lagoons across Highway 2 from the campground and day use area.</i></p> <p>The water tank is in the burned area, the burn severity upslope of the tank is approximately 50% low and 50% moderate. The sewage lagoons are not in the burned area but are adjacent slopes burned at approximately 70% low and 30% moderate severity.</p>	<p>Probability of damage or loss = possible</p> <p>Magnitude of consequence = moderate</p> <p>Risk = intermediate</p> <p>Emergency treatment needed = no</p>



Values at risk	Risk and emergency
<p><i>Damage to Highway 2 adjacent to Skinney Creek and at Chiwaukum Creek.</i></p> <p>Thompson Creek is a tributary to Skinney Creek; flooding and debris flows originating in Thompson Creek may affect downstream sections of Skinney Creek and Highway 2. Flooding and debris flows originating in Chiwaukum Creek may also affect Highway 2.</p>	<p>Probability of damage or loss = possible</p> <p>Magnitude of consequence = major</p> <p>Risk = high</p> <p>Emergency treatment needed = no</p> <p>Emergency action needed = yes</p>
<p><i>Damage to trail infrastructure, including tread, drainage features, and retaining walls.</i></p> <p>Slope ravel or failures, debris, and increased runoff or debris flows may affect all or portions of the trails.</p>	<p>Probability of damage or loss = very likely</p> <p>Magnitude of consequence = minor</p> <p>Risk = low</p> <p>Emergency treatment needed = no</p> <p>Emergency action needed = yes</p>

Note: the BAER Team has been working directly and providing support to NRCS EWP efforts on private lands within and below the Chiwaukum Creek Fire.

## **NATURAL RESOURCES**

### **Water Quality**

Water quality will be affected by ash, sediment, and debris. Generally, suspended and dissolved materials will be transported through burned area streams into the Wenatchee River and beyond. Heavier materials will be transported and deposited multiple times as they move downstream. Deposition of silts and sands may adversely affect aquatic life; deposition of gravels and cobbles may have both adverse and beneficial effects.

### **T & E Fisheries**

The Wenatchee River currently supports runs of Upper Columbia River summer steelhead (threatened), Upper Columbia River spring Chinook salmon (endangered), Columbia River bull trout (threatened) and their designated "Critical Habitat", as well as coho salmon, sockeye salmon, cutthroat, red band/rainbow, and Pacific lamprey.

Potential post-fire effects to the Wenatchee River and more specifically Chiwaukum Creek watershed include: increased water temperature, peak flows and channel scour, surface erosion and sediment delivery, and landslides and debris flows. These post-fire effects may impact the survival of ESA-listed fish eggs, fry, juveniles and adults downstream of the fire and alter habitat and channel conditions. Hatchery Creek suffered a large proportion of high and moderate burn severity but is not listed or occupied critical habitat for ESA listed fish. However, Chiwaukum Creek suffered a portion of high and moderate burn severity and given topography, increased sedimentation from post fire effects is expected and can be very damaging to the resident and fluvial bull trout population within the system. The probability of fine sediment or a debris flow

reaching the Wenatchee river system from Hatchery creek and Chiwaukum is likely; however, these events would be localized and of short duration with some effects being diluted with increased flows. The Wenatchee serves primarily as a migratory corridor with ideal spring Chinook and summer steelhead spawning and rearing habitat upstream of the Chiwaukum complex so, effects to these species will be minimal.

The probability of fine sediment or a debris flow impacting TES species on the Wenatchee river is possible but, effects are limited and there is a low risk to fisheries as a critical value at risk, however, probability of damage or loss to the fisheries on Chiwaukum creek is likely (50% to < 90% occurrence within 1-3 years) with moderate consequences (damage to critical fisheries resources resulting in considerable or long term effects) so the overall risk value is high.

During the BAER assessment, road-related sediment delivery to the Wenatchee River and tributaries was considered a risk to critical fisheries values. Geologic and hydrologic analysis determined that potential road-related sediment delivery resulting from intense precipitation events would contribute a minor percentage above expected levels of erosion and mass wasting generated within the burned area. Therefore, the road treatments alone would not be effective at reducing the post-fire risk to critical fisheries values. However, road treatments were developed to protect other critical values and will have secondary, long-term benefits to portions of the Chiwaukum Creek and Wenatchee watershed and to ESA-listed fish. Specific road treatments are highlighted in the BAER Engineering report.

### **Invasive Plants**

#### **Soils**

Soil loss through post wildfire erosion on high and moderate soil burn severity classes will result in a long-term loss of soil productivity. Additionally, other detrimental fire/soil heating effects on soils occurred on both high and moderate burn severity areas.

The Soils Team considered but did not propose any hill-slope erosion control treatments for protection of soil productivity. Hill-slope treatments could potentially reduce but not eliminate threats to downstream values at risk.

Natural recovery of ground cover through needle cast and native vegetation is generally expected to occur over the next 3-5 years. Under severely burned forest stands, the full function of the thick litter and duff layer that existed before the fire would be not be fully realized until a new forest stand is established.

### **Cultural**

Nineteen (19) recorded cultural resource sites are located within or adjacent to the Chiwaukum fire perimeter. Sites in the Hatchery Creek Recreation Residence Tract (7 historic cabins), a multi-component site in the Tumwater Campground, and sites associated with the Chiwaukum Town Site along Chiwaukum Creek and Highway 2 were field-reviewed to identify risk(s) from

erosion, watershed failure, flooding, debris flow, and hazard tree fall that could potentially affect site integrity and permanently alter or destroy cultural resources. None of the cultural resource sites visited during this assessment requires immediate BAER treatment.

**B. Emergency Treatment Objectives:**

**ROADS**

**Road Treatments to Mitigate the Emergency**

Implement actions within the fire to:

1. Ensure safe primary access (ingress and egress) for administrative access within the drainage
2. Reduce road-related hazards related to the burned area
3. Reduce the potential for accelerated surface runoff damaging Forest Service roads within and directly downstream of the fire areas in headwaters directly affected by the fire
4. Reduce the potential for debris "bulking" has a potential debris flow encounters a road-related drainage structure.
5. Reduce the potential for roads to act as a conduit for overland flow and increasing sediment loading.

**HUMAN LIFE/SAFETY and PROPERTY**

**Protection/Safety Treatments to Mitigate the Emergency**

Implement actions within the fire to:

6. Ensure safety of traveling public and agency personnel along US Highway 2, FSR 7905, FSR 7909 within developed recreation sites and along trails within and downstream of the burn area
7. Inform and educate the public
8. Ensure the safety of Forest users by addressing the threat to users at campground facilities downstream of the burn area

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

Land \_\_\_ % Channel \_\_\_ % Roads/Trails 80 % Protection/Safety 80 %

**D. Probability of Treatment Success**

	Years after Treatment		
	1	3	5
Land			

Channel			
Roads/Trails	80	0	0
Protection/Safety	70	80	80

E. Cost of No-Action (Including Loss):

F. Cost of Selected Alternative (Including Loss):

G. Skills Represented on Burned-Area Survey Team:

<input checked="" type="checkbox"/> Hydrology	<input checked="" type="checkbox"/> Soils	<input type="checkbox"/> Geology	<input type="checkbox"/> Range	<input checked="" type="checkbox"/> PIO
<input type="checkbox"/> Forestry	<input type="checkbox"/> Wildlife	<input type="checkbox"/> Fire Mgmt.	<input checked="" type="checkbox"/> Engineering	
<input type="checkbox"/> Contracting	<input type="checkbox"/> Ecology	<input checked="" type="checkbox"/> Botany	<input checked="" type="checkbox"/> Archaeology	
<input checked="" type="checkbox"/> Fisheries	<input type="checkbox"/> Research	<input type="checkbox"/> Landscape Arch	<input checked="" type="checkbox"/> GIS	

USFS Team Leader: Greg Kuyumjian. Email: [gakuyumjian@fs.fed.us](mailto:gakuyumjian@fs.fed.us) Phone: 509-664-9330

A Forest Service BAER team was assembled to conduct the burned area assesment and the BAER process of evaluating burned area conditions, critical values at risk, threats, risk and treatments was employed. Because the fire burned both NFS and non-federal lands, interdisciplinary and inter-agency coordination occurred throughout the process. External partners and their agencies are listed below.

**Forest Service BAER Team Members (core team)**

Forest ServiceTeam Lead	Greg Kuyumjian
Logistics	Joni Brazier/Tedd Huffman/Tommy John
Soils	Eric Schroder/Mike Natharius/Jim Gries/ Aldo Aguilar
Hydrology	Ben Stratton/Katherine Foster/Matt Karrer/Jennifer Hickenbottom
Engineering	Jon Jennett/Peggy Fisher/Erica Tarbox
Fisheries	Allison Johnson/Kate Meyer
GIS	Julia Gower/Chaochung Tsai
Public Information	Dolores Maese/Louis Haynes
Cultural Resources	Lindsey Smith

**Forest Service BAER Team Members (extended team)**

Fisheries	Richard Vacirca
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**External Partners and Contacts**

Katherine Rowden	National Weather Service
Amy Hendershot	NRCS

Garrett Fish  
Dennis Staley

NRCS  
USGS

#### **H. Treatment Narrative:**

(Describe the emergency treatments, where and how they will be applied, and what they are intended to do. This information helps to determine qualifying treatments for the appropriate funding authorities. For seeding treatments, include species, application rates and species selection rationale.)

#### **Land Treatments:**

No treatments identified at this time. Some associated "killer tree" removal to insure safety during implementation of engineering treatments may be necessary.

#### **Channel Treatments:**

No treatments identified at this time

#### **Roads and Trail Treatments:**

Treatment #R1 – Construct/Improve Unarmored Drainage Sag: Construct outsloped drain sags for diverting and removing water off the road surface, as well as draining any roadway ditch. Typical drainage sags are 30-50 ft in length and create a low water trough to redirect drainage flow. Drainage sags are installed in natural grade break in the road prism. Actual spacing of drainage sags will be based on Forest Service Handbook direction and location of topographical features, particularly in areas where active streams are crossing the road.

Treatment #R2a – Construct/Improve Armored Drainage Dip: Construct outsloped drain dips with armoring for diverting and removing water off the road surface, as well as draining any roadway ditch. Typical drainage dips or rolling dips on steeper grades (5-12% grades) have a one (1) foot trough depth and range between 120 to 140 feet in length including taper with the cross slope of the roadbed maintained through the dip. Drain dips rely on a mound of soil at the downhill side to stop water. Actual spacing of drainage dips will be based on Forest Service Handbook direction and location of topographical features. (See Appendix for detail)

Treatment #R2b – Construct/Improve Unarmored Drainage Dip: Construct/improve outsloped drain dips for diverting and removing water off the road surface, as well as draining any roadway ditch. Typical drainage dips or rolling dips on steeper grades (5-12% grades) have a one (1) foot trough depth and range between 120 to 140 feet in length including taper with the cross slope of the roadbed maintained through the dip. Drain dips rely on a mound of soil at the downhill side to stop water. Actual spacing of drainage dips will be based on Forest Service Handbook direction and location of topographical features. (See Appendix for detail)

Treatment #R3 – Construct Armored Vented Ford: Construct outsloped drainage feature over existing culverts with armoring to improve the culverts ability to better handle anticipated increases in stream flow including debris, keeps the flow in the same drainage, thus reducing diversion potential and usually prevents a total fill failure. Fords will be located based on locations of existing culverts and length of armor will depend on field conditions at each site. (See Appendix for detail)

Treatment #R4 – Surface Water Management:

1. Clean culvert inlets and outlets and reconstruct catch basin: Reconstruct catch basin and clean inlets and outlets of existing relief culverts and those culverts in active stream channels to reduce the buildup of sedimentation which may lead to fill failure along road grades >2% within or directly downslope or downgrade of moderately to high intensity burn areas in areas contiguous with critical fisheries habitat and located above residences and structures.
2. Construct water bars to enable these roads to divert and redirect expected increases in surface runoff. Actual spacing of cross drains will be based on Forest Service Handbook direction and field verification.
3. Re-establish continuous drainage within roadway ditches to enable roads to better handle expected increases in surface runoff, prevent road prism drainage and potential for increasing sedimentation from the road surface
4. Installation of temporary erosion control during construction

Treatment #R5– Fabricate and install gate: Fabricate/purchase and install closure gates and burned area hazard notification signs to inform the public of post-fire conditions and management actions taken to protect the public safety (roads, trails and trailheads). Gates will be located to allow the Forest Service to provide essential access to private lands and protect the public from potential road washouts as a least cost alternative. A gate is to be along FSR 7905 above the season recreation cabins and on FSR 7508.

Treatment #R6 – Storm Patrol: Patrol area during and immediately after storm events to repair, unplug, or aid in drainage of road drainage features along FSR 7905 and FSR 7909 to reduce the risk of catastrophic road drainage failure and high sedimentation yield. As needed access for the remaining open access for administration and public, it is important to monitor this road. Recommend two person teams to complete the assessment. Days include 5 days for road crew backhoe to complete emergency mitigation action.

Trail Protection - Of 16 miles of trails within the Chiuuakum fire, 2 miles cross ground which had High Burn Severity, and 6 miles crossed ground with Moderate Burn Severity. About half of the trail miles in moderate severity ground are immediately downslope of high severity. Treatment methods will be used to manage and control surface runoff to prevent loss of the trail prism below areas with High Burn Severity. Treatments on 5 miles of trails would include: waterbarring, drainage construction, and trail outsloping

#### **Protection/Safety Treatments to Mitigate the Emergency**

Treatment #PS1 – Fire Closure Signs: Area closure signs will be installed at the entrance to FSR 7905 and FSR 7908 off State Hwy 2.

Treatment #PS2 – ALERT Support: Support installation of one or two ALERT stations within the fire perimeter. Project will be coordinated with local NRCS and State and County officials.

#### I. Monitoring Narrative:

(Describe the monitoring needs, what treatments will be monitored, how they will be monitored, and when monitoring will occur. A detailed monitoring plan must be submitted as a separate document to the Regional BAER coordinator.)

#### Part VI – Emergency Stabilization Treatments and Source of Funds

Interim #

Line Items	Units	# of Units	NFS Lands		Other \$	Other Lands				All Total \$
			Cost per unit	BAER \$		# of units	Fed \$	# of Units	Non Fed \$	
<b>A. Land Treatments</b>										
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line</i>				\$0	\$0		\$0		\$0	\$0
<b>Subtotal Land Treatments</b>				\$0	\$0		\$0		\$0	\$0
<b>B. Channel Treatments</b>										
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line</i>				\$0	\$0		\$0		\$0	\$0
<b>Subtotal Channel Treat.</b>				\$0	\$0		\$0		\$0	\$0
<b>C. Road and Trails</b>										
Unarmored drain sags	Each	1	870	\$870	\$0		\$0		\$0	\$870
Armored drain dips	Each	18	1790	\$32,220	\$0		\$0		\$0	\$32,220
Unarmored drain dip	Each	12	870	\$10,440	\$0		\$0		\$0	\$10,440
Armored vented ford	Each	2	5494	\$10,988	\$0		\$0		\$0	\$10,988
Surface water mgmt	Mile	3	6756	\$20,268	\$0		\$0		\$0	\$20,268
Storm inspection/response	Day	5	1175	\$5,875	\$0		\$0		\$0	\$5,875
Trail protection	Miles	5	3750	\$18,750			\$0		\$0	
<i>Insert new items above this line</i>				\$0	\$0		\$0		\$0	\$0
<b>Subtotal Road &amp; Trails</b>				\$99,411	\$0		\$0		\$0	\$80,661
<b>D. Protection/Safety</b>										
Closure/Warning Signs	each	2	500	\$1,000	\$0		\$0		\$0	\$1,000
ALERT support	each	2	3000	\$6,000	\$0		\$0		\$0	\$6,000
Gate	each	2	7140	\$14,280	\$0		\$0		\$0	\$14,280
<i>Insert new items above this line</i>				\$0	\$0		\$0		\$0	\$0
<b>Subtotal Structures</b>				\$21,280	\$0		\$0		\$0	\$21,280
<b>E. BAER Evaluation</b>										
	each	1			\$65,000		\$0		\$0	\$65,000
<i>Insert new items above this line</i>							\$0		\$0	\$0
<b>Subtotal Evaluation</b>					\$65,000		\$0		\$0	\$65,000
<b>F. Monitoring</b>										
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line</i>				\$0	\$0		\$0		\$0	\$0
<b>Subtotal Monitoring</b>				\$0	\$0		\$0		\$0	\$0
<b>G. Totals</b>				\$120,691	\$65,000		\$0		\$0	\$166,941
Previously approved										
Total for this request				\$120,691						

# **PART VII - APPROVALS**

1. Michael B. Ballum  
Forest Supervisor (signature)

9-10-14  
Date

2. Robert J. S. S. S. S. S.  
Regional Forester (signature)

9-16-14  
Date

			NFS Lands				Other Lands			All
		# of	Cost per unit		Other	# of	Fed	# of	Non Fed	Total
Line Items	Units	Units		BAER \$	\$	units	\$	Units	\$	\$
<b>A. Land Treatments</b>										
				\$0	\$0		\$0		\$0	\$0
Insert new items above this line				\$0	\$0		\$0		\$0	\$0
Subtotal Land Treatments				\$0	\$0		\$0		\$0	\$0
<b>B. Channel Treatments</b>										
				\$0	\$0		\$0		\$0	\$0
Insert new items above this line				\$0	\$0		\$0		\$0	\$0
Subtotal Channel Treatments				\$0	\$0		\$0		\$0	\$0
<b>C. Road and Trails</b>										
Unarmored drain sags	Each	1	870	\$870	\$0		\$0		\$0	\$870
Armored drain dips	Each	18	1790	\$32,220	\$0		\$0		\$0	\$32,220
Unarmored drain dip	Each	12	870	\$10,440	\$0		\$0		\$0	\$10,440
Armored vented ford	Each	2	5494	\$10,988	\$0		\$0		\$0	\$10,988
Surface water mgmt	Mile	3	6756	\$20,268	\$0		\$0		\$0	\$20,268
Storm inspection/response	Day	5	1175	\$5,875	\$0		\$0		\$0	\$5,875
Insert new items above this line				\$0	\$0		\$0		\$0	\$0
Subtotal Road & Trails				\$80,661	\$0		\$0		\$0	\$80,661
<b>D. Protection/Safety</b>										
Closure/Warning Signs	each	2	500	\$1,000	\$0		\$0		\$0	\$1,000
ALERT support	each	2	3000	\$6,000	\$0		\$0		\$0	\$6,000
Gate	each	2	7140	\$14,280	\$0		\$0		\$0	\$14,280
Insert new items above this line				\$0	\$0		\$0		\$0	\$0
Subtotal Structures				\$21,280	\$0		\$0		\$0	\$21,280
<b>E. BAER Evaluation</b>										
	each	1		---	\$65,000		\$0		\$0	\$65,000
Insert new items above this line				---	\$65,000		\$0		\$0	\$0
Subtotal Evaluation				---	\$65,000		\$0		\$0	\$65,000
<b>F. Monitoring</b>										
				\$0	\$0		\$0		\$0	\$0
Insert new items above this line				\$0	\$0		\$0		\$0	\$0
Subtotal Monitoring				\$0	\$0		\$0		\$0	\$0
<b>G. Totals</b>				\$101,941	\$65,000		\$0		\$0	\$166,941
Previously approved										
Total for this request				\$101,941						