USDA-FOREST SERVICE FS-2500-8 (6/06)

Date of Report: October 11, 2012

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

[X] 1. Funding request for estimated emergency stabilization funds
[ ] 2. Accomplishment Report
[ ] 3. No Treatment Recommendation

B. Type of Action

[X] 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

A. Fire Name: Elbow Pass Complex

B. Fire Number: MT-LCF002085

C. State: Montana

D. County: Lewis and Clark

E. Region: Northern (1)

F. Forest: Lewis and Clark

G. District: Rocky Mountain

H. Fire Incident Job Code: P1G37C

I. Date Fire Started: 07/12/2012

J. Date Fire Contained: 10/4/2012

K. Suppression Cost: TOTAL: $4,130,000

L. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): 0
2. Fireline seeded (miles): 0
3. Other (identify): 0

M. Watershed Numbers:

HUC 6 Number	HUC6 names
170102090101	Upper Danaher Creek (FNF)
170102090102	Rapid Creek (FNF)
100301040203	Upper South Fork Sun River (LCNF)
100301040201	Straight Creek (LCNF)

N. Burned acres by Ownership

Ownership	Total Acres
Private	0
State	0
BLM	0
Forest Service	26,000
Other	0
Total Acres	26,000

O. VegetationTypes: Vegetation types within the perimeter of the Elbow Pass Complex include Lodge Pole pine and Subalpine.

P. Dominant Soils: Soils form based on an integration of climate, geologic parent material, topography, living organisms, and time. Within relatively short distances, the combination of soil-forming factors can vary, resulting in soils with different physical and chemical characteristics. Soils within the Elbow Pass Fire perimeter are derived mainly from limestone on the ridges and ridge tops. Hillslopes are generally underlain by argillites and siltites and quartzites with a thin layer of volcanic ash loess at the surface while, drainage bottoms are mantled with colluvium and residuum deposited through glacial till. The dominant soils are classified at the family level as Typic/Andic/Lithic Cryoborolls/Cryochrepts with surface textures of cobbly/very gravelly silt loams/loams. Surface rock ranges in cover from 15 to 70 percent and in size from gravels to cobbles. Land Type Association units (LTA) and attributes used in the analysis are from the Holdorf et al, 1980 publication (Holdorf et al, 1980).

Table 1. General characteristics from the Land Type Association (LTA) unit analysis for the Elbow Pass Fire

LT	Landform	Slope Range	Parent Material	Soil Family	Soil Surface Texture
10	Forested & grassy floodplains & terraces	0-10	Mixed	Fluvents, Typic & Argic Cryoborolls	Variable
20	Forested break lands	60+	Mixed	Typic & Andic Cryochrepts, Lithic Cryandepts	Loam, Silt Loam
27	Forested break lands	60+	Mixed, Limestone	Typic & Andic Cryochrepts, Lithic Cryandepts	Loam, Silt Loam
37	Forested smooth residual slopes	25-60	Mixed	Andic Cryochrepts	Loam
40	Peaks & alpine ridges	60+	Mixed	Lithics	Stony, Very Gravelly Loam
43	Forested, cool aspect break lands	60+	Mixed	Andic Cryochrepts, Lithic Cryandepts	Silt Loams, Loams
60	Forested ridges, slopes, sparsely vegetated ridges	25-60+	Mixed, Limestone	Andic Cryochrepts, Lithics	Silt Loam, Loam

66	Forested high elevation ridges & slopes	25-60	Mixed, Limestone	Andic Cryochrepts	Silt Loam
70	Forested high elevation ridges & slopes	10-80	Colluvium & Residuum	Typic & Andic Cryochrepts	Stony, Very Gravelly Silt Loam, Loam
90	Slump land	0-40	Mixed	Typic & Andic Cryoboralfs	Loam, Silt Loam

96% of the soils within the Elbow Pass complex are rate moderate to high erodibility.

Q. Geologic Types: Mount Pablo Formation (KJmpe) through the Ellis Group Madison Group (Mm) Castle Reef and Allan Mountain Formations. Medium light gray, thick limestone or dolomite. Sun River Member (upper part of the formation): Light gray dolomite with thick fossiliferous lenses. Shallow marine. Thickness as much as 300m. Quaternary derived glacial till and alluvium are present in the valley bottoms and side slopes.

R. Miles of Stream Channels by flow regime:

FIRE	PERENNIAL	INTERMITTENT/EPHEMERAL	TOTAL
Elbow Pass Complex	21	~40	61

S. Transportation System (NFS only):

Open Road miles

Fire Name	Sum of Miles
Elbow Pass Complex	**0**
Other Public Roads	0
Roads Open to All Vehicles, Yearlong	0
Roads Open to Highway Legal Vehicles Only, Yearlong	0
State or US Highway	0
Total	**0**

Open Trail miles

Fire Name	Sum of Miles
Elbow Pass Complex	**21**
Trail Special Designation, Yearlong	21
Trails Open to Vehicles 50 inches or Less in Width, Yearlong	0
Grand Total	**21**

Admin Use routes

Row Labels	Sum of

	Miles
Elbow Pass Complex	**0**
ADMIN	0
Grand Total	**0**

PART III - WATERSHED CONDITION

A. Burn Severity (NFS acres ONLY):

Fire	Unclassified	Unburned	Low Severity (Forest and Non-Forest)	Moderate Severity	High Severity
Elbow Pass Complex		8211	1742		9677

The remoteness of the fire and for safety reasons, the BAER team was not allowed into the fire to analyze soil burn severity. However, based on the BARC map the above severity was estimated (based on burn intensity). Burn intensity was clearly classified on the BARC (and verified by fly-overs) as either low or high. Very few moderate values were noted.

B. Water-Repellent Soil (acres): 24,960.

C. Soil Erosion Hazard Rating (acres):

Table 2. Soil erosion ratings based on Land Type Associations (LTA) units with associated acres within the fire perimeter.

LT	Soil Material Erodibility*	Hydrologic Soil Group	Percent of Burn Area**
10	Moderate	C	4
20	Low (Moderate - High)	C	13
27	Low (Moderate - High)	C	9
37	Low (Moderate)	C	7
40	Low	C	4
43	Low (Moderate – High)	C	6
60	Low (Moderate – High)	C	41
66	Low (Moderate – High)	C	3
70	Low (Moderate – High)	C	1
90	High (Moderate)	C	10

* LTA Hazard Rating – Nesser 1998 (adjustments by D. Marr to account for ash loess influence depicted by parenthesis)
** Acreage used in calculations omits rock outcrop. Data is based on ElbowPass-LTA-BurnedArea-Analysis-Acres08292012.xlsx.

D. Erosion Potential: 17.2 tons/acre tons/acre (ERMiTT results for moderate/High severity)

E. Sediment Potential: 425 tons cubic yards / square mile (25% of surface erosion delivered)

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years): 3-7

B. Design Chance of Success, (percent): 80

C. Equivalent Design Recurrence Interval, (years): 5

D. Design Storm Duration, (hours/minutes): 6/30

E. Design Storm Magnitude, (inches): 1.7/1.1

F. Design Flow, (cubic feet / second/ square mile): 26.5

G. Estimated Reduction in Infiltration, (percent): 56

H. Adjusted Design Flow, (cfs per square mile): 165 cfs/mi^2

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats:

Summary

The most recent acreage available for the Complex based on the latest incident report is 26,128 total acres: 17,324 acres on the Lewis and Clark NF; 7,565 acres on the Flathead NF; and 1,239 acres on the Lolo NF.

The Elbow Pass Complex is comprised of five different lightning ignitions from July 12 through July 31. These four fires have merged into one fire, the Elbow Pass Complex: Triple Divide Fire, Rapid Creek Fire, Elbow Pass Fire, and Bar Creek Fire. The fires are generally located 25 miles west southwest of Augusta, Montana. The Falls Point fire is south of the Complex. All are located in inaccessible terrain in heavy fuels. The fires are in the Bob Marshall and Scapegoat Wilderness Areas.

Summary of Watershed Response

The winter of 2011/2012 was very dry throughout the Rocky Mountain Ranger District with very low snow pack and without the typical June rains, resulting in extremely dry fuel conditions. Much of the Elbow Pass Complex Fire occurred under severe burning conditions (temperatures over 95 degrees, 30-50 mph winds, and relative humidity <10%). The Elbow Pass Complex fire was large with extensive areas of high burn intensity.

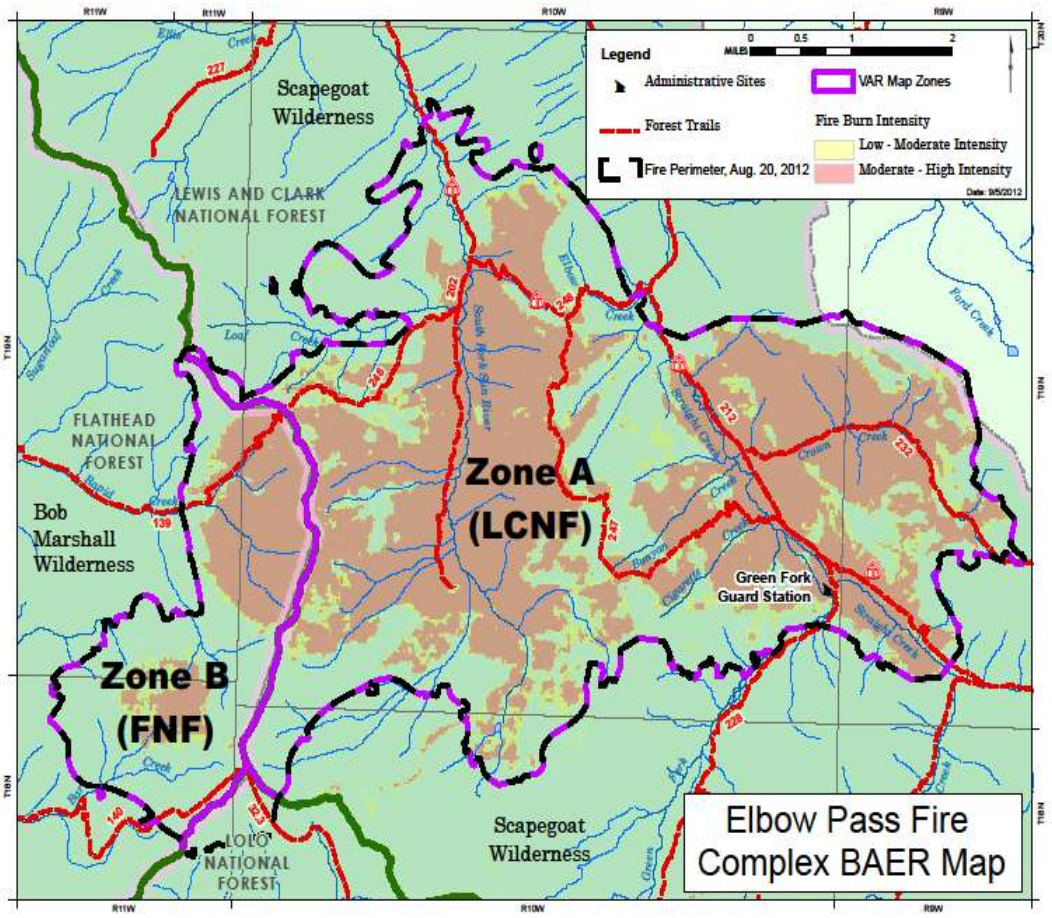
With the loss of ground cover from burning and hydrophobic conditions found throughout the Elbow Pass Complex fire areas there is a risk of post-fire erosion from a short duration-high intensity rainstorm in the next several years

The fire occurred entirely within the boundary of the Bob Marshall Wilderness. Access within the fire perimeter was very limited due to safety concerns from snags and the remoteness of the fire. Therefore, BEAR investigation of fire severity and hydrophobic soils was not possible at this time.

The surface erosion potential for representative landform hill-slopes within the Elbow Pass Fire was estimated using the ERMiT (Erosion Risk Management Tool) model (Robichaud et al 2006). ERMiT combines weather variability with spatial and temporal variability of soil properties to model the range of post-fire erosion rates

that are likely to occur. The ERMiT model limitations are primarily related to the difficulty of applying the model across a landscape. ERMiT modeling is usually applied to a relatively small area that is typical and extrapolated across a wider view. Recent validation of the model in Montana and Idaho do indicate that results are improving with refinement of the model.

Elbow Pass Complex Burn Map 1



The Elbow Pass Complex Fire had substantial areas of high intensity as shown. The fire burned very quickly through heavily forested areas with small areas of mosaic low to non-burn along the edges. However the lodgepole pine stands, which had high fuel loadings, burned much hotter, particularly in the Straight Creek and upper Sun River Drainages. These areas have the majority of the Values At Risk.

The data entered into the ERMiT model includes climate, soil texture, rock content of the soil profile, vegetation type (forest, range, or chaparral), hillslope gradient and horizontal length, and soil burn severity. The climatic data for the Elbow Pass Fire was based on the information available from the Gibson Dam station. Soil characteristics were determined from previous BAER reports completed in the area and landtype association descriptions in the Holdorf 1980 document. Slope characteristics and burn intensity were determined from GIS models and BARC Imagery. Below is a list of the input variables used for analysis:

<u>High Intensity:</u>	<u>Low Intensity:</u>
Slope Length: 1000ft	Slope Length: 1000ft
Surface Text: Sandy Loam	Surface Tex: Sandy Loam
Rock Content: 45%	Rock Content: 45%
Hillslope %: 15, 15-30->30	Hillslope %: 15, 15-30->30

The results from the ERMiT runs were used to create erosion hazard potentials specific to the Elbow Pass Fire. High erosion hazard is defined by slopes >30% that fall within high burn intensity/moderate to high burn severity areas. Low erosion hazard is defined by slopes >30% that fall within low burn intensity/low to moderate burn severity. The results of the ERMiT runs, separated by erosion hazard provide potential erosion (ton ac^{-1}) within the first two years following the fire (Table 6).

Table 6. Results of ERMiT modeling.

Burn Severity	Acres	Potential Erosion Hazard (ton/acre)	
		Year 1	Year 2
Low-Moderate	1301	7.2	3.4
Moderate - High	8802	17.9	10.7

Photo showing the high intensity of burn within the Elbow Pass Complex Fire. The soil burn severity in these areas was judged to be predominantly high with pockets of moderate severity burn. Trail segments and cultural resource areas with these heavily burned areas comprise the majority of the Values at Risk – predominantly Trails which are also the only burned cultural resource sites.

Illustration of high intensity burn in riparian areas and side slopes, upper Straight Creek area. High burn severity areas.

Values at Risk:
Risks were assigned based on Interim Directive No. **2520-2010-1**.

The BAER inter-disciplinary team identified issues that result from fire effects within the Elbow Pass Complex Fire. The primary watershed effects from the fires include a potential reduction in infiltration, due to soil water repellency, with the resulting increase in potential runoff. Increased runoff, especially where the vegetation and surface duff layer has been burned will result in increased potential for soil erosion and sedimentation. After examination of the fire area the BAER team, in consultation with other specialists, identified the following values at risk due either to increased runoff, increased soil erosion potential, or public safety hazards. These estimated post-fire effects and identified values at risk shaped the analysis and report:

- **Heritage/Cultural Resources:** All significant (NRHP eligible), potentially eligible and unevaluated sites or portions of sites within the burned area were carried forward for the consideration of effects in the recommended BAER treatments.

  The table in Appendix B lists the sites at risk which were identified in association with the Elbow Pass Fire. Site significance (NRHP eligibility) is noted, as is the potential threat or risk, whether or not the site is in the burned area, and recommended treatments. Risk was ranked as high, moderate or low to determine the need for site treatment under BAER protocol.

  The sites within the burned area are all associated with forest or public values where 'heritage' is not the primary function; these resources are referred to in cultural resource management as 'multi-use' heritage assets. These sites are part of the historic National Forest Trail System and Forest Service Administrative sites. BAER restoration treatments are generally proposed by the primary function; hence, heritage values are integrated into the treatment, and reviewed by the archaeologist, but not ascribed a 'monetary' value in the economic analysis. If the risk to heritage sites is ranked as 'moderate' or 'high' and the threat is not mitigated by treatments already proposed, site specific heritage

treatment would be prescribed.

Five (5) of the seven (7) System trails in the Elbow Pass Fire have been previously recorded as historic linear sites. The Region's Programmatic Agreement (PA) for Cultural Resources contains a special appendix for the Maintenance of Historic Trails. Under the PA, NHPA Section 106 compliance for trails maintenance is accomplished in a designated process, which includes inventory of the trail and historic record documentation as mitigation for the incremental changes that occur from maintenance. Two (2) trails (#246 and #232) will require more complete inventory and site recordation as a result of proposed BAER treatments for the Elbow Pass Fire.

In addition, cultural resource inventory may be required in areas of where turnpike has been identified as a treatment on the upper South Fork Sun River Trail #202, and possibly Trail #246. This extra survey may be required because the characteristics common in areas of trail needing turnpike overlap with those that are of high-probability for prehistoric cultural sites (e.g., relatively low-slope, often near springs or seeps, and near lakes or ponds). In the case of new prehistoric or historic sites being found within the trail corridors during required cultural resource inventory, locations of areas proscribed as avoidance areas will be supplied to trail coordinators and Resource Advisors in map form and not included in public reports, due to confidentiality requirements.

As a result of the heritage resource analysis, no site-specific treatments were recommended for BAER funding, as trail treatments proposed are considered adequate for the protection of the trail system as an historic resource. Several monitoring and inventory activities and certain 'notification' or consultation requirements are to be completed during the next year under general program management.

- **Trails and Recreation:** There are roughly 21 *burned* miles (2 miles Flathead NF and 19 Lewis and Clark) of trails within the fire perimeter. These trails are the only access into the area and are used by Forest personnel and the public. The impacted trails are all in the Scapegoat Wilderness. They are designed and maintained as pack and saddle trails. The trail system has been damaged by the fire and is now a hazard to travelers and will likely result in erosional degradation of streams and waterways. The trails are also cultural resources (historic FS trail system).

- **Soil Productivity:** High intensity rainfall during the first two years following the fire will accelerate soil erosion. The loss of a major portion of the topsoil could significantly reduce soil productivity of those sites. In addition, pre-fire populations of noxious weeds are anticipated to significantly increase as a result of the fire and potentially impact soil productivity.

- **Water Quality:** Increased sediment and nutrient yields are anticipated from portions of watersheds that burned at moderate or greater intensity. Some populations of aquatic species may continue to be impacted particularly in South Fork Sun River from the Complex fire.

- **Potential Loss of Native Vegetation and Ecological Integrity due to Weed Infestation and Spread:** Noxious weeds/invasive plant species pose a serious threat to the composition, structure, and function of native plant communities. Depending on burn severity and site potential, fire as a disturbance process has the potential to greatly exacerbate infestations of certain noxious weed species. Soil disturbance resulting from all levels of burn severities in a wildfire incident and fire suppression related activities (hand lines, structure protection, drop spots, etc.) that cause vegetation and soil alteration provide the optimum conditions for noxious weed invasion.

  The potential for accelerated expansion of noxious weed species within the fire perimeter, especially within and adjacent to already infested areas is high. Moderate and high intensity burned acres provide ideal seedbeds for noxious weed establishment with little competition from native vegetation.

Herbaceous vegetation, forests and riparian habitats are crucial for a variety of terrestrial and aquatic species. These areas and soil stability are the emergency values at risk found on National Forest.

In accordance with the revised Forest Service manual, the risk matrix below, Exhibit 2 of Interim Directive No.: 2520-2010-1, was used to evaluate the Risk Level for each value identified during the Elbow Pass Complex Fire BAER assessment. Only treatments that had a risk of Intermediate or above are recommended for BAER authorized treatments.

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

For the Elbow Pass Complex the risk levels by resource included Trails, soils, weeds/sensitive plants, and cultural resources. System trails and weeds/sensitive plants resources had risk levels of very high and therefore are resources recommended for BAER funded treatments. Soils also rated very high, however wilderness designation of the location of the fire would preclude any treatment to stabilize soils.

Probability of Damage or Loss	Magnitude of Consequences		
	Major	Moderate	Minor
	RISK		
Very Likely	Very High Soil	Very High	Low
Likely	Very HighTrails	High weeds/sensitive plants	Low
Possible	High	Intermediate Cultural	Low
Unlikely	Intermediate	Low	Very Low fisheries

B. Emergency Treatment Objectives:

Weed Control, Native Vegetation Recovery and Soil Stabilization: Immediate detection and treatment (herbicide) of known weed infestation areas and continued monitoring of the most likely vectors of weed spread will reduce the risk of expansion of existing infestations and allow burned plant communities to recover more rapidly.

System Trails: The trails in the fire perimeter are the only access within this area of the forest and located entirely within the Wilderness Area. They are used extensively by the public for recreation and by the forest for administration. The objectives for the trails treatment will be to stabilize 21 miles of the system trails to minimize erosion and stream impacts from post fire runoff. Trail treatment will also protect the trails as historic heritage resources. Removal of hazard trees will help to protect crews doing the necessary trail work by removing hazard trees that threaten the worksites of the crews.

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

Land **100** % Channel **na** % Roads/Trails **95** % Protection/Safety **95** %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land (weeds)	50	70	90
Land (site proteection)	Na	na	na
Channel	Na	na	na
Roads/Trails	95	85	75
Protection/Safety	90	90	90

E. Cost of No-Action (Including Loss): $2,000,000

F. Cost of Selected Alternative: $101,500 LCNF; $11,850 FNF

G. Skills Represented on Burned-Area Survey Team:

[x] Hydrology	[x] Soils	[x] Geology	[] Range
[ ] Forestry	[ ] Wildlife	[ ] Fire Mgmt.	[x] Engineering
[ ] Contracting	[ ] Ecology	[x] Botany	[x] Archaeology
[ ] Fisheries	[ ] Research	[ ] Landscape Arch	[x] GIS

Team Leader Wayne Green

Email: wgreen@fs.fed.us Phone: 406-791-7740

Core Team Members:

- Dave Marr – Soil Scientist
- Wayne Green – Hydrologist/Geologist
- Ian Bardwell – Engineering/Trails
- Kelsey McCartney – GIS/Archaeology Specialist
- Jason Oltrogge - Weeds Specialist
- Tessa Donahue –Values at Risk

H. Treatment Narrative:

Land Treatments:

Weed Treatments: The emergency to the resource caused by the fire is of a high priority, especially in those areas in which there were invasive species concentrations prior to the burn. There are approximately 80 acres of known spotted knapweed infestation located within the fire perimeter southwest of Green Fork cabin. Current cost of treating back country weed infestations is approximately $200.00/acre. If monitoring of disturbed sites and treatment of existing infestations does not take place, the likelihood of noxious invasive species expansion is high. The increase is infestations in not only an economic factor in regards to treatment costs but there is a loss of wildlife habitat and wilderness values that is hard estimate a cost.

It is recommended that the existing weed infestations as mapped be treated by contract. The approximate cost of this treatment would be $200.00/acre X 80 acres = $16,000.00.

Cultural Resource Treatments: Treatments prescribed for trails are adequate to protect the integrity of the historic trails. No additional treatments are requested.

Trail Treatments: Within the fire perimeter, 21 miles of NFS system trails have been burned with a moderate to high intensity wildfire. The trails system is the only transportation system within this area of the Bob Marshall Wilderness area of the Rocky Mountain Ranger District. The trail system provides access for year around recreation opportunities, hunting opportunities, fire suppression, wildlife surveys, and are considered culturally significant sites.

These trail miles occur on steep side slopes that are very susceptible to erosional events during normal runoff years. A large fire event such as the Elbow Pass Fire makes the trails system susceptible to washouts, gullying, and rilling during the upcoming fall and spring runoff events. The high elevation makes them more likely experience thunder storms. The increased erosion associated with the fire event will increase the risk to ecological health, stream sedimentation, and public safety within the fire area and the risk of damage to cultural sites.

Excessive surface flows down the routes are probable and will cause significant surface erosion and failure in localized areas. We are not rebuilding the trails but taking measures to keep the trail from experiencing further impacts from post fire runoff and debris torrents. Travel during wet periods is a significant safety issue due to the slippery nature of the soil. Without the treatments, overland flow and soil erosion will damage both the trail as well as transfer additional sediment load into the aquatic system. It is likely that many of the routes will become impassible within the next year without treatment. Long sections of the travel routes pass through riparian areas that are wet for most of the year and will require the reconstruction of turnpikes through these areas. Treatment of hazard trees will provide for a safe working environment for the rehab crews during contract administration.

There are no motorized routes within the fire perimeter.

Trail treatments by method include:

Treatment type	**Explanation:** Provide explanation and rationale for each treatment
Safety:	
Hazard Tree Removal	Remove hazardous trees that would pose a threat to hand crews working on BAER treatments.
Trail Work:	
Trail ditching	Provide trail drainage to protect trail during expected high flow events, and reduce sediment delivery to streams and waterways.
Trail Curb Logging	Repair trail log curbs on steep slopes to provide safety and stabilize trail.
Berm Removal and Outsloping	Remove outside berm and outslope trail to restore trail drainage to protect soils and reduce erosion. Protect heritage sites and preserve the historic trail.
Trail Turnpike	Repair turnpikes across riparian areas to provide safe passage and to reduce soil losses and damage to sensitive wet areas.

Trail Culvert	Install culvert in trail drainage crossing to protect crossing during expected high flows.
Weeds Treatment:	
Weeds Treatment	Treat known knapweed infestation within the fire perimeter.
Cultural Resources:	
Cultural Resource Monitoring	Monitor repairs of trail system during construction/reconstruction and complete Sec. 106 review of treatments.

Protection and Safety Treatments: The hazard tree treatment is to provide a safe work environment for the trail crew to work in while implementing the trail work and will also provide safety to cultural resource personnel.

I. Monitoring Narrative: Treatments and fire recovery will be completed for three consectutive years starting in the spring of 2013. Treatments will be surveyed for effectiveness of stability, erosion control and safety. The fire will be monitored for vegetation recovery.

Part VI (A) – Emergency Stabilization Treatments and Source of Funds: Lewis and Clark National Forest. (see below)

			NFS Lands		
		Unit	# of		Other
Line Items	Units	Cost	Units	BAER $	$
A. Land Treatments					
Noxious Weeds/InvasiveTreatments	Acres	200	80	$16,000	$0
Noxious Weeds/Invasive Detection	Acres	4000	1	$4,000	$0
Subtotal Land Treatments				$20,000	$0
B. Channel Treatments					
Insert new items above this line!				$0	$0
Subtotal Channel Treat.				$0	$0
C. Road and Trails					
Water Bars	each	60	324	$19,440	
Berm Removal	feet	2	8892	$17,784	
Curb Log	feet	3	1130	$3,390	
Ditching	feet	1	9298	$9,298	
Turnpikes	feet	30	750	$22,500	
Culvert	each	800	2	$1,600	
				$0	
Insert new items above this line!				$0	$0
Subtotal Road & Trails				$74,012	$0
D. Protection/Safety					
Hazard Tree Treatments	site	60	324	$19,440	
Hazard Tree Treatments	/200ft	15	97	$1,455	
Insert new items above this line!				$0	$0
Subtotal Structures				$20,895	$0
E. BAER Evaluation					
Team evaluation	ea	1	3000	$3,000	$3,000
	EA			---	$0
Insert new items above this line!				---	$0
Subtotal Evaluation				$3,000	$3,000
F. Monitoring					
Local Review of treatments 5 specialists	LS	1	3000	$3,000	
Insert new items above this line!				$0	$0
Subtotal Monitoring				$3,000	$0
G. Totals				$120,907	$3,000
Previously approved					
Total for this request				**$120,907**	

Part VI (B): Emergency Stabilization Treatments and Source of Funds: Flathead National Forest.

A. Land Treatments					
Noxious Weeds/InvasiveTreatments	Acres	200	10	$2,000	$0
		0	0	$0	$0
Subtotal Land Treatments				$2,000	$0
B. Channel Treatments					
Insert new items above this line!				$0	$0
Subtotal Channel Treat.				$0	$0
C. Road and Trails					
Water Bars	EA	60	42	$2,520	
Berm Removal	Feet	2	1557	$3,114	
Install Curb Logs	Feet	3	235	$705	
Ditching	Feet	1	781	$781	
	each			$0	
Hazard Tree Removal (water Bar sites)	Site	60	42	$2,520	
Hazard Tree Removal (all others)	/200 ft	15	13	$195	
Insert new items above this line!				$0	$0
Subtotal Road & Trails				$9,835	$0
D. Protection/Safety					
Post Fire Signs	each	0	0	$0	
Insert new items above this line!				$0	$0
Subtotal Structures				$0	$0
E. BAER Evaluation					
Team evaluation	ea			$0	$0
	EA			---	$0
Insert new items above this line!				---	$0
Subtotal Evaluation				$0	$0
F. Monitoring					
Local Review of treatments 5 specialists	LS			$0	
Insert new items above this line!				$0	$0
Subtotal Monitoring				$0	$0
G. Totals				$11,835	$0
Previously approved					

PART VII - APPROVALS

1. /s/ William Avey 10/12/2012
   Forest Supervisor Date

2. _____ _____
   Regional Forester Date

Appendix A: Trails Analysis Cost Estimates.

SUMMARY OF COST REQUEST[1]*:*

FOREST	TRAIL WORK	HAZARD TREE MITIGATION
FLATHEAD (1.6 MILES)	*$7,120*	*$2,684*
LEWIS AND CLARK (18.6 MILES)	*$74,012*	*$20,540*

GOAL: Stabilize 21miles of burned trail (2 miles Flathead NF & 19 miles Lewis and Clark) in order to minimize erosion and stream sedimentation from post-fire runoff and protect the trails as a historic heritage resource. Protect crews doing the necessary trail work by removing hazard trees that threaten the worksites of the crews.

METHODS: Use a mix of waterbar installation, ditching, outslope berm removal, culvert replacement, turnpiking, and curb logs to direct water off the trail as quickly as possible while maintaining the overall trail structure, in order to prevent sediment from entering streams by minimizing trail erosion that is likely to occur due to fire effects. Work will be in accordance with EM-7720-102, Forest Service Standard Specifications for Construction of Trails and conform to wilderness standards based on a minimum tools analysis.

GIVENS: The impacted trails are all in the Scapegoat Wilderness. They are designed and maintained as pack and saddle trails. All work will be done as according to a minimum tools analysis. Waterbars and curb logs will be log, native material, and possibly rock; culverts will be poly. Turnpiking will be native material curb logs, geotechnical underlayment as needed and gravel fill from local sources where possible.

ASSUMPTIONS: Because of the nature of the terrain in the fire area and the pattern of burn along the trails, treatment of the burned miles of trail should, in the majority of cases, be adequate to mitigate the impacts of any future runoff event causing sediment delivery into streams and to protect the character and potential site eligibility of the historic Forest Service Trails system. Analysis of the fire-effected trails, therefore, will be limited to those areas actually burned, as shown on the BARC (as opposed to within the greater area of the fire perimeter). Note: There may be cases where some drainage work is needed outside the actual burn area to prevent increased sedimentation, such as areas where a steep segment of trail may itself be unburned but the slope above it is burned, but in general a visual overview of the burned area data did not reveal this to be a common occurrence, and therefore the analysis was run on only those mile of trail actually burned.

DATA ANALYSIS METHODS:

1. The classified BARC was added to a generated slope raster classified by percent of slope in order to come up with six categories divided by percentage of slope (side slope) and burn intensity:
    i. 0-15% Slope, High Intensity Burn
    ii. 0-15% Slope, Low Intensity Burn
    iii. 15-30% Slope, High Intensity Burn
    iv. 15-30% Slope, Low Intensity Burn
    v. >30% Slope, High Intensity Burn
    vi. >30% Slope, Low Intensity Burn
2. This raster was converted to a polygon layer and then intersected with the Bob Marshall Wilderness Complex Trails layer, with a resulting output of "Trails within the burn, classified based on their side slope and the intensity of burn along those segments." Miles of trail was then re-calculated on this resulting output (OUTPUT: TrailBarcSlopeIntersect). The summary is below, broken out by Forest and slope/burn intensity:

[1] This breakdown is inclusive of the amount needed to stabilize the historic trail system within the fire area (Heritage sites over 50 years old), but not the amount that will be required to fulfill Section 106 of the NHPA requirements for the trail work itself. That is dealt with elsewhere.

Slope-Intensity	Forest	Miles
0-15% Slope, Low Intensity Burn	FNF	0.04
0-15% Slope, High Intensity Burn	FNF	0.19
15-30% Slope, High Intensity Burn	FNF	1
15-30% Slope, Low Intensity Burn	FNF	0.04
>30% Slope, High Intensity Burn	FNF	0.3
Total Burned Miles		1.57

Slope-Intensity	Forest	Miles
0-15% Slope, Low Intensity Burn	LCNF	1.2
0-15% Slope, High Intensity Burn	LCNF	9.51
15-30% Slope, Low Intensity Burn	LCNF	0.67
15-30% Slope, High Intensity Burn	LCNF	5.56
>30% Slope, Low Intensity Burn	LCNF	0.29
>30% Slope, High Intensity Burn	LCNF	1.36
Total Burned Miles		18.59

3. The attribute table for TrailBARCSlopeIntersect was exported and brought into an Access database for querying and analysis. The following numbers were used to standardize, per mile, the general drainage system work needs based on side slope and burn intensity and their cost (Ian Bardwell, Trail Coordinator, Rocky Mountain Ranger District):

Slope-Intensity	Waterbars per mile @ $60/per	Feet per mile Berm Removal/Outsloping @ $2/foot	Curb Log Feet per Mile @ $3/foot	Ditching Feet per Mile @ $1/foot
0-15% Slope, Low Intensity Burn	5	0	0	500
0-15% Slope, High Intensity Burn	10	0	0	500
15-30% Slope, Low Intensity Burn	10	792	0	500
15-30% Slope, High Intensity Burn	25	1056	0	500
>30% Slope, Low Intensity Burn	25	1056	158 (3% of trail)	500
>30% Slope, High Intensity Burn	50	1584	792 (15% of trail)	500

4. In Access the TrailBARCSlopeIntersect Table was queried together with the specific numbers and costs per structure type presented in item 3, above. The summary, by trail, is attached. The summary, grouped, by forest, is below (Flathead Request $7,120; Lewis & Clark Request $49,912):

Forest	# Waterbars Needed	Waterbar $ Total @$60/each)	Feet Berm Removal / Outsloping Needed	Berm Removal and Outsloping $ Total (@$2/foot)	Feet of Curblog Needed	Curb Log $ Total (@$3/foot)	Feet of Ditching Needed	Ditching $ Total (@$1/foot)	Turnpikes ($30/foot)	Culverts ($800 ea)	Total Structure $ Requested
FLATHEAD	42	$2,520	1557	$3,114	235	$705	781	$781	$0	$0	**$7,120**
LEWIS & CLARK	324	$19440	8892	$17,784	1130	$3,390	9298	$9,298	$22,500	$1600	**$74,012**
TOTALS	366	$21960	10449	$20898	1365	$4095	10079	$10079	$22,500	$1600	**$81,132**

5. Hazard Tree Removal for safety of crews working in burned areas on work identified for trails in the BAER Request. These are estimated costs based on knowledge of the burn area environment (larger dbh lodgepole, spruce and fir, largely in higher intensity burns, and often on side-slopes of >15%). Not every waterbar site will take 2 people 2 hours to make safe, but others may take longer if more trees or difficult situations are present. Likewise, not every 200 feet along other work items will require ½ hour of work to make the site safe, but other segments may take significantly more time.
   i. Waterbar sites: estimate approximately 2 hours at each site to ensure site safety (for identification and removal of one-two trees). Used a measure of $15/hour (GS-5) x 2 people = 30/hour x 2 hours =$60/waterbar site.
   ii. Per-foot work: Berm removal/outsloping, curb log installation and ditching (half of which is assumed to be associated with waterbar site safety above), time to clear hazards in the work zone: ½ hour per 200 feet to ensure crew safety ($15/hour x 2 people/2=$15/200 feet).

Forest	# Waterbars Needed	Hazard Tree Removal ($60/site)	Feet Berm Removal / Outsloping Needed	Hazard Tree Removal ($15/200 feet)	Feet of Curblog Needed	Hazard Tree Removal ($15/200 feet)	Feet of Ditching Needed	Hazard Tree Removal ($15/200 feet/2)	Total Hazard Tree Removal
FLATHEAD	42	$2,520	1557	$117	235	$18	781	$29	**$2,684**
LEWIS & CLARK	324	$19,440	8892	$667	1130	$85	9298	$349	**$20,540**
TOTALS	366	$21,960	10449	$784	1365	$102	10079	$378	**$23,224**

Appendix B: Cultural Resource Sites Considered in BAER Analysis

IDENTIFIED SITES AT RISK, STATUS, ANALYSIS, RECOMMENDATIONS

Site Number	Site Type/ Discussion	NRHP Status	In Burn Area	Fire Impacts Threats	BAER Risk rating	Recommendations/ Site Treatments
Known Sites within the Burned Area						
24LC1511	Green Fork Trail #228	Uneval.	Yes	Burned structures; change in character	Moderate	Design BAER treatments to retain historic trail integrity; Use cultural PA to consult with SHPO
24LC1962	Cigarette Creek Trail #247	Uneval	Yes	Burned structures; change in character	Moderate	Design BAER treatments to retain historic trail integrity; Use cultural PA to consult with SHPO
24LC1963	Straight Creek Trail #212	Uneval	Yes	Burned structures; change in character	Moderate	Design BAER treatments to retain historic trail integrity; Use cultural PA to consult with SHPO
24LC1964	Elbow Pass Trail #248	Uneval.	Yes	Burned structures; change in character	Moderate	Design BAER treatments to retain historic trail integrity; Use cultural PA to consult with SHPO
24LC1238	South Fork Sun River Trail #202	Elig?	Yes	Burned structures; change in character	Moderate	Design BAER treatments to retain historic trail integrity; Use cultural PA to consult with SHPO
24LC0937	Green Fork Administrative Cabin	Elig.	Yes	Burned non-historic features (corral, tack shed), cabin wrapped and sprinkled. Potential change in site character with fuels removal at site.	Moderate	No BAER Treatments prescribed. Monitor for suppression and post-fire related site form updates.
	Observation Pass (Loaf Creek) Trial 246	Unrecorded, known to be historic	Yes	Burned structures; change in character	Moderate	Design BAER treatments to retain historic trail integrity; Use cultural PA to consult with SHPO on trail maintenance (record site)
	Petty Crown Trail #232	Unrecorded, known to be historic	Yes	Burned structures; change in character	Moderate	Design BAER treatments to retain historic trail integrity; Use cultural PA to consult with SHPO on trail maintenance (record site)
Sites outside the burn area, downstream and potentially impacted during run-off events or fire suppression						
24LC0940	Welcome Creek Administrative Cabin	Elig.	No	Cabin wrapped in case fire moves south. Fuels reduction?	Low	Monitor in the future
24LC0797	Gibson Dam	Eligible	No	Indirect – additional sediment & logs in future	Moderate	No heritage-specific recommendations
24LC1241	S. Side Gibson Lithics	Elig	In lakebed	Additional sediment?	Low	Monitor in future
24LC1242	S. Side Gibson #2 lithics	Elig.	In lakebed	Additional Sediment?	Low	Monitor in future
24LC1815	Hoadley Boulder Prehistoric	Uneval	No	Heavy use of trail for suppression; compaction	Moderate	Monitor
24TT0229	Prehistoric	Eligible	In lakebed	Additional sediment?	Low	Monitor in future
24TT0230	Prehistoric	Elig?	In lakebed	Additional sediment?	Low	Monitor in future
24TT0297	GAP 93-1 / Lithic Scatter	Elig?	In lakebed	Additional sediment?	Low	Monitor in future
24TT0299	GAP – 93-3 / Lithic Scatter	Elig?	In lakebed	Additional sediment?	Low	Monitor in future