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BURNED-AREA REPORT

(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

[**X**] 1. Funding request for estimated WFSU-SULT funds
[ ] 2. Accomplishment Report
[ ] 3. No Treatment Recommendation

B. Type of Action

[**X**] 1. Initial Request (Best estimate of funds needed to complete eligible rehabilitation 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: Waterfall

B. Fire Number: PNA7VK

C. State: Nevada

D. County: Carson City

E. Region: Four

F. Forest: Humboldt-Toiyabe

G. District: Carson

H. Date Fire Started: July 14, 2004

I. Date Fire Contained: July 20, 2004

J. Suppression Cost: $8,000,000

K. Fire Suppression Damages Repaired with Suppression Funds

1. Fireline waterbarred (miles): 12 miles
2. Fireline seeded (miles): 0 miles
3. Other (Brush pulled back over): 9 miles

L. Watershed Numbers: HUC 5 1605010202, 1605020201

M. Total Acres Burned: 8,799
NFS Acres (2,782) Native American (206) State (359) Private (2,495) Carson City (2,507) College (154)

N. Vegetation Types: Bitterbrush, Mt. Sagebrush, Mountain Shrub, and Jeffrey Pine Forest and Riparian

O. Dominant Soils: Soils in the fire area have formed from granite and metavolcanic rock. In the drainages and floodplains soils have formed from alluvium from the granite and metavolcanic soils above. Granitic soils

within the burn area are mostly Corbet, Toiyabe, with smaller amounts of Glenbrook and Haybourne soils. Metavolcanic soils within the burn area are mainly Aldax Variant, Vicee, Koontz, and Sutro Variant with a small amount of Arkson. Soils formed from mixed alluvial deposits are mostly Holbrook, Jubilee, Surprise, and Toll.

P. Geologic Types: Bedrock within the Waterfall Wildfire area is comprised of Juro-Cretaceous metamorphic and Cretaceous igneous rocks. The metamorphic rock was originally volcanic flows from a previous existing volcanic

mountain range. The igneous rock is granitic in composition (i.e., granite, granodiorite and monzonite) belonging to the Sierra Nevada batholith (Trexler, 1977; Archibold, 1969). The metamorphic rock is more resistant to weathering than the igneous rock which weathers to what is colloquially referred to as "decomposed granite." The decomposed granite is the major source of landslide materials.

This area along the eastern side of the Sierra Nevada Mountain Range is seismically active. Several faults that are 300 years or younger lie parallel to the older faults which trend north by northeast. The older and younger faults define the boundary between the uplifted and downthrown blocks found in the basin and range province in western Nevada. Carson City lies on a downthrown block.

Geologically recent (i.e., 2 million years and younger) processes include the seismic activity and subsequent land sliding that has occurred in response to a combination of earthquakes and rainfall. This land sliding includes debris slides and debris flows. Deposits of these landslide events now blanket the area under Carson City and to the west of Carson City and include alluvial fans and aprons.

Q. Miles of Stream Channels by Order or Class: 18.6 miles of perennial stream and 23 miles of intermittent streams.

R. Transportation System

Trails: 3 miles Roads: 29.28 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres) 2,860 (33% low); 3,990 (45% moderate); 1,261 (14% high); 688 (8%) unburned
USFS (acres): 838 (low); 1,462 (moderate); 415 (high)
Other lands (acres): 2,022 (low); 2,528 (moderate); 846 (high)
B. Water-Repellent Soil (acres): 2,000

C. Soil Erosion Hazard Rating (acres):
616 (7% low) 2,552 (29% moderate) 5,631 (64% high)

D. Erosion Potential: 15-30 tons/acre

E. Sediment Potential: 2,534 cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years): 10 years, 50-100 for trees

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

C. Equivalent Design Recurrence Interval, (years): 25 years

D. Design Storm Duration, (hours): 6 hours

E. Design Storm Magnitude, (inches): 2 inches

F. Design Flow, (cubic feet / second/ square mile): 14 cfsm

G. Estimated Reduction in Infiltration, (percent): 18% of the area

H. Adjusted Design Flow, (cfs per square mile): 16.8 cfsm

PART V - SUMMARY OF ANALYSIS

A. Description of Watershed Emergency:

The Waterfall Fire is located west of U.S. Highway 395 directly above Carson City, Nevada. The burned area includes areas within eleven watersheds including Kings Canyon, Ash Canyon, Coombs and Vicee Canyons. The headwaters on the burn area follow the watershed divide on the Carson Range of the Sierra Nevada. The canyons affected are headwater tributaries to the Carson River to the east. This area is prone to summer thunderstorms often resulting in flash flooding.

Landownership within the fire includes: USFS, Washoe Tribe of CA and NV, Carson City, State of Nevada, Private, Nevada State Board of Regents, and Tahoe State Park. In addition to being the scenic backdrop for the Capital City, the area generates most of the city's municipal water supply. Initial assessments indicate that post fire impacts may include excessive water run off, debris flows, mud slides and other threats to Carson City's municipal water supply and water quality, infrastructure of the municipal water system, human life and property. Also at risk are down slope subdivision drain systems, sewer systems, and roadways.

Threats to life and property: Over 516 homes ~~ranging from $250,000 to $750,000 in value~~ are at risk from increased run-off directly downstream of the Waterfall Fire within the Carson City. Areas where the fire burned directly above and into subdivisions are at risk of rock falls, flooding and debris flows, especially in the Ash, and Kings Canyon areas.

Geologic instability and landside potential: The combination of vegetation loss from the wildfire with rainfall may result in landsliding. Computer models were used to derive hazard ratings for management decision-making. These include predicting initiation sites of landslides using Level I Stability Analysis (Hammond et al. 1992; Koler, 1998) and estimating runout distances of debris flows (Benda and Cundy, 1990). Results from the computer modeling indicate that a moderate-high to a high probability of landsliding occurrence will take place within the fire area during the next ten years until re-vegetation takes place. The probability increases from a moderate to a high hazard rating in response to rainfall – specifically rainfall events that have a frequency of 60 minutes or greater for return intervals of 2 to 25 years. Lesser rainfall frequencies are unlikely to result in landsliding.

The highest hazard runoff areas are the existing alluvial fans/aprons located in the North King Canyon Creek, Premier Mine, and Ash Canyon Creek areas. The Ash Canyon Creek area has the greatest risk because of the likelihood of debris flow reaching housing developments. High hazard areas have also been identified in the Vicee and Coombs Canyon areas but the runout areas are not as significant because the number of buildings and houses are much less prevalent than in the other high hazard areas.

Public safety and closures: The fire area is easily accessible all along the eastern perimeter. This area receives very high use from city residents and visitors.There is an existing and continuing public safety and hazard situation on the fire. The public can gain access to the steep terrain and unstable canyons in several areas. Carson City has closed the fire to all public access at this time. USFS and the private landowners will need to work together to control use of the area for the sake of public safety. Signage, public information kiosks, media releases and barriers will be needed to meet the public safety needs for at least the next year and a half.

Wind erosion and public safety: The Waterfall Fire lies adjacent to U.S. Highway 395 and directly adjacent to Carson City. The local winds are consistant in the afternoon along the mountain front in Carson City. The dust and ash from this fire could cause public safety problems related to decreased visibility and health problems. Blowing ash could also impact the municipal water supply, as the City uses surface water supplies that lie within the burned area.

Carson City and Virginia City municipal water supplies: The Waterfall Fire occurred in a designated municipal watershed. It is the sole municipal watershed for Carson City. Potential impacts of the Waterfall Fire to surface water supplies to Carson City include increases in sediment load and turbidity in the creeks that supply surface water to Carson City, and a possible increase in pH. The increased sediment load to the surface water treatment plant will likely cause temporary shutdown of the plant during precipitation events and heavy runoff periods. Landslides and/or mudslides would likely create the same effects, but may have the potential for longer-term disruption of operations if they occur in the stream bottoms. Hydrologists have confirmed that there is a high risk of debris flows and very high probability of increased ash and silt in the streams and just above the water quality treatment plant. The highest potential comes with the first moderate

to high storm event. This would cause damage to the buildings and system infrastructure associated with the water quality treatment plant.

Soil and ash run off resulting from the fire will also reduce the infiltration capacity of the Vicee Canyon recharge infiltration basins by plugging the bottom substrates with fine-grained material. Other debris carried downstream during major precipitation events may also interrupt recharge capabilities.

Also at immediate risk are the pipelines in Lakeview, Timberline, Vicee and Ash Canyons that supply water from Marlette/Hobart Water System to Virginia City and Carson City. These pipelines are vulnerable in several places where they cross streams. There are two pipelines, one that supplies water to the historic inverted siphon to Virginia City (which is their only source of municipal water) and another to the Ash Canyon Water Treatment Plant in Carson City. The access road to the Marlette Lake pump was within the fire and was burned. The Marlette Lake pump operates on diesel fuel and must be trucked in three times a week. The road is at risk of damage from increased flows and is not to a high enough standard to accommodate those flows. Loss of access on this road to the Marlette/Hobart Water System would inhibit system adjustments and the delivery of diesel fuel to the Marlette Lake pump, which would reduce and stop the flow to Virginia City and Carson City within a few days.

Threat to soil loss and loss of productivity**:** High severity burn occurred on 1,261 (14%) acres, and moderate severity burn occurred on 3,990 acres (45%). Acres of low severity burned areas are 2,860 (33%). (The remaining 8% not burned.) This level of severity has created localized hydrophobic soil conditions, removed overstory vegetation and organic duff cover. The majority of the high burn severity area is in the Kings Canyon and Ash Canyon subwatersheds. The majority of the high burn severity areas are on very steep slopes, and have a mixed moderate to fine sandy loam surface. There is as much as three inches of burnt ash on the high severity burn areas and no natural mulch on the soil surface. These soils are perched above the perennial streams in the Kings and Ash canyons. High and moderate burn severity areas have very high erosion potentials. This situation

places high risks upon water quality as well as threatening long-term site productivity and quality, and could contribute to debris flow during larger watershed events, posing a potential threat to life and property.

Threat to stream and Carson River water quality: Sediment yield is expected to increase from moderate and high severity burn areas as discussed previously. Key streams considered to be at extremely high risk from increased sediment yields are Ash Canyon and Kings Canyon Creek. These creeks flow through the City's drainage system and into the Carson River. These channels and pipes are not sized to compensate for this increase in expected waterflows or filter the sediment load. Therefore the Carson River can expect an increase in ash, storm flow, sediment and debris with the first substantial thunderstorm event and with spring runoff.

Threat to aquatic ecosystem integrity: Many of the riparian zones and aspen stands were burned at moderate and high intensities. These habitats are particularly important as they provide for high biodiversity, travel corridors, and local microclimates. In addition, Kings and Ash Canyon Creeks are recreational fisheries, with brook and rainbow trout. The lack of overhead shading vegetation due to the fire, and the resulting increased sedimentation into the creeks threaten aquatic environments. Preliminary assessments by Nevada Department of Wildlife found a total loss of the recreational fisheries. The threat of overland flow, debris flows and slope failure above the actual stream beds in steep areas will overwhelm these systems with sediment and threaten the natural restoration of the woody vegetation.

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Threat to terrestrial ecosystem integrity: There are no Federally listed plants or animals known to exist in the watershed. No critical habitat exists in the watershed. There are no state listed plants or habitat known to exist in the burn area.

The Waterfall Fire burned approximately 2,767 acres of forested stands. These areas were important to species such as black bear, goshawk, flammulated owl, bats, and many other types of cavity nesting birds. The long period in which it will take for this habitat to reestablish will have an adverse effect to forest dependent species. The Waterfall Fire burned nearly all of the winter range and significantly impacted the summer range for the Carson River mule deer herd. Damage to the winter range amounted to the loss of important bitterbrush, sagebrush, sagebrush/perennial grass, and Sierra mountain shrub foraging habitats. Loss of these vegetation types has created a forage deficit on the winter range. Damage to summer range amounted to the loss of overstory cover, hiding cover, and forage with the removal of almost all brush and shrubs and a substantial portion of the overstory trees. There is long-term loss of deer winter range and other wildlife habitats in the Waterfall Fire area through type conversion to a non-native cheatgrass and/or other noxious weed dominated vegetation type. This can alter the fire cycle such that some shrub/brush habitats may not return.

Invasive weed threat: There are several non-native undesirable and noxious weed species that were present pre-fire. Many of these have a high post-fire expansion and colonization probability. Seeding will be important to aid in the control of these species as well as using herbicide treatment where needed.

Species	Postfire Threat Potential
Cheatgrass - *Bromus tectorum*	very high
Medusahead - *Taeniatherum caput-medusae*	high
Hoary cress – *Cardaria draba*	high
Canada thistle - *Cirsium arvense*	moderate
Tall whitetop - *Lepidium latifolium*	moderate
Russian-thistle - *Salsola kali*	high
Yellow starthistle - *Centaurea solstitialis*	high
Annual ragweed - *Ambrosia artemisiifolia*	high

The location of the noxious weeds are both on Forest System Lands and City and Private. They are almost all along travel routes leading to the National Forest. Cheatgrass is present in varying amounts on all lands. Return

and expansion of cheat grass into much of the burned area is expected to occur from 6300 ft. and below into the urban interface. This threat is real, known, and apparent, not speculative. (See specialist report for Fire Effects on Waterfall Fire invasive weeds). Mountain big sage habitats throughout the west have experienced a significant impact from this invasion. Prior to human settlement, the typical fire regime was 12-25 years, with the advance of cheatgrass, the potential of increased fire intervals is imminent. Due to the change in plant structure and fuel loads, fires often burn much hotter. These more intense fires can promote the invasion of exotics, most commonly cheat grass. In turn, the fire regime shortens to every few years which places this urban interface at great risk.

Because cheatgrass has very weak root systems, erosion potential will remain high if not reseeded with other species, and in some cases, a non-native such as crested wheat has been recommended. At elevations below 6300 feet, cheat grass can begin to out-compete native shrubs and perennial grasses. If wildfire were to reoccur before native vegetation has had an opportuntiy to re-establish itself, the plant communty may become entirely dominated by cheat grass so that a type conversion takes place. A more frequent fire cycle will then become established that will be a consistent threat to life and property. As these lower lands burn more often the risk to the uphill USFS lands increases dramatically as well. This is evident on C-Hill which reburned during this fire and other foothills up and down the Sierra Front such as Peavine Mt. near Reno. Following fire, soil nutrient conditions are more favorable towards noxious weeds and invasive species thus promoting their introduction over native plant species. Therefore, in the case of sagebrush and bitterbrush habitats, fire has increased these areas' susceptibility to invasion by cheat grass and other noxious weeds.

Fuels: The Waterfall Fire destroyed a significant amount of the forest cover. Rarely was the fire intense enough to consume significant amounts of the woody portions of killed trees. If not removed from the watersheds these trees will add a large volume of dead fuel to the landscape over the next 5 to 10 years. This issue is most critical around the urban interface, but will be watershed-wide as well. Selected fire-killed trees that should be removed around the burned perimeters of the Lakeview and Timberline subdivisions, and on the west side of those homes located at the mouth of North Kings Canyon.

B. Emergency Treatment Objectives:

The emergency treatment objectives are to protect those values described in section A.

This section also describes the direct benefit, impact and relationship to adjacent USFS administered public lands.

- Reduction of Implementation Costs for all parties: Strong partnering developed through the suppression and BAER planning process will allow for many opportunities for joint and combined implementation efforts across the landscape. It is to the benefit of the USFS to aid non-federal partners in implementation efforts in order to reduce costs for all parties involved.
- Protection of over 516 homes that ~~ranging from $250,000 to $750,000 in value which~~ are at risk from increased watershed run-off, rock fall and debris flows directly downstream of the Waterfall Fire within Carson City. Erosion treatments such as log erosion barriers, straw wattles, seeding and mulching will aid in the protection of private property.

- Reduction of wind blown soil erosion into the subdivision and across U.S. 395. Seeding and mulching will reduce the dust and ash that could cause public safety problems related to decreased visibility and health problems. Blowing ash could also impact the municipal water supply, as the city uses surface water supplies.
- To protect Carson City's municipal water system: To restore as soon as possible vegetative cover and have in place erosion control that will hold soil and reduce the expected soil runoff. Treatments will aid in the reduction of debris flows and increased flooding that could impact Carson City's municipal water supply and water quality. The USFS has an office in Carson City that relies on these systems. Treatments will also aid in

protection of the infrastructure of the municipal water system, human life and property, down slope subdivision drain systems and sewer systems.

- Reduction of impacts to Carson City's municipal water supply and water quality: Treatments will aid in reducing sediment load and turbidity in the creeks that supply surface water to Carson City. Reducing the chance of temporary or longer term shutdown of the plant during precipitation events and heavy runoff periods.

QUILL WATER TREATMENT FACILITY			
Impacts Resulting from Significant Rain Event as a Result of Waterfall Fire Removal of Vegetation in the Watershed	**Cost Impact**	**Summer % Loss to Total Supply**	**Winter % Loss to Total Supply**
Minor event resulting in increased turbidity Reduction in ability to treat flows by = 1.5 mgd	Minimal	7.5%	30%
Moderate event resulting in sediment flows into discharge ponds. Shutdown of treatment facility temporarily (1-3 days) to remove sediments - 3 mgd loss	$10K - 100K	15% of production	67%
Large event resulting in breaching of discharge ponds Shutdown of treatment facility to reconstruct ponds (5-10 days) - 3 mgd loss	$0.5 - 1 M	15%	67%
Catastrophic event heavily damaging or destroying treatment facility, 1 year or longer to replace - 3 mgd loss	$5 M	15%	67%

- Reduce amount of sedimentation entering the Vicee Canyon recharge infiltration basins: Treatments will aid in preventing plugging the bottom substrates with fine-grained material in these basins. Other debris carried downstream during major precipitation events may also interrupt recharge capabilities.
- Protection of the pipelines in Vicee Canyon and Lakeview Road: Treatments to the Lakeview road, and erosion control treatments and seeding will aid in protection of these pipelines. The pipelines run from Hobart reservoir to both Carson City and Virginia City, which is Virginia City's only water source.
- Protection of human life through closures and a travel management plan: Implementation of closures and the travel management plan will aid in the most critical objective of this plan; protection of human life from post-fire hazards. This objective will also protect rehabilitation efforts and sensitive areas from damage by recreation use off of the main roads. Funding of a ranger/Public Information Officer for the burned area through implementation of the plan will aid in this effort to protect the public. Signage, public information kiosks, media releases and barriers will be needed to meet the public safety needs for at least the next year and a half. All of the access roads into the burn area lead directly into the Forest Service administered lands.
- Reduction of the loss of soil productivity: Implementation of prescribed treatments on high and moderate severity burned area will aid in the reduction of soil loss and soil productivity loss on over 59% of the burned area (4,111). Forest Service administered lands which received high and moderate severity burn total 1,822 acres of the total 2,782 acres burned. This situation places high risks upon water quality as well as threatening long-term site productivity and quality, and could contribute to debris flow during larger watershed events, posing a potential threat to life, federal and non-federal property. Due to the mosaic of landownership in the burn area, it benefits the Forest Service to help ensure that the other landowners are able to succeed in erosion control structures and seeding on all moderate and high severity burn areas.

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- Protection of stream and Carson River water quality: Treatments will reduce sediment yield into key streams in Ash and Kings Canyons. These creeks flow through Carson City's in pipes and channels and into the Carson River. Therefore the Carson River can expect an increase in ash, storm flow, sediment and debris with the first substantial thunderstorm event and with spring runoff. Many portions of these streams flow through a checkerboard ownership pattern. Treatment must be consistent over all ownerships in order to successfully treat water quality issues.
- Threat to aquatic ecosystem integrity: Many of the riparian zones and aspen stands were burned at moderate and high intensities. These habitats are particularly important as they provide for high biodiversity, travel corridors, and local microclimates. In addition, Ash and Kings Canyon Creeks are recreational fisheries, with brook and rainbow trout. The lack of overhead shading vegetation and the increased sedimentation into the creeks threaten aquatic environments. Preliminary assessments by Nevada Department of Wildlife found a total loss of the recreational fisheries. The threat of overland flow, debris flows and slope failure above the actual stream beds in steep areas will overwhelm these systems with sediment and threaten the natural restoration of the woody vegetation.
- Provide for wildlife habitat short term by preventing vegetative type conversion: Implementation of erosion control treatments and seeding will aid in preventing type conversion which could cause irreversible loss of the native habitats. The diversity of landownership calls for consistent seed mixes and applications of seeding prescriptions in order to meet objectives and to maximize cost effectiveness.
- Reduction of post fire fuels and hazard trees to protect human life and property: The Waterfall Fire killed a significant amount of the forest cover. Rarely was the fire intense enough to consume significant amounts of the woody portions of killed trees. Removal of fire-killed trees around the burned perimeters of the Lakeview and Timberline subdivisions, and on the west side of those homes located at the mouth of North Kings Canyon will significantly diminish risk to human life and private property. If not removed from the watersheds these trees will add a large volume of dead fuel to the landscape over the next 5 to 10 years and add to the fire hazard around the urban interface. This threat will be watershed-wide, impacting all landowners. There are many steep slopes on the steep National Forest System lands above the subdivisions.
- Reduction of acres infested by invasive and noxious weeds: Seeding treatments must be applied across all land ownerships to reduce the spread of noxious weed onto National Forest lands. There are several non-native undesirable and noxious weed species that were present pre-fire. Many of these have a high post-fire expansion and colonization probability. Any areas of high and moderate burn intensities left untreated could easily become infested and act as weed seed sources to other areas. Limiting vehicle access into the fire area by strategically placing barriers and gates at access points below National Forest will greatly reduce the spread of noxious weeds.
- Reduction of acres infested by cheat grass: Seeding treatments must be applied across all ownerships. Return and expansion of cheat grass into much of the burned area is expected to occur from 6300 ft. and below into the urban interface if not seeded with vegetation that will compete with this invasive grass. This threat is real, known, and apparent, not speculative. (See specialist report for Fire Effects on Waterfall Fire Invasive Weeds). Any areas of high and moderate burn intensities left untreated could easily become infested and act as weed seed sources to other areas. Allowing this invasive annual to become established will also change the fire regime to one that promotes the invasion of other invasive exotics. In turn, the fire regime shortens to every few years which places this urban interface at great risk. As these lower lands burn more often, the risk to the uphill National Forest System Lands increases dramatically.
- To provide a short-term implementation monitoring plan as well as a longer term monitoring plan that will generate recommendations to ensure the success of the rehabilitation efforts.

C. Probability of Completing Treatment Prior to First Major Winter Damage-Producing Storm:

Land **80** % Channel **80** % Roads **80** % Cultural **90** % Public Warning System for Hazards **75%**

D. Probability of Treatment Success

Treatment	Year 1	Year 3	Year 5	Beyond BAER
Land	**75**	**90**	**90**	**90**
Channel	**75**	**80**	**90**	**90**
Roads	**80**	**85**	**95**	**90**
Cultural	**80**	**90**	**90**	**90**
Warning System	**80**	**80**	**80**	**90**

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

Four parameters were used to determine the loss of resources if no treatment were appplied. These include loss of site productivity valued at $1,550,000 and loss of roads valued at $550,000. Impacts of sediment on road drainage infrastructure $4,000,000. Impacts of sediment on Carson City and Virginia City water systems $5,000,000. Total cost of no action is $11,100,000.

A non-calculated cost of the no action alternative also includes the anticipation of cheat grass invasion into the burned areas. Much of the cost of the action alternative is associated with revegatation of native and non-native desirable species $250,000. Additional costs of the no action, which has not been is the loss of the aesthetic value to local citizens and tourists.

F. Cost of Selected Alternative (Including Loss):

The cost of implementing the proposed treatments is $6,316,603. As noted above the values at risk are estimated to be worth $11,100,000 if lost. So the selected alternative would save an estimated $4,783,397 when compared to a total loss of the resources at risk.

G. Skills Represented on Burned-Area Survey Team:

Team Leader
Asst. Team Leader Writer/Editor
Public Information Officer
Forester, Fuels Management
Vegetation
Engineering
Water Supply
Recreation

Wildlife
Archaeology
Hydrology
Soil Scientist
Geologist
GIS, Computer Specialist
Urban Forestry
Washoe Tribe, Colony Representative
Recreation access
Implementation Specialist
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H. Treatment Narrative:

It is extremely important that emergency land and channel treatments, road and trail treatments and other work be completed throughout the burn area. In addition to Forest Service funding for National Forest lands. the funding table at the end of this report also identifies possible funding opportunities from NRCS and FEMA. Spending authority under Wyden Amendment is being requested for some road work on Carson City lands to ensure that the roads are upgraded to a sufficient condition to complete BAER treatments on National Forest system lands above the city lands. We have also included several sigining treatments as part of the Wyden request. These signs need to be installed on City lands to inform the public of hazards and access issues on National Forest lands above the City.

Land Treatments

Log Erosion Barriers (LEB) and Contour Felling of Trees: The purpose of this treatment is to trap soil and ash from side slopes to prevent material from entering stream channels and to keep sediment on site. Trees will be felled and installed perpendicular to the slope in areas designated on the treatment map. An estimated 30 to 40 LEB/acre will be installed. This treatment will vary depending on localized conditions. LEBs will be installed in high severity areas where there is timber available.

Straw Wattles: The purpose of this treatment is to capture and retain soil and ash on slopes, reduce soil creep and sheet rill/erosion until vegetation re-establishes. Wattles will be installed on hillsides behind vulnerable homes and on slope contours where sufficient trees are not available for contour felling as designated on treatment map. An estimated 30-40 wattles/acre will be installed. This treatment will occur depending on localized conditions.

Seeding: The purpose of this treatment is to minimize soil wind and water erosion by providing a vegetative surface cover, and to prevent the introduction and increase of noxious and invasive weeds. Seeding will be done with four different seed mixes tailored to fit specific areas of the burn. Some areas will applied by air and some will be applied with a seed drill. The seeding will overlap with the LEB's, straw wattles and with the straw

mulching in some areas. Aerial seeding is necessary due to the very steep slopes in the upper elevations of the burn areas and lack of road access to this area.

Seeding of all lands with consistent seed mixes and across the entire watershed will decrease the application costs to all parties. It is extremely important that soil productivity be protected on both private and public lands. These soils are essential in ensuring that all lands are revegetated with the desired species. This will ensure decreased weed and cheat grass infestations on all lands. The high amount of PLS per sq. ft. is needed in the seed mixes 1A and 2 due to the type of application and seed sizes. In order to ensure complete coverage on the target area a higher amount of Poa seed needs to be applied. The Poa seeds are very light and small. Some drifting of seed is anticipated.

1- High Elevation Overall Mix (aerial seeding)

Species	Variety	PLS Seeds Sq/Ft Mix	PLS Pounds/Acre
Sterile Triticale	**Quickguard**	**4.5**	**15**
Elytrigia intermedia ssp. tricophorum	**Luna**	**11.5**	**5**
Poa canbyi	**Canbar**	**21.3**	**1**
Poa ampla	**Sherman**	**20.2**	**1**
Onobrychis viciaefolia	**Sanfoin**	**0.3**	**0.5**
	TOTAL	**57.8**	**22.5**

1A-High Elevation Manzanita Mix (aerial seeding)

Species	Variety	PLS Seeds Sq/Ft Mix	PLS Pounds/Acre
Sterile Triticale	**Quickguard**	**7.5**	**25**
Poa canbyi	**Canbar**	**106.3**	**5**
	TOTAL	**113.8**	

2 - Mid-Elevation Overall Mix (aerial seeding)

Species	Variety	PLS Seeds Sq/Ft Mix	PLS Pounds/Acre
Elytrigia intermedia ssp. tricophorum	**Luna**	**18.4**	**8**
Agropyron cristatum	**Ephraim**	**23.0**	**5**
Poa canbyi	**Canbar**	**31.9**	**1.5**
Poa ampla	**Sherman**	**30.4**	**1.5**

Astragalus cicer	**Cicer milkvetch**	**3.3**	**1**
	TOTAL	**106.9**	**17**

Low Elevation Drill Mix

Variety		PLS Seeds Sq/Ft Mix	PLS Pounds/Acre
Luna		**9.2**	**4**
Ephraim		**13.8**	**3**
Canbar		**10.6**	**0.5**
Cicer milkvetch		**3.3**	**1**
	TOTAL	**36.9**	**8.5**

Mulching: The purpose of this treatment is to cover soil surface in order to mitigate raindrop impact, wind erosion and to protect the seeds and create an insulating layer for seedbed. Only certified weed free mulch products will be used. Aerial and hand mulching application will occur, with most of the hand mulching occurring along the urban interface. Crimping
in of straw on areas drilled to increase stability of the straw (so it will resist wind erosion) and increase water holding capacity. This will be accomplished using the rangeland drill.

It is extremely important that soil productivity be protected on both private and public lands. These soils are essential in ensuring that all lands are revegetated with the desired species. This will ensure decreased weed and cheat grass infestations on all lands.

Hazard Tree Removal: The purpose of this treatment is to remove hazard trees around the urban interface and along roads for public safety. The funding table attached to this document lists the specific number of hazard trees to be removed.

Cultural Site Protection: The purpose of this treatment is to restore and protect seven cultural sites which are at risk from erosion. The sites will be stabilized with straw matting, mulching or hand seeding to develop a ground cover that will stabilize soil and disguise artifact scatters and features.

The water powered Ash Sawmill, constructed in 1860 (Wilson 1992:65) is located within an area of the fire on Carson City lands that was moderately burned. Although some vegetation was not completely burned, enough was burned off to expose the site's features and artifacts. There is an increased risk that the site may continue to be impacted by unauthorized digging since additional artifacts and features have been exposed. Additionally, the site is positioned at the base of a steep slope that was burned and will be impacted by soil erosion and falling trees from above.

In addition to the Ash sawmill six additional historic Comstock related sites were found within the burned area. These include two road segments, three artifact scatters, and one flume/earthen ditch. None of these sites have been recorded and all are susceptible to severe soil erosion in the event of a heavy rainstorm. All of these sites are situated along or at the base of steep slopes or near drainages, which may also make them susceptible to erosion from flood events.

The majority of these sites are located on Carson City lands and funds from NRCS may be used to record and stabilize the sites.

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Channel Treatments

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Protection of Water System Intake Structures: The purpose of this treatment is to protect Carson City's water supply. Design and install trash racks on Kings Canyon and Ash Creeks to protect the water intake structures from debris flows.

Protection Barriers for at Risk Homes: The purpose of this treatment is to directly protect four homes at direct risk in need of immediate protection. Install barriers to protect homes that are in the direct path of flood and/or debris flows from Ash Creek, Kings Creek, and unnamed drainage near the Premier Mine site. Barriers will be designed and placed to divert flows away from the structures.

Bridge Construction: The purpose of this treatment is to remove the existing culvert and upgrade it to a bridge over the unnamed drainage near the Premier Mine. There is a culvert that will not have enough capacity in the event of a flood and/or debris flow and will cause the flows to be diverted down the road and onto a homesite. It is recommended that the culvert be removed and a bridge constructed.

City Storm Drain System Protection: This treatment will increase the capacity of the city drain system. This includes an assessment of the drainage system infrastructure in the Timberline and Lakeview subdivisions and in the subdivisions in the area between the Premier mine and Quill Ranch Rd. Appropriate maintenance and upgrades will be needed. Much of
the drainage network through the neighborhoods is all or partially clogged and some of the drainage network will not pass the expected flows. Once clean and functioning a drainage patrol will be implemented to check the drains during storm events to keep them functioning at the critical time.

Maintenance of Irrigation/Diversion Structures: The Kings Canyon and Ash Creeks have irrigation systems on them that could clog and divert flood flows to unwanted areas. The purpose of this treatment is to clean and maintain the irrigation system diversions to handle additional run-off from the fire area to prevent flooding outside of channel areas.

Maintenance of Vicee Canyon Flood Control Structures: This treatment is to clean out the existing water infiltration basins so that they can catch and hold sediment. The basins are not functioning at full capacity at this time and need to be cleaned out. Increase maintenance interval as needed.

Sediment Detention Basin: Vicee Canyon is very unstable and has potential to produce a large debris flow. Part of the debris flow potential is large alluvial deposits just below the Timberline Subdivision. This treatment will help to protect the homes at the bottom of Vicee Canyon, design and construct a detention basin which is identified on the channel treatment map. This structure is located above the gabion structures noted as the next treatment.

Gabions: The purpose of this treatment is to trap and store channel-mobilized sediment, prevent further downcutting and widening of the channel, and attenuate peak flows. These structures will also help to stabilize the channel in the long term. Install at least three gabion structures on Vicee Creek.

Water Pipeline Reinforcement: One of the major water lines supplying water to Carson City could be subject to damage if Vicee creek has a debris flow. Protect the pipe by reinforcing the pipe locations where the pipeline interfaces with the floodplain of Vicee Creek.

C-Hill Stream Channel Work: There are drainages that flow into Kings Canyon St., Rhodes St., Curry St. Moses St., Betts St., Paiute St., and Indian Colony that have under capacity or non existing culverts. A sedimentation/detention basin with a controlled out flow would improve the drainage and allow the drain system to sufficiently handle the expected runoff.

Early Warning System: Install an early warning system at the top of the watershed to alert the community of a upper watershed event. The condition of the watershed within the burned area poses a threat to the community in many ways including a direct threat to life, property, and water quality. A large precipitation producing storm could happen in the upper part of the watershed and not be noticed in the lower part of the watershed. The town needs to be warned to get out of harms way and shut down the water system intakes before the hazard hits. This request is for two rain guages which would be installed on National Forest System Lands. The guages are designed to tip over once they fill with rainwater and send immediate alert. The City would purchase the guages and USFS personnel would install and maintain them.

Roads and Trail Treatments

Musgrove /Lakeview Road Drainage: Roads #41446, #41162 and #41184. Travels southwesterly and easterly from Franktown Road to the neighborhood pavement within Lakeview; approximately 9 miles. The route provides vital access for the operation, maintenance and repair of aged water transmission pipelines for Carson City, Virginia City, Silver City and Gold Hill. Approximately 2,400 gallons of diesel fuel is transported twice weekly from July 1 through October 15 along this route to sustain a water pumping system that delivers water to the users. The delivery pipeline intersects this route at 3 locations. Daily administrative vehicle use by employees of the Lake Tahoe State Park and the U.S. Forest Service must be accommodated.

Existing culverts and the water pipeline sustained no physical damage; however efforts to provide additional cover over the pipelines resulted in steeper, loosened approaches that became challenges to the fuel delivery vehicle operated by the State of Nevada. These approaches now require moderate reconstruction and compaction to assure safe, stable passage for the fuel hauling vehicle. The culverts should not be subject to significantly increased runoff potential since they were only skirted by the fire.

1. BAER road restoration work will consist of surface blading and shaping to restore road template drainage; and the replacement of lost shoulder material & cover material over the culverts and pipeline;
2. Water will be applied to the road surface throughout the blading & shaping activity to promote compaction of the abraded roadway surface.

Kings Canyon Road Drainage: FDR #41039. This road descends northeasterly from US Highway 50 through National Forest and private lands to the western extension of King Street in Carson City; approximately 10 miles. This scenic route serves as a heavily used recreational corridor for many varieties of dispersed use.

1. The fire burned across a 3500’ native surface segment (USFS) and an additional 1.8 miles of asphalt pavement within the Carson City limits. Existing culverts through this burned area will be subject to significantly increased runoff and sediment delivery from future high intensity rainfall events. Culvert replacements which are identified will be submitted for funding through an interim request.
2. Sediment accumulations in roadside ditches through the burned area will be removed by a grader (if possible) or a backhoe (with off-site haul) to provide adequate ditch capacity for increased sediment loads that will be generated from future high intensity rainfall events.

3. An angled rolling dip will be constructed (section 23) to prevent the migration of accelerated runoff & sediment northeasterly within the roadway.
4. Fiberglass delineator posts with reflective yellow decals will be placed in the road shoulder to mark the inlet and outlet ends of existing culverts.

Voltaire Canyon Road Repair and Drainage: FDR # 41710. This road ascends southerly and northeasterly from the Kings Canyon road through National Forest Land to the southwestern limits of Carson City for approximately five miles. This vital utility corridor provides access to private lands, serves for rehabilitation access & emergency evacuation, and offers dispersed recreation opportunities on the National Forest (including "C" Hill). {Note: At the north end, a right-of-way exists for an alternate route connection to Kings Canyon Road near Kingsview Way.} Secondary laterals extend easterly to private land and Native American Land. One "shortcut" lateral travels westerly about 1.25 mile crossing Kings Canyon creek and connects to the Kings Canyon Road.

The native soil is mostly loose decomposed granite. Roadside ditches have been marginally effective, with frequent maintenance, to handle storm runoff even with frequent maintenance. The increased runoff potential from this fire and other recent fires within the tributary area suggests an increased risk of flash flood impacts to travelers on the roadway through a 4,000' section of the confined canyon bottom.

1. The roadside channel does not have the capacity to accommodate the increased flows expected as a result of the fire. This can be mitigated by removing accumulated sediments from the roadside ditch, installing rock filled wire gabions (to isolate the drainage channel from the road), and elevating the roadway surface with the screened sediment from the ditch;
2. Reconstruction of an abrupt ford crossing (Section 24, NW 1/4) is necessary to provide access for implementation of BAER treatments and to contribute to a safe evacuation route from Kings Canyon;
3. A rock armored drain dip will be constructed at the Kings Canyon creek crossing (section 23) on the secondary connector to the Kings Canyon Road.

** Note: Routes that are a part of the Humboldt-Toiyabe National Forest road network are identified with route numbers and are referred to as Forest Development Roads (FDR's).*

Ash Canyon Road Repair: This route provides public access through private and Carson City lands to the Lake Tahoe Basin and the Lake Tahoe Nevada State Park. Approximately 400 acres of national forest land can be reached from this road. The roadway is about 4 miles in length ascending from an elevation of 4,800' to 7,800' near the state park boundary. The Ash Canyon watershed is a vital contributor to the Carson City municipal water supply utilizing a delivery pipeline from the Marlette/Hobart system. The road serves as critical access for operation, maintenance and repair of the Carson City water storage and distribution system. Additionally, a USGS water flow monitoring station lies upstream from the municipal water intake system; one of five monitoring stations used continuously to quantify and record this critical resource.

The Ash Canyon road provides public access to the upper watershed offering an ideal location (at the 6300' level) for a staging area for implementation of BAER treatment efforts. This corridor also serves as useful monitoring vista for observation of active slide areas on the slopes (south and west) above Ash Canyon creek and its tributaries. With the accelerated runoff potential from the burned slopes, there is an increased risk for these unstable areas to deliver sediment
flows that can degrade water quality or suddenly block water flow in the drainage. The gravity of these consequences emphasizes the importance of safe access for diligent, prudent surveillance of these areas of concern.

This route was used heavily to support the fire suppression efforts which resulted in abrasion and loosening of the driving surface. Some road segments (in Sections 10 & 11) lack drainage structures which results in the confinement of surface runoff within the road prism. The resulting concentration of runoff increases water velocity, erosion effects and the eventual delivery of sediment flows into Ash Canyon Creek. Repair efforts will include:

1. As a temporary measure, a woven filter fabric will be used as an envelope in the construction of angled water bars, in areas where loose decomposed granite water bars would not survive the repeated wheel impacts that will be delivered during the implementation of other BAER treatments in the area.
2. Rock rip-rap will be placed at the water bar outlets for energy dissipation and erosion control.
3. In support of BAER treatment efforts in this heavily burned drainage, a staging area clearing will be developed at the 6300' level (in Section 10). Turnouts will be provided along a 7,500 foot single lane road segment traveling easterly

   from the staging area. These turnouts will provide safe passing zones for two way traffic during the BAER implementation period in this important watershed.

Structures~~Recreation~~

1. Temporary joint closure of the entire burned area on U.S. Forest Service and Carson City properties through spring, 2005. The exceptions to the joint closure will be for access of private property owners.
2. The following roads and trails that will be open for public access and recreational use:
   Carson City's V&T Multi-use Trail.
3. Recreational Road Corridors: The roads listed below will be certified for public safety and reconstructed for year round access to accommodate high clearance, four-wheel drive vehicles.
   - Kings Canyon Road
   - Voltaire Canyon Road
   - Voltaire Canyon Loop Road (to Kings Canyon Road)
   - Musgrove Canyon Road
   - Selected Fire Break and Utility Service Roads within the urban interface area (to be identified as rehabilitation activities are completed in the burn area)
   - Lakeview Park (Limited access through the park to Lakeview Road)
   - Or as authorized by the U.S. Forest Service or Carson City

3. In order to manage public access, and protect/communicate with the public, including implementing the strategy of returning public recreational use to the burn area, the following items will need to be installed around the fire perimeter and within the burn area:

- twenty (20) informational signs,
- six (6) directional signs,
- forty (40) warning signs regard difficult road travel signs,
- one hundred (100) Carsonite road markers,
- five (5) vehicle gates

Warning Signs: These signs are needed to ensure the public is aware of the hazards in the burn area, especially concentrated along the trails and access roads most commonly used. Install warning, closure status and educational signing at all access points to the fire area . The signs will describe potential dangers due to flood events falling trees, rolling material, and any implemtation operations.

BEAR Evaluation

This included the cost for the initial BAER assessment. Cooperating agencies funded their own staffs and the estimated amount of their contribution is included in the FEMA column. As BAER the monitoring plan is implemented, interim requests may be submitted to treat weeds and other resource problems which are identified through monitoring.

Monitoring

A monitoring plan will be submitted for approval at a later date. The monitoring plan will include requests for effectiveness monitoring of treatments and monitoring for invasive plants.

~~**Recreation Monitor and**~~ **Public Information:** To ensure consistant continued stream of information to the public and other agencies on safety, landowner assistance, closures, travel plans changes and rehabilitation updates. To administer,

monitor and implement all aspects of the travel management plan including the hazard signing, public information with the media in dispersing public safety and closures. This would be a temporary ~~1 ½ year~~ position during implementation of BAER treatments.

BAER Implementation Team: A full time team leader~~person (detailer)~~ will be hired by the Forest Service to work with the Nevada Division of Forestry, Carson City and other land owners to implement the BAER plan. Cooperating agencies will provide implementation liaisons who will be funded through their regular salary or through other emergency funding. Coordination between landowners is essential for successful implementation of this plan.

Part VI – Emergency Rehabilitation Treatments and Source of Funds by Land ~~O~~Ownership

See attachment

~~See attachment.~~

PART VII - APPROVALS

/s/ Robert L. Vaught
Forest Supervisor (signature)

July 27, 2004
Date

Regional Forester (signature)

Date

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