Date of Report: 10-12-20

BURNED-AREA REPORT

PART I - TYPE OF REQUEST

A. Type of Report

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

B. Type of Action

☒ 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)

☐ 2. Interim Request #___
☐ Updating the initial funding request based on more accurate site data or design analysis

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Riverside

B. Fire Number: OR-MHF-000859

C. State: Oregon

D. County: Clackamas

E. Region: Pacific Northwest

F. Forest: Mt. Hood

G. District: Clackamas River

H. Fire Incident Job Code: P6NKP2 (0606)

I. Date Fire Started: 09-08-20

J. Date Fire Contained: 10-31-20

K. Suppression Cost: 17,800,000

L. Fire Suppression Damages Repaired with Suppression Funds (estimates): Click here to enter text.

1. **Fireline repaired (miles):** Only 3.08 miles of handlines and dozer lines were constructed because roads were used primarily for containment on NF lands. As of Oct. 11, roughly less than a mile had been repaired.
2. **Other (identify):** Click here to enter text.

M. Watershed Numbers:

Table 1: Acres Burned by Watershed

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
170900090601	Canyon Creek	10,713	2,033.79	18.98
170900090408	Cedar Cr. Molalla R.	8,419	64.47	0.77
170900110306	Cot Cr/Oat Grove FK.	14,170	2,795.63	19.73
170900090405	Dead Horse Canyon Cr.	8,987	8,838.12	98.34
170900110603	Dubois Cr Clackamas R.	12,636	1,626.76	12.87
170900110107	Farm Cr. Collawash R	16,325	549.12	3.36
170900110403	Fish Creek	29,806	26,776.85	89.84
170900090602	Headwaters Milk Cr.	10,243	489.03	4.77
170900110406	Helion Cr. Clackamas R.	11,719	11,029.84	94.11
170900110503	Lower Eagle Creek	22,358	270.52	1.21
170900110103	Lower Hot Springs FK	18,272	140.56	0.31
170900090407	Lower NF Molalla R.	7,116	4,281.07	60.16
170900110602	Middle Clear Cr.	21,812	2,106.76	9.66
170900110405	NF Clackamas R.	20,637	1,068.44	5.18

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
170900090403	Pine Cr. Molalla R.	23,952	636	2.66
170900110205	Pot Cr. Clackamas R	22,961	201.43	0.88
170900110402	Roaring R	27,308	2,277.68	8.34
170900110404	SF Clackamas R	17,665	17,404.64	98.53
170900090401	Table Rock	23,227	417.28	1.80
170900110401	Three Lynx Cr. Clackamas R	31,546	24,874.33	78.85
170900090404	Trout Cr. Molalla R	15,677	1,521.21	9.70
170900110601	Upper Clear Cr.	12.246	8,988.47	73.40
170900090406	Upper NF Molalla R	19,699	18,820.33	95.54
170900090604	Woodcock Cr.	8,200	1,099.19	13.40

N. Total Acres Burned:

Table 2: Total Acres Burned by Ownership

OWNERSHIP	ACRES
NFS	85,625
OTHER FEDERAL (BLM)	10,998
STATE	152
PRIVATE	41,349
TOTAL	138,126

O. Vegetation Types: Three major forest stand association groups within the fire perimeter include the following forest types: western hemlock, mountain hemlock, and silver fir. Grand fir, white fir, and other types compose a small portion of the burn area. **Western Hemlock Series:** Occurs at lower elevations in the southwest portion of the forest and the overstory is normally dominated by Douglas fir with regular disturbance such as fire. The understory is western hemlock with a variety of shrub ground cover types depending on elevational and moisture gradients as with all groups. **Pacific Silver Fir Series:** Occurs in cooler and more moist conditions at a higher elevation than the Western Hemlock Series. The overstory of this series is also usually the dominant overstory species outside of disturbance with pacific silver fir and shrub types dominating the understory. **Mountain Hemlock Series:** Occurs in cool moist conditions at upper elevations on both sides of the Cascade.

P. **Dominant Soils:** Major geologic forces that shaped much of the landscape in the Riverside fire area include volcanism, glaciation, landsliding, and fluvial processes. Parent materials are composed of pyroclastic rock, igneous rock formations, and glacial till. Columbia River basalts are also found in the lower Clackamas River drainage and in the Fish Creek drainage. Earth flow formations are also common in the area and are considered very productive. Please see the Riverside BAER Geology report for a more detailed discussion of the geology found in the area. Several soil texture types are found in the Riverside fire perimeter, but sandy loam and silt loam textured soils are by far the dominate texture class. Volcanic ash cap soils (Andisols) are also present in the Riverside fire perimeter as are Alfisols, Ultisols, and Inceptisols. Erosion potential is generally high in the Riverside fire perimeter due to soils being derived of pyroclastic or igneous parent material (100 & 200 series in the Mt Hood SRI respectively) that are readily broken down by weathering processes and occurring on steep slopes (>30%). Vegetation cover is key in protecting these soil types from excessive erosion.

Q. **Geologic Types:** The burned area lies entirely within the Western Cascades Physiographic Province, which is characterized by older volcanic rocks, generally steep slopes, and large ancient landslide deposits (Peck, et al., 1964). There are four bedrock units that underlie the fire perimeter. The oldest and lowest in position are the Little Butte Volcanic Series located in the upper reaches of the Clackamas River, at the confluence of the Clackamas and Collawash Rivers. The entire valley bottom is situated on large scale earthflows that produce generally subdued topography as compared to the lower portion of the watershed. Overlying the Little Butte Volcanic Series are two members of the Columbia River Basalt Group. These lava flows form most of the very steep to near-vertical valley side slopes of the Lower Clackamas River along Highway 224. The basalt flows are generally resistant to erosion and form steep cliffs. However,

there is a weak sedimentary interbed called the Vantage Member, between the two flows. It is composed of ash deposits and is a barrier to groundwater flow, which results in increased pore-water pressure at the slope face where the unit is exposed. The resulting pressures create a slip surface for large ancient landslides. The Vantage Member typically forms a steep bench of loose, unconsolidated talus where the upper basalt flows have been removed by undercutting. Immediately above the Columbia River basalt flows is the Rhododendron Formation, which is composed of pyroclastic flow and mudflow deposits. This unit caps the ridges within the burn perimeter, including Wanderer's Peak, Soosap Peak, Fish Creek Mountain, and East Mountain. The material in this unit is easily eroded and prone to landsliding in the steep headwater tributaries of the aforementioned peaks. Overlying the Rhododendron Formation are younger volcanics of the High Cascades. These units are primarily found in the headwaters of tributaries of the Clackamas River East of the fire perimeter, and generally cap the ridge tops, including Mount Mitchell and Oak Grove Butte. One exception is the wide plateau known as "La Dee Flat" north of the Clackamas River at Promontory Park. La Dee Flat is composed of a member of the Boring Volcanics and has a generally low slope angle that precludes the development of landslides.

R. Miles of Stream Channels by Order or Class:

Table 3: Miles of Stream Channels by Order or Class

STREAM TYPE	MILES OF STREAM
PERRENIAL	352.91
INTERMITTENT	620.87
EPHEMERAL	--
OTHER	--

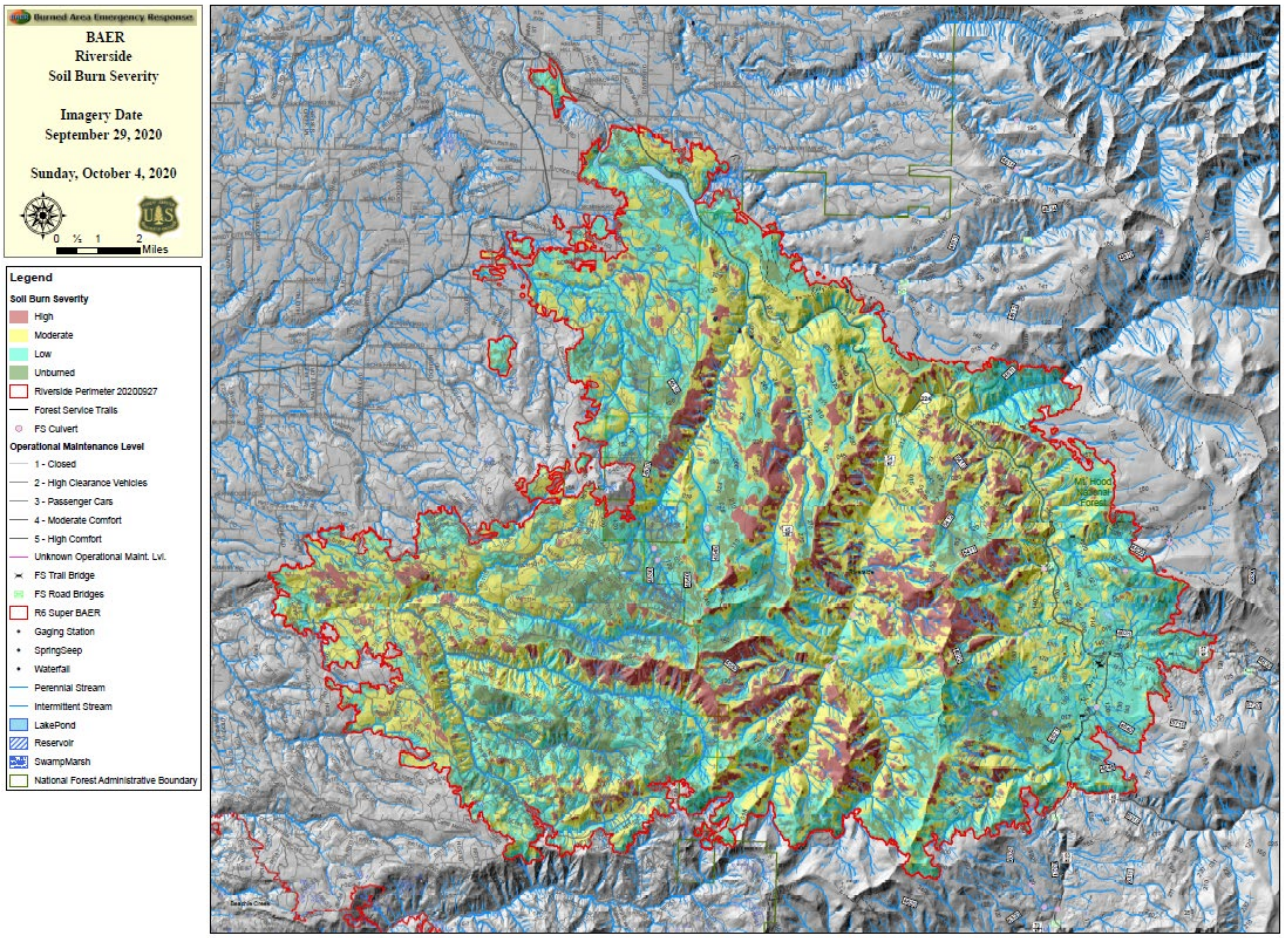
S. **Transportation System:**
Trails: *National Forest (miles):* 32.87 *Other (miles):* 0
Roads: *National Forest (miles):* 264.04 *Other (miles):* 504.22

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

Table 4: Burn Severity Acres by Ownership

Soil Burn Severity	NFS	Other Federal (BLM)	State	Private	Total	% within the Fire Perimeter
Unburned	9,361.77	2,848.47	6.98	5,906.75	18,123.97	13.17
Low	26,069.76	4,968.31	122.24	16,248.43	47,408.74	34.46
Moderate	34,013.46	3,390.64	22.79	17,690.66	55,117.55	40.06
High	13,536.98	1,365.09	0.00	2,031.68	16,933.75	12.31
Total	82,981.97	12,572.51	152.01	41,787.52	137,584.01	100



B. Water-Repellent Soil (acres): Fire-induced or altered hydrophobicity occurred on approximately 32% of soils (100% of severely burned soil and 50% of moderately burned soil) or around 44,493 acres.

C. Soil Erosion Hazard Rating: 25,097 acres of low (17%); 46,135 acres of moderate (34%); 50,682 acres of high (37%); 15,878 acres very high (12%). Methodology for calculating soil erosion hazard ratings can be found in Appendix A of the soil report.

D. Erosion Potential: 70 tons/acre;

E. Sediment Potential: 37,550 cubic yards/square mile
Erosion and sediment potential are average estimates from model runs and are generally considered higher than expected. In the event of a high intensity rain event or a rain on snow event then we would expect to see a watershed response like the higher numbers displayed above. In the report we converted the model numbers into a percent increase from baseline conditions (pre-burn) and feel this is a better representation of the model outputs. These percent increases are in Appendix C of the Riverside BAER Soils Report.

F. Estimated Vegetative Recovery Period (years): 2-5 years

G. Estimated Hydrologic Response (brief description): Hydrologic response following wildfire in the Riverside Fire burned area will include reduced interception and infiltration of precipitation, increased runoff and erosion, higher stream flow volumes for a given precipitation or snowmelt input, and a more rapid rise of stream and river levels compared with those of unburned conditions. Additionally, the probability of severe erosion, debris flows, and hillslope failure is substantially higher, and will remain so for at least the next few years. (Callery and Krezlok, 2020).

Estimated pre and post-fire Q5 peak flows for drainages larger than ~29,000 acres.

Pour Points	Drainage Area	Burn Severity (Acres)				Pre-Fire Q5 (cfs)	Post-Fire Q5 (cfs)	% Increase	Times Difference	Pre-Fire Q10 (cfs)
		High	Mod	Low	Un-burned					
Fish Creek	29,795 (ac) 47 (mi^2)	6,310	5,640	12,793	5,052	4730	7,757	64.0%	1.63 X	5,910
Clackamas River at North Fork Reservoir	426,375 (ac) 666 (mi^2)	13,618	41,993	31,458	339,306	35,000	39,550	13.0%	1.13 X	44,000
Clackamas River at Three Lynx PGE hydro-electric facility	312,320 (ac) 488 (mi^2)	1,867	13,266	14,896	282,291	20,800	21,798	4.8%	1.04 X	26,200

PART V - SUMMARY OF ANALYSIS

Introduction/Background

The Riverside fire was human caused on September 8. Firefighters responded immediately in the early morning hours when the fire was first reported. Driven by high winds, crews reported extreme fire growth including torching, running, and spotting fire behavior as the fire moved 17 miles west along the Clackamas River drainage over the course of the day. High east winds and low humidity continued to drive the fire in the Clackamas River corridor and surrounding private lands. Erratic winds continued to push growth on all sides of the fire with crews reporting the largest growth to the east and southeast causing a 10,000-foot smoke plumes from the Riverside and Beachie Creek Fires to merge. Heavy smoke prevented pilots from conducting air operations for several days until a weather system changed conditions on Sept. 18. At least 57 homes and 186 other structures were lost in the fire. As of Oct. 10, the fire was 60% contained.

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

Table 5: Critical Value Matrix

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

1. Human Life and Safety (HLS):

Value	Probability	Consequence	Rating	Threat
Trails and Roads	Possible	Major	High	Some trails and roads go through moderate and high intensity burn areas and are prone to fire killed standing trees where BAER treatments will occur. A few roads also must stay open as they go to important communication sites in the Clackamas drainage. This includes the 4600 road near Austin Point that is now at greater risk to human safety from rock fall.
Ripplebrook, Oak Grove Work Center, Timberlake Job Corp, Lazy Bend Campground (Hazmat)	Likely	Major	Very High	Hazard trees are near some of the clean-up sites and where people are going to access remaining buildings and homes.

2. Property (P):

Value	Probability	Consequence	Rating	Threat
Trails	Very Likely	Moderate-Major	High to Very High	Portions of trails are on steep slopes below and through section of high and moderate intensity burn making them prone to erosion from to increased run-off and hazard trees.
Campgrounds	Very Likely	Moderate	Very High	Hazard trees at most campgrounds in moderate intensity burns that may fall onto remaining structures. Several campgrounds completely burned leaving downed hazards and exposed vault toilets.
Roads	Very Likely	Major	Very High	Steep side slopes, erodible soils, loss of canopy cover, increased peak flows and debris flows, hazard trees, and poorly drained road network.
Ripplebrook, Oak Grove Work Center, Timberlake Job Corp, Lazy Bend Campground (Hazmat)	Very Likely	Major	Very High	At Timber Lake Job Corp, the WCF shop (stored paint) and several buildings burned. At Ripplebrook nine residential homes either used as quarters burned. Several homes remain. The Main office, gas/fuel house and C&M shop also burned. Hazardous material could get into nearby pond and wetlands.

3. Natural Resources (NR):

Value	Probability	Consequence	Rating	Threat
Native and Natural Plant Communities	Very Likely	Moderate	Very High	Localized noxious and invasive weed populations exist immediately adjacent to the burned area and area disturbed by suppression. Plants will compete aggressively with native species for space and nutrients.
Wild and Scenic River – Clackamas River, Oak Grove Fork Clackamas River, S.F. Clackamas River, Fish Creek, and Roaring River	Unlikely to Very Likely	Moderate to Major	Intermediate to Very High	River segments have different Wild, Scenic, and Recreation ORVs. Only the Clackamas River and Fish Creek have recreation ORVs were evaluated for impacts from potential runoff, debris flows, and sediment to water recreation, fish, and water quality. **The Clackamas River above Fish Creek rated as intermediate and below Fish Creek high. Fish Creek rated as very high.**
Upper Willamette River Chinook, Lower Columbia River steelhead and Coho	Likely to Very Likely	Minor to Moderate	Low to Very High	Risk to species and designated critical habitat due to the threat of post-fire runoff, ash, erosion, and sediment delivery. Most drainages and the Clackamas River rated at a low risk rating except for **Fish Creek that rated very high**. In this drainage threats have the potential to negatively affect populations and habitat.
Northern Spotted Owls	Unlikely	Minor	Very Low	Species risk are not from post-fire effects. Owls may be affected by loss of overstory and understory in high and moderate intensity burned areas. Prey species availability may have varying responses to soil burn severity.
Water Used for Domestic and Municipal	Very Likely	Moderate	High	Water quality could be at risk due to relatively large area of burn resulting in increases in flow, sediment, elevated levels of turbidity and ash. Water intakes for all cities are below the N.F. Reservoir which should reduce large sediment.

4. Cultural and Heritage Resources:

Value	Probability	Consequence	Rating	Threat
Lithic scatters	Likely	Moderate to High	High to Very High	Burn severity in these areas are moderate and locations are prone to increased wind throw that will disturb sites and unearth artifacts

B. Emergency Treatment Objectives - Reduce threats to:

- Human life and safety on roads in high and moderate severity burn areas by installing warning signs and gates.
- Road damage from increased runoff and sediment through storm patrols, cleaning drainage ditches and culverts, and install additional culverts at select locations in high and moderate burn severity areas.
- Trails from increased runoff and sediment through cleaning drainage and install waterbars in high and moderate burn severity areas.
- Human life and safety by installing gates at the Ripplebrook and Oak Grove Work Center to prevent access of unauthrized personel to burned structures with hazardous materials.
- Human life and safety from hazard trees at select location at Ripplebrook and Oak Grove Work Center where clean-up of burned buildings occurs, where the Forest Service employees need to access remaining residences/buildings and public areas at the Timberlake Job Corps.
- Forest Service property in campgrounds in high and moderate intensity burn areas by selectively dropping hazard trees that could fall on remaining high value structures.
- Impacts to water quality and human life/safety where hazardous building materials occur and vault toilets burned in campgrounds by removng material, capping vaults, and placing containment barriers around hazmat sites.
- Native plant communities by reducing the spread invasive plants within the area, especially along and adjacent to Forest roads and dozer lines used by fire equipment and in areas with localized invasive plant species within and adjacent moderate and high intensity burns the first year following containment of the fire.
- Cultural sites by dropping select trees where windthrow can disturb the site and expose artifacts. Scatter slash to obscure the site to prevent removal of artifacts and vandalism.

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

Land 85% **Channel** NA
Roads/Trails 75% **Protection/Safety** 85%

D. Probability of Treatment Success

Table 6: Probability of Treatment Success

	1 year after treatment	*3 years after treatment*	*5 years after treatment*
Land	90	85	85
Channel	--	--	--
Roads/Trails	80	90	90
Protection/Safety	95	100	100

E. Cost of No-Action (Including Loss): Refer to attached Values at Risk (VAR) spreadsheet for specific costs.

The VAR analysis summary identified that the total treatment cost is estimated at $825,131 with an expected benefit of $7,748,087. The summary implied minimum value of protecting non-market resource critical values is justified for the treatments proposed in this BAER assessment. The expected benefit/cost ratio is 9.4.

F. Cost of Selected Alternative (Including Loss): Refer to attached Values at Risk (VAR) spreadsheet for specific costs.

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: John Chatel
Email: john.chatel@usda.gov **Phone(s)971-801-5379**

Forest BAER Coordinator: Todd Reinwald
Email: todd.reinwald@usda.gov **Phone(s):971-325-5153**

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

Skill	Team Member Name
Team Lead(s)	John Chatel, Todd Reinwald
Soils	Mary Young, Luke Cerise
Hydrology	Todd Parker, Hazel Wood
Engineering	Pete Huppi, Kevin Duchow
GIS	Kim Vieira, Susanne Campbell
Archaeology	Trent Skinner, Ayme Swartz
Weeds	Jennifer Miner, Christina Mead
Recreation	Jeremy Evans, Eric Amstad
Other	Ryan Cole, Chuti Fiedler, Jeff Goldberg

H. Treatment Narrative:

Land Treatments:

Hand and Mechanical Tree Felling to Protect Cultural Resources

Purpose of Treatment: National Register of Historic Places eligible Lithic Scatter associated with logistical camp-flintknapping task location. Wind throw induced turbation very likely to occur within site boundary. This frequently leads to upending of the root system and surrounding soils and sediments creating a mound and depression microsite and redistributing cultural materials. The loss of site integrity in these instances is an irreversible loss. Lop and scatter of available slash within site boundary will aid in erosion control and camouflage artifacts and features to prevent looting.

General Description: Felling, lopping, and scattering of likely windthrow trees within site boundaries

Location (Suitable) Sites:

- 35CL 00035
- 35CL 00074
- 35CL 00164
- 35CL 00284
- 665EA300
- 665EA301
- TEMP-Riverside-1

Design/Construction Specifications:

- Sites (35CL 00035 and -00164) are only accessible on foot after crossing the Clackamas River through use of one of the PGE cable car crossing
- Remaining sites border Hwy224
- Directional felling of designated trees that are inside the site boundaries to limit impact
- Directional felling (towards the site's outer boundaries) of designated trees that are located on the periphery of the site
- Lopping and scattering of available slash within site boundary to aid in erosion control and camouflage artifacts and features
- In all cases, heavy equipment will be kept outside the site boundaries
- DOI qualified archaeologist will be on hand to monitor all activities
- Review hazards of felling trees/JHA before implementation.

Noxious Weeds EDRR

Purpose of Treatment: To respond to the potential for rapid invasion of invasive plants into native plant communities on the Mt. Hood National Forest. EDRR is prescribed in order to mitigate long term impacts to native plant communities within and in the vicinity of the fires boundaries. The purpose of treatments is to promote native plant resources by removing invasive plant populations.

General Description:

- Invasive plant detection surveys – Known infestations of high priority invasive plants within high and moderate burn severity in the Riverside Fire area will be assessed for potential spread or expansion. When assessment actions are initiated, personnel will be equipped to immediately treat infestations when suppression repair is completed, and safe access is possible. This will allow for the best chance of managing known infestations to prevent an expansion from pre-fire levels. Additionally, detection surveys will be focused in areas of increased probability of infestation (e.g. Roads, trails, select streams, fire lines, drop points, helispots, staging areas, areas of high and moderate burn severity within a ¼ mile of known invasive plant infestations, and BAER implementation impacts). BAER funding authorization will be used for the first year (starting October 2020) to meet objectives above. Existing or future partnerships may be used to monitor and/or treat invasive plants on National Forest System Lands.
- Treatment of known invasive plant sites and new sites detected through surveys – Objective is to strategically treat known infestations (currently estimated to be roughly 80 acres). Strategic treatments include sites adjacent to moderate and high severity burned areas, fire lines.

Location (Suitable) Sites: Known and expected invasive plant sites within and directly adjacent to the Riverside Fire area on National Forest System Lands. 688 acres of suppression related disturbance (dozer line, handlines, etc.) and 113 acres of potential spread into moderate and high intensity burn areas will have EDRR surveys and treatment as needed. Proposed locations for surveys are along vector corridors and within high and moderate severity burned areas within the Riverside Fire. Existing known invasive plant locations are included in the accompanying map and will be treated in a strategic manner. New sites found during EDRR surveys will be treated to the extent possible with priority given to sites within or near to fire lines and near riparian habitat. See the map that accompanies this proposal for more specific location information.

Design/Construction Specifications: Detection surveys entail hiking or driving vector corridors and hiking areas of high and moderate burn severity. Survey protocols include GPS mapping, flagging, and documenting occurrences. Treatments include manual removal, and chemical application.

Vault Cleanup and Select Hazard Tree Removal

Purpose of Treatment: Raw sewage is a hazard to human life and safety, and to the environment. Perform work as soon as possible, as open vaults could fill with rainwater, and then any further precipitation run-off could overflow the vaults, spilling out raw sewage.

General Description:

- Pump and cover toilet vaults at locations where the vault openings have been compromised by the fire.
  - Remove remnant materials to provide access to pumping and covering vaults.
- Cover exposed vault where vent stack burned off of CXT at Indian Henry Campground.

Location (Suitable) Sites:

- Sunstrip CG (1 building)
- Fish Creek CG (2 double buildings)
- Lockaby CG (2 buildings)
- Carter Bridge Day Use / Picnic Area (1 building)
- Big Eddy Day Use / Boat Access Site (1 building)

Design/Construction Specifications:

- Pump toilet vaults at locations where the vault openings have been compromised by the fire.
- Properly dispose of waste at nearest county or municipal dumping site.
- Plan routes to minimize mileage charges, and to keep number of trips to a minimum.

- Remove remnant materials to provide access to pumping and covering vaults.
- Cover exposed vault hole from burned vent stack at Indian Henry Campground CXT

Hazmat Containment

Purpose of Treatment: Containment of contaminated run off is needed at the Timberlake site located next to lakes and Ripplebrook site located next to wetlands. If material drained from these areas, it would contaminate a drink water source at each site.

General Description: The Timber Lake Job Corp shed and Ripplebrook construction and maintenance shop completely burned and stored petroleum products, as well as some unknown substances presumed to be hazardous. The Timber Lake Job Corp shed is located adjacent to Timber Lake and topographic conditions promote the runoff of hazmat into the Lake, potentially affecting a drinking water source. The Ripplebrook Maintenance Yard is also located along Highway 224 just past the Timber Lake Job Corp Center. The construction and maintenance shop (C&M) as well as a gas and oil house burned. Both facilities appear to have been used to store hazmat including petroleum products, as well as some unknown substances presumed to be hazardous. These facilities are located adjacent to a wetland and topographic conditions promote the runoff of hazmat into it, potentially affecting a drinking water source.

Location (Suitable) Sites:

- Timber Lake Job Corp Center
- Ripplebrook Maintenance Yard

Design/Construction Specifications: Plastic sheeting was placed to cover burnt materials at the Job Corp site and the remains of the C&M shop. Sheeting was partially extended outside of these areas and secured with sandbags to ensure it would stay in place and that rainfall/runoff would not penetrate each site. Protection was completed by “First Strike Environmental Company on 10-09-2020 since significant rain was predicted that could have washed material into nearby wetlands and waterbodies.

Protection of Campground Infrastructure

Purpose of Treatment: Burned trees may pose an unacceptable risk to public safety or property. Hazard trees will be mitigated in locations needed to protect life, safety, and property.

General Description: Burned trees may pose an unacceptable risk to public safety or property. Hazard trees will be mitigated in locations needed to protect life, safety, and property.

Location (Suitable) Sites:

- Cripple Creek Trail #703 Trailhead
- Alder Flat Trail #574 Trailhead
- Fish Creek Trailhead
- Riverside CG
- Rainbow CG
- Ripplebrook CG
- Sunstrip CG
- Indian Henry CG
- Roaring River CG
- Fish Creek CG
- Armstrong CG
- Lockaby CG
- Carter Bridge CG
- Lazy Bend CG
- Hole in The Wall Boat Access Site
- Carter Bridge Day Use / Picnic Area
- Big Eddy Day Use / Boat Access Site
- Moore Creek Boat Access Site

Design/Construction Specifications:

- Take down select hazard trees identified to be a threat to property such as toilet buildings. Take down hazard trees identified to be a threat to human life or safety at sites where there is no threat to property, but there is threat to human life or safety, [and

where it is impractical or more expensive to close the site to the public, or where it is necessary for worker safety while they are performing other BAER emergency work].
- Place trees on contour (where possible) in locations that do not adversely affect road drainage.
- Review hazards of felling trees/JHA before implementation.

Channel Treatments: No Treatments Proposed

Roads and Trail Treatments:

Road Drainage Stabilization and Select Hazard Tree Removal

Purpose of Treatment: The watersheds burned in the Riverside Fire will show the effects of the fire via increased runoff rates, erosion, sediment, and debris transport creating a future concern for roads and associated drainage structures. The effects could result in filling the ditches, plugged culverts and potentially overtopped or washed away road surfaces and fill slopes. Treatments are recommended to minimize the risks to public safety and protect the investment of the transportation system from the expected increased post-fire runoff.

General Description: Several road stabilization treatments have been prescribed for Forest Service Roads within the Riverside Fire that will be directly impacted by post fire events. These treatments are necessary to mitigate the predicted effects that will occur to the transportation infrastructure system.

Location (Suitable) Sites:

Road drainage locations:

NFSR #	NAME	MILES	TREATMENT
4500000	HILLOCK BURN/MEMALOOSE RD.	17.28	Drainage as shown on map
4620000	SANDSTONE RD.	5.68	Drainage as shown on map
5400000	FISH CREEK	1.74	Drainage as shown on map
5410000	5410	2.02	Drainage as shown on map
	Total	**26.91**	

Replacement Cross drain culvert locations:

NFSR #	GPS POINT	PIPE SIZE	TREATMENT
4500000	45.136571, -122.238244	24”x40’	Replace in kind with CMP
4500000	45.124536, -122.258468	24”x40’	Replace in kind with CMP

Design/Construction Specifications:

- Ditch Cleaning – All drain ditches within or affected by moderate and high severity burn areas along the length of the roads shall have all existing silt and debris removed and either hauled away or side cast such that the material cannot reenter the drainage structure during a runoff event.
- Culvert Cleaning – Remove any blockages from inlet, outlet and inside barrel and straighten bent inlets and outlets. Catchment-basins shall have all existing silt and debris removed to between 6 inches and 12 inches below the bottom of the culvert. Hauled away or side cast the material so that it cannot reenter the drainage structure during a runoff event. Culverts are typically 18 inch to 24 inch ditch relief culverts, with some larger but are easily accessible by equipment, i.e. backhoe. Individual culverts that are larger or have larger fill above the culverts that are not easily accessed with equipment and will need to be cleaned by hand are counted on an individual basis.
- Cross Drain Culvert Replacement – Two HDPE (plastic) cross-drains were burned and subsequently melted during the fire. They will need to be replaced with corrugated metal pipes (CMP) to ensure ditch relief is maintained so that over toping of the road and failed fill slopes do not become an issue.
- Hazard Tree mitigation – Select hazard trees that pose an imminent risk will be felled that are within reach of all sites where drainage work will be needed. Please reference Hazard tree specification form for further details. The hazard tree work associated with drainage will be paid for under drainage.

Road Storm Patrols

Purpose of Treatment: The purpose of the monitoring is to identify and implement additional work needed to maintain and/or repair damage to road surfaces and flow conveyance structures across roads in order to protect FS infrastructure. The patrols are used to identify those problems such as debris caught on the debris racks, plugged or partially plugged culverts, and washed out roads and to clear, clean, and/or block those roads that are or have received damage. The storm patrollers shall have access to at least a backhoe and dump truck that can be used when a drainage culvert is plugged or soon to be plugged and to repair any road receiving severe surface erosion. Forest personnel will survey the roads within the fire perimeter after storms during the rainy season. Survey will inspect road surface condition, ditch erosion, debris racks, and culverts/inlet basins for capacity to accommodate runoff flows. A plan very similar to a FERM (Flood Emergency Road Maintenance) plan should be drafted. The plan identifies the responsibilities of those prior to, during and post large flow events.

General Description: Roads within the Riverside Fire contain drainage structures that cross drainages and side channels located in watersheds that have areas of a large percentage of high burn severity. These side channels now have the potential for increased runoff and debris flows. The predicted increased flows are a direct cause from the lack of vegetation to slow down the water flow and/or from hydrophobic soil conditions that can prevent surface water infiltration. These flow increases pose a threat to the existing crossings which may result in plugging culverts or exceeding their maximum flow capacity. If these flows plug drainage structures, the result could be massive erosion and debris torrents further down the drainage due to the failure of the fill slope.

Location (Suitable) Sites: The patrols should first focus on the Forest Service roads that are of more value to the transportation system. The Forest and district have identified the most susceptible areas and roads across the district and those locations that are within the fire perimeter are listed below:

NFSR #	NAME	MILES
4500000	HILLOCK BURN/MEMALOOSE RD.	30.18
4620000	SANDSTONE RD.	5.68
5400000	FISH CREEK	1.74
5410000		3.38
	TOTAL	**40.98**

Design/Construction Specifications:

- FS personnel will direct the work.
- Immediately upon receiving heavy rain the FS will send out patrols to identify road hazard conditions – obstructions such as rocks, sediment, washouts – and plugged culverts so the problems can be corrected before they worsen or jeopardize motor vehicle users.
- Heavy equipment necessary to mechanically remove any obstructions from the roads and culvert inlets and catch basins shall be procured when needed.
- All excess material and debris removed from the drainage system shall be placed outside of bank-full channel where it cannot re-enter stream channels.

Trail Drainage Stabilization and Select Hazard Tree Removal

Purpose of Treatment: The purpose of the trail stabilization treatments is to allow water to (1) sheet flow across the trail, and (2) where water does collect, to shed off the trail as soon as possible. Water is a trail's worst enemy, and the trail treatments are intended to minimize the time and distance that water spends on the trails by building features into the trail that shed the water. Where water flow over the trail cannot be avoided, armoring the trail will stabilize it and stop or slow down erosion. By doing these treatments, the trail prism will be protected from the increased hydrological response that is expected for post-fire storm events.

General Description: Trail stabilization work: Install drainage (Rolling Grade Dips/Grade reversals/Nicks) features where needed to stabilize trail. Install Waterbars only where necessary and then only Rock. Clean out existing waterbars. Armor drainage crossings. Re-establish trail bench/prism as needed. Select hazard trees that pose an imminent risk to workers will be felled.

Location (Suitable) Sites:
- Dry Ridge #518
- Riverside Trail #723
- Alder Flat Trail #574
- Clackamas River Trail #715
- Memaloose Lake Trail #515
- Hillockburn Trail #516
- Cripple Creek Trail #703
- Fish Creek Mountain Trail #541

Design/Construction Specifications: If contracted out, line out work with agency trail expert. De-berm trail where needed, re-establish 5% Outslope, install knicks, and rolling grade dips; minimize waterbar use where grade reversal methods can be used. If waterbars must be used, use only rock. Clean out existing waterbars or replace with grade reversal methods. Armor drainage crossings where needed. Remove hazard trees, as needed, for worker safety.

Protection/Safety Treatments:

Debris Slide Catchment Installation

Purpose of Treatment: The installation of the K-rail will allow for catchment of debris flows, and thus prohibit these flows from obstructing a highly used paved road (FSR 4600). The 4600 road near Austin Point provides primary access road into the fire and can't be temporarily closed.
General Description: Place concrete K-Rail (Jersey Barriers) along FSR 4600 near Austin Point to minimize debris slides from obstructing travel.
Location (Suitable) Sites: The location of this treatment is approximately 4 miles south of Ripplebrook, OR, on the FSR 4500, at gps (45.030863, -122.051088). Excavated debris will be placed approximately 1 mile east at gps (45.028625, -122.031877).
Design/Construction Specifications: 60 linear feet of concrete K-Rail will be placed at specified location. 100 CY of debris (mostly rock and soil) will be excavated to reform the ditch line and moved to designated area approximately 1 mile away.

Hazard Tree Falling at Critical Open Roads and Ripplebrook Residences

Purpose of Treatment: Hazard tree treatments are needed on the 5410 and 5411 roads lead to critical communication sites that need to remain opened to Forest Service and other agency employees to access communication sites throughout the year at Whalehead and Memaloose. These communication sites are needed to support 911 and law enforcement services in the Clackamas River drainage. Select hazard trees that pose an imminent risk to workers and blocking the road will be felled on roads that needed to remain open. Select hazard trees will also be felled that pose an imminent risk to staff returning to collect belongings at unburned Forest Service homes.
General Description: Forest service roads within the Riverside Fire that pass-through areas where the severity of the burn is moderate and high are at risk of having burnt and dying trees fall over the roadway. These hazard trees pose a risk to motorists or people working on other treatments in the area, especially during high wind events. Burned trees may also pose an unacceptable risk to, residents, and remaining property. Hazard trees will be selectively mitigated in locations needed to protect property, life, and safety.
Location (Suitable) Sites: The initial area to first concentrate the removal of hazard trees is on those high use roads that will remain open and traverse through the sections of high and moderate burn severities. While accessing the roads within the higher burn severities, also identify those hazard trees that lie along the roads in the lower burn severities. Maintenance Level 1 roads are closed roads and will not be treated, Maintenance Level 2 Roads may be closed due to safety concerns (at the Rangers discretion), it is generally accepted that the roads to be treated provide important access and need to remain open and should be treated for safety reasons.
Design/Construction Specifications:
1. FS personnel will prepare and administer the contract.
2. Estimated length of roads in Moderate and High burn severity areas total 30.28 miles.
3. Assume the removal of select hazard trees production rate of 0.5 mile a day by a hand crew and an excavator with operator to move trees off of roads and cut slopes.

NFSR #	NAME	MILES	DAYS OF WORK
5410000	5410	0.47	1
5411000	5411	3.08	6
	FS Ripplebrook Residences		3
		TOTAL	**10**

Specifications:

- Take down all hazard trees identified to be a threat to property such as roadways and residences. Take down hazard trees identified to be a threat to human life or safety at sites where there is no threat to property, but there is threat to human life or safety, [and where it is impractical to close the site to the public, or where it is necessary for worker safety while they are performing other BAER emergency work].
- Place trees on contour (where possible) in locations that do not adversely affect road drainage.
- Review hazards of felling trees/JHA before implementation.

Hazard Warning and Closure Signs for Roads

Purpose of Treatment: The purpose of "Burned Area Warning Signs" is to reduce the risks to human life and safety by alerting motorists of existing threats while traveling the authorized routes within the areas susceptible to flooding, debris flows, hazards trees, and all other risks attributable to post fire events on the landscape. Replacement of the burned Regulatory and Warning signs is necessary at intersections and bridge approach ends to identify potential hazards, thus conforming to the FS Sign and Poster Guidelines and MUTCD. Replacement of the pre-existing route and roadside hazard markers burned or melted by fire are both for safety, and public reassurance of location on FS system roads, as stipulated in the Forest Travel Management Plan and the Motor Vehicle Use Map.

General Description: This treatment is for installation of "Entering Burned Area" warning signs and replacement of burnt or fire damaged warning signs, roadside hazard and route markers.

Location (Suitable) Sites: Locations for "Burned Area" warning signs will be located at all points of entries by use of forest system roads into the burned areas. These locations are as follows:

- On FSR 4500000, West end of FSR 4500
- On FSR 4500000, On South side of Memaloose Bridge
- On FSR 4600000, Near East side of fire line near Austin Point
- On FSR 4600200, beginning of 3 Links road
- On FSR 4610000, North side of fire on 4610
- On FSR 4610000, South side of fire near junction with Hwy 212
- On FSR 4620000, Near intersection of 4620 and Hwy 212
- On FSR 4630000, Pipeline road junction with Hwy 212
- On FSR 4630000, Pipeline road on North East side of fire line
- On FSR 4631000, Near junction with Hwy 212 and 4631 near Ripplebrook
- On FSR 4635000, North East side of fire on 4635 near 4635135
- On FSR 4635000, North East side of fire on 4635
- On FSR 5400000, Near intersection of 5400 and Hwy 212
- On FSR 5700000, Near East fire boundary.

Design/Construction Specifications: "Burned Area" warning signs along the roads shall measure, at a minimum, 30 inches by 36 inches and consist of 0.08" aluminum, sheeted in high intensity yellow with black letters, which is shown in the photo below. The "BURNED AREA" lettering shall be a minimum of 5 inches in height and all remaining lettering shall not be less than 3.5 inches in height. Traffic Warning, Road Closure, and Barricade Markers Signs shall conform to the M.U.T.C.D. standards and shall be installed per Federal Highway Safety Standards.

Gates on Roads

Purpose of Treatment: The primary reason of installing the gates is for public safety especially during periods of expected moderate to high rainfall events. In the event severe stormy weather passes over the Riverside Fire area a line officer may decide they need to close the roads that would be affected by

the expected run off. A gate would be necessary in preventing the public from accessing the area of the forest by vehicle during these severe weather events. The closure orders will be necessary when it is determined there is a danger to the public caused by potential debris flows and flooding from the hill slopes above the roads. Three gates are needed to prevent access to hazmat sites at Ripplebrook, Oak Grove, Three Lynx, and Lazy Bend.

General Description: This treatment is for the installation of steel post gates to close roads when necessary for public safety and to develop and implement closure orders when necessary.

Location (Suitable) Sites:

Road	Location
FSR 4500000 Single Swing	West end of road near 4500/4500130 junction
FSR 4600200 Double Swing	Near the junction of 4600200 and Hwy 212
FSR 4620000 Single Swing	Just past boat launch
FSR 4630000 Double Swing	Near junction with 4631000
FSR 4631000 Double Swing	Near junction with Hwy 212
FSR 5400000 Double Swing	Just past boat launch/parking area

Design/Construction Specifications:

- The gates shall be constructed according to the Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects FP-03 (Similar to the photo below). All signing associated with the gate installation shall follow Forest Service Engineering Manual 7100-15 and the Federal Highways Manual of Uniform Traffic Control Devices (MUTCD). This includes typical gate barricade markers and object markers and any signs that may be installed with the gate such as a road closed sign.
- All gates shall be able to be secured in the open position so as not to be a hazard to traffic. Cables, chains, or single-wire barriers shall never be used across any roadway because they are not readily visible to road users. Travel management signs may be used on gates to display access and travel management restrictions and closures. Refer to the Sign Installation Guide for additional information about the required gate signs.
- Road closure information will be posted on the gates and through public notices.

Trailhead and Campground Gates

Purpose of Treatment: In the aftermath of the Riverside Fire, hazard trees will be an ongoing threat. Until the hazard trees are treated, these recreation sites should remain closed with a gate for public protection. Once hazard trees are mitigated at these recreation sites, the gate can continue to be used for public safety in times of high water and debris flow due to the increased post-fire hydrological response, especially on Fish Creek.

General Description: Gates will be installed at Recreation Sites to allow for closures to protect the public from post-fire hazards. Closures may be implemented immediately until hazard trees and other post-fire hazards are mitigated, and seasonally, or periodically on a temporary basis as the need arises to protect the public.

Location (Suitable) Sites:

- Riverside Trail #723 Trailhead
- Fish Creek Trailhead
- Clackamas River Trailhead
- Indian Henry Campground

Design/Construction Specifications: Install heavy-duty road gate (i.e. DuraGate Super-Duty Steel Barrier Gate, or equivalent) at the entrances to the above recreation sites.

Warning Signs for Campgrounds and Trailheads

Purpose of Treatment: The public needs to be made aware of the hazards associated with post-fire events, such as falling objects, hazard trees (especially during wind events), mud slides and rolling rocks (especially during heavy rain events), and potential for flooding (especially during heavy rain events). These hazard warning signs will inform the public, increase safety, and transfer responsibility of post-fire effects safety to the public.

General Description: Install hazard warning sign at recreation sites to inform the public of the hazards associated with post-fire events, such as falling objects, hazard trees (especially during wind events), mud slides and rolling rocks (especially during heavy rain events), and potential for flooding (especially during heavy rain events).

Location (Suitable) Sites:

Riverside Trail #723 Midpoint TH	Ripplebrook CG	Sandstone Boat Access Site
Cripple Creek Trail #703 TH	Sunstrip CG	Hole in The Wall Boat Access Site
Alder Flat Trail #574 Trailhead	Indian Henry CG	Carter Falls Interpretive Site
Fish Creek Trailhead (x2)	Roaring River CG	Carter Bridge DU / Picnic Area
Memaloose Lake Trail #515 TH	Fish Creek CG	Big Eddy DU / Boat Access Site
Hillockburn Trail #516 Trailhead	Armstrong CG	Moore Creek Boat Access Site
La Dee Flat OHV Staging Area	Lockaby CG	Raab CG
Riverford CG	Carter Bridge CG	Grouse Point Trailhead
Riverside CG (x2)	Lazy Bend CG	Hideaway Lake CG
Rainbow CG (x2)		

Design/Construction Specifications:

- Install hazard warning sign at each of the above listed recreation sites.
- Sink a U-channel post or Square tube post at the entrances to the listed sites. Place in conspicuous locations.
- Mount 36” X 24” Polyflex or Aluminum signs (with pre-drilled holes) to U-channel or Square tube posts. Use fender washers if necessary, to prevent bolt head from pulling through sign during high wind events.
- Periodically check signs and maintain or replace as needed.

I. Monitoring Narrative: No monitoring is proposed

PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

			NFS Lands				Other Lands				All
		Unit	# of		Other		# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	BAER $	$		units	$	Units	$	$
A. Land Treatments											
Vault Cleanup	Each	631	19	$11,980	$0			$0		$0	$11,980
Noxious Weeds Treatments	Acre	105	113	$11,865	$0			$0		$0	$11,865
Noxious Weeds Treatments	Acre	193	688	$132,784	$0			$0		$0	$132,784
Hazmat Clean Containment	Sites	13,141	2	$26,282	$0			$0		$0	$26,282
Cultural Site Protection	Acre	75	157	$11,775	$0			$0		$0	$11,775
Campground Infrastructure P	Each	75	445	$33,375	$0			$0		$0	$33,375
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Land Treatments				$228,061	$0			$0		$0	$228,061
B. Channel Treatments											
				$0	$0			$0		$0	$0
				$0	$0			$0		$0	$0
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Channel Treatments				$0	$0			$0		$0	$0
C. Road and Trails											
Trail Drainage	Miles	16	7796	$124,580	$0			$0		$0	$124,580
Strom Patrols	Miles	41	1575	$64,543	$0			$0		$0	$64,543
Road Drainage	Miles	27	9,905	$264,662	$0			$0		$0	$264,662
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Road and Trails				$453,785	$0			$0		$0	$453,785
D. Protection/Safety											
Trailhead and Campground C	Each	4	5000	$20,000	$0			$0		$0	$20,000
Hazard Trees on Open Road	Days	10	3334	$33,340	$0			$0		$0	$33,340
Debris Catchments	Each	1	17750	$17,750	$0			$0		$0	$17,750
Road Gates	Each	6	8381	$50,286	$0			$0		$0	$50,286
Road Signs	Each	16	692	$11,072	$0			$0		$0	$11,072
Trailhead and Campground S	Each	34	325	$11,050	$0			$0		$0	$11,050
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Protection/Safety				$143,498	$0			$0		$0	$143,498
E. BAER Evaluation											
Initial Assessment	Report	1	151761	---	$151,761			$0		$0	$151,761
				$0	$0			$0		$0	$0
Insert new items above this line!				---	$0			$0		$0	$0
Subtotal Evaluation				$0	$151,761			$0		$0	$151,761
F. Monitoring											
Insert new items above this line!				$0	$0			$0		$0	$0
Subtotal Monitoring				$0	$0			$0		$0	$0
G. Totals				$825,344	$151,761			**$0**		**$0**	**$977,105**

PART VII - APPROVALS

1. RICHARD PERIMAN Digitally signed by RICHARD PERIMAN Date: 2020.10.16 11:18:04 -07'00' 10/16/2020

Forest Supervisor Date