Geohazard Treatment Re-Evaluation

Clarification/Re-Assessment of Selected BAER Treatments, Station Fire, Sept, 2009
Recreation Residences and FS Fire Stations

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At the request of Forest Supervisor Jody Noiron, two of the geologists who worked on the assessment phase of Burned Area Emergency Response (BAER) for the Station Fire took a second look at some of the treatments proposed for structure protection which addressed debris flow, flooding, erosion control and rockfall/landsliding concerns. The focus was on Recreation Residences and Forest Administration facilities, and one full day and two half days of field work were completed. We consulted in the field with District Ranger Mike McIntyre, LA County Public Works Engineer Bill Saunders, USFS Fire Officials Steve Johnson and Linda Winkler.

Assumption: In our analysis, we assume that people will be evacuated from FS Admin facilities and Recreation Residences prior to storm events. If that does not happen, human lives will be at risk in many of these cases. Also, falling rock and landslides do not only happen during and immediately after storms; they can occur at any time, but especially during and after storm events.

Angeles Crest Fire Station

Situation: The two primary issues here are an increased potential for debris flows exceeding the carrying capacity of the drainage structures, then flowing through the compound, and increased potential for rockfall damaging the Fire Station and propane and retardant tanks. Access up Rd. 2N76 to Mount Lukens is also a primary issue, but the nature of the switchbacking road, criss-crossing drainages, indicates that post-storm maintenance will be critical.

Recommendations: Since the trailers (and two propane tanks) are to be removed prior to the first storm events, we see no need to enhance the current drainage structure.

Behind the fire station and engine bay, construct (using fire crew labor) a rock deflection roof over the propane tank, anchor 2 sheets of plywood over the Phos-chek containers, and attach 10 sheets of plywood to the back-side of the Station and Engine Bay to protect windows, doorways, and walls from rockfall. Also, clean out and repair old existing landing-mat catchment structures on the slope behind the station. An alternative to lower costs could be to use volunteer labor.

If debris flows or flooding events are not contained within the existing drainage system, Highway 2 could experience undercutting from loss of control of water/sediment. Short

of major drainage re-construction, keeping culverts and drainage-ways cleaned out is our only recommendation.

Shortcut Fire Station
Situation: Minor threat of sediment impacting Fire Station and Bunkhouse

Recommendations: Dig soil from behind retaining wall behind fire station to create a 2 foot deep by 2 foot wide ditch that will capture overland flow of water and fine sediment from gentle slope above, and store it or divert it from spilling into passageway behind station. Use that soil to fill sandbags to stack around south and west sides of the barracks to extend existing partial retaining wall to protect backside of crew-house from overland flow/flooding. Stack 100 sandbags, 3-high, for 40 feet, @ 8 sandbags per 10 feet per layer, 3 layers high (~ 2 feet high). All sandbagging work will be done by the local fire crew (see attached sketch). An alternative to lower costs could be to use volunteer labor. Woodstraw mulch was recommended by the hydrologists.

Monte Cristo Fire Station
Situation: The Fire Station and one residence are located at the bottom of a moderate sized, moderately burned sub-watershed of erosive, raveling decomposed granitic soils, previously covered by dense chaparral, with much stored sediment on steep slopes and in ephemeral draws. Two main draws lead down to concrete lined channels that normally carry water and minor sediment flow safely through the compound. Now, burned slopes have a high probability of damaging debris flows which may not be contained by the concrete channels.

Recommendations: Add 3 sections of K-rails (by contractor), totaling 350 feet strategically located (see attached sketch) to channel overflow flooding of debris flows past the (upper) residence and (lower) fire station and associated propane tank and gasoline/diesel storage tanks. Add a single layer of sandbags along the uphill side of the K-rails to prevent erosion from undermining soil supporting the K-rails. (@ 8 sandbags per 10 feet = 280 bags). Fire Crews can clear small trees/brush (chainsaw), do minor leveling of pads for K-rails, with shovels, and fill sandbags with local material (may have to be hauled from ½ to one mile for this much material). An alternative to lower costs could be to use volunteer labor.

Big Tujunga/Vogel Flat Fire Station
Situation: Above the Big Tujunga Fire Station and Residences are two manmade drainage channels (see sketch) that have filled in with sediment in 2 areas. Hillslope runoff has the potential to flood the top residence (House #1040). In addition rolling rocks from that same slope might impact the residence. The trail behind the station creates a dam within the drainage channel, restricting flow. In case of extreme runoff the channel could overflow and flood the fire station.

Recommendations: It is recommended that the west end of the manmade drainage channels above the residence (house #1040) be deepened from inside the dog kennel to the west, and the berm heightened. The soil dug out of the channel can be used to rebuild

the berm along the channel. In addition the dam in the channel above the Fire Station should be removed, the channel deepened and again the soil removed should be used to rebuild the berm along the channel. All work can be done by the local fire crew. An alternative to lower costs could be to use volunteer labor.

Clear Creek Fire Station No geohazard issues. We did not assess for mulch.
Recommendation: We are forwarding Hydro recommendation to apply woodstraw mulch.

Arroyo Seco Fire Station - No Geohazard issues.

Big Tujunga/Vogel Flat Recreation Residences:
Situation: Issue 1: The three remaining Forest Service Recreation Residences along Big Tujunga River are at risk from high flood flows, potentially augmented by upstream debris flows. Issue 2: A wellhead near Recreation Residences 11 and 12 is very close to Vogel Creek, and if flows are high, groundwater contamination could occur.

Recommendations: Issue 1: After discussion with LA Co. Engineer Bill Saunders, we feel there is little chance that K-Rails would be effective in protecting the three residences, especially since a county map shows the 50 year rainfall event (burned and bulked) floodplain extending approximately seven feet above the base of the 3 recreation residences. We are not recommending to install K-rails, as their effectiveness in this location is uncertain.

Issue 2: Use local sandy material to build a low (3 foot) sandbag wall to deflect flow from impacting the wellhead ("V" shaped, 2 legs @ 10 feet long/8 bags, 2 bags wide, 4 bags high).

Millard Recreation Residences
Situation: Recreation residence (cabin 23) is located at the bottom of a 500+ foot slope, which experienced a light to moderate burned severity. The threat of debris slides, dry ravel and rockfall impacting the residence is high. The slope above Residence 24 is mostly unburned, and there is little change in the existing risk due to the fire. At least two of the cabins furtherest down the canyon along Millard Creek are at some risk from drainage-ways which pass very close to the buildings. Drainage-way improvement by the residents, such as increasing berm heights, planting native vegetation that would help stabilize channel, etc., could lower risks. Evacuation is important during storm events.

Recommendations: A two wing, 6 foot chain link deflection fence should be constructed (by a contractor) above the cabin for protection from rockfall. On the up-slope side of the chain link fence stack 220 sandbags, 3-high, for 90 feet, @ 8 sandbags per 10 feet per layer, 3 layers high (~ 2 feet high). (See attached sketch). This sandbag structure will behave as a deflecting structure to sediment and debris flowing down the slope.

Delta Flat/Trailunga Recreation Residences

Situation: The existing threat from loss of control of water affecting Values At Risk has been substantially increased by the fire. Accelerated hillslope runoff has the potential to flood an erratically aligned drainage channel which has historically been un-naturally altered by numerous upslope road crossings and inadequate concrete/rock drainage structure design and placement. At numerous locations, this channel has the potential to clog and overflow its banks and change course. Even if it stays within the current channel, it will deliver sediment into two (2) recreation residences (cabins 52 and 53) at Delta Flat/Trailunga Recreation Residence tract. If flow escapes the current channel, other residences may be flooded with water and sediment.

Recommendations: The **minimum** that should be done for the emergency situation is to construct a sandbag deflecting structure along the road and upper boundaries of these two residences to catch fine sediment and channel water flow. The objective is to protect the two residences from flooding and sediment deposition. Stack 270 sandbags, 3-high, for 90 feet, @ 8 sandbags per 10 feet per layer, 3 layers high (~ 2 feet high) along the roadway in front of residence #52. Along the edge of the road in front of residence #53, stack 170 sandbags, 3-high, for 56 feet, @ 8 sandbags per 10 feet per layer, 3 layers high (~ 2 feet high) (see attached sketch). Total length of the two sandbag berms is 146 feet. This design will channel flow down an existing side-road that has historically been the flow pathway.

For the **long-term,** a much more substantial drainage design for this entire tract should be engineered (with both watershed and engineering input) and constructed, since this flooding will be an ongoing issue. The costs would be covered by the permittees.

La Paloma Recreation Residences

Situation: The two remaining unburned recreation residences in this tract, # 36 and #37 are at increased risk from rolling rock and surficial debris from steep (70%+) lightly burned slopes. Slopes above #37 are longer and have greater potential for slope instability. Residence #36 is also at risk from debris flows from a moderate sized moderately burned drainage on its east side. If a small to moderate sized debris flow overtops the irregular channel, which currently has a constricted section which could direct the flow towards #36, it could severely damage the residence.

Recommendations: Rolling rocks/unstable slope issue – install heavy duty chain link fencing as a deflection mechanism to slow rolling rock and cause it to be deflected diagonally along the slope away from the residences. For cabin #37, angle fencing from west side stone stairway for 30 feet up to a clump of partially burned oak trees. Then on the east side of those trees, install the fencing from the oak trees 65 feet down to the NE above the propane tank, then turn N for another 25 feet just far enough to provide protection to the tank and east side of the residence.

Above Residence #36, Install 80 feet of chain link fencing starting above the two water tanks, and angle downslope to the NW to deflect material towards the west where it can migrate downward between the two residences.

Behind both sections of fencing, install sandbags to catch fine sediment and channel water flow. Stack 480 sandbags, 3 bags high (~ 2 feet high), for 200 feet, @ 8 sandbags per 10 feet per layer (see attached sketch). Use local dry ravel (loose sand and small gravel) from cones at bottom of slopes to fill sandbags.

Trail Canyon Recreation Residences

Situation: One of the four remaining recreation residences that did not burn is at very high risk of damage from falling rock and high risk from landsliding (debris slide) from a lightly burned 500'+ escarpment, the toe of which abuts the residence. Wooden posts that supported a chain link rock catchment/deflection fence burned, causing the fence to collapse. The owner, Larry Bartlet, has been working diligently to clean out debris that had collected and begin replacing the fence.

Recommendation: Rebuild chain link deflection fence, using metal posts instead of wood.