Alluvial Fan Task Force

California Department of Water Resources Project

Minutes Plenary Meeting #4
Friday, march 14, 2008
San Bernardino County Department of Behavioral Health Building
850 E. Foothill Blvd.
Rialto, CA 92376

Members Present: Riverside County Supervisor Marion Ashley, San Bernardino County Supervisor Paul Biane, Sara Agahi, Danielle Borish, Dale Casey, Georgia Celehar, Tom Davis, Mike Fox, Andy Henderson (for Mark Grey), Rick Iger, Chuck Lackey (for Jon McQuiston), John McCarthy, Norman Meek, Dave Mlynarski, Brian Moore (for Ali Sahabi), Tom O'Keefe, Stephanie Pincetl, Lee Reader, Tom Scott, Eric Shamp, Scott Steinmetz, Chris Stone, Marty Teal, Sergio Vargas, Ralph Wagner, Kathleen Webb, Dusty Williams, Duane Young

State and Federal Representatives Present: Chris Adams, Ed Bortugno (for Rebecca Wagoner), Steve Cowdin, Scott Dawson, Greg Krzys, Ray Lenaburg, Ted Masigat (for Tammy Conforti), Mark Stuart

Technical Consultants Present: Susan Lien Longville, Susan Carpenter, Bo Cutter, Suzie Earp, Massoud Rezakhani, Adolph Lugo, Lynn Merrill, Bill Short, Tom Spittler, Jeremy Lancaster, Lisa Pierce, Boykin Witherspoon, Gigi Hanna

Members Absent: Kern County Supervisor Jon McQuiston, Los Angeles County Supervisor Michael Antonovich, San Diego County Supervisor Bill Horn, Joan Taylor, Tom Davis, Ali Sahabi, Vana Olson, Ray Torres, Mark Pisano, Paul Quill

Technical Consultants Absent: Cameron Barrows, Doug Hamilton,

State and Federal Representatives Absent: Mike Anderson, Tammy Conforti, Dave Gutierrez, Ricardo Pineda, Stephan Lorenzato, Maria Lorenzo-Lee, Pete Sorenson, Rebecca Wagoner.

Others Present: Mekbib Degaga, Stuart McKibbin, Steven Hernandez, David Garcia, Terry Rogers

Meeting called to order: at 9:30 a.m. by AFTF Facilitator, Susan Carpenter.

Welcome:

- Meeting Host, San Bernardino County Supervisor Paul Biane

Meeting Theme: *Examining Best management Practices and Existing Ordinances*

Panels/Presentations: (All PowerPoint presentations are available to participants on the password-protected AFTF website at http://www.alluvialfantaskforce.info

1. **"Characteristics of Fire Behavior on Alluvial Fans"**
   PowerPoint by Tom O'Keefe, AFTF member and Chief, California Department of Forestry and Fire Protection.

   O'Keefe discussed the difference between alluvial fans and other land forms in terms of fire behavior. Alluvial fans serve as a transition zone for fire behavior that changes dramatically from the toe to the apex, primarily because of variations in fuel, slope and topography.

   Fuels
   Fuel, which in this case means vegetation, transitions from grasses to shrubs/brush to timber as the alluvial fan ascends. Additionally, the energy release components increase; flame lengths and mid-flame temperatures increase. Fire intensity is dynamic and varies throughout the year (an acre can burn three times in a year, depending on conditions);

   Additional local factors, such as wind or solar exposure, can affect fire behavior in unusual ways.

   Slope
   Slopes on alluvial fans of 20 percent or more are generally classified as very high fire severity. As temperatures and slope increase, tactical opportunities change rapidly. Fire accelerates because it is going upslope, but firefighters decelerate because of the steepness of the slope.

   The first tripling of the slope of a fire increases the rate of fire by 2 times, but firefighters remain moving at same rate or possibly slower. In the second tripling of slope, the fire moves 4 to 6 times faster. Above that, the fire is said to be spreading at an extreme rate of spread.

   Topography
   Topography matters. Slopes of canyons create "chimneys" that preheat the fuels on a slope via convection column. Aspect of the slope also matters. A north facing slope is wetter and has heavier vegetation while a west facing slope will be drier and have more solar exposure and have lighter vegetation. Fire behavior on a west facing slope will be greater than an east or north facing slope.

As fires move into canyons, options for fighting fire change because aircraft cannot go into the canyons.

Fire behavior rules:

- Fire burns faster uphill;
- Except when it doesn't;
- Fires may burn aggressively even in areas deceptively devoid of fuels;
- Fire spreading out down slope across a fan can occur in a limited area or across several miles;
- Fire in canyons that are in alignment with wind direction may spread with the wind, regardless of the slope;
- Fire behavior is extremely dynamic; and
- Land forms that are either adjacent to or upslope can create micro climates altering fire behavior.

Alluvial Fan Fire Example: History of Snow Creek

> The frequency between fires should be every 40 years, but on Snow Creek, it is 4.5 years. In the last 40 years, there have been 11 fatalities from fire. Some of the factors are prevailing winds from the west, elevation changes of nearly 7,000 feet in two miles (steepest slope in the U.S.), which affects the daily flow of wind. Additionally, the desert retains heat and as that heat rises, a convection column from the desert meets the cold air masses from the San Jacinto ridge creating strong down slope winds at night (much stronger than upslope winds).

O'Keefe said that 60 percent of development occurs in wildland urban interface, creating greater need for evacuation, which siphons resources that could be used for fighting fire. Other risk factors include byproducts that are carried down the watershed after a fire. Mitigation must happen, but mitigation of one risk may mitigate multiple risks.

Upslope measures that reduce the impact of fire severity include:

- Ember resistant construction;
- Fuel reduction to restore watershed and forest health;
- Retrofit strategies for older communities.

Fire defense should be designed into new developments including:

- Direct flame contact—modify fuels to alter fire behavior
- Radiation—distance and resistive building materials reduce chance of fire damage
- Convection—selection sites to avoid (geologic) chimneys
- Ember Cast—palapas, patios, pergolas and plants can all add to the fuel load on a property.

Chief O'Keefe directed meeting participants to the California Wildland Urban Interface Fire Codes, which go into effect July 1, 2008, and reflect lessons learned

from many fires. The codes can be accessed here:
http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_codes.php

2. **"Economic Strategies for addressing Impacts of Development on Alluvial Fans"** PowerPoint by Dr. Bo Cutter, University of California, Riverside, AFTF technical Team.

Cutter discussed the benefits of alluvial fans, which include:

- Housing—these are prime areas to build high-end developments
- Open Space—Living within 1500 feet of open space increases a home value by 16.1%, compared to living the same distance from an urban park, which increases the value 1.8%
- Recreation—People devote time and money to recreation so we know it is something they value.
- Ecological—Preservation of habitat, fire control
- Flood Control/Groundwater Recharge—Climate change and Bay-Delta water management issues create water supply uncertainty, making groundwater storage valuable for buffering areas through the dry periods.
- Water Quality

Because natural flood control services are provided by alluvial fans, one way to measure the value those services is to consider the costs avoided by having those services. Losses from a flood include direct losses, such as physical damage from event and indirect losses, such as temporary unemployment and business disruption.

There is no way to separate the costs of alluvial fan flooding from all flooding, but overall, Southern California has sustained more than $1.3 billion in direct losses from floods; San Bernardino and Riverside Counties have had direct losses from floods greater than $900 million. Cutter said it would be safe to assume that there was a high proportion of alluvial fan flooding in those statistics. Another natural benefit of alluvial fans is that they can defray the flooding costs, he said.

Flood Control agencies have done a good job of avoiding the greater-than-$100 million floods since 1994—a fact that speaks to the value of flood control services. However, Flood Control revenues are limited. Property taxes are the most dependable form of revenue and can cover capital, maintenance and operations; State and federal revenues are volatile and often restricted to capital costs. Developer fees raise revenues for capital costs. The concern, however, is that maintenance costs will increase as the infrastructure ages (much of the infrastructure is close to 40 years old).

While property taxes are available for these costs, property taxes have not kept up with construction costs, and will probably fall with the economic downturn.

Cutter discussed additional funding mechanisms that local agencies use to cover those costs. They include:

Local Alternatives:

- Developer Fee--Riverside County uses a developer's drainage fee to finance capital costs, covering up to 10 percent of the county's capital needs as housing has exploded.
- Assessment districts, Mello-Roos, and Geologic Hazard Abatement Districts (GHADs)—These three include an actual dollar fee. Some are tied to the cost of living, with increases built in; they are governed by a city council or county supervisors; generally the districts contract with local agencies to provide flood control services and are best formed at the time of development with single landowners.
    - **How they differ:** assessment district's funding is linked to the property benefits; Mello-Roos levy a special tax for properties that benefit from community facilities; GHADs are for properties that benefit from geologic hazard mitigation—meant for erosion, flood control, seismic and water quality concerns.
    - **Legal Status**: GHADs are a state level agency, making them exempt form local ordinances; they can own property and exercise eminent domain (there are about 40 of them in Northern Ca. and 2 or 3 in Southern Ca). Assessment/Mello-Roos are fund-raising mechanisms.
    - **Engineering/science requirements**: GHADs requires a "Plan of Control" certified by a geologic engineer. Assessment Districts require certification that the assessment amount is related to benefits received. With Mello-Roos districts, there is no science/engineering required.
- Local bond funding—Prop. O in Los Angeles provides $500 million for water quality, flood prevention, water conservation and open space. It passed with a 75.8% approval, showing people's willingness to pay for services.
- State bond funding—Prop 1E provides $300 million for storm water projects outside of the Central Valley; $290 million for flood protection corridors, bypasses and setbacks. This could be used to set aside key flood channels and open space.
- Water supply agencies—they have an interest in ensuring recharge capacity is maintained and could be a source of investment in infiltration capacity.

Cutter's vision of development tied to funding streams on alluvial fan:
1. Set aside flood channels, habitat, high infiltration areas—funding could include local bonds, state bonds and water supply agencies
2. Flood control facilities—funding could come from developer fees
3. Maintenance funds—provided by local funding districts
4. Recovery Funds—provided by local funding districts

In conclusion, Cutter said alluvial fans have many benefits, not just flood control and housing, but flood control agency funding alone will not support those multiple benefits. Local funding districts and developer fees can provide more funding at the local level. Regional and state bonds can provide funding for capital costs and water supply agencies could provide funding to preserve or enhance infiltration and groundwater recharge.

3. **"Local Government Strategies for Addressing Impact of Development on Alluvial Fans"**
   PowerPoint by Lynn Merrill, Lynn Merrill & Associates, AFTF technical Team.

Merrill discussed the costs to Public Works departments in dealing with the impacts of development on alluvial fans in terms of how much it would cost to clean up from one major event.

(City and County governments provide the infrastructure maintenance and support after a development is built—and are the ones who need to figure out how to stretch the funds to do so. After developers have left, the city/county is responsible for the facilities constructed and impacts to local infrastructure such as storm drains. In most local governments, Public Works funding is insufficient to fund regular day to day operations and major post-flood clean ups that requires human and equipment resources to get the city functioning again).

The event he used for illustrative purposes was a hypothetical flood at Harrison County basin, a San Bernardino County Flood Control facility built in the 1980s, right above a housing tract. At 770 feet long, 220 feet wide and 100 feet deep, the basin may contain up to 8.47 million cubic feet of material, including 313,700 cubic yards of sand, gravel boulders and organic materials. To remove that amount of debris requires loaders, dump trucks, bottom dumps, scrapers, etc. Depending on type of material to be removed, the debris will need to go to a sand and gravel processor, a landfill or an old quarry—all need to permitted for the material hauled. If the material is severely contaminated (a possibility that O'Keefe's presentation indicated was highly likely), it may need to be tested, and will significantly effect the cost of removal. The route from the Harrison Canyon basin requires trips through residential neighborhoods, onto a freeway and off onto residential streets—creating significant impact on neighbors. The effort may require mining or extraction permits, a truck route permit, and signoffs from AQMD, Fish and Game, Regional Water QCB, etc.

The typical end-dump truck can move up to 30 cubic yards per load. With 313,700 cubic yards of material to remove from the basin, it will take 10,500 loads of debris (each a truck trip from basin to end location) going through residential neighborhoods, which will have to contend with traffic, noise, dust and damage to pavement. A fleet of 30 trucks could haul about 300 loads a day, but it would take 35 days to clean out the basin. If another rain event happens before the basin is cleaned out, it is highly likely that the basin will overflow, causing more problems, he said.

Hauling alone can cost more than $100,000. If the flood isn't declared a disaster, there is no state/federal aid and local agencies are left funding the clean-up.

Things to consider:

- What are BMPs to minimize debris flows while balancing both site-specific and regional development?

- Funding for maintenance and restoration without counting on state and federal agencies
- Improve ability to quickly restore services and operations to pre-event condition for multiple storm events

The answer, Merrill said, is to design flood/debris control features within a development needs to consider maintainability and logistics. And there needs to be a balance between public safety and maintainability.

Merrill's recommendations for flood control facility design

- Place service road away from the residential areas that allow two-way truck traffic to move outside of the neighborhood.
- Design basin to allow staging, movement and turn-around areas for trucks and equipment
- During design and review process, estimate annual quantities to be removed and identify potential sites capable of taking those quantities.
- Identify haul routes and determine adequacy at time of design
- As part of approval process, adopt recommended haul routes.
- Incorporate funding mechanism into the projects when adopted, by establishing special districts.

Conclusion: Considering the logistics and costs of future maintenance during the design phases and planning them in will help local agencies restore a flood debris basin to full capacity in order to prevent future damage and protect residents from losses.

4. **Film presentation of San Bernardino's flood history and Alluvial Fans**
   by Mike Fox, San Bernardino Co. Flood Control District, AFTF member

5. **Small Group Exercise**
   by Jeremy Lancaster, California Geologic Survey

   Using definitions of active and inactive alluvial fan surfaces provided by the California Geologic Survey, the small work groups were asked to evaluate sites on a map that might be active alluvial fans, consider the best uses for them, justify their conclusions and to determine if the definitions provided were helpful in their decision-making. The intent of the exercise was to introduce the participants to the definitions, but also to identify potential gray areas perceived during practical use.

6. **"Alluvial Fans and Regulated Land Use Planning"**
   PowerPoint by Boykin Witherspoon, Cal Poly Pomona, AFTF technical Team.

Witherspoon introduced a spreadsheet that covers select counties and cities to provide a quick look at what each county has in terms of ordinances, and information regarding flooding and alluvial fans from county general plans. Even in its initial stages, the spreadsheet shows subtle differences in language among different governments. The spreadsheet will be in the Appendix of the Task Force's final report.

He also examined case studies of real ordinances and BMPs, old building standards and new ones, to see what they look like and how they work on alluvial fans. Some examples included: mass grading; compacted pads (required in flood zones); keying structures to the bedrock (required in Los Angeles Co.) All of these standards change the characteristics of the land being developed. “Although the location stays the same, it is no longer, by our definition, and alluvial fan. So the inherent values are diminished,” he said. These issues should be considered.

He also introduced non-structural efforts being used in some jurisdictions, including notification of hazards when title changes hands and early warning systems for floods.

He said that ordinances and housing developments don’t necessarily reflect the knowledge available about diverting debris (with dykes or deflectors, for example). Before we could engineer and plan our way out of risk, we knew (there was risk). Over time we’ve engineered and rationalized away that knowledge, he said. A lot of what we see in ordinances is based on technology based in riparian floods and there may be a difference.

He said that multi-objective measures may bridge the gap between general plans and local ordinances and cited the case of Maricopa County, which works with the existing FEMA classifications, then sub-divides further to better define actual hazards (for a complete discussion of the Maricopa County case, see minutes from Plenary Meeting 3). Another example he mentioned was in the City of Palm Springs, who added an ordinance to its existing framework—the Chino Cone ordinance—which allows the ordinance requirements to supersede any conflicting provision of existing zoning code.

Conclusion: There is a need and room for creativity in designing a model ordinance specific to alluvial fans.

Meeting Adjourned: 3 p.m.
Next Meeting: Friday, April 11, 2008
K. Hahn Hall of Administration, 500 W. Temple St., Los Angeles, CA 90012

Minutes respectfully submitted to the AFTF members by Gigi Hanna, AFTF Administrative Coordinator. Please contact ghanna@csusb.edu if corrections are necessary.