RESOLUTION #97-22

DESIGNATION OF HAZARDOUS DEVELOPMENT SITE

WHEREAS, the Board of Commissioners of Boise County enacted Ordinance #97-2, which authorized the designation of Hazardous Development Sites to protect the health, safety, and general welfare of the public; and

WHEREAS, Resolution #97-10 was passed by the Board on February 28, 1997, declaring T8N R3E SEC 8; Portion of Lot 6 or Tax 46; Recorded as Instrument 151750, 5-18-94, at the Boise County Recorder's Office, Idaho City, which lies adjacent to the Alluvial Fan at Lower Banks, Boise County, State of Idaho.

WHEREAS, Ordinance #97-2 was an emergency ordinance and has been rescinded by the Board of County Commissioners by the enactment of Ordinance #97-3, the Boise County Zoning and Development Ordinance; and

WHEREAS, Ordinance #97-3, Chapter 5, Designation of Hazardous Development Sites is now in effect;

NOW THEREFORE, BE IT RESOLVED, by the Board of Commissioners of Boise County, Idaho as follows:

I. That technical studies have been conducted concerning debris, flood and flow potential in the Alluvial Fan Complex at Lower Banks in Boise County, Idaho. Said investigation reveals that the site identified below by approximate legal description is within the path of flow debris, flooding and sediments and is subject to an imminent threat to life and property. The details of such evaluation are set forth in the technical report of Federal/State Interagency Team dated February 5, 1997, which is attached and hereby made a part of this Resolution.

II. Based upon the foregoing, the Board of County Commissioners designates the following described lands as a Hazardous Development Site within the meaning of Boise County Ordinance #97-3, Chapter 5. Said land is more particularly described as follows:

T8N R3E SEC 8; Portion of Lot 6 or Tax 46; Recorded as Instrument 151750, 5-18-94, at the Boise County Recorder's Office, Idaho City, which lies adjacent to the Alluvial Fan at Lower Banks, Boise County, State of Idaho.

III. The employees and staff of Boise County are hereby authorized to carry out the responsibilities set forth in Ordinance #97-3, Chapter 5, to notify the affected property owners (Coriell) of the Hazardous Development Site designation and to proceed as necessary to inform others affected by this action.

IV. Effective Date: This Resolution shall be immediately effective upon its passage by the Board of Commissioners of Boise County and supersedes Resolution #97-10.

APPROVED and ADOPTED as a Resolution of the Board of Commissioners of Boise County, Idaho, on this 21st day of April, 1997.

John N. Dyer, Chairman of the Board, District I

John S. Foard, Jr., Commissioner, District II

Harold E. Raper, Commissioner, District III

Attest:

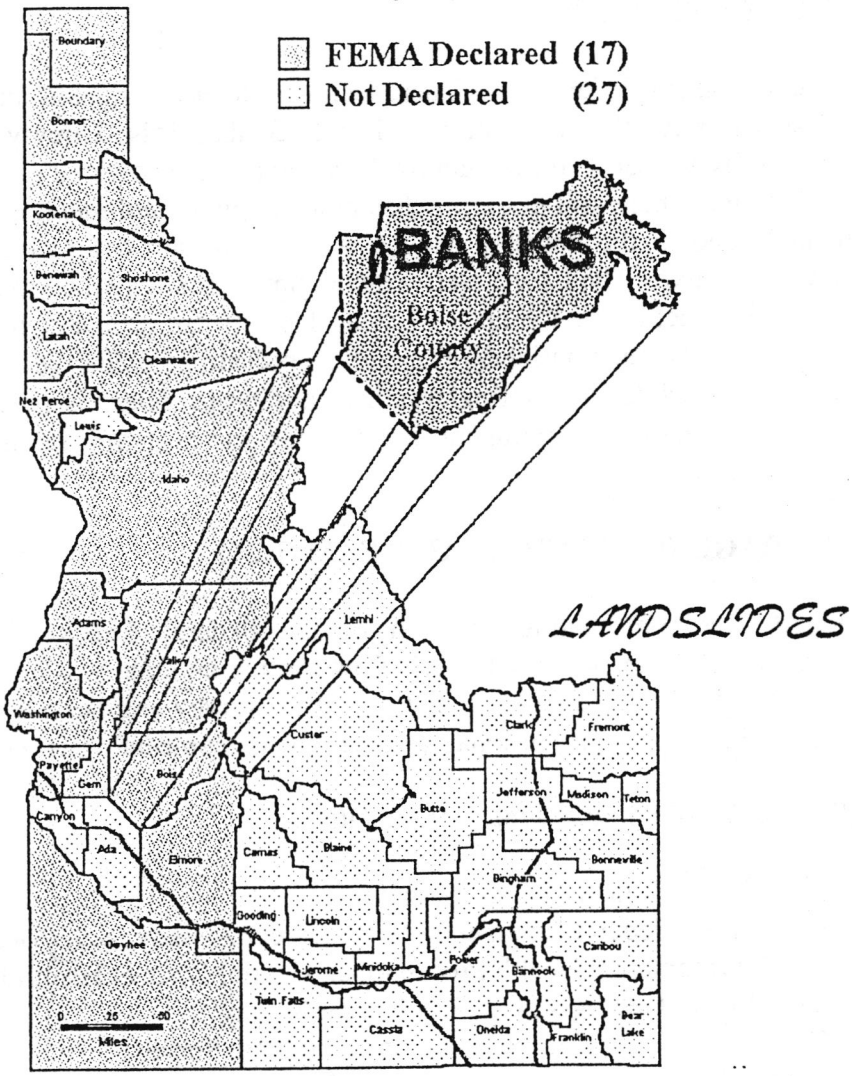
Rora A. Canody, Clerk to the Board

FEMA-DR-1154-ID

Fema/State Interagency Technical Report

Boise County Debris Flow

January1-3, 1997



MUD SLIDES

LANDSLIDES

Debris FlowDamage

February 5, 1997

FEDERAL/STATE INTERAGENCY TEAM

TECHNICAL EVALUATION

ALLUVIAL FAN COMPLEX
DEBRIS FLOOD/FLOW POTENTIAL

BANKS, BOISE COUNTY, IDAHO

EXECUTIVE SUMMARY:

A coordinated Federal/State/Local technical team conducted an onsite evaluation of the two watersheds above the community of Lower Banks, Boise County, Idaho. Both watersheds were damaged by a recent wildfire and by the weather and snow and rain conditions of December and early January. There still exists a substantial supply of sediment, boulders, and log debris in both channels and in the unstable canyon walls. Soils are conducive to slumping and many slumps are still active. The Lower Banks development is situated on the apex of a canyon mouth deposit. Flood velocities at the apex of such deposits are typically high, causing high impact forces from boulders, deep burial depths, and the potential for deep scouring. The potential exists for more extreme winter and spring weather conditions. There is reasonable cause to warrant ongoing concern relating to imminent threat to life and property due to the potential for debris floods and flows.

THE INTERAGENCY TECHNICAL TEAM (IAT)

Under the coordinating function of the Federal Emergency Management Agency (FEMA), a federal, state, and local debris flow evaluation team was created. The team consisted of a debris flow technical team coordinator, a snow survey engineer, two consulting debris flow engineers, a public health professional, and geologists representing federal and state agencies.

The IAT consisted of the following representatives:

Fred May, Ph.D., Geologist, IAT Coordinator
Phil Carpenter, P.E., Federal Emergency Management Agency, engineer
Jerry Davis, Environmental Health Professional, Central District Health Department
Mary Donato, Ph.D., Geologist, U.S. Geological Survey
Virginia Gillerman, Ph.D., Geologist, Idaho Geological Survey
Evert Lawton, P.E., Ph.D., University of Utah, Department of Civil Engineering
Phil Morrisey, P.E., Natural Resources Conservation Service, Snow Survey Office
Jim O'Brien, P.E. Ph.D. FLO Engineering, Breckenridge, Colorado
Terrel Stevenson, Geologist, Natural Resources Conservation Service
Jim Clayton, Ph.D., Soil Scientist, U.S.F.S., Intermountain Research Station

INTRODUCTION

Alluvial fans are cone-shaped stream sediment deposits at canyon mouths. When streams flood onto alluvial fan surfaces, they lay down sediments and debris that cause the alluvial fan to grow in depth and size. Typically, alluvial fans consist of three parts, an upper part referred to as the "fan apex" (also known as the "high-velocity zone or the "channelized zone), a middle part that is referred to as the "braided zone" (the stream velocities slow and the water flow creates a braided pattern), and a lower zone referred to as the "sheet flow zone" (stream velocity slows more and the flowing water occurs as a slow-moving sheet flow).

The community of Lower Banks is situated on two alluvial fans that blend together. The fan is typical of narrow canyon alluvial fans that are truncated by a river (in this case, the Payette River). This fan is not a complete fan, because it does not have all three components. It is considered by the IAT to consist only of the "fan apex", which is the most dangerous part of an alluvial fan during times of flooding, due to the high velocities of the sediment and debris, the destructive forces of debris carried by the flows, the considerable depths of sediment, and the deep scouring.

The terms "debris flow", "debris flood", "debris torrent", "mudslide", "mudflow", and "landslide" have different technical definitions, but they all refer to similar processes by which mixtures of water and debris flow (sometimes rapidly and destructively) down streambeds or slopes.

TECHNICAL PERCEPTION OF RISK

The evaluation of a hazard involves "technical perception of threat and risk" based on "best available data/information at the time. The IAT conducted an onsite evaluation of the area of concern, and our observations are discussed below. The technical perception of this IAT is provided in this report and its conclusions. This report is provided as input to the federal and state coordinating agencies, the Federal Emergency Management Agency (FEMA) and the Idaho Bureau of Disaster Services (BDS), for this element of the overall disaster (FEMA 1154 - DR-ID).

FIELD EVALUATION

On February 1, 1997, at 9:00 a.m., the IAT met at the FEMA Disaster Field Office (DFO) for an initial briefing. The group then went to Lower Banks, Boise County, Idaho, where it met with Jim Powell, the major landowner and residents of the Lower Banks Alluvial Fan Complex. The field evaluation began at about 11:00 a.m.. The IAT was accompanied by Mr. Powell. The IAT hiked both the stream bottom and the south-facing slopes of the main Lower Banks Canyon (the north-facing slope was snow-covered and mainly inaccessible, but clearly visible). The IAT conferred during the onsite evaluation, obtaining multi-disciplinary and multi-objective concurrence relative to considerations of "imminent threat to life and property." The onsite field evaluation ended at approximately at 1:30 p.m.

The helicopter aerial survey of the Lower Banks watersheds began at approximately 2:30 p.m. The first flight included Phil Morrisey (Natural Resources Conservation Service, Snow Survey Office), Dr. Gillerman (I.G.S), and Dr. Donato (U.S.G.S.). A snow survey was conducted of the Lower Banks watershed. Snow cores were taken and snow depths and snow water contents were measured at three elevations (3,700', 4,420', and 5,000'). Snow depths were 5", 7", and 17.25" and the amount of water stored in the snow is equivalent to 1.6", 1.9", and 5.75" of water, respectively. Summed over the Lower Banks watershed, this equates to approximately 28 acre feet of water. The two geologists accompanying the snow surveyor conducted an aerial geological survey, observing numerous watershed slumps in various stages of slope failure. Additional flights included the environmental health professional, the IAT Coordinator/Geologist, the two consulting engineers, and a Geographic Information Specialist and a FEMA general counsel.

On Sunday, February 2, 1997, the IAT reconvened from 9:00 a.m. to 1:00 p.m. to review their results and to determine what tasks needed to be accomplished to prepare this present report. The individual technical reports were prepared and delivered to the IAT Coordinator on February 3 and 4, 1997, to be included in the present IAT report.

THE MAIN LOWER BANKS WATERSHED

The elevation of Lower Banks is about 2,800' and the upper elevation is 5,085', a difference of 2,285'. The north facing slopes are still snow-covered, whereas the south-facing slopes at lower elevations are now relatively free of snow. The north-facing slopes are relatively-densely covered with brush and trees and are steeper than the south-facing slopes. The main stream channel runs a fairly straight course westward to its confluence with the Payette River, a distance of approximately 4,000 feet, with an average slope of about 36 percent.

The snow-covered north-facing slopes are assumed to be underlain by frozen ground. This ground will thaw and will likely become unstable when that happens. The steeper slopes and more dense vegetation may contribute numerous slumps with tree debris into the channel bottom, which is assumed by the IAT to contribute to the ongoing imminent threat to human life below on the fan apex—in a sense, the second "barrel" of a "double-barrel shotgun."

The south-facing slope is not as steep as the north-facing slope and it is sparsely vegetated with grasses and sparse conifers. This side of the canyon was relatively free of snow up to about 4,000 feet elevation. It had thawed, was saturated, and was contributing to canyon wall slumping at the time of the onsite evaluation. The potential still exists for more slumps to reach the canyon bottom and, under the right conditions, cause damming and surges of water, mud and debris onto the fan apex below.

The discussion above is relative to the main Lower Banks Canyon, and not the lesser canyon to the immediate south. That smaller canyon has very similar conditions and poses a threat to the mobile homes, highway, and houses below.

The Lower Banks watersheds are considered by the IAT to be damaged. This is an important point that relates to the concept of imminent threat to life and property, even on an ongoing basis for several years to come. The damage resulted from the deep and extensive burn that occurred five years ago, and from which the trees of the watershed have not yet recovered. The damage also resulted from the December and early January weather, snow and rainfall, and warm temperatures. The watershed reacted to the latter conditions with rapid runoff, undercutting of stream banks, slumping, natural dams, and flood surges onto the alluvial fan below. Many active and incipient slumps still exist on the south-facing slopes of the two canyons, and evidence of slumping is present in the north-facing frozen slopes.

The watershed is underlain by thoroughly-weathered granite. Slumps on the south-facing slope of the main canyon demonstrated that the granite was weathered to a depth of three to four feet and that deep ground fractures extend beneath the surface downward toward the stream channel. The weathered granite soils are a considerable part of the debris flow problem, because they are highly porous and permeable and are minimally cohesive (i.e. tend to fall apart). It is thought by the IAT that water seeping through these sediments under some seepage pressure contributed significantly to the slump problems. This continues to happen, especially when it rains onto soils that are already saturated.

The canyon slopes also contain much boulder debris. This is the source for much of the boulder debris that ultimately emerges through the canyon mouth onto the alluvial fan. Each slump into the channel bottom will supply boulders that will ultimately be transported to the fan below. Boulders pose a significant threat to human life and property because their impact forces are considerably greater than are the forces of the water or mud against structures. It was concluded that these forces on this fan apex cannot be reasonably mitigated.

THE LOWER BANKS ALLUVIAL FAN:

The Lower Banks alluvial fan is not a complete alluvial fan. It consists of only what is called the "fan apex", or the high-velocity zone, or the "channelized zone." Thus, Lower Banks development occurs on the part of an alluvial fan called the "fan apex." It is here that debris flow velocities, impact forces, and scouring potential are the greatest, and where the threat to human life and property is the greatest. The fact that an alluvial fan exists at Lower Banks is evidence that flash floods and debris flows occur here with some frequency. This is supported by the presence of rapids in the Payette River immediately downstream from Lower Banks. These rapids are the site of boulders lodged in the river from periodic floods emerging from the Lower Banks alluvial fan complex.

The distance from the canyon mouth to the Payette River is estimated at about 500 feet. The slope is difficult to express because the ground surface drops to the level of Highway 55, then again to the level of the river. It is sufficient to indicate that the distance is both short and relatively steep. This condition is conducive to very high water and debris velocities and impact forces for boulders impacting against structures. Velocities at the motel below were estimated at

approximately 18 feet per second. These velocities pushed five-foot boulders through the motel, destroying it. Such forces cannot be mitigated with any reasonable structural engineering approach.

WHAT HAPPENED:

A series of storms swept through western Idaho during the month of December. Individually, none of these storms was unusual, but their combined effect was to accumulate a snowpack that is estimated to be the deepest in 50 years. During a warming trend in late December, rain falling upon the melting snowpack produced saturated watershed soils on the steep slopes in the two canyons above Banks. Both canyons produced debris-laden floods, affecting literally all development on the alluvial fan.

The resulting debris flow process is fairly well-understood. The process is as follows: The high runoff scoured into the bottoms and banks of the streams of both canyons, carrying the eroded sediment and debris downstream and undercutting the existing stream banks. The undercut banks became unstable, creating higher slumps that also slid into the stream bottoms, blocking the flow and causing downstream surges of debris-laden waters. The greatest volume of sediment, boulders, and debris came from the eroded stream bottom and sides. The canyon walls contributed a much lesser amount because these slopes were covered with snow until well into the debris-flow process. Now the canyon walls are barren of snow, but saturated and loose. It is important, to note that this process has primarily involved only the south-facing slopes of the canyons and that under certain conditions, debris-flows involving the north-facing slopes may be expected to occur later, when those slopes thaw.

The debris flow process is still active. The two Banks watersheds are damaged. "Perched" slumps rest on their "slip surfaces" waiting to move, when activated by thawing soils, additional snowmelt, or rain. Abundant sediment, debris, and boulders are still present on hill slopes and in parts of the stream gully, available to be remobilized by flowing water. The process is considered to be ongoing and the technical team believes that imminent threat will continue. We cannot predict exactly what might cause future catastrophic debris flows to occur, but periods of intense rain (including summer thunderstorms), sudden snowmelt, and rain falling on snow are likely triggers. Hazardous conditions exist at any time when heavy rainfall and/or sudden snowmelt may be expected to occur.

THE EFFECT

On January 1 - 3, 1997, a large volume of water and sediment passed from the main Banks Canyon onto the alluvial fan apex, then crossing Highway 55, and reaching the Payette river. The watershed contributed 12-14 acre feet of sediment and the water volume is estimated at 34.3 acre feet. Boulders up to five feet in diameter reached the area of the motel. Any structure on the alluvial fan that experienced this size-range of boulders was destroyed, as a

result. Other damage was caused by burial, due to the depth of the debris flow. This results in sediment and debris pouring through windows and doorways into structures, filling them with rock and mud. Scouring was also a problem, although it appeared that damage on the fan was mainly a factor of burial and impact forces.

ONGOING THREAT

The IAT concurred that the threat to the community of Lower Banks is present, that it will most likely continue through the snowmelt window until June, and that the damaged watershed will likely remain through the next five years and beyond. The watershed has been damaged due to the recent wildfire, the granitic soils have little cohesion, they are porous, and saturated. Slumps exist on both sides of each canyon above Lower Banks. More slumps will likely form if the winter and spring continue to be wet. Canyon bottom slopes have been undercut by stream scouring. Canyon slopes are strewn with boulders and many boulders and downed trees lie in the stream bottom. Many more trees will enter the canyon bottom with further slumping and undercutting.

High impact forces caused by moving boulders in additional flood events during the remainder of the winter and through the spring (snowmelt window) will be life thtreatening. The threat and risk are perceived by the IAT to be significant and that the degree of threat and risk satisfies the definition of Immediate/Imminent Threat as presented in the Robert T. Stafford, Emergency Relief and Disaster Assistance Act.

PUBLIC HEALTH CONCERNS:

The debris flow destroyed existing sewer systems for 5 mobile homes, 4 cabins, the motel, and the RV park. Severe damage also occurred to the spring and corresponding distribution system supplying all but the 4 southernmost home sites on the fan. Rebuilding sewer systems to conform to current regulations may or may not be possible or practical due to the site limitations. Any new water system would need to be built to public water distribution standards and would likely require drilling a well. There may be practical limitations to such a plan.

CONCLUSIONS:

The IAT concurred that the threat and risk to human life meets the definition of "imminent threat", as defined in the Rober T. Stafford, Emergency Relief and Disaster Assistance Act.

1) Soils in the two watersheds above Lower Banks are saturated and conducive to slumping into the canyon bottom.

2) Many active or incipient slumps exist in both canyons.

3) The north facing slopes are still frozen but slumps are visible. When these thaw, later in the

spring, there is the potential for ongoing debris floods and flows.

4) The watershed is damaged from a recent wildfire and from recent weather and debris flows and floods.

5) There is concern that further severe winter or spring weather may cause additional debris floods and flows.

6) The impact forces of boulders as large as 5-feet diameter are difficult to mitigate against.

7) Development on the apex of an alluvial fan (canyon mouth deposit) is difficult to protect from debris floods and flows.

8) The establishment or repair of drinking water and sewage treatment for the Banks alluvial fan community may be difficult.