Introduction to Formulating Mitigation Measures on Alluvial Fans

Alluvial Fan Task Force
Plenary Meeting 1

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Introduction

- What is an Alluvial Fan?
- How do Floods occur on Alluvial Fans?
- What is “Alluvial Fan Flooding”?
- National Research Council Findings
- State of California Guidelines
- Information and Resources
What is an Alluvial Fan?

- A Landform.
- A Sedimentary Deposit Located at a Topographic Break.
- Composed of Streamflow and/or Debris Flow deposits.
- Shaped like a Fan either Fully or Partially Extended.
National Research Council Findings

- Site Investigation is Essential
- Existing NFIP Framework Leads to Inconsistency.
- The Role of Flow Path Uncertainty is Different for Flood Plain Mapping and Mitigation.
What is an Alluvial Fan?

- Fan apex
- Radial spreading alluvial fan
- Braided channel systems
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- Fan Apex
What is an Alluvial Fan?
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Why Are Alluvial Fans Treated Differently?

- Direction of Flows not Always Predictable.
- More Severe Consequences of Flooding: Erosion, Debris Impact.
- California’s Highest Growth Areas are in Counties with extensive Alluvial Fan Environments.
How Do Floods Occur on Alluvial Fans?

- **Entrenched Fan:** Flood Waters are confined to Existing Channels, Adjacent Surfaces are “Remnant”

- **Active Fan:** Flood Waters have Historically Escaped Topographic Confines causing Erosion and Deposition along Uncertain Flow Paths.
Entrenched Channels
What is “Alluvial Fan Flooding”?

- A Flood Hazard where Flow Path Uncertainty is so Great, it cannot be ignored in characterizing flood risk.
- Historical Evidence of abrupt Erosion and Deposition.
- Elevation of Structures on Fill will not Mitigate the Flood Risk.
“Alluvial Fan Flooding”
Difference Between Riverine and “Alluvial Fan Flooding”

- For a Riverine Flood, you know, in advance, where the flood is going to travel and can prepare Cross Sections.

- For “Alluvial Fan Flooding” You may not know where the water will go and, therefore, need other skills.
Existing NFIP Framework Leads to Inconsistency

- Stabilizing a channel bank is generally considered a good practice to protect adjacent areas.
- For "Alluvial Fan Flooding" This approach can be construed as concentrating flood risk to neighboring areas.
Alluvial fans in California

- Broadly Identify Major Alluvial Fan and Depositional Environments throughout the State.
- Categorize and Assess Landforms to identify Active and Inactive Fan Surfaces.
- For Active Surfaces, Characterize Existing and Impending Development.
SUMMARY

- Floods on Alluvial Fans Can be more Hazardous than for Rivers.
- High populations already exist in alluvial fan areas
- Alluvial fans are located in California’s highest growth areas.
- Fan areas have unique ecological values
- Inactive fans can become active.
- Alluvial Fans can be Future High Hazards Areas in California