Geology of Alluvial Fans & Hazards Associated with Development

Alluvial Fan Task Force
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Debris flow source area, Highlands, CA
Potential Geologic Hazards

- Floods
- Debris flows
- Soil erosion
- Seismic shaking
- Surface fault rupture
- Liquefaction
- Collapsible soil
Controlling Factors

- Properties of the alluvium fan
- Properties of source areas
- Slope
- Drainage area/Channel geometry
- Hydrologic processes
- Tectonics/Seismology
- Fire and landuse
Longitudinal Hydrologic Profiles

- River Severn
- River Derwent (Yorkshire)
Hjulstrom's diagram of the relations among erosion, transportation, and deposition of sedimentary particles. [Adapted from Hjulstrom (1939).]
National Average Acres Burned by Decade on Federal Lands

Source: National Interagency Fire Center, Boise
Channel cross-sectional area (square feet)

Drainage area (square miles)

\[ A = 2.45 D_A^{0.66} \]
Geology of Day Canyon and East Etiwanda Canyon fans
Conclusion:
Development on alluvial fans can be designed to avoid or mitigate hazards

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- Debris flows
- Soil erosion
- Seismic shaking
- Surface fault rupture
- Liquefaction
- Collapsible soil

Regional and site-specific investigations are the tools for this work