Alluvial Fan Definitions and Site Development

AFTF Group Exercise - Plenary Meeting No. 4
March 14, 2008

As a developer, regulator, consultant, or landuse advocate please consider potential development sites depicted on the map below that appear to be on an alluvial fan. Consider how an ordinance using the definitions that follow could be helpful in the selection and review process for your assigned site.

Geologic Unit Descriptions
Qw: Very Young Wash Deposits
Qf: Very Young Alluvial Fan Deposits (Late Holocene).
Qyf5: Young Alluvial Fan Deposits (Late Holocene).
Qya: Young Alluvial Deposits (Holocene).
Qyes1: Young Eolian Deposits (Sheet Sand).

Reference: Morton and Miller, 2006, Geologic Map of the San Bernardino and Santa Ana 30X60 Quadrangles, USGS OFR 2006-
**Question:**

Use the definitions below, and evaluate sites that may be on an active fan surface.

**Definitions:**

**Alluvial Fan** is a fan shaped landform, either fully or partially open, at the mouth of a canyon created over time by deposition of eroded material (alluvium) in arid and semi-arid regions. The geographic apex of the fan is at the mouth of the canyon and the base of the fan spreads across low lying plains below. Alluvial fans evolve when sediment transported by flood waters or debris flows is deposited in active channels, resulting in the formation of a new channel elsewhere on the fan surface. The rate and location of the deposited materials can vary greatly over time and location and only a portion of a fan may be active. Alluvial fan floods and debris flows may travel at high velocities, eroding high volumes of sediment from mountain canyons and depositing this material lower on the fan surface.

**Active Alluvial Fan Surface** is an alluvial fan surface where the fan building processes of flooding, debris flow, sediment deposition, and erosion are active or potentially active during storm events. Active portions of the fan have generally shallow stream channels, often braiding into several channels that distribute alluvium broadly across the fan surface. Fan surfaces tend to be mobile or easily disturbed, sparsely vegetated, and vegetated with plants adapted to disturbance. Active alluvial fan surfaces can be defined based on a combination of data, such as, historic activity, relative geomorphic dating, hydrology, channel migration, vegetative development, avulsion potential, channel elevation differences, soil/desert pavement development, desert varnish, and weathering characteristics. Methods of gathering such data may include, but are not limited to: aerial photo interpretation, detailed topographic maps, quaternary geologic maps, field mapping, and engineering analysis.

**Inactive Alluvial Fan Surface** is an alluvial fan surface where the fan building processes are no longer active. Fan surfaces are stable and usually marked by longer lived vegetation and well-developed soil, or by desert pavement and desert varnish. Stream channels are generally single strand, incised below the inactive fan surface, and associated with a flat low floodplain terrace. Floods along channels on inactive alluvial fan surfaces behave as normal riverine floods.

**Note:** The intent of this exercise is to introduce the participants to the definitions, but also to identify potential gray areas perceived during practical use.
Site A: The alluvial fan surface site is on geologic unit Qf (see description above) in an area with a braided channel network running through most of the site. Vegetation is sparse, and exposed rocks on the fan surface are free of desert varnish.

Does this site appear to be on or partially on an Active Alluvial Fan Surface?

Please state your group’s reasoning for this conclusion:

What land uses would you consider reasonable for this site?

Do the definitions provide enough information to help you assess the site for development potential?

☐ Yes  ☐ No

Please identify issues your group had with the assessment of this site:
Site B: The alluvial fan surface is on geologic unit Qyf5 (see description above) in an area with consolidated boulders and cobbles, densely packed at the surface, with relatively deep, red-colored soil. A distributary channel (map unit Qw) coming in from the northern portion of the site abruptly stops at a 5-foot thick pile of boulders and cobbles, roughly 200 feet long by 100 feet wide.

Does this site appear to be on or partially on an Active Alluvial Fan Surface?

Please state your group's reasoning:

What land uses would you consider reasonable for this site?

Do the definitions provide enough information to help you assess the site for development potential?

☐ Yes  ☐ No

Please identify issues your group had with the assessment of this site:
Site C: The alluvial fan surface is on geologic unit Qyes1 (see description above) in an area with densely packed gravel and sand at the surface. Drainage patterns are moderately incised and form a dendritic contributory pattern across the site.

Does this site appear to be on or partially on an Active Alluvial Fan Surface?

Please state your group's reasoning?

What land uses would you consider reasonable for this site?

Do the definitions provide enough information to help you assess the site for development potential?

☐ Yes  ☐ No

Please identify issues your group had with the assessment of this site:
**Site D:** The alluvial fan surface is on geologic unit Qw (see description above) in an area that has been disturbed by site grading, but with scattered boulders lying around the site. Drainage patterns are not evident due to the ground disturbances, but historic records/photos indicate that the area has flooded in the past.

Does this site appear to be on or partially on an Active Alluvial Fan Surface?

Please state your group's reasoning?

What land uses would you consider reasonable for this site?

Do the definitions provide enough information to help you assess the site for development potential?

☐ Yes  ☐ No

Please identify issues your group had with the assessment of this site:
Site E: The alluvial fan surface site is on geologic unit Qf (see description above) in an area with a braided channel network running through most of the site. The alluvial fan surface is on geologic unit Qya (see description above). The site location was developed as an industrial warehouse in the 1930s and abandoned in the 1950s. No historic records of flooding exist. Trenches excavated into the old asphalt parking lot at the site by a consultant expose gravel and boulders with scattered debris, such as smashed cars, wood, and broken bricks.

Does this site appear to be on or partially on an Active Alluvial Fan Surface?

Please state your groups reasoning?

What land uses would you consider reasonable for this site?

Do the definitions provide enough information to help you assess the site for development potential?

☐ Yes  ☐ No

Please identify issues your group had with the assessment of this site: