

Implications of Urbanization on Alluvial Fans

Episodic Streams Workshop

November 8 & 9, 2010

Thomas E. Spittler

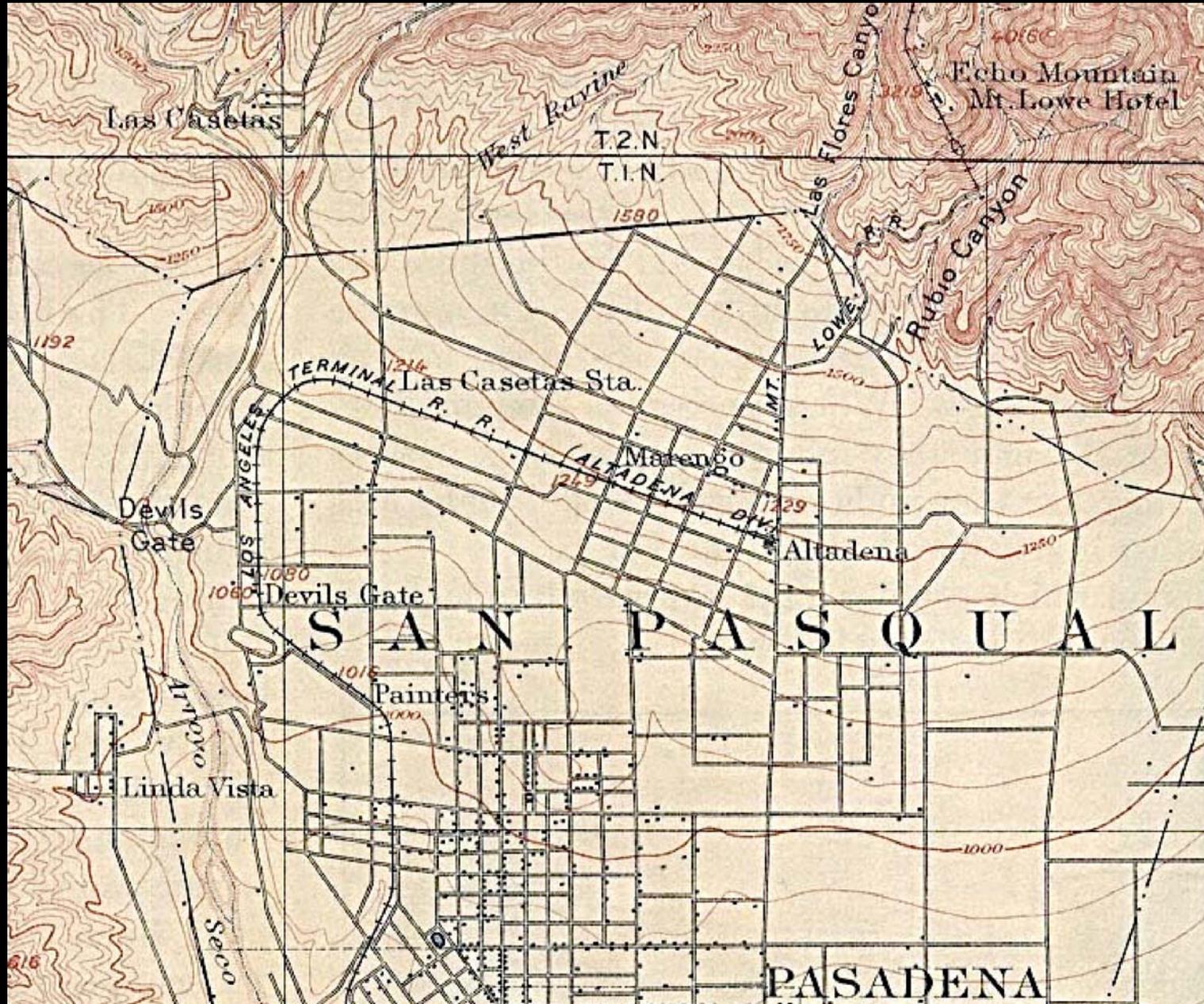
California Geological Survey



Hazards & Resources



Why develop on alluvial fans?



Claremont in the 1890s





Day Canyon and East Etiwanda Canyon fans in 1973

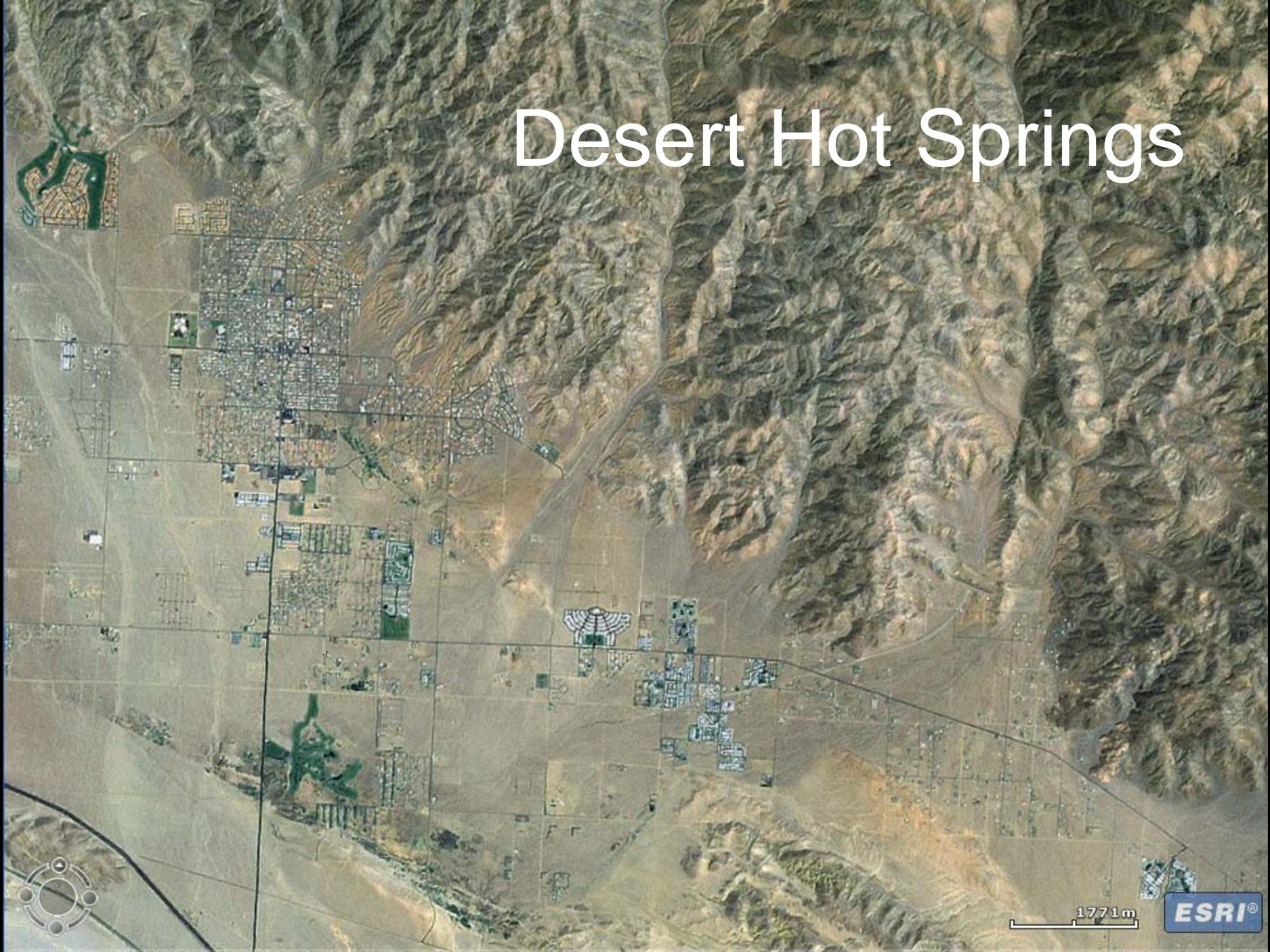
http://geomaps.wr.usgs.gov/socal/geology/inland_empire/compressional_faults.htm



Day Canyon and East Etiwanda
Canyon fans in 2006



Desert Hot Springs



1771m



Position 33°57'31"N 116°26'47"W, Altitude 12.17 Kilometers

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Hazards

- Floods and debris flows
- Fault rupture
- Seismic shaking
- Landslides and rockslides
- Hazardous minerals
- Fire
- Long-term maintenance



Magnesia Canyon 1979 debris flow

Connected to ESRI



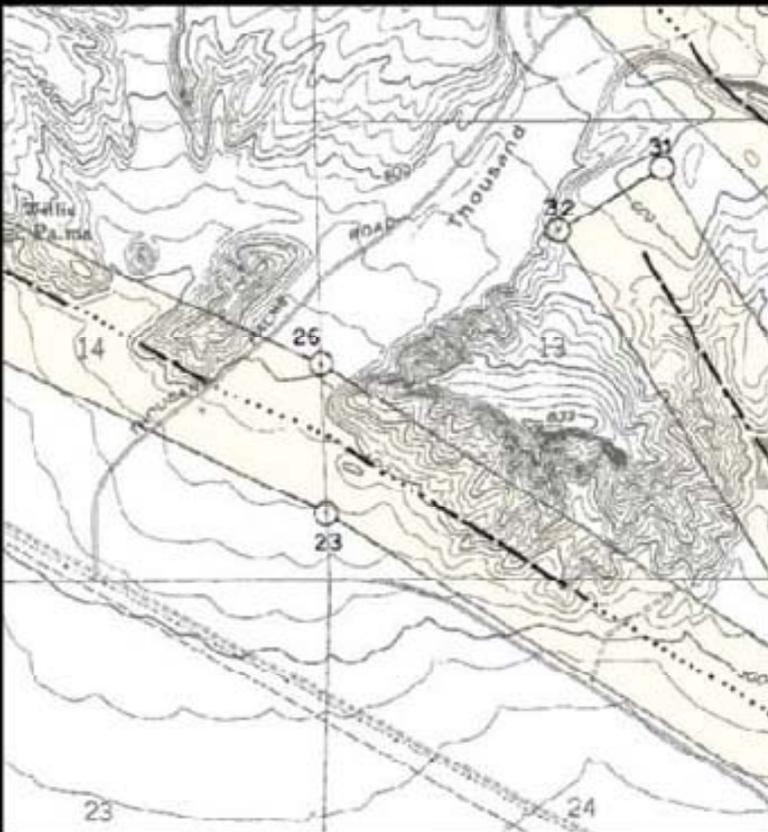
Magnesia Canyon in 2006

Position 33°45'04" N 116°23'16" W Altitude 2.58 Kilometers

ESRI

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Surface Fault Rupture



East-southeast of
Desert Hot Springs



Seismic Shaking Potential



Murrieta

Landslide Hazard

November 2003



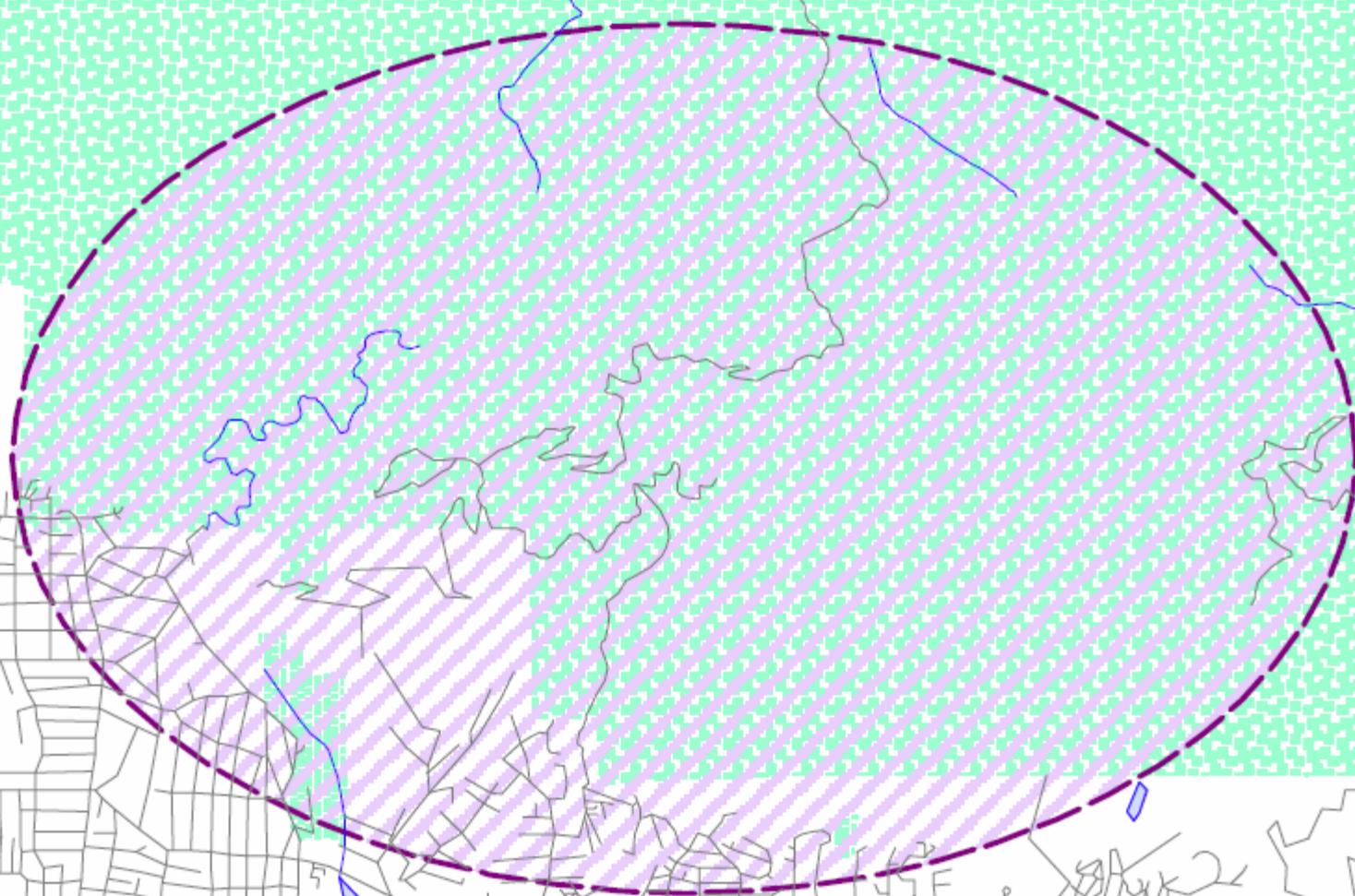
February 2004

Rockfall



Pioneertown

7.19.2006



ena

Sierra Madre

sadena

**Hazardous minerals
(Radon)**

Wildfire



San Bernardino Co.
CALFIRE files



**Wrightwood fan
Phelan**





Heath Canyon, Wrightwood



Sheep and Heath Canyons, Wrightwood

Long-Term Facilities Maintenance



Altadena 1993

11/17/93

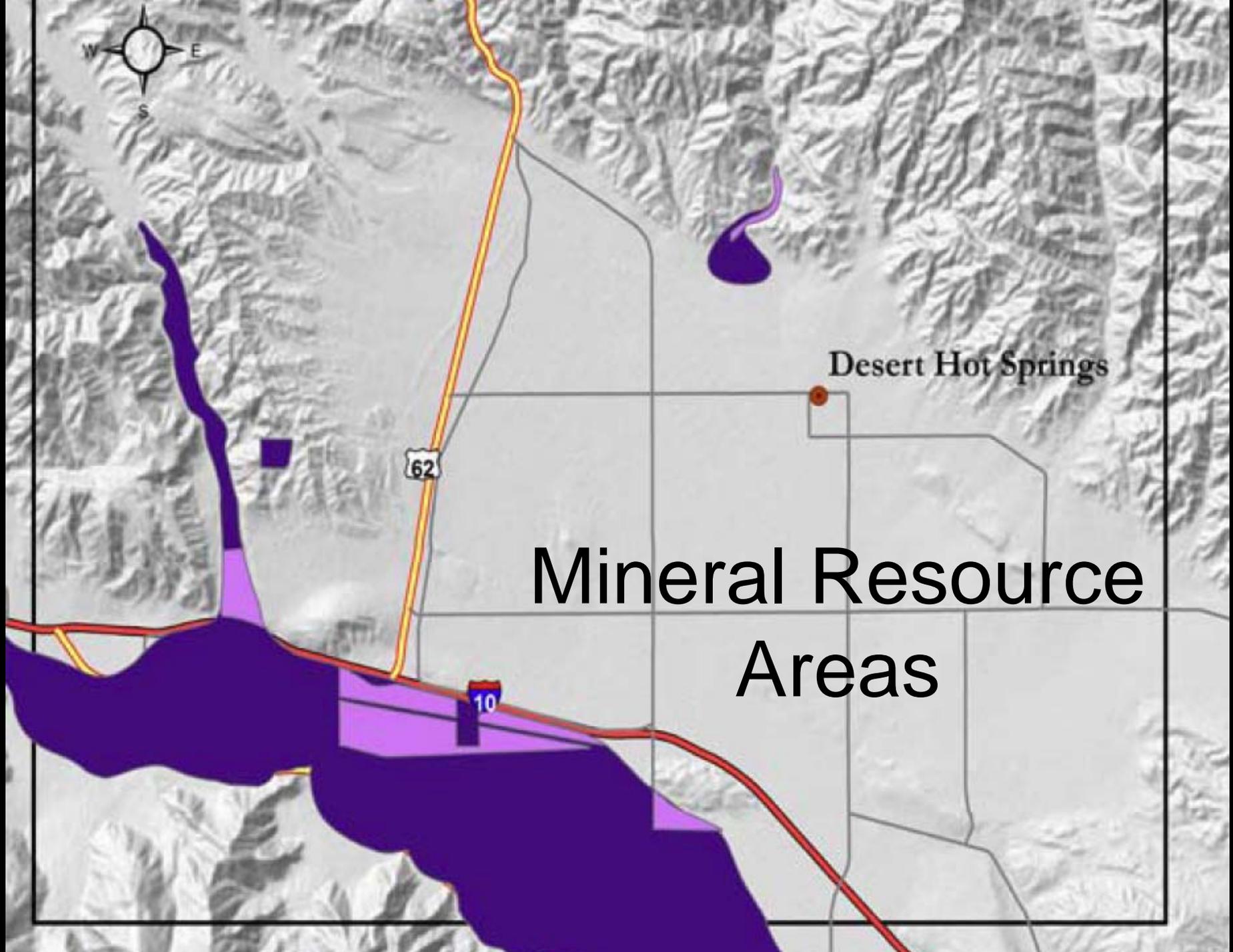
Resources

- Plants and animals
- Economic minerals
(including sand & gravel)
- Groundwater recharge
- Recreation
- Historic & archeological sites

Valuable Natural Resources

Fauna and Flora





Desert Hot Springs

62

10

Mineral Resource Areas



Aggregate Quarries

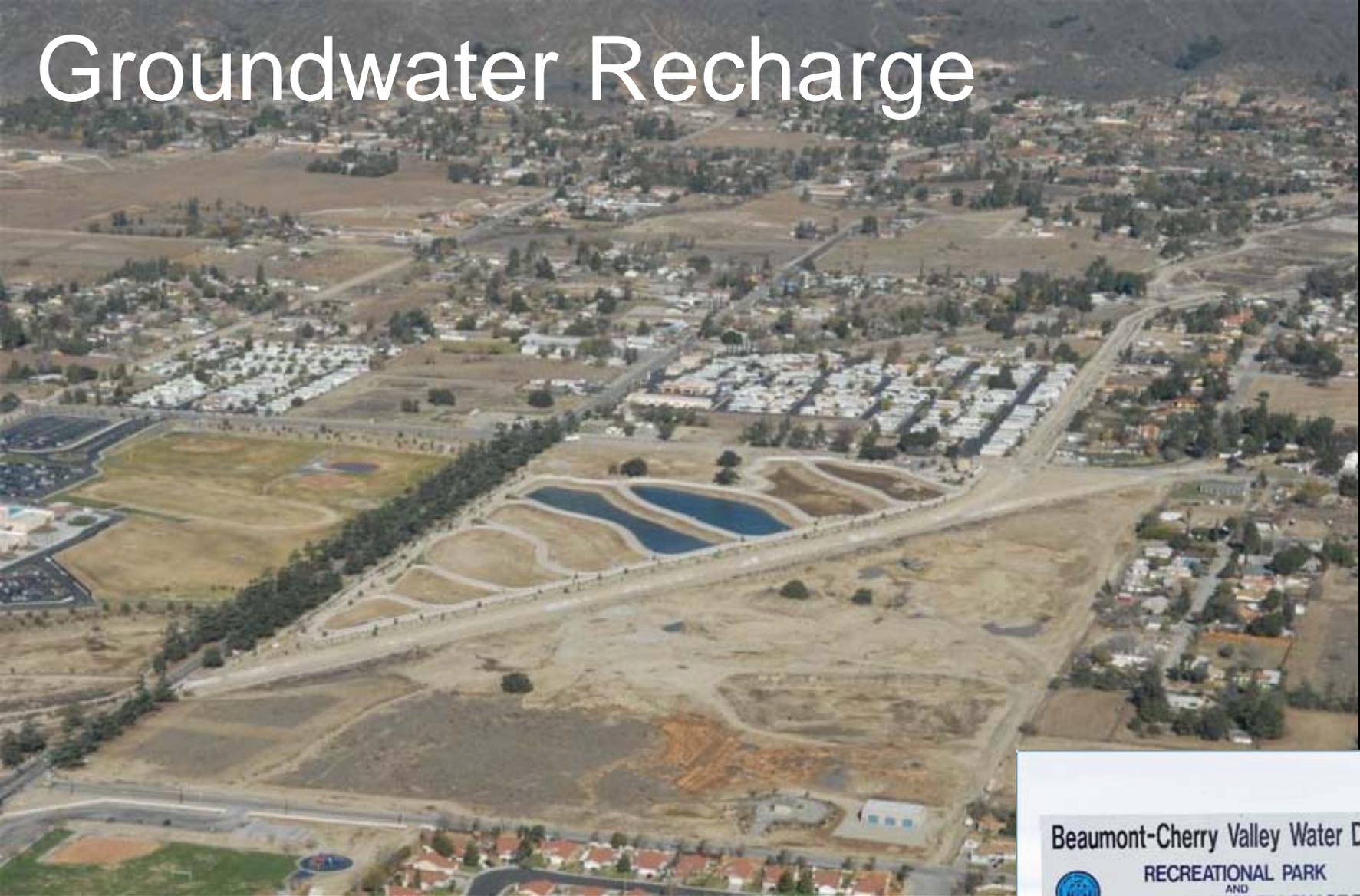


Position 34°08'44"N 117°56'08"W, Altitude 1.20 Kilometers

Local sourcing
vs.
transporting



Groundwater Recharge



Beaumont-Cherry Valley Water District



RECREATIONAL PARK

AND
RECHARGE FACILITY PHASE I



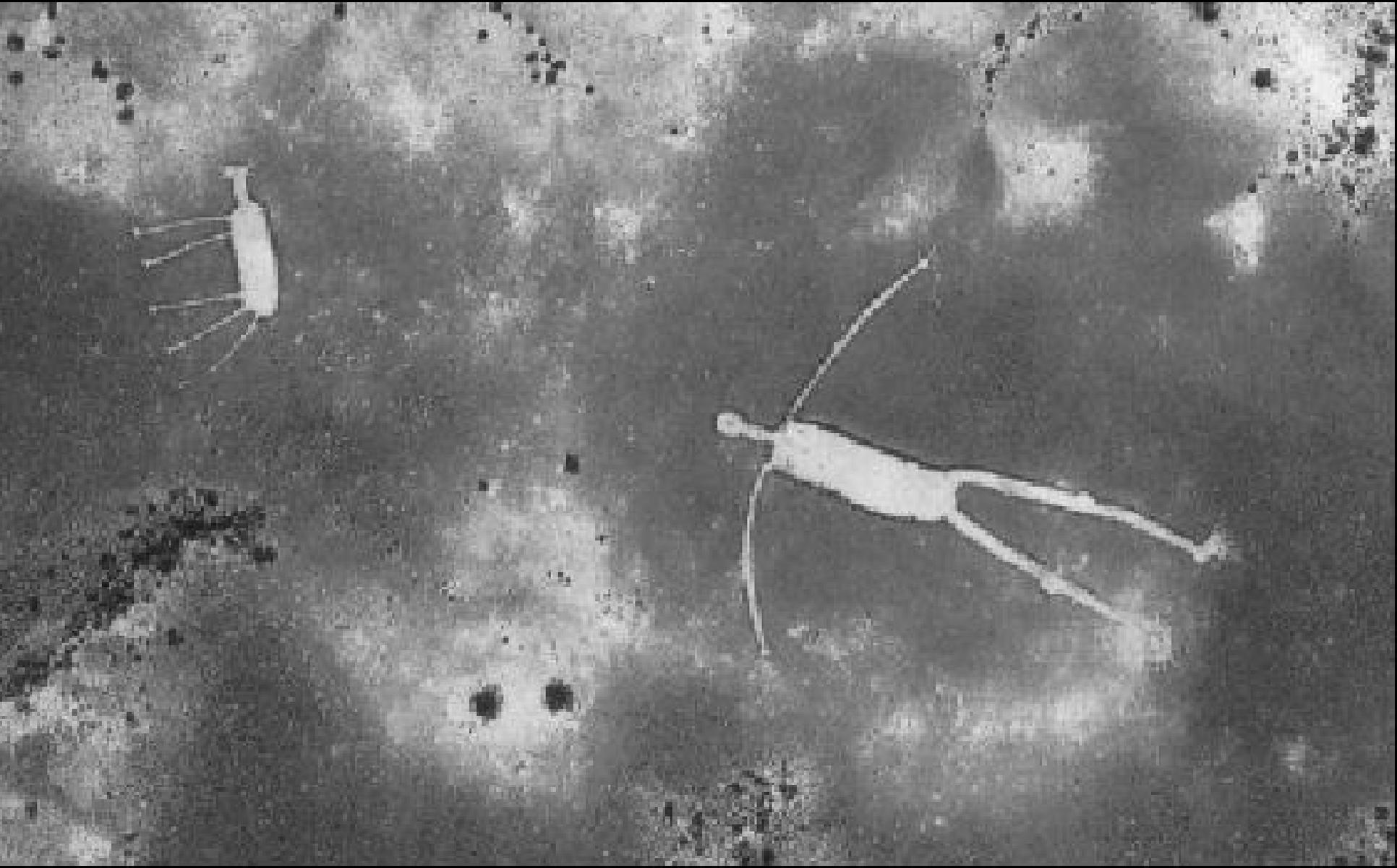
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Joshua Tree National Park

Blythe Intaglios prior to SUVs



Blythe
Intaglios
today





Opportunities & Consequences

Front-End Loading CEQA

The AFTF Integrated Approach

The Integrated Approach

For Sustainable Development On Alluvial Fans



JULY 2010

