

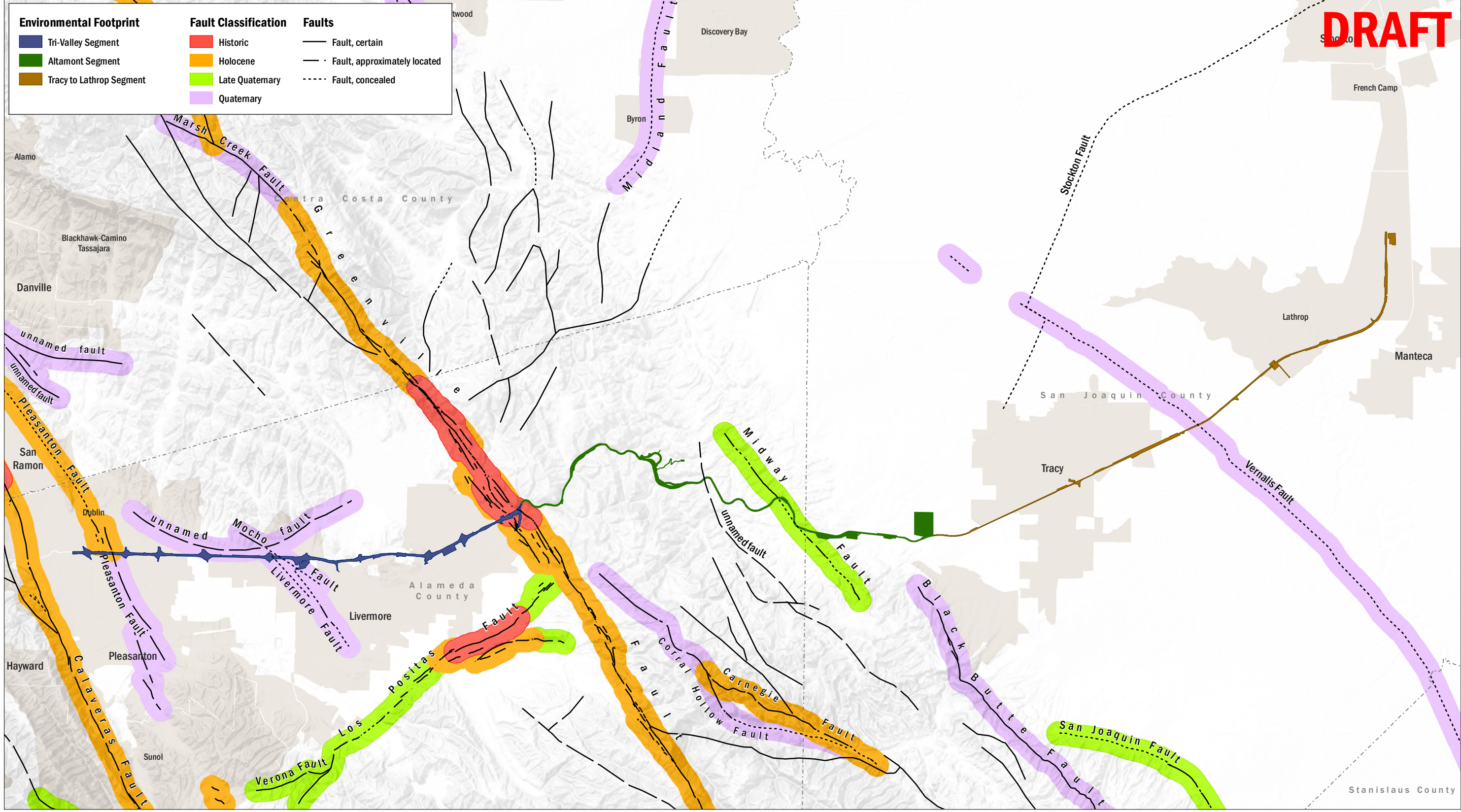
Appendix N  
**Supporting Geology, Soils, Seismicity, and  
Paleontological Information**

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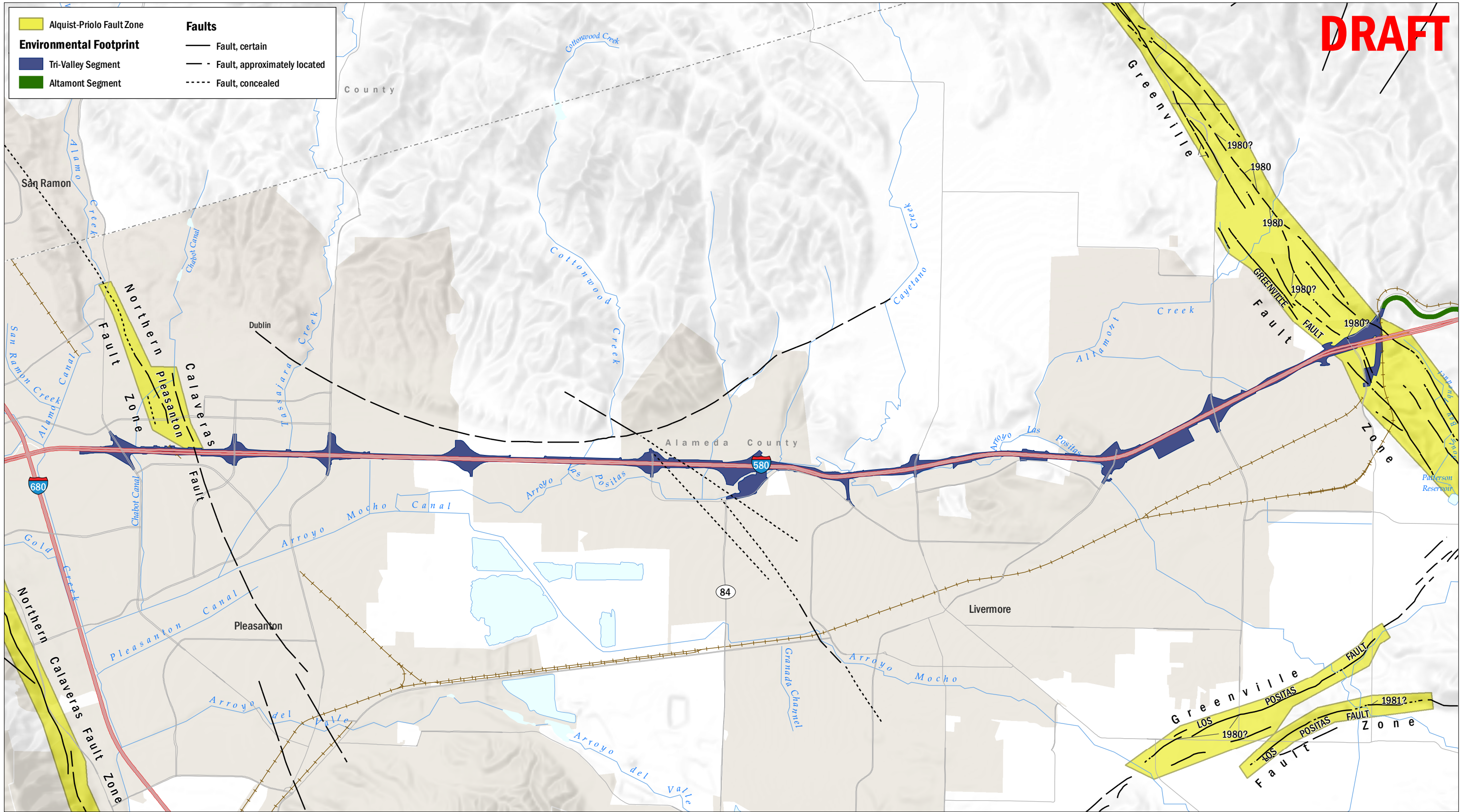


Data Sources: Jennings, C.H., and Bryant, W.A., 2010; State Fault Map; California Geological Survey, Geologic Data Map No. 6; Gutierrez, C., Bryant, W., Salcedo, G., and Wills, C., 2010; Updated Geologic Map of California; California Geological Survey, Geologic Data Map No. 2 (originally compiled by Jennings, C.W., 1977); AECOM, 2020.

**FIGURE N-1**  
Fault Activity Map



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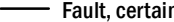


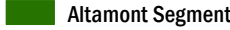

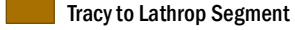


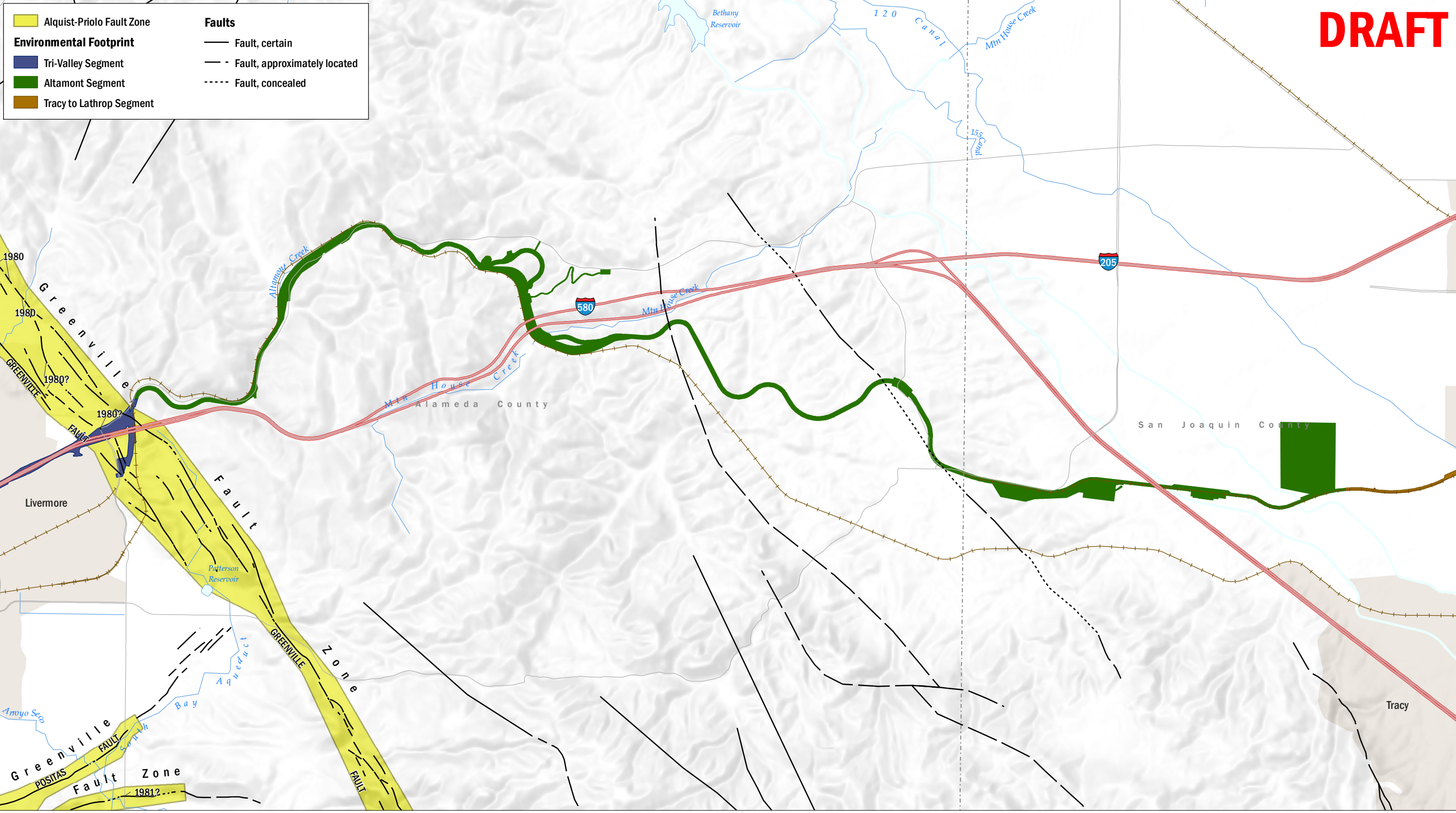
<span style="background-color: yellow; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Alquist-Priolo Fault Zone	<b>Faults</b>
<b>Environmental Footprint</b>	— Fault, certain
<span style="background-color: blue; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Tri-Valley Segment	- - - Fault, approximately located
<span style="background-color: green; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Altamont Segment	· · · · · Fault, concealed

Data Sources: California Geological Survey, Official Earthquake Fault Zone Maps of the following quadrangles: Dublin (1982), Livermore (1982), Altamont (1982), Midway (1982); Jennings, C.H., and Bryant, W.A., California Geological Survey, State Fault Map, 2010; AECOM, 2020.



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	Alquist-Priolo Fault Zone	<b>Faults</b>	
<b>Environmental Footprint</b>			Fault, certain
	Tri-Valley Segment		Fault, approximately located
	Altamont Segment		Fault, concealed
	Tracy to Lathrop Segment		



Data Sources: California Geological Survey, Official Earthquake Fault Zone Maps of the following quadrangles: Dublin (1982), Livermore (1982), Altamont (1982), Midway (1982); Jennings, C.H., and Bryant, W.A., California Geological Survey, State Fault Map, 2010; AECOM, 2020.

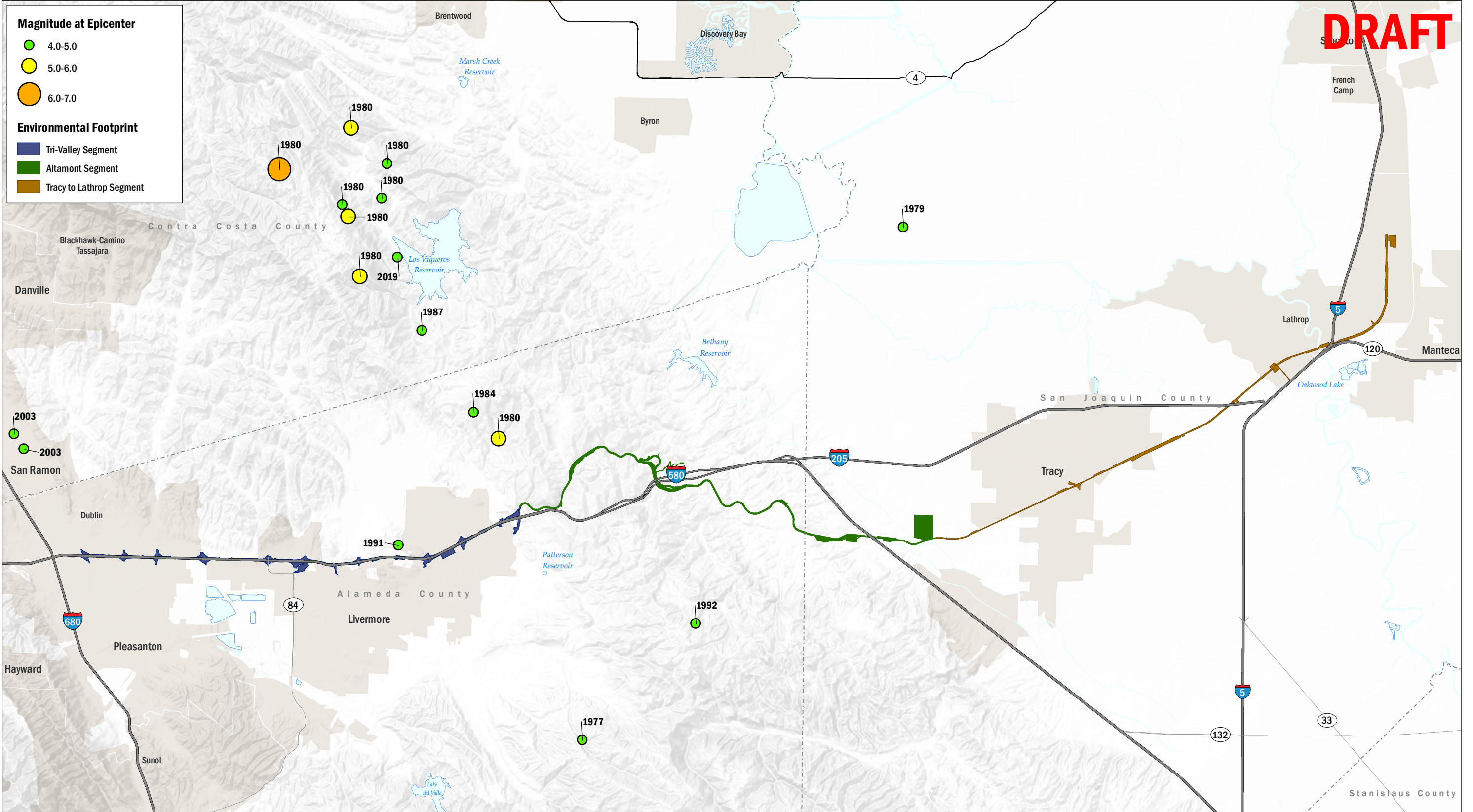


**AECOM**  
Valley Link Project

**FIGURE N-2B**  
*Alquist-Priolo Earthquake Fault Zone, Greenville Fault  
Altamont Segment*



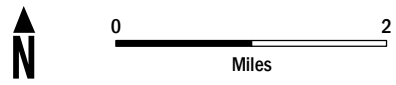
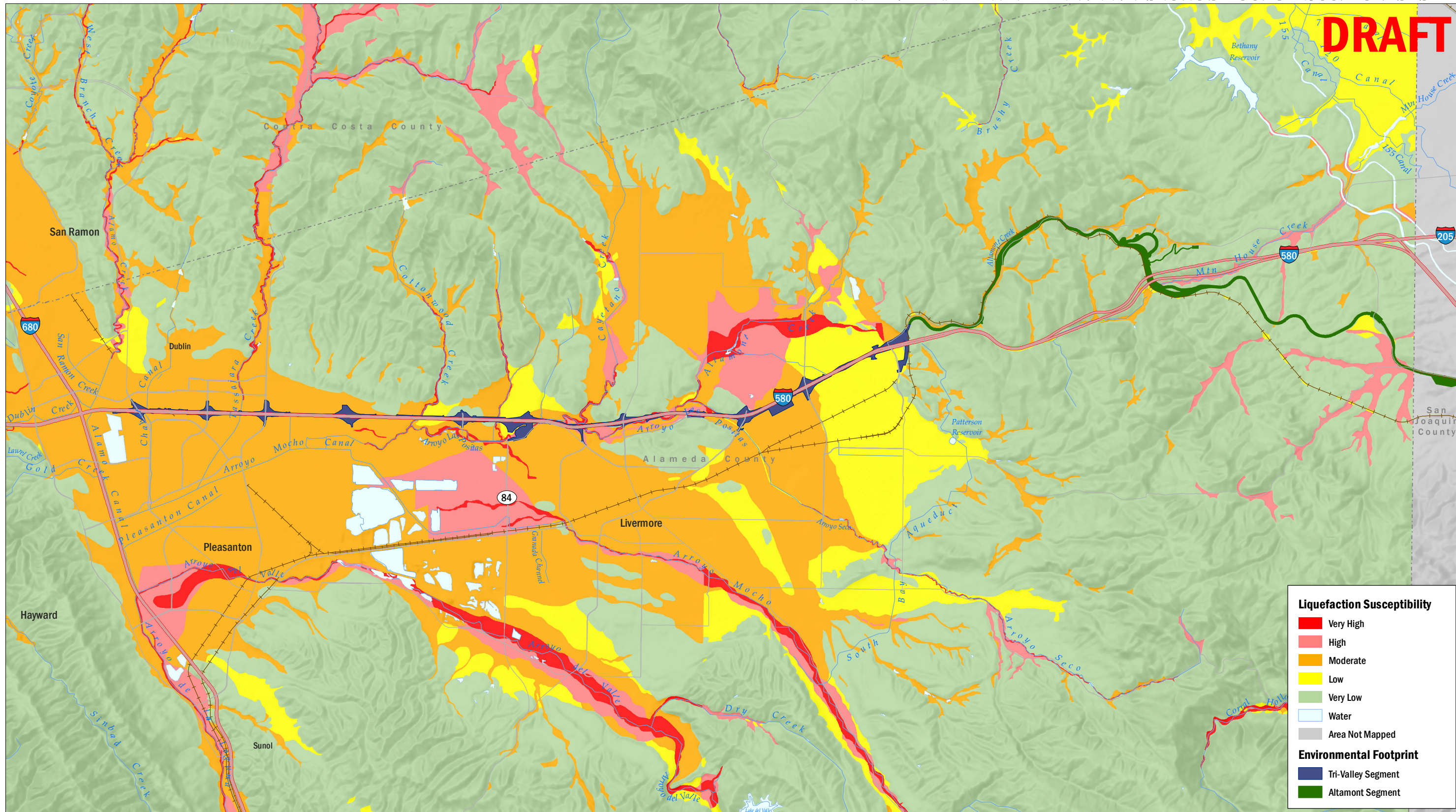
# DRAFT



Data Sources: United States Geological Survey, Earthquake Hazards Program, Earthquake Catalog, <https://earthquake.usgs.gov/earthquakes/>; AECOM, 2020.



**DRAFT**



Data Sources: Witter, et al., 2006, U.S.G.S., OF2006-1037; Knudsen, et al., 2000, U.S.G.S., OF2000-444; AECOM, 2020.

**FIGURE N-4**  
*Liquefaction Susceptibility  
 Tri-Valley and Altamont Segments*



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Data Sources: California Geological Survey Official Seismic Hazard Zone Reports of the following quadrangles: Dublin (2008), Livermore (2008), Altamont (2009); AECOM, 2020.



**FIGURE N-5**  
*Liquefaction Hazard Zones  
Tri-Valley Segment*



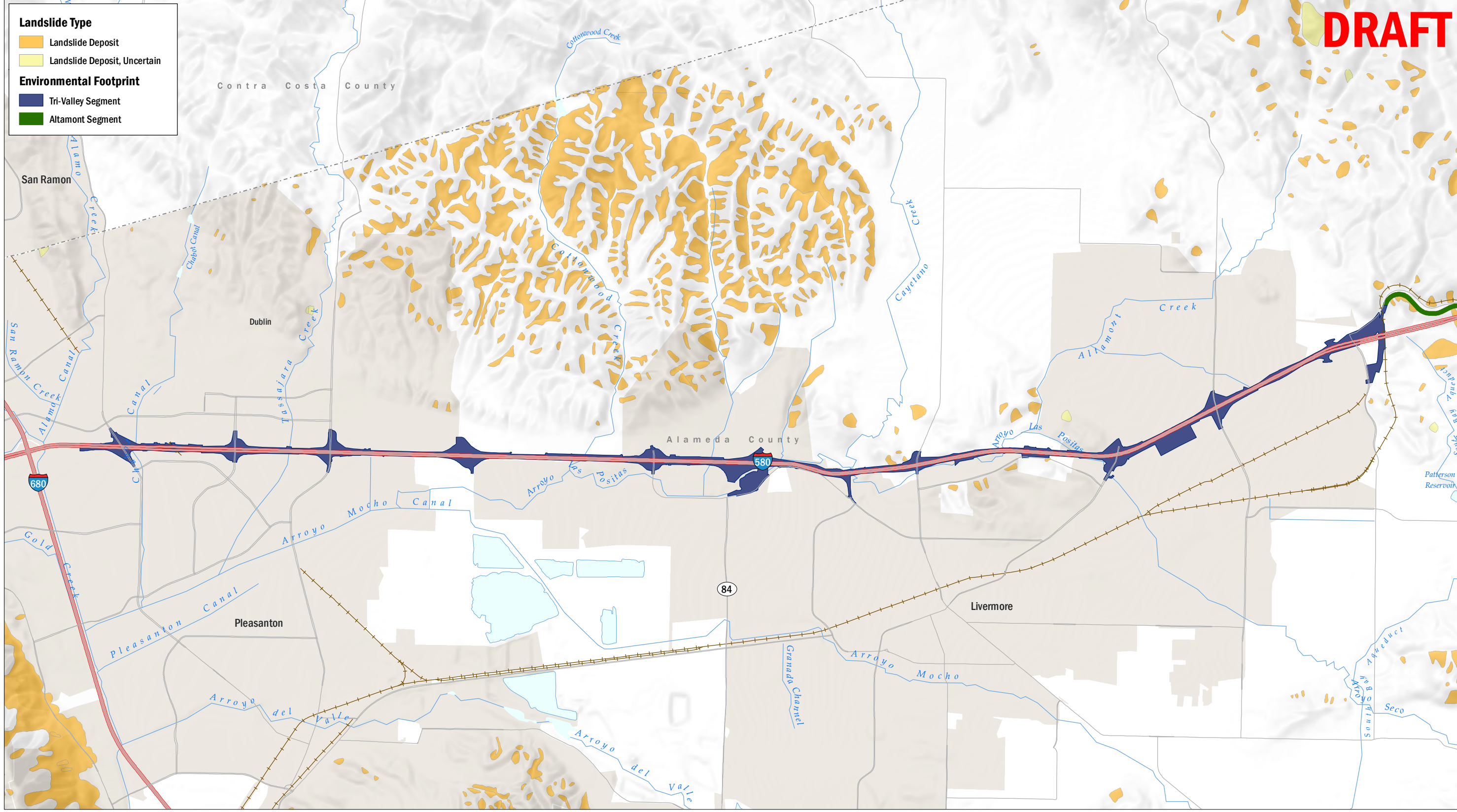
**DRAFT**

**Landslide Type**

- Landslide Deposit
- Landslide Deposit, Uncertain

**Environmental Footprint**

- Tri-Valley Segment
- Altamont Segment



Data Sources: Roberts, S., Roberts, M.A., and Brennan, E.; 1999; Landslides in Alameda County, California, a Digital Database; USGS Open File Report 99-504; AECOM, 2020.

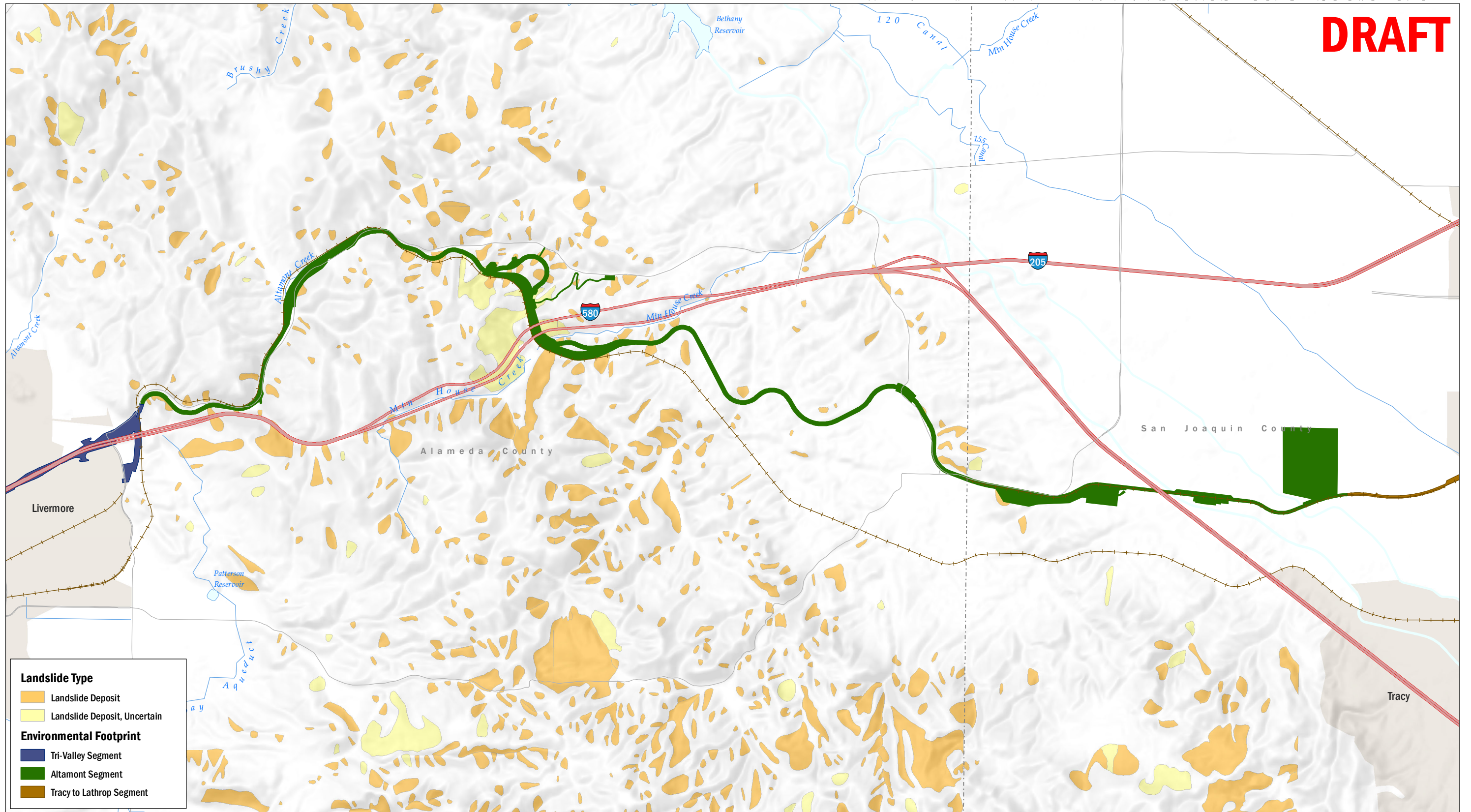


**AECOM**  
Valley Link Project

**FIGURE N-6A**  
Mapped Landslide Deposits  
Tri-Valley Segment



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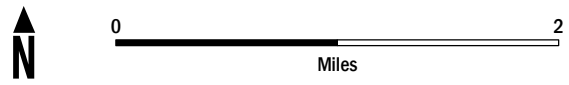


**Landslide Type**

- Landslide Deposit
- Landslide Deposit, Uncertain

**Environmental Footprint**

- Tri-Valley Segment
- Altamont Segment
- Tracy to Lathrop Segment

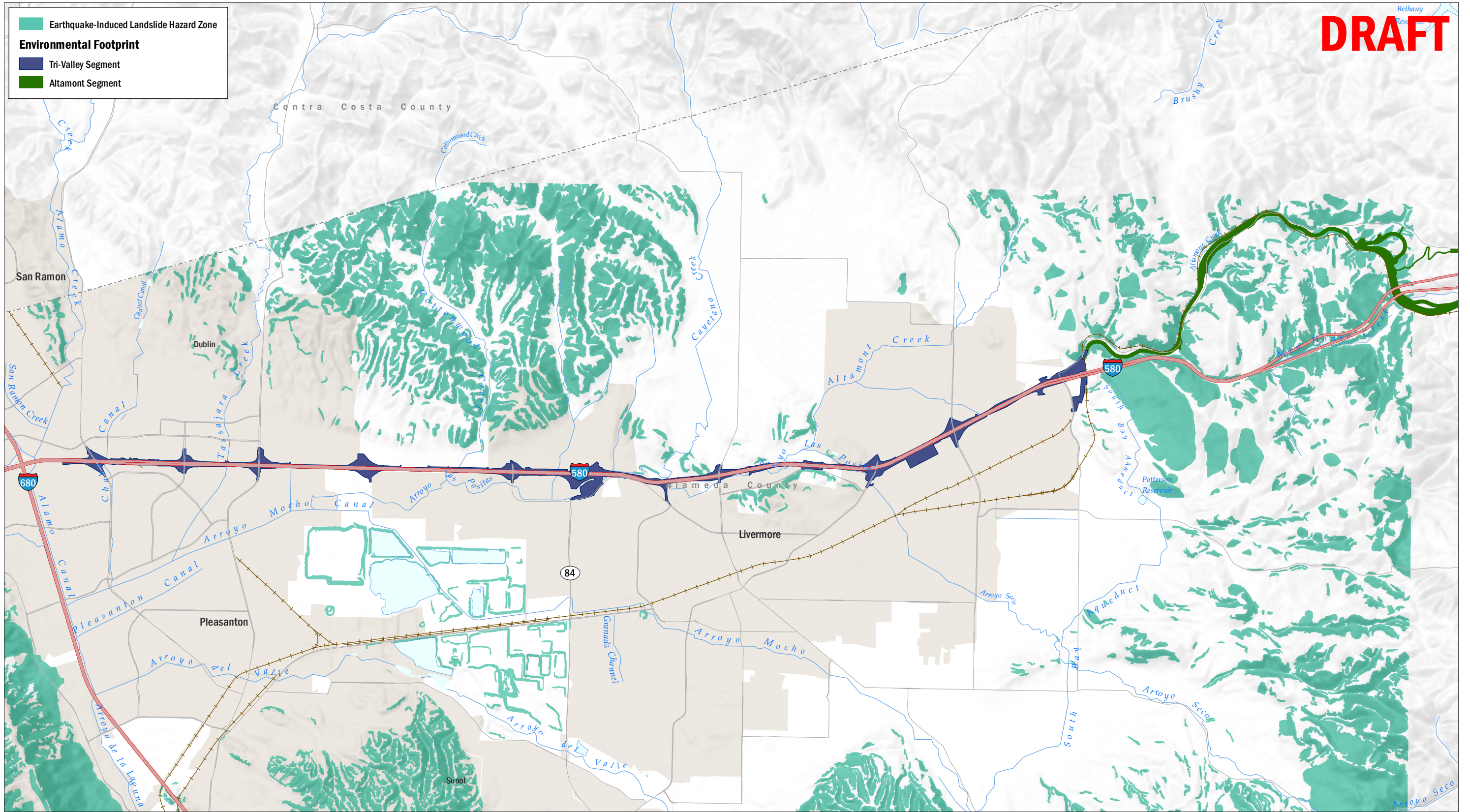


Data Sources: Roberts, S., Roberts, M.A., and Brennan, E.; 1999; Landslides in Alameda County, California, a Digital Database; USGS Open File Report 99-504; AECOM, 2020.



**FIGURE N-6B**  
Mapped Landslide Deposits  
Altamont Segment



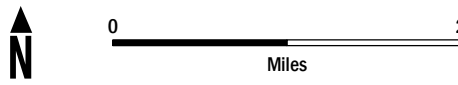


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**Earthquake-Induced Landslide Hazard Zone**

**Environmental Footprint**

- Tri-Valley Segment
- Altamont Segment

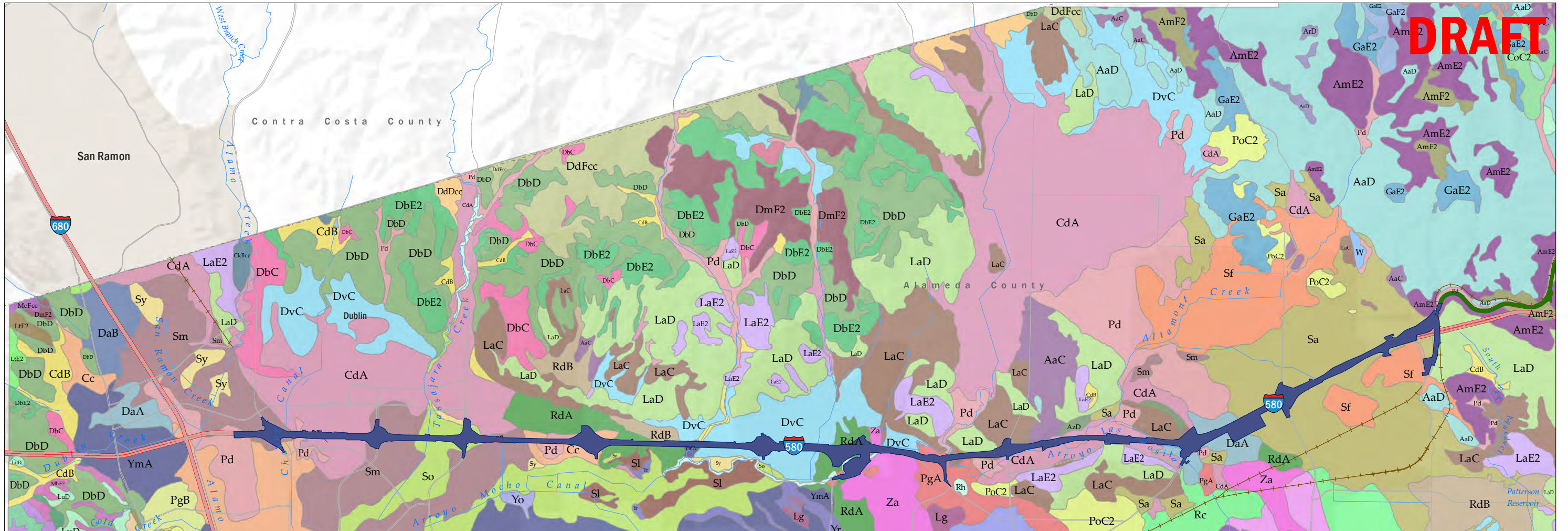


Data Sources: California Geological Survey Official Seismic Hazard Zone Reports of the following quadrangles: Dublin (2008), Livermore (2008), Altamont (2009); AECOM, 2020.

**FIGURE N-7**  
Earthquake-Induced Landslide Hazard Zones



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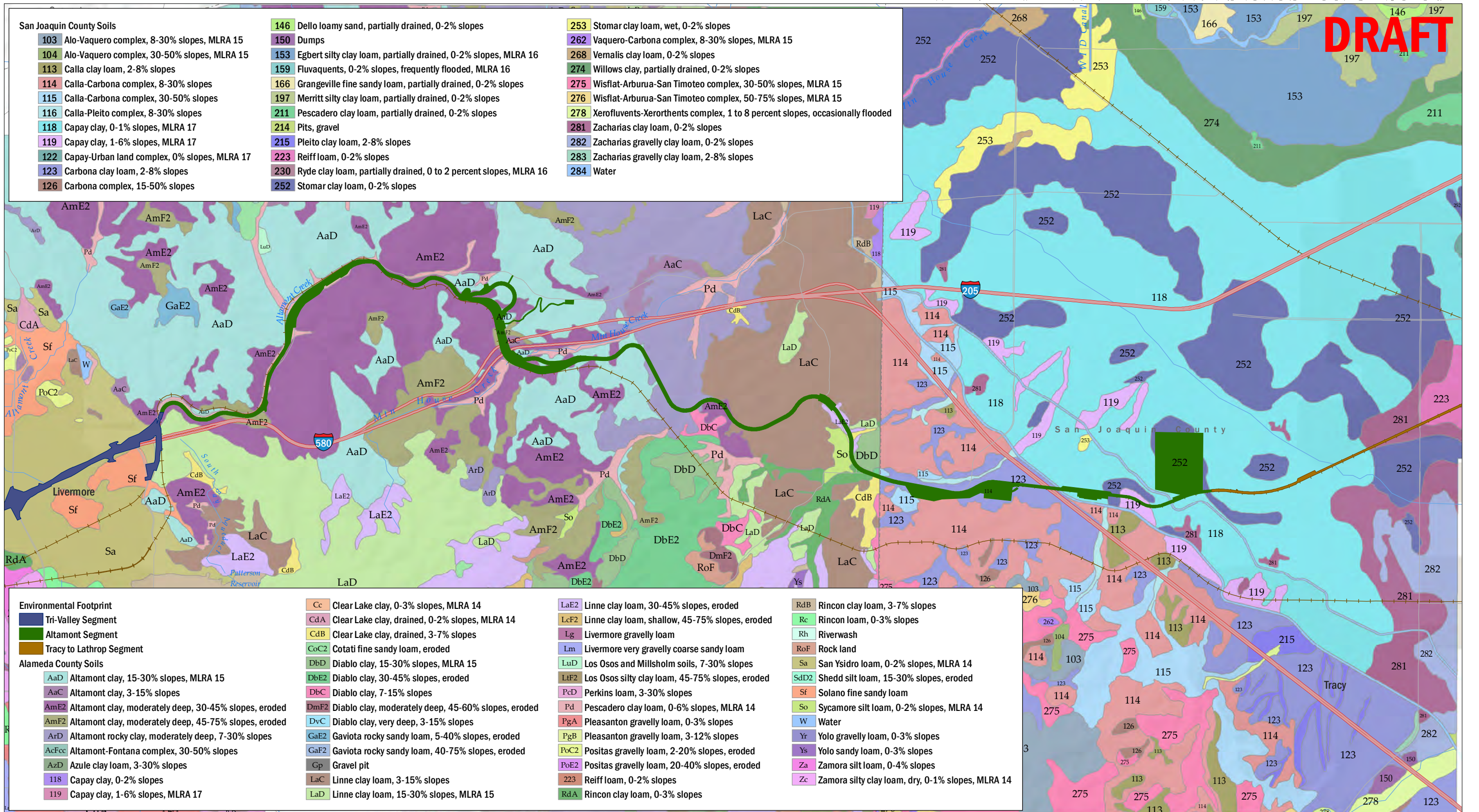
<b>Environmental Footprint</b>	<b>DbE2</b> Diablo clay, 30-45% slopes, eroded	<b>LtE2</b> Los Osos silty clay loam, 30-45% slopes, eroded	<b>Sa</b> San Ysidro loam, 0-2% slopes, MLRA 14
<b>Tri-Valley Segment</b>	<b>DdFcc</b> Diablo clay, 30-50% slopes, MLRA 15	<b>LtF2</b> Los Osos silty clay loam, 45-75% slopes, eroded	<b>SdD2</b> Shedd silt loam, 15-30% slopes, eroded
<b>Altamont Segment</b>	<b>DbC</b> Diablo clay, 7-15% slopes	<b>MeFcc</b> Millsholm loam, 15-50% slopes, moist, MLRA 15	<b>Sf</b> Solano fine sandy loam
<b>Alameda County Soils</b>	<b>DdDcc</b> Diablo clay, 9-15% slopes	<b>MeGcc</b> Millsholm loam, 20-60% slopes, moist, MLRA 15	<b>Sl</b> Sunnyvale clay loam
<b>AaD</b> Altamont clay, 15-30% slopes, MLRA 15	<b>DmF2</b> Diablo clay, moderately deep, 45-60% slopes, eroded	<b>MhE2</b> Millsholm silt loam, 30-45% slopes, eroded	<b>Sm</b> Sunnyvale clay loam over clay
<b>AaC</b> Altamont clay, 3-15% slopes	<b>DvD2</b> Diablo clay, very deep, 15-30% slopes, eroded	<b>MhF2</b> Millsholm silt loam, 45-75% slopes, eroded	<b>Sn</b> Sunnyvale clay loam, drained
<b>AmE2</b> Altamont clay, moderately deep, 30-45% slopes, eroded	<b>DvC</b> Diablo clay, very deep, 3-15% slopes	<b>PcD</b> Perkins loam, 3-30% slopes	<b>Sy</b> Sycamore silt loam over clay
<b>AmF2</b> Altamont clay, moderately deep, 45-75% slopes, eroded	<b>DvE2</b> Diablo clay, very deep, 30-45% slopes, eroded	<b>PcF2</b> Perkins loam, 45-75% slopes, eroded	<b>So</b> Sycamore silt loam, 0-2% slopes, MLRA 14
<b>ArD</b> Altamont rocky clay, moderately deep, 7-30% slopes	<b>GaE2</b> Gaviota rocky sandy loam, 5-40% slopes, eroded	<b>Pd</b> Pescadero clay loam, 0-6% slopes, MLRA 14	<b>TaCcc</b> Tierra loam, 2-9% slopes, MLRA 14
<b>AzD</b> Azule clay loam, 3-30% slopes	<b>GaF2</b> Gaviota rocky sandy loam, 40-75% slopes, eroded	<b>PgA</b> Pleasanton gravelly loam, 0-3% slopes	<b>VaE2</b> Vallecitos rocky loam, 30-45% slopes, eroded
<b>AzE2</b> Azule clay loam, 30-45% slopes, eroded	<b>Gp</b> Gravel pit	<b>PgB</b> Pleasanton gravelly loam, 3-12% slopes	<b>W</b> Water
<b>AzF2</b> Azule clay loam, 45-60% slopes, eroded	<b>LaC</b> Linne clay loam, 3-15% slopes	<b>PoC2</b> Positas gravelly loam, 2-20% slopes, eroded	<b>Yr</b> Yolo gravelly loam, 0-3% slopes
<b>Cc</b> Clear Lake clay, 0-3% slopes, MLRA 14	<b>LaD</b> Linne clay loam, 15-30% slopes, MLRA 15	<b>PoE2</b> Positas gravelly loam, 20-40% slopes, eroded	<b>Yo</b> Yolo loam over gravel, 0-3% slopes
<b>CdA</b> Clear Lake clay, drained, 0-2% slopes, MLRA 14	<b>LaE2</b> Linne clay loam, 30-45% slopes, eroded	<b>PoF2</b> Positas gravelly loam, 40-60% slopes, eroded	<b>YmB</b> Yolo loam, 0-8% slopes, MLRA 15
<b>CdB</b> Clear Lake clay, drained, 3-7% slopes	<b>Lg</b> Livermore gravelly loam	<b>PtB2</b> Positas gravelly loam, thick surface, 2-10% slopes, eroded	<b>YmA</b> Yolo loam, calcareous substratum, 0-6% slopes, MLRA 14
<b>CoC2</b> Cotati fine sandy loam, eroded	<b>Lm</b> Livermore very gravelly coarse sandy loam	<b>RdA</b> Rincon clay loam, 0-3% slopes	<b>Ys</b> Yolo sandy loam, 0-3% slopes
<b>CkBcc</b> Cropley clay, 2-5% slopes	<b>LpF2</b> Los Gatos-Los Osos complex, 30-75% slopes, eroded, MLRA 15	<b>RdB</b> Rincon clay loam, 3-7% slopes	<b>Za</b> Zamora silt loam, 0-4% slopes
<b>DaA</b> Danville silty clay loam, 0-3% slopes	<b>LuD</b> Los Osos and Millsholm soils, 7-30% slopes	<b>Rc</b> Rincon loam, 0-3% slopes	<b>Zc</b> Zamora silty clay loam, dry, 0-1% slopes, MLRA 14
<b>DaB</b> Danville silty clay loam, 3-10% slopes	<b>LuE2</b> Los Osos and Millsholm soils, 30-45% slopes, eroded	<b>Rh</b> Riverwash	
<b>DbD</b> Diablo clay, 15-30% slopes, MLRA 15	<b>LsC</b> Los Osos loam, seeped variant, 3-15% slopes	<b>RoF</b> Rock land	



Sources: NRCS, SSURGO (Alameda Area 2018, San Joaquin County 2018)

**FIGURE N-8A**  
Soil Types  
Tri-Valley Segment





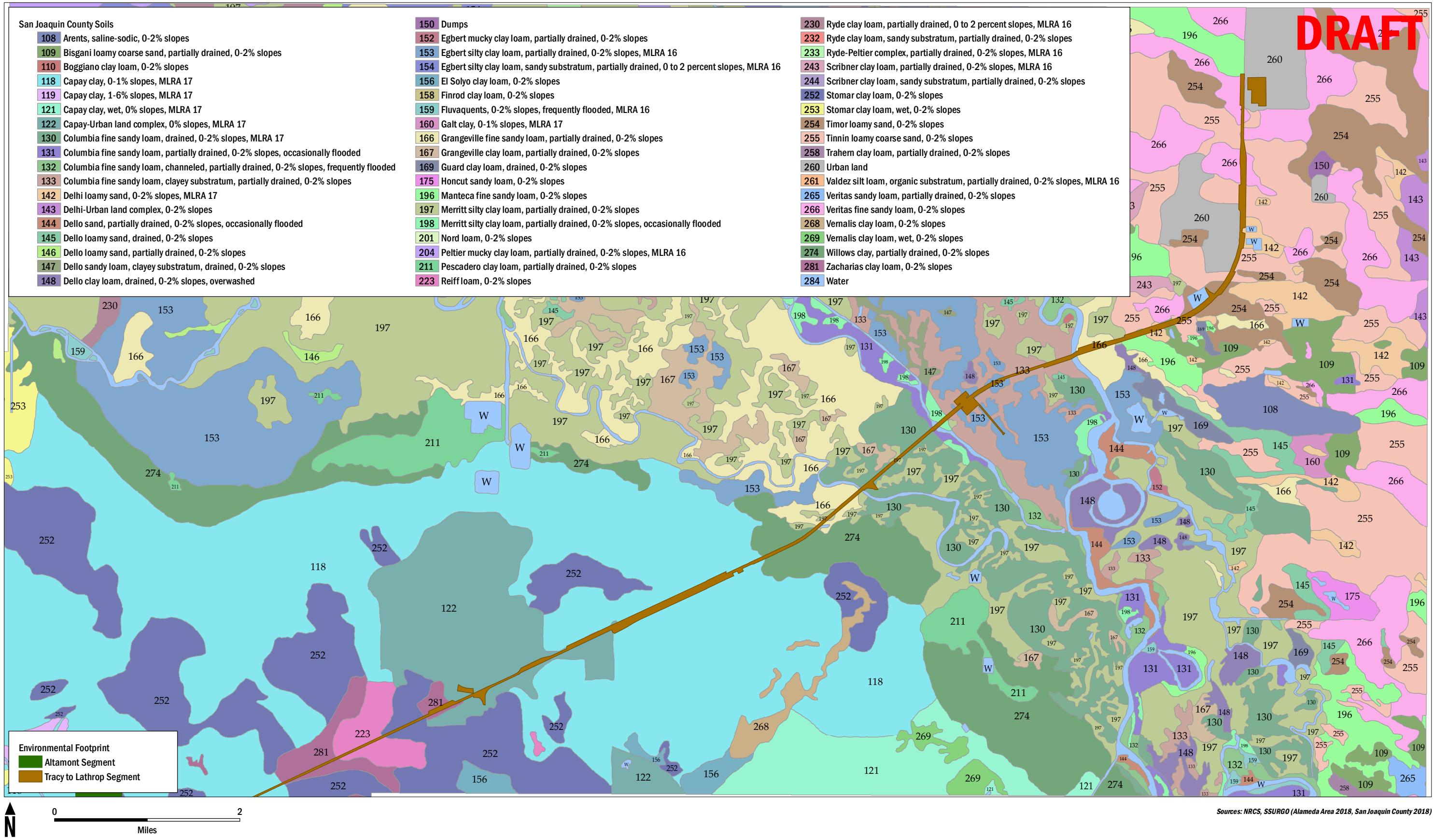
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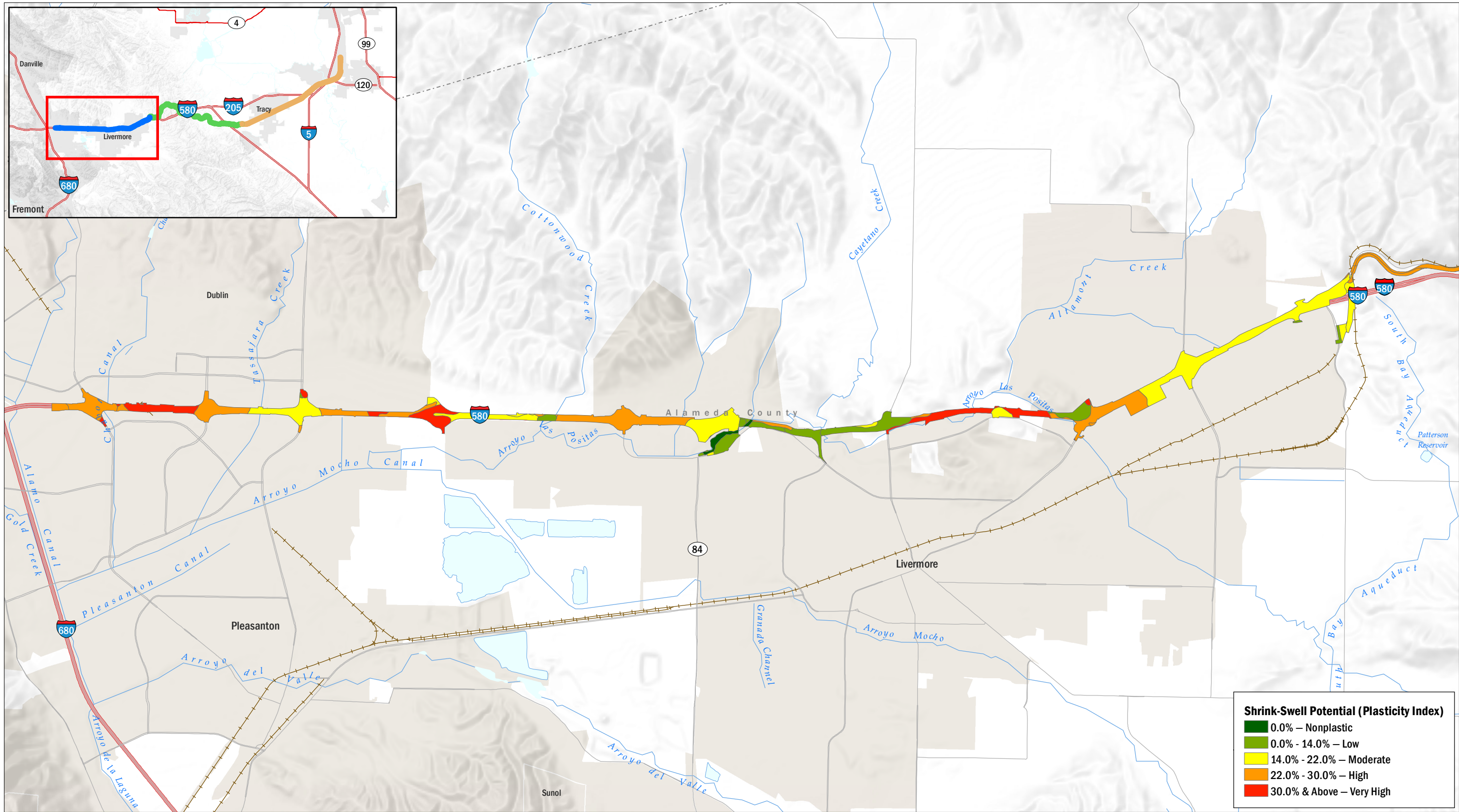


Sources: NRCS, SSURGO (Alameda Area 2018, San Joaquin County 2018)

**FIGURE N-8B**  
Soil Types  
Altamont Segment



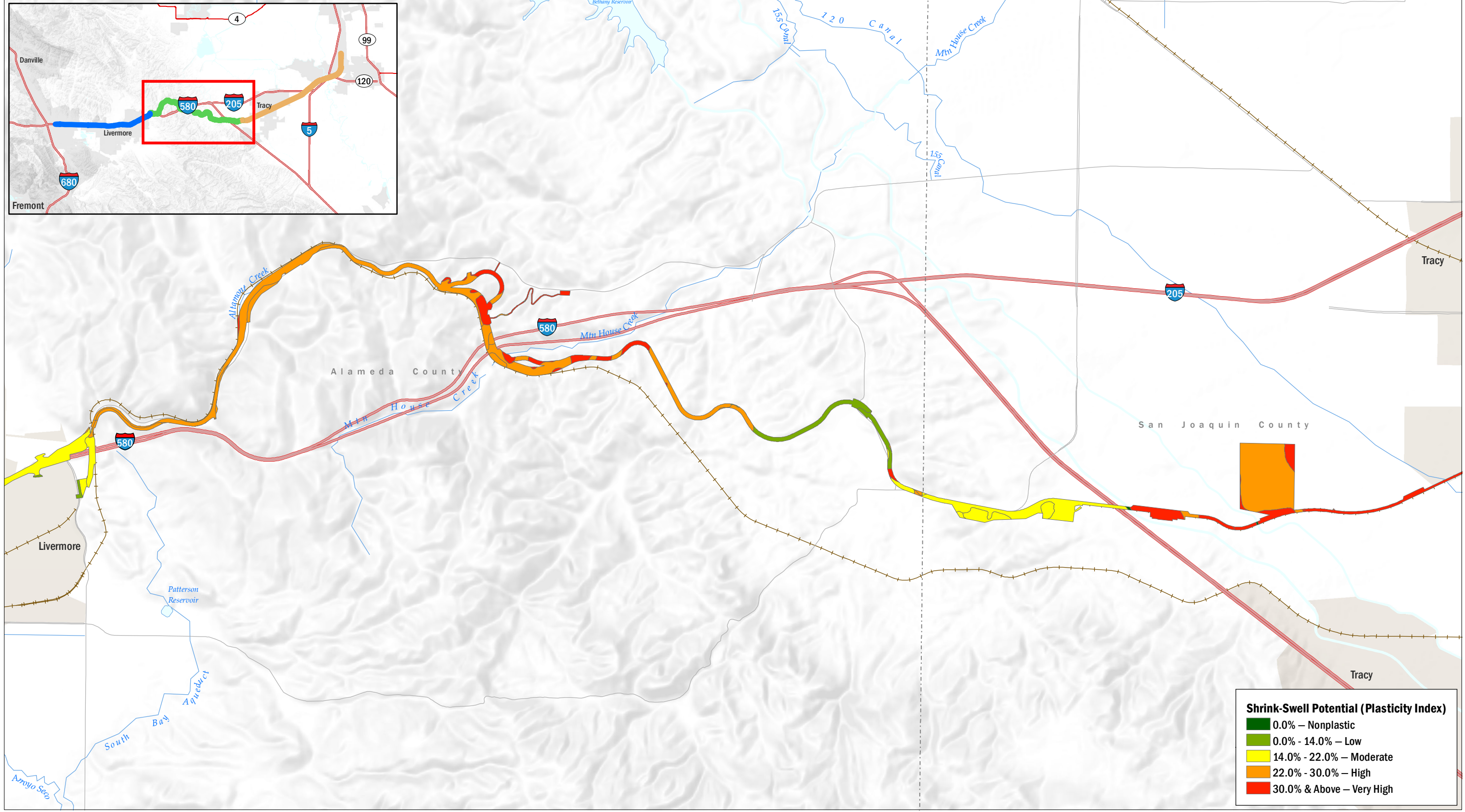




USDA NRCS SSURGO, 2018; AECOM, 2020.

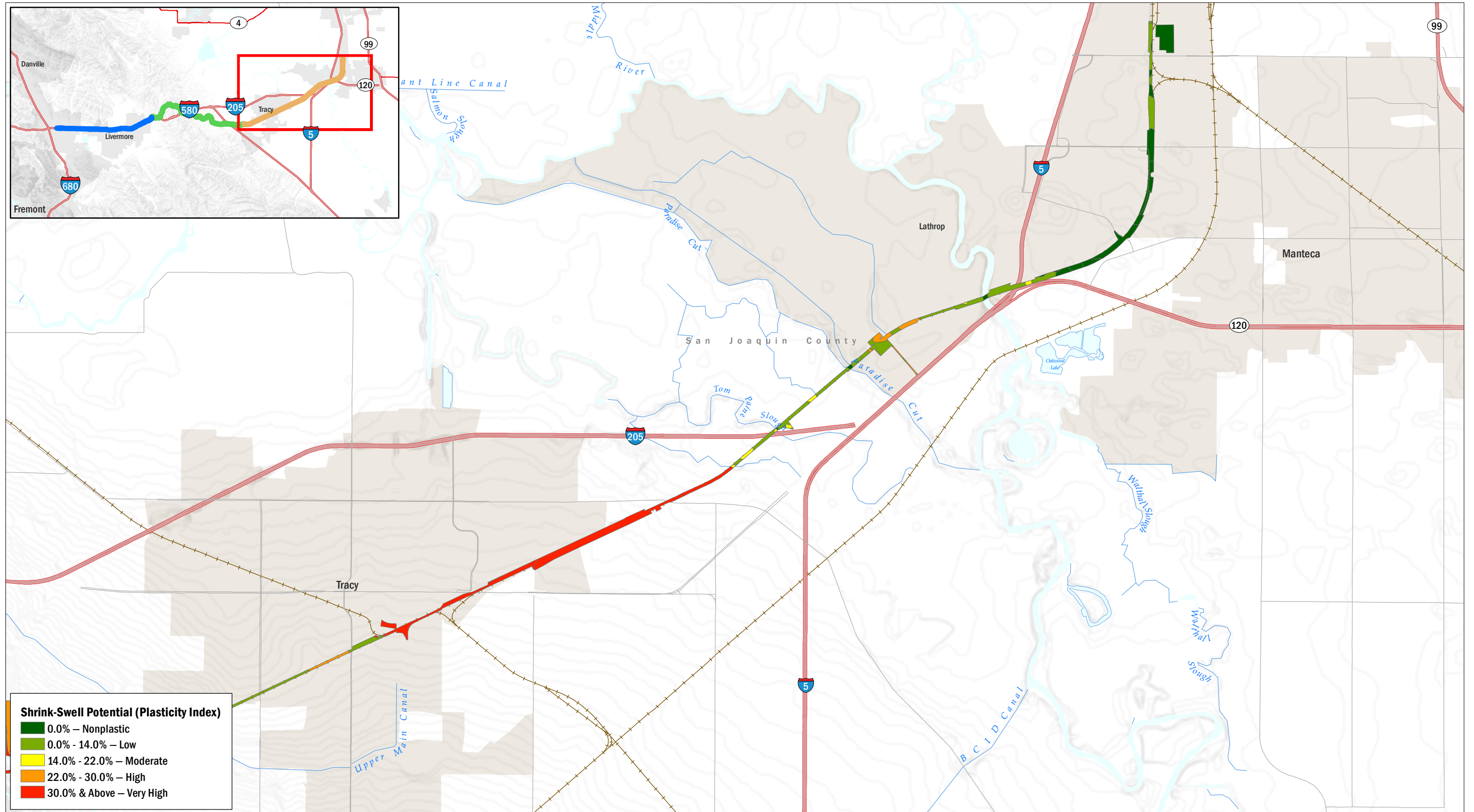






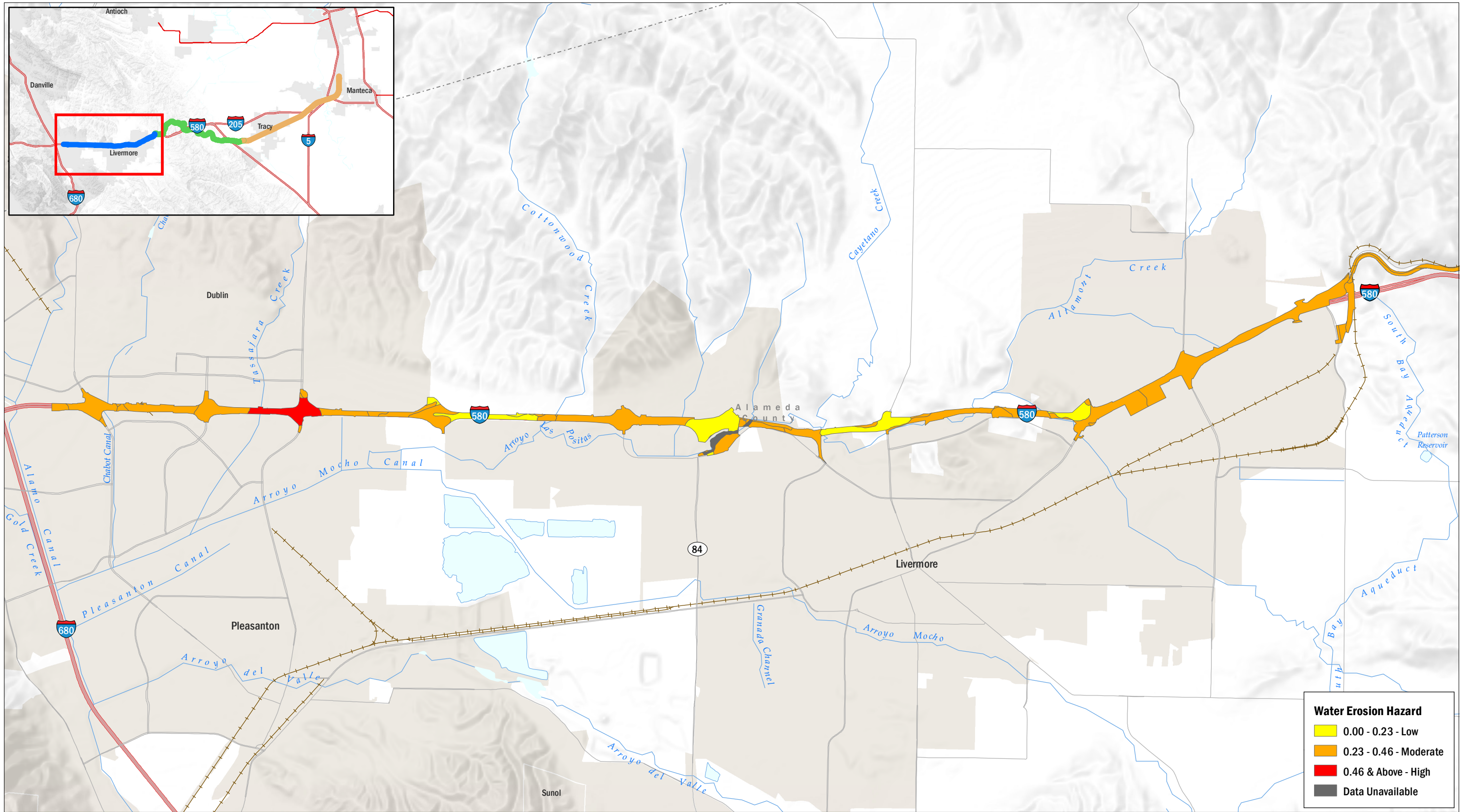
USDA NRCS SSURGO, 2018; AECOM, 2020.

**FIGURE N-9B**  
*Shrink-Swell Potential (Plasticity Index)*  
*Altamont Segment*



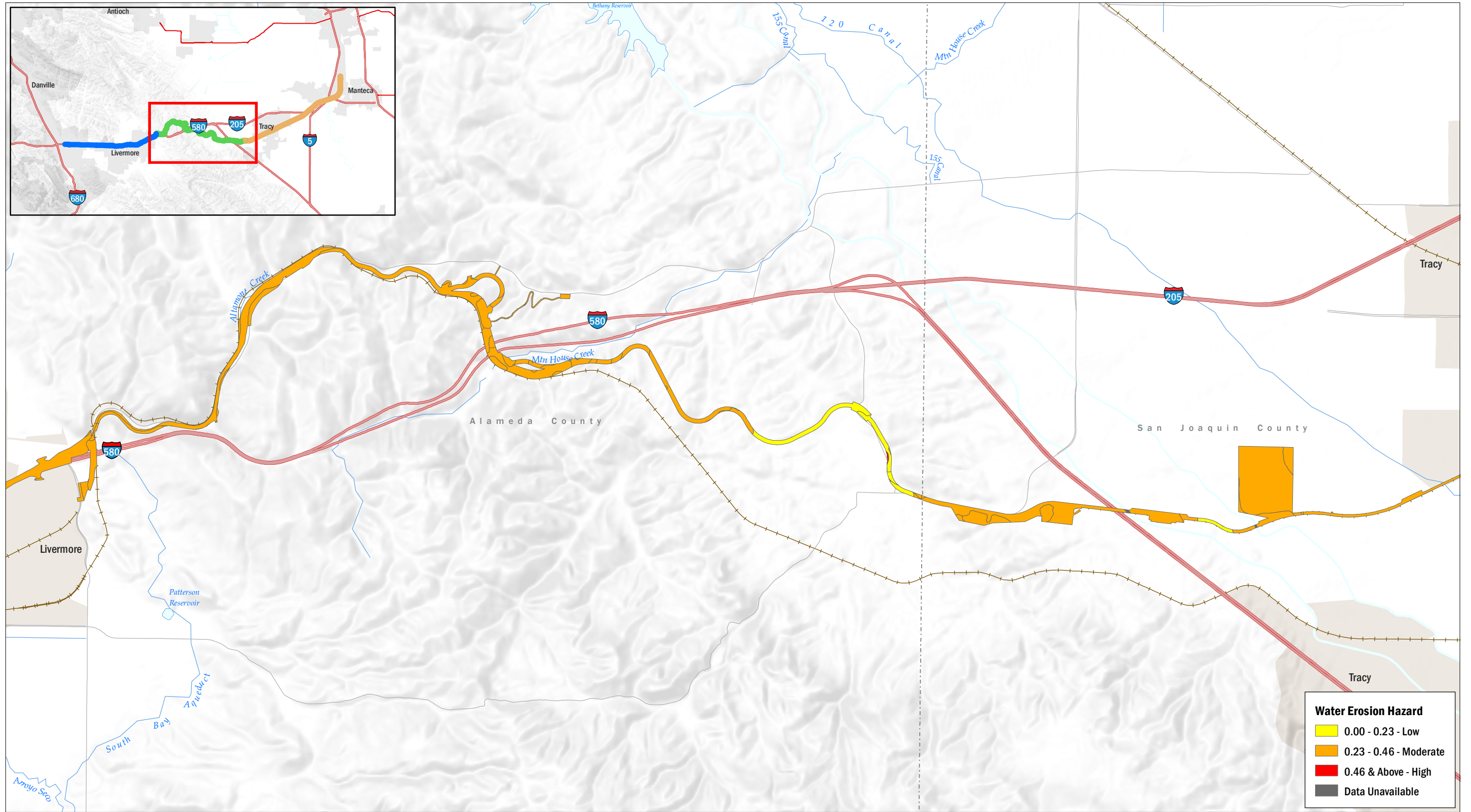
USDA NRCS SSURGO, 2018; AECOM, 2019



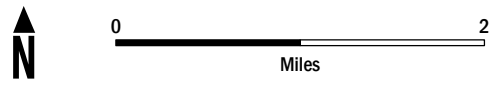
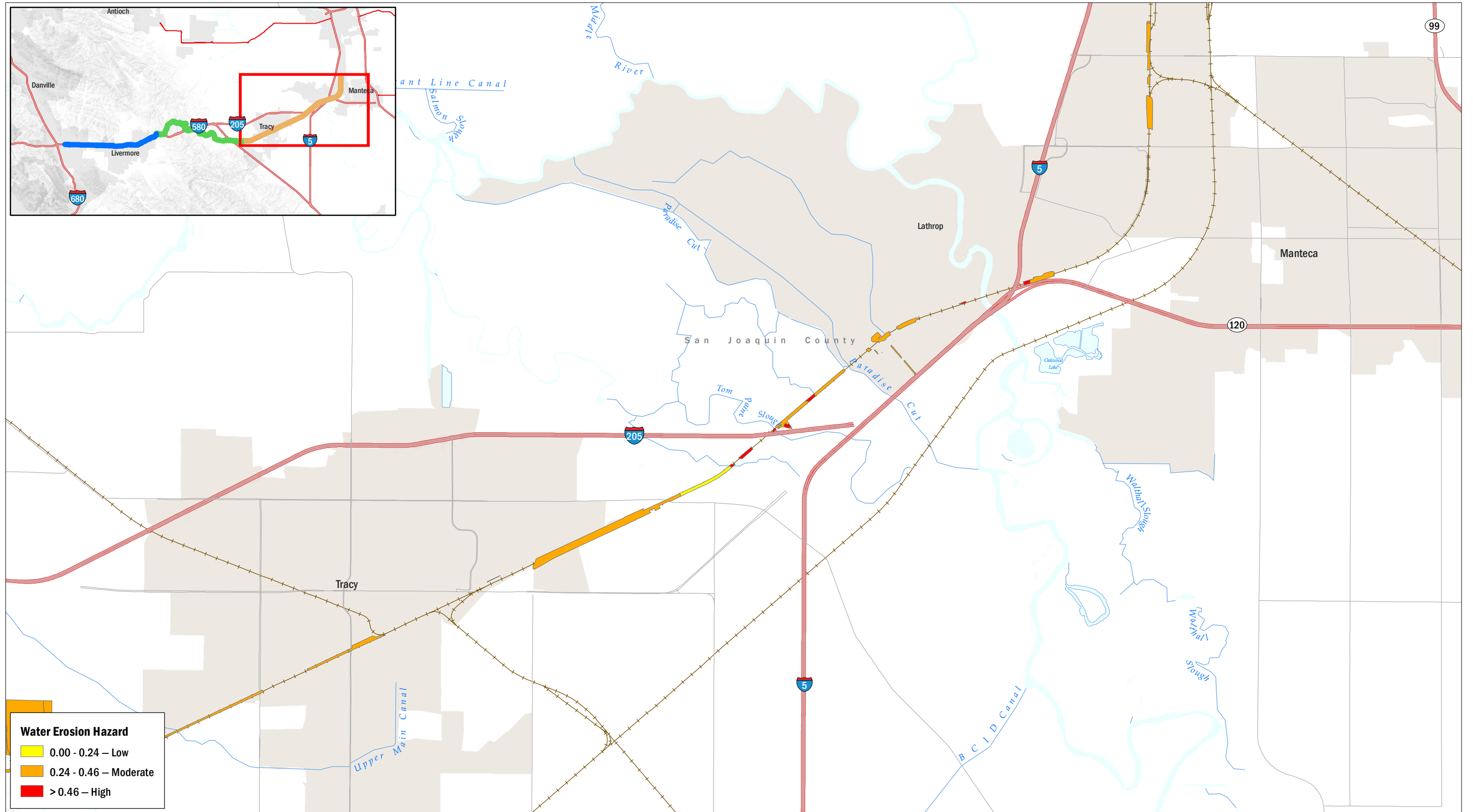


USDA NRCS SSURGO, 2018; AECOM, 2020





USDA NRCS SSURGO, 2018; AECOM, 2020



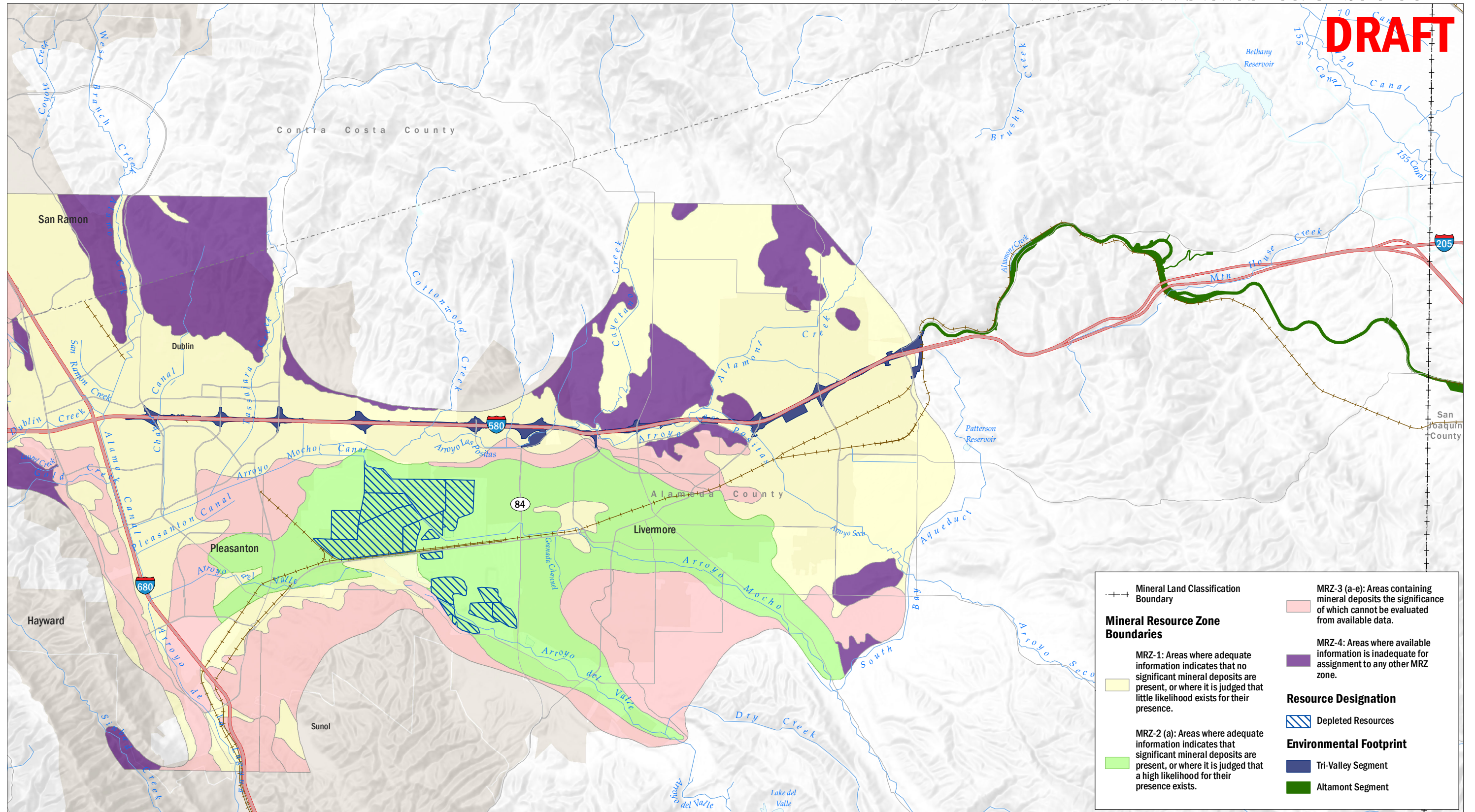
USDA NRCS SSURGO, 2018; AECOM, 2019



**FIGURE N-10C**  
Water Erosion Hazard  
Tracy to Lathrop Segment



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--- Mineral Land Classification Boundary

**Mineral Resource Zone Boundaries**

MRZ-1: Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.

MRZ-2 (a): Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists.

MRZ-3 (a-e): Areas containing mineral deposits the significance of which cannot be evaluated from available data.

MRZ-4: Areas where available information is inadequate for assignment to any other MRZ zone.

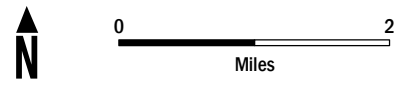
**Resource Designation**

Depleted Resources

**Environmental Footprint**

Tri-Valley Segment

Altamont Segment



Data Sources: Susan Kohler-Antablin, 1996, Update of Mineral Land Classification: Aggregate Materials in the South San Francisco Bay Production-Consumption Region, CGS Open File Report 96-03; Stinson et al., 1987, CGS Special Report 146: Plates 2.6, 2.9, 2.14; AECOM, 2020.

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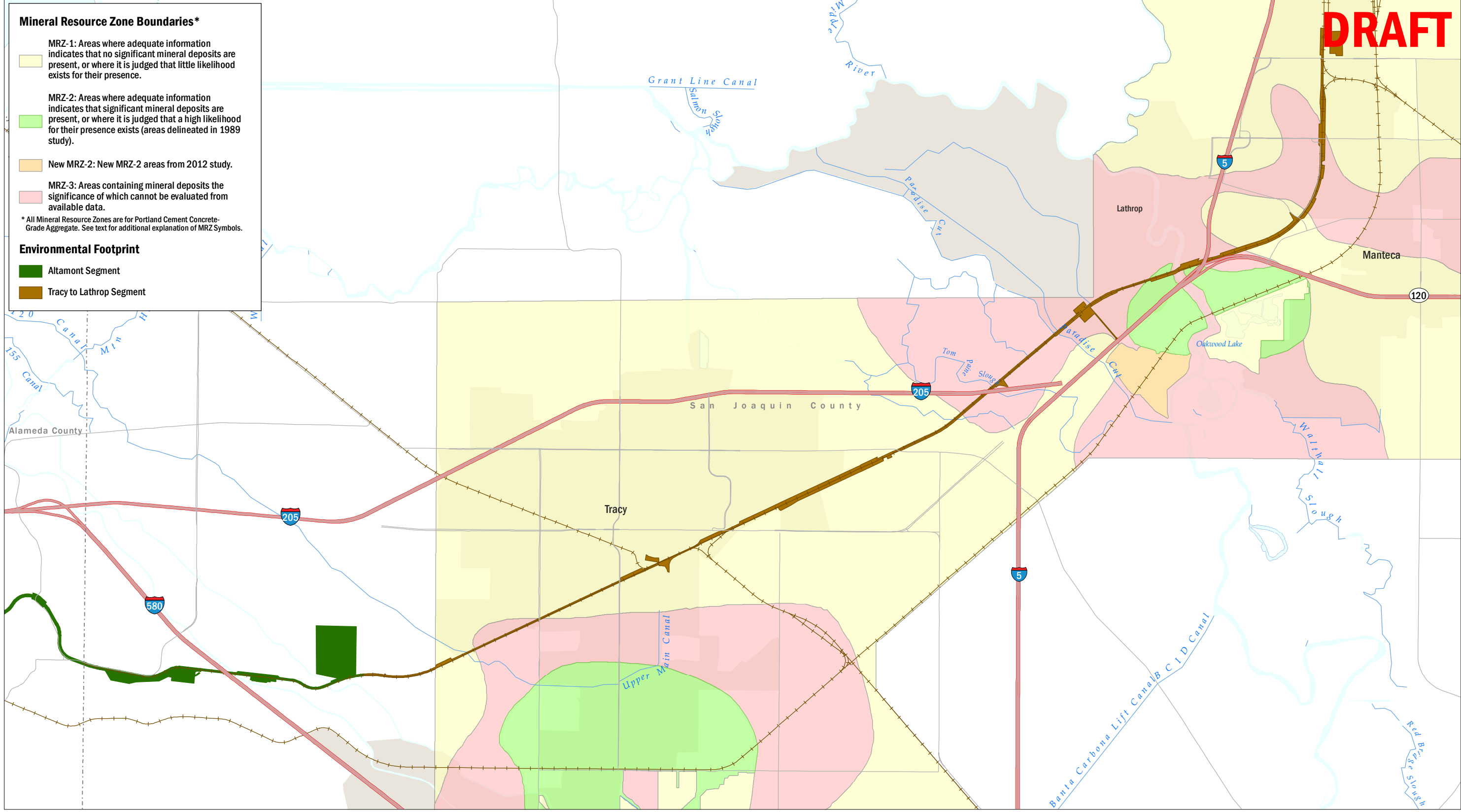
**Mineral Resource Zone Boundaries\***

- MRZ-1: Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.
- MRZ-2: Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists (areas delineated in 1989 study).
- New MRZ-2: New MRZ-2 areas from 2012 study.
- MRZ-3: Areas containing mineral deposits the significance of which cannot be evaluated from available data.

\* All Mineral Resource Zones are for Portland Cement Concrete-Grade Aggregate. See text for additional explanation of MRZ Symbols.

**Environmental Footprint**

- Altamont Segment
- Tracy to Lathrop Segment

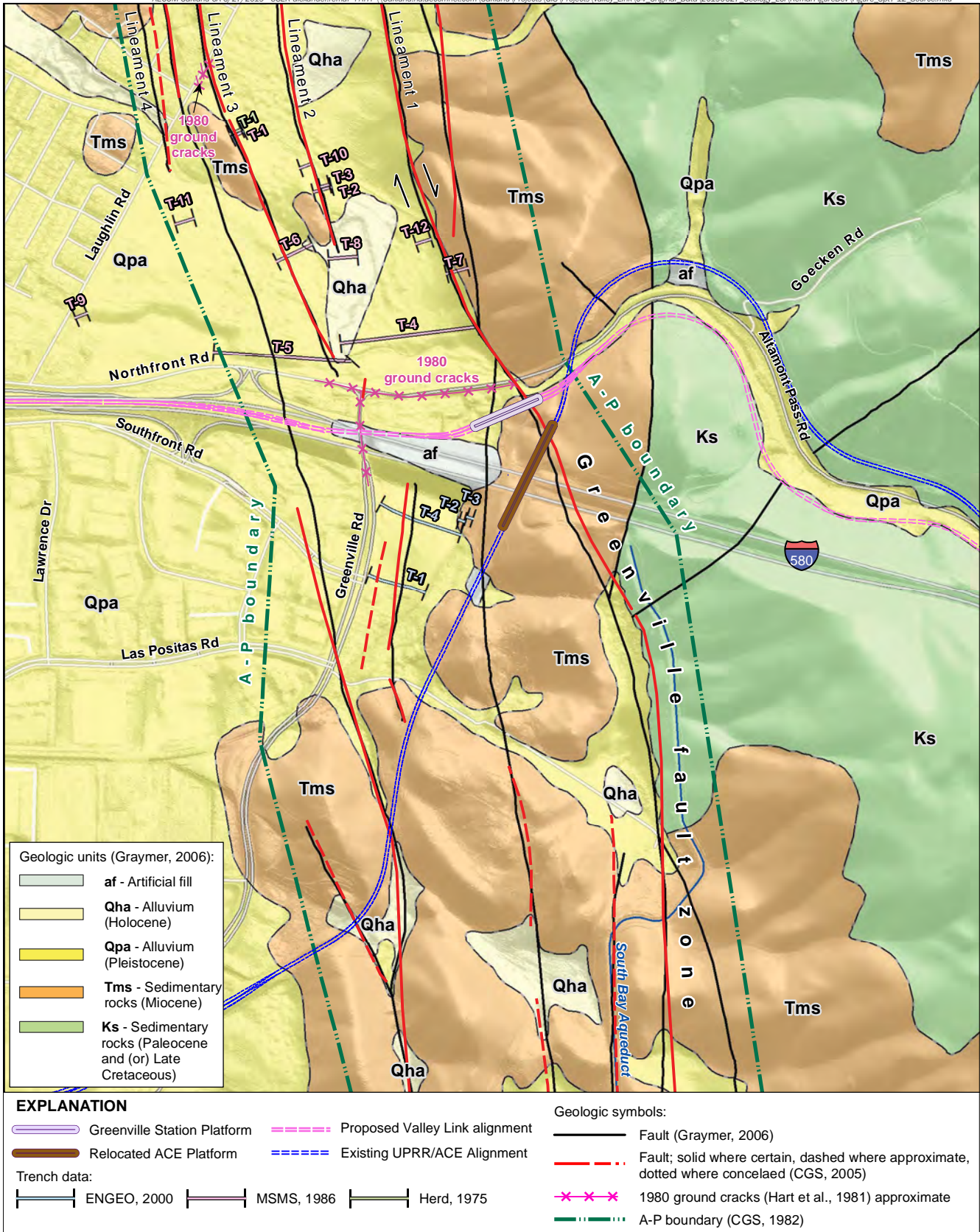


Data Sources: Smith and Clinkenbeard 2012, Update of Mineral Land Classification for Portland Cement Concrete-Grade Aggregate in Stockton-Lodi Production-Consumption Region, San Joaquin and Stanislaus Counties, California, CGS Special Report 199; Esri, 2019; AECOM, 2019.



**FIGURE N-11B**  
Mineral Land Classification  
East Altamont and Tracy to Lathrop Segments





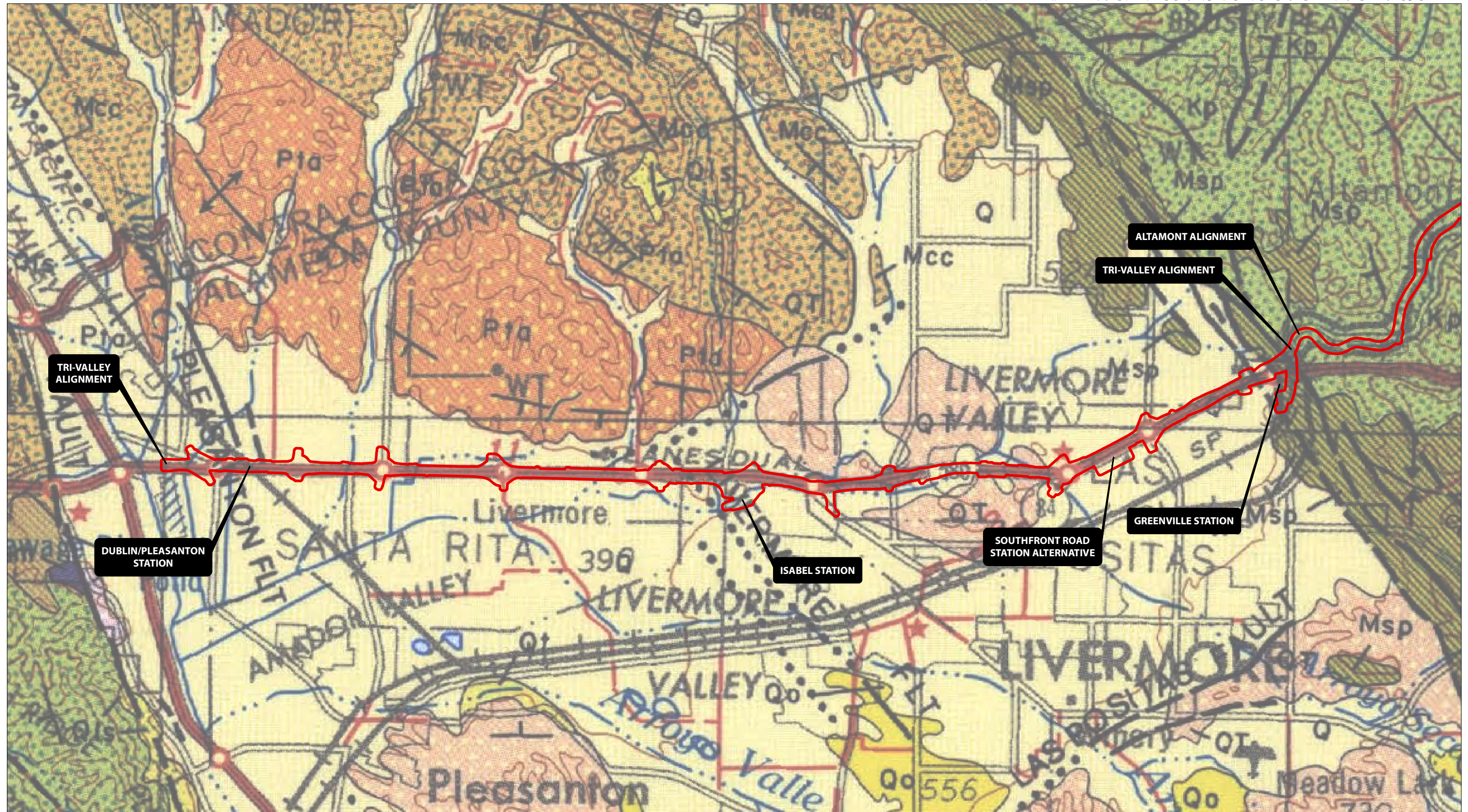
Sources: Lettis Consultants International, Inc. 2019; Lineaments 1-4 (MSMS, 1985); 10 m hillshaded DEM from USGS NED (2013).



**AECOM**  
Valley Link Project

**FIGURE N-12**  
Greenville Fault Zone Investigations





Data Sources: USGS

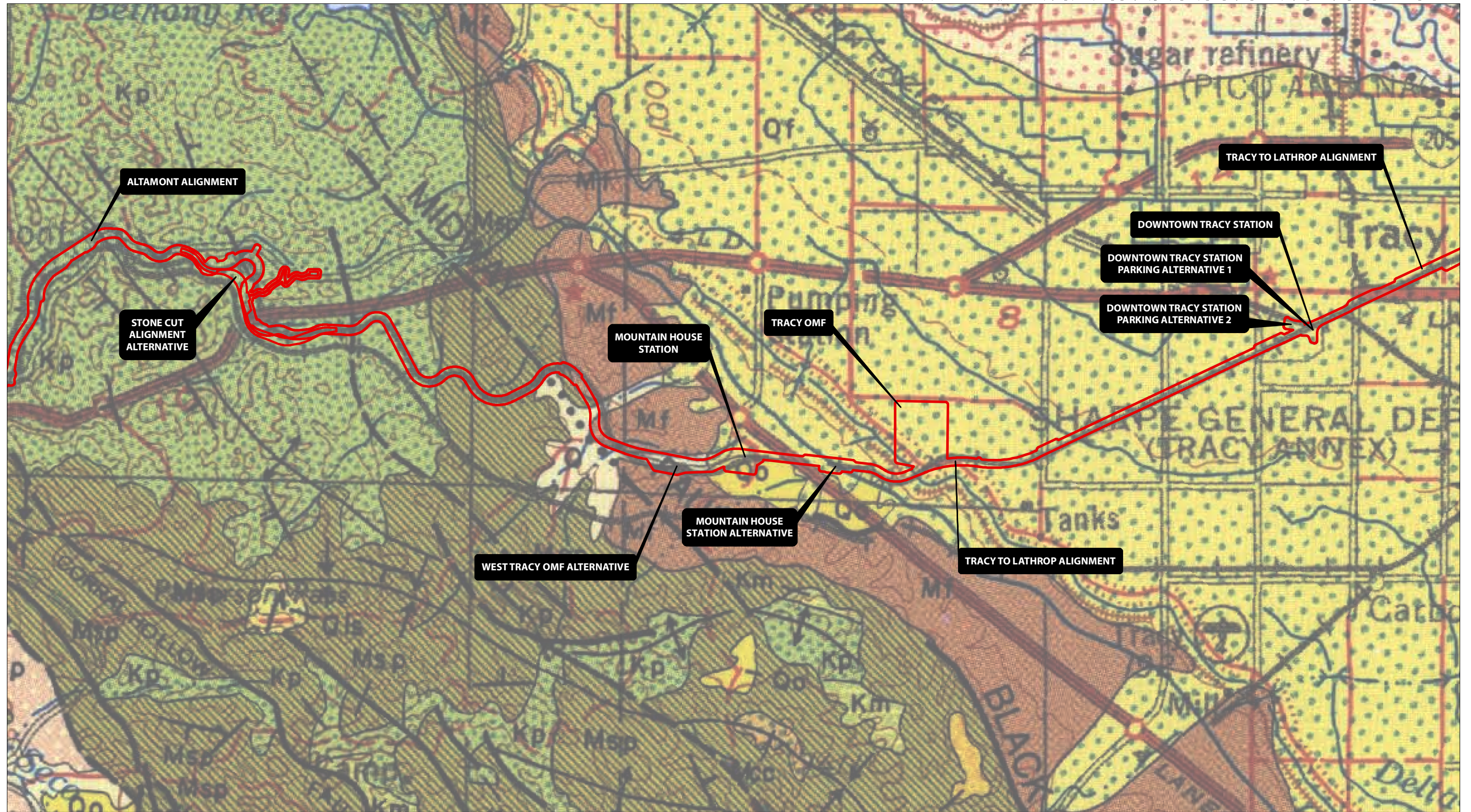


Generalized Paleontological Study Area	Alluvial fan deposits	Los Banos Alluvium	Fanglomerate
<b>Geologic Units</b>	Landslide deposits	Plio-Pleistocene nonmarine deposits (Sand and gravel)	Monterey Formation (Marine shale and sandstone)
Alluvium	Terrace deposits	Tassajara Formation (Nonmarine mudstone)	Moreno Formation (Marine shale)
Dune Sand	Modesto Formation	Contra Costa Group (Nonmarine sedimentary rocks)	Panoche Formation (Marine sandstone and shale)
Dos Palos Alluvium	Older alluvium	San Pablo Group (Marine sandstone)	



**FIGURE N-13**  
*Paleontological Study Area*





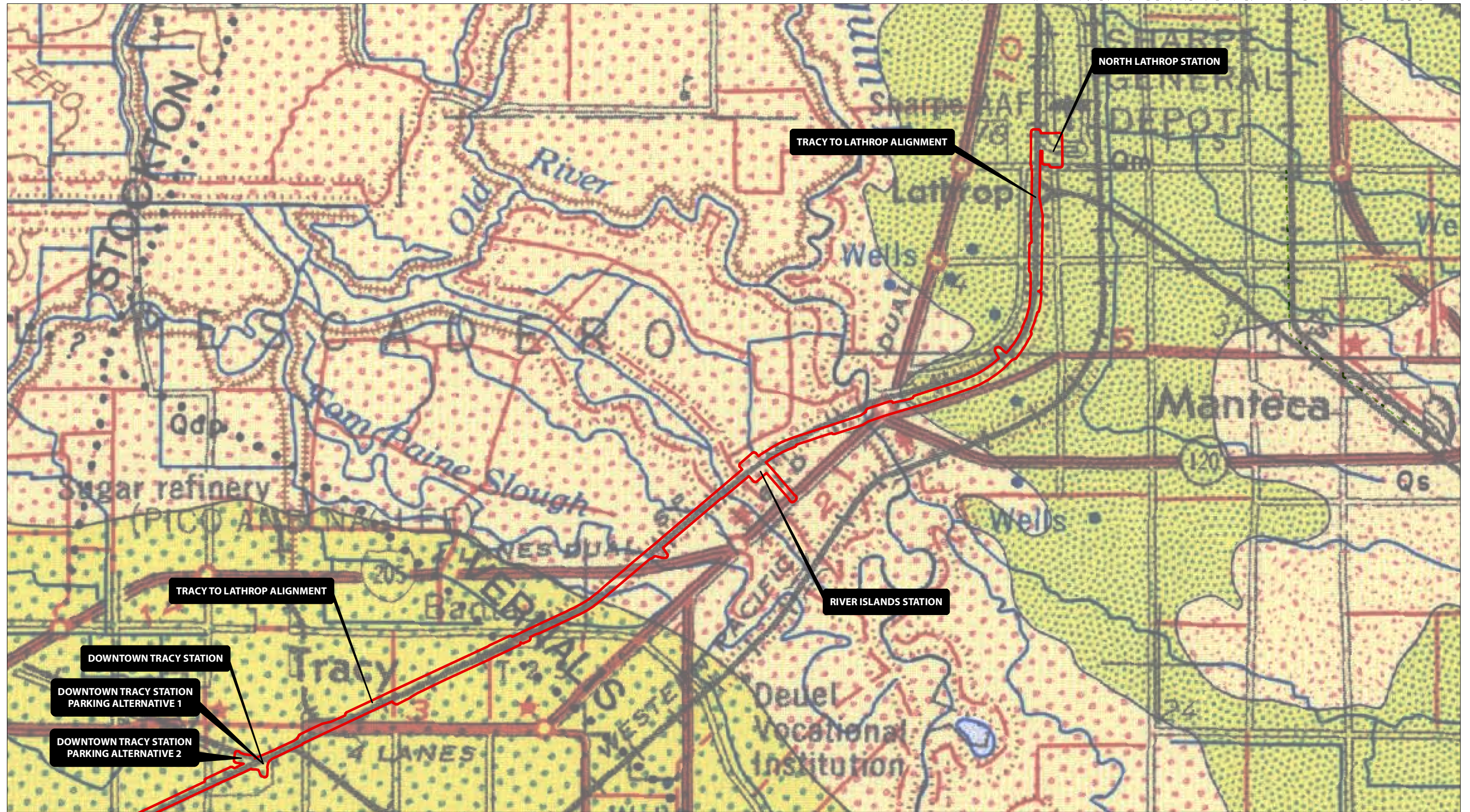
Data Sources: USGS

Generalized Paleontological Study Area	Alluvial fan deposits	Los Banos Alluvium	Fanglomerate
<b>Geologic Units</b>	Landslide deposits	Plio-Pleistocene nonmarine deposits (Sand and gravel)	Monterey Formation (Marine shale and sandstone)
Alluvium	Terrace deposits	Tassajara Formation (Nonmarine mudstone)	Moreno Formation (Marine shale)
Dune Sand	Modesto Formation	Contra Costa Group (Nonmarine sedimentary rocks)	Panoche Formation (Marine sandstone and shale)
Dos Palos Alluvium	Older alluvium	San Pablo Group (Marine sandstone)	



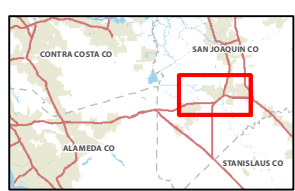
**FIGURE N-14**  
*Paleontological Study Area*





Data Sources: USGS

Generalized Paleontological Study Area	Alluvial fan deposits	Los Banos Alluvium	Fanglomerate
<b>Geologic Units</b>	Landslide deposits	Plio-Pleistocene nonmarine deposits (Sand and gravel)	Monterey Formation (Marine shale and sandstone)
Alluvium	Terrace deposits	Tassajara Formation (Nonmarine mudstone)	Moreno Formation (Marine shale)
Dune Sand	Modesto Formation	Contra Costa Group (Nonmarine sedimentary rocks)	Panoche Formation (Marine sandstone and shale)
Dos Palos Alluvium	Older alluvium	San Pablo Group (Marine sandstone)	



**FIGURE N-15**  
*Paleontological Study Area*