

As reported by Kupferman (1995), two additional Subsidence Report Zones have since been created by the County Board of Supervisors:

Murrieta Area-California Oaks: In 1991, a Subsidence Report Zone was created in the Murrieta area, as a result of ground cracking at the California Oaks project (see section 2.6.1). This cracking was determined to be a result of a rising ground water table, rather than a falling ground water table. Shlemon and Hakakian (1992) attribute the cracking at California Oaks to be the result of saturation of collapsible alluvium that was left in-place during rough grading. The limits of the Subsidence Report Zone for the Murrieta area was based on natural hydrologic and political boundaries (Kupferman, 1995). Shortly after creation of this Zone, the area was adopted into the city of Murrieta and continues to be enforced by the city.

The cracking at California Oaks led to modifications in County policies. The County Department of Buildings and Safety adopted a set of technical guidelines for the review of geotechnical reports. The guidelines require that a project geotechnical consultant must document observations and inspections during grading; and that the County Geologist review and approve geotechnical reports for all grading projects (Kupferman, 1995).

Silverhawk Development: In 1994, a third Subsidence Report Zone was established. The establishment of this Zone was pre-emptive, as no ground fissuring had yet been observed. However, geotechnical data, and similarities in geology, topography, hydrology and grading with the previously established California Oaks zone, warranted its establishment. This third Subsidence Report Zone was removed following the preparation of geotechnical studies by the project developer.

2.8.5.1 Recommended Minimum Requirements to Address Subsidence Potential:

This Technical Background Report recognizes the hazard of subsidence and ground fissuring in Riverside County and supports the implementation of a Safety Element policy to require preliminary soils engineering and engineering geologic reports. Prior to issuance of grading permits, the potential for subsidence must be addressed in regions identified by this study as active or susceptible. This recommendation is supported by the Uniform Building Code.

At a minimum, geotechnical investigations and reports that address subsidence potential should:

- Identify and locate any faults, scarps, and fissures in the vicinity.
- Review available land level lines of past ground surface movement in the vicinity, including degree of differential subsidence across nearby faults and proximity of regional subsidence bowls.
- Review groundwater development in the vicinity, including the location of nearby, high-capacity wells. Review available historic water level data from nearby wells.
- Review available maintenance records of nearby wells for signs of possible subsidence-induced damage.
- Review subsurface units from available well drillers' logs.

At a minimum, conclusions should discuss:

- Location (or absence) of all surface ruptures on or adjacent to the site.
- Type of faults and nature of anticipated offset, including direction of relative displacement, and maximum possible displacement.
- Statement of relative risk, addressing the probability or relative potential for future surface displacement. This may be stated in semi-quantitative terms such as low, moderate, or high, or in terms of slip rates determined for specific fault segments.
- Degree of confidence in, and limitations of, the data and conclusions.

At a minimum, recommendations should provide:

- Set-back distances from faults and fissures. State, Federal or local guidelines may dictate minimum standards otherwise.
- Mitigative measures for appropriate structures that cannot avoid crossing faults and fissures. Examples include, but are not limited to, critical pipelines, aqueducts, flood channels, railroads, and roadways.
- Discussion of the need for additional studies, or inspection during construction.

2.8.6 Mitigation of Wind Erosion