

**DEPARTMENT OF WATER RESOURCES**NORTHERN REGION OFFICE  
2440 MAIN STREET  
RED BLUFF, CA 96080-2356

February 3, 2015

Glenn County Board of Supervisors  
525 West Sycamore Street, Suite B1  
Willows, California 95988

Glenn County Water Advisory Committee  
Post Office Box 351  
Willows, California 95988

Dear Supervisors and Committee members:

The purpose of this letter is to provide land subsidence results from the Global Positioning System (GPS) surveys performed in Glenn County. GPS surveys were performed to monitor changes in ground surface elevation to detect subsidence throughout the county and ultimately the entire Sacramento River Valley. The enclosed comparison showed two areas of the county exhibiting land subsidence.

The Glenn County subsidence network was installed and initially monitored in 2004. It consisted of 58 stations; about half were existing survey monuments, and the other half were installed as part of this project. Initial GPS surveying took place during March and April 2004. The network was resurveyed in spring 2008 as part of a larger Sacramento Valley GPS subsidence project.

The two surveys did not follow the same observation schedule and monitoring plan, and therefore, direct comparison was not possible at some locations within the county. By performing data analysis and review, the Northern Region Office of the Department of Water Resources (DWR) was able to develop the enclosed map showing the land surface change along the defined paths, or vectors, between the years of 2004 and 2008. The data analysis and review performed to complete the map included identifying and using similar vectors, where available, from both years. It also included using auto leveled monuments, where necessary, to be able to include the monuments that were relocated between the survey years. This was performed only when there was a direct relationship between the points in order to preserve the accuracy of the survey data.

Using the best methodologies available at the time, the GPS vertical accuracy, or threshold, for this monitoring effort was estimated to be 0.164 feet or approximately 2 inches. Any changes that show greater than the defined threshold are considered statistically significant and indicate possible ground movement.

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In general, the analysis did not show that the county experienced widespread ground movement during this four-year time frame. However, two areas determined from the analysis indicate ground movement. The first area, to the south and east of Hamilton City, did exhibit a change in ground surface elevation that is statistically significant. The monument designated "WILD" on the enclosed figure showed an average change of 0.38 feet or about 4.5 inches when compared to the nearest monuments to the west. This monument is on the eastern edge of the Glenn County network and additional surveying would need to be performed comparing 2008 to current levels in a larger area of Glenn and Butte counties to determine if this is an ongoing concern or just an anomaly.

The second area is near Sunset Avenue and County Road E to the southwest of Orland. This area showed a change just below the level of being statistically significant at 0.125 feet or about 1.5 inches. This may have indicated an area of concern and warrant additional surveying to determine whether this is an onset of land subsidence or not.

Ideally, the entire Sacramento Valley GPS Subsidence Monitoring Network should be resurveyed and compared to the valley wide 2008 survey to determine changes caused by the increased groundwater pumping and the persistent drought impacts. It is possible to check small areas without resurveying the entire network as mentioned above. DWR will further investigate the opportunities to work with the Sacramento Valley counties to resurvey the Sacramento Valley GPS Subsidence Monitoring Network. As an intermediate step, DWR may resurvey the two local areas that showed subsidence in 2008 to investigate any additional land elevation changes.

A formal presentation of the results will be provided by DWR to the Glenn County Water Advisory Committee at a future date.

If you have any questions or need additional information, please contact me at (530) 528-7403, or Roy Hull, Engineering Geologist, at (530) 529-7337.

Sincerely,



Bill Ehorn, Chief  
Groundwater and Geologic Investigations

Enclosure

ec: (See attached list.)