

AN AIRBORNE ELECTROMAGNETIC INVESTIGATION OF THE MARINA, CA HYDROGEOLOGIC FRAMEWORK

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In mid-May 2017 an airborne electromagnetic survey (AEM) was conducted around Marina, California in order to provide a detailed hydrogeological framework for implementation of ground water management plans. The Marina Coast Water District (MCWD) wanted to gain knowledge of the distribution of aquifer materials and saline waters present in the area. Approximately 635 line-kilometers were acquired over three days. The data were processed and inverted with both lateral (LCI) and spatial constraints (SCI). It turned out that this survey was a rare instance of where the Laterally-Constrained inversions produced better results than the Spatially-Constrained inversions because of the heavy infrastructure throughout the Marina survey area which includes the northern Salinas Valley. More data had to be electromagnetically decoupled (removed) from the data set during the Spatially-Constrained editing process than during the Laterally-Constrained editing process. Retaining more data for the inversion allowed for more continuous subsurface mapping of the Marina area. Following the inversion, spatial integration of the AEM results with local borehole information including geophysical and lithology logs and groundwater electrical conductivities allowed for development of regression equations describing the conversion from AEM bulk resistivities to groundwater resistivities and from groundwater resistivities to an estimation of total dissolved solids (TDS). The AEM inversion results matched the borehole geophysical logs very well and successfully mapped a near-surface

fresh water aquifer that had not been thoroughly characterized. Inverted resistivities were initially classified as saltwater-saturated sediments if the resistivity was less than 3 ohm-m and freshwater-saturated sediments if the resistivities were greater than 30 ohm-m. Classifications and correlations were also made between the AEM resistivities and borehole lithologies that were then applied throughout the survey area. The AEM investigation provided the MCWD with information they could only have achieved with very expensive boreholes and, that, after many years of drilling.