To: Jeff Ward, Placer Land Trust
From: Karl Mertz and Sarah Roeske
Date: March 3, 2010
Re: Baseline Summary of Bruin Ranch Geologic Setting

Bedrock exposed at Bruin Ranch comprises a suite of volcanic rocks of Jurassic age assigned to the Smartville Complex. Radiometric dating from Smartville rocks nearby provide a middle Jurassic age for most of these volcanics, approximately 160 million years. The rocks have a NW-SE trending fabric, are gently folded, and have experienced low-grade metamorphism. Locally, these metavolcanic rocks weather into large “fin”-shaped structures. Three principal lithotypes are exposed at Bruin Ranch: (1) volcanic flow units of basaltic to andesitic composition: some flows are brecciated, others show evidence of pillow structures; (2) Coarse volcaniclastic units, including volcanic breccias, ranging in composition from rhyodacite to basalt; and (3) fine-grained volcaniclastic and pyroclastic flow rocks mostly rhyodacitic to andesitic in composition. Locally, the volcaniclastic/pyroclastic rocks are clearly stratified. Similar Smartville volcanic rocks are also exposed at Land Trust properties just to the south of Bruin Ranch, including the Liberty Ranch, Taylor, and Kotomayan Preserves.

The Smartville Complex represents one of numerous NNW-SSE trending metamorphic belts accreted to the ancient Sierra plate margin during the Paleozoic and Mesozoic. Smartville rocks at Bruin Ranch likely originated as a series of volcanic lava flows and explosive pyroclastic eruptions during the Middle Jurassic associated with a volcanic arc system. This arc reflected plate collision and subduction of oceanic plates to the west with the North American Plate. This long Mesozoic history of tectonic subduction played a central role in the subsurface generation of the Sierra Nevada Batholith, now exposed as granitic rocks in much of the range. Subduction-related accretion and metamorphism of a wide suite of marine and volcanic rocks lead to development and growth of the Sierra Foothill belts, including the Smartville Complex.

The Bruin Ranch property lies entirely within the Foothill geologic zone dominated by rock units of the Smartville Complex. The Smartville in the Bruin Ranch area is exposed between the Wolf Creek Fault Zone to the east, and the Spenceville Fault Zone which runs along the western edge of the adjoining Garden Bar property. The Wolf Creek Fault Zone separates the Smartville from older metamorphic rocks of the Central Belt to the east, while the Spenceville Fault separates the Smartville from younger volcanic rocks to the west included in the Western Metamorphic Belt.