APPENDIX A

LOCAL CLIMATE AND WATER RESOURCES

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Climate

High temperatures occur during July, August, and September, with temperature readings commonly in excess of 100 degrees Fahrenheit (°F). Fog of varying density and duration is common within the Sacramento Valley during winter. However, given the physical topography, dense or persistent fog is much less common in the project areas. Winds occur seasonally, with dry north winds common during the summer and fall, while winds from the south are frequently associated with winter storm events. Winds in excess of 60 miles per hour may occur; however, these events are relatively uncommon and of short duration. Average wind speed at Red Bluff is 8.8 miles per hour, with the strongest winds reported during the winter months. Gross evaporation, the depth of water lost to the atmosphere, averages approximately 70 inches per year in the foothill region.

Average annual precipitation within the Sites and Colusa Reservoir areas is approximately 18 inches and occurs almost exclusively as rain. Average annual precipitation in the Colusa Cell area is slightly higher, with up to 22 inches per year. Snow occurs annually at higher elevations and occasionally within the reservoir areas. Some areas within western Glenn County that range in elevation from 5,000 to 7,000 feet frequently receive between 60 and 75 inches of precipitation per year, primarily as snow. Mean annual temperature in the area of the proposed reservoirs is approximately 62°F. Summer temperatures in excess of 115°F have been documented. The project areas generally have about 220 frost-free days per year, and nearby areas in the Sacramento Valley have about 260 frost-free days per year.

Average annual precipitation in the Thomes-Newville Reservoir area ranges from 20 to 24 inches, primarily as rain. Annual precipitation averages 23.5 inches at Paskenta. The wettest year on record at the Paskenta monitoring location (1982-1983) was 48.4 inches, and the driest (1938-1939) was 8.6 inches. The project area generally has between 220 and 250 frost-free days per year. The average date of the last spring freeze is April 1 at Paskenta. Summer temperatures in excess of 90°F occur approximately 97 days per year, and summer temperatures in excess of 100°F occur annually.

The average annual precipitation in the Red Bank Reservoir area is 25 inches because of the slightly higher elevation and more northern location. Snowfall occurs more frequently here than at the other potential reservoir locations, but it seldom persists for long or contributes significantly to the total annual precipitation. Approximately 175 to 200 frost-free days per year occur in the Red Bank Reservoir area, with the last frost of the spring on or about May 1. Temperature ranges are similar to those described for the other three proposed reservoirs.

Hydrology

Flows in the Thomes Creek watershed fluctuate seasonally. Summer low flows are frequently measured at less than 4 cubic feet per second (cfs), while winter flows often exceed 4,500 cfs. Flows recorded at Paskenta have ranged from zero in 1977 to 37,800 cfs during December 1964. (The December 1964 runoff event was triggered by a major rain-on-snow storm.) Periodic large floods, such as the 1964 event, can result in tremendous bedload movement.

Stream flows within Red Bank and South Fork Cottonwood Creeks are generally greater than stream flows in creeks within the other three proposed reservoir areas. Red Bank Creek stream gaging (measured

near Red Bluff – near the confluence with the Sacramento River) indicates an average annual discharge of 35,377 acre-feet (AF), with annual extremes ranging from 988 AF in 1976 to 138,775 AF in 1983.

The surface water quality of streams draining eastward from the Coast Range is generally poor. These streams generally have very high suspended sediment loads because of their metavolcanic bedrock and schist formations, which produce clays that stay in suspension during turbulent flow conditions. Soil disturbance within these watersheds can accelerate erosion and sedimentation processes and lead to increased metal and nutrient concentrations. High concentrations of metals and nutrients are commonly present during both low-flow and storm runoff events. These concentrations frequently exceed water quality criteria established for the protection of beneficial use or the maintenance of aquatic life. Water is generally warm in streams flowing through the proposed reservoir sites. Total phosphorus concentrations are at stimulatory levels for algae.

Groundwater

There are about 280 well completion reports on file with Department of Water Resources (DWR) for the general area of the potential offstream reservoir projects. Approximately 60% of these wells are used for domestic purposes. Irrigation wells and stock watering wells make up 10% each. About 20% of the wells are classified as "other" and are used for monitoring, test wells, or another unknown use. Most of the irrigation wells are just east of the Tehama-Colusa Canal, outside of the area of the Sites and Colusa Reservoir areas, and they have reported depths and yields of about 250 feet and 750 gallons per minute (gpm), respectively. The few wells in or close to the reservoir inundation areas obtain their yield from the Great Valley Sequence rocks. These wells are typically about 50 feet deep and yield less than 10 gpm.

Few of the 170 reported domestic wells are within any of the proposed reservoir inundation areas. Domestic wells in the general area average about 200 feet deep and yield an average of about 10 gpm. These wells are only perforated down to about 150 feet and the rest of the hole depth is apparently used for water storage. The stock wells are shallower and average about 125 feet deep and also yield an average of about 10 gpm. Most of the yield comes from fractures in the Great Valley Sequence rocks.

Landowners within the northern portion of Sites Reservoir and the Colusa Cell report the presence of shallow salt-water deposits. Limited sampling of the springs that feed Salt Lake in the northeastern portion of Sites Reservoir show elevated levels of various minerals and salts. The depth and extent of this highly mineralized groundwater is unknown. The flow from these springs is very limited.

DWR's Bulletin 118 identifies only one groundwater basin within the immediate area of the proposed projects: the Chrome Town Area adjoining the Thomes-Newville Reservoir area. This is not a true groundwater basin, but a groundwater area. It consists of Quaternary terrace deposits up to about 50 feet thick, which is unusual because terrace deposit thickness in the range of 10 to 20 feet is more common. Most wells in the area obtain their water from either the gravels in the terrace deposits at the contact with the underlying Great Valley Sequence rocks or from the fractures in the Great Valley Sequence rocks. Well yields up to 10 gpm are all that can be expected from this area. Dry wells are not uncommon.