Appendix 22
Socioeconomics

Line items and numbers identified or noted as “No Action Alternative” represent the “Existing Conditions/No Project/No Action Condition” (described in Chapter 2 Alternatives Analysis). Table numbering may not be consecutive for all appendixes.”

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APPENDIX 22A
Economics Analytical Framework

This document and the series of attached economics model technical memorandum describe the methods and assumptions for evaluating benefits in the Sites Reservoir Project (Project) investigation. The economics analysis for the Project investigation was developed from past water resource investigations by the California Department of Water Resources (DWR) and the Bureau of Reclamation (Reclamation). The methodology is consistent with analytical process for evaluating storage and conveyance options in California. Included in the economics evaluation is a set of economic analysis tools and assumptions to use for feasibility and impact analysis. This document summarizes the key economic analysis tools for evaluation of regional impacts, municipal and industrial (M&I) water supply and quality, and agricultural water supply. These economic analysis tools include:

- Reporting Metrics Tool
- Regional Economics
  - IMPLAN
- Municipal and Industrial Water Supply Economics
  - Least Cost Planning Simulation Model (LCPSIM)
  - Other Municipal Water Economics Model (OMWEM)
  - Lower Colorado River Basin Water Quality Model (LCRBWQM)
  - Bay Area Water Quality Economics Model (BAWQM)
- Agricultural Water Supply Economics
  - Statewide Agricultural Production Model

22A.1 Reporting Metrics Tool

The Reporting Metrics Tool (RMT) developed for the Project Feasibility Report and EIR/EIS is a spreadsheet model that reports system operations and economics metrics. The reports are a summary of system specifications for scenarios evaluated, modeled operations, and modeled economics impacts at a range of detail. The reported system operations metrics include yield and water supply, water quality, and hydropower. The reported economics metrics include project costs, agricultural and M&I water supply, and M&I water quality.

For additional description of the RMT and Project Feasibility Report and EIR/EIS results, see Appendix 22B Reporting Metrics Tool.

22A.2 Regional Economics

Regional economic effects include changes in characteristics like regional employment and income. The magnitudes of the economic effects depend on the initial changes in economic activity within the region (such as construction expenditure or loss of production from existing activities), the interactions within the regional economy, and the “leakage” of economic activity from this regional economy to the larger, surrounding economy. Economic linkages create multiplier effects in a regional economy as money is circulated by trade. These linkages are often modeled using a large mathematical model called an input-output model.

IMPLAN is a computer database and modeling system used to create input-output models for any combination of United States counties. IMPLAN is a widely used input-output model system in the United States. It provides users with the ability to define industries, economic relationships, and projects to be analyzed. It can be customized for any county, region, or state, and used to assess the "ripple effects" or "multiplier effects" caused by increasing or decreasing spending in various parts of the economy.

IMPLAN includes (1) estimates of county-level final demands and final payments developed from government data; (2) a national average matrix of technical coefficients; (3) mathematical tools that help the user formulate a regional model; and (4) tools that allow the user to change data, conduct analyses, and generate reports.

Economic impacts on a regional economy can result from construction and operation of facilities, changes in recreational uses, changes in agricultural production, changes in water quality to municipal and industrial users, and changes in other affected businesses. The direct effects of quantified changes (e.g., construction and operation spending or change in agricultural production or recreation expenditures) are input into IMPLAN regional economic models. Based on input from project cost estimators, local and non-local components of labor and non-labor (i.e., equipment and other materials) expenditures associated with construction and operation of Project facilities can be identified. Expenditures can be used as input into IMPLAN to determine the regional employment and income changes associated with construction and operation of Project facilities for all Project alternatives. The resulting output (employment and income) for each model run is the change from the base model run (Existing Conditions and the No Action Alternative are the same "base" IMPLAN model). A separate regional IMPLAN model is used to estimate the employment and income changes associated with changes in agricultural production in the selected region. Changes in employment and income associated with changes in recreation expenditures can also be estimated using a regional IMPLAN model by identifying changes in recreational expenditures.

An IMPLAN model of the Primary Study Area was used to estimate total changes in employment and income in the region. The model follows county lines and incorporates, to the extent allowed by available data, the employment and income characteristics of the economic sectors in the region modeled. Construction-related changes were modeled based on the expected year of expenditure. All other changes were assumed to be average annual changes. Estimates of direct employment during construction and operation for each alternative were derived from the total payroll estimate. With the exception of employment, all direct effects were expressed in dollar terms for all affected sectors. For example, agricultural effects were incorporated into the input-output models in dollar terms as changes in gross revenues or costs.

For additional description of model methods and assumptions see Appendix 22C Regional Economics Modeling.

22A.3 Municipal and Industrial Water Supply Economics

Economic benefits and costs on M&I users occur with changes in water supply and quality. Effects from changes in water supply are calculated using the LCPSIM and the OMWEM, briefly described below. These models were developed by DWR for use in planning and impact studies related to water supply for SWP and CVP contractors that may be affected by surface storage projects or re-operations. LCPSIM is used to estimate the benefits of changes in the water supply in the urban areas of the southern San

Francisco Bay – South and the South Coast regions. Other affected SWP and CVP contractors are included in OMWEM.

22A.3.1 Least Cost Planning Simulation Model (LCPSIM)

LCPSIM is an annual time-step urban water service system simulation/optimization model. Its objective is to find the least-cost water management strategy for a region, given the mix of demands and available supplies. It uses shortage management measures, including the use of regional carryover storage, water market transfers, contingency conservation, and shortage allocation rules to reduce regional costs and losses associated with shortage events. It also considers the adoption of long-term regional demand reduction and supply augmentation measures that reduce the frequency, magnitude, and duration of shortage events.

For additional description of model methods and assumptions see Appendix 22D Urban Water Supply Economics Modeling.

22A.3.2 Other Municipal Water Economics Model (OMWEM)

A number of relatively small M&I water providers receive SWP or CVP water but are not covered by LCPSIM. A set of individual spreadsheet calculations, collectively called OMWEM, can be used to estimate economic benefits of changes in SWP or CVP supplies for these potentially affected M&I water providers. The model includes CVP M&I supplies north of Delta, SWP and CVP supplies to the Central Valley and the Central Coast, and SWP supplies or supply exchanges to the desert regions east of LCPSIM's South Coast region. The model estimates the economic value of M&I supply changes in these areas as the change in cost of shortages and alternative supplies (such as groundwater pumping or transfers).

For additional description of model methods and assumptions see Appendix 22D Urban Water Supply Economics Modeling.

22A.3.3 Lower Colorado River Basin Water Quality Model (LCRBWQM)

LCRBWQM is an M&I water quality economics model that covers almost the entire urban coastal region of southern California. LCRBWQM was developed by Reclamation and Metropolitan Water District of Southern California (MWD). LCRBWQM divides MWD's service area into 15 sub areas to reflect the unique water supply conditions and benefit factors of each. The salinity model is designed to assess the average annual salinity benefits or costs based on demographic data, water deliveries, TDS concentration, and cost relationships for typical household, agricultural, industrial, and commercial water uses. It uses mathematical functions that define the relationship between TDS and items in each affected category, such as the useful life of appliances, specific crop yields, and costs to industrial and commercial customers.

For additional description of model methods and assumptions see Appendix 22E Urban Water Quality Economics Modeling.

22A.3.4 Bay Area Water Quality Economics Model (BAWQM)

BAWQM is an M&I water quality economics model that includes the portion of the Bay Area region from Contra Costa County south to Santa Clara County. The model was developed and used for the economic evaluation of a proposed expansion of Los Vaqueros Reservoir (Reclamation, 2006). It uses estimated relationships between salinity and damages to residential appliances and fixtures to estimate the benefits from changes in salinity. Specific model outputs compare change in average salinity and change in annual salinity costs.

For additional description of model methods and assumptions see Appendix 22E Urban Water Quality Economics Modeling.

22A.4 Agricultural Water Supply Economics

The economic analysis of changes in agricultural production in areas receiving irrigation water uses changes in SWP and CVP water delivery provided by CALSIM II. Agricultural economic effects are evaluated using a regional agricultural production model developed specifically for large-scale analysis of agricultural water supply and cost changes. Groundwater and water quality effects have been evaluated using a separate analysis of groundwater conditions and costs associated with managing salts in irrigation water.

22A.4.1 Statewide Agricultural Production Model (SWAP)

The SWAP model is the evolution of a series of production models of California agriculture developed by the University of California at Davis and DWR. SWAP and the Central Valley Production Model (CVPM) have been used for numerous policy analyses and impact studies over the past 15 years, including the impacts of the Central Valley Project Improvement Act (Reclamation and USFWS, 1999), Upper San Joaquin Basin Storage Investigation (Reclamation, 2008), the SWP drought impact analysis (Howitt et al., 2009), and the economic implications of Delta conveyance options (Lund et al., 2007).

SWAP is a regional model of irrigated agricultural production and economics that simulates the decisions of agricultural producers (farmers) in California. Its data coverage is most detailed in the Central Valley, but it also includes production regions in the Central Coast, South Coast, and desert areas. The model assumes that farmers maximize profit subject to resource, technical, and market constraints. Farmers sell and buy in competitive markets, and no one farmer can affect or control the price of any commodity. The model selects those crops, water supplies, and other inputs that maximize profit subject to constraints on water and land, and subject to economic conditions regarding prices, yields, and costs.

For additional description of model methods and assumptions see Appendix 22F Agricultural Supply Economics Modeling.

22A.5 References

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