

## CHAPTER 6 – RECOMMENDATIONS

### PHASE II GROUNDWATER MODEL

#### Model Purpose/Objectives

It is recommended that a basin-wide numerical groundwater flow model be developed for the Paso Robles Groundwater Basin. The model will serve as a tool for quantitative evaluation of existing and future hydraulic conditions across the basin, including changing groundwater level elevations, well yields, natural and artificial recharge, and associated effects on surface water-groundwater interaction. Specifically, the objectives of the model include:

- Refining uncertain components of the hydrologic budget for the basin;
- Refining estimates of perennial yield for the basin;
- Evaluating water quality trends in response to hydraulic changes across the basin;
- Evaluating potential impacts on groundwater levels and perennial yield as a result of continued and varied basin operations and hydraulic conditions; and
- Defining operational options for comprehensive and/or localized management of groundwater use across the basin.

#### Model Development

The groundwater model should encompass the entire project study area defined in this study and include the hydraulic interaction between surface water and groundwater. Specific components of the model required include groundwater flow, hydrologic budget, and water quality.

To represent these components, it is recommended that the groundwater flow model be based on the US Geological Survey's (USGS) MODFLOW model (McDonald and Harbaugh, 1988). MODFLOW is a modular, three-dimensional, finite difference groundwater flow model used widely for evaluation and management of groundwater resources (van der Heijde et al., 1985). To evaluate water quality, use of the US Environmental Protection Agency's (USEPA) MT3D model (Zheng, 1990) in conjunction with the USGS MODFLOW code is recommended. MT3D is used widely in conjunction with MODFLOW in order to evaluate changes in groundwater quality in response to hydraulic conditions represented by MODFLOW.

The model domain should reflect the entire study area and associated Atascadero subbasin, with variable grid discretization based on known locations of groundwater pumping and recharge centers across the basin. The temporal component of the model should correspond to the base period defined in this study. Data reflecting aquifer geometry, hydrogeologic parameters, well pumpage, recharge, and groundwater quality, as summarized in this study, should be incorporated into the model.



Once these data have been incorporated into the groundwater flow model, the model should be calibrated with respect to historically observed conditions across the basin. Specifically, calibration targets such as average groundwater level elevations throughout the base period, annual groundwater level elevations throughout the base period, and the hydrologic budget for the basin should serve as targets for steady-state and transient calibrations.

### **Model Application**

A series of basin-operation scenarios should be developed and simulated using the calibrated model. For each scenario, groundwater level declines, water quality impacts, and estimates of perennial yield may be defined for the specific hydrologic conditions simulated. The initial scenario, representing a baseline condition, should reflect a transient simulation with known pumping, recharge, and climatological conditions throughout the base period. Additional scenarios should build on the Baseline Scenario, reflecting changes to one or more hydrologic components of the basin. The list of potential scenarios may include:

- Simulation of historical conditions throughout the base period (i.e. Baseline Scenario);
- Simulation of water level and water level impacts based on anticipated water demands at "build-out";
- Simulation of water level and/or water quality impacts associated with brief extreme drought (mid-1970s drought);
- Simulation of water level and/or water quality impacts associated with sustained severe drought (late 1980s-early 1990s drought)
- Simulation of water level and/or water quality impacts associated with increased vineyards and more agricultural pumping
- Simulation of water level and/or water quality impacts associated with increased municipal pumping (same wastewater disposal as Baseline Scenario)
- Simulation of water level and/or water quality impacts associated with continued pumping (i.e. same as Baseline Scenario), but no municipal wastewater returns (RWQCB stops discharge of wastewater to groundwater or streams)
- Simulation of water level and/or water quality impacts associated with Nacimiento Water Project (e.g. decreased municipal pumping) but wastewater returns are the same;
- Simulation of water level and/or water quality impacts associated with City of Atascadero water reuse plan, including changes in wastewater reuse;
- Simulation of water level and/or water quality impacts associated with water conservation, both urban and agricultural;



- Simulation of water level and/or water quality impacts associated with various pumping patterns; ( e.g., the City of Paso Robles, TCSD, or AMWC alter pumping amounts from various wells/wellfields to optimize use of storage);
- Simulation of water level and/or water quality impacts associated with possible artificial recharge scenarios, (e.g., changes in Salinas Dam operations, increasing recharge along the Salinas River, Estrella River, or Huer Huero Creek using in-channel check dams or releasing raw surplus water from Nacimiento);
- Simulation of water quality impacts associated with accidental release of chemical contamination in open recharge pits or rivers within the basin;

In addition, the model may be used to develop specific operational scenarios (i.e. pumping and recharge) in order to address any undesirable trends in water quality and water levels resulting from the above scenarios.

