

APPENDIX

More detailed outline for Groundwater Sustainability Plans under the Sustainable Groundwater Management Act

- 1) Summary statement of local basin objectives and approach to groundwater sustainability
- 2) Basin geography
 - a. Location, boundaries and bordering areas
 - b. Area addressed by plan if not entire basin
 - c. Climate (historic, current and projected)
 - d. Land use and demography (historic, current and projected)
 - e. Water uses and volumes (historic, current and projected)
 - f. Sources of water (historic, current and projected)
 - g. Major basin problems related to groundwater
- 3) Summary of basin hydrogeology and water budget
 - a. Summary of basin hydrogeology
 - b. Summary of basin water budget and overdraft susceptibility
 - i. Summarize modeling and historical measurements for water balance analyses
 - ii. Current water budget component estimates
 1. Total groundwater extraction
 2. Recharge
 3. Groundwater/surface water interaction (recharge and discharge)
 4. Groundwater inflow/outflow at basin boundaries
 5. Change in storage
 - iii. Future water budget component estimates
 1. Surface water imports
 - a. Residual demand supplied by groundwater pumping
 - b. Annual average and variability of imports
 - c. Environmental challenges
 - d. Legal and regulatory considerations
 2. Potential effects of San Joaquin-Sacramento Delta infrastructure futures over planning horizon
 3. Natural surface water flows to and from basin (annual variability)
 4. Population and land use trends
 5. Potential effects of climate change over planning horizon
 6. Effects of potential (anticipated/planned) basin boundary adjustments

7. Summary of major uncertainties and estimated range of uncertainty in water balances
 - c. Summary of land subsidence problems and susceptibility
 - d. Summary of saltwater intrusion problems and susceptibility
 - e. Summary of other basin water quality problems and susceptibility
 - i. Relevant hydrogeochemistry and natural sources of contamination
 - ii. Nonpoint source water quality sources and future trends
 - iii. Point-source water quality sources and future trends
- 4) Sustainability objectives, options and analysis
- a. Basin-specific definition of sustainability (quantity, quality, land subsidence, groundwater/surface water interaction) compatible with the act's definition of sustainability
 - b. Forecast if nothing changes (bracketed by uncertainty)
 - c. Sustainability objectives
 - i. Arrest long-term groundwater level decline
 - ii. Increase groundwater storage
 - iii. Improve water quality
 - iv. Improve aquatic and terrestrial ecosystems
 - v. Stop land subsidence
 - vi. Stop/reverse seawater intrusion
 - vii. Mitigate impacts on surface water
 - d. Options for achieving sustainability. Actions to modify water budget
 - i. Increase recharge
 - ii. Decrease discharge
 - iii. Combination
 - iv. Amounts required (bracketed by uncertainty)
 - v. Water quality options
 - vi. Other options
 - e. Analysis and evaluation of options and combined options for achieving sustainability objectives. Possible refinement of analysis with aquifer modeling
 - f. Major uncertainties and ranking of uncertainties by relevance for beginning to manage towards sustainability
- 5) Plan activities
- a. Management activities
 - b. Responsibilities, timelines and milestones
 - c. Management, supply and information agreements with neighboring and regional basins, water suppliers and land-use authorities
 - d. Enforcement of implementation responsibilities
 - e. Funding
 - f. Measurement and verification

- i. Data to be collected
 - ii. Monitoring networks (type, locations, depths, frequencies)
 - iii. Procedures
 - g. Near-term efforts for moving forward while important data gaps are filled
 - h. Efforts for reducing uncertainties
 - i. Activities
 - ii. Science coordination
 - iii. Approximate costs and funding
 - iv. Timeframes of activity completion and plan updates
 - i. Recourse contingencies to make implementation robust
- 6) Implementation actions supporting GSP activities
 - a. Near-term implementation actions and responsibilities
 - b. Efforts and responsibilities for improving information and refining uncertainties to manageable levels
- 7) Appendices
 - I. Basin Hydrogeology
 - a. Geology (structural and depositional)
 - b. Unconsolidated deposits
 - i. Groundwater basins identified in DWR Bulletin 118
 - ii. Architecture and stratigraphy
 - iii. Variations across basin
 - c. Deeper geology
 - i. Unconsolidated deposits
 - ii. Consolidated deposits
 - iii. Fractured hard rock
 - iv. Variations across basin
 - d. Water budget components and quantification
 - i. Descriptions and land use conditions
 - 1. Recharge
 - a. Diffuse recharge
 - i. Precipitation/runoff (natural and agricultural settings)
 - ii. Agricultural return flow (irrigated settings)
 - iii. Urban stormwater runoff/return flow
 - b. Localized recharge
 - i. Streams, lakes, wetlands, reservoirs, etc.
 - ii. Artificially induced/intentional recharge
 - 2. Discharge
 - a. Supply well pumping (historic, current and projected)
 - b. Evapotranspiration
 - i. Natural vegetation

- ii. Riparian vegetation
 - iii. Crops
 - 1. Irrigated crops
 - 2. Non-irrigated crops/dryland farming
 - iv. Bare soil
 - c. Baseflow/discharge to streams
 - d. Agricultural drains
 - 3. Groundwater inflow/outflow at basin boundaries
 - a. Interbasin flow
 - b. Bedrock-alluvial basin flows/mountain front recharge/discharge
 - 4. Change in storage
 - ii. Spatial variations of individual flow components
 - 1. Across basin
 - 2. With depth
 - iii. Magnitude of diurnal/seasonal/inter-annual dynamics in the transient (time-varying) changes of individual flow components
 - iv. Sensitivity analysis to show likely range of values and identify where uncertainty is important
 - v. Detailed methods and calculations presented in appendix
 - 1. Available data
 - 2. Estimation methods when data on flows are not available, derived using analytical/modeling/estimation tools
- e. Hydraulic heads and flows
 - i. Unconsolidated deposits
 - 1. Confined/unconfined
 - 2. Trends and cycles (historic, current and projected)
 - 3. Variations
 - a. Across basin
 - b. With depth
 - 4. Level of overdraft (as applicable)
 - ii. Deeper geology
 - Nature of confining beds and basement
- f. Water quality
 - i. Major constituents of interest
 - 1. Constituents of note and sources
 - 2. Variations
 - a. Across basin
 - b. With depth
 - 3. Trends (historic, current and projected)
 - 4. Depth of transition from fresh to brackish/saline water
 - 5. Hydrogeochemistry data and natural contaminants
 - ii. Unconsolidated deposits
 - iii. Deeper geology

- g. Land subsidence (as applicable)
 - h. Saltwater intrusion (as applicable)
 - i. Groundwater model availability to represent: understanding of groundwater system; support of estimation of water and contaminant flows and their spatial-temporal variability; evaluation of effectiveness of planned actions (including uncertainty analysis)
- II. Details of calculations for water budget component estimation
- III. Options considered for achieving sustainable management
 - a. Potential options
 - i. Hydrologic
 - ii. Operational/logistical
 - b. Evaluation of options and alternatives
 - i. Financial
 - ii. Economic
 - iii. Regulatory and legal
 - iv. Other
 - c. Selected plan activities
 - i. Management activities
 - ii. Timelines and milestones
 - iii. Measurement and verification
 - 1. Data to be collected
 - 2. Monitoring networks (type, locations, depths, frequencies)
 - 3. Procedures
- IV. Process of basin GSP development – reviewing the process of local and stakeholder engagement, analysis and plan development
- V. Monitoring and assessment plan details
- VI. Other supporting documents
 - a. Supporting information regarding evaluation of uncertainty
 - b. Supporting information regarding sustainability analysis
 - c. Supporting information on measures for achieving sustainable management
 - d. Details on selected option to achieve sustainability