

Las Posas Basin Plan Discussion Paper No. 12

Groundwater Management Areas Overview

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This document provides an introductory discussion of approaches for developing groundwater management areas within the Las Posas Basin. Although this document provides suggested management areas, the analysis contained herein is not intended to be complete or to provide the final answer. Rather, this document is intended to get the ball rolling. The Users Group will be going through the process of refining the management areas during the next several meetings.

Suggested Approach for Establishing Groundwater Management Areas

Groundwater management areas can be used to tailor the basin-specific plan to address the unique conditions and resource management challenges specific to different areas *within* the Las Posas Basins. Management area boundaries may change over time to accommodate changes in basin hydrology, understanding of the basin hydrology, or if new hydrologic information collected in the basin provides a justification for doing so.

There is no set procedure for developing management areas. One end-member option is a one-size fits-all approach that applies to the three Las Posas sub-basins. This approach is simple, but does not provide the flexibility necessary to address pumpers' needs in different areas. The other end of the spectrum would be an approach that attempts to address the unique characteristic encountered at every well in the basin. This approach is too complex and isn't necessary. We are looking for something in-between. The recommended approach for this group is to identify a relatively small number of management areas that possess common attributes/issues. Keep in mind, the management area boundaries can be changed or refined over time as we learn more. Factors that may be considered include:

- Hydrogeology (areas that have similar groundwater storage, flow, and recharge characteristics due to geologic or hydrologic controls);
- Water quality;
- Pumping patterns and water levels;
- Vested interest in managing the groundwater resource;
- Management goals, objectives, and potential solutions;
- Political boundaries; and
- Others?

Management Areas

Applying the above-described approach, a suggested first-order division might be to establish two primary management areas, one for the West Las Posas sub-basin (WLP) and another for the East & South Las Posas sub-basins (ELP+SLP). Table 1 shows how the above-described factors were used to reach this recommendation. Note that global objectives, such as monitoring programs, governance, etc. have been purposely omitted. The table is for discussion purpose only – it is not intended to be comprehensive.

Table 1
Criteria Used to Create Primary Management Areas

Area / Criteria	West LP sub-basins	East+South LP sub-basins
Hydrogeology	Lower system (most notably the Fox Canyon Aquifer) is believed to be geologically isolated from ELP basin. Possible inter-basin flow in units above Lower System. Recharge from Oxnard Plain Basin inflows and other sources.	Lower system believed to be geologically isolated from WLP basin. Possible inter-basin flow in units above Lower system. Unconfined aquifer and Epworth Aquifer also present and pumped. Recharge from Arroyo Simi / Las Posas and other sources. Outflow to PV Basin.
Water Quality	Exceptional. Some concern about potential migration of impaired groundwater from ELP in upper units.	Elevated concentration of chloride and other dissolved ions are a major concern in areas near Arroyo Simi / Las Posas within SLP and the southern ELP. Elsewhere, water quality is generally exceptional.
Pumping Patterns and Water Levels	Large, pervasive pumping depression in the eastern part of sub-basin. Depression does not extend into ELP due to geologic controls, however, may be inducing flow of impaired water in upper units. Water levels in western and central portions of sub-basin are depressed relative to historical levels, but appear to now be stable over wet/dry cycles.	SLP and the southern ELP areas are essentially full due to wastewater flows in Arroyo Simi / Las Posas. Water levels in the remainder of ELP were largely stable during the 1990's and until about 2007 when the in-lieu program ramped down and ASR withdrawals increased. Since 2007, water have dropped ≥ 100 feet in some areas.
Possible Management Objectives (not comprehensive)	<p>(1) Prevent long-term aquifer mining by balancing Lower System pumping with the aquifer's ability to transmit water from recharge sources to the pumping depression. Suggested metric - maintain water levels in the pumping trough at or above historical low levels seen during the early 1990's.</p> <p>(2) Limit potential for migration of high chloride water from ELP in upper units by raising water levels in pumping depression. Initial suggested metric same as above.</p>	<p>(1) Limit northward migration of impaired water in ELP.</p> <p>(2) Balance non-ASR pumping in Lower System with recharge to prevent long-term aquifer mining. Suggested initial metric: maintain water levels observed in 1990's. (may not be met everywhere during ASR extraction cycles.)</p> <p>(3) Shallow aquifer: remediate groundwater, provide supplemental water, and increase natural recharge.</p> <p>(4) Protect well owners from short-term impacts during extraction phases of ASR project.</p>

As suggested in Table 1, WLP may likely be managed differently than ELP+SLP because it is geologically isolated and has very different groundwater management goals and potential solutions. In fact, was it not for the presence of water purveyors with service areas straddling the WLP / ELP basin boundary, the WLP basin might not need to be part of the management plan.

Management Sub-Areas

Further sub-divisions should be made within the primary management areas, as needed. *Subdivisions should only be made if the benefit of increased plan flexibility outweighs the increased complexity caused by sub-dividing.*

West Las Posas Management Sub-Areas

Compared to ELP+SLP, the issues in WLP are relatively straightforward and a single management area may suffice. If desired, as many as three management areas within WLP could be considered: (1) Western+Central WLP; (2) Eastern WLP (pumping depression area); and (3) Camarillo Hills. Table 2 describes the high-level differences between these sub-areas (not intended to be comprehensive). **The Users Group should discuss whether or not this level of subdivision is necessary.**

Table 2
Possible WLP Basin Management Sub-Areas

Sub-Area	Western +Central Area	Eastern Area (Pumping Depression)	Camarillo Hills
Hydrogeology	Similar to Eastern area. Inflow from Oxnard Plain contributes to stabilized water levels.	Similar to Western + Central Area. Geologic barrier between WLP and ELP magnifies drawdown from pumping in this area.	Folding causes large area of aquifer exposure. Hydraulic connection with remainder of sub-basin and PV basin not well understood.
Water Quality	Currently no known concerns.	Some concern about potential migration of impaired water from ELP in upper units.	Currently no known concerns.
Pumping Patterns and Water Levels	Pumping is spread out. Water levels are depressed from historical pumping, but appear to now be stable over wet/dry cycles.	Pumping is concentrated in this area. Large, pervasive pumping depression exists.	Water levels are depressed from historical pumping, but appear to now be stable over wet/dry cycles.

Table 2 (continued)
Possible WLP Basin Management Sub-Areas

Sub-Area	Western +Central Area	Eastern Area (Pumping Depression)	Camarillo Hills
Possible Management Objectives (not comprehensive)	Maintain water levels over wet/dry cycles.	(1) Balancing pumping with recharge to this area. Suggested metric - maintain water levels at or above historical low levels seen during the early 1990's. (2) Raise water levels to limit potential for migration of high chloride water from ELP. Initial suggested metric same as above.	Protect recharge water quality. Additional or different monitoring in this area to support further evaluation of recharge and hydraulic connectivity with remainder of WLP and PV Basin.

East+South Las Posas Management Sub-Areas

Compared to WLP, the issues in ELP+SLP are more complicated and management sub-areas are probably needed. The simplest approach would be to establish two sub-areas, one for the shallow aquifer and another lower system (now we are thinking three-dimensionally). Recognizing the fact that the lower system pumpers within the ASR project zone of influence have additional management concerns, a third "ASR" area probably makes sense. So the initial recommendation is three sub-areas: (1) Shallow aquifer; (2) Lower aquifer system area; and (3) area influenced by ASR operations. Table 3 describes the differences between these sub-areas (not intended to be comprehensive – for example, the Epworth Gravels is omitted).

The Users Group should discuss whether or not this level of subdivision adequately addresses varying concerns within the ELP+SLP area. Other sub-areas or different divisions may be needed.

Table 3
Possible ELP+SLP Basin Management Sub-Areas

Area/ Criteria	Shallow Aquifer	Lower Aquifer System	ASR Area
Hydrogeology	Shallow, unconfined alluvial aquifer (<= 200 feet thick) adjacent to Arroyo Las Posas. Alluvial aquifer is a source of recharge to Lower System aquifers west of Moorpark.	Lower system, primarily Fox Canyon Aquifer. Some wells tap Grimes Canyon Aquifer.	Lower system, primarily Fox Canyon Aquifer. Some wells tap Grimes Canyon Aquifer.

Table 3 (continued)
Possible ELP+SLP Basin Management Sub-Areas

Area/ Criteria	Shallow Aquifer	Lower Aquifer System	ASR Area
Water Quality	Elevated chloride concentrations are a major concern. Sources are non-native inflows and stranded salts in the unsaturated zone.	Water quality is exceptional except southern areas which are being increasingly impacted poor quality recharge from the shallow aquifer.	Poor quality water is encroaching on the both ASR well fields from the south.
Pumping Patterns and Water Levels	Shallow aquifer is essentially full; water levels are currently maintained by non-native inflow from discharges at Moorpark and Simi Valley POTWs, Simi Valley dewatering operations, and urban runoff.	Water levels appear to be maintained by recharge from shallow aquifer and are largely stable (some exceptions).	Area is strongly influenced by ASR operations. Water levels have dropped up to ~100 feet in some areas near the well fields during the recent pumping phase.
Possible Management Objectives (not comprehensive)	Remove salts, generate supplemental water, and increase natural recharge.	Limit saline intrusion to the extent feasible. Where it cannot be controlled, develop alternative water quality management solutions.	Protect local wells from short-term impacts during ASR extraction activities.

Closing

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