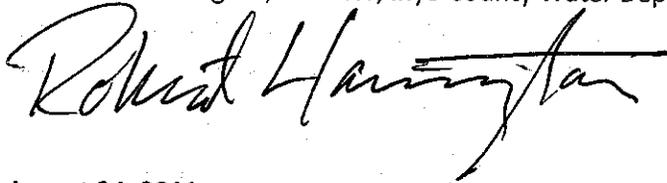


Requirements for effective management and mitigation of groundwater pumping based on the experience of Owens Valley, Inyo County, California.

Prepared for the Office of the Nevada State Engineer on behalf of the Great Basin Water Network

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For over a century, the City of Los Angeles has been exporting water from Inyo County to Los Angeles to meet Los Angeles's water supply needs. In 1970, the Los Angeles Department of Water and Power (LADWP) increased the capacity of their aqueduct system by constructing a second aqueduct to transfer water from Inyo County and Mono County to Los Angeles. The sources of water to supply the second aqueduct were intended to be (1) increased groundwater pumping in Owens Valley, (2) decreased irrigation in Owens Valley, and (3) increased surface water exported from the Mono Basin in Mono County. A few months after the completion of the second aqueduct, the California Environmental Quality Act (CEQA) was enacted. In 1972, Inyo County commenced litigation under CEQA to compel LADWP to complete an Environmental Impact Report on the operation of the second aqueduct. A lengthy period of challenges and counter-challenges ensued, and the litigation between Inyo County and Los Angeles was settled in 1991 by both parties entering into the Inyo/Los Angeles Long-Term Water Agreement (LTWA). The LTWA sets forth environmental goals for LADWP's water management activities in Inyo County, forms policy making and technical oversight committees, defines baseline conditions for ascertaining vegetation changes caused by groundwater pumping, provides criteria by which production wells will be operated, sets forth a process for determining whether a significant effect on the environment has been caused by LADWP water management activities, provides financial resources to Inyo County to maintain a technical staff, and outlines a process for resolving disputes that arise under the LTWA. An appendix to the LTWA, the "Green Book", outlines vegetation and hydrologic monitoring methods, baseline vegetation conditions, management of LADWP production wells, methods for assessing impacts to non-LADWP wells, and future studies necessary for the implementation of the LTWA.

To meet the requirements of the LTWA, Inyo County and LADWP have implemented over 50 mitigation measures, including maintaining limitations on groundwater withdrawals, revegetation of sites impacted by groundwater pumping, maintaining irrigation on historically irrigated lands, supplying sites with water to mitigate loss of spring habitat, rewatering a section of the Owens River that had been dewatered since 1913, supplying water to maintain fisheries, supplying water to sites for recreational purposes, and financial compensation for private well owners impacted by LADWP pumping. These mitigation measures address impacts from LADWP's groundwater withdrawals prior to 1990, and put in

place processes for mitigating future (i.e., post-1990) impacts resulting from future groundwater withdrawals.

The scale of groundwater development proposed for Spring, Cave, Dry Lake, and Delamar Valleys is similar to pumping conducted in Owens Valley since the construction of Los Angeles's second aqueduct. Since 1970, when the second aqueduct was completed, through 2009, LADWP's annual groundwater pumping has ranged from 43,201 acre-feet to 209,394 acre-feet, and has averaged 90,408 acre-feet per year. The USGS (Danskin, 1998), in a report examining water management alternatives in Owens Valley, estimated annual recharge to be in the 170,000 to 210,000 acre-feet, thus, about half of the recharge in Owens Valley is discharged through LADWP production wells.

Because of the similarities between LADWP's activities in Owens Valley and SNWA's proposed project, Inyo County's experience implementing the LTWA and its mitigation measures is pertinent to the Nevada State Engineer's consideration of the SNWA's applications. The Hydrologic Monitoring and Mitigation Plan for Delamar, Dry Lake, and Cave Valleys and the Hydrologic Monitoring and Mitigation Plan for Spring Valley (Hydrographic Area 184) propose a number of potential mitigation measures, but provides no process to implement mitigation measures. Our experience in Owens Valley has highlighted the importance of clearly specifying the processes by which mitigation measures will be approved, developed, implemented, and monitored. The Monitoring and Mitigation Plans associated with the SNWA applications are deficient in not providing such processes.

Specific processes necessary for successfully managing and mitigating impacts from groundwater pumping are:

1. Technical resources. For rural counties and tribal governments to participate equally with federal agencies and SNWA in evaluating monitoring data, modeling data, and assessing the need for mitigation, these entities need to be provided with the financial ability to hire the staff and consultants necessary to evaluate monitoring results and other information pertinent to managing SNWA's groundwater transfer activities. LTWA Section XIV.C provides financial resources to the Inyo County for "Water and Environmental Activities." The Inyo County has historically used these funds to maintain a staff to monitor hydrologic and environmental conditions, evaluate monitoring results, develop models to assess effects of LADWP's activities, develop mitigation measures, and, if necessary, hire legal assistance.
2. A clear process for identifying whether mitigation is necessary. The Monitoring and Mitigation Plans associated with SNWA's applications do not contain a process to identify whether mitigation is necessary. LTWA Section IV.B provides a three-step process where an alleged adverse impact is examined by technical staff from the County and LADWP in terms of its (1) measurability, (2) the cause of the impact, and (3) the significance of the impact. The LTWA identifies baseline conditions to use when evaluating alleged impacts.
3. Quantifiable goals for mitigation measures. When mitigation measures are agreed to, a plan should be developed that includes quantifiable goals. A schedule for periodic assessment of the

progress of the measure needs to be included in the plan, and the goals for the measure need to be quantifiable so that the success or failure of the mitigation measure is clear and the mitigation plan can be modified as necessary.

4. Dispute resolution. The Monitoring and Mitigation Plans associated with SNWA's applications do not address how disagreements will be resolved. Implementation of mitigation measures will entail considerable expense and/or reduce the volume of water exported, which may result in disputes over whether mitigation should be implemented, how mitigation should be implemented, and whether an implemented measure is meeting its goal. The LTWA (Section XXVI) lays out a process where disputes that cannot be resolved at the level of the technical staff from the County and LADWP are elevated to policy makers, an arbitration panel, and the Court if necessary.

5. Pumping management. One of the mitigation measures identified in the Monitoring and Mitigation Plans associated with SNWA's applications is "Reduction or cessation of groundwater withdrawals." This is an attractive mitigation measure, in that, if implemented effectively, it may avoid an adverse impact altogether. For this measure to be effective, the methods, thresholds, and criteria for curtailing pumping need to be identified with great specificity. The LTWA and Green Book contain methods for determining whether a LADWP production well may be operated. These methods are based on comparison of measurements of soil water and plant-water-requirements at 22 monitoring sites located throughout Owens Valley. If soil water is inadequate to sustain native phreatophytes through their growing season, pumping wells linked to discrete monitoring sites may not be operated until soil water recovers. We have found that these criteria for managing pumping are inadequate because they do not account for the (possibly lengthy) amount of time necessary for the water table to recover to the point where it can replenish the root zone. Production wells can reduce spring flows or drawdown the water table beneath phreatophytic plant communities relatively quickly compared to the length of time necessary for the water table to recover. A better pumping management method – one which we are seeking to implement in Owens Valley – is to base pumping management directly on the depth of the water table. To manage pumping based on depth to the water table, it is necessary that thresholds of allowable impacts be quantified for groundwater-dependent resources, a groundwater modeling exercise be conducted to determine what amounts of drawdown at monitoring points would not result in those thresholds being exceeded, and a monitoring network be designed to implement the program. Inyo County is successfully implementing such a program to manage a non-LADWP groundwater transfer project in Rose Valley, where the applicant has agreed to groundwater elevation thresholds where pumping will be curtailed if elevations decline below those thresholds. The thresholds were developed by setting a limit on how much decline in spring flow would be acceptable (10%), and using a groundwater model to determine what groundwater elevations in an array of monitoring wells corresponded to a 10% reduction in spring flow. The mitigation plan for this project specifies that the groundwater model and groundwater elevation thresholds will be revisited and

improved as the project generates additional data with which to recalibrate and improve the groundwater model.

References

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