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Submitted via email: cbeale@resourceslawgroup.com

Subject: Recommendations related to Modeling for the Protection of Groundwater and Groundwater Dependent Communities in the Development of the Desert Renewable Energy Conservation Plan

Docket Number: 09-RENEW EO-01

The Nature Conservancy (the Conservancy) respectfully submits the attached letter that contains additional recommendations on the inclusion of groundwater modeling by the Renewable Energy Action Team and staff as a requirement when addressing groundwater and groundwater dependent species and communities in the development of the draft Desert Renewable Energy Conservation Plan (DRECP). As a stakeholder in the DRECP process, our organization supports this critical plan and we thank you for the opportunity to share these recommendations. This letter will be filed to the California Energy Commission Docket Office via email.

If you have any questions, please do not hesitate to contact me at (760) 399-7275 or lcrane@tnc.org.

We look forward to continuing to work collaboratively on the Desert Renewable Energy Conservation Plan.

Sincerely,

Laura Crane
Director, California Renewable Energy Initiative
The Nature Conservancy

Enclosed: Recommendations related to modeling for the Protection of Groundwater and Groundwater Dependent Communities in the Development of the Desert Renewable Energy Conservation Plan

cc:
James Kenna, California State Director, Bureau of Land Management via email: jkenna@blm.gov
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Use of Modeling for the Protection of Groundwater and Groundwater Dependent Communities in the Development of the Desert Renewable Energy Conservation Plan

I. Introduction

The Nature Conservancy (the Conservancy) is a world-wide conservation organization, devoted to preservation of the lands and waters upon which all life depends. Striving to maintain fresh water flows for nature and people in the face of drought and climate change is an increasingly critical aspect of our work, in California, across the United States, and globally.

The Conservancy actively participated in the federal Solar Programmatic Environmental Impact Statement (SPEIS) process, is a formal stakeholder in the Desert Renewable Energy Conservation Plan (DRECP) process, and has commented on individual renewable development project proposals. The protection of groundwater and related surface water flows—the streams, springs, seeps, and wetlands on which the survival of so much desert life depends—is a critical component of our work.

In May, the Conservancy submitted a letter recommending steps to protect groundwater and groundwater-dependent natural communities in the DRECP. That letter urged the use of groundwater modeling approaches and methods as an essential component of a strategy to protect groundwater dependent resources. Based on follow-up discussions and meetings resulting from our May letter, we understand that there is some concern about how to use modeling given significant uncertainties about groundwater information and resources in the planning area of the DRECP. The purpose of this letter is to provide recommendations to address those concerns, expanding on our earlier submission, providing justification and more specific recommendations for the use of groundwater modeling in the implementation of the DRECP.

We strongly recommend that the DRECP:

1. Require that renewable energy development proposing to pump groundwater within the DRECP use a numerical groundwater model appropriate for basin conditions and adequate to predict the long term effects of that pumping on groundwater dependent resources.
2. Require developers proposing to pump groundwater to acquire, use, and augment hydrological information and data sufficient to provide reasonable certainty that the numerical groundwater model will accurately represent dynamic conditions in the affected basin(s).

II. Discussion

The science and practice of groundwater modeling has advanced significantly in the past two decades, assisted by the decreasing costs of computer power and a better understanding of groundwater hydrology principles. An array of models is available, ranging from relatively simple analytical models to sophisticated numerical models that represent groundwater systems in three dimensions. Even relatively complex numerical models can be acquired and populated at reasonable cost, and most certainly at modest cost in the context of solar facilities costing multiple billions of dollars advancing proposals to withdraw groundwater over many decades. Notably, in a number of ongoing proceedings, federal and state permitting agencies have recognized the utility and necessity of groundwater modeling.

Groundwater modeling is an essential regulatory tool. The modeling process requires users to explicitly state and verify assumptions about the target groundwater system, including key components of the basin water budget. Model calibration, which requires fitting hydrological data to the model, then provides a test of the reasonableness of those assumptions. Even in the absence of detailed information about basin hydrology, groundwater modeling helps identify sensitive parameters that will guide data collection and assist in establishing monitoring locations and conditions. Models thus provide the only effective means to evaluate the internal consistency of assumptions about the effects of proposed pumping in the target basin. An appropriate model, coupled with a carefully designed monitoring program, provides the basis for adaptively managing the groundwater basin, and modifying pumping where adverse effects are predicted to occur.

Appropriate and effective models require only the level of data and complexity needed to describe the effects of the project pumping in the context of other groundwater uses and groundwater dependent resources. A key principle is to represent the groundwater system in the simplest terms while maintaining the hydrogeologic assumptions that make up the conceptual model for the flow system. However, where essential information and data are missing, model assumptions are not internally consistent, or changes in groundwater uses occur, it is important to collect additional data and to update the model.

Absent a realistic and verified groundwater model coupled with a well-designed monitoring program, it is difficult, if not impossible, to quantitatively predict and manage the effects of groundwater development on groundwater dependent resources.

The Bureau of Land Management (BLM) has recognized the importance of groundwater modeling in a number of settings. BLM's Conservation Management Action (CMA) proposal for groundwater protection in the DRECP contains recommendations that clearly seem aimed at requiring modeling (e.g., water supply assessments and the central role of basin water budgets), although groundwater modeling is not specifically addressed in early versions of the CMAs.

More importantly, BLM is requiring the use of groundwater modeling for a number of utility scale solar projects (e.g., Soda Mountain, the Riverside East SEZ/Chuckwalla basin projects, and in recommendations for the Bright Source Hidden Hills project, currently on hold). In the Death Valley Regional Flow System--the Amargosa watershed-- the USGS has prepared a sophisticated regional numerical groundwater model that can be used, in conjunction with more localized data, to determine the effects of proposed pumping on the Wild and Scenic Amargosa River and other groundwater dependent resources.

The Solar Programmatic Environmental Impact Statement (SPEIS) Record of Decision (ROD) endorses the use of groundwater modeling as a best management practice (design feature) for ecological resources in project approvals.

> Solar facilities shall be sited and designed, and constructed to avoid minimize, or mitigate impacts on ecological resources…. Methods…may include, but are not limited to the following…
>
> Demonstrating, through hydrologic modeling, that that the withdrawals required for the project are not going to affect groundwater discharges that support special status species or their habitats[1].

Other SPEIS water and ecological resource requirements strongly imply the need for companion groundwater modeling. Notably, some of these requirements have fairly little value in the absence of accompanying groundwater modeling. These include requirements that developers conduct extensive hydrologic studies to "demonstrate a clear understanding of the local surface water and groundwater hydrology[2],"; implement groundwater monitoring, using adaptive management strategies, to protect water quantity and quality in areas adjacent to or downstream from development areas[3], and avoid, or provide compensatory mitigation for, adverse effects on special status species or aquatic sites[4].

Groundwater modeling is the only practical way to predict potential adverse effects on ecological resources in a manner that can be monitored for and adapted to as needed, and that can assist in focusing monitoring on those resources in an efficient, cost-effective manner. To have their intended effect, requirements must be accompanied by modeling to provide reliable and realistic protection for rare desert water related resources. While the sophistication of the modeling may well vary with the nature of project pumping and the groundwater basin, it is important to require

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[1] Solar Programmatic Environmental Impact Statement, Record of Decision (SPEIS ROD), Appendix A, Design Features for Ecological Resources, A.4.1.11.2, ER-2-1(a), at pages 79, 82, October 2012 .
[2] SPEIS ROD, Appendix A, Design Features for Water Resources, A.4.1.10.1, WR-1-2 at page 69
[3] SPEIS ROD, Appendix A , Design Features for Water Resources, A.4.1.10.3 , WR 3-1 at page 73
[4] SPEIS ROD, Appendix A, Design Features for Ecological Resources, A.4.1.11.2, ER 2-1 at page 79-81.

the use of an appropriate model to determine and avert effects on springs, seeps, and other crucial desert surface water sources--where those resources may be affected even over a very long time interval Where proposed pumping will clearly not have major impacts, preparation of a simple analytical model may suffice. However, where basins are overdrafted, sensitive groundwater resources are present, or significant project pumping is proposed, numerical groundwater modeling is the preferred option.

Where a project proposes to pump very little groundwater and is not close proximity to a sensitive receptor, for example, the modeling effort may be as simple as calculation of the basin water budget, identification of recharge and discharge areas, and use of an analytical model like the Theis equation to predict extent and timing of potential impacts. However, where sensitive resources may be affected—even at a distance from the pumping well—or the basin hydrogeology is complex, or the basin is overallocated or overdrafted, or substantial pumping is proposed, a two- or three-dimensional numerical model, such as the USGS program MODFLOW (an industry standard), should be required.

Even numerical modeling can be relatively simple, from a reconnaissance-level model where the natural boundaries of the system are honored and various estimates of aquifer properties and water budget components are used to establish a reasonable range of potential impacts, to fully calibrated models that incorporate extensive data collection throughout the basin.

The USGS has issued a recent comprehensive paper describing the effects of well withdrawals (groundwater pumping) on streams and other hydrologic features. The paper includes recommended methods to determine and manage those effects, including central reliance on numerical modeling. (Barlow and Leake, Streamflow Depletion by Wells—Understanding and Managing the Effects of Groundwater Pumping on Streamflow, Circular 1376, USGS, 2012). With respect to modeling, the circular opines:

> For even modestly complex settings, numerical models are the most robust method for determining the rates, locations, and timing of streamflow depletion caused by pumping because they are capable of handling many of the common complexities of real groundwater systems. They are the only effective method for determining detailed, basinwide water budgets that account for the effects of complex pumping histories from large numbers of wells on all types of hydrologic features, including streams…Managing streamflow depletion by wells is challenging because of the significant time delays that often occur between when pumping begins and when the effects of that pumping are realized in nearby streams…Effective management of streamflow depletion requires both a long-term perspective and an understanding of how streamflow responds to pumping at each well individually and at all wells simultaneously. Numerical models are the most effective means to determine the effects of pumping on streamflow… Circular, at 77-78.

III. Conclusion

In sum, groundwater models are essential and standard tools to understand and manage the long term effects of groundwater pumping on ecological resources (as well as effects on human uses of groundwater). Accordingly, we urge the DRECP to include an explicit requirement of groundwater modeling in the adopted CMA's and any other regulatory provisions in the Plan that will govern facility approvals in the Plan area. An explicit modeling requirement would be consistent with the BLM's well-reasoned reliance on these models in specific siting cases and their inclusion as a design feature in the Solar PEIS ROD. The imposition of a modeling requirement would represent an important advance in sustainable management of resources on our public lands, and would materially assist in implementing state and federal mandates to avoid, minimize and mitigate harm to sensitive resources.