Deep Rose LLC (project proponent) has applied for a conditional use permit under the Inyo County Groundwater Ordinance (codified as Ordinance 1004, Inyo County Code Chapter 18.77) to extract up to 50 acre-feet of groundwater from Rose Valley and transport the water by tank truck to a site northeast of Rose Valley (Figure 1). The project involves drilling up to four exploratory wells for geothermal resources. Since this project proposes to transfer or transport groundwater from a groundwater basin within Inyo County for use in an area outside the basin, it is subject to Ordinance 1004.

When applicable, Ordinance 1004 requires that the Inyo County Water Department and Inyo County Water Commission (Water Commission) evaluate hydrological and related environmental impacts of a project, and based on such an evaluation, identify and develop mitigation measures, monitoring, project conditions, groundwater management, and findings. Ordinance 1004 provides that the Water Commission shall submit its recommendations to the Inyo County Planning Commission (Planning Commission). Approval of a conditional use permit (CUP) pursuant to the Ordinance 1004 requires a finding by the Planning Commission that the transfer or transport of water will not unreasonably affect the overall economy and environment of Inyo County.

Guidance for determining whether a proposed project will unreasonably affect the environment of Inyo County is provided in Ordinance 1004 (County Code Section 18.77.30.D):
In determining whether a proposed water transfer will unreasonably affect the environment of Inyo County, all relevant factors shall be considered, including, but not limited to, effects on fish, wildlife, and other instream uses, effects on water levels in wells, effects on springs and seeps, effects on riparian and groundwater dependent vegetation, effects on rare or endangered plant or animal species, effects on surface water features, recharge to the groundwater basin, effects on the groundwater storage capacity of the basin, potential for overdraft, potential for subsidence, effects on water quality, the capability of the proposed monitoring, groundwater management and/or reporting program to detect and avoid significant adverse impacts and the cumulative effects of the proposed water transfer within the affected groundwater basin, when considered together with the effects of past water transfers, past transfers and water exports, as well as approved and anticipated future water transfers, and water exports from the affected groundwater basin, on the environment.

Ordinance 1004 further provides (Section 18.77.55):

The county planning commission, in consideration of the relevant recommendations submitted by the water commission, shall approve and incorporate, as appropriate, a monitoring, groundwater management, and/or reporting program into each conditional use permit it grants for a transfer or transport of water described in Section 18.77.010.A. The monitoring, groundwater management and/or reporting program shall be of such scope and extent as the commission finds to be necessary to ensure that the proposed water transfer will not unreasonably affect the overall economy or the environment of the county. In determining the scope of a monitoring, groundwater management and/or reporting program, the ability of the proposed program to detect and avoid potential significant adverse effects before such effects occur shall be considered. The monitoring and/or reporting portion of the program shall be in compliance with Chapter 15.44 of this Code. The groundwater management and/or reporting program may include, but shall not be limited to, instream flow measurements, reports of the amounts of surface water diverted and/or amounts of groundwater pumped, monitoring of wells, monitoring of groundwater levels, monitoring of spring [sic] and seeps, monitoring of vegetation, wildlife, fish, and economic effects and thresholds and/or trigger points which, if reached, will control the extraction of groundwater.

**Project summary**

Deep Rose LLC proposes to drill, test, and monitor up to four geothermal exploration wells of depths of up to 18,000 feet. The goal of the project is to explore, locate, and verify the existence of a commercially viable geothermal resource. The specific objectives of the project are to drill into and flow test the geothermal reservoir to confirm its physical characteristics and determine if the geothermal resource is commercially viable.

Concerning the water supply for the project, the project proponent proposes to produce up to 50 acre-feet of groundwater from a site within Rose Valley. The project proponent intends to drill a water well in a parcel owned by the project proponent in northeastern Rose Valley (APN 037-040-26,
shown on Figure 1), and truck the water to the drilling site within Section 16, T21S, R38E (MDBM). The project proponent plans for the well to be 6 or 8 inches in diameter, drilled to a depth of approximately 300 feet, and screened approximately from 200 to 300 feet depth. The final depth and screened interval will depend on conditions encountered during drilling.

The water will be used for drilling and dust abatement on roads. The project proponent estimates a water requirement of 60,000 gallons per day for 200 days, which equates to 37 acre-feet; however, the project proponent has applied for up to 50 acre-feet to ensure there is sufficient water to complete the project should any unforeseen circumstances requiring additional water arise during drilling. The proposed groundwater withdrawal exceeds one acre-foot, and, as shown in Figure 1, is planned to be pumped in Rose Valley and transported for use in an area outside of Rose Valley; therefore Ordinance 1004 is applicable to this project.

This project is exploratory in nature. Commercial production of geothermal power is beyond the scope of this CUP. Should this exploration identify a commercially viable resource, Deep Rose LLC would be required to prepare and submit additional CEQA/NEPA documentation and apply for additional approvals, including a CUP, before proceeding with any commercial development or production.

**Hydrological and related environmental impacts**

To evaluate the hydrological and related environmental impacts of the project, a groundwater model was used to simulate the amount of drawdown that would occur due to pumping for the project. The model was originally developed for Coso Operating Company’s Hay Ranch Water Extraction and Delivery Project (CUP 2007-003/Coso Operating Company, LLC). The most recent version of this model is documented in a report prepared by Daniel B. Stephens & Associates for Inyo County (Daniel B. Stephens & Associates, 2011). Previous versions of the model and its conceptual basis are found in Brown and Caldwell (2006) and MHA (2008). For this analysis, groundwater pumping for the proposed project was assumed to total 50 acre-feet extracted from model layer 1 from a location within APN 037-040-26 withdrawn at a constant rate over a period of one-year, beginning two years after pumping began for the Coso/Hay Ranch Project. Two model runs were done: first, the model was run without any pumping for the proposed project; second, pumping for the proposed project was added to the model. The effect of the proposed project was then determined by subtracting the results of the second model run from the first model run.

A monitoring program has been established to monitor effects of the Coso/Hay Ranch project. Numerous plans and reports concerning this program are available on the Water Department’s web site at http://www.inyowater.org/coso/default.htm. This monitoring program consists of regular monitoring and reporting of groundwater pumping rates in two wells, groundwater elevations in 24 wells, and surface water flow rates at four sites. To assess the potential for significant adverse impacts from the proposed project, the maximum drawdown resulting from pumping for the project was estimated at a subset of the monitoring network wells. The subset of wells was chosen to include the closest wells to the proposed well for the project (V816 and Cal Pumice), the nearest well used for domestic water supply (Dunmovin), the nearest monitoring well on Coso Operating Company’s Hay Ranch property (Hay Ranch 1A), a well in the central part of Rose Valley (Coso Junction #1), and a well near the groundwater discharge zone at the southern end of Rose Valley (LLR North). Table 1 presents
these results (locations of wells given in Table 1 are shown in Figure 1). The Dunmovin, Coso Junction #1, and LLR North wells are used as trigger wells to manage pumping for the Coso/Hay Ranch Project. For these three wells, maximum levels of acceptable drawdown have been established for the purpose of protecting groundwater-dependent habitat at Little Lake Ranch (Table 1).

Drawdown resulting from pumping for this project is 0.13 feet at the Cal Pumice well, which is the greatest drawdown among the six wells shown on Figure 1. In the three Coso/Hay Ranch trigger wells shown in Table 1, drawdowns from the proposed project are at least two orders of magnitude smaller than the maximum acceptable drawdowns; therefore, the proposed project has no significant cumulative effect when considered with the ongoing Coso/Hay Ranch Project.

Daniel B. Stephens & Associates (2011) concluded that the model was calibrated within commonly accepted standards for groundwater models. The method used here of evaluating the difference in hydraulic head between two model runs eliminates site-specific errors in hydraulic head. There is uncertainty in the model results due to assumptions and uncertainties in the model inputs (aquifer properties, basin stratigraphy, water budget values, and structural geology of the basin); however, despite these sources of uncertainty, it is reasonable to conclude from these model results that hydrologic changes resulting from the proposed project will be minor. Even if the results of this analysis were in error by a factor of three, the predicted effect of the proposed project would be negligible.

The model results indicate that groundwater pumping for the project will have no significant environmental impacts, will not interfere with Coso Operating Company’s production of water at Hay Ranch, and will not affect or interfere with the monitoring and management of the Coso/Hay Ranch Project. Given the negligible disturbance to the groundwater system, and the distance to potentially affected groundwater-dependent habitat, there is no potential for negative environmental impacts from the proposed pumping, either resulting solely from pumping from the project, or cumulatively with pumping for the Coso/Hay Ranch Project.

Table 1. Predicted drawdown in monitoring wells due to pumping for the proposed project.

<table>
<thead>
<tr>
<th>Monitoring well</th>
<th>Maximum drawdown (ft)</th>
<th>Distance from assumed location of pumping (miles)</th>
<th>Maximum acceptable drawdown (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V816</td>
<td>0.07</td>
<td>0.8</td>
<td>-</td>
</tr>
<tr>
<td>Cal Pumice</td>
<td>0.13</td>
<td>0.7</td>
<td>-</td>
</tr>
<tr>
<td>Dunmovin</td>
<td>0.11</td>
<td>1.1</td>
<td>23.3</td>
</tr>
<tr>
<td>Hay Ranch 1A</td>
<td>0.12</td>
<td>1.1</td>
<td>-</td>
</tr>
<tr>
<td>Coso Junction #1</td>
<td>0.03</td>
<td>3.2</td>
<td>10.1</td>
</tr>
<tr>
<td>LLR North</td>
<td>0.01</td>
<td>9.2</td>
<td>1.3</td>
</tr>
</tbody>
</table>

**Recommended findings and permit conditions**

The Water Department recommends that these findings be made concerning Conditional Use Permit No. 2008-02/Deep Rose LLC (Deep Rose Geothermal Project):
1. The proposed project would transfer greater than one acre-foot of groundwater from within Rose Valley Basin (basin number 6-56) for use outside Rose Valley Basin, therefore the Inyo County Groundwater Ordinance (Ordinance 1004) requires a conditional use permit from the Inyo County Planning Commission.

2. An extensive monitoring program is already in place in Rose Valley. This monitoring program will continue through the duration of the proposed project.

3. The project will have no negative effects on fish, wildlife, other instream uses, water levels in wells, springs and seeps, riparian and groundwater dependent vegetation, rare or endangered plant or animal species, surface water features, recharge to the groundwater basin, groundwater storage capacity of the basin, potential for overdraft, potential for subsidence, water quality, the capability of any existing or proposed monitoring, groundwater management and/or reporting program to detect and avoid significant adverse impacts, and there will be no negative cumulative effects on the environment of the proposed water transfer within the affected groundwater basin when considered together with the effects of past water transfers, past transfers and water exports, approved and anticipated future water transfers, and water exports from the affected groundwater basin.

4. The project will have no negative or significant hydrological or related environmental effects and the proposed water transfer will not unreasonably affect the environment of Inyo County; therefore, no mitigation is required.

5. The Water Commission recommends that the Planning Commission approve the project with the following conditions:

   a. The total amount of groundwater withdrawn under this permit shall not exceed 50 acre-feet.

   b. The project proponent shall monitor and report groundwater extraction by installing and monitoring a totalizing meter on the supply well, and the amount of groundwater pumped from the well shall be reported to the Inyo County Planning Department six months following the granting of the permit and at six-month intervals thereafter until groundwater withdrawal under this permit ceases.

References


Figure 1. Location of Deep Rose Project pumping, point of use, and monitoring wells discussed in this report. Rose Valley groundwater basin is shaded.