



# AGRO ENGINEERING

“COMPREHENSIVE AGRICULTURAL AND WATER RESOURCE CONSULTING”

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July 1, 2011

Adam Green  
Development Manager  
SOLARRESERVE  
2425 Olympic Boulevard, Suite 500E  
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Mr. Green,

Solar Reserve has thirty-nine center-pivot irrigation sprinkler quarters under option in Saguache County. I was asked to provide an estimate of the amount of ground water that is currently being pumped for irrigation purposes on these lands, as well as an estimate of the amount of ground water that is currently being consumed. Once the solar facility is operational, this ground water withdrawal for irrigation purposes will cease and the facility will have a net positive effect on the aquifer system.

Figure 1 shows the acreage of crops currently being irrigated under the center-pivots on Solar Reserve's land. These acreages were planimeted from the 2005 NAIP aerial photography. A total of 4,713 acres are currently being irrigated under center-pivot sprinklers.

The crop irrigation requirements for crops grown in the area are shown in Table 1. Average effective precipitation for the area has been subtracted from the average crop evapotranspiration rates to determine the average net consumptive use of irrigation water for each of the crops. The net crop irrigation requirement represents the average annual irrigation requirement for these crops. No surface water has been used historically for irrigation purposes on these lands. Consequently, the entire crop irrigation requirement has historically been met by pumping ground water.





**LEGEND**

Boundary of Optioned Properties

2005 Irrigated Parcels (acres)

ALFALFA

POTATOES

SMALL\_GRAINS

VEGETABLES

2005 Aerial NAIP Image

**Solar Reserve  
Irrigated Parcel Areas**





Table 1. Crop Consumptive Use Requirements

Crop	Average Annual Crop Evapotranspiration (inches/yr)	Average Effective Precipitation (inches/yr)	Net Crop Irrigation Requirement (inches/yr)
Wheat	21.9	2.8	19.1
Barley	16.9	2.3	14.6
Lettuce	16.7	2.3	14.4
Potatoes	16.5	2.3	14.2
Alfalfa - Good	29.0	5.0	24.0
Alfalfa - Above Avg	26.0	5.0	21.0
Alfalfa - Avg	23.0	5.0	18.0
Alfalfa - Below Avg	18.0	5.0	13.0
Alfalfa - Poor	14.0	5.0	9.0
Alfalfa - Seedling	16.9	2.3	14.6
Fallow	5.0	5.0	0.0

The total acreage of the different crop types grown in 2005 was aggregated from Figure 1 and shown in Table 2. It is assumed that this crop mix is representative of the crops that have been grown historically. The crop consumptive use was estimated by multiplying the average annual crop irrigation requirement by the acreage irrigated for each crop type. The total crop consumptive use is estimated at 6,300 acre-ft/yr.

Table 2. 2005 Sprinkler Irrigated Land

Crop	Area Irrigated (acres)	Crop Irrigation Requirement (inches/yr)	Crop Consumptive Use (acre-ft/yr)
Alfalfa - Above Avg	1233.57	21.0	2158.7
Alfalfa - Seedling	122.62	14.6	149.2
Potatoes	1211.24	14.2	1433.3
Barley	709.18	14.6	862.8
Lettuce	1436.24	14.4	1723.5
TOTAL	4712.85		6327.6

Assuming an average irrigation application efficiency of 72% for this area indicates that 8,800 acre-ft/yr would have to be pumped on average to support the 6,300 acre-ft/yr of consumptive use occurring from the irrigated crops. This estimate agrees with the measured ground water pumping of 8,884 acre-ft that was metered in 2009 and reported to the State from these fields.

Table 3. Estimates of Ground Water Diversion and Consumptive Use

Irrigation Application Efficiency:	72%	
GW Consumptive Use:	6327.6	acre-ft/yr
GW Diversion:	8788.3	acre-ft/yr
2009 Metered Pumping:	8883.8	acre-ft/yr

Consequently, current and historic irrigation practices on these fields have resulted in the pumping of around 8,800 acre-ft/yr of ground water. Of this total, around 6,300 acre-ft/yr has been consumptively used by crops. The remaining 2,500 acre-ft/yr would have deep percolated and recharged back to the unconfined aquifer. Once the solar facility has been developed, this ground water pumping for irrigation purposes will cease resulting in less withdrawal from the aquifer system.

Sincerely,

A handwritten signature in black ink that reads "Kirk Thompson". The signature is written in a cursive style with a large, sweeping flourish at the end.

Kirk Thompson, P.E.