



## Memorandum

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**To:** Megan Gutwein  
**From:** Marshall Haworth and Craig Lis, P.E.  
**Date:** November 25, 2019  
**Subject:** Schweizer Farm Depth to Groundwater Table

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As noted in our November 21, 2019 memorandum regarding “Depth to Groundwater Table on Participating Farms”, additional review of groundwater level data on the Schweizer farm was recommended.

Research indicates that a groundwater depth less than 6 feet below ground surface (bgs) was recorded in a shallow well on the Schweizer Farm in Section 5, Township 23 South, Range 57 West, 6<sup>th</sup> P.M. The depth to groundwater data was obtained from a United States Geological Survey (USGS) well identified as Site Number 380452103484300 - SC02305705BAD3 (the Well), which has a total depth of 24 feet. The Well is monitored by the USGS, which has recorded 80 water level measurements, beginning in March 1965 and last recorded in December 2018. The shallowest recorded depth to groundwater measurement was 1.77 feet bgs in September 1999. The deepest recorded depth to groundwater measurement was 16.22 feet bgs in March 2004.

We graphed the recorded depth to groundwater measurements for the Well to assess the depth to groundwater trend (see Figure 1 below). The groundwater measurements in Figure 1 show that a significant change in the groundwater levels occurred in 1994. Review of Figure 1 also reveals that the groundwater levels from approximately March 1965 to March 1994 were usually deeper than 6 feet bgs, and that only 2 of the 33 depth to groundwater measurements are shallower than 6 feet bgs, while from 1994 to 2018 15 of the 47 measurements were shallower than 6 feet bgs.

Noting that the well is approximately 200 feet to the northeast of the Catlin Canal, we considered that the Catlin Canal may be influencing the depth to groundwater at the Well. The annual volume of diversion of the Catlin Canal (in acre-feet) was added to Figure 1 on a secondary axis. This addition to Figure 1 shows that the general trends of the annual volume of diversions match the general trends of the depth to groundwater measurements. Review of annual diversion records reveals that since 1994 annual diversions were greater than 100,000 acre-feet in 15 of 25 years (60% of the period) and averaged approximately 95,600 acre-feet, while from 1965 through 1993 annual diversions were greater than 100,000 acre-feet in only 8 of 29 years (28% of the period) and averaged approximately 85,800 acre-feet.

Though the increase in groundwater levels may also be related to other factors, it is likely that the increase in annual diversions is responsible for a significant portion of the increase in groundwater levels.

We also reviewed the USGS report titled *USGS Hydrogeologic characteristics of the valley-fill aquifer in the Arkansas River valley, Crowley and Otero Counties, Colorado*. Plate 3 of the USGS report shows groundwater table elevation contours in the area of interest around Schweizer Farm. Plate 3 shows the groundwater gradient is in the northeast to east direction at an approximate slope of 0.57% (45 feet between groundwater wells divided by 7,900 feet). The ground surface slopes in the same general direction at approximately 0.33% (26 feet divided by 7,900 feet). This demonstrates that the depth to the water table increases downgradient from the canal.

In conclusion, review of the groundwater level data confirmed the potential for a shallow groundwater table on the Schweizer Farm in the vicinity of the Catlin Canal.

