

6-AVEK-6

EXHIBIT 6-AVEK-6

Ranges of Typical Applied Crop Water Duty

(all values in acre-feet per acre)

Source	Alfalfa	Onions	Carrots	Grain	Potato	Pistachios	Jujubes	Pasture	Turfgrass
Summary Expert Report, Phase 3 ⁽¹⁾	6.5	4.5	3.9	2.6	2.8	4.9 (Orchard)	-	6.7	-
High Desert Research Results ⁽²⁾	4 - 10+	-	-	-	-	-	-	-	-
Groundwater Recordation Notice, 2008 ⁽³⁾	7.6	-	-	-	-	-	-	7.4	-
Groundwater Recordation Notice, 2007 ⁽⁴⁾	5.5 - 6.0	-	-	-	-	-	-	5.5 - 6.0	-
Groundwater Recordation Notice, 1999 ⁽⁵⁾	4.0 - 6.0	-	-	-	-	-	-	5.0 - 7.0	-
DWR Bulletin 113-4 ⁽⁶⁾	5.1 - 6.5	2.7 - 3.7 (Other Field)	2.7 - 3.7 (Other Field)	0.5 - 2.2	2 - 2.5 (Other Truck)	3.1	-	7.0 - 7.2	-
Wagner & Bonsignore Analysis, Antelope Valley ⁽⁷⁾	6.2	4.2	5.1	1.8	2.4	-	-	6.1	4.3 - 13.4
Wagner & Bonsignore Analysis, Mojave Area ⁽⁸⁾	7.1 - 8.1	-	-	-	-	5.0	4.0	-	-
WSSP-1, Calandri "Stoner 1" Parcel, 2013 ⁽⁹⁾	7.1	-	-	-	-	-	-	-	-
Actual Farming Practices, Mojave Area, 2013 ⁽¹⁰⁾	6.8	-	-	3.6	-	1.7	-	4.2	-

Notes

- (1) *Summary Expert Report, Phase 3 - Basin Yield and Overdraft, Antelope Valley Area of Adjudication*, Beeby, R. et al, July 2010. Values includes irrigation efficiencies.
- (2) "Currently, the amount of water high-desert alfalfa growers are applying to their fields varies considerably, ranging from 4 acre feet to over 10 acre feet per acre per year." *High-Desert Irrigation Study, Water Application Rates for Maximum Profit*, High Desert Research Results, Alfalfa and Other Forages, Orloff, S. et al, 1989.
- (3) *Agricultural Water Use Worksheet, Table II: Average Depth of Water Applied to Irrigate Each Crop*, Antelope Valley, 2008 Annual Notice of Extraction and Diversion of Water (Groundwater Recordation Program), State Water Resources Control Board, Division of Water Rights.
- (4) *Agricultural Water Use Worksheet, Table II: Average Depth of Water Applied to Irrigate Each Crop*, Antelope Valley, 2007 Annual Notice of Extraction and Diversion of Water (Groundwater Recordation Program), State Water Resources Control Board, Division of Water Rights.
- (5) *Agricultural Water Use Worksheet, Table II: Average Depth of Water Applied to Irrigate Each Crop*, Antelope Valley, 1999 Annual Notice of Extraction and Diversion of Water (Groundwater Recordation Program), State Water Resources Control Board, Division of Water Rights.
- (6) Table 1, Estimated 1980 County Average Unit Application Water, *Crop Water Use in California*, Bulletin 113-4, Department of Water Resources, April 1986. Values are for Kern County and Los Angeles County.
- (7) Turfgrass is average of 2005 through 2012, from analysis of crop evapotranspiration of applied water (ET_{aw}) output values from California DWR's CUP+ program based on daily climate measurements from Palmdale CIMIS Station supplemented by Victorville CIMIS Station, crop development data from FAO Irrigation and Drainage Paper No. 56 by R. Allen et al, and soil properties found using USDA Natural Resources Conservation Service Web Soil Survey program, and estimated irrigation efficiency of 80% based on Solid Set or Permanent Sprinkler Irrigation as described in "Irrigation Systems and Water Application Efficiencies" by Kenneth H. Solomon, CA State University, Fresno. High turfgrass value based on Oasis Effect, as described on Figure 46 of FAO Irrigation and Drainage Paper No. 56. All other crops are average of 1998 through 2012, from analysis of crop ET_{aw} output values from California DWR's CUP+ program based on daily climate measurements from CIMIS Victorville Station in San Bernardino County supplemented by measurements from CIMIS Barstow NE Station, soil properties from USDA's NRCS Web Soil Survey, and crop properties from FAO Irrigation and Drainage Paper No. 56, with growing seasons as reported in Appendix D-3: Tables 1 through 3, from Appendix D, Land Use, Water Requirements and Water Supplies, Antelope Valley Area of Adjudication, efficiencies reported in Appendix D-3: Table 4 *Applied Crop Water Duties and Irrigation Efficiency Values* from Appendix D, Land Use, Water Requirements and Water Supplies, Antelope Valley Area of Adjudication.
- (8) Average 1997 through 2013. Analysis of crop evapotranspiration of applied water (ET_{aw}) output values from California DWR's CUP+ v3.1 program based on daily climate measurements from CIMIS Barstow NE Station in San Bernardino County (supplemented by CIMIS Victorville station), soil properties from USDA's NRCS Web Soil Survey, and crop properties from FAO Irrigation and Drainage Paper No. 56 (Allen, R.K., L.S. Pereira, D. Raes, and M. Smith, 1998). Daily weather data from CIMIS was used by CUP+ to compute daily ET_o using the Penman-Monteith equation. Lower range based on default K_c values for CUP+ program averaged for all cutting cycles throughout each year. K_c values assumed to be 1.00 for all growing stages with adjustments according to climatological effects. Upper range based on Assumed K_{c,im} effects of pivot sprinkler irrigation. K_{c,im} adjustment per FAO No. 56 Figure 30b based on less than 24 hour wetting interval. Assumes seven cutting and growing cycles. Growing cycle K_c assumed to be K_{c,im} of 1.10, K_{c,mat} of 1.2, K_{c,ent} of 1.15. Includes an irrigation efficiency of 85% for center pivot irrigation based on a potential range of 75-95% as indicated in *Irrigation Efficiency* by T. Howell, USDA, 2003.
- (9) *AVEK Customer Water Use Report - 2010 thru 2013 (Est)*, WSSP-1 Calandri "Stoner 1" Parcel (320 Acres), dated November 18, 2013, received from Tom Burns via electronic communication. AVEK water deliveries for 2013 were 2,268 acre-feet (November and December were estimated), applied to 320 acres of alfalfa. 2,268 acre-feet divided by 320 acres equals a water duty of 7.1 acre-feet per acre.
- (10) Reported water production and acreage for 13 alfalfa farms and 8 gram farms in 2013. Water production divided by acreage equals applied water.