



Memorandum

To: File 908.23

From: Krystle Ervin, E.I. and Craig Lis, P.E.

Date: November 25, 2019

Subject: CS-U/Super Ditch Pilot Project Revised HCU Analysis

The historical consumptive use analysis provided in the August 16, 2019 application was revised based on comments provided by interested parties and discussions at the November 6, 2019 conference meeting. The revisions are as follows:

1. The maximum acreage was limited to no more than the 1985 acreage mapped by Colorado and agreed to by Kansas as a part of the Kansas V. Colorado litigation.
2. The LFT run was corrected to use the HB-1238 defaults.
3. The Catlin Canal ditch loss was revised to the value of 16.5% used in Case No. 12CW94 per Section II.G.2.ii.2 of the Criteria And Guidelines For Fallowing-Leasing Pilot Projects (Criteria and Guidelines) which directs applicants to use cited information from a previous change case or information from the relevant ditch company to estimate ditch losses and off-farm losses.
4. The period from 1973 to 2002 was used for the Diamond A and Mameda farms and the period from 1978 to 2007 was use for the Groves Farm to exclude use of portions of the farm in Rule 14 plans from the HCU study period.
5. Irrigated acreages for the Diamond A, Mameda, and Groves farms were obtained from a 1975 aerial photograph to provide data for the revised study periods per Section II.G.1. of the Criteria And Guidelines. (See attached Figures 1, 2 and 3, respectively.)
6. The Mayhoffer 2015 Irrigated Area (Revised Figure 21) was reduced by deducting the area for the house and surrounding grounds.
7. The consumptive use factors are based on the portions of the study period from 1979 and later to exclude the pre-Winter Water Storage Program period.
8. Volumetric limits are based on the completed 30-year study periods.

Only revised tables and figures are attached. All other tables and figures are unchanged from the August 16, 2019 application. This memorandum and the revised LFT spreadsheet

may be accessed by entering the following link in your file browser (e.g., Windows File Explorer) or internet browser.

<ftp://server.martinandwood.com>

The user name and password are as follows.

User name: CSSDpilot2020
Password: catlin

Attachments: Updated Table 2 - Historically Irrigated Lands
Updated Table 3 - Historically Irrigated Acreages Identified on Aerial Photographs
Updated Table 5 - Historical Consumptive Use, Fallow Acres and Fallow Shares
Table 9 - Colorado Springs' Supplies for Return Flow Replacement
Table 11 - Summary of Projection Results
Consumptive Use Factors
Monthly and Annual Maximum Consumptive Use Credits
Figure 1 - Diamond A 1975 Irrigated Area
Figure 2 - Mamede 1975 Irrigated Area
Figure 3 - Groves 1975 Irrigated Area
Revised Figure 21 - Mayhoffer 2015 Irrigated Area.

**Updated Table 2
Historically Irrigated Lands**

Participating Farmer	Legal Description of Historically Irrigated Lands	Irrigated Acreage (2015)	Historical Irrigated Acreage ¹	Pilot Project Historical Irrigated Acres ¹	Number of Participant Shares	CPW Shares	Total Number of Shares	Shares per Acre ¹	Participant Associated Share Certificates
Diamond A	Portions of Sections 20, 28, 29, 30, 31, 32, and 33, T22S, R57W of the 6th P.M., Otero County, Colorado	1100.9	1097.71	874.15	1,087.010	278.000	1,365.010	1.244	16, 18, 21, 22, 3604, 3712
Schweizer	Portions of the E1/2 and NW1/4 of Section 5, T23S, R57W of the 6th P.M., Otero County, Colorado	196.9	174.71	174.71	195.476	0.000	195.476	1.119	91, 3493, 3498, 3703
Mameda	Portions of Section 11, T23S, R57W of the 6th P.M., Otero County, Colorado	157.6	157.08	157.08	99.000	0.000	99.000	0.630	42, 43
Groves	Portions of the SE1/4 of Section 5, portions of the NW1/4 of Section 3, and portions of Section 4, T24S, R56W of the 6th P.M., Otero County, Colorado	262.4	217.41	194.95	156.240	18.000*	174.240	0.801	2, 3, 4, 5
Mayhoffer	Portions of the NW1/4 of Section 18, T24S, R55W of the 6th P.M., Otero County, Colorado	35.2	31.61	31.61	35.000	0.000	35.000	1.107	3663
Total	-	1753.0	1678.52	1,432.5	1,572.726	296.000	1868.726	1.098	-

¹Average for relevant study period. The CPW shares were included in the historical consumptive use analysis per discussion at the November 6, 2019 CS-U/SuperDitch Pilot Project Conference. The CPW shares are factored out of the results by proportionately reducing the Pilot Project Historical Irrigated Acres to that irrigated only by the participant shares.

*Groves leased 30 CPW shares for 18 years of the 30-year study period. The average of 18 shares per year is used for the purposes of this table.

Updated Table 3
Historically Irrigated Acreages Identified on Aerial Photographs

Aerial Photograph	Image Source	Estimate of Irrigated Area (acres)
Diamond A aerial, 6/15/1975, black and white	earthexplorer.usgs.gov	1,157.40
Diamond A aerial, 9/4/1988, infrared	earthexplorer.usgs.gov	1,088.65
Diamond A aerial, 8/16/1993, black and white	earthexplorer.usgs.gov	1,055.64
Diamond A aerial, 8/1/2009, color	earthexplorer.usgs.gov	1,092.41
Diamond A aerial, 09/2015, color	earthexplorer.usgs.gov	1,100.94
Schweizer aerial, 9/4/1988, infrared	earthexplorer.usgs.gov	201.68
Schweizer aerial, 8/16/1993, black and white	earthexplorer.usgs.gov	205.92
Schweizer aerial, 8/1/2009, color	earthexplorer.usgs.gov	204.73
Schweizer aerial, 09/13/2015, color	earthexplorer.usgs.gov	212.20
Mameda aerial, 6/15/1975, black and white	earthexplorer.usgs.gov	169.41
Mameda aerial, 9/4/1988, infrared	earthexplorer.usgs.gov	149.43
Mameda aerial, 7/25/1993, black and white	earthexplorer.usgs.gov	155.40
Mameda aerial, 8/1/2009, color	earthexplorer.usgs.gov	147.58
Mameda aerial, 09/13/2015, color	earthexplorer.usgs.gov	157.57
Groves aerial, 6/28/1975, black and white	earthexplorer.usgs.gov	285.03
Groves aerial, 9/5/1988, infrared	earthexplorer.usgs.gov	258.37
Groves aerial, 7/25/1993, black and white	earthexplorer.usgs.gov	250.91
Groves aerial, 8/1/2009, color	earthexplorer.usgs.gov	186.77
Groves aerial, 8/25/2015, color	earthexplorer.usgs.gov	262.36
Mayhoffer aerial, 9/5/1988, infrared	earthexplorer.usgs.gov	30.93
Mayhoffer aerial, 7/25/1993, black and white	earthexplorer.usgs.gov	30.60
Mayhoffer aerial, 8/1/2009, color	earthexplorer.usgs.gov	32.44
Mayhoffer aerial, 8/25/2015, color	earthexplorer.usgs.gov	35.19

Updated Table 5
Historical Consumptive Use, Fallow Acres and Fallow Shares

Farm Name	HCU Minimum (2002)	HCU Average	HCU Maximum Year (1996)	HCU Average	Current Irrigation (2015)	Pilot Project Current Irrigation	Adjusted HCU Average	Fallow Fields	CU Fallow Minimum (2002)	CU Fallow Average	CU Fallow Maximum (1996)
	acre-feet	acre-feet	acre-feet	acre-feet /acre	acres	acres	acre-feet /acre	acres	acre-feet	acre- feet	acre-feet
Diamond A	223.3	771.3	909.3	0.70	1100.9	876.7	2.13	362.9	145.9	614.7	724.7
Schweizer	11.9	46.4	52.8	0.24	196.9	196.9	1.54	30.2	10.7	49.9	63.1
Mameda	31.8	122.6	129.5	0.78	157.6	157.6	1.28	95.5	32.5	130.1	176.8
Groves	28.3	121.6	128.2	0.46	262.4	235.3	1.35	90.3	28.0	117.0	155.7
Mayhoffer	13.8	54.5	61.6	1.55	35.2	35.2	1.55	35.2	12.6	58.6	74.1
Total	309.0	1116.4	1281.4	-	1753.0	1501.6	-	614.2	229.8	970.4	1194.5

*Groves leased 30 CPW shares for 18 years of the 30-year study period. The average of 18 shares per year is used for the purposes of this table.

Table 9
Colorado Springs' Supplies for Return Flow Replacement

Company/Source	Shares	Firm Yield (AF)
Colorado Canal Company	28,012.76	4,672
Lake Meredith Reservoir Company	21,084.75	(included with Colorado Canal)
Lake Henry Reservoir Company	6,923.15	(included with Colorado Canal)
Sugarloaf Water Rights	-	73
Denver Basin Reusable Water	-	0
Fountain Mutual Irrigation Company	144	64
Chilcott Ditch Company	9	0
Temporary Use Agreement Waters	-	0
Reusable Return Flows	-	19,379

Table 11
Summary of Projection Results
(All values in acre-feet)

HCU	Tailwater	Deep Percolation	Lagged Deep Percolation	
			(3/15-11/14)	(11/15 + 54 Months)
970.4	330.5	1322.1	521.7	800.4

Consumptive Use Factors

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Diamond A	-	-	0.042	0.126	0.282	0.493	0.495	0.497	0.352	0.151	0.044	-
Schweizer	-	-	0.051	0.151	0.367	0.525	0.529	0.534	0.454	0.263	0.197	-
Mameda	-	-	0.521	0.419	0.498	0.550	0.550	0.550	0.550	0.550	0.550	-
Groves	-	-	0.228	0.286	0.427	0.537	0.550	0.550	0.523	0.401	0.345	-
Mayhoffer	-	-	0.058	0.152	0.370	0.526	0.531	0.535	0.450	0.271	0.212	-

**Monthly and Annual Maximum Consumptive Use Credits
(All Values in Acre-Feet)**

Farm	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Diamond A	0.0	0.0	141.6	178.8	264.3	455.0	456.6	474.3	272.9	212.5	149.5	0.0	1879.7
Schweizer	0.0	0.0	13.7	34.8	61.5	86.6	84.3	84.2	56.0	55.7	28.7	1.0	369.7
Mameda	0.0	0.0	25.6	35.8	37.5	44.3	46.3	45.5	32.6	27.5	13.6	2.0	261.1
Groves	0.0	0.0	30.9	50.5	55.4	73.8	76.7	72.2	53.4	38.2	20.8	3.0	347.2
Mayhoffer	0.0	0.0	2.7	6.2	11.2	15.5	15.0	15.0	10.0	10.0	5.3	4.0	67.1



Legend

1975 Irrigated Area (acres)



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Figure 1 Colorado Springs/Super Ditch Pilot Project Diamond A Farm 1975 Irrigated Area

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Drawn: MRH



Legend

 1975 Irrigated Area (acres)



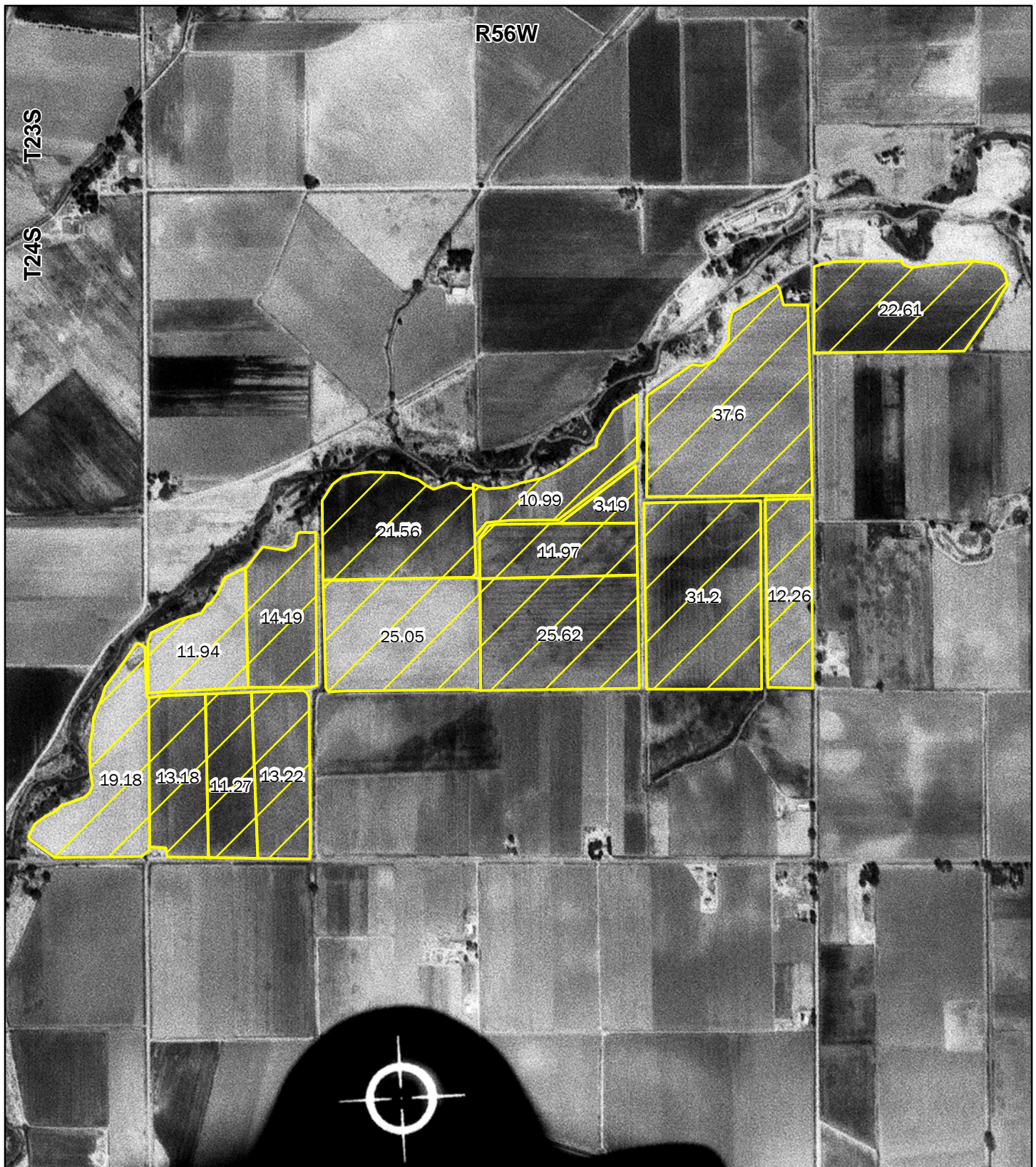
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Miles
Coordinate System: NAD 1983 UTM Zone 13N
Projection: Transverse Mercator
Datum: North American 1983
Scale: 1:8,500



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Figure 1 **Colorado Springs/Super Ditch Pilot Project** **Mameda Farm** **1975 Irrigated Area**

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Legend

 1975 Irrigated Area (acres)



0 0.075 0.15 0.3
Miles
Coordinate System: NAD 1983 UTM Zone 13N
Projection: Transverse Mercator
Datum: North American 1983
Scale: 1:13,000



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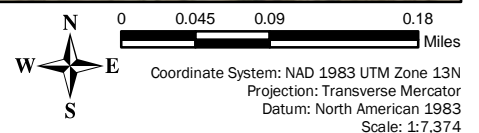
Figure 3 Colorado Springs/Super Ditch Pilot Project Groves Farm 1975 Irrigated Area

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2015 Irrigated Area (acres)



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Revised Figure 21 Colorado Springs/Super Ditch Pilot Project Mayhoffer Farm 2015 Irrigated Area

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