

WATER PERMIT NO. 2884-2

Name of Applicant: **Rapid Valley Sanitary District – Water Service**

Address: **4611 Teak Drive, Rapid City SD 57703** Phone: **605-393-1050**

Amount of Water Claimed: **109.7 AF** Total Acres: **N/A**

Source of Water Supply: **Surface**

Water to be used for: **Municipal** County: **Pennington**

Type of Waste Disposal System:

Location: **Approx. 4 miles southeast of Rapid City**

PRIORITY Date Received: **12-26-24** Application/License Fee: **\$300.00**

Corrected Application Received: **N/A** Period of Annual Use: **April 1 – October 31**

Remarks: **Transfer of Jon Buxton South Side Ditch WR to Rapid Valley Sanitary District**

Diversion Point: **NE 1/4 NW 1/4 Sec 15-T1N-R8E**

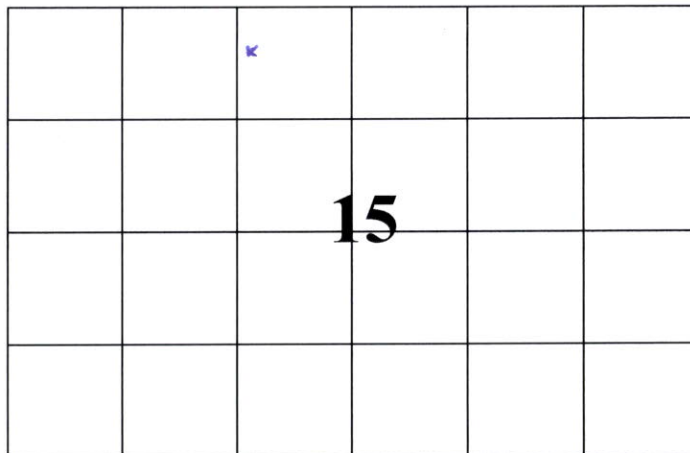
Land to be Irrigated: **N/A**

Depth of Well: **N/A**

Well Driller: **N/A**

Remarks:

Type of Map: **aerial**



Reviewed and the Number Assigned on: **01-13-25**

By: **Rachel Rodriguez**

Notice of Hearing - date to intervene: _____

SOUTH DAKOTA
WATER PERMIT NO. 2884-2

Date of first receipt of application December 26, 2024.

Date of receipt of completed application January 9, 2025.

The Acting Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 2884-2 to Rapid Valley Sanitary District – Water Service, 4611 Teak Drive, Rapid City SD 57703, authorizing the construction of the water use system and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 2884-2 transfers a portion of Rapid Creek's natural flows appropriated under Vested Water Right No. 2040-2 from irrigation use via South Side Ditch to use by the Rapid Valley Sanitary District (RVSD) in its water distribution system. The transfer is for Rapid Creek water historically used for irrigation of 68 acres located in the S 1/2 NW 1/4, NE 1/4 SW 1/4 Section 23-T1N-R8E (Buxton property). The portion of Rapid Creek natural flows transferred to RVSD under this Permit is 0.765 cubic feet of water per second (cfs) with an annual volume limitation of 109.68 acre-feet of water. The existing diversion point on Rapid Creek for South Side Ditch is a shared headgate located in the SE 1/4 NW 1/4 Section 15-T1N-R8E. This permit also changes the diversion point for 0.765 cfs (109.68 acre-feet) to a point used by RVSD located approximately three-tenths of a mile upstream, in the NE 1/4 NW 1/4 (Lot 3R) Section 15-T1N-R8E. This permit does not authorize any new water to be appropriated from Rapid Creek. This permit will retain the May 3, 1880, priority date established by the South Side Ditch vested water right for natural flow from Rapid Creek. This site is located on the southeastern outskirts of Rapid City SD.
2. The water appropriated shall be used for the purpose of municipal use and may not exceed the amount of water needed for beneficial use.
3. The water is to be used during the following described annual period: April 1 – October 31.
4. The date of approval of Permit No. 2884-2 is March 14, 2025.
5. The date from which applicant may claim right is May 3, 1880.
6. One-fifth of the construction is to be completed on or before September 14, 2027.
7. All construction is to be completed on or before March 14, 2030.
8. Water is to be put to beneficial use on or before March 10, 2034.
9. Water rights obtained in compliance with the laws of the State of South Dakota may not be unlawfully impaired by this appropriation.

QUALIFICATIONS

1. Permit No. 2884-2 is limited to a diversion rate of 0.765 cubic feet of water per second for a total annual volume of 109.68 acre feet of water. The Rapid Valley Sanitary District shall measure diversions at the District's water treatment plant. The total monthly diversion shall not exceed the amount listed on the following table.

(continued)

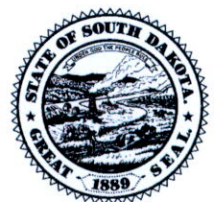
Month	Acre feet
April	6.3
May	11.44
June	17.4
July	20.85
Aug	26.45
Sept	17.4
Oct	9.84
Totals	109.68

2. The Rapid Valley Sanitary District shall report to the Chief Engineer annually the amount of water withdrawn each month as measured at the District's water treatment plant.
3. Permit No. 2884-2 authorizes diversion of only natural flow water by the Rapid Valley Sanitary District and does not include any right to stored irrigation water available under contract from Pactola Reservoir and Deerfield Reservoir.
4. The Water Management Board retains jurisdiction of Permit No. 2884-2 in the event that changes occur in the system that require adjustments to be made in the monthly or total annual volumes authorized by Permit No. 2884-2.
5. Diversion under Permit No. 2884-2 may not interfere with existing water rights in effect prior to approval of No. 2884-2 or any domestic rights.
6. The amount of water with a May 3, 1880, priority date which may be appropriated under Vested Water Right No. 2040-2, is reduced by 0.765 cfs.
7. The permit holder, Rapid Valley Sanitary District, shall permanently render inoperable the structural means of diverting water to the land which is no longer subject to Vested Water Right No. 2040-2. This work shall be completed prior to the permit holder's diversion of the transferred water to beneficial use by the district. The permit holder must notify the Chief Engineer to schedule an inspection. This transfer is subject to the Chief Engineer's approval that the works are rendered inoperable. This qualification does not grant access to property owned by third parties for making structural changes. The permit holder is responsible for ensuring that access is obtained from such third parties for making structural changes. The permit holder is also responsible for ensuring that such third parties are notified that inspections will occur.

WATER MANAGEMENT BOARD

By: Mark Mayer
 Mark Mayer, PE
 Director of Office of Water
 Department of Agriculture and Natural Resources

4/3/25
 date



FORM 2: Application for uses other than irrigation
(type or print)

Mail to: DENR - Water Rights 523 E Capitol Ave Pierre, SD 57501-3182 ph. (605) 773-3352	No. <u>2884-2</u> (office use only) Hydrologic Unit <u>10120110</u>
	Basin <u>Cheyenne</u>
	Newspaper <u>Rapid City Journal</u>

PAID
DEC 26 2024
Ck# 038602
Rec't# _____

Application For Permit To Appropriate Water Within The State Of South Dakota

Check use(s) of water:

- | | | | |
|---|--|--|--|
| ☒ Municipal | ☐ Water Distribution System | ☐ Recreational | ☐ Institutional |
| ☐ Rural Water System | ☐ Commercial | ☐ Fish & Wildlife | ☐ Geothermal |
| ☐ Domestic (over 18 gpm) | ☐ Industrial | ☐ Other _____ | |

Type of Application: (check one)

- | | | |
|--|---|---|
| ☐ New | ☒ Vested Right (Use predates Mar 2, 1955) | ☐ Future Use Reservation |
| ☐ Place to Beneficial Use Water Reserved by Future Use Permit No. _____ | | |
| ☐ Amendment/Correction to Permit No. _____ | | |

Description of amendment/correction: (i.e. change diversion point(s), add diversion point(s), change use, etc.)

Transfer of Jon Buxton South Side Irrigation Ditch Water Rights to Rapid Valley Sanitary District-Water Service and to change the diversion point to the RVSD Water Treatment Plant Intake on Rapid Creek at south Redwing Ln.

1. Name to Appear on Water Permit Rapid Valley Sanitary District-Water Service
- Mailing Address 4611 Teak Drive, Rapid City, SD 57703
- (Address) (City) (State) (Zip Code)
- Phone 605-393-1050 Mobile 605-381-2904 Email rvsd@rapidnet.com and rschmidt@rvsd.com

2. Amount of water claimed 0.765 *CFS or 109.7 **GPM and 109.7 ***AF or _____ Gallons
- Flow rate and volume are both required. (*Cubic Feet per Second) (**Gallons per Minute) (***)Acre Feet - storage capacity of dam/dugout or annual use)

3. Source of water supply Rapid Creek (NE 1/4 NW 1/4)

4. Location of point of diversion Lot 3R, Section 15, T1N, R8E, BHM (44°03'02" N, 103°08'46" W) County Pennington
- (example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W)

If not a public water supply (e.g. municipal), will water be used outside of the area described above? ☐ Yes ☐ No

If "Yes," where will water be used? _____

(example - NW1/4 section 12-T104N-R53W)

5. County or counties where water will be used Pennington
6. Annual period during which water is to be used April to October 31

7. Give a description of the project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)

Refer to the attached Engineering Report in Support of the Transfer of Little Giant Ditch and South Side Ditch Water Rights, Rapid City, South Dakota. Prepared for Rapid Valley Sanitary District-Water Service (RVSD) on behalf of White Sands Water Engineers, Inc. and Foth Infrastructure and Environment LLC. The diversions are to transfer Buxton water rights on the South Side Ditch to the existing water treatment plant intake on Rapid Creek on the south end of Red Wing Lane. The water will be utilized for municipal purposes and wastewater for the water system is collected by RVSD and conveyed to City of Rapid City Water Reclamation Facility

I, Rusty Schmidt Manager, the applicant, certify under
Name of Person Title (if applicable)
penalty of perjury that I have read this application, examined the attached map, and that the matters stated are true. I further certify, if acting on behalf of an entity or individual other than myself, that I am authorized to submit this application.

2015-10

Attachments: Attach Form 2A if diversion is from a well or dugout, or if storage of water is proposed. Also, attach map and any other technical information. (see instructions)

Supplemental Information

(type or print)

RECEIVED

DEC 26 2024

OFFICE OF
WATER

1. Well Information

(check one or both as applicable) ☐ Drilling new well(s) ☐ Using existing well(s)

a) If new wells, how many ____ Have test holes been drilled ☐ Yes ☐ No Drilled by ____
(if yes, please provide copies of logs)

b) If existing wells, how many ____ Provide copy of log(s), if available. Drilled by ____

For either Existing or Proposed Wells:

c) Well Depth (required) ____ Depth to Top of Water Bearing Material ____ Depth to Water from Surface ____

d) Distance to nearest domestic well on applicant's property ____ Property owned by others ____

2. Wastewater Disposal System Information

a) Type of System (i.e. septic tank, drain field) ____

b) System Capacity (gallons) ____ Year Constructed ____

c) Connected to the City of ____ Sanitary System

3. Dugout Information

a) Surface Dimensions ____ Depth ____

b) Depth to water (ground surface to water level) ____

4. Water Storage Dams

If the proposed water use system contains one or more storage dams, please furnish the information requested below for each dam. The locations of the dams need to be shown on the map submitted with the application.

a) If a private engineering firm or government agency was involved in the design of this dam, please give their name and address:

b) Freeboard ____

c) Crest Width ____

Crest Length ____

d) Height ____

e) Primary Outlet Capacity ____

If pipe, diameter ____

f) Secondary Spillway Capacity ____

Spillway Width ____

g) X & Y Slope (e.g. 3 to 1 is a typical slope)

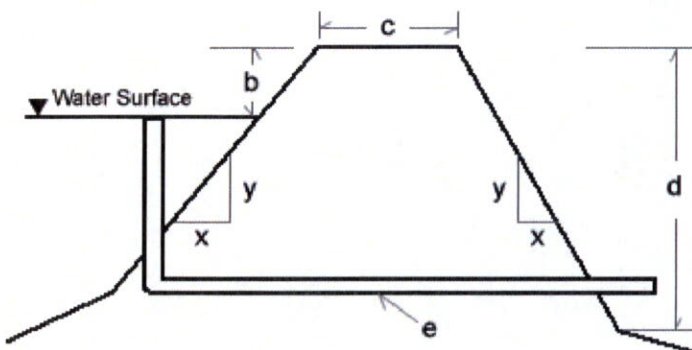
Upstream ____

Downstream ____

h) Surface Area of Impoundment ____

i) Storage ____ Acre Feet

j) Drainage Area Above Dam ____ Acres



Affidavit of Water Use

Form 2B

(Type or Print in Ink)

Note: This Form is supplemental to Form 2 and is to be used when an affidavit is needed to document historical water use, primarily with vested right claims.

Affidavit Of Construction Of Water Use System And Application Of Water To Beneficial Use

RECEIVED

DEC 26 2024

OFFICE OF
WATER

Name of Applicant (Same as Form 2) _____

Mailing Address _____
(Address) (City) (State) (Zip Code)

A. Notice of Appropriation _____ Date of Posting _____

Date of Recording _____ Recording Date _____

B. Date of start of construction of water supply system _____

C. Date that water was first applied to beneficial use _____

D. Name of owner of original water supply system _____

E. Amount of water originally applied to beneficial use _____

F. Present use of water - amount of water now being used _____

Date that this water was first used _____

G. Chronological History of Water Use

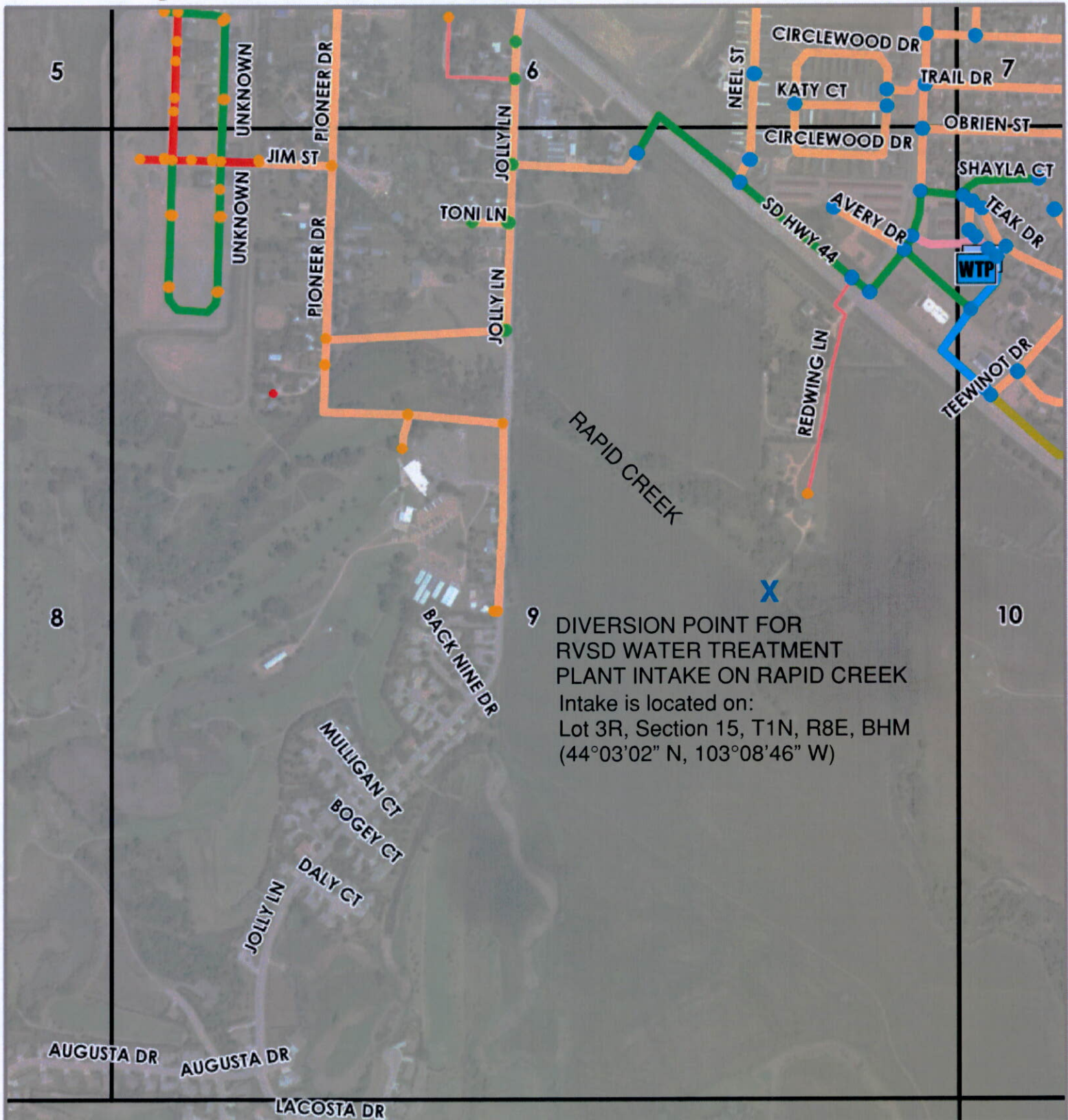
I, _____ the applicant, certify that I have read the foregoing and that the matters therein are true.

I, the undersigned do hereby certify that I know about the water use system described above, that I have read the foregoing, and that the matters therein are true.

_____, 20____

_____, 20____

PROPOSED DIVERSION POINT FOR MUNICIPAL WATER USE BY RVSD



RECEIVED

DEC 26 2024

OFFICE OF
WATER



Transfer of Little Giant Ditch and South Side Ditch Water Rights from Buxton to Rapid Valley Sanitary District – Water Service

Prepared For Rusty Schmidt, Manager
Rapid Valley Sanitary District-Water Service
4611 Teak Drive
Rapid City, SD 57703

Prepared by Ted Schultz, PE.
Foth Infrastructure & Environment LLC
510 ½ Ninth Street, Suite 200
Rapid City, SD 57701

December 9th, 2024



Foth Infrastructure & Environment, LLC

510 ½ Ninth Street, Suite 200 Rapid City, SD 57701
Ph: 605.381.0433 Web: www.foth.com

FORM 2: Application for uses other than irrigation
(type or print)

Mail to: DENR - Water Rights 523 E Capitol Ave Pierre, SD 57501-3182 ph. (605) 773-3352	(office use only) No. _____ Hydrologic Unit _____
	Basin _____
	Newspaper _____

Application For Permit To Appropriate Water Within The State Of South Dakota

Check use(s) of water:

☒ Municipal	☐ Water Distribution System	☐ Recreational	☐ Institutional
☐ Rural Water System	☐ Commercial	☐ Fish & Wildlife	☐ Geothermal
☐ Domestic (over 18 gpm)	☐ Industrial	☐ Other _____	

Type of Application: (check one)

☐ New	☒ Vested Right (Use predates Mar 2, 1955)	☐ Future Use Reservation
☐ Place to Beneficial Use Water Reserved by Future Use Permit No. _____		
☐ Amendment/Correction to Permit No. _____		

Description of amendment/correction: (i.e. change diversion point(s), add diversion point(s), change use, etc.)

Transfer of Jon Buxton South Side Irrigation Ditch Water Rights to Rapid Valley Sanitary District-Water Service and to change the diversion point to the RVSD Water Treatment Plant Intake on Rapid Creek at south Redwing Ln.

- Name to Appear on Water Permit Rapid Valley Sanitary District-Water Service
Mailing Address 4611 Teak Drive, Rapid City, SD 57703
(Address) (City) (State) (Zip Code)
Phone 605-393-1050 Mobile 605-381-2904 Email rvsd@rapidnet.com and rschmidt@rvsd.com
- Amount of water claimed 0.765 *CFS or **GPM and ***AF or Gallons
Flow rate and volume are both required. (*Cubic Feet per Second) (**Gallons per Minute) (***)Acre Feet - storage capacity of dam/dugout or annual use)
- Source of water supply Rapid Creek
- Location of point of diversion Lot 3R, Section 15, T1N, R8E, BHM (44°03'02" N, 103°08'46" W) County Pennington
(example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W)
If not a public water supply (e.g. municipal), will water be used outside of the area described above? ☐ Yes ☐ No
If "Yes," where will water be used? _____
(example - NW1/4 section 12-T104N-R53W)
- County or counties where water will be used Pennington
- Annual period during which water is to be used April to October
- Give a description of the project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)

Refer to the attached Engineering Report in Support of the Transfer of Little Giant Ditch and South Side Ditch Water Rights, Rapid City, South Dakota. Prepared for Rapid Valley Sanitary District-Water Service (RVSD) on behalf of White Sands Water Engineers, Inc. and Foth Infrastructure and Environment LLC. The diversions are to transfer Buxton water rights on the South Side Ditch to the existing water treatment plant intake on Rapid Creek on the south end of Red Wing Lane. The water will be utilized for municipal purposes and wastewater for the water system is collected by RVSD and conveyed to City of Rapid City Water Reclamation Facility

I, Rusty Schmidt Manager, the applicant, certify under
Name of Person Title (if applicable)
penalty of perjury that I have read this application, examined the attached map, and that the matters stated are true. I further certify, if acting on behalf of an entity or individual other than myself, that I am authorized to submit this application.

Affidavit of Water Use

Form 2B
(Type or Print in Ink)

Note: This Form is supplemental to Form 2 and is to be used when an affidavit is needed to document historical water use, primarily with vested right claims.

Affidavit Of Construction Of Water Use System And Application Of Water To Beneficial Use

Name of Applicant (Same as Form 2) _____

Mailing Address _____
(Address) (City) (State) (Zip Code)

A. Notice of Appropriation _____ Date of Posting _____

Date of Recording _____ Recording Date _____

B. Date of start of construction of water supply system _____

C. Date that water was first applied to beneficial use _____

D. Name of owner of original water supply system _____

E. Amount of water originally applied to beneficial use _____

F. Present use of water - amount of water now being used _____

Date that this water was first used _____

G. Chronological History of Water Use _____

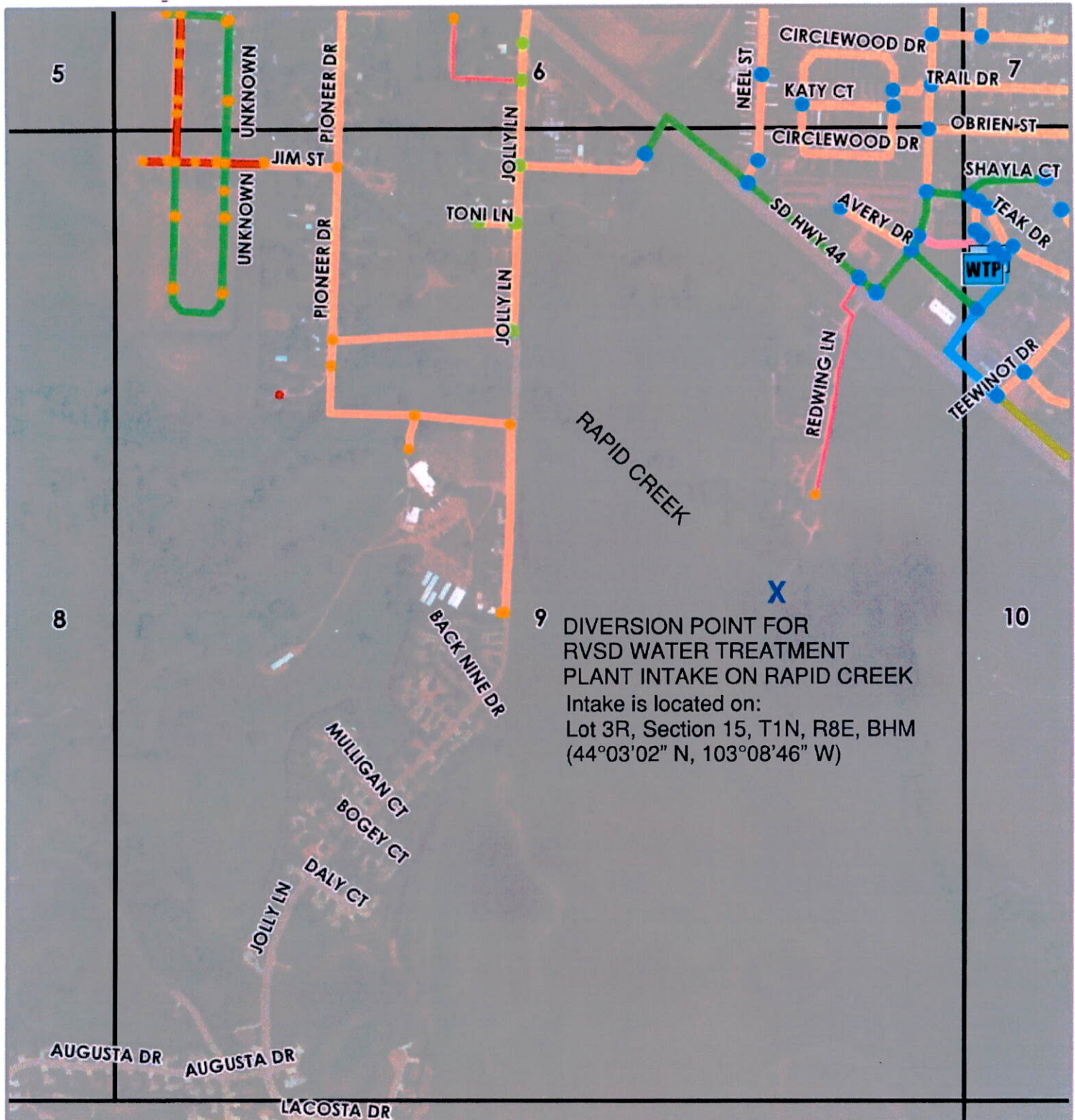
I, _____ the applicant, certify that I have read the foregoing and that the matters therein are true.

I, the undersigned do hereby certify that I know about the water use system described above, that I have read the foregoing, and that the matters therein are true.

_____, 20____

_____, 20____

PROPOSED DIVERSION POINT FOR MUNICIPAL WATER USE BY RVSD



Supplemental Information

(type or print)

1. Well Information (check one or both as applicable) ☐ Drilling new well(s) ☐ Using existing well(s)

- a) If new wells, how many ____ Have test holes been drilled ☐ Yes ☐ No Drilled by ____
(if yes, please provide copies of logs)
- b) If existing wells, how many ____ Provide copy of log(s), if available. Drilled by ____

For either Existing or Proposed Wells:

- c) Well Depth (required) ____ Depth to Top of Water Bearing Material ____ Depth to Water from Surface ____
- d) Distance to nearest domestic well on applicant's property ____ Property owned by others ____

2. Wastewater Disposal System Information

- a) Type of System (i.e. septic tank, drain field) ____
- b) System Capacity (gallons) ____ Year Constructed ____
- c) Connected to the City of ____ Sanitary System

3. Dugout Information

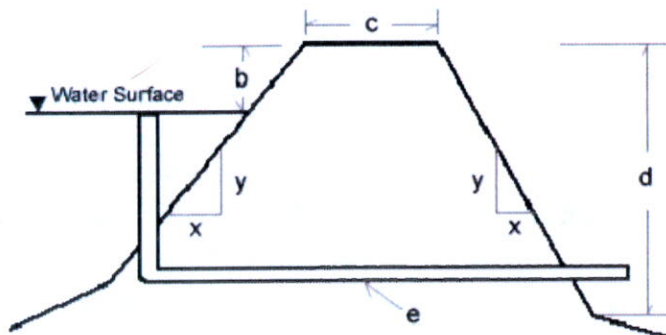
- a) Surface Dimensions ____ Depth ____
- b) Depth to water (ground surface to water level) ____

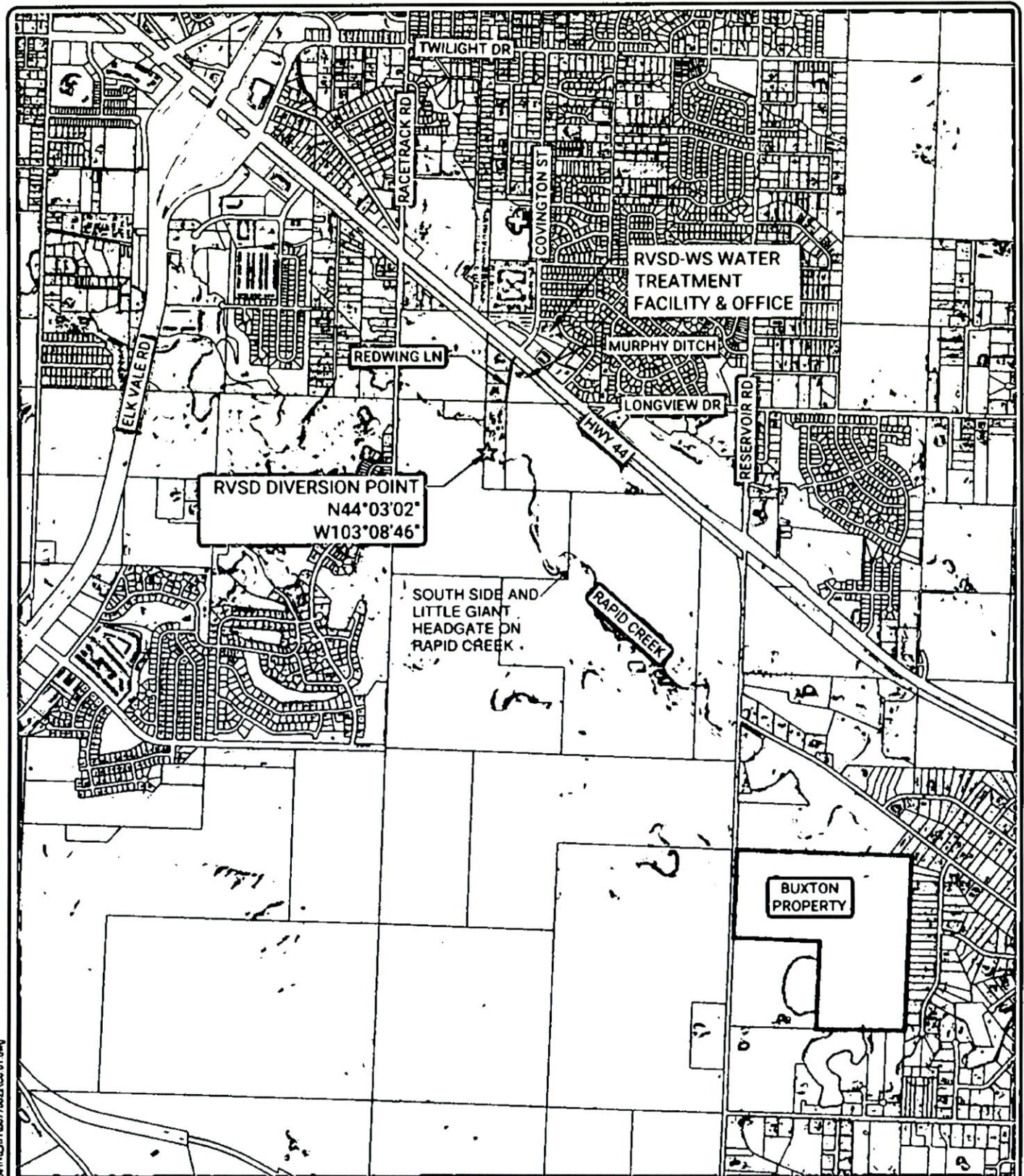
4. Water Storage Dams

If the proposed water use system contains one or more storage dams, please furnish the information requested below for each dam. The locations of the dams need to be shown on the map submitted with the application.

- a) If a private engineering firm or government agency was involved in the design of this dam, please give their name and address:

- b) Freeboard ____
- c) Crest Width ____
Crest Length ____
- d) Height ____
- e) Primary Outlet Capacity ____
If pipe, diameter ____
- f) Secondary Spillway Capacity ____
Spillway Width ____
- g) X & Y Slope (e.g. 3 to 1 is a typical slope)
Upstream ____
Downstream ____
- h) Surface Area of Impoundment ____
- i) Storage ____ Acre Feet
- j) Drainage Area Above Dam ____ Acres

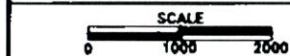




11/19/2024 7:53 AM RL/1 C:\p\work\24\007\0027\00 01.dwg



VICINITY MAP RVSD WATER RIGHTS



PROJECT ID: 0024R007.00

DATE:
PREPARED BY: RF
CHECKED BY: TS



FIGURE NO.
EX1

FORM 2: Application for uses other than irrigation
(type or print)

Mail to: DENR - Water Rights 523 E Capitol Ave Pierre, SD 57501-3182 ph. (605) 773-3352	(office use only) No. _____ Hydrologic Unit _____
	Basin _____
	Newspaper _____

Application For Permit To Appropriate Water Within The State Of South Dakota

Check use(s) of water:

☒ Municipal	☐ Water Distribution System	☐ Recreational	☐ Institutional
☐ Rural Water System	☐ Commercial	☐ Fish & Wildlife	☐ Geothermal
☐ Domestic (over 18 gpm)	☐ Industrial	☐ Other _____	

Type of Application:
(check one)

☐ New	☒ Vested Right (Use predates Mar 2, 1955)	☐ Future Use Reservation
☐ Place to Beneficial Use Water Reserved by Future Use Permit No. _____		
☐ Amendment/Correction to Permit No. _____		

Description of amendment/correction: (i.e. change diversion point(s), add diversion point(s), change use, etc.)

Transfer of Jon Buxton Little Giant Ditch Water Rights to Rapid Valley Sanitary District-Water Service and to change the diversion point to the RVSD Water Treatment Plant Intake on Rapid Creek at south Redwing Ln.

- Name to Appear on Water Permit Rapid Valley Sanitary District-Water Service
Mailing Address 4611 Teak Drive, Rapid City, SD 57703
(Address) (City) (State) (Zip Code)
Phone 605-393-1050 Mobile 605-381-2904 Email rvsd@rapidnet.com and rschmidt@rvsd.com
- Amount of water claimed 0.396 *CFS or **GPM and ***AF or Gallons
Flow rate and volume are both required. (*Cubic Feet per Second) (**Gallons per Minute) (***Acre Feet - storage capacity of dam/dugout or annual use)
- Source of water supply Rapid Creek
- Location of point of diversion Lot 3R, Section 15, T1N, R8E, BHM (44°03'02" N, 103°08'46" W) County Pennington
(example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W)
If not a public water supply (e.g. municipal), will water be used outside of the area described above? ☐ Yes ☐ No
If "Yes," where will water be used? _____
(example - NW1/4 section 12-T104N-R53W)
- County or counties where water will be used Pennington
- Annual period during which water is to be used April to October
- Give a description of the project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)

Refer to the attached Engineering Report in Support of the Transfer of Little Giant Ditch and South Side Ditch Water Rights, Rapid City, South Dakota. Prepared for Rapid Valley Sanitary District-Water Service (RVSD) on behalf of White Sands Water Engineers, Inc. and Foth Infrastructure and Environment LLC. The diversions are to transfer Buxton water rights on the Little Giant Ditch to the existing water treatment plant intake on Rapid Creek on the south end of Red Wing Lane. The water will be utilized for municipal purposes and wastewater for the water system is collected by RVSD and conveyed to City of Rapid City Water Reclamation Facility

I, Rusty Schmidt Manager, the applicant, certify under
Name of Person Title (if applicable)
penalty of perjury that I have read this application, examined the attached map, and that the matters stated are true. I further certify, if acting on behalf of an entity or individual other than myself, that I am authorized to submit this application.

Affidavit of Water Use

Form 2B

(Type or Print in Ink)

Note: This Form is supplemental to Form 2 and is to be used when an affidavit is needed to document historical water use, primarily with vested right claims.

Affidavit Of Construction Of Water Use System And Application Of Water To Beneficial Use

Name of Applicant (Same as Form 2) _____

Mailing Address _____
(Address) (City) (State) (Zip Code)

A. Notice of Appropriation _____ Date of Posting _____

Date of Recording _____ Recording Date _____

B. Date of start of construction of water supply system _____

C. Date that water was first applied to beneficial use _____

D. Name of owner of original water supply system _____

E. Amount of water originally applied to beneficial use _____

F. Present use of water - amount of water now being used _____

Date that this water was first used _____

G. Chronological History of Water Use

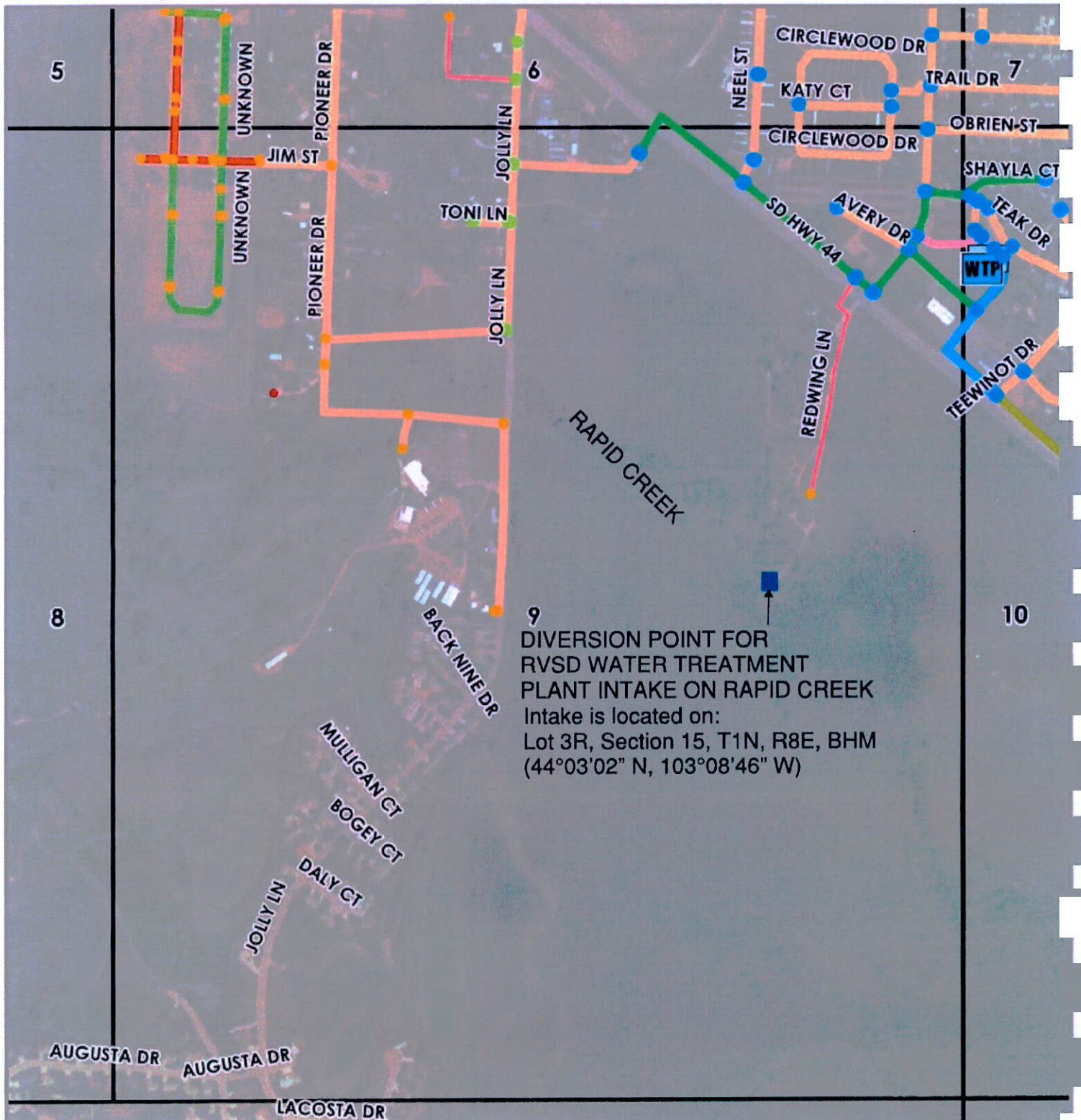
I, _____ the applicant, certify that I have read the foregoing and that the matters therein are true.

I, the undersigned do hereby certify that I know about the water use system described above, that I have read the foregoing, and that the matters therein are true.

_____, 20____

_____, 20____

PROPOSED DIVERSION POINT FOR MUNICIPAL WATER USE BY RVSD



Supplemental Information

(type or print)

1. Well Information (check one or both as applicable) ☐ Drilling new well(s) ☐ Using existing well(s)

- a) If new wells, how many ____ Have test holes been drilled ☐ Yes ☐ No Drilled by ____
(if yes, please provide copies of logs)
- b) If existing wells, how many ____ Provide copy of log(s), if available. Drilled by ____

For either Existing or Proposed Wells:

- c) Well Depth (required) ____ Depth to Top of Water Bearing Material ____ Depth to Water from Surface ____
- d) Distance to nearest domestic well on applicant's property ____ Property owned by others ____

2. Wastewater Disposal System Information

- a) Type of System (i.e. septic tank, drain field) ____
- b) System Capacity (gallons) ____ Year Constructed ____
- c) Connected to the City of ____ Sanitary System

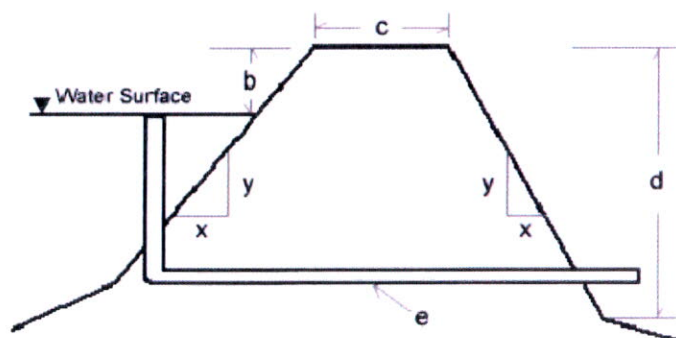
3. Dugout Information

- a) Surface Dimensions ____ Depth ____
- b) Depth to water (ground surface to water level) ____

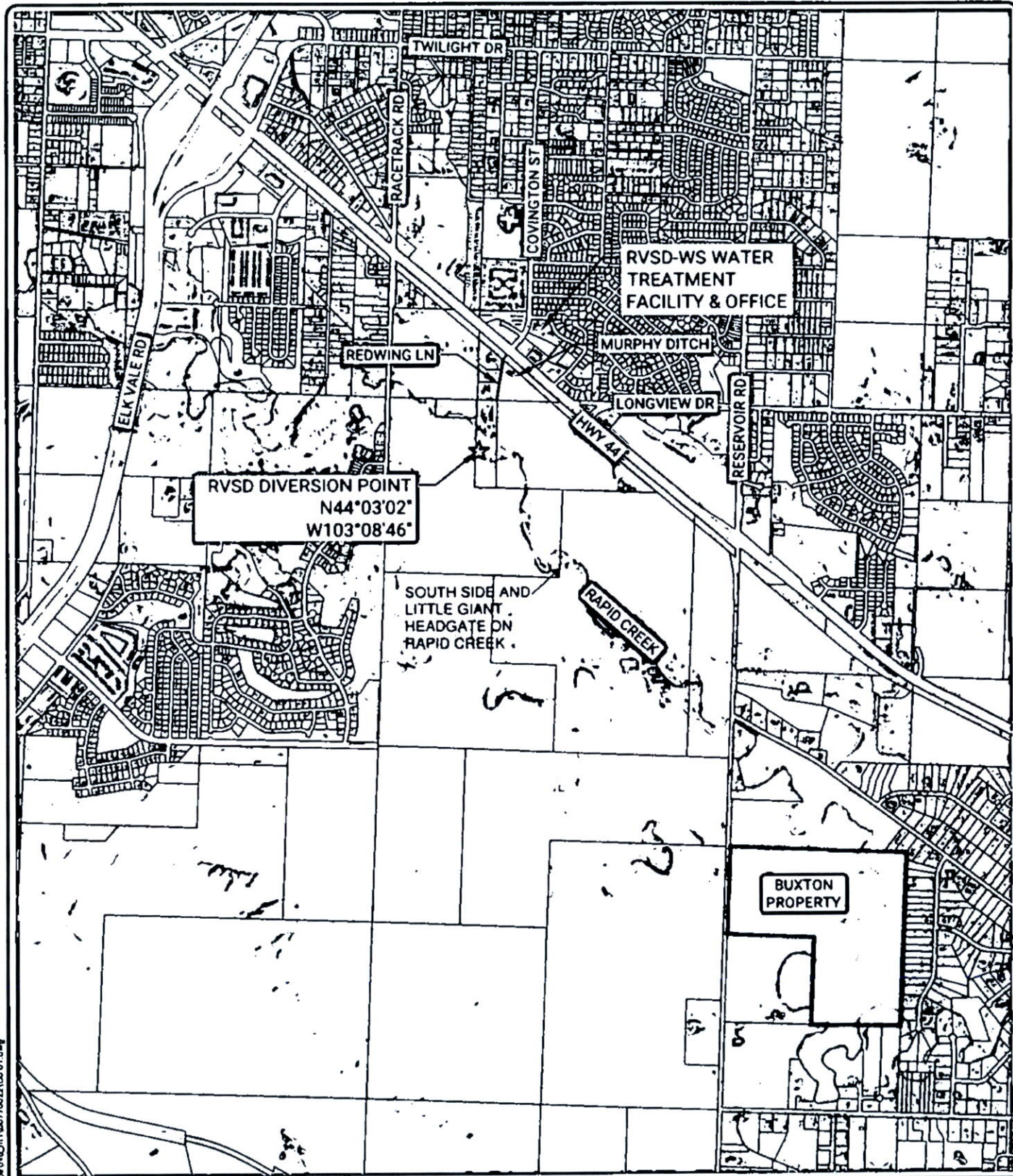
4. Water Storage Dams

If the proposed water use system contains one or more storage dams, please furnish the information requested below for each dam. The locations of the dams need to be shown on the map submitted with the application.

- a) If a private engineering firm or government agency was involved in the design of this dam, please give their name and address:



- b) Freeboard ____
- c) Crest Width ____
Crest Length ____
- d) Height ____
- e) Primary Outlet Capacity ____
If pipe, diameter ____
- f) Secondary Spillway Capacity ____
Spillway Width ____
- g) X & Y Slope (e.g. 3 to 1 is a typical slope)
Upstream ____
Downstream ____
- h) Surface Area of Impoundment ____
- i) Storage ____ Acre Feet
- j) Drainage Area Above Dam ____ Acres



11/19/2024 7:55 AM RLTJ C:\p\work\2024\0024\0001.dwg



VICINITY MAP RVSD WATER RIGHTS



PROJECT ID: 0024R007.00

DATE:
PREPARED BY: RF
CHECKED BY: TS



FIGURE NO.
EX1



Engineering Report in Support of the Transfer of Little Giant Ditch and South Side Ditch Water Rights Rapid City, South Dakota

Prepared for:

Rapid Valley Sanitary District

Date: November 4, 2024



Kelsey Haworth
Project Manager



Clayton J. Phillips
Staff Engineer

The following members of the White Sands Water Engineers, Inc. staff contributed to the preparation of this report.

Senior Project Manager: Jennifer L. Ashworth, P.E.

Project Manager: Kelsey Haworth

Staff Hydrologist/Engineer: Clayton J. Phillips



white sands water engineers, inc
303.495.7576 | www.WhiteSandsWater.com

Table of Contents

1	Introduction	1
2	Buxton Property	1
3	Irrigation Water Supplies	1
3.1	South Side Ditch	2
3.2	Little Giant Ditch.....	2
3.3	Diversion Records	3
4	Analysis of Crop Demand	4
4.1	Comparison to Previous Transfers.....	5
4.2	Climate Data	5
4.3	Study Period	5
4.4	Irrigated Acreage and Crop Pattern.....	6
4.5	Irrigation Efficiency.....	6
4.6	Crop Demands	7
5	Transferable Amount of Water Rights	7
5.1	Maximum Rate of Diversion	7
5.2	Determination of Right to Be Transferred.....	8
5.3	Total Water Rights to be Transferred.....	9
6	References	9

List of Tables

Table 1 – South Side Ditch and Buxton Property Interest	2
Table 2 – Little Giant Ditch and Buxton Property Interest.....	3
Table 3 – Ditch Diversion Summary (Values in Acre-Feet)	4
Table 4 – Buxton Property Water-Holding Capacity	6
Table 5 – Maximum Pro-Rata Diversion Rates	8
Table 6 – Little Giant Ditch Transferable Right (all values in acre-feet)	8
Table 7 – South Side Ditch Transferable Right (all values in acre-feet).....	9

List of Figures

- Figure 1 – Buxton Property General Location
Figure 2 – Buxton Property 1971 Irrigated Acreage

List of Appendices

- Appendix A – RESPEC Engineering Reports

1 INTRODUCTION

At the request of Rapid Valley Sanitary District (District), White Sands Water Engineers (WSWE) evaluated the transferrable amount of water available from the South Side Ditch and Little Giant Ditch water rights historically used on Mr. John Buxton's Property (Buxton Property). Mr. Buxton is contemplating transferring the South Side Ditch and Little Giant Ditch water rights to the District. A title search and review of the ownership of the land and the water rights was not conducted and WSWE does not offer an opinion on ownership.

The purpose of this report is to summarize our investigation of the historical operation of the South Side Ditch and Little Giant Ditch as they relate to the delivery of irrigation water to the Buxton Property. Additionally, based on the historical agricultural practices used on the property, the historical consumptive use and depletions associated with the South Side and Little Giant Ditches were quantified. Using the ditch diversion records and resulting historical consumptive use, WSWE was able to quantify the transferable amount of each water right associated with the Buxton Property.

2 BUXTON PROPERTY

The Buxton Property is a 120-acre parcel of land located approximately six miles southeast of Rapid City in Section 23, Township 1 North, Range 8 East of the Black Hills P.M., as shown in **Figure 1**. Rapid Creek runs from North to South through the center of the Buxton Property. As determined using aerial imagery, the Eastern side of the property has approximately 43 irrigated acres and is irrigated by water delivered out of the Little Giant Ditch. The Western side of the property has approximately 68 irrigated acres and is irrigated by water delivered out of the South Side Ditch. The measured irrigated acreages are consistent with the acreages listed under Permit No. 2040-2 for the South Side Ditch water right and Permit No. 2383-2 for the Little Giant Ditch water right.

Based on interviews with Mr. Buxton, agricultural operations on the property primarily consisted of the use of flood irrigation to irrigate alfalfa and pasture grass. A more detailed description of the irrigated acreage and cropping pattern is below in **Section 4.4**.

3 IRRIGATION WATER SUPPLIES

Water is supplied to the Buxton Property via the South Side Ditch and Little Giant Ditch as shown in **Figure 1**. Below is a description of the permits, operations, and water supplies of each of these ditches.

3.1 SOUTH SIDE DITCH

The South Side Ditch diverts water from the south side of Rapid Creek at a point located in the SE $\frac{1}{4}$ of the NW $\frac{1}{4}$ of Section 15, Township 1 North, Range 8 East of the Black Hills P.M. in Pennington County. The headgate of the South Side Ditch also serves as the headgate for the Little Giant Ditch and is located approximately four miles downstream on Rapid Creek from Rapid City. The South Side Ditch extends from its headgate approximately six miles toward the south and east, irrigating lands on the south side of Rapid Creek.

The South Side Ditch diverts water under one original water right. Under Permit No. 2040-2, the South Side Ditch has the right to divert a total of 23.4 cfs with a priority date of May 3, 1880. The South Side Ditch is a member of the Rapid Valley Water Conservancy District and is therefore eligible to receive storage water deliveries from Pactola and Deerfield Reservoirs.

The South Side Ditch consists of an earthen channel over its entire course, and individual farmers are provided with water via turnouts. The Buxton Property has one turnout structure from the South Side Ditch which feeds a 409-yard-long pipe that bifurcates into two unlined laterals that feed the property's western irrigation system. The ditch is operated on an informal rotational basis whereby owners in the ditch receive water in turn, based on their pro-rata interest. To the degree possible, individual farmers are flexible in taking delivery of water and will routinely trade their normal rotation turns to conform more directly to their specific irrigation and harvesting needs. At times, more than one owner is provided with water depending on the divertible flow rate at the river headgate.

The permit issued for the water right under the South Side Ditch identifies a total of 1,877 acres for irrigation using water diverted by the ditch. Of this total, 68 acres are irrigated within the Buxton Property. The pro-rata interest of this right by the Buxton Property is approximately 3.62%, or 0.85 cfs, as shown in Table 1.

Table 1 – South Side Ditch and Buxton Property Interest

	Permit No. / Amount	Permit Acreage	Percent Interest
South Side Ditch	23.4 cfs	1877 acres	
Buxton Property	0.85 cfs	68 acres	3.62%

3.2 LITTLE GIANT DITCH

The Little Giant Ditch has two diversion points off Rapid Creek. One is the joint diversion point with the South Side Ditch Company and is located in the SE $\frac{1}{4}$ of the NW $\frac{1}{4}$ of Section 15, Township 1 North, Range 8 East of the Black Hills P.M. in Pennington County. The second diversion point is operated by the Rapid Valley Water Company Ditch (Murphy Ditch), which is located in the SW $\frac{1}{4}$ of Section 8, Township 1 North, Range 8 East of the Black Hills P.M.

The water from the Little Giant Ditch that serves the Buxton Property is re-diverted out of the South Side Ditch diversion point just below the river headgate and siphoned under Rapid Creek where it then flows on the north side of the creek. The Little Giant Ditch diverts water under one original water right, Permit No. 2383-2, which gives it the right to divert a total of 5.26 cfs with a priority date of June 14, 1878.

The Little Giant Ditch consists of an earthen channel over its entire course and individual farmers are provided with water via turnouts. The Buxton Property has one turnout structure from the Little Giant Ditch which feeds a 589-yard-long unlined lateral that feeds the property's eastern irrigation system. The ditch is operated on an informal rotational basis whereby owners in the ditch receive water in turn, based on their pro-rata interest. To the degree possible, individual farmers are flexible in taking delivery of water and will routinely trade their normal rotation turns to conform more directly to their specific irrigation and harvesting needs. At times, more than one owner is provided with water depending on the divertible flow rate at the river headgate.

The permit issued for the water right under the Little Giant Ditch identifies 514.9 acres for irrigation using water diverted by the ditch. Of this total, 43 acres are irrigated within the Buxton Property. The pro-rata interest of this right by the Buxton Property is approximately 8.35%, or 0.44 cfs, as shown in **Table 2**.

Table 2 – Little Giant Ditch and Buxton Property Interest

	Permit No. / Amount	Permit Acreage	Percent Interest
Little Giant Ditch	5.26 cfs	514.9 acres	
Buxton Property	0.44 cfs	43 acres	8.35%

3.3 DIVERSION RECORDS

Diversion records for the Little Giant Ditch were taken from the report *Rapid City Little Giant Ditch Water Rights Transfer*, prepared by RESPEC in 2017 (RESPEC Report), also included in **Appendix A**. As previously noted, water for the Little Giant Ditch is originally diverted from Rapid Creek at a joint headgate shared by the South Side Ditch and the Little Giant Ditch; prior to the first farm headgate the ditch bifurcates, and the Little Giant Ditch portion of the diverted water is taken under Rapid Creek. Both ditches operate based upon a pro-rata allocation system which bases each farmer's allocation of water upon the irrigated acreage the farmer owns within the system. The RESPEC Report notes the diversion records were collected from the US Bureau of Reclamation for the South Side Ditch over the years 1963 to 1968 and 1972 to 1978. The RESPEC Report further explains that the total diversions for the Little Giant Ditch had been proportioned between the South Side and Little Giant Ditches based on the total acreage associated with each ditch's water rights. The Little Giant Ditch diversion records provided in the RESPEC Report are summarized below in row 1 of **Table 3**. It should be noted that WSWE contacted the US Bureau of Reclamation to obtain the diversion records for either the Little Giant or South Side Ditches but were unsuccessful in obtaining copies.

In order to calculate the total diversions at the river headgate and the South Side Ditch diversions we used the irrigated acreages determined in Permit No. 2040-2 and Permit No. 2383-2 (as shown in **Tables 1 and 2**) and proportioned the Little Giant records in the RESPEC Report upwards based on the acreage from the permits. For the total diversions, we assumed that the Little Giant Ditch diversions were the pro-rata portion of the total based on the 514.9 acres under the Little Giant Ditch as compared to the total 2,391.9 acres (514.9 acres + 1,877 acres). The total diversions could then be multiplied by the ratio of South Side Ditch irrigated acreage (1,877 acres) to total irrigated acreage to find the average monthly South Side Ditch diversion. The calculated total river headgate diversions and the South Side Ditch diversions are below in **Table 3**. It is our understanding the diversion season for both the South Side Ditch and Little Giant Ditch began in last few weeks of April and ended late September into early October.

The diversion records associated with the Buxton Property are calculated by applying Mr. Buxton's percent ownership (as shown in **Tables 1 and 2**) to the Little Giant Ditch and South Side Ditch diversions. Additionally, as previously done in the RESPEC Report and confirmed by the South Dakota Department of Agriculture and Natural Resources (SDDANR), a 9.8% transit loss is incurred so must also be applied before determining deliveries to the Buxton Property. The Little Giant Ditch and South Side Ditch diversions delivered to the Buxton Property are summarized in rows 4 and 5 of **Table 3** below.

Table 3 – Ditch Diversion Summary (Values in Acre-Feet)

		Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1	Little Giant Ditch¹ Diversions	0	96	146	175	222	146	0	785
2	Total Diversions at River Headgate	0	446.0	678.2	812.9	1,031.3	678.2	0	3,646.6
3	South Side Ditch Diversions	0	350.0	532.2	637.9	809.3	532.2	0	2,861.6
4	Buxton Property Little Giant Ditch Pro-Rata Diversions (Minus 9.8% Ditch Loss)	0	7.2	11.0	13.2	16.7	11.0	0	59.1
5	Buxton Property South Side Ditch Pro-Rata Diversions (Minus 9.8% Ditch Loss)	0	11.4	17.4	20.8	26.4	17.4	0	93.4

¹ From Rapid City Little Giant Ditch Water Rights Transfer, RESPEC, June 2017.

4 ANALYSIS OF CROP DEMAND

To analyze the crop demand on the Buxton Property, WSWE utilized the Integrated Decision Support Consumptive Use (IDSCU) Model, developed by Colorado State University (CSU). This model utilizes the Modified Blaney-Criddle equation. Model inputs and outputs are further described in the sections below.

4.1 COMPARISON TO PREVIOUS TRANSFERS

Previous transfers of water rights within the Rapid Creek watershed have utilized two separate methodologies. One method, described in the RESPEC Report, included the use of the American Society of Civil Engineers (ASCE) Penman-Monteith equation. This equation requires daily average values of dew point, maximum and minimum temperature, wind speed, and solar radiation. While this method is considered by ASCE to be more accurate, the daily data it requires, such as wind speed and solar radiation, were not regularly recorded until recently. In their analysis, RESPEC utilized an online scheduling consultant tool developed for landowners within the Belle Fourche Irrigation District (BFID). However, this tool is not readily available and was therefore not used by WSWE.

A report by Leonard Rice Engineers (LRE) in support of the transfer of water rights from Harney Peak Ranch to the District, utilized the State CU model, developed by the Colorado Division of Water Resources (Colorado DWR). State CU utilizes the Modified Blaney-Criddle equation for the calculation of evapotranspiration. State CU is similar to IDSCU and requires the same climate data, irrigated area information, and diversion data as IDSCU, producing similar outputs.

IDSCU and State CU are similar models that both rely on the Modified Blaney-Criddle equation for the calculation of evapotranspiration, so it is our opinion that IDSCU is an appropriate model for the calculation of historical crop demand on the Buxton Property.

4.2 CLIMATE DATA

For each year in the study period, the model requires freeze and frost dates, which are the last days in the spring and the first days in the fall where the temperature is at or below 28°F and 32°F, respectively. The model also requires inputs of monthly temperature data and monthly precipitation data. Climate data was sourced from the National Oceanic and Atmospheric Administration (NOAA) weather station located at the Rapid City Regional Airport, approximately three miles northeast of the property. Weather data became available at Rapid City Regional Airport in 1943. During the selected period (1970 to 2023), the data provided was continuous and uninterrupted, making it unnecessary to utilize a secondary weather station to fill in for any missing data.

4.3 STUDY PERIOD

The IDSCU model described above requires inputs such as daily average temperature, rainfall, crop type, and soil water-holding capacity. In order to represent average, dry, and wet conditions, a study period of 1970 to 2023 was selected. This study period has a consistent starting year with the study period used in the RESPEC report but has been extended through 2023 to bring the period closer to present-day.

4.4 IRRIGATED ACREAGE AND CROP PATTERN

Of the Buxton Property's 120 acres, only 111 acres are irrigable and used for farming. The split between the two ditches is such that on the west side of the property, irrigated by South Side Ditch, there are 68 irrigated acres, and on the east side, irrigated by the Little Giant Ditch, there are 43 acres. These values were validated against the permitted acreage for the property on both ditch transfer receipts, which matched exactly. Historical images available from both 1971 and 1997 provided empirical evidence that the farm consistently irrigated 111 acres. **Figure 2** delineates the historical irrigated acreage based on the 1971 aerial image.

According to Jon Buxton, the property primarily grew a mix of alfalfa and pasture grass. This was verified by a site visit conducted by Jennifer Ashworth with WSWE on July 23, 2024. Mr. Buxton did not know the precise acreage used to grow either crop; however, he estimated that approximately 70% of the property was alfalfa and 30% was pasture grass. This equals approximately 78 acres of alfalfa and 33 acres of pasture grass. Since no clarification was provided regarding whether one side of the property grew the majority of alfalfa, it was assumed that both the east (Little Giant Ditch) and west (South Side Ditch) sides maintained the same 70/30 split of alfalfa and pasture grass. The crop characteristics for alfalfa and pasture grass used in the IDSCU model are consistent with the crop characteristics outlined in ASCE Manual No. 70 *Evapotranspiration and Irrigation Water Requirements* and United States Department of Agriculture (USDA) *Technical Release No. 21 Irrigation Water Requirements*.

4.5 IRRIGATION EFFICIENCY

Soil types on the Buxton Property were determined using the NRCS Web Soil Survey. Primarily, the property is composed of Egas Silty Clay Loam (63.27%), with the remaining portion made up of Bridgeport Silt Loam (29.09%) and Colombo Loam (7.64%). Further utilizing the United States Department of Agriculture's (USDA) National Soil Survey Handbook, the Available Water-Holding Capacity (AWC) of each soil was calculated. To calculate the average water-holding capacity of the Buxton Property, a weighted average was applied using the AWC listed after each soil type; a summary is shown below in **Table 4**.

Table 4 – Buxton Property Available Water-Holding Capacity

Depth (ft)	Available Water-Holding Capacity (in/ft)
1	1.88
2	1.74
3	1.63
4	1.62
Total	6.87

Flood irrigation was used to irrigate all 111 acres on the Buxton Property. Based on the soil types described above and the slope of the irrigated acreage, the maximum modeled irrigation efficiency was determined to be 55%. However, Mr. Buxton also mentioned that the irrigation infrastructure on the property is poorly maintained, and in many places, the structures are either overgrown or in need of maintenance. It was also stated that the farm typically has enough water, and occasionally, excess water flows back into the creek. Taking into consideration the condition of water delivery infrastructure, RESPEC's determination of efficiency in previous Little Giant Ditch transfers, and WSWE's conversation with SDDANR regarding the standard assumption of farm efficiency, a maximum modeled irrigation efficiency of 50% was used in the IDSCU analysis.

4.6 CROP DEMANDS

Using the irrigated acreage and cropping pattern provided by Mr. Buxton, the IDSCU model determined an average annual consumptive use of 264.9 acre-feet over the 1970 to 2023 study period. However, because of the bisected nature of the property, which only utilizes one ditch to irrigate the west side of the property and the other to respectively irrigate the east side, it is important to individually consider the sides of the property irrigated by the South Side Ditch and the Little Giant Ditch. On the west side of the property, which has the lower soil AWC, the average annual crop demand was 162.3 acre-feet. When applying the 50% irrigation efficiency, this brings the average annual irrigation water requirement of the property irrigated by the South Side Ditch to 324.5 acre-feet. The east side of the property, with the higher AWC and smaller irrigated acreage, has an average annual crop consumptive use of 102.6 acre-feet per year. With the irrigation efficiency adjustment, this brings the average annual irrigation water requirement of the east side of the property irrigated by the Little Giant Ditch to 205.2 acre-feet.

5 TRANSFERABLE AMOUNT OF WATER RIGHTS

Utilizing the results of the modeling methods and calculations described above, a final determination was made of the volume of water which could be transferred from the Buxton Property to Rapid Valley Sanitary District without causing harm to fellow water users of Rapid Creek. The following section describes this determination in greater detail.

5.1 MAXIMUM RATE OF DIVERSION

The maximum rate of diversion should not exceed the Buxton Property's cumulative pro-rated interest in the adjudicated ditch water rights. Additionally, this amount must be reduced to account for ditch losses to protect the remaining shareholders. The maximum allowable diversion rates for the South Side and Little Giant ditches are shown below in **Table 5**.

Table 5 – Maximum Pro-Rata Diversion Rates

Ditch	Water Right	Buxton Interest	Ditch Loss	Pro-Rata Rate
South Side Ditch	23.4 cfs	3.62%	9.8%	0.85 cfs
Little Giant Ditch	5.26 cfs	8.35%	9.8%	0.44 cfs

5.2 DETERMINATION OF RIGHT TO BE TRANSFERRED

Similar to the analysis completed in the RESPEC Report, the amount that can be transferred is determined by the minimum of the average monthly water delivery to the Buxton Property and the average monthly irrigation water requirement from April through October.

Table 6 shows the transferable volume from Little Giant Ditch. The pro-rata diversions for Little Giant Ditch are from **Table 3**. The irrigation water requirement was calculated using the crop demand from IDSCU and adjusting upwards to account for the 50% irrigation efficiency as previously discussed. In the months of May through September, the transferable right is limited by the pro-rata delivery. In April and October, the transferable right is equal to the irrigation water requirement. The total transferable volume associated with the use of the Little Giant Ditch on the Buxton Property is 69.3 acre-feet.

Table 6 – Little Giant Ditch Transferable Right (all values in acre-feet)

Little Giant Ditch	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Historical Diversions to Ditch	0	96	146	175	222	146	0	785
Pro-rata Diversions (Minus 9.8% Ditch Loss)	0	7.2	11.0	13.2	16.7	11.0	0	59.1
Crop Demand	2.0	12.7	21.3	27.5	23.3	12.7	3.1	102.6
Crop Demand at 50% Efficiency	4.0	25.5	42.5	54.9	46.7	25.4	6.2	205.2
Irrigation Right to Be Transferred	4.0	7.2	11.0	13.2	16.7	11.0	6.2	69.3

Table 7 shows the transferable volume from the South Side Ditch. The pro-rata diversions for the South Side Ditch are from **Table 3**. The irrigation water requirement was calculated using the crop demand from IDSCU and adjusting upwards to account for the 50% irrigation efficiency as previously discussed. In the months of May through September, the transferable right is limited by the pro-rata delivery. In April and October, the transferable right is equal to the irrigation water requirement. The total transferable volume associated with the use of the South Side Ditch on the Buxton Property is 109.7 acre-feet.

Table 7 – South Side Ditch Transferable Right (all values in acre-feet)

South Side Ditch	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Historical Diversions to Ditch	0	350	532	638	809	532	0	2861.6
Pro-rata Diversions (Minus 9.8% Ditch Loss)	0	11.4	17.4	20.8	26.4	17.4	0	93.5
Crop Demand	3.2	20.2	33.6	43.5	36.9	20.1	4.9	162.2
Crop Demand at 50% Efficiency	6.3	40.3	67.2	86.9	73.8	40.1	9.8	324.5
Irrigation Right to Be Transferred	6.3	11.4	17.4	20.8	26.4	17.4	9.8	109.7

5.3 TOTAL WATER RIGHTS TO BE TRANSFERRED

Combining the two sides of the Buxton Property, the total volume of water available to be transferred is 179.0 acre-feet per year, or 1.61 acre-feet per acre per year. This volume takes into consideration historical diversions, transit losses, historical deliveries, crop demand, and irrigation efficiency on the Buxton Property. The maximum rate of transfer is not to exceed 0.85 cfs for the South Side Ditch or 0.44 cfs for the Little Giant Ditch water rights.

6 REFERENCES

Integrated Decision Support System, Consumptive Use Model Version 3.3.162, Colorado State University, July 24, 2016.

NRCS Soil Report. Available: <https://websoilsurvey.nrcs.usda.gov/app/>.

Colorado Irrigation Guide, United States Department of Agriculture, January 1978 and December 1988 Revision.

Evapotranspiration and Irrigation Water Requirements, in ASCE Manual and Reports of Engineering Practice, No. 70, American Society of Civil Engineers, 1990.

National Oceanographic and Atmospheric Administration, Climate Data, Rapid City Airport, South Dakota. Available: <https://forecast.weather.gov/MapClick.php?lat=44.04556&lon=-103.05389>.

Personal Communication. July 9, 2024, Mr. Jon Buxton, Mr. Ted Schultz, Mr. Rusty Schmidt, Mr. Dustin Paschke, & WSWE.

Personal Communication. August 27, 2024, Mr. Ted Schultz & WSWE.

Personal Communication. October 3, 2024, Mr. Jon Buxton & WSWE.

Personal Communication. October 14, 2024, Mr. Kevin Ham & WSWE.

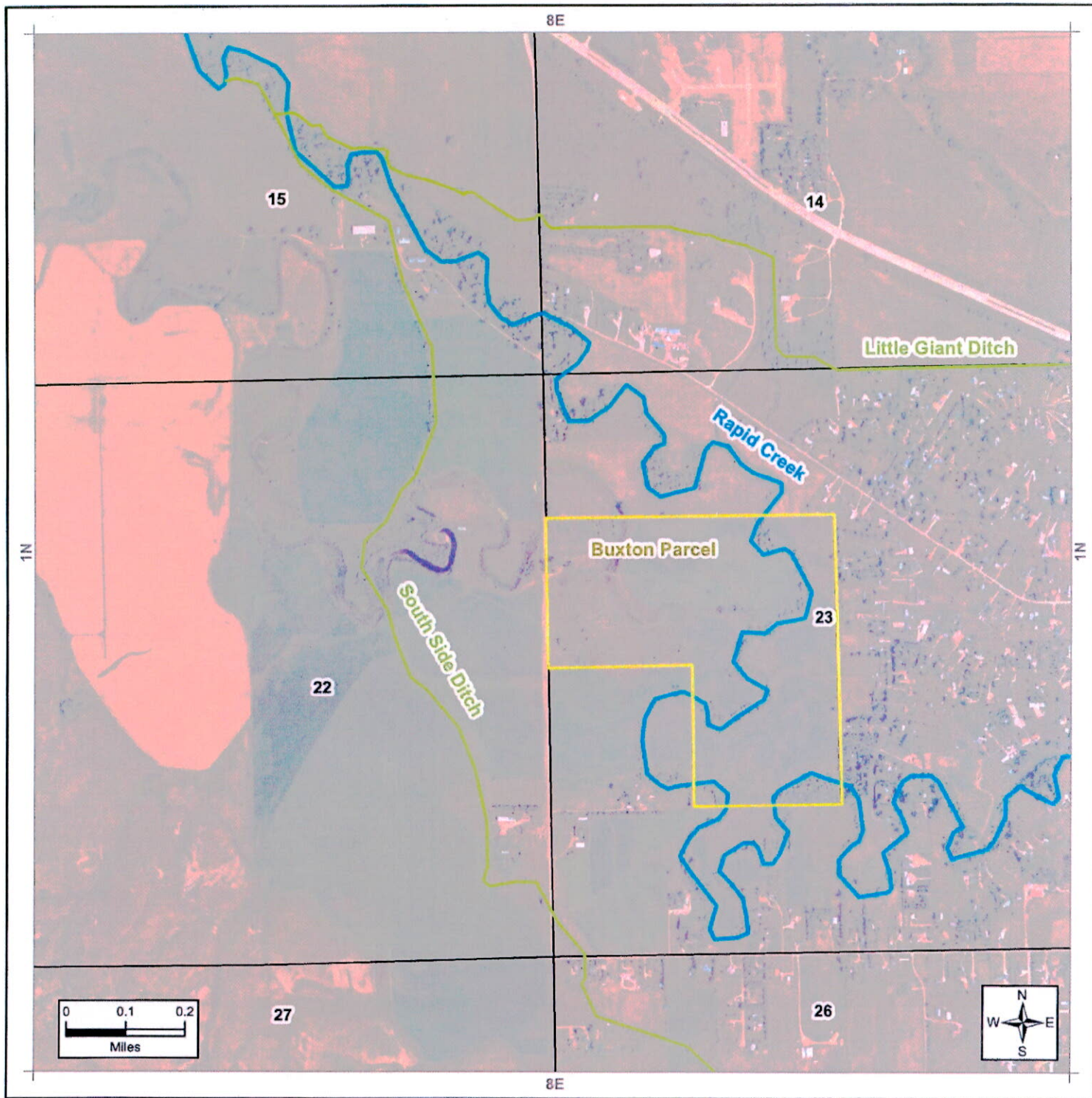
Vested Right Claim, Water Rights Division DWNr, South Dakota, Permit No. 2040-2.

Vested Right Claim, Water Rights Division DWNR, South Dakota, Permit No. 2383-2.

City of Rapid City Little Giant Ditch Water Rights Transfer 154 Acres Green Valley Estates Subdivision. Jered K. Oswald, RESPEC, June 2017.

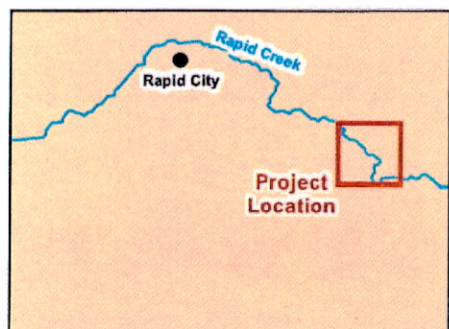
City of Rapid City Little Giant Ditch Water Rights Transfer. Jered K. Oswald, RESPEC, June 2017.

Historical Use Analysis of Irrigation Water at The Harney Peak Ranch, Prepared for: Rapid Valley Sanitary District. Edward J. Armbruster, Gregg S. Ten Eyck, and Greg Wierenga, Leonard Rice Engineers, Inc and CETEC Engineering, Inc.



September 2024

Figure 1
Buxton Property
General Location

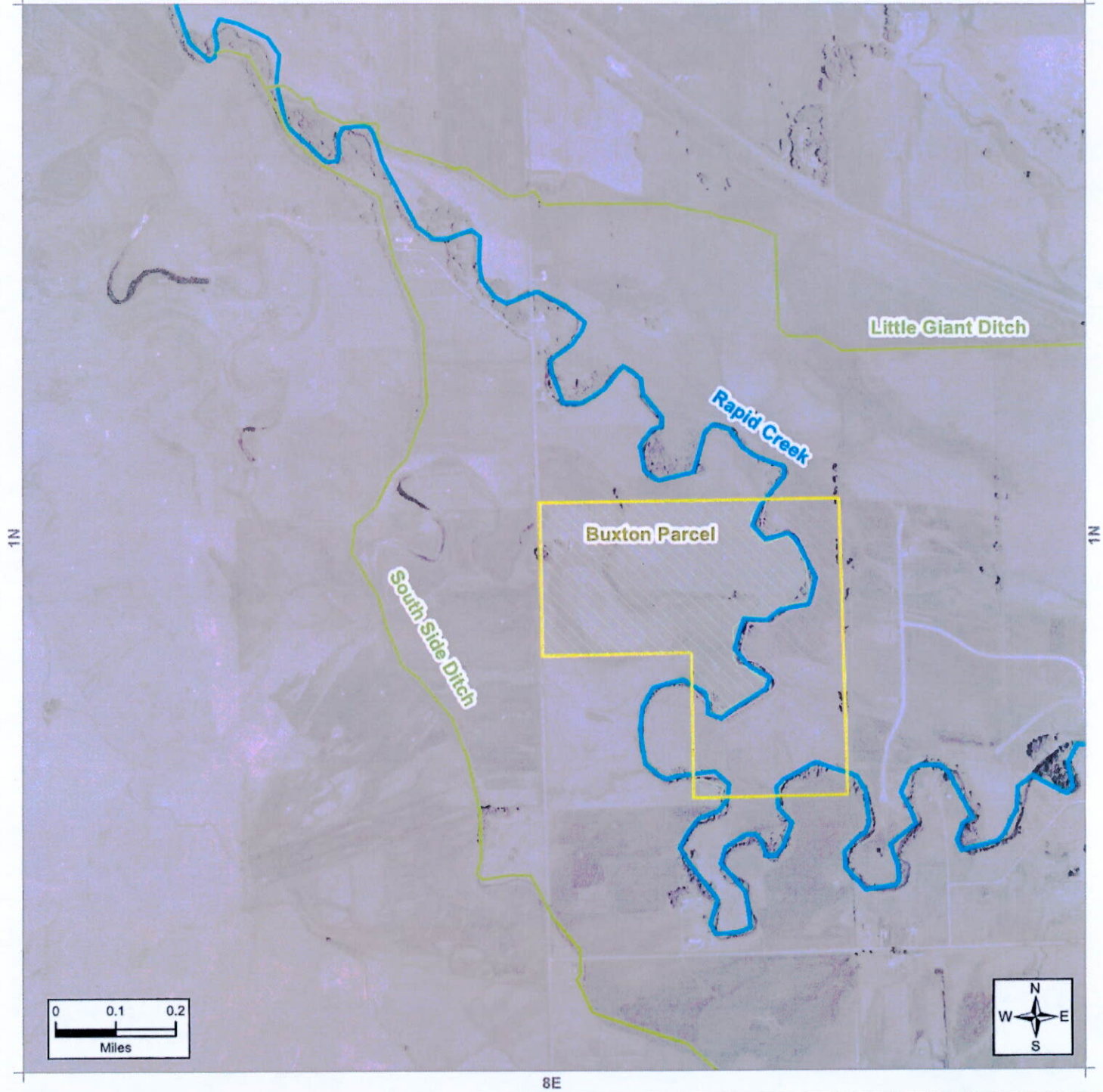


The mapping contained within this document is intended to be used for reference purposes only and is not suitable for construction and/or surveying purposes.

Aerial Imagery Date: March 2023

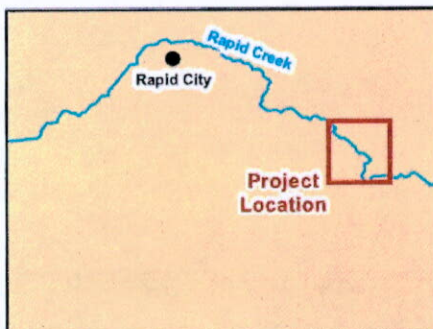


8E



September 2024

Figure 2
Buxton Property
1971 Irrigated Acreage



- Little Giant Irrigated Area (43 Acres)
- South Side Irrigated Area (68 Acres)

The mapping contained within this document is intended to be used for reference purposes only and is not suitable for construction and/or surveying purposes.

Aerial Imagery Date: August 1971



Appendix A — RESPEC Engineering Reports



CITY OF RAPID CITY LITTLE GIANT DITCH WATER RIGHTS TRANSFER 154 ACRES GREEN VALLEY ESTATES SUBDIVISION

TOPICAL REPORT RSI-2713



PREPARED BY

Jared K. Oswald

RESPEC

3824 Jet Drive

Rapid City, South Dakota 57703

PREPARED FOR

City of Rapid City

300 Sixth Street

Rapid City, South Dakota 57701

JUNE 2017

Project Number 2897





FOREWORD

An engineering analysis was conducted on the 154 Acres Green Valley Estates Subdivision on Little Giant Ditch water rights that were inherited by Mr. Brian Dail. This report determines the amount of water the property has the right to transfer to the water supply system for the City of Rapid City, South Dakota. The 154-acre property being assessed is located within Section 23, Township 1 North, Range 8 East, Black Hills Meridian, Pennington County, South Dakota. The water right for the property is recognized to be served irrigation water through a vested right (State of South Dakota Reissued Vested Right Water License No. 2383-2), which allows 5.26 cubic feet per second (cfs) to be diverted from Rapid Creek into the Little Giant Ditch. The analysis determined that 280.9 acre-feet of water (approximately 1.8 acre-feet per acre) can be transferred annually from the property to diversion points within Rapid City from April 15 to November 1, not to exceed a prorated acreage share of 1.42 cfs. A total annual volume of 140.4 acre-feet is available for transfer to Pactola Reservoir storage.



TABLE OF CONTENTS

1.0 INTRODUCTION	1
1.1 HISTORIC CROP WATER USE	1
1.2 HISTORIC DIVERSIONS	7
1.3 DELIVERY SYSTEM LOSSES	7
2.0 WATER RIGHTS AVAILABLE FOR TRANSFER	10
APPENDIX A. HISTORIC CROP WATER USE BY YEAR	A-1



LIST OF TABLES

TABLE	PAGE
1-1 Calculated, Weighted Water-Holding Capacity for the 154 Acres Green Valley Estates.....	7
1-2 Amount of Irrigation Demand Based on Historic Crop Water Use Analysis.....	9
1-3 Historic Diversions and Monthly Pro Rata Share Available for Transfer Water Right Based on Historic Diversion Records for the South Side Ditch Company	9
2-1 Irrigation Amounts Available for Transfer From the City of Rapid City Property	11
2-2 Approximate Locations of City of Rapid City Diversion Points/Galleries	12

LIST OF FIGURES

FIGURE	PAGE
1-1 Location of the 154 Acres in Green Valley Estates Subdivision	2
1-2 Crop Coefficient (Kc) Throughout the Growing Season for Alfalfa Developed Specifically for Water Rights on the 154 Acres Green Valley Estates Subdivision	4
1-3 Plant-Available Coefficient (Ka) Response to Changes in Percent of Available Water in the Soil Profile	5
1-4 Location of 154 Acres in Green Valley Estates Subdivision With Soils Overlayed	6
1-5 Water Balance Tracking for 1970 Irrigation Season	8
1-6 Total Values of Rainfall, Irrigation, Reference Evapotranspiration, and Actual Evapotranspiration During the Analysis Period of 1970–2015	8
2-1 City of Rapid City Diversion Points	13
A-1 Crop Water Use Calculation for Year 1970	A-2
A-2 Crop Water Use Calculation for Year 1971	A-2
A-3 Crop Water Use Calculation for Year 1972	A-3
A-4 Crop Water Use Calculation for year 1973	A-3
A-5 Crop Water Use Calculation for Year 1974	A-4
A-6 Crop Water Use Calculation for Year 1975	A-4
A-7 Crop Water Use Calculation for Year 1976	A-5
A-8 Crop Water Use Calculation for Year 1977	A-5
A-9 Crop Water Use Calculation for Year 1978	A-6
A-10 Crop Water Use Calculation for Year 1979	A-6
A-11 Crop Water Use Calculation for Year 1980	A-7
A-12 Crop Water Use Calculation for Year 1981	A-7
A-13 Crop Water Use Calculation for Year 1982	A-8
A-14 Crop Water Use Calculation for Year 1983	A-8
A-15 Crop Water Use Calculation for Year 1984	A-9
A-16 Crop Water Use Calculation for Year 1985	A-9
A-17 Crop Water Use Calculation for Year 1986	A-10
A-18 Crop Water Use Calculation for Year 1987	A-10
A-19 Crop Water Use Calculation for Year 1988	A-11
A-20 Crop Water Use Calculation for Year 1989	A-11
A-21 Crop Water Use Calculation for Year 1990	A-12
A-22 Crop Water Use Calculation for Year 1991	A-12
A-23 Crop Water Use Calculation for Year 1992	A-13

LIST OF FIGURES (CONTINUED)



FIGURE

A-24	Crop Water Use Calculation for Year 1993
A-25	Crop Water Use Calculation for Year 1994
A-26	Crop Water Use Calculation for Year 1995
A-27	Crop Water Use Calculation for Year 1996
A-28	Crop Water Use Calculation for Year 1997
A-29	Crop Water Use Calculation for Year 1998
A-30	Crop Water Use Calculation for Year 1999
A-31	Crop Water Use Calculation for Year 2000
A-32	Crop Water Use Calculation for Year 2001
A-33	Crop Water Use Calculation for Year 2002
A-34	Crop Water Use Calculation for Year 2003
A-35	Crop Water Use Calculation for Year 2004
A-36	Crop Water Use Calculation for Year 2005
A-37	Crop Water Use Calculation for Year 2006
A-38	Crop Water Use Calculation for Year 2007
A-39	Crop Water Use Calculation for Year 2008
A-40	Crop Water Use Calculation for Year 2009
A-41	Crop Water Use Calculation for Year 2010
A-42	Crop Water Use Calculation for Year 2011
A-43	Crop Water Use Calculation for Year 2012
A-44	Crop Water Use Calculation for Year 2013
A-45	Crop Water Use Calculation for Year 2014
A-46	Crop Water Use Calculation for Year 2015

1.0 INTRODUCTION

An engineering analysis was completed on the 154 acres in Green Valley Estates Subdivision, with irrigation rights off of the Little Giant Ditch and receives diversions from Rapid Creek. The property's water rights are located in the NE1/4NW1/4 (4 acres), SW1/4NE1/4 (40 acres), NE1/4SE1/4 (28 acres), SE1/4NE1/4 (39 acres), NW1/4SE1/4 (35 acres), and SW1/4SE1/4 (8 acres) of Section 23. Section 23 is located within the Township 1 North of Range 8 East of the Black Hills Meridian. The engineering analysis is divided into three report sections (Historic Crop Water Use, Historic Diversions, and Delivery System Losses) to comprehensively assess the volume and flow rate available for transfer to diversion points within the City of Rapid City, South Dakota. The historic irrigation requirements (demand) and diversions (supply) were compared on a monthly basis to determine if supply or demand is the limiting amount. The delivery system losses were subtracted from Historic Diversion records to determine the monthly acre-feet of water available for transfer.

The water right volume for transfer and the rate of diversion for the Little Giant Ditch is calculated based on acres and current State of South Dakota Reissued Vested Right Water License No. 2383-2 (Water License No. 2383-2). Little Giant Ditch Company is discussed in the "Report on Water Filings on Rapid Creek for Irrigation Purposes," which was written by Raymond F. Lund in July and August of 1942, that states that Little Giant Ditch Company is not incorporated; the report makes no mention of shares. This report discusses a contract, dated March 15, 1898, that was signed between South Side Ditch Company and Little Giant Ditch Company and agrees that Little Giant Ditch should have 400-miner inches (in). The assessments for Operation and Maintenance (O&M) were made according to the amount of water each landowner is assigned. The Little Giant Ditch Company presently assesses four water right holders on the ditch for O&M expenses that are incurred by the ditch. These assessments are currently based on 296 acres.

Using assessed acreage is viable for operational and financial management of the Little Giant Ditch. However, these acres do not relate to the 514.9 acres legally described in the current Water License No. 2383-2. Therefore, using assessments is not a viable method to determine transferrable water rights. The only fair and equitable method to determine water right volumes and rate of diversion is to use acreage and distribute the water rights using Water License No. 2383-2, which was issued by the State of South Dakota in 2015.

1.1 HISTORIC CROP WATER USE

An assessment was conducted to determine the historic crop water use and irrigation requirements of the water rights that were inherited by Mr. Dail, on the property, which is shown in Figure 1-1. An online irrigation scheduling consultant tool, which was developed for individual landowners within the Belle Fourche Irrigation District (BFID) in western South Dakota, tracks the daily water balance in a field and recommends irrigation timing and depth. Because of the proximity of the BFID to the property, the methods used to develop the tool were deemed appropriate to assess historic crop water use.

The analysis was run daily between April 15 and October 31 from 1970–2015. The inputs required to track a daily water balance are local weather and rainfall estimates, crop type, and soil water-holding capacity. Weather and rainfall data were collected from the Rapid City Regional Airport,

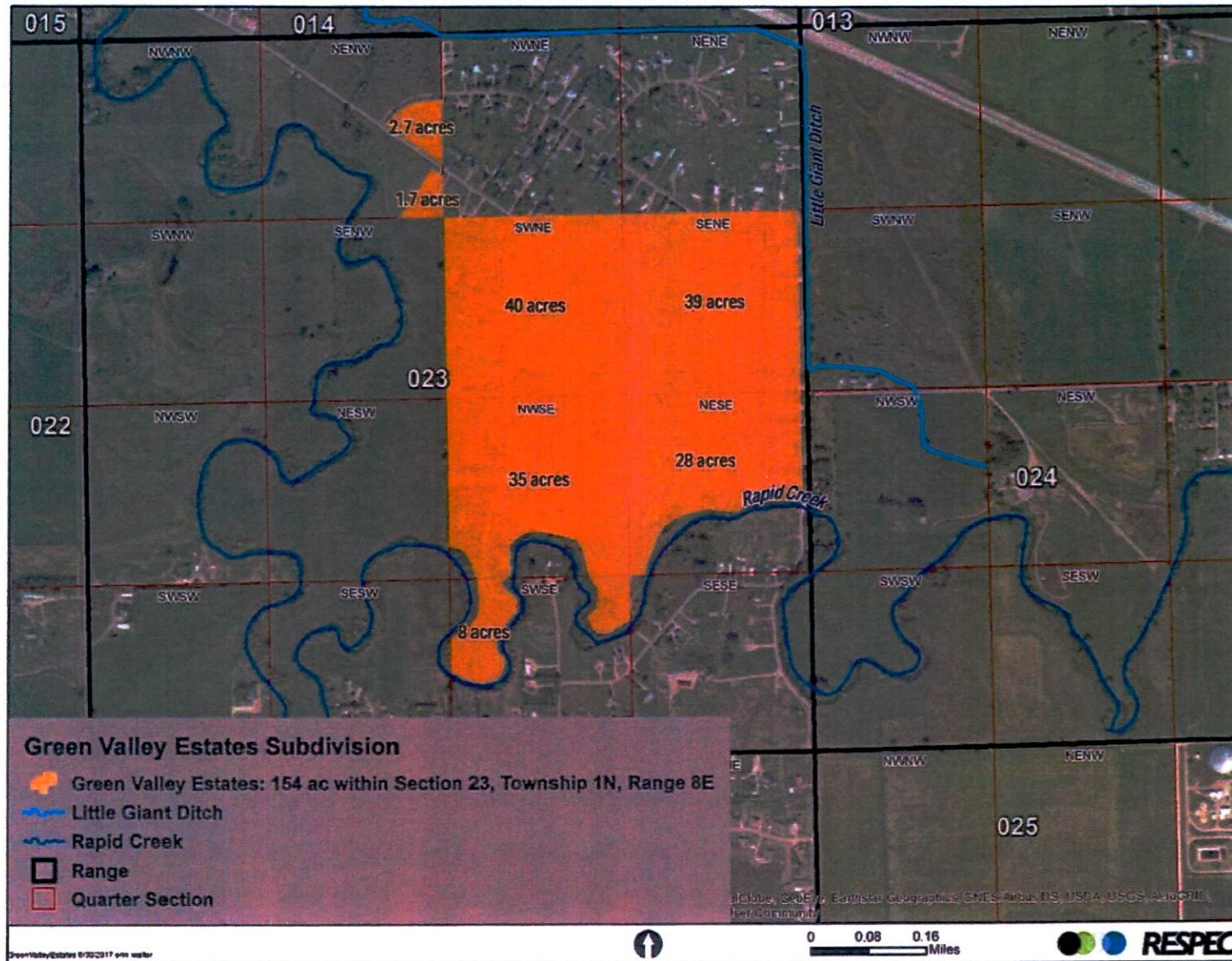


Figure 1-1. Location of the 154 Acres in Green Valley Estates Subdivision.

which is located approximately 3 miles northeast of the property, and therefore, representative. The weather data were input into the American Society of Civil Engineers (ASCE) Penman Monteith (PM) equation (Equation 1-1) to calculate daily evapotranspiration (ET). This equation requires daily average values of dew point, maximum and minimum temperature, average wind speed, and solar radiation. All of the variables, with the exception of solar radiation, were available from the Rapid City Regional Airport weather station. Solar radiation data were calculated based on the station's average daily cloud cover and an empirical curve of radiation as a function of the station's latitude.¹ The output value from the ASCE PM equation were converted from millimeters per day (mm d⁻¹) to inches per day (in d⁻¹).

$$ET = \frac{0.408\Delta(R_n - G) + \gamma \frac{C_n}{T + 273} u_2 (e_s - e_a)}{\Delta + \gamma(1 + C_d u_2)} \quad (1-1)$$

where:

ET = evapotranspiration (mm d⁻¹)

R_n = calculated net radiation at the crop surface (MJ m⁻² d⁻¹)

G = soil heat flux density at the soil surface (MJ m⁻² d⁻¹)
set as 0.05 MJ m⁻² d⁻¹

T = mean daily air temperature at 1.5–2.5-m height (m s⁻¹)

u_2 = mean daily wind speed at 2-m height (m s⁻¹)

e_s = mean actual vapor pressure at 1.5–2.5-m height (kPa)
calculated using the maximum and minimum air temperature

e_a = mean actual vapor pressure at 1.5–2.5-m height (kPa)
calculated using the average dew point temperature

Δ = slope of the saturation vapor pressure-temperature curve (kPa °C⁻¹)

γ = psychrometric constant (kPa °C⁻¹)

C_n = numerator constant that changes with reference type and calculation
time step (K mm s³ Mg⁻¹ d⁻¹), set as 1600 K mm s³ Mg⁻¹ d⁻¹

C_d = denominator constant that changes with reference type and calculation
time step (s m⁻¹), set as 0.38 s m⁻¹.

Units for the 0.408 coefficient are m² mm MJ⁻¹.

Before United Corporation sold lots in Green Valley Estates Subdivision, these acres were assumed to be historically irrigated for alfalfa/grass hay. The ASCE PM equation estimates daily evapotranspiration and references a 0.5-meter (m)-tall crop that is similar to full-cover alfalfa. The PM equation uses the weather parameters required to estimate the amount of water that would be lost from full-cover alfalfa on that day.

¹ Hamon, R. W., L. L. Weiss, and W. T. Wilson, 1954. "Insolation as an Empirical Function of Daily Sunshine Duration," *Monthly Weather Review*, Vol. 82, No. 6, pp. 141–146.

This reference ET (ET_r) estimate is multiplied by a crop coefficient (K_c) to adjust this value to any crop or crop stage other than full-cover alfalfa with a plant-available water coefficient (K_a) that adjusts for changes in soil moisture to calculate the actual ET estimate (ET_a) (Equation 1-2):

$$ET_a = ET_r \times K_c \times K_a \quad (1-2)$$

The values for K_c used in this analysis are shown in Figure 1-2. The start of growing season is assumed to begin on April 15. For alfalfa, the plant is assumed to begin to thrive when the first 5 days of average temperature exceed 41 degrees Fahrenheit, which occurs, on average, on April 15 for this area. At this time, the K_c is estimated to be 0.5, or half of the water used for a full-cover alfalfa crop. After the start of the season, the value steadily increases until the crop is harvested and the K_c drops immediately to 0.3, and the cycle repeats itself. For this analysis, the alfalfa is assumed to be harvested, on average, on June 2, July 12, and August 21.

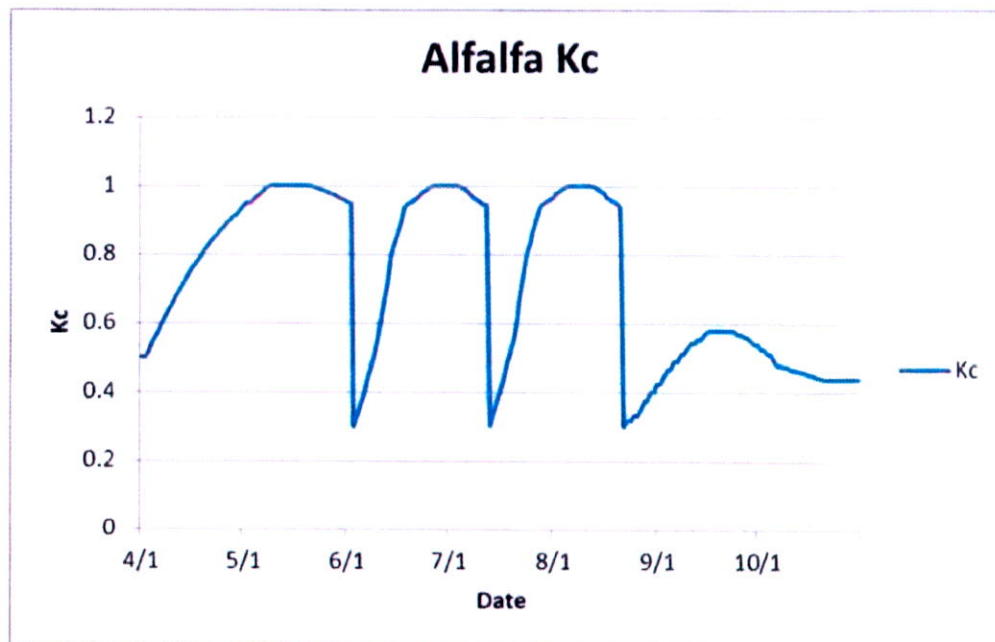


Figure 1-2. Crop Coefficient (K_c) Throughout the Growing Season for Alfalfa Developed Specifically for Water Rights on the 154 Acres Green Valley Estates Subdivision.

The ET_r estimate is also multiplied by a plant-available water coefficient (K_a) to determine the daily ET_a. This value takes into account the current soil water balance. The form of the coefficient is depicted in Figure 1-3. In essence, the more saturated the soil profile, the closer K_a gets to one, and the more readily available the water is to be released.

To assess the percent available water in the soil, the water-holding capacity must be known. Figure 1-4 provides an aerial view of the Dail property with the soils overlaid. The 154 acres that are being assessed consist of 84 percent Egas Silty Clay Loam (Eg) and 16 percent Bridgeport Silt Loam (Bp). The overall water-holding capacity of the property was determined by calculating an area-weighted value. This was found by estimating water-holding capacity in inches per foot (ft) for the top 4 ft for each soil type. The top 4 ft are considered to be effective rooting depth for an established alfalfa crop.

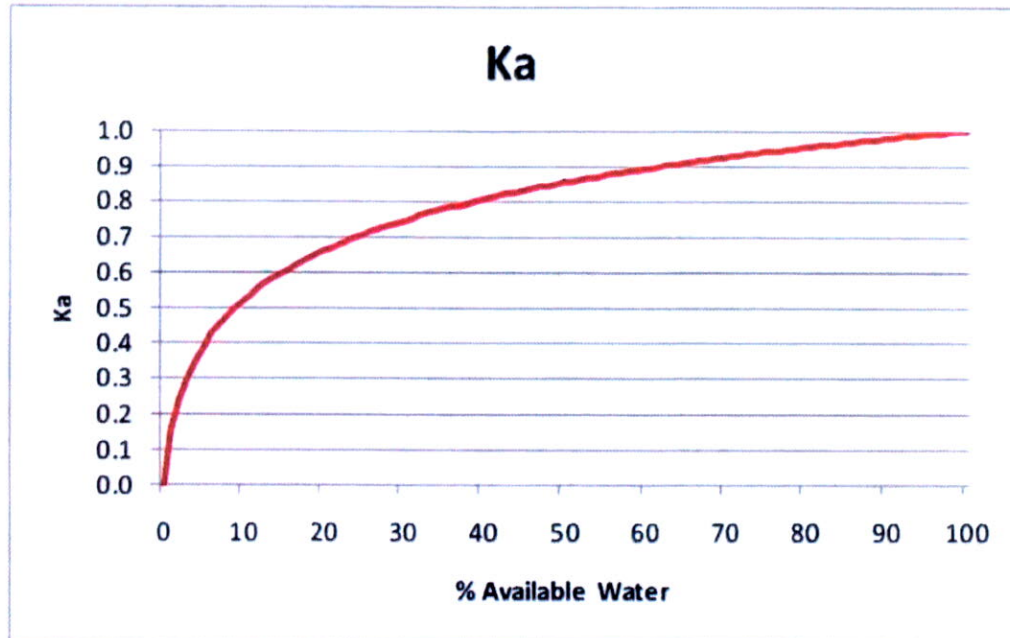


Figure 1-3. Plant-Available Coefficient (Ka) Response to Changes in Percent of Available Water in the Soil Profile.

The estimated water-holding capacity of the individual soil types is then multiplied by the percent of area that they comprise on the property. The calculated, area-weighted, water-holding capacity for the property is represented in Table 1-1.

The daily water balance is found by adding the daily rainfall and simulated irrigation amounts and subtracting the ETa calculated by using Equation 1-3. Irrigation events were simulated and assumed to occur when the calculated balance reached 50 percent of the water-holding capacity (i.e., field capacity). Irrigation amounts fully replenished any soil water deficit at the time.

$$\text{Available Water} = \text{Previous Day Available Water} - \text{ETa} + \text{Rainfall} + \text{Irrigation} \quad (1.3)$$

Figure 1-5 provides a graphical representation of the estimated water balance from 1970 using the described methods. During the irrigation season (April 15 to October 31), the field received 11.39 in of rainfall and 40.56 in of ETa deficit, which included 24.98 in of irrigation. The graphs from the remaining years are displayed in Appendix A. Figure 1-6 displays the total yearly values for reference rainfall, irrigation, reference ET (ETr), and actual ET (ETa) throughout the period. On average, 57.97 in of ETr, 40.62 in of ETa, 12.82 in of rainfall, and 23.72 in of irrigation simulated. The greatest amount simulated (36.80 inches) occurred in 1988 in response to receiving only 8.58 in of rain and having 50.79 in of ETa.

The property was surface irrigated before being sold as lots, and therefore, irrigation efficiency was assumed to be 50 percent. Table 1-2 displays the water available to be transferred from Green Valley Estates Subdivision by month, based on analyzing historic crop water use. According to this analysis, the crop demands an average of 89.1 acre-feet during the irrigation season with monthly delivery rates needed to supply this demand, varying from 0.57 cubic feet per second (cfs) in October to 2.30 cfs in July.

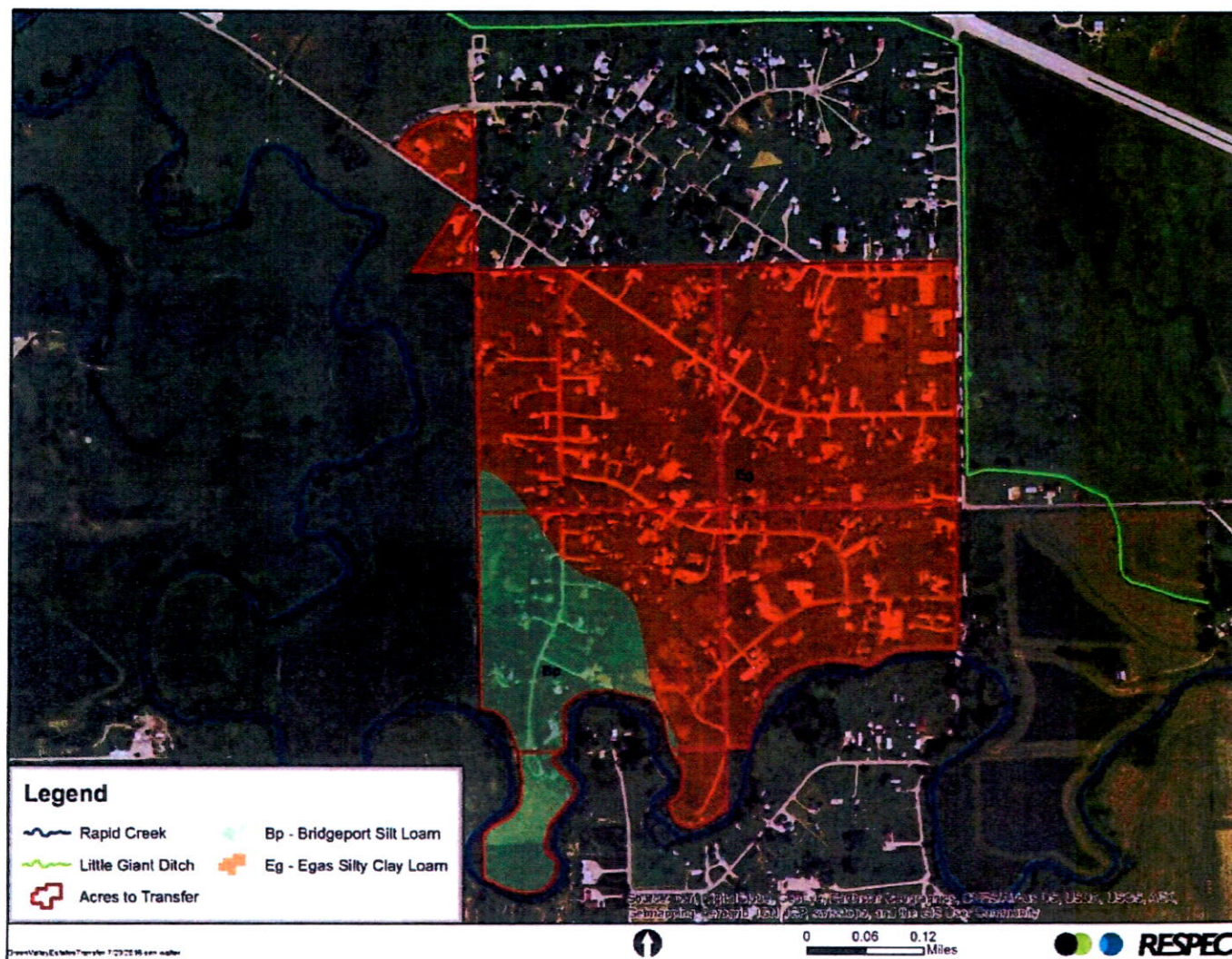


Figure 1-4. Location of 154 Acres in Green Valley Estates Subdivision With Soils Overlayed.

Table 1-1. Calculated, Weighted Water-Holding Capacity for the 154 Acres Green Valley Estates

Depth (ft)	Water-Holding Capacity (in/ft)
1	1.71
2	1.60
3	1.48
4	1.48
Total	6.27

1.2 HISTORIC DIVERSIONS

Little Giant Ditch has two diversion points off of Rapid Creek. One is a joint diversion point with the South Side Ditch Company and is located in the SE ¼ NW ¼ of Section 14, Township 1 North, Range 8 East. The second diversion point is operated by the Rapid Valley Water Company (Murphy) Ditch, which is located in the SW ¼ of Section 8, Township 1 North, Range 8 East. Murphy Ditch supplies water for a portion of Little Giant Ditch Company's irrigated land, supplying 56.9 acres. The water serving Green Valley Estates in Section 23, from the Little Giant Ditch, is diverted off of the South Side Ditch diversion point. Because no water delivery records are available from the Little Giant Ditch Company, the historic diversion data for the South Side Ditch were applied to this transfer report. The historic diversions to Little Giant Ditch were assumed to be the same acre-feet per acre as the historic diversions off of the South Side Ditch.

Diversion records were collected by the US Bureau of Reclamation (USBR) for the South Side Ditch on a monthly basis over a 13-year period (data from the Reclamation Rapid Valley Project Histories for 1963–1968 and 1972–1978). These records were proportioned to represent the acre-feet diverted to the Little Giant Ditch and are included in Table 1-3. To determine the historic monthly delivery amount to the field, the estimated historic diversions to the ditch were then multiplied by the fraction of land (pro rata share) that Green Valley Estates encompasses within the water rights on the Little Giant Ditch minus estimated delivery losses (Equation 1-4). The Water License No. 2383-2 identifies that the 154-acre water right is approximately 30 percent of the 514.9 acres that were originally designated as irrigable under this right. Table 1-3 shows the amount of water available for transfer using this method of analysis with the South Side Ditch Company's diversion data.

$$\text{Monthly Pro Rata Share} = \text{Monthly Historic Diversion for Little Giant Ditch} \times \frac{154}{514.9} \times [1 - \text{Delivery Losses (9.8\%)}] \quad (1-4)$$

1.3 DELIVERY SYSTEM LOSSES

Delivery system losses were estimated in a 1989 USBR study to be 9.8 percent. This number has been consistently referenced in all of the previous transfers from the Rapid Valley Water Conservancy District.

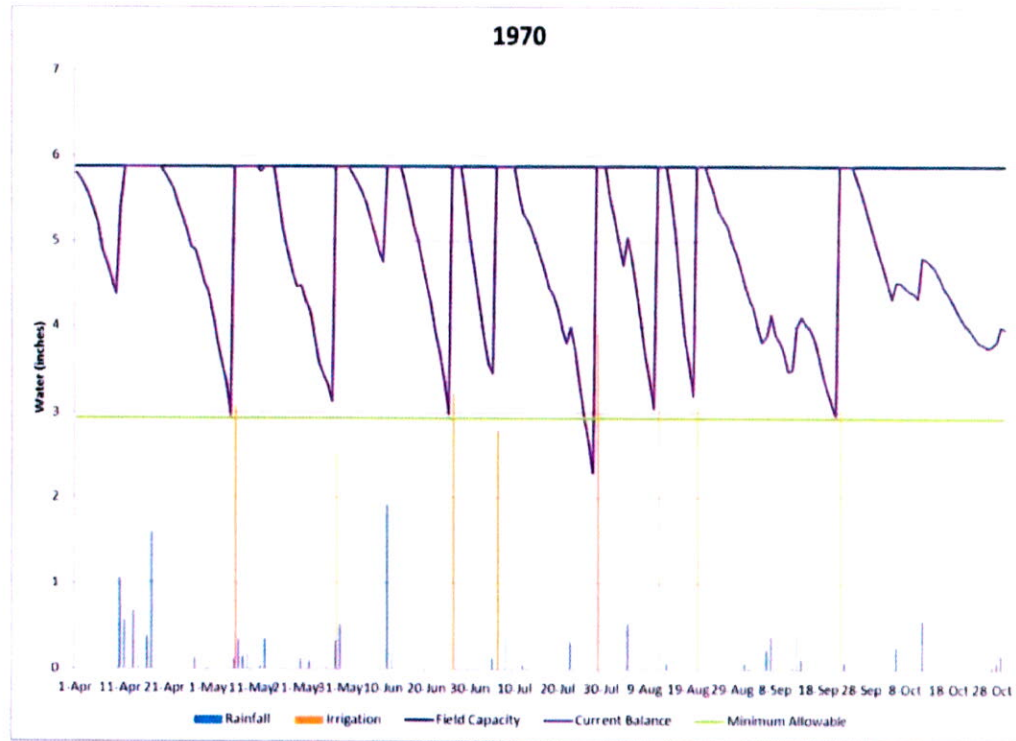


Figure 1-5. Water Balance Tracking for 1970 Irrigation Season.

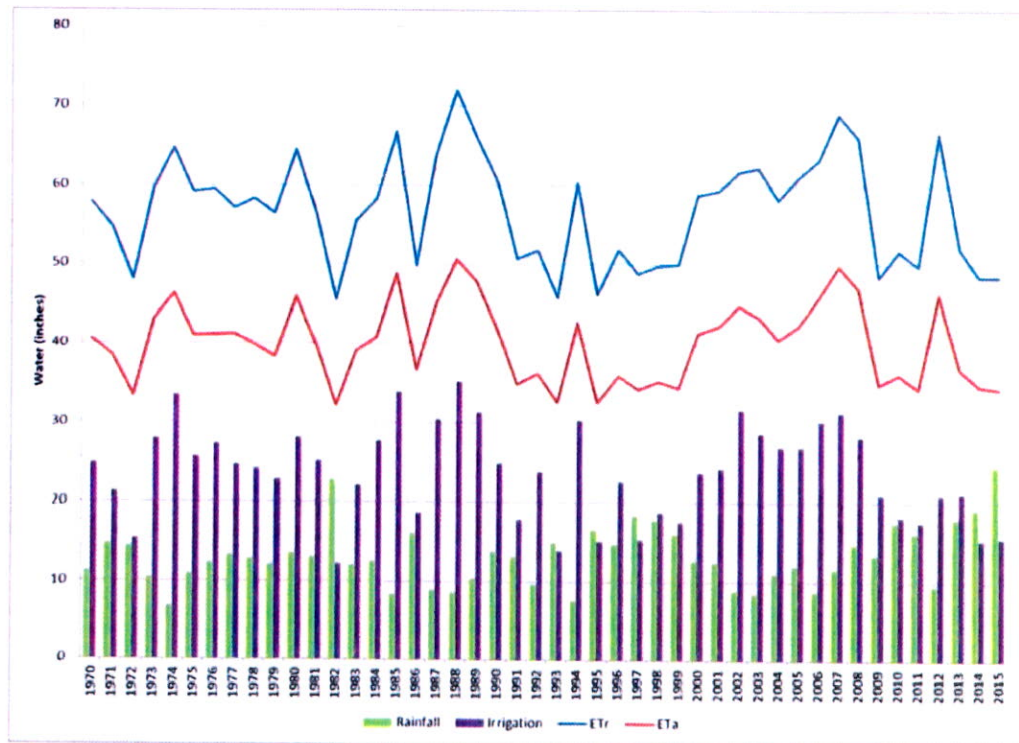


Figure 1-6. Total Values of Rainfall, Irrigation, Reference Evapotranspiration, and Actual Evapotranspiration During the Analysis Period of 1970–2015.

Table 1-2. Amount of Irrigation Demand Based on Historic Crop Water Use Analysis

	April	May	June	July	August	September	October	Total
Crop Demand (inches)	1.3	4.1	3.7	5.5	5.1	3.1	1.4	24.3
Crop Demand at 50 Percent Application Efficiency (inches)	2.7	8.3	7.4	11.0	10.2	6.3	2.7	48.6
Acre-Feet/Acre Crop Demand	0.22	0.69	0.62	0.92	0.85	0.52	0.23	
Number of Acres	154	154	154	154	154	154	154	
Acre-Feet of Crop Demand	34.0	105.9	95.5	141.5	131.1	80.7	35.2	623.9
Days of Delivery	15	31	30	31	31	30	31	199
CFS Equivalent	1.14	1.72	1.61	1.23	1.36	0.57		

CFS = cubic feet per second.

Table 1-3. Historic Diversions and Monthly Pro Rata Share Available for Transfer Water Right Based on Historic Diversion Records for the South Side Ditch Company

	April	May	June	July	August	September	October	Total
Historic Diversions To Ditch (Acre-Feet)		96	146	175	222	146		785
Pro Rata Share of Historic Diversions Minus Ditch Loss (Acre-Feet)	0	25.9	39.4	47.2	59.8	39.4	0	211.7



2.0 WATER RIGHTS AVAILABLE FOR TRANSFER

An engineering analysis was completed to determine the water rights that were available for transfer from Green Valley Estates located within Sections 23, Township 1 North, Range 8 East of the Black Hills Meridian, Pennington County, South Dakota. To complete this analysis, the historic crop water use for the 154 acre parcel and historic diversion records to the South Side Ditch prorated to Little Giant Ditch (based on acres) were assessed. Table 2-1 provides a monthly summary of the findings in acre-feet, subtracting out the 9.8 percent delivery losses and the irrigation rights available for transfer in acre-feet and cfs. The irrigation rights to be transferred was found by taking the lesser of the two analyses (i.e., crop water use or diversions), except in April and October when the crop water use amount was used because no historic delivery records were available.

The analysis determined that 280.9 acre-feet of water (approximately 1.8 acre-feet per acre) can be transferred annually from the property to diversion points within Rapid City (Table 2-2 and illustrated in Figure 2-1) from April 15 to November 1, not to exceed a prorated acreage share of 1.42 cfs. A total annual volume of 140.4 acre-feet is available for transfer to Pactola Reservoir storage.

Table 2-1. Irrigation Amounts Available for Transfer From the City of Rapid City Property

Row	Description	April	May	June	July	August	September	October	Total
A ^(a)	Historic Diversions to Ditch (Acre-Feet)		96	146	175	222	146		785
B ^(b)	Pro Rata Share of Historic Diversions Minus Ditch Loss (Acre-Feet)	0	25.9	39.4	47.2	59.8	39.4	0	211.7
C ^(c)	Crop Demand Minus Ditch Loss (Acre-Feet)	34.0	105.9	95.5	141.5	131.1	80.7	35.2	623.9
D ^(d)	Irrigation Right to Be Transferred to Diversion Points in Rapid City Minus Upstream Return Flows (Acre=Feet)	34.0	25.9	39.4	47.2	59.8	39.4	35.2	280.9
E ^(e)	Irrigation Right to Be Transferred to Pactola Reservoir (Acre-Feet)	17.0	12.9	19.7	23.6	29.9	19.7	17.6	140.4
F ^(f)	Irrigation Right to Be Transferred to Diversion Points in Rapid City (cfs)	0.57	0.42	0.66	0.77	0.97	0.66	0.57	

- (a) Taken from previous South Side Ditch water rights transfers and calculated for Little Giant Ditch acreage outlined in Section 1.2.
- (b) Calculated by multiplying Row A by the ratio of acres to be transferred to the total irrigated acres validated.
- (c) Calculated using an online irrigation scheduling tool outlined in Section 1.1.
- (d) The lesser of Row B and C are used, except for April and October when no diversion data were available.
- (e) Multiply Row D by assumed irrigation efficiency of 50 percent.
- (f) Multiply Row D by conversion factor.



Table 2-2. Approximate Locations of City of Rapid City Diversion Points/Galleries

Location Name	Location
Jackson Springs Gallery	NW¼ SE¼ Section 8
Girl Scout Gallery	SW¼ SW¼ Section 3
Mountain View Water Treatment Plant	SE¼ NE¼ Section 3

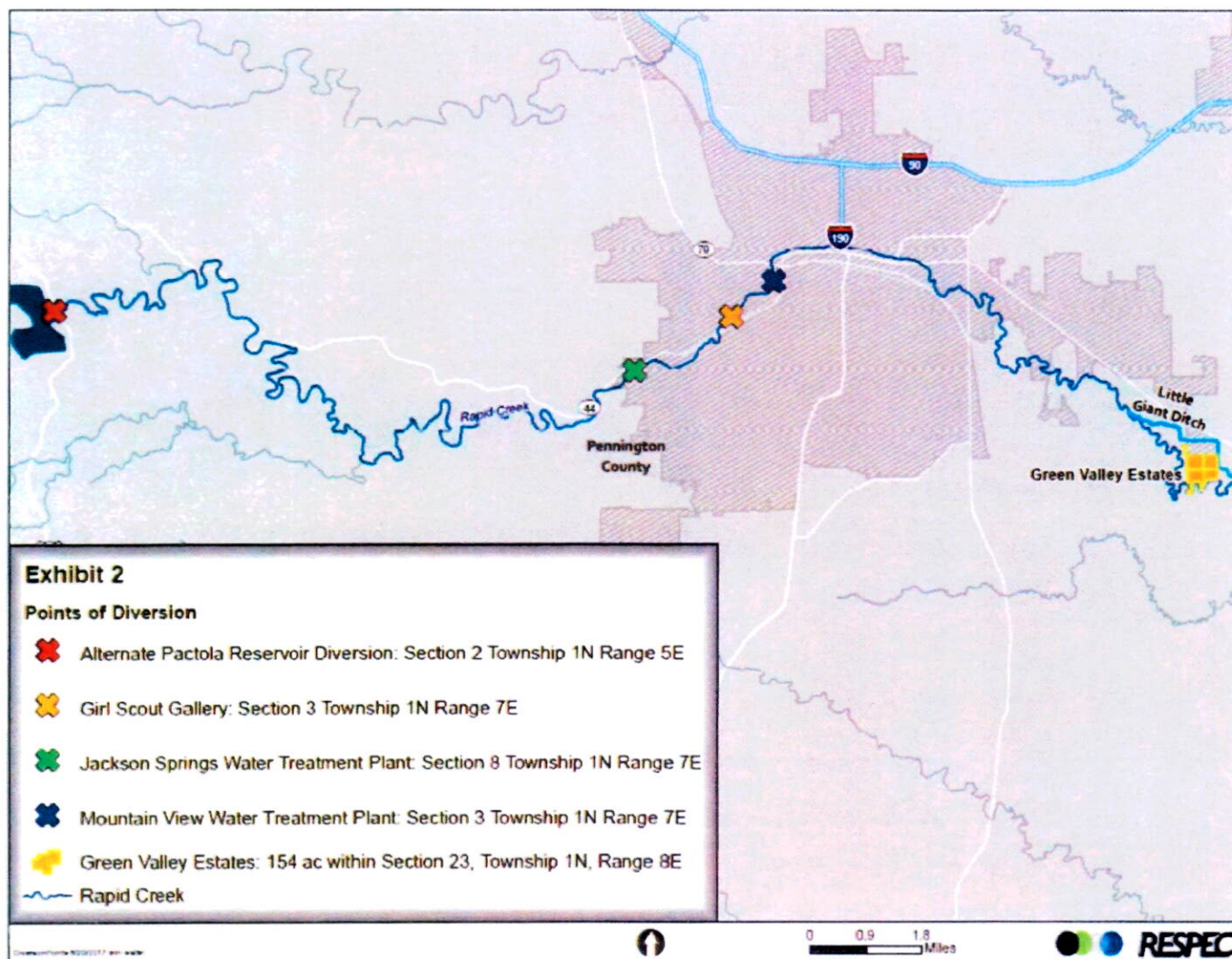


Figure 2-1. City of Rapid City Diversion Points.



APPENDIX A

HISTORIC CROP WATER USE BY YEAR



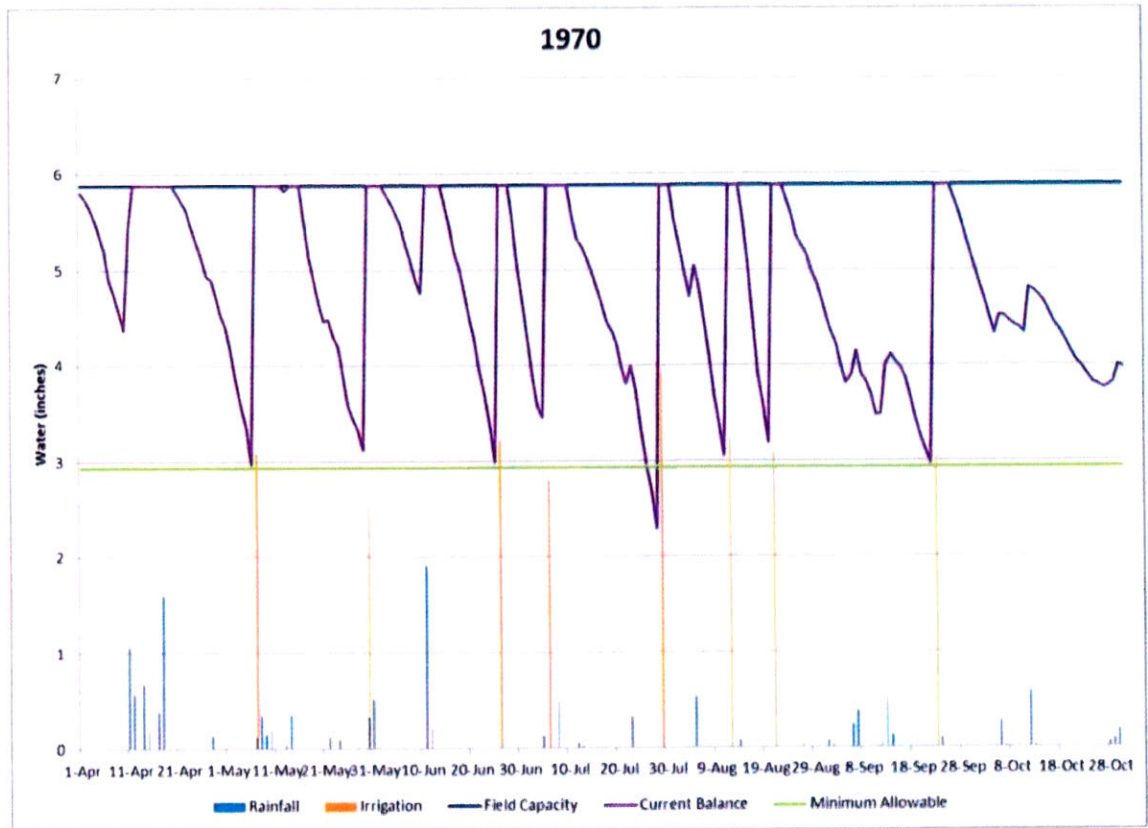


Figure A-1. Crop Water Use Calculation for Year 1970.

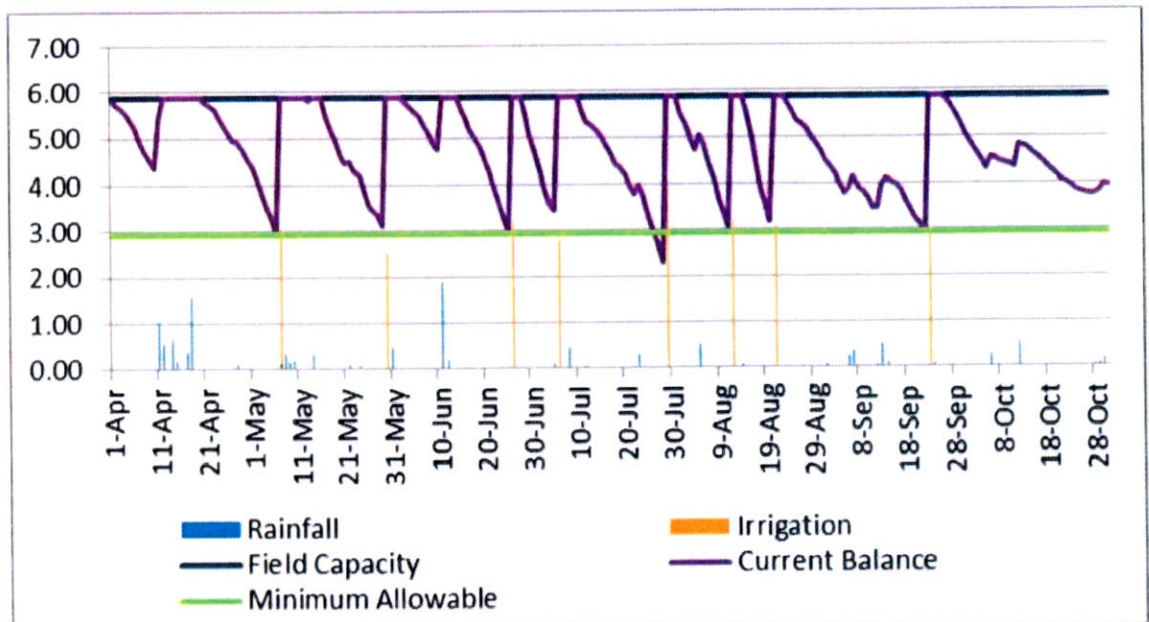


Figure A-2. Crop Water Use Calculation for Year 1971.

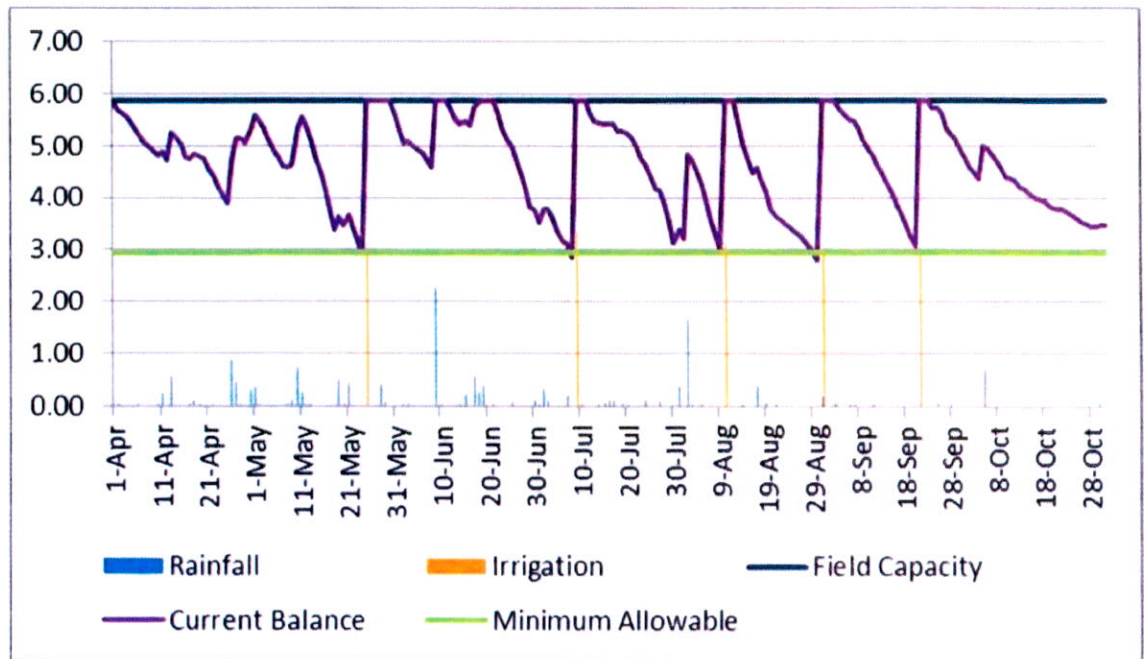


Figure A-3. Crop Water Use Calculation for Year 1972.

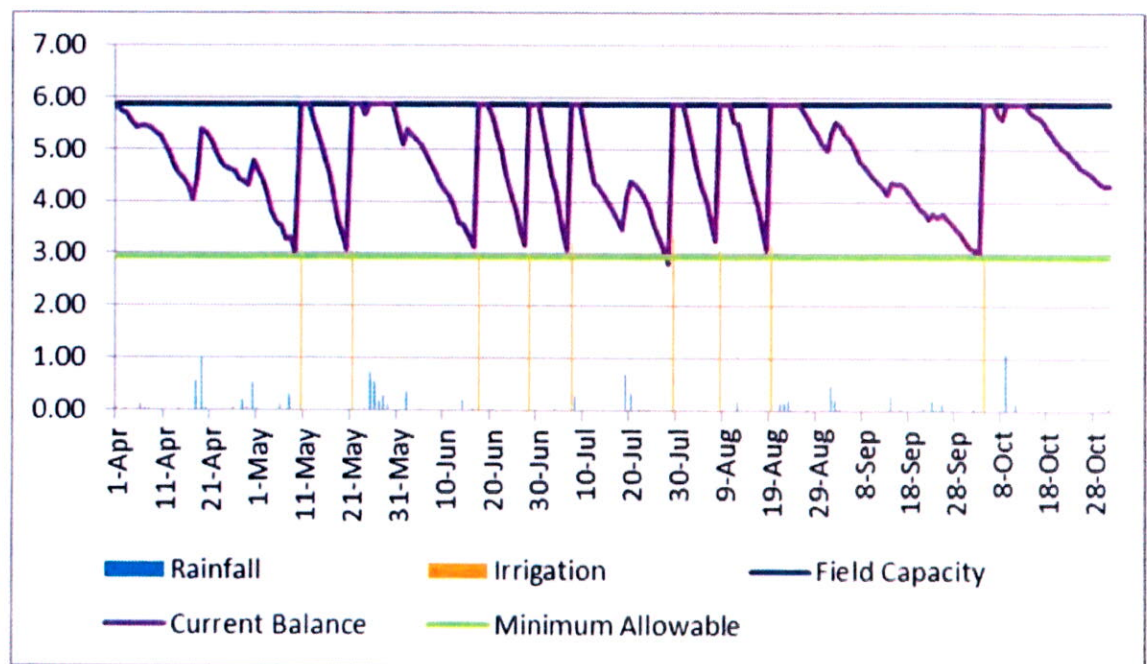


Figure A-4. Crop Water Use Calculation for year 1973.

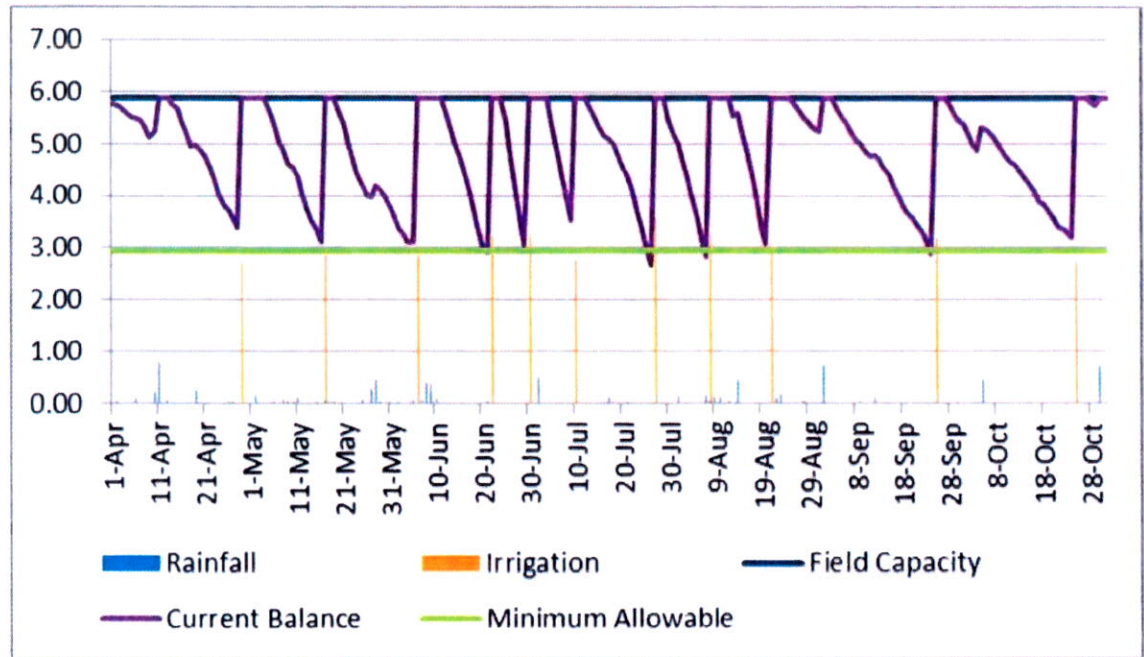


Figure A-5. Crop Water Use Calculation for Year 1974.

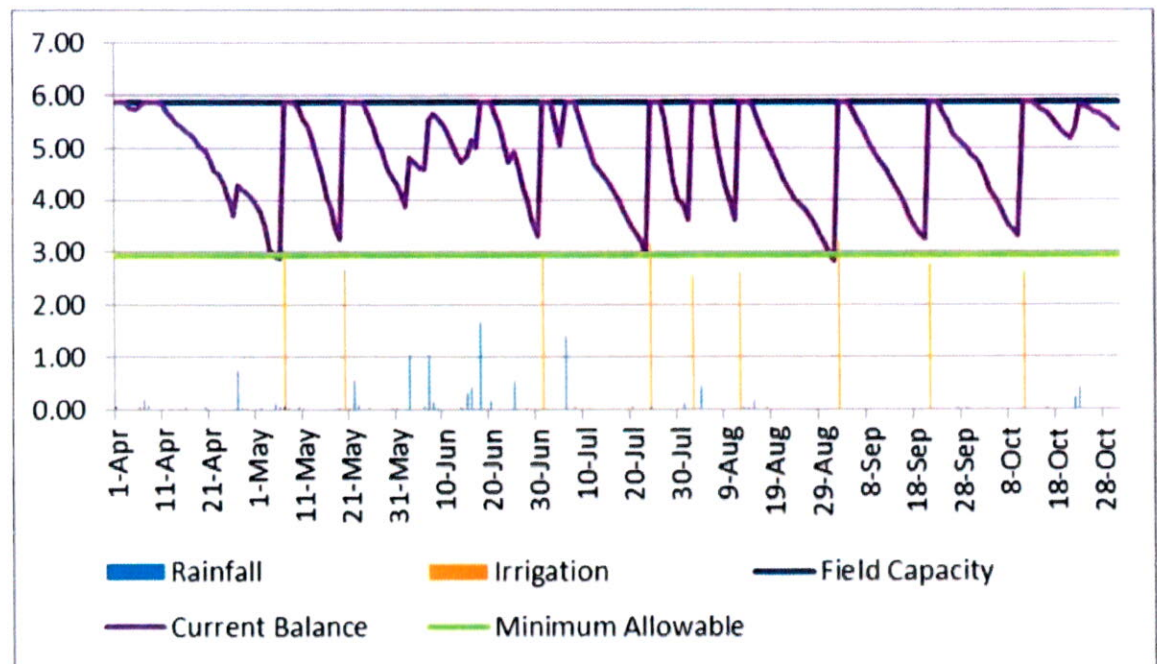


Figure A-6. Crop Water Use Calculation for Year 1975.

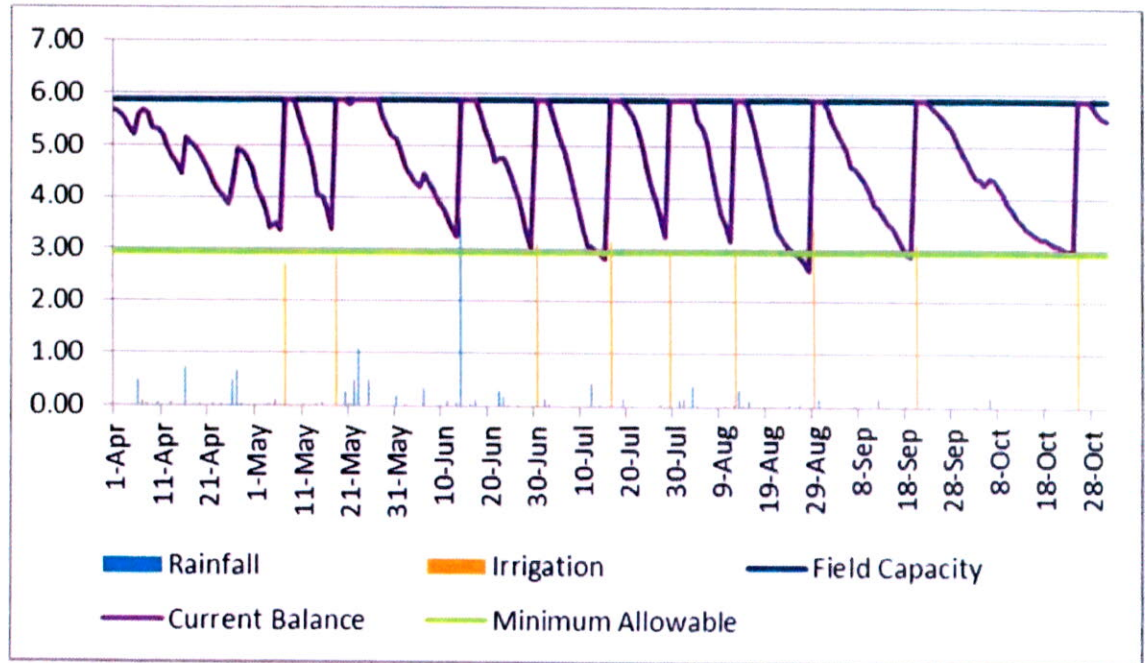


Figure A-7. Crop Water Use Calculation for Year 1976.

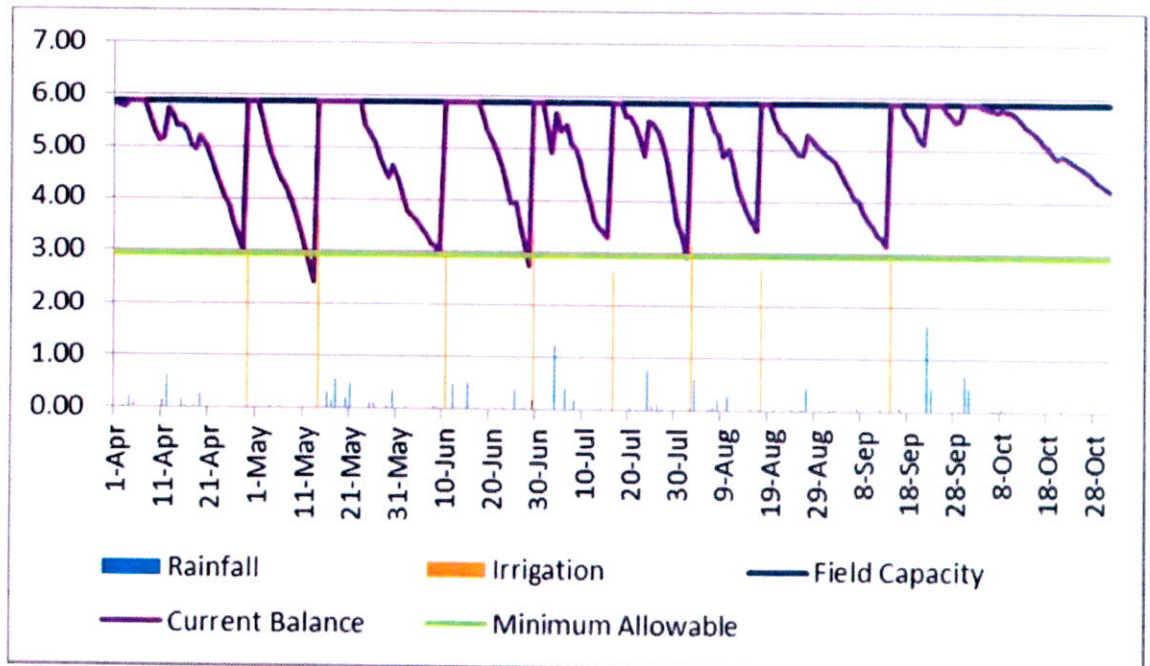


Figure A-8. Crop Water Use Calculation for Year 1977.

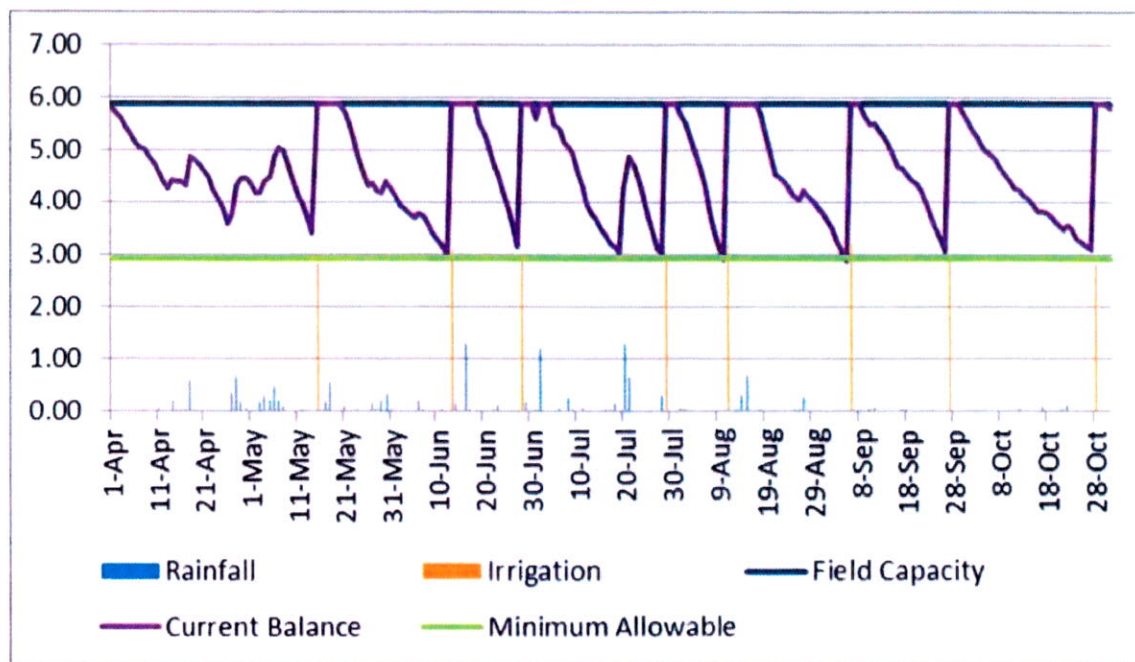


Figure A-9. Crop Water Use Calculation for Year 1978.

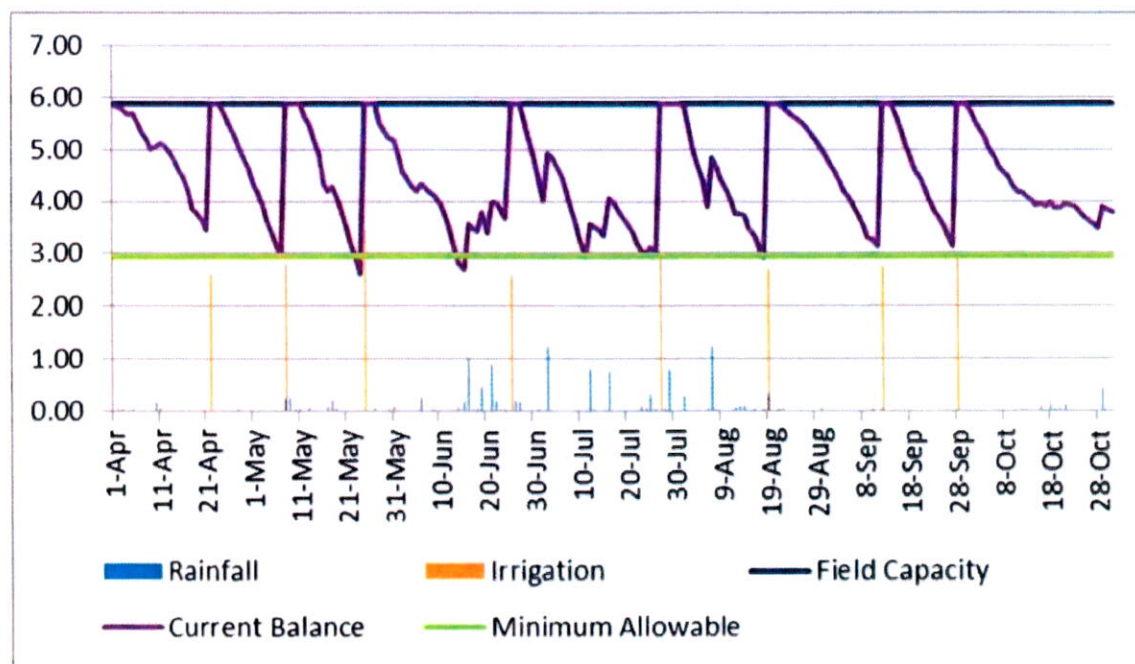


Figure A-10. Crop Water Use Calculation for Year 1979.

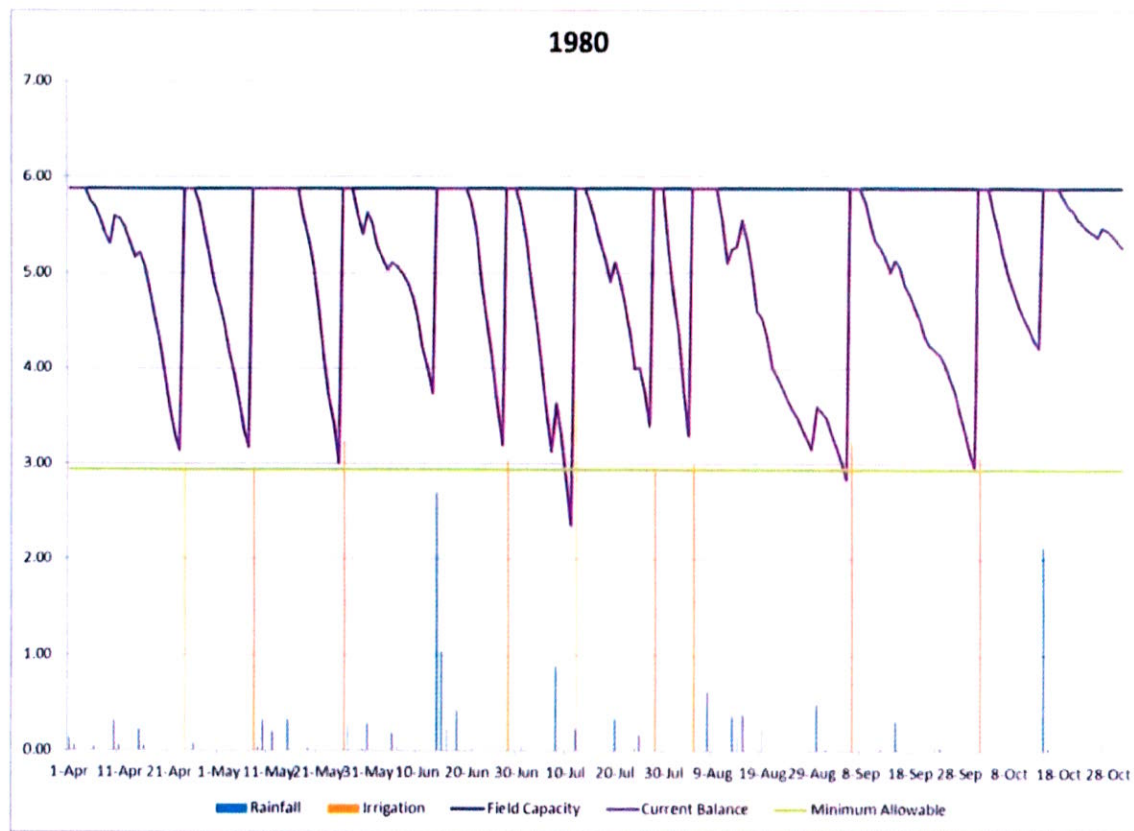


Figure A-11. Crop Water Use Calculation for Year 1980.

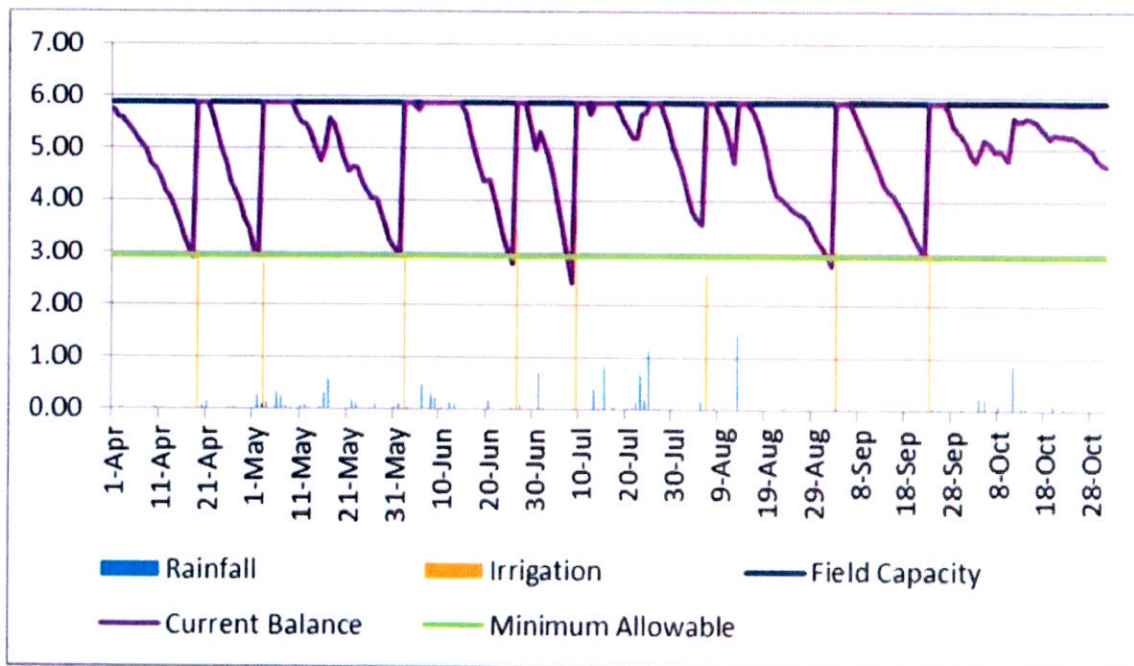


Figure A-12. Crop Water Use Calculation for Year 1981.

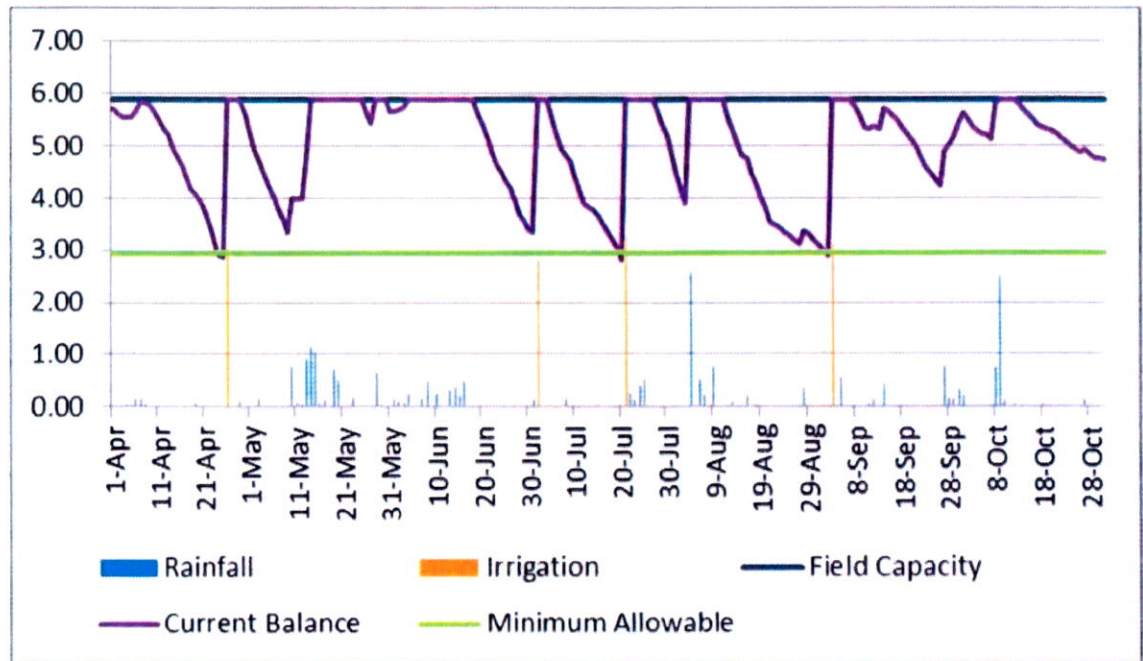


Figure A-13. Crop Water Use Calculation for Year 1982.

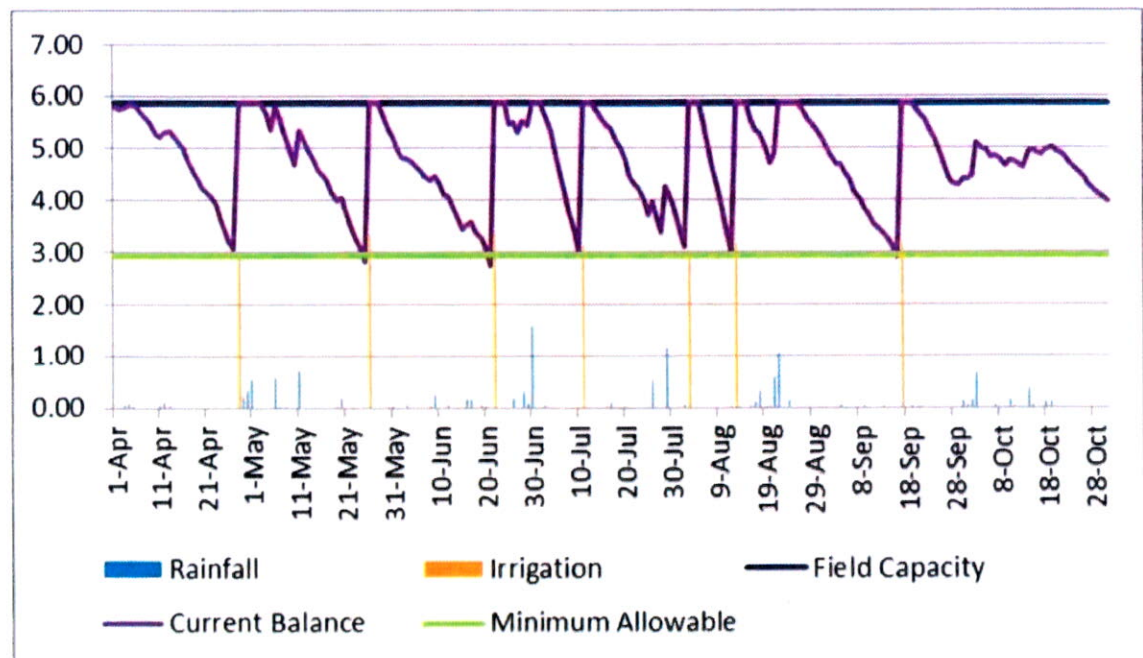


Figure A-14. Crop Water Use Calculation for Year 1983.

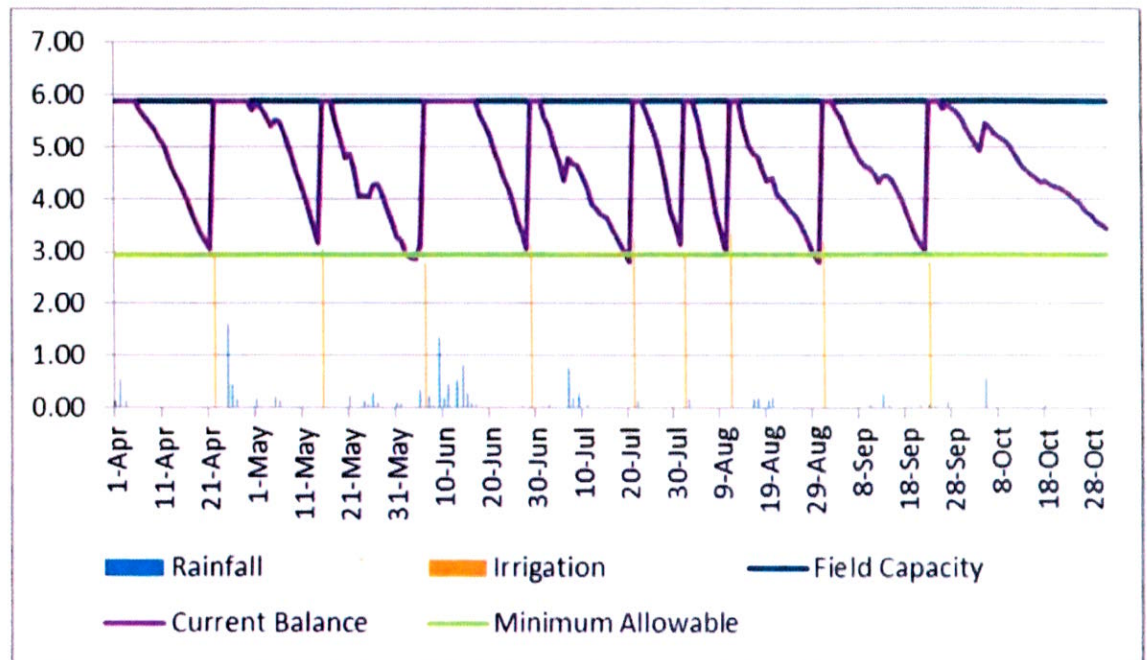


Figure A-15. Crop Water Use Calculation for Year 1984.

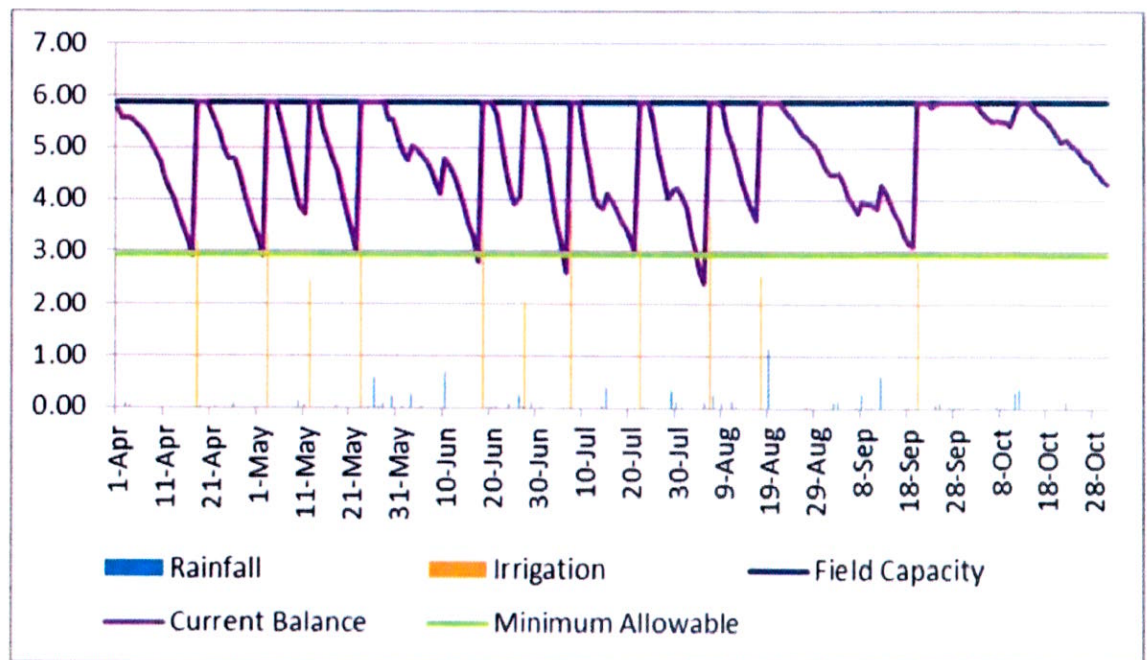


Figure A-16. Crop Water Use Calculation for Year 1985.

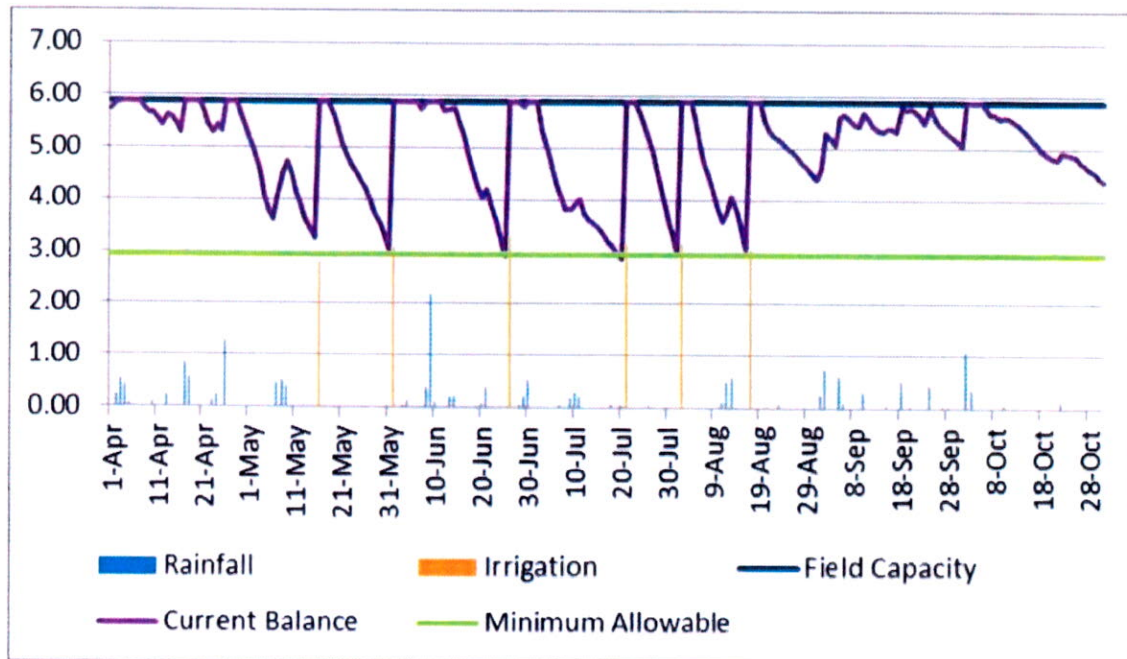


Figure A-17. Crop Water Use Calculation for Year 1986.

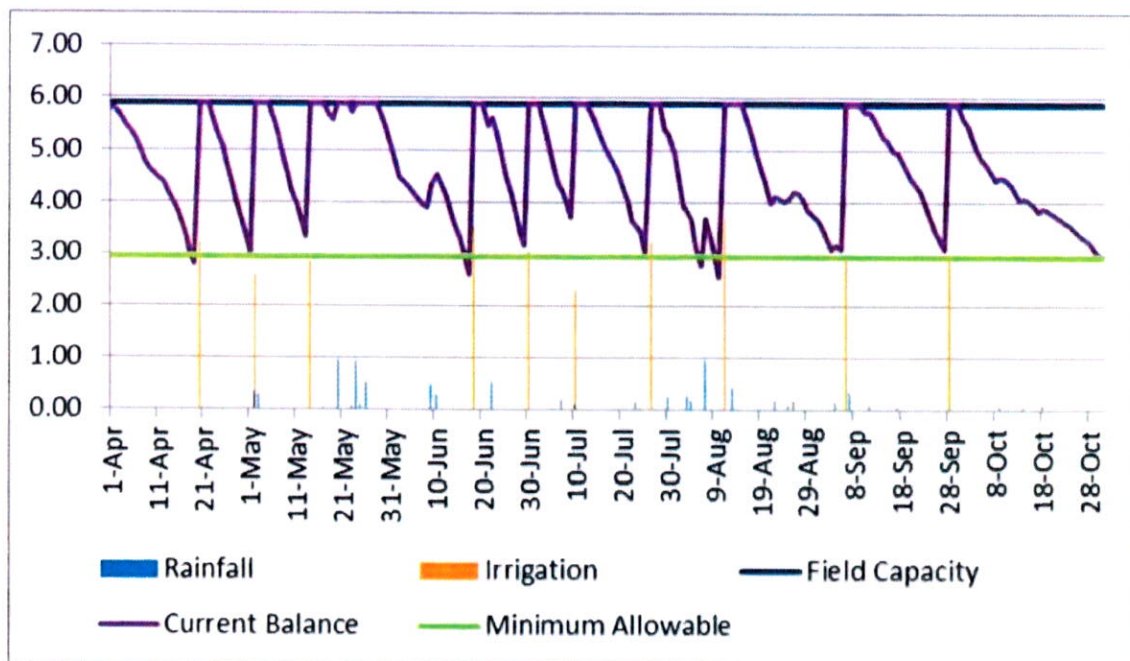


Figure A-18. Crop Water Use Calculation for Year 1987.

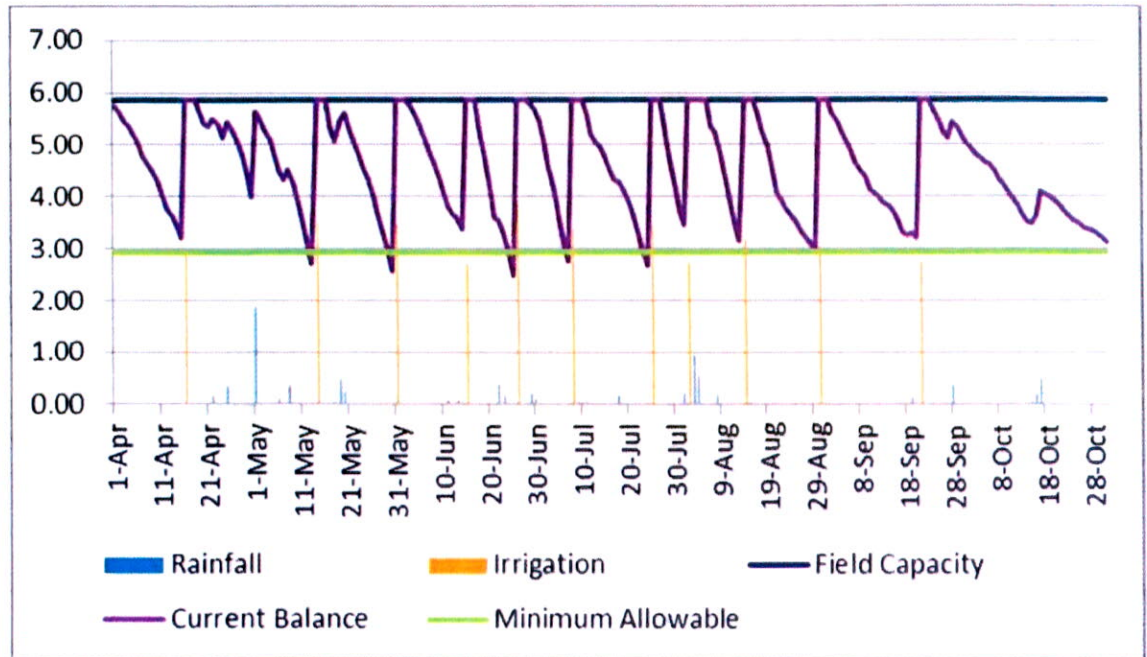


Figure A-19. Crop Water Use Calculation for Year 1988.

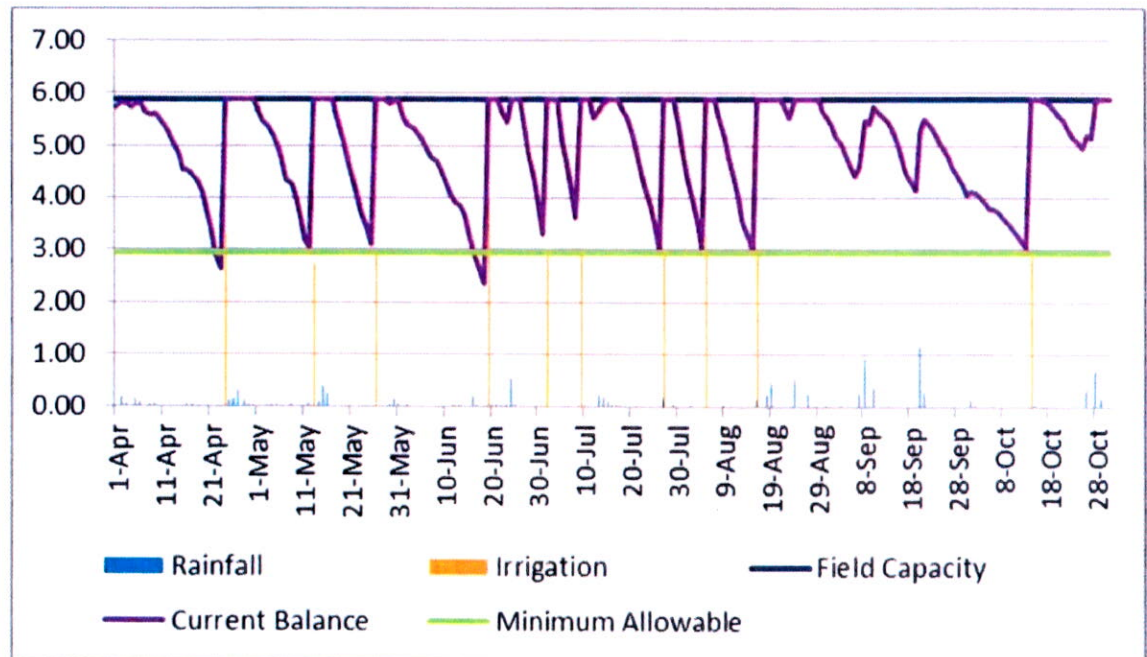


Figure A-20. Crop Water Use Calculation for Year 1989.

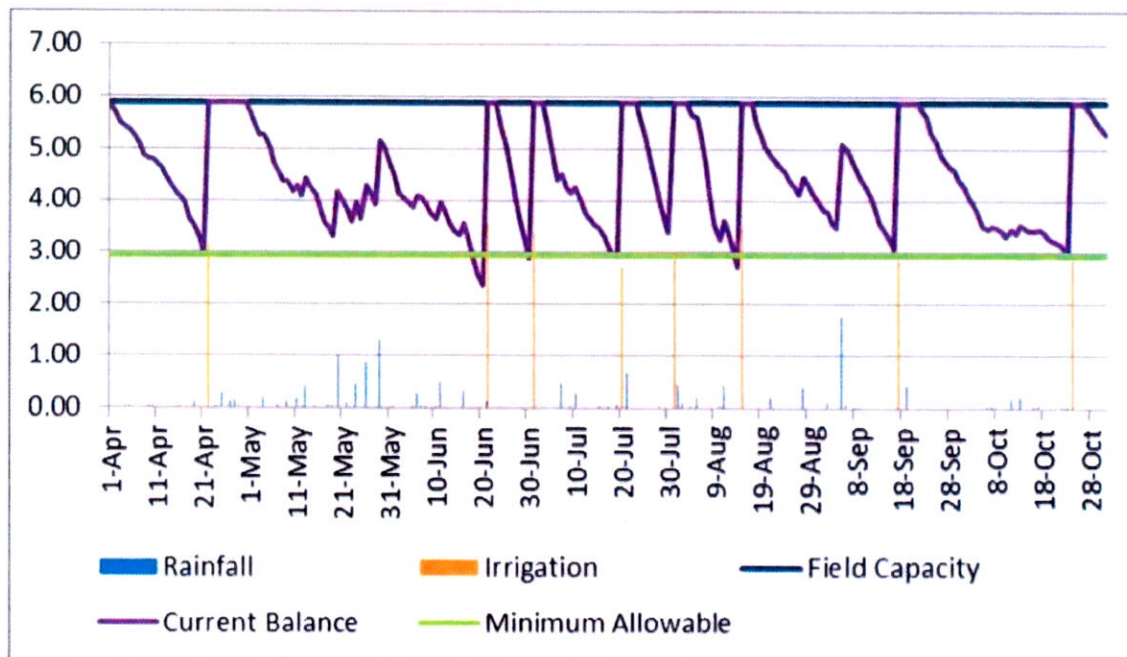


Figure A-21. Crop Water Use Calculation for Year 1990.

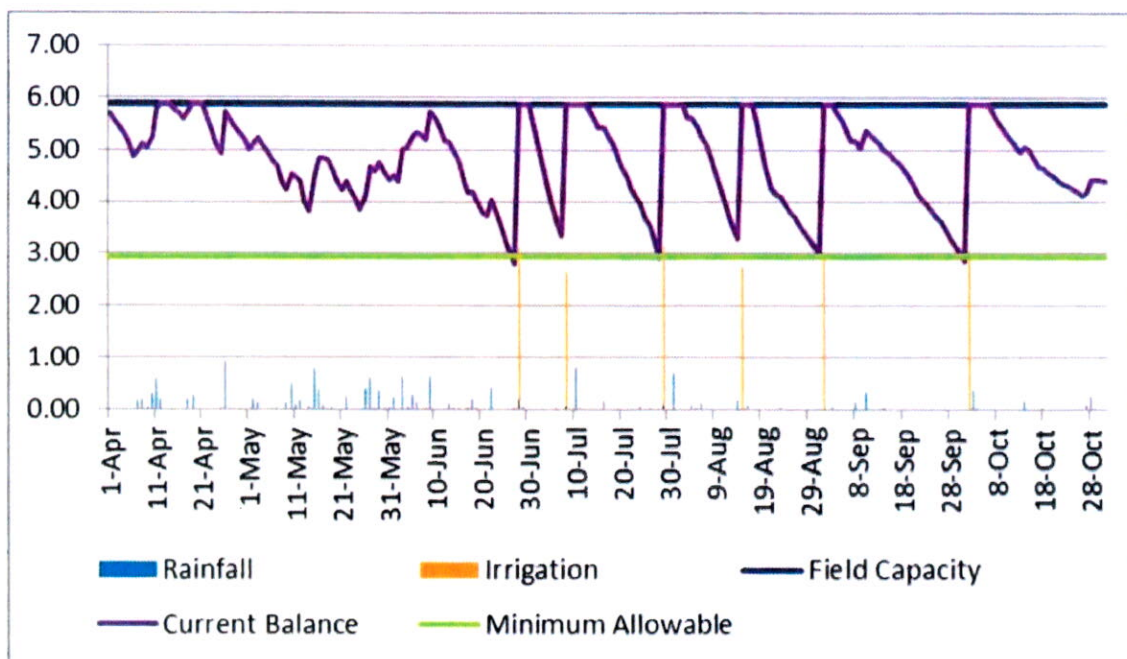


Figure A-22. Crop Water Use Calculation for Year 1991.

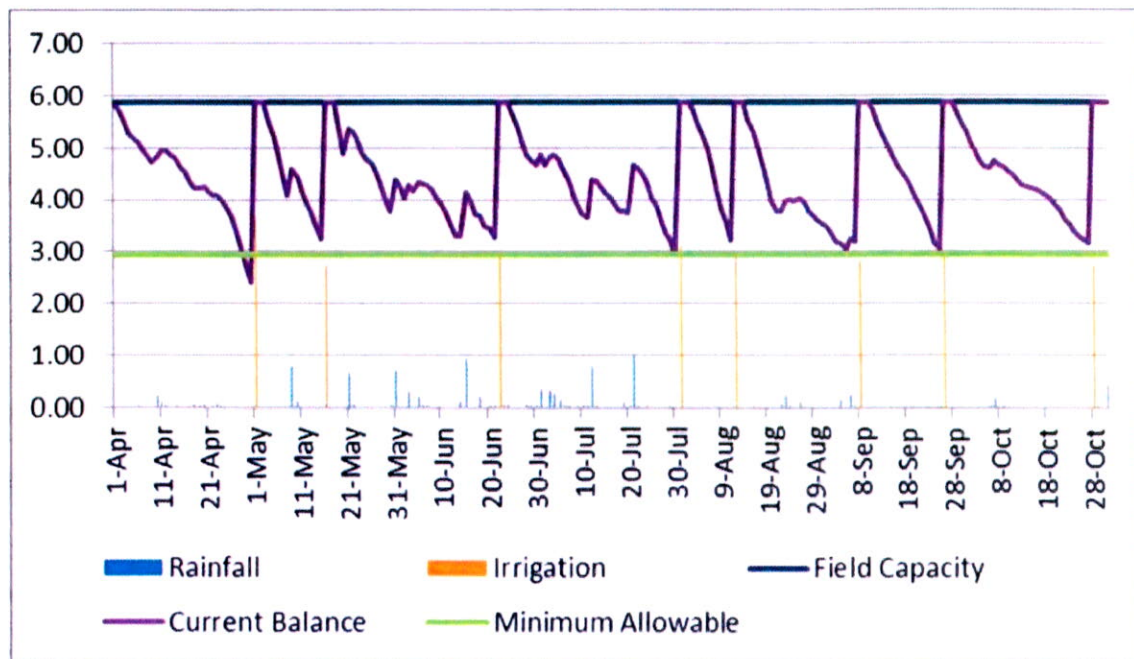


Figure A-23. Crop Water Use Calculation for Year 1992.

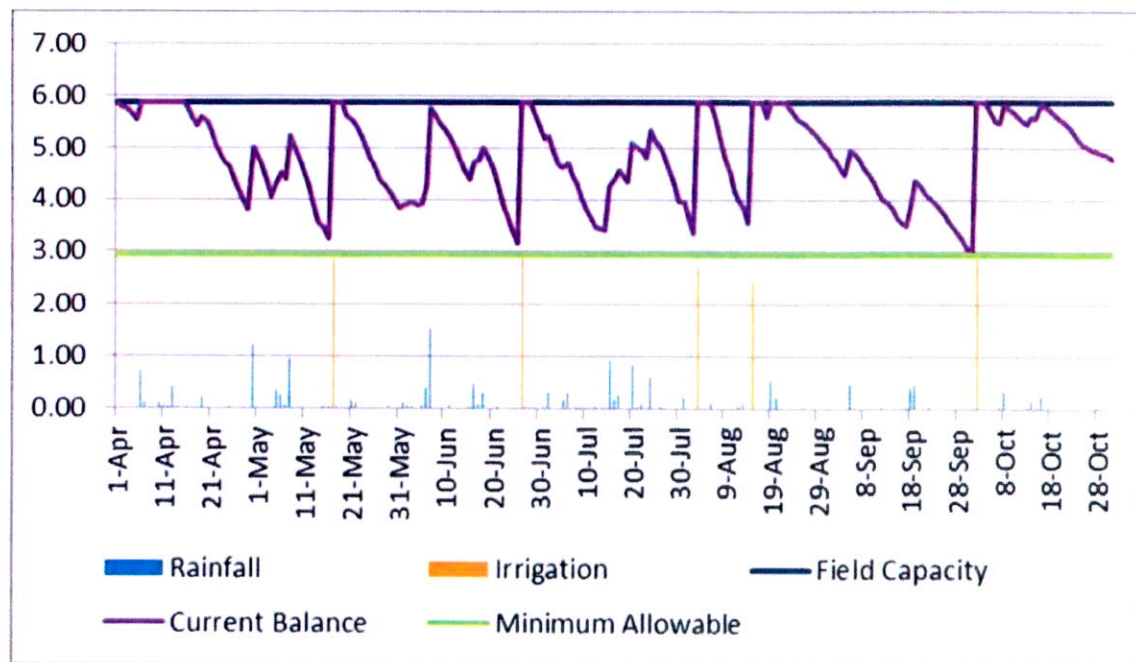


Figure A-24. Crop Water Use Calculation for Year 1993.

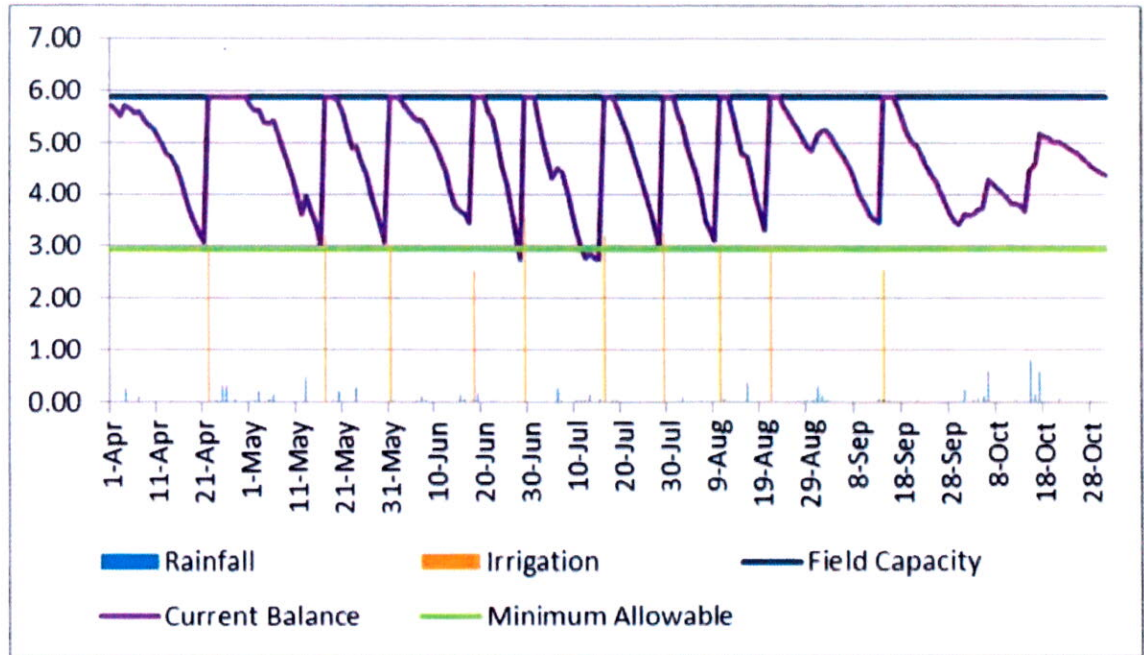


Figure A-25. Crop Water Use Calculation for Year 1994.

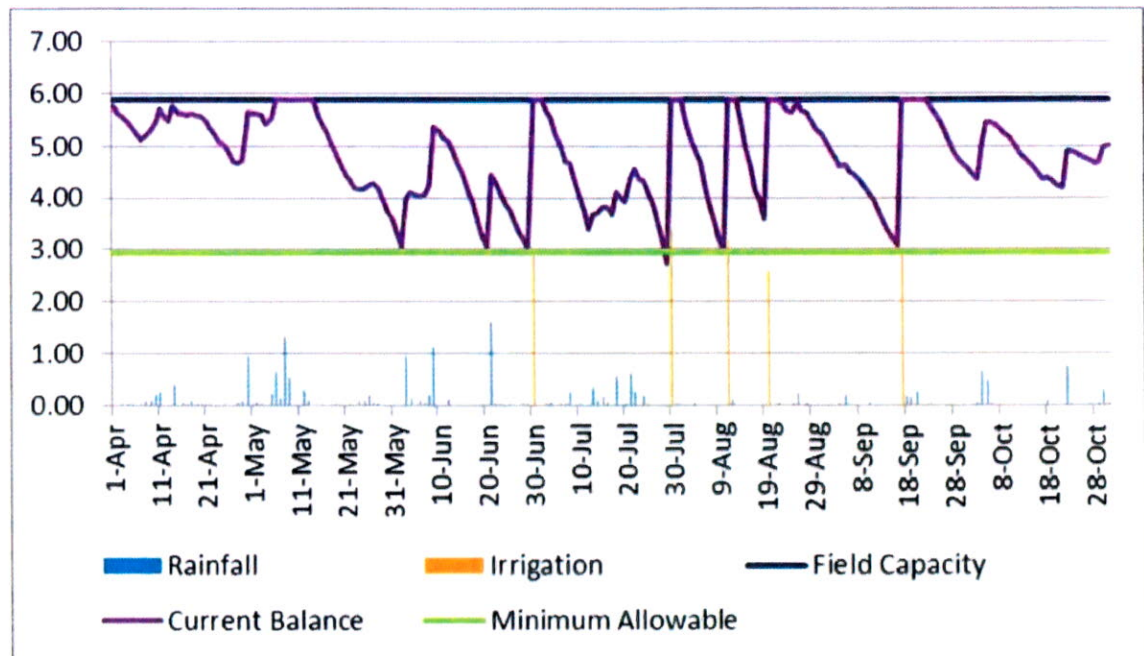


Figure A-26. Crop Water Use Calculation for Year 1995.

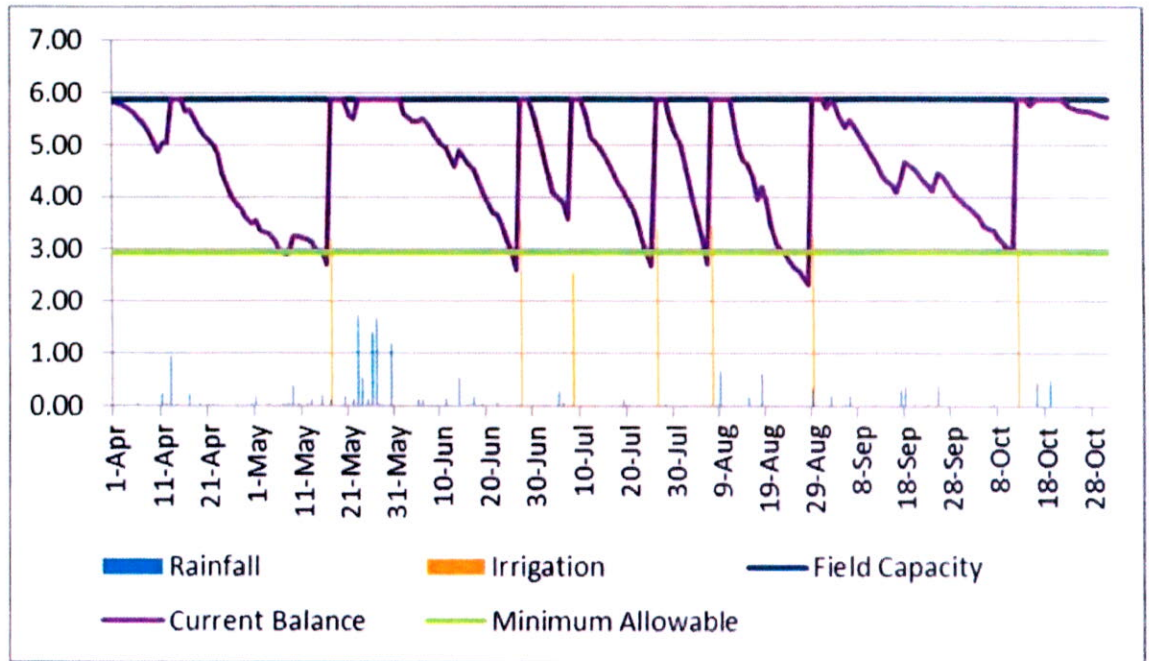


Figure A-27. Crop Water Use Calculation for Year 1996.

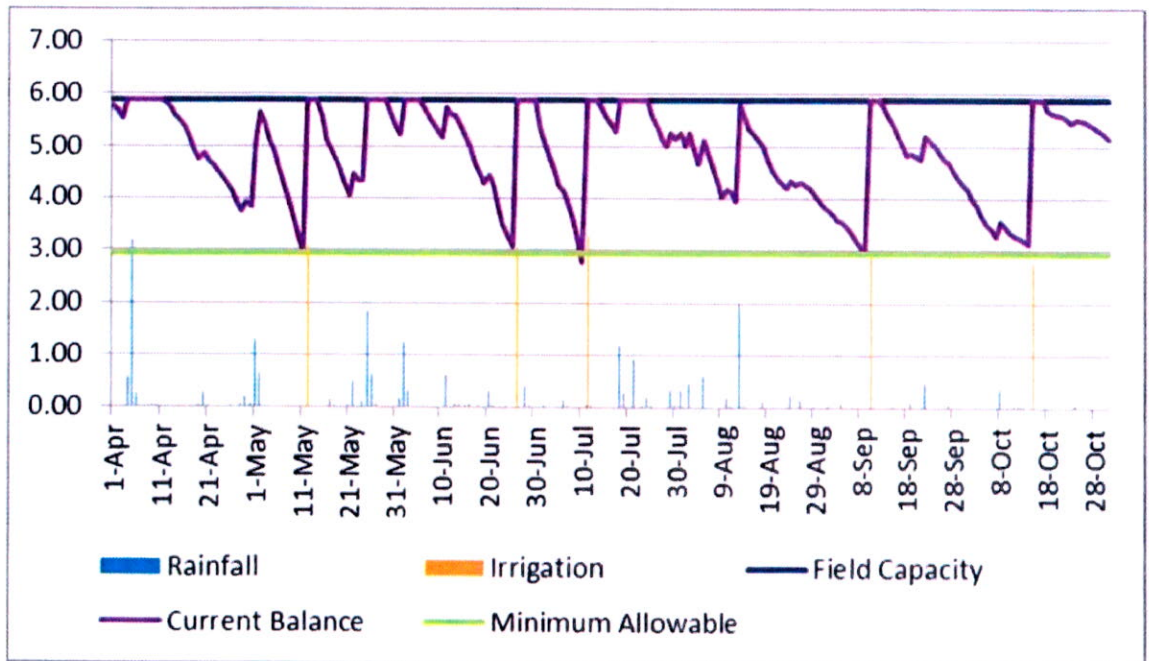


Figure A-28. Crop Water Use Calculation for Year 1997.

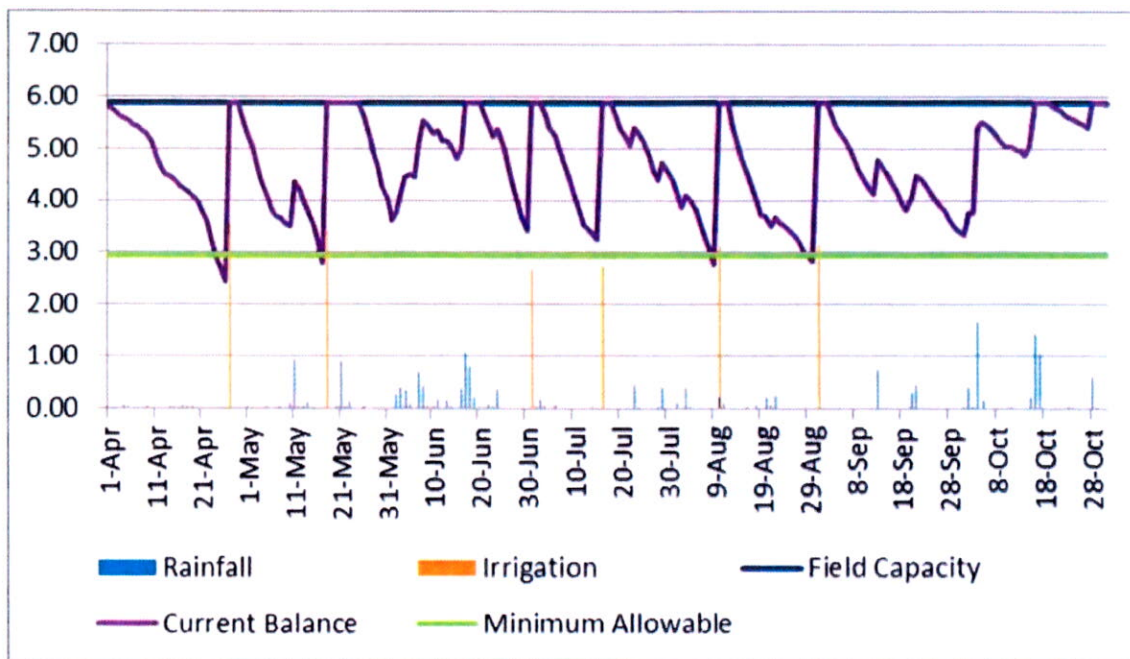


Figure A-29. Crop Water Use Calculation for Year 1998.

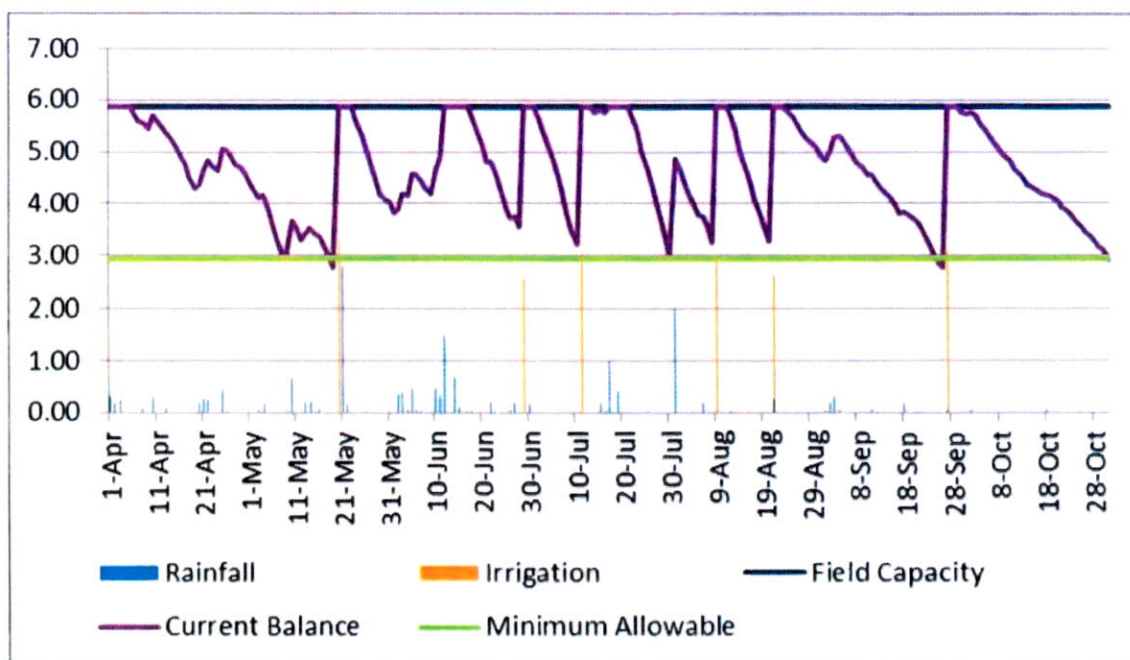


Figure A-30. Crop Water Use Calculation for Year 1999.

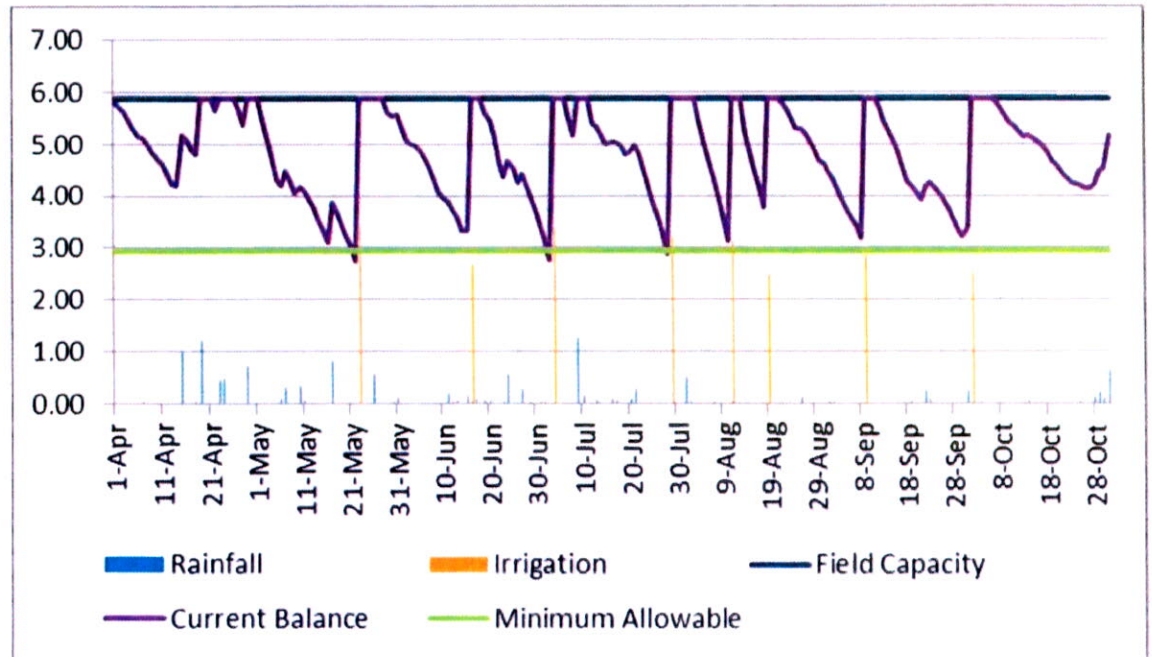


Figure A-31. Crop Water Use Calculation for Year 2000.

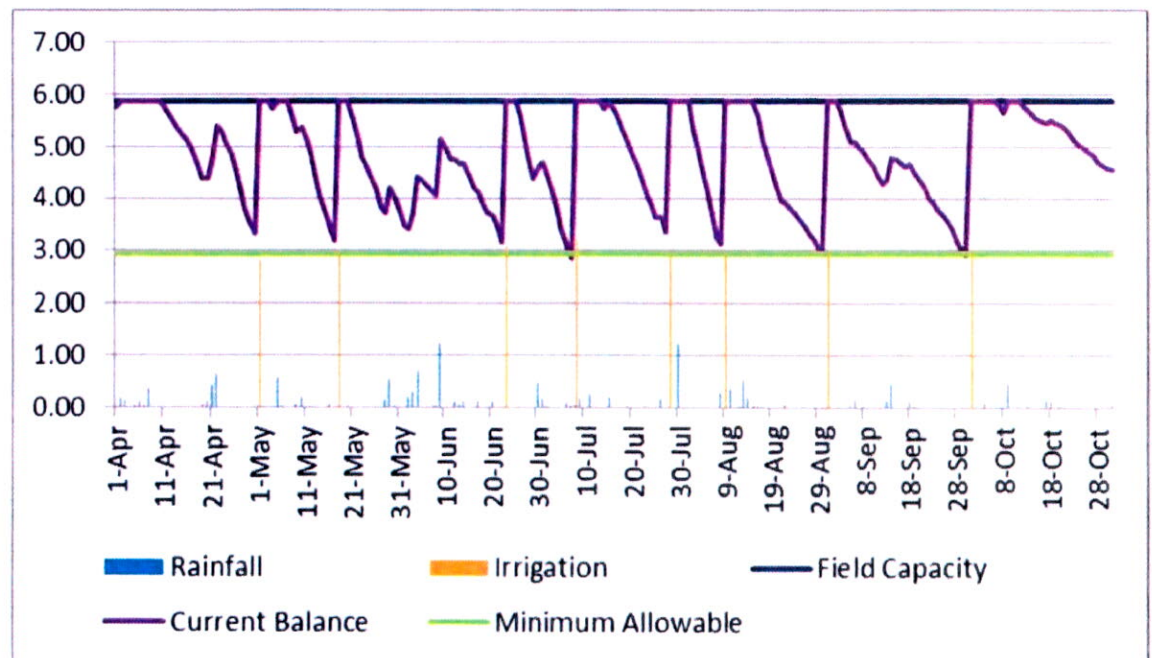


Figure A-32. Crop Water Use Calculation for Year 2001.

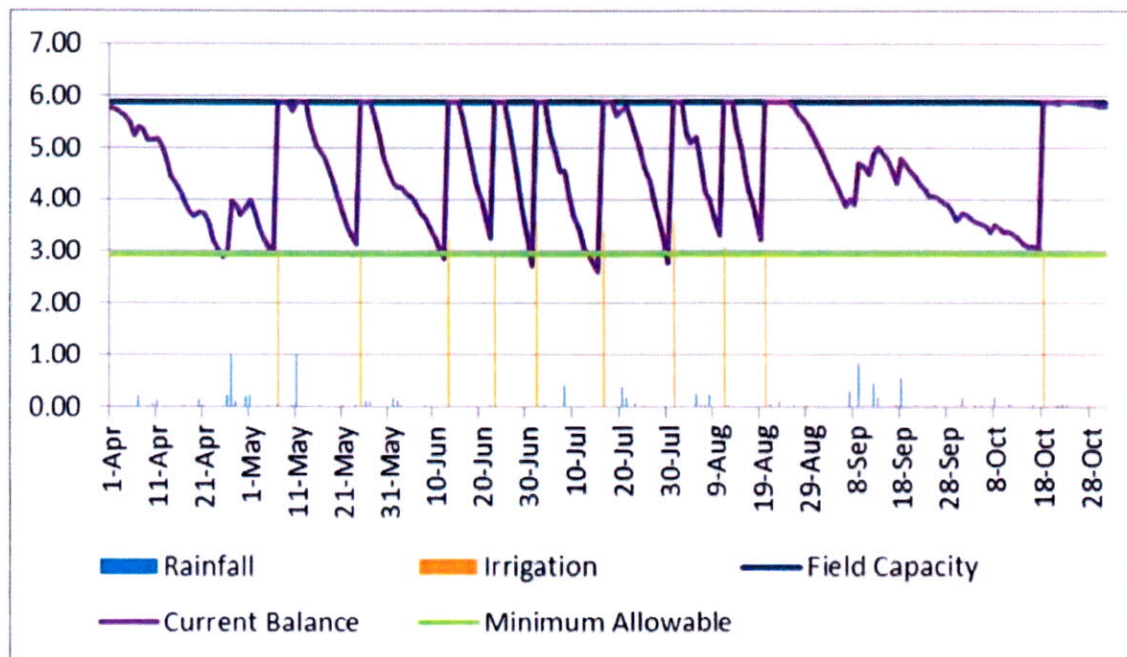


Figure A-33. Crop Water Use Calculation for Year 2002.

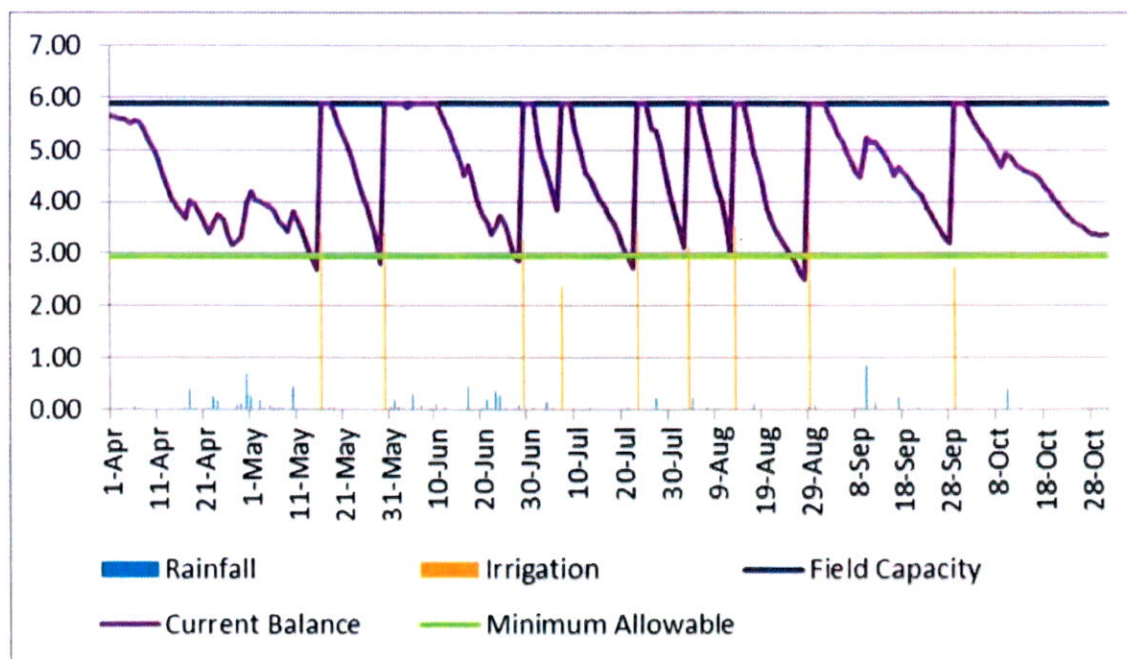


Figure A-34. Crop Water Use Calculation for Year 2003.

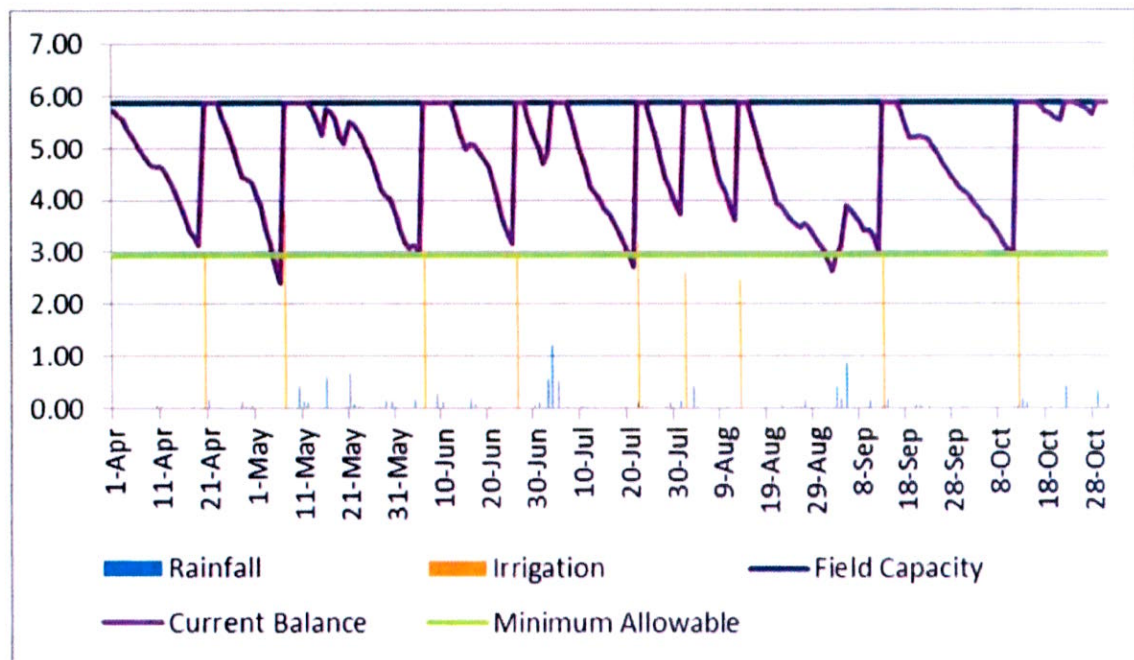


Figure A-35. Crop Water Use Calculation for Year 2004.

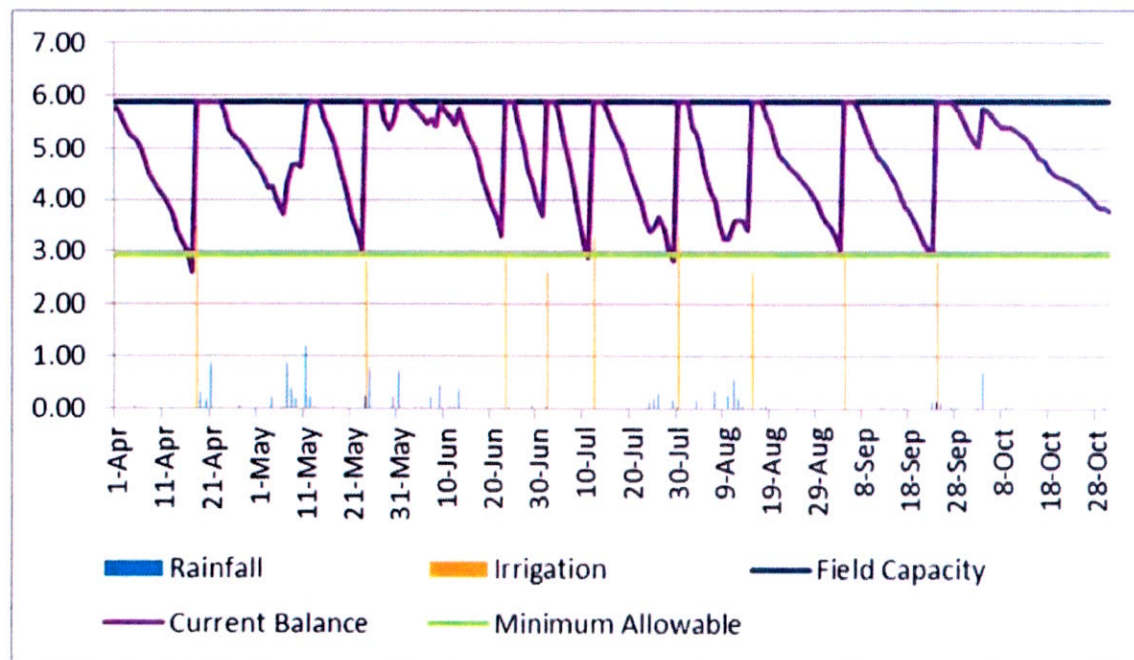


Figure A-36. Crop Water Use Calculation for Year 2005.

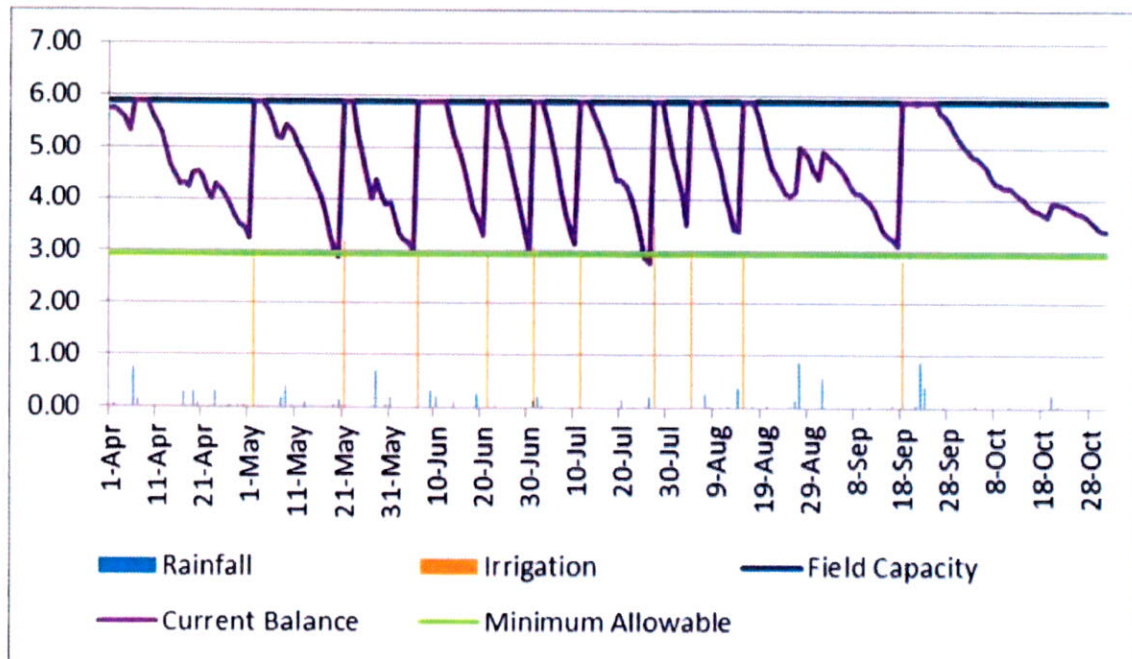


Figure A-37. Crop Water Use Calculation for Year 2006.

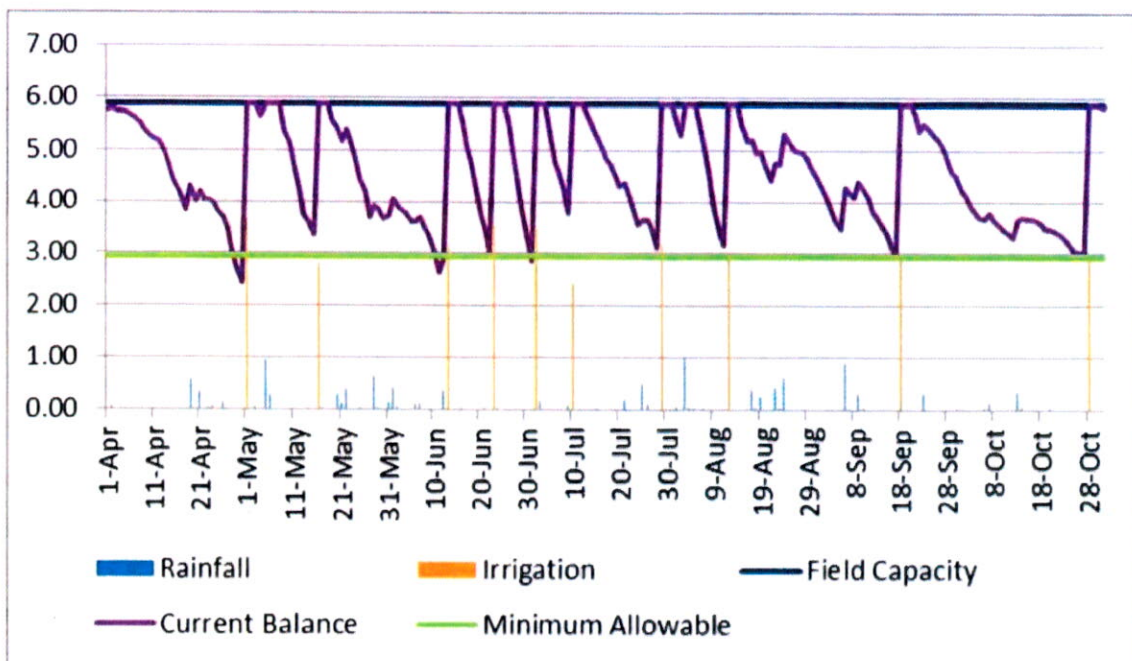


Figure A-38. Crop Water Use Calculation for Year 2007.

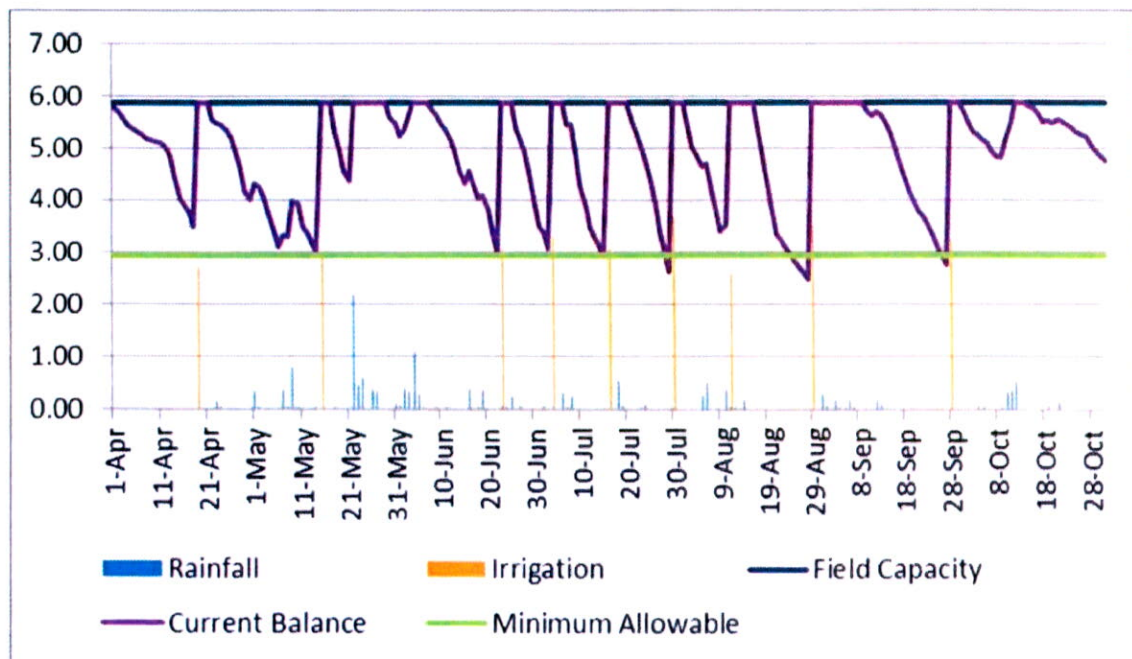


Figure A-39. Crop Water Use Calculation for Year 2008.

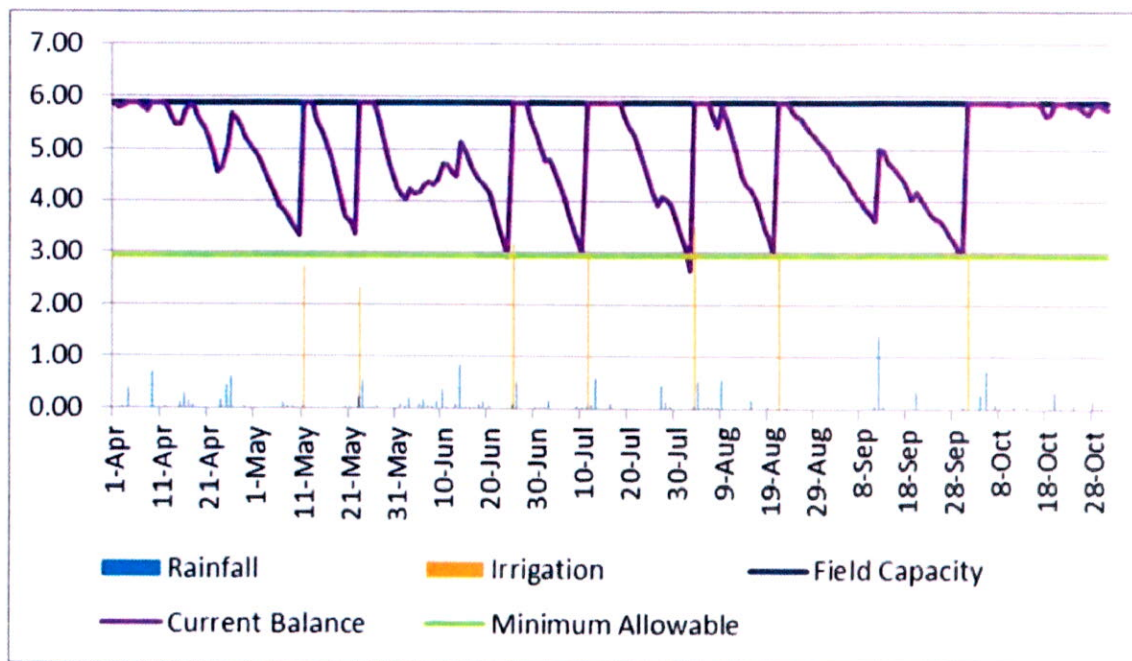


Figure A-40. Crop Water Use Calculation for Year 2009.

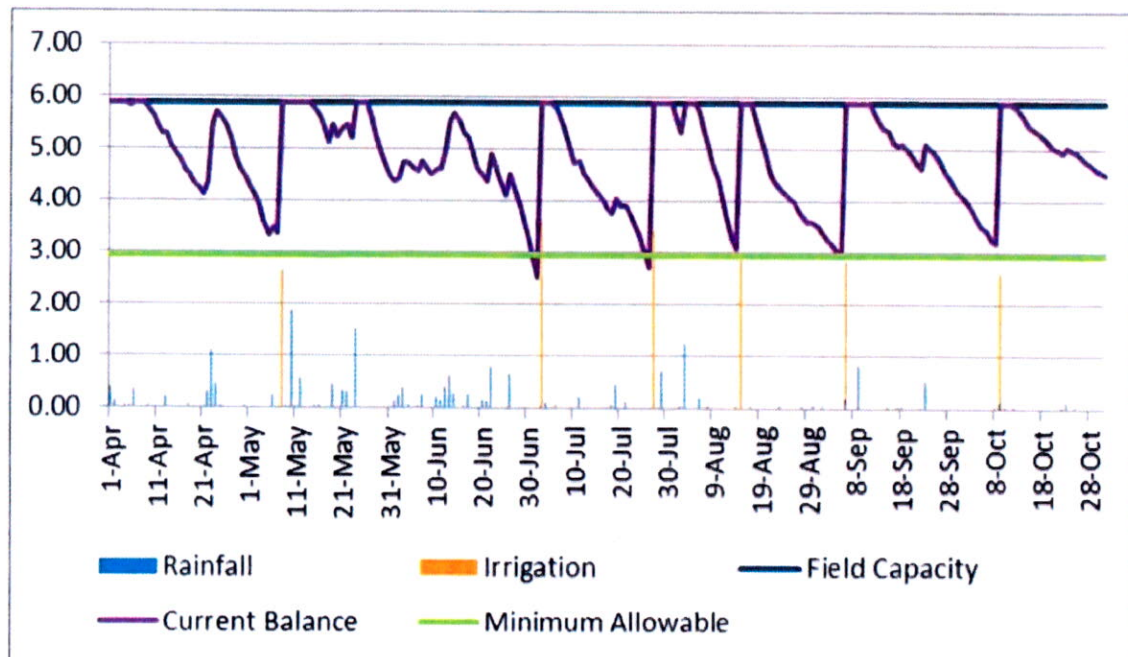


Figure A-41. Crop Water Use Calculation for Year 2010.

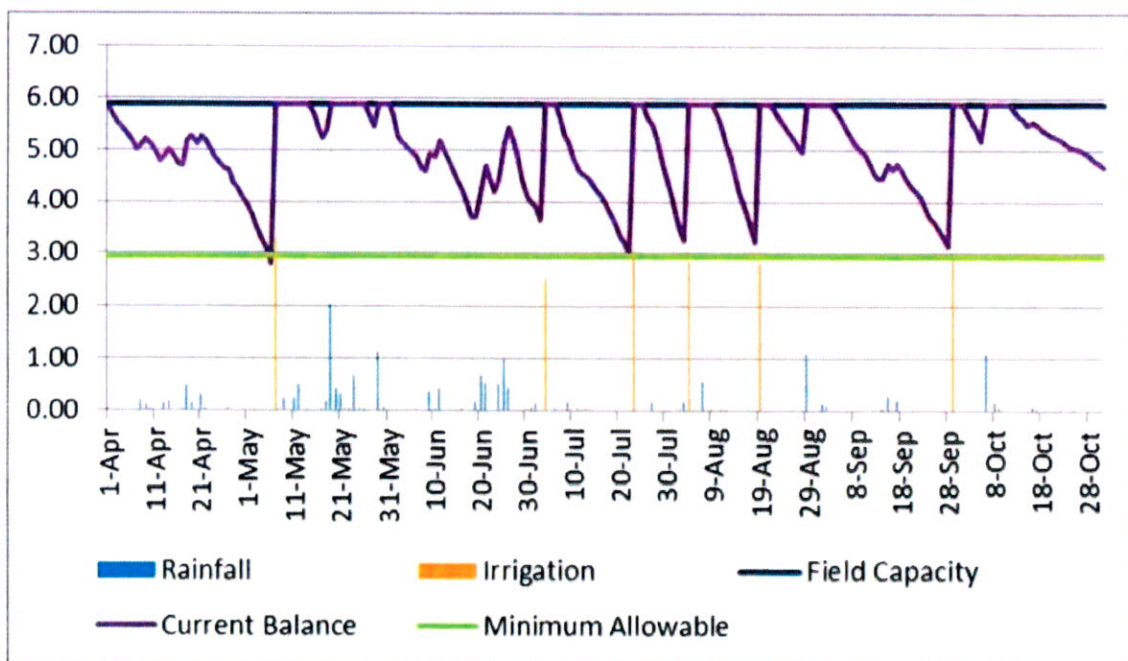


Figure A-42. Crop Water Use Calculation for Year 2011.

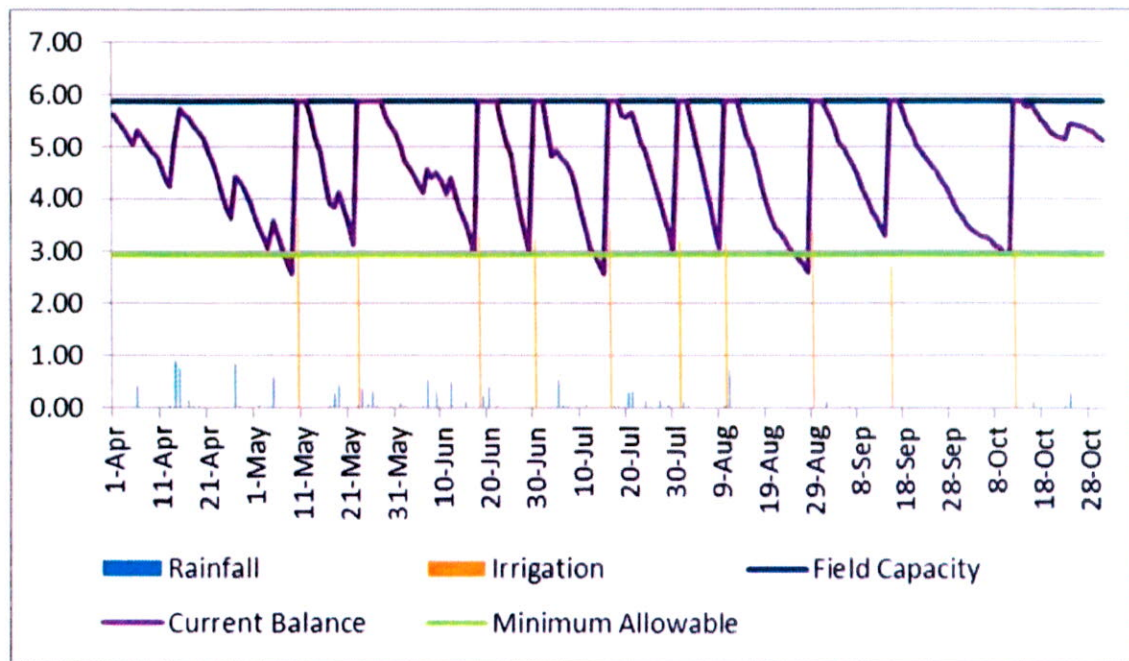


Figure A-43. Crop Water Use Calculation for Year 2012.

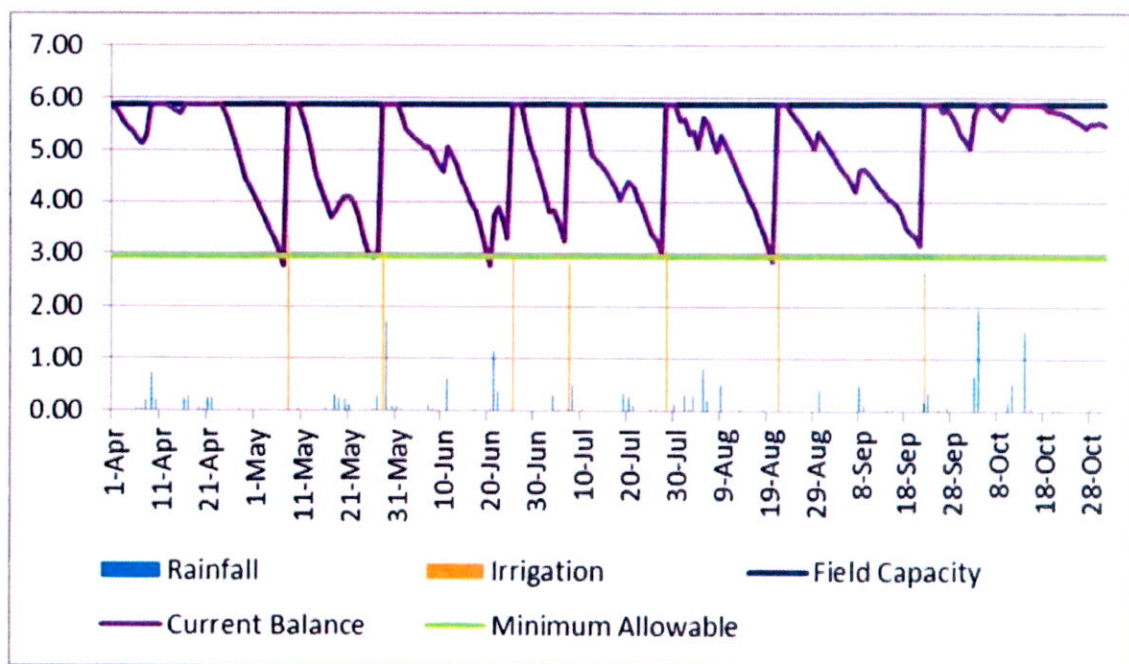


Figure A-44. Crop Water Use Calculation for Year 2013.

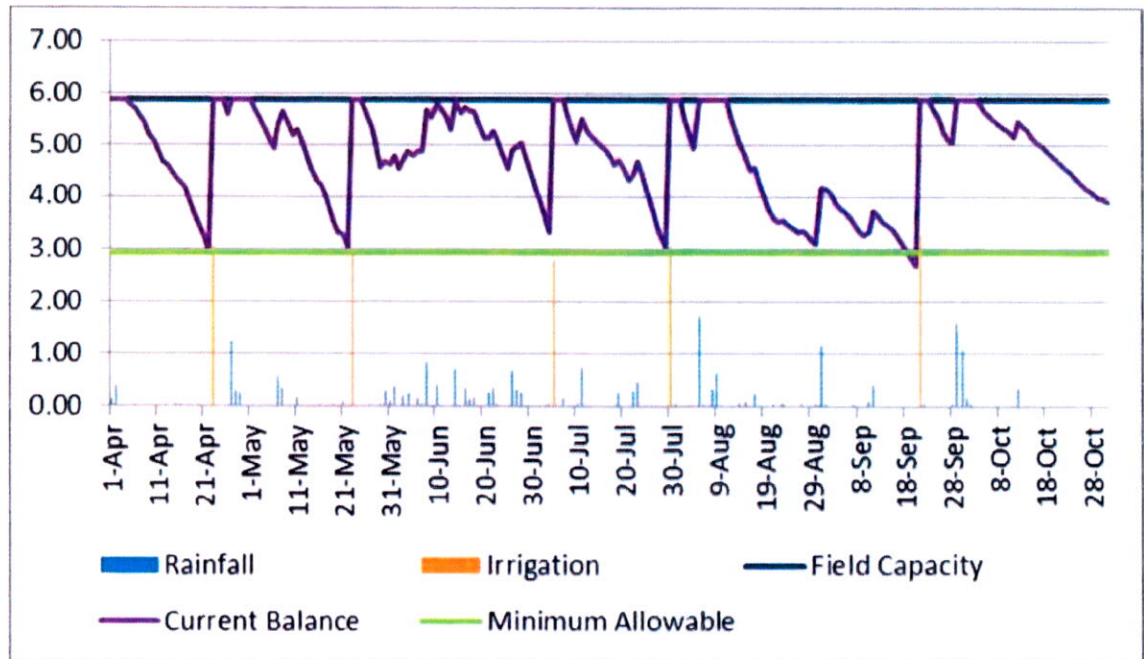


Figure A-45. Crop Water Use Calculation for Year 2014.

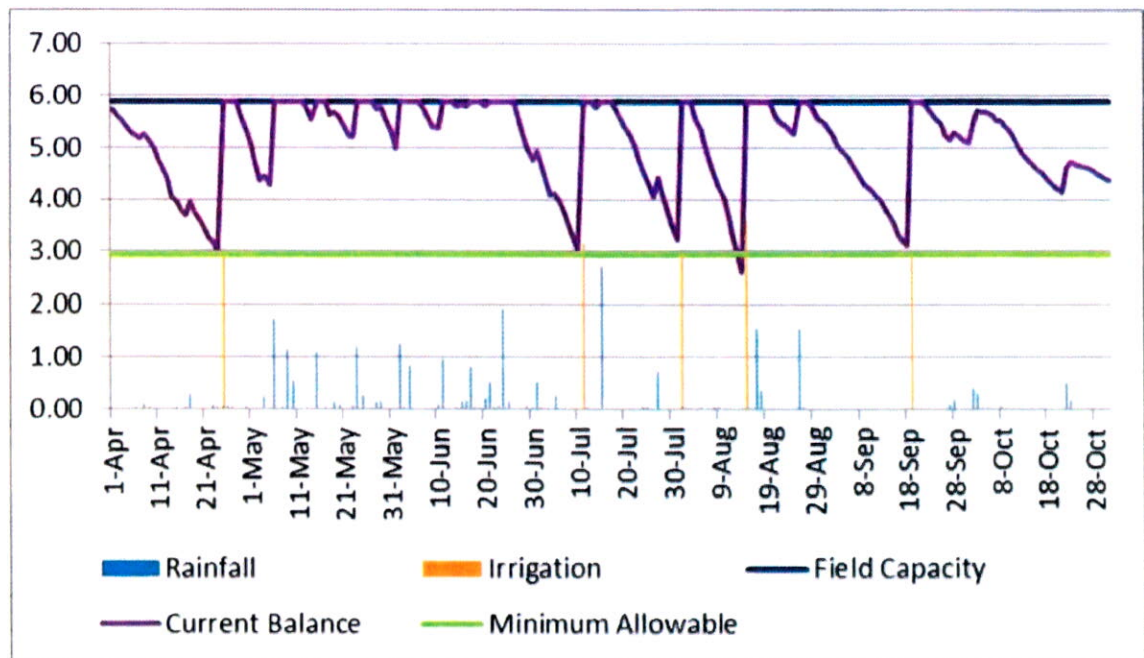


Figure A-46. Crop Water Use Calculation for Year 2015.



CITY OF RAPID CITY LITTLE GIANT DITCH WATER RIGHTS TRANSFER

TOPICAL REPORT RSI-2712



PREPARED BY

Jared K. Oswald

RESPEC

3824 Jet Drive

Rapid City, South Dakota 57703

PREPARED FOR

City of Rapid City

300 Sixth Street

Rapid City, South Dakota 57701

JUNE 2017

Project Number 2897





FOREWORD

An engineering analysis was conducted on the property owned by Mr. Brian Dail to determine the amount of water that the property has the right to transfer to the water supply system for the City of Rapid City, South Dakota. The 38-acre property that is being assessed is located within Section 23, Township 1 North, Range 8 East, Black Hills Meridian, Pennington County, South Dakota. The property has been served irrigation water through a vested right (State of South Dakota Reissued Vested Water Right License No. 2383-2), which allows 5.26 cubic feet per second (cfs) to be diverted from Rapid Creek into the Little Giant Ditch. The analysis determined that 68.8 acre-feet of water (approximately 1.8 acre-feet per acre) can be transferred annually from the property to diversion points within Rapid City from April 15 to November 1 not to exceed a prorated acreage share of 0.35 cfs. A total annual volume of 34.4 acre-feet is available for transfer to Pactola Reservoir storage.



TABLE OF CONTENTS

1.0 INTRODUCTION	1
1.1 HISTORIC CROP WATER USE	1
1.2 HISTORIC DIVERSIONS	7
1.3 DELIVERY SYSTEM LOSSES	7
2.0 WATER RIGHTS AVAILABLE FOR TRANSFER	10
APPENDIX A. HISTORIC CROP WATER USE BY YEAR	A-1



LIST OF TABLES

TABLE	PAGE
1-1 Calculated, Weighted Water-Holding Capacity for the Dail Property	7
1-2 Amount of Irrigation Demand Based on Historic Crop Water Use Analysis.....	9
1-3 Historic Diversions and Monthly Pro Rata Share Available for Transfer from the Dail Property Based on Historic Diversion Records for the South Side Ditch Prorated to Little Giant Ditch Company.....	9
2-1 Irrigation Amounts Available for Transfer From the City of Rapid City Property	11
2-2 Approximate Locations of City of Rapid City Diversion Points/Galleries	12

LIST OF FIGURES

FIGURE	PAGE
1-1 Location of the Brian Dail Property Off of the Little Giant Ditch	2
1-2 Crop Coefficient (Kc) Throughout the Growing Season for Alfalfa Developed Specifically for the Dail Property	4
1-3 Plant-Available Coefficient (Ka) Response to Changes in Percent of Available Water in the Soil Profile	5
1-4 Location of the Dail Property With Soils Overlayed	6
1-5 Water Balance Tracking for 1970 Irrigation Season	8
1-6 Total Values of Rainfall, Irrigation, Reference Evapotranspiration, and Actual Evapotranspiration During the Analysis Period of 1970–2015	8
2-1 City of Rapid City Diversion Points	13
A-1 Crop Water Use Calculation for Year 1970	A-2
A-2 Crop Water Use Calculation for Year 1971	A-2
A-3 Crop Water Use Calculation for Year 1972	A-3
A-4 Crop Water Use Calculation for year 1973	A-3
A-5 Crop Water Use Calculation for Year 1974	A-4
A-6 Crop Water Use Calculation for Year 1975	A-4
A-7 Crop Water Use Calculation for Year 1976	A-5
A-8 Crop Water Use Calculation for Year 1977	A-5
A-9 Crop Water Use Calculation for Year 1978	A-6
A-10 Crop Water Use Calculation for Year 1979	A-6
A-11 Crop Water Use Calculation for Year 1980	A-7
A-12 Crop Water Use Calculation for Year 1981	A-7
A-13 Crop Water Use Calculation for Year 1982	A-8
A-14 Crop Water Use Calculation for Year 1983	A-8
A-15 Crop Water Use Calculation for Year 1984	A-9
A-16 Crop Water Use Calculation for Year 1985	A-9
A-17 Crop Water Use Calculation for Year 1986	A-10
A-18 Crop Water Use Calculation for Year 1987	A-10
A-19 Crop Water Use Calculation for Year 1988	A-11
A-20 Crop Water Use Calculation for Year 1989	A-11
A-21 Crop Water Use Calculation for Year 1990	A-12
A-22 Crop Water Use Calculation for Year 1991	A-12
A-23 Crop Water Use Calculation for Year 1992	A-13

LIST OF FIGURES (CONTINUED)

FIGURE	PAGE
A-24 Crop Water Use Calculation for Year 1993	A-13
A-25 Crop Water Use Calculation for Year 1994	A-14
A-26 Crop Water Use Calculation for Year 1995	A-14
A-27 Crop Water Use Calculation for Year 1996	A-15
A-28 Crop Water Use Calculation for Year 1997	A-15
A-29 Crop Water Use Calculation for Year 1998	A-16
A-30 Crop Water Use Calculation for Year 1999	A-16
A-31 Crop Water Use Calculation for Year 2000	A-17
A-32 Crop Water Use Calculation for Year 2001	A-17
A-33 Crop Water Use Calculation for Year 2002	A-18
A-34 Crop Water Use Calculation for Year 2003	A-18
A-35 Crop Water Use Calculation for Year 2004	A-19
A-36 Crop Water Use Calculation for Year 2005	A-19
A-37 Crop Water Use Calculation for Year 2006	A-20
A-38 Crop Water Use Calculation for Year 2007	A-20
A-39 Crop Water Use Calculation for Year 2008	A-21
A-40 Crop Water Use Calculation for Year 2009	A-21
A-41 Crop Water Use Calculation for Year 2010	A-22
A-42 Crop Water Use Calculation for Year 2011	A-22
A-43 Crop Water Use Calculation for Year 2012	A-23
A-44 Crop Water Use Calculation for Year 2013	A-23
A-45 Crop Water Use Calculation for Year 2014	A-24
A-46 Crop Water Use Calculation for Year 2015	A-24

1.0 INTRODUCTION

An engineering analysis was completed on two parcels of property, which are owned by Mr. Brian Dail, with irrigation rights off the Little Giant Ditch, which receives diversions from Rapid Creek. The property is located in the NW $\frac{1}{4}$ NW $\frac{1}{4}$ (10 acres) and the NE $\frac{1}{4}$ NW $\frac{1}{4}$ (28 acres) of Section 23. Section 23 is located within the Township 1 North of Range 8 East of the Black Hills Meridian. The engineering analysis is divided into three report sections (Historic Crop Water Use, Historic Diversions, and Delivery System Losses) to comprehensively assess the volume and flow rate that are available for transfer to diversion points within the City of Rapid City, South Dakota. The historic irrigation requirements (demand) and diversions (supply) were compared on a monthly basis to determine if supply or demand is the limiting amount. The delivery system losses were subtracted from Historic Diversion records to determine the monthly acre-feet of water available for transfer.

The water right volume for transfer and the rate of diversion for the Little Giant Ditch is calculated based on acres and the current State of South Dakota Reissued Vested Water License No. 2383-2 (Water License No. 2383-2). Little Giant Ditch Company is discussed in the "Report on Water Filings on Rapid Creek for Irrigation Purposes," which was written by Raymond F. Lund in July and August of 1942, and states that Little Giant Ditch Company is not incorporated and the report makes no mention of shares. This report discusses a contract, dated March 15, 1898, that was signed between South Side Ditch Company and Little Giant Ditch Company and agrees that Little Giant Ditch should have 400 miner inches (in). The assessments for Operation and Maintenance (O&M) were made according to the amount of water each landowner is assigned. The Little Giant Ditch Company presently assesses four water right holders on the ditch for O&M expenses that are incurred by the ditch. These assessments are currently based on 296 acres.

Using assessed acreage is viable for operational and financial management of the Little Giant Ditch. However, these acres do not relate to the 514.9 acres legally described in Water License No. 2383-2. Therefore, using assessments is not a viable method to determine transferrable water rights. The only fair and equitable method to determine water-right volumes and rate of diversion is to use acreage and distribute the water rights using Water License No. 2383-2, which was issued by the State of South Dakota in 2015.

1.1 HISTORIC CROP WATER USE

An assessment was conducted to determine the historic crop water use and irrigation requirements of The Dail property, which is shown in Figure 1-1. An online irrigation scheduling consultant tool, developed for individual landowners within the Belle Fourche Irrigation District (BFID) in western South Dakota, tracks the daily water balance in a field and provides a recommendation of irrigation timing and depth. Because of the proximity of the BFID to the property, the methods used to develop the tool were deemed appropriate to assess historic crop water use.

The analysis was run daily from April 15 to October 31 from 1970–2015. The inputs required to track a daily water balance are local weather and rainfall estimates, crop type, and soil water-holding capacity. Weather and rainfall data were collected from the Rapid City Regional Airport, which is located approximately 3 miles northeast of the property and is, therefore, deemed representative.

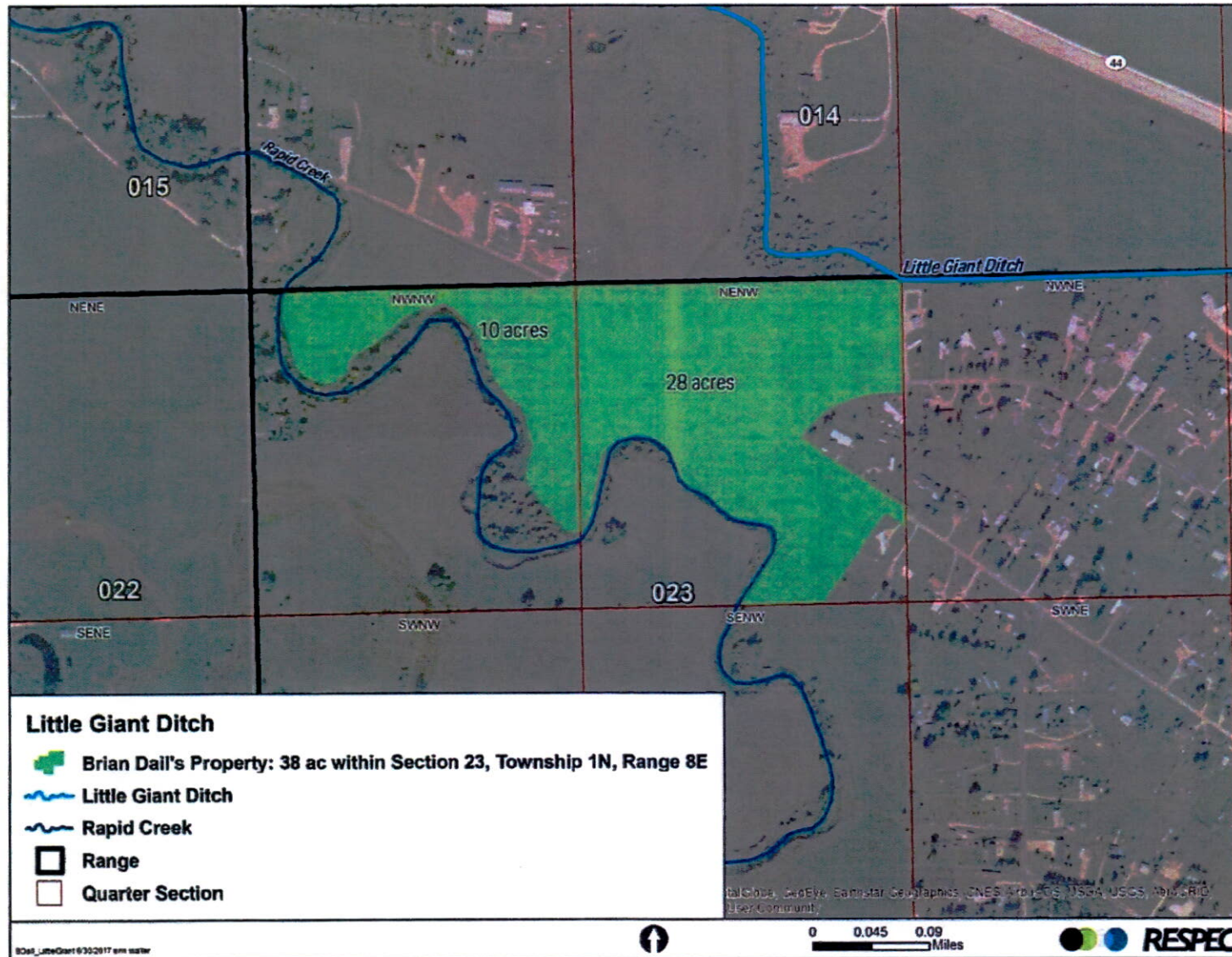


Figure 1-1. Location of the Brian Dail Property Off of the Little Giant Ditch.

The weather data were input into the American Society of Civil Engineers (ASCE) Penman Monteith (PM) equation (Equation 1-1) to calculate daily evapotranspiration (ET).

This equation requires daily average values of dew point, maximum and minimum temperature, average wind speed, and solar radiation. All of the variables, with the exception of solar radiation, were available from the Rapid City Regional Airport weather station. Solar radiation data were calculated based on the station's average daily cloud cover and an empirical curve of radiation as a function of the station's latitude.¹ The output value from the ASCE PM equation were converted from millimeters per day (mm d⁻¹) to inches per day (in d⁻¹).

$$ET = \frac{0.408 \Delta (R_n - G) + \gamma \frac{C_n}{T + 273} u_2 (e_s - e_a)}{\Delta + \gamma (1 + C_d u_2)} \quad (1-1)$$

where:

ET = evapotranspiration (mm d⁻¹)

R_n = calculated net radiation at the crop surface (MJ m⁻² d⁻¹)

G = soil heat flux density at the soil surface (MJ m⁻² d⁻¹)
set as 0.05 MJ m⁻² d⁻¹

T = mean daily air temperature at 1.5–2.5-m height (m s⁻¹)

u_2 = mean daily wind speed at 2-m height (m s⁻¹)

e_s = mean actual vapor pressure at 1.5–2.5-m height (kPa)
calculated using the maximum and minimum air temperature

e_a = mean actual vapor pressure at 1.5–2.5-m height (kPa)
calculated using the average dew point temperature

Δ = slope of the saturation vapor pressure-temperature curve (kPa °C⁻¹)

γ = psychrometric constant (kPa °C⁻¹)

C_n = numerator constant that changes with reference type and calculation
time step (K mm s³ Mg⁻¹ d⁻¹), set as 1600 K mm s³ Mg⁻¹ d⁻¹

C_d = denominator constant that changes with reference type and calculation
time step (s m⁻¹), set as 0.38 s m⁻¹.

Units for the 0.408 coefficient are m² mm MJ⁻¹.

Mr. Dail indicated that the field has been historically irrigated for alfalfa/grass hay. The ASCE PM equation estimates daily evapotranspiration and references a 0.5-meter (m)-tall crop similar to full-cover alfalfa. The PM equation uses the weather parameters that are required to estimate the amount of water that would be lost from full-cover alfalfa on that day.

¹ Hamon, R. W., L. L. Weiss, and W. T. Wilson, 1954. "Insolation as an Empirical Function of Daily Sunshine Duration," *Monthly Weather Review*, Vol. 82, No. 6, pp. 141–146.

This reference ET (ET_r) estimate is multiplied by a crop coefficient (K_c) to adjust this value to any crop or crop stage other than full-cover alfalfa with a plant-available water coefficient (K_a) that adjusts for changes in soil moisture to calculate the actual ET estimate (ET_a) (Equation 1-2):

$$ET_a = ET_r \times K_c \times K_a \quad (1-2)$$

The values for K_c used in this analysis are shown in Figure 1-2. The start of the growing season is assumed to begin, on average, on April 15. For alfalfa, the plant is assumed to thrive when the first 5 days of average temperature exceed 41 degrees Fahrenheit, which usually occurs in April for this area. At this time, the K_c is estimated to be 0.5, or half of the water used for a full-cover alfalfa crop. After the start of the season, the value steadily increases until the crop is harvested and the K_c drops immediately to a 0.3, and the cycle repeats itself. For this analysis, the alfalfa is assumed to be harvested, on average, on June 2, July 12, and August 21.

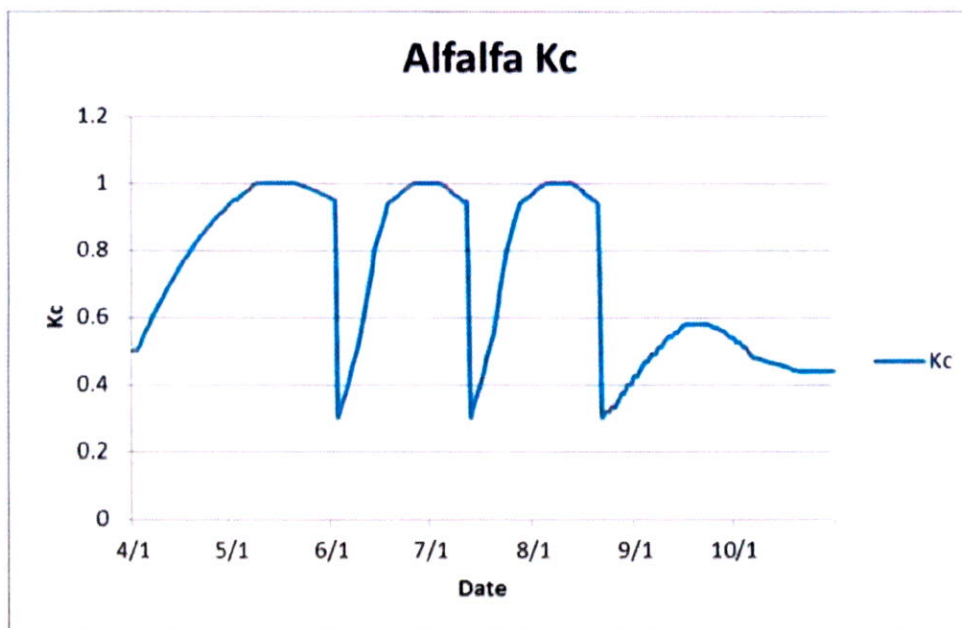


Figure 1-2. Crop Coefficient (K_c) Throughout the Growing Season for Alfalfa Developed Specifically for the Dail Property.

The ET_r estimate is also multiplied by a plant-available water coefficient (K_a) to determine the daily ET_a. This value takes into account the current soil water balance. The form of the coefficient is depicted in Figure 1-3. In essence, the more saturated the soil profile, the closer K_a gets to one, and the more readily available the water is to be released.

To assess the percent available water in the soil, the water-holding capacity must be known. Figure 1-4 provides an aerial view of the Dail property with the soils overlayed. The 38 acres that are being assessed consist of 93 percent Egas Silty Clay Loam (Eg) and 7 percent Bridgeport Silt Loam (Bp). The overall water-holding capacity of the property was determined by calculating an area-weighted value. This was found by estimating water-holding capacity in inches per foot for the top 4 ft for each soil type. The top 4 ft are considered the effective rooting depth for an established alfalfa crop and were used.

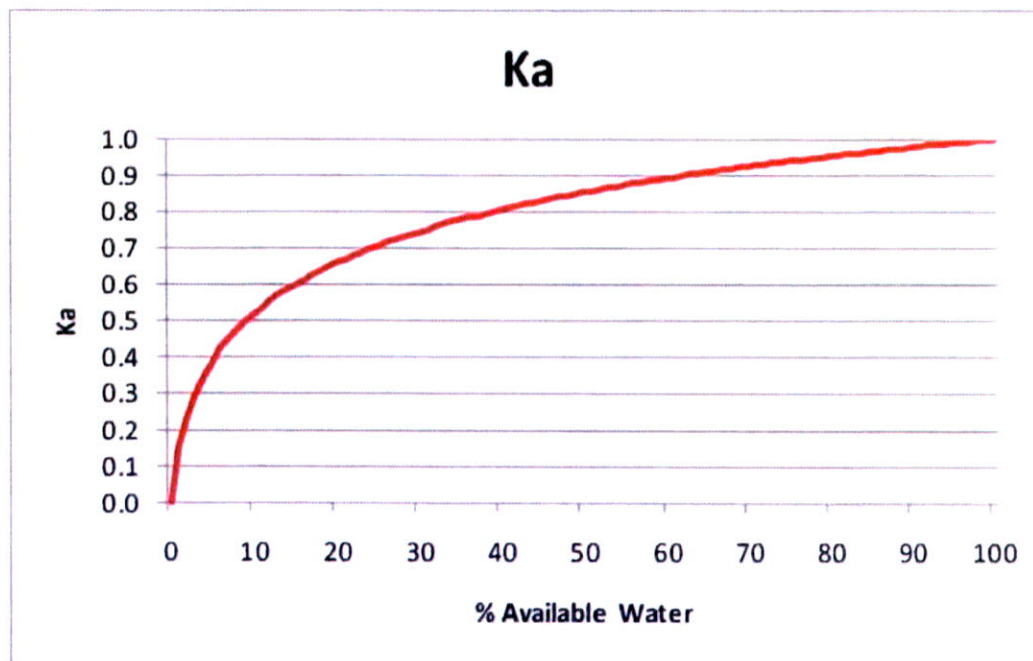


Figure 1-3. Plant-Available Coefficient (Ka) Response to Changes in Percent of Available Water in the Soil Profile.

The estimated water-holding capacity of the individual soil types is then multiplied by the percentage of area that they cover on the property. The calculated, area-weighted, water-holding capacity for the property is represented in Table 1-1.

The daily water balance is found by adding the daily rainfall and simulated irrigation amounts and subtracting the ETa calculated by using Equation 1-3. Irrigation events were simulated and assumed to occur when the calculated balance reached 50 percent of the water-holding capacity (i.e., field capacity). Irrigation amounts fully replenished any soil water deficit at the time.

$$\text{Available Water} = \text{Previous Day Available Water} - \text{ETa} + \text{Rainfall} + \text{Irrigation} \quad (1-3)$$

Figure 1-5 provides a graphical representation of the estimated water balance from 1970 using the described methods. During the 1970 irrigation season from April 15 to October 31, the field received 11.39 in of rainfall and 40.56 in of ETa deficit, which induced 24.98 in of irrigation. The graphs from the remaining years are displayed in Appendix A. Figure 1-6 displays the total yearly values for reference, rainfall, irrigation, reference ET (ETr), and actual ET (ETa) throughout the analysis period. On average, 57.97 in of ETr, 40.57 in of ETa, 12.82 in of rainfall, and 24.36 in of irrigation were estimated. The greatest irrigation amount simulated (35.19 in) occurred in 1988 in response to receiving only 8.58 in of rain and 50.63 in of ETa.

According to Mr. Dail, the property has been surface irrigated throughout its existence, and irrigation efficiency was, therefore, assumed to be 50 percent. Table 1-2 displays the water available to be transferred from the Dail property by month, based on analyzing historic crop water use. According to this analysis, the crop demands an average of 21.7 acre-feet during the irrigation season with monthly delivery rates that are needed to supply this demand, varying from 0.13 cubic feet per second (cfs) in October to 0.58 cfs in July.



Figure 1-4. Location of the Dail Property With Soils Overlayed.

Table 1-1. Calculated, Weighted Water-Holding Capacity for the Dail Property

Depth (ft)	Water-Holding Capacity (in/ft)
1	1.62
2	1.50
3	1.38
4	1.38
Total	5.88

1.2 HISTORIC DIVERSIONS

Little Giant Ditch has two diversion points off of Rapid Creek. One is a joint diversion point with the South Side Ditch Company and is located in the SE ¼ NW ¼ of Section 14, Township 1 North, Range 8 East. The second diversion point is operated by the Rapid Valley Water Company (Murphy) Ditch, which is located in the SW ¼ of Section 8, Township 1 North, Range 8 East. Murphy Ditch supplies water for a portion of Little Giant Ditch Company's irrigated land, supplying 56.9 acres. The water serving the Dail property in Section 23, from the Little Giant Ditch, is diverted off of the South Side Ditch diversion point. Because no water delivery records are available from the Little Giant Ditch Company, the historic diversion data for the South Side Ditch were applied to this transfer report. The historic diversions to Little Giant Ditch were assumed to be the same acre-feet per acre as the historic diversions off of the South Side Ditch.

Diversion records were collected by the US Bureau of Reclamation (USBR) for the South Side Ditch on a monthly basis over a 13-year period (data from the Reclamation Rapid Valley Project Histories for 1963–1968 and 1972–1978). These records, which are included in Table 1-3, were proportioned to represent the acre-feet that are diverted to Little Giant Ditch. To determine the historic monthly delivery amount to the field, the estimated historic diversions to the ditch were then multiplied by the fraction of land (pro rata share) that the Dail property encompasses within the water rights on the Little Giant Ditch minus estimated delivery losses (Equation 1-4). The Water License No. 2383-2 identifies that the 38-acre property is approximately 7.4 percent of the 514.9 acres that are designated as irrigable under this right. Table 1-3 shows the amount of water available for transfer using this method of analysis with the South Side Ditch Company's diversion data.

$$\text{Monthly Pro Rata Share} = \text{Monthly Historic Diversion for Little Giant} \times \frac{38}{514.9} \times [1 - \text{Delivery Losses (9.8\%)}] \quad (1-4)$$

1.3 DELIVERY SYSTEM LOSSES

Delivery system losses were estimated in a 1989 USBR study as 9.8 percent. This number has been consistently referenced in all of the previous transfers from the South Side Ditch or Rapid Valley Water Conservancy District.

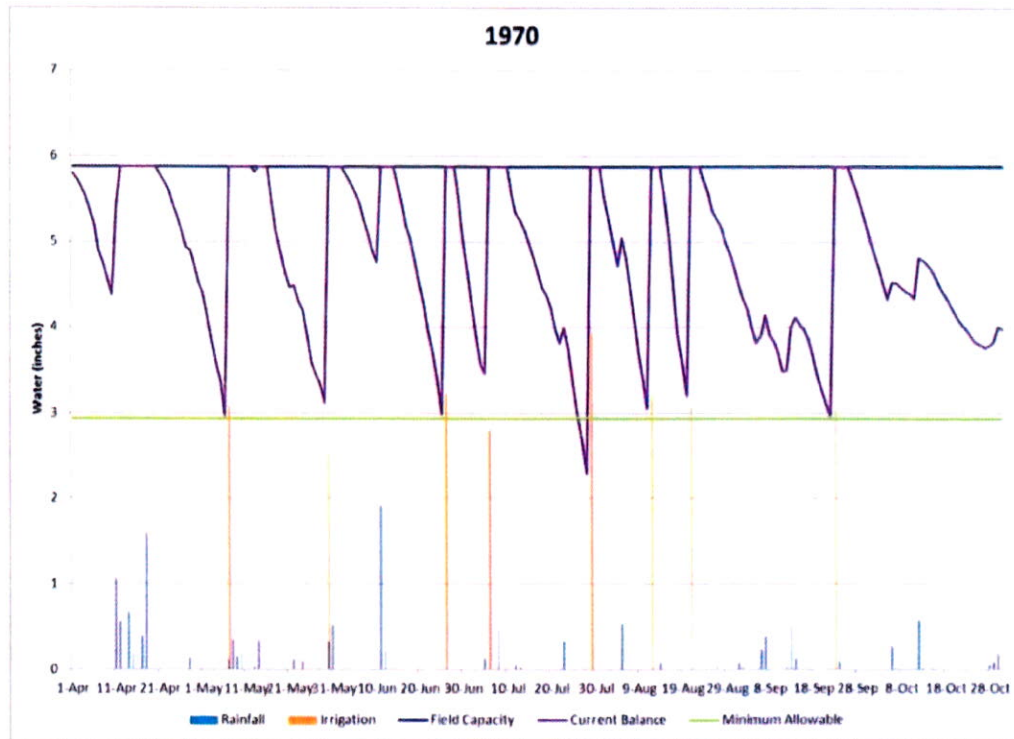


Figure 1-5. Water Balance Tracking for 1970 Irrigation Season.

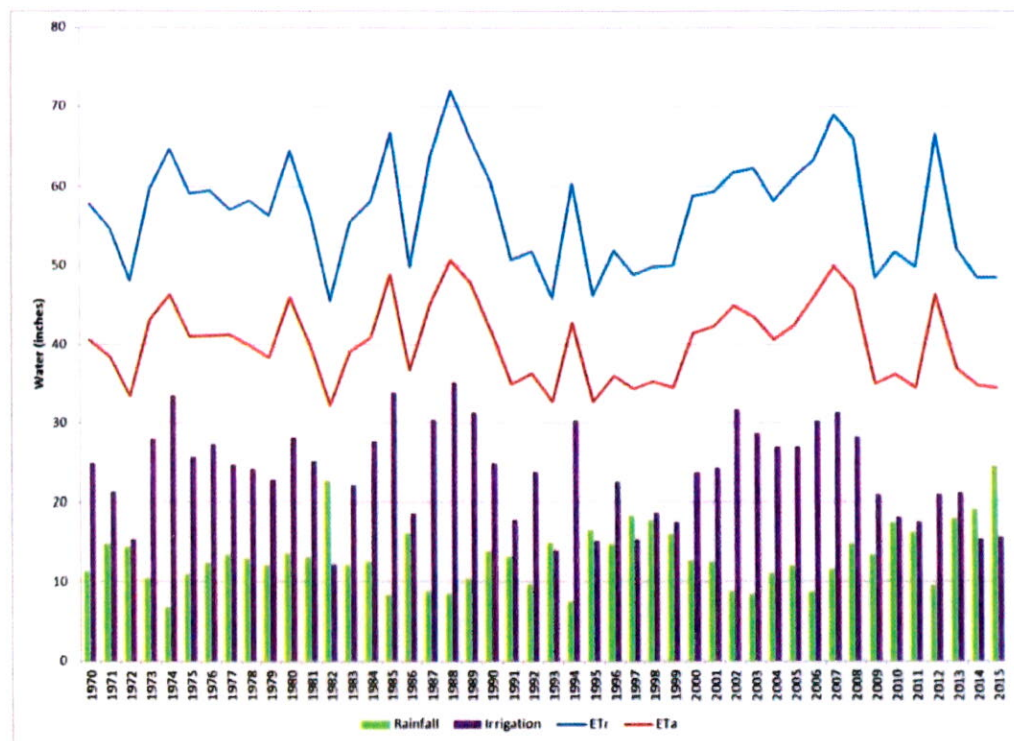


Figure 1-6. Total Values of Rainfall, Irrigation, Reference Evapotranspiration, and Actual Evapotranspiration During the Analysis Period of 1970-2015.

Table 1-2. Amount of Irrigation Demand Based on Historic Crop Water Use Analysis

	April	May	June	July	August	September	October	Total
Crop Demand (inches)	1.3	4.2	3.7	5.6	5.1	2.8	1.3	24.0
Crop Demand at 50 Percent Application Efficiency (inches)	2.7	8.3	7.3	11.3	10.2	5.7	2.5	48.0
Acre-Feet/Acre Crop Demand	0.22	0.69	0.61	0.94	0.85	0.47	0.21	
Number of Acres	38	38	38	38	38	38	38	
Acre-Feet of Crop Demand	8.4	26.3	23.2	35.7	32.2	18.0	8.1	151.9
Days of Delivery	15	31	30	31	31	30	31	199
CFS Equivalent	0.28	0.43	0.39	0.58	0.52	0.30	0.13	

CFS = cubic feet per second.

Table 1-3. Historic Diversions and Monthly Pro Rata Share Available for Transfer from the Dail Property Based on Historic Diversion Records for the South Side Ditch Prorated to Little Giant Ditch Company (Based on Acres)

	April	May	June	July	August	September	October	Total
Historic Diversions To Ditch (Acre-Feet)		96	146	175	222	146		785
Pro Rata Share of Historic Diversions Minus Ditch Loss (Acre-Feet)	0	6.4	9.7	11.7	14.8	9.7	0	52.3

2.0 WATER RIGHTS AVAILABLE FOR TRANSFER

An engineering analysis was completed to determine the water rights that were available for transfer from the Dail property located within Sections 23, Township 1 North, Range 8 East of the Black Hills Meridian, Pennington County, South Dakota. To complete this analysis, the historic crop water use for the 38-acre parcel and historic diversion records for South Side Ditch prorated to Little Giant Ditch Company were assessed. Table 2-1 provides a monthly summary of the findings in acre-feet, subtracting out the 9.8 percent delivery losses and the irrigation rights available for transfer in acre-feet and cfs. The irrigation rights to be transferred were found by taking the lesser of the two analyses (i.e., crop water use or diversions), except in April and October when the crop water use amount was used because no historic delivery records were available.

The analysis determined that 68.8 acre-feet of water (approximately 1.8 acre-feet per acre) can be transferred annually from the property to diversion points within Rapid City (Table 2-2 and Figure 2-1) from April 15 to November 1, not to exceed a prorated acreage share of 0.35 cfs. A total annual volume of 34.4 acre-feet is available for transfer to Pactola Reservoir storage.

Table 2-1. Irrigation Amounts Available for Transfer From the City of Rapid City Property

Row	Description	April	May	June	July	August	September	October	Total
A ^(a)	Historic Diversions to Ditch (Acre-Feet)		96	146	175	222	146		785
B ^(b)	Pro Rata Share of Historic Diversions Minus Ditch Loss (Acre-Feet)	0	6.4	9.7	11.7	14.8	9.7	0	52.3
C ^(c)	Crop Demand Minus Ditch Loss (Acre-Feet)	8.4	26.3	23.2	35.7	32.2	18.0	8.1	151.9
D ^(d)	Irrigation Right to Be Transferred to Diversion Points in Rapid City Minus Upstream Return Flows (Acre=Feet)	8.4	6.4	9.7	11.7	14.8	9.7	8.1	68.8
E ^(e)	Irrigation Right to Be Transferred to Pactola Reservoir (Acre-Feet)	4.2	3.2	4.8	5.8	7.4	4.9	4.1	34.4
F ^(f)	Irrigation Right to Be Transferred to Diversion Points in Rapid City (cfs)	0.14	0.10	0.16	0.19	0.24	0.16	0.13	

(a) Taken from previous South Side Ditch water rights transfers and calculated for Little Giant Ditch acreage outlined in Section 1.2.

(b) Calculated by multiplying Row A by the ratio of acres to be transferred to the total irrigated acres validated.

(c) Calculated using an online irrigation scheduling tool outlined in Section 1.1.

(d) The lesser of Row B and C are used, except for April and October when no diversion data were available.

(e) Multiply Row D by assumed irrigation efficiency of 50 percent.

(f) Multiply Row D by conversion factor.



Table 2-2. Approximate Locations of City of Rapid City Diversion Points/Galleries

Location Name	Location
Jackson Springs Gallery	NW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 8
Girl Scout Gallery	SW $\frac{1}{4}$ SW $\frac{1}{4}$ Section 3
Mountain View Water Treatment Plant	SE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 3

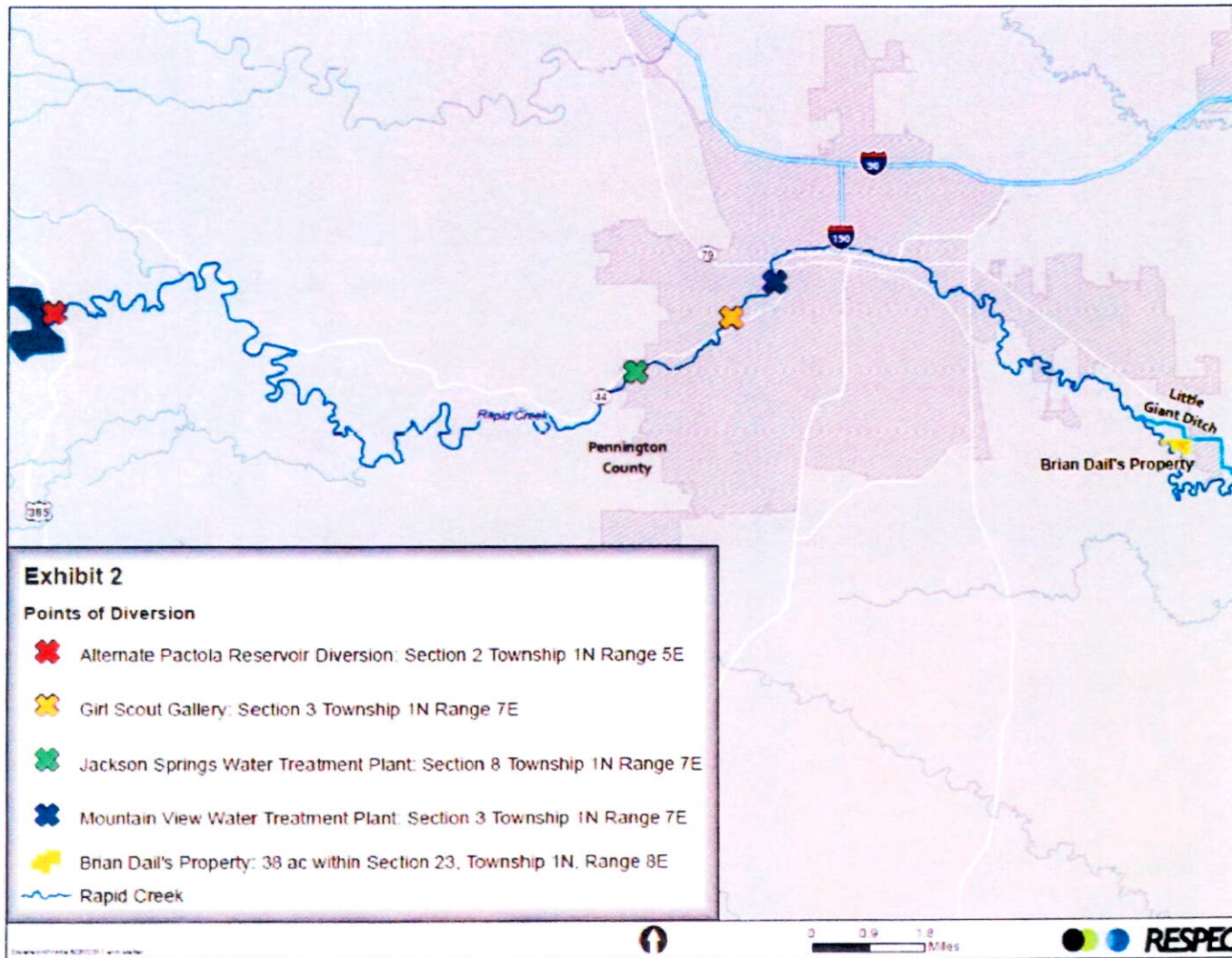


Figure 2-1. City of Rapid City Diversion Points.



APPENDIX A

HISTORIC CROP WATER USE BY YEAR



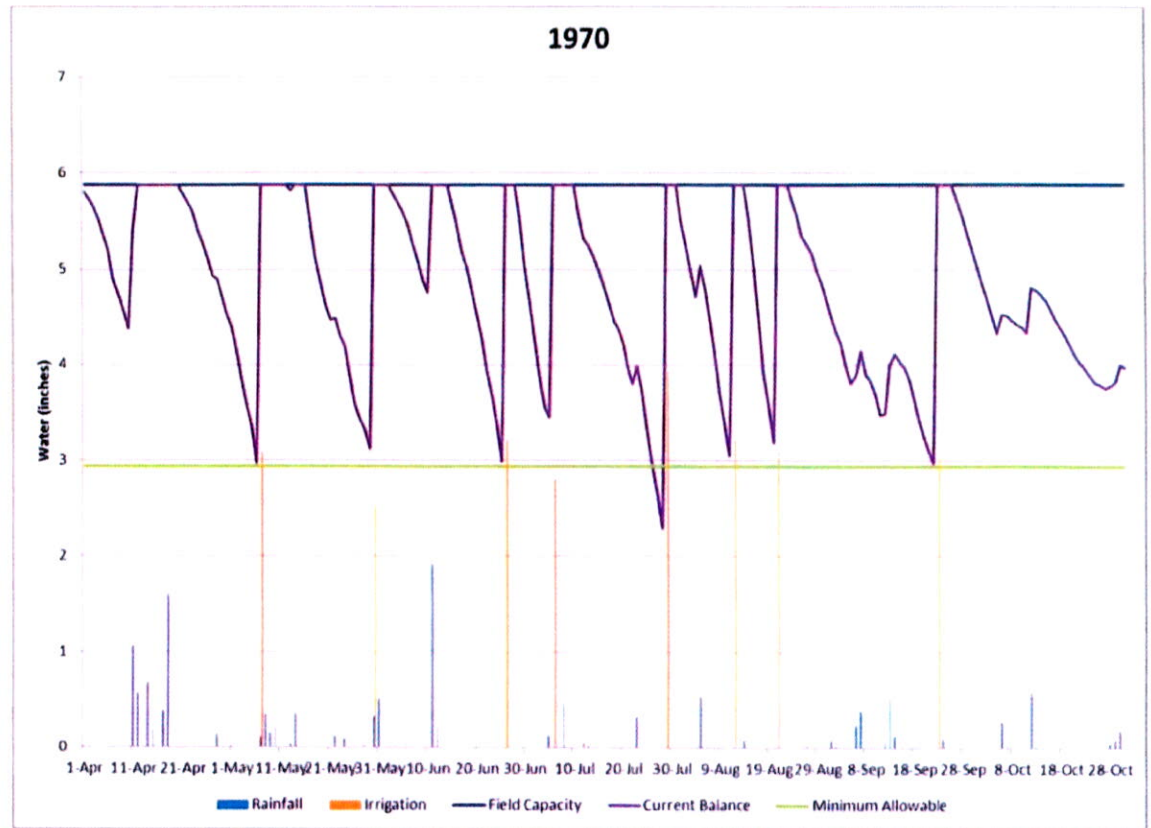


Figure A-1. Crop Water Use Calculation for Year 1970.

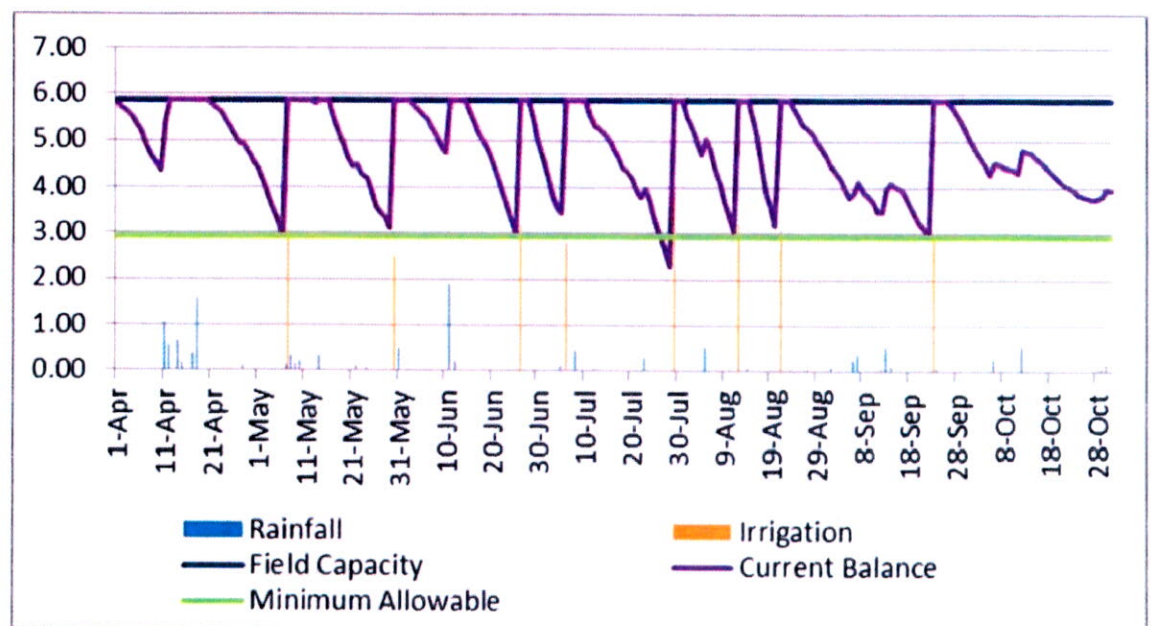


Figure A-2. Crop Water Use Calculation for Year 1971.

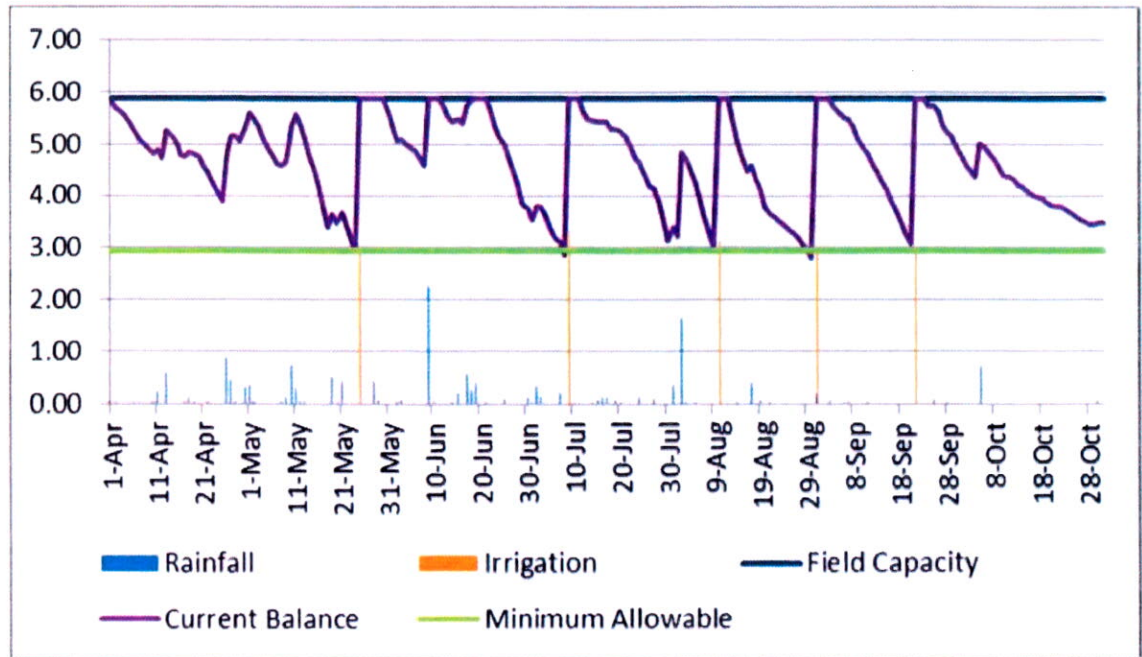


Figure A-3. Crop Water Use Calculation for Year 1972.

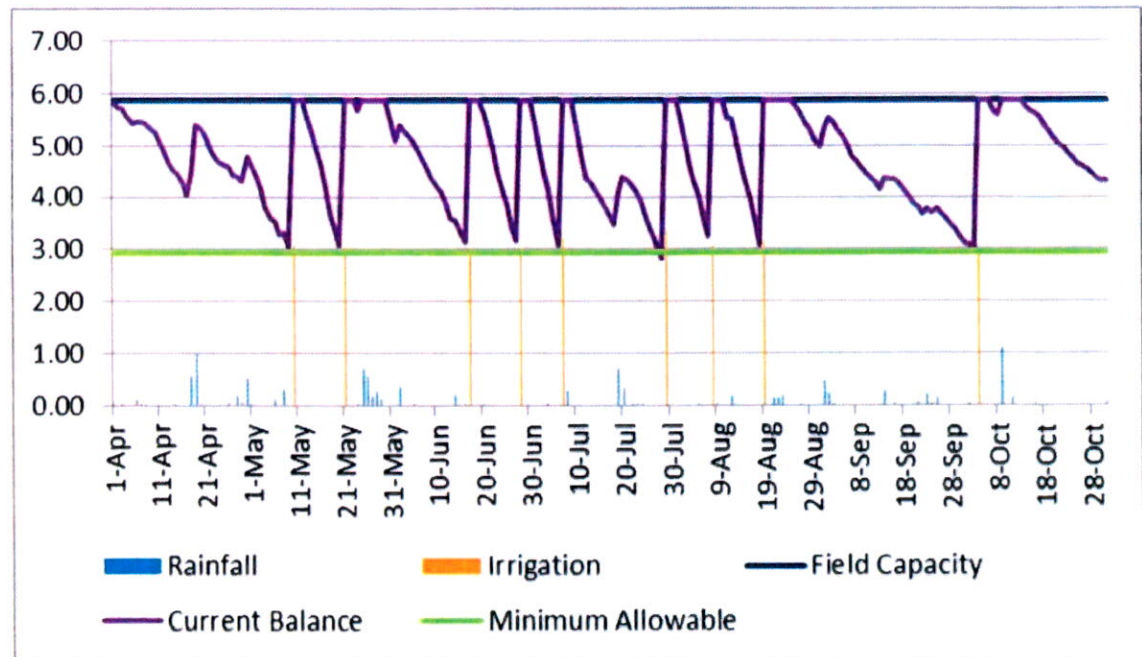


Figure A-4. Crop Water Use Calculation for year 1973.

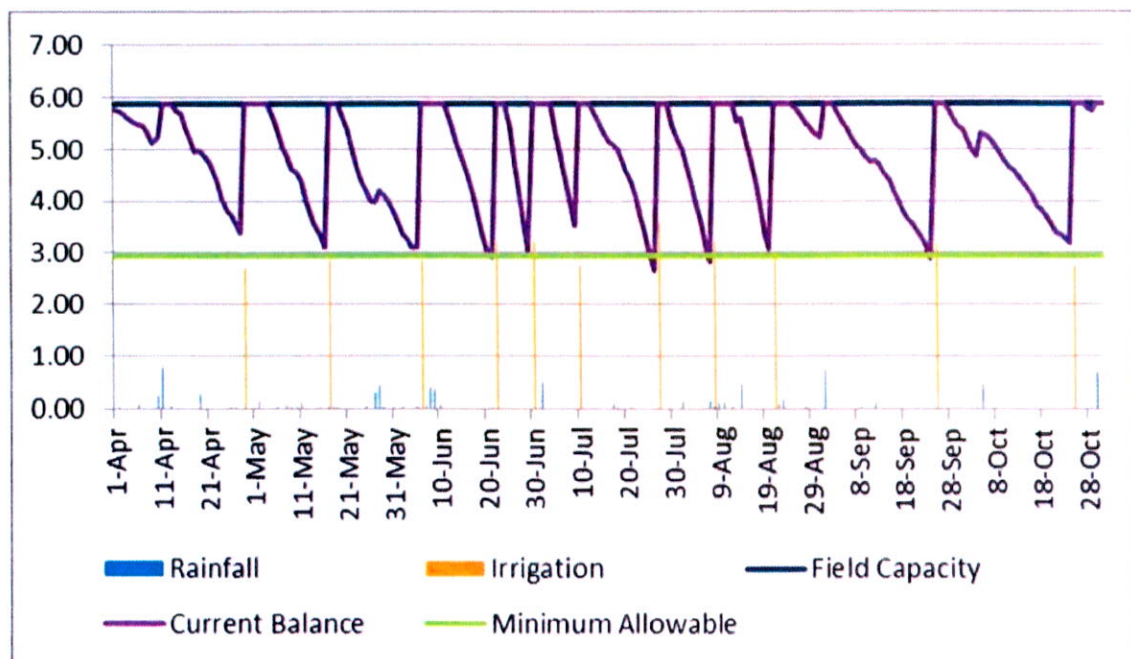


Figure A-5. Crop Water Use Calculation for Year 1974.

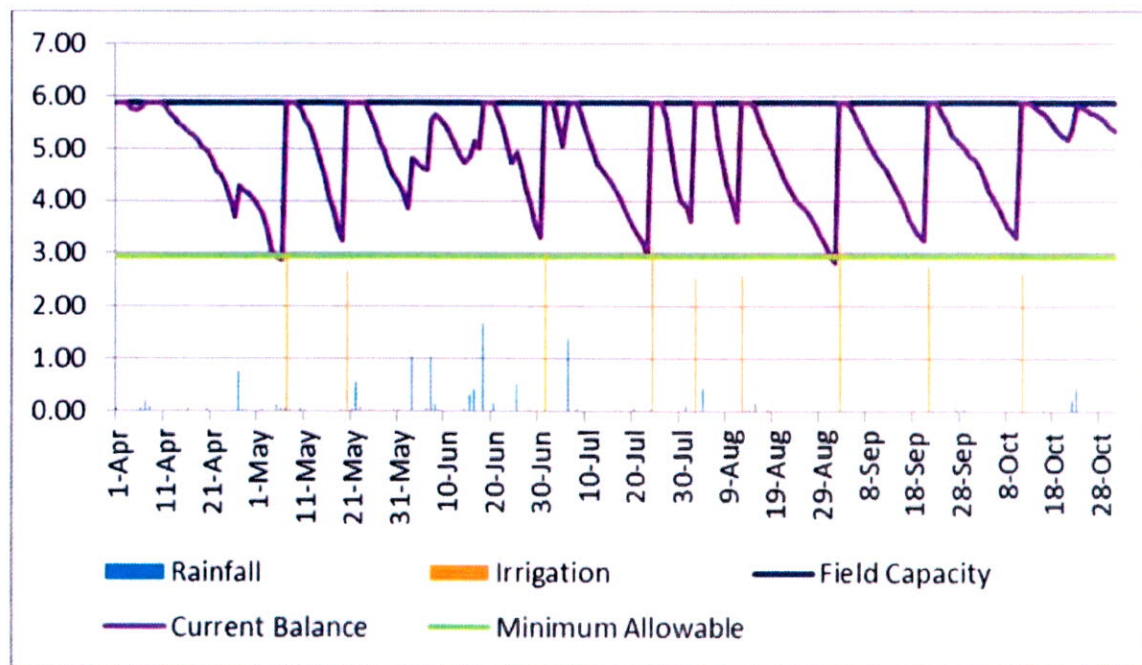


Figure A-6. Crop Water Use Calculation for Year 1975.

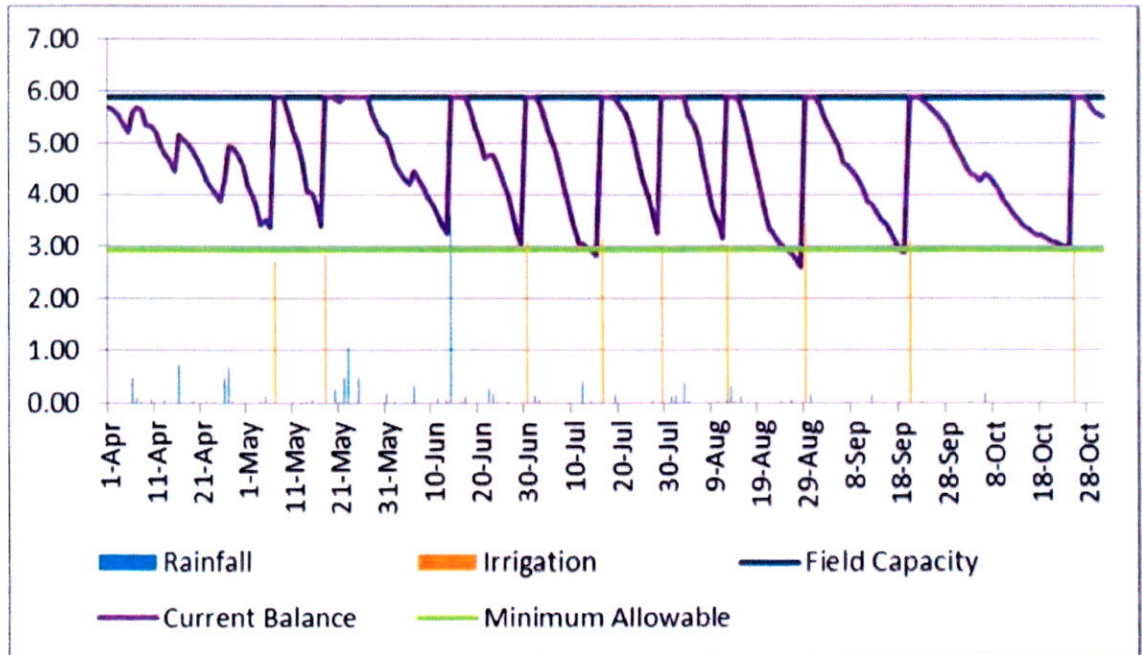


Figure A-7. Crop Water Use Calculation for Year 1976.

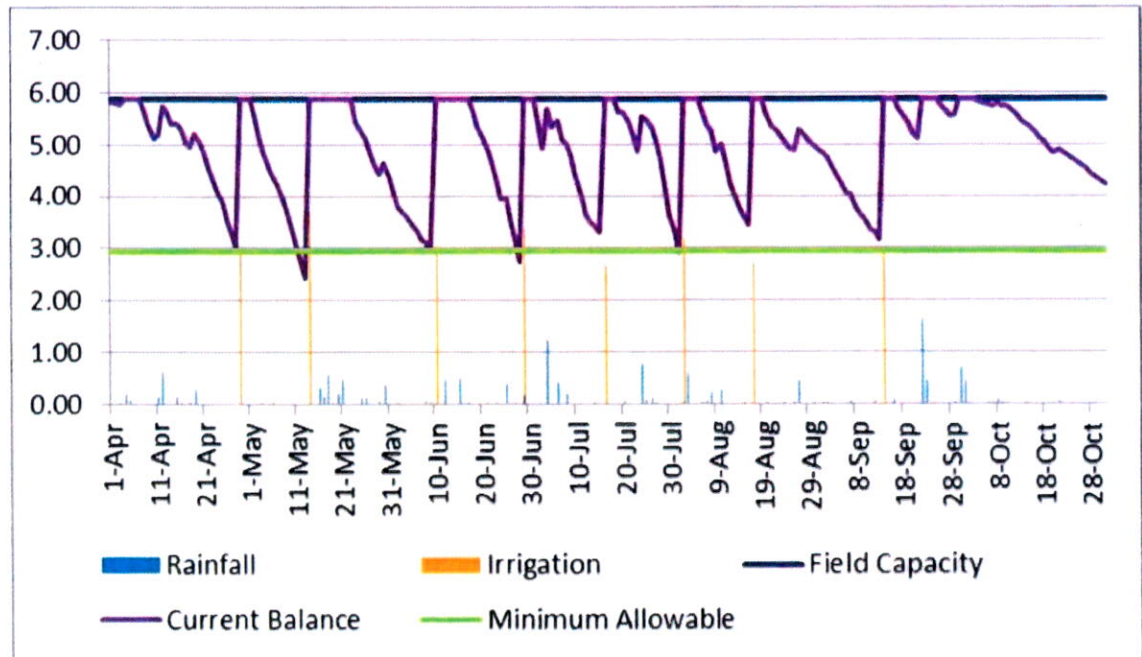


Figure A-8. Crop Water Use Calculation for Year 1977.

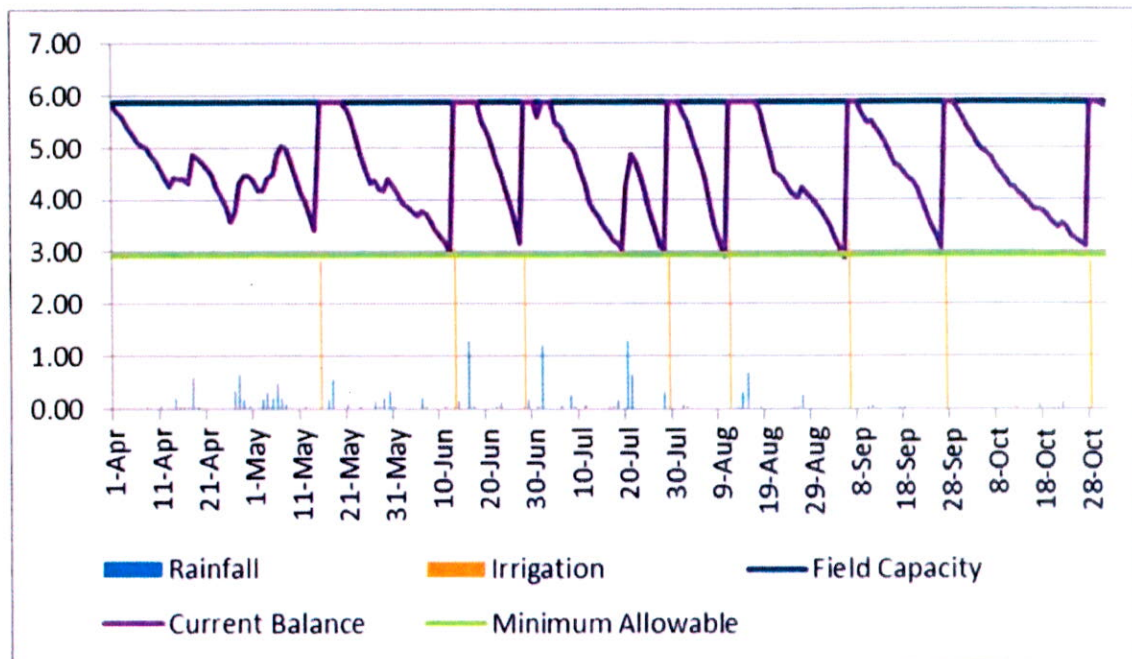


Figure A-9. Crop Water Use Calculation for Year 1978.

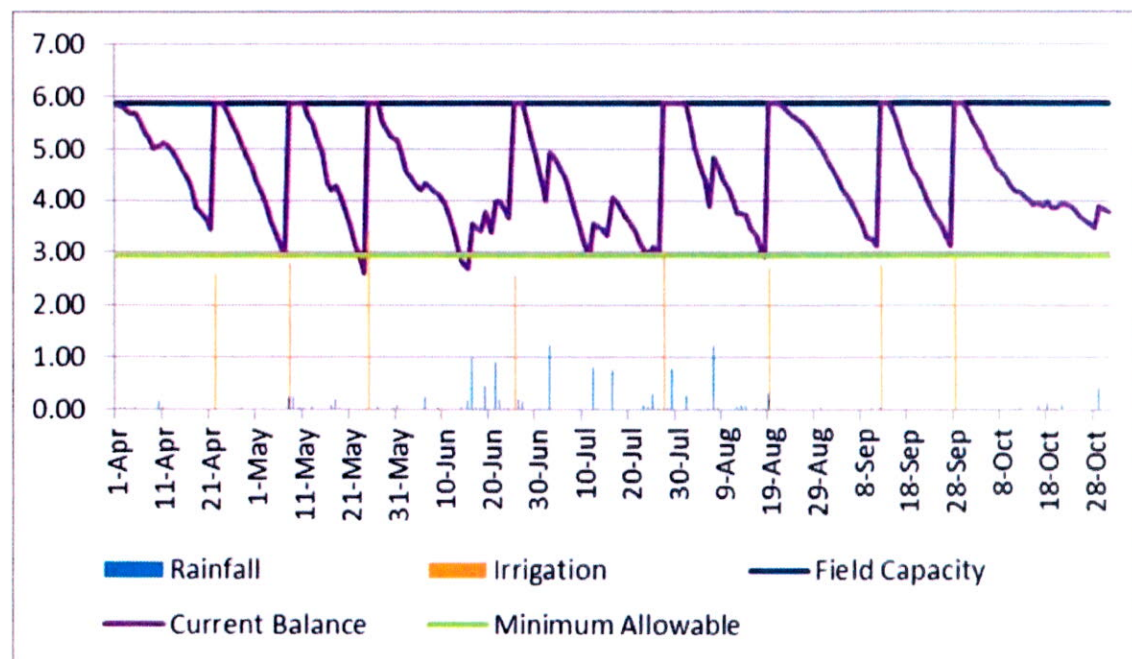


Figure A-10. Crop Water Use Calculation for Year 1979.

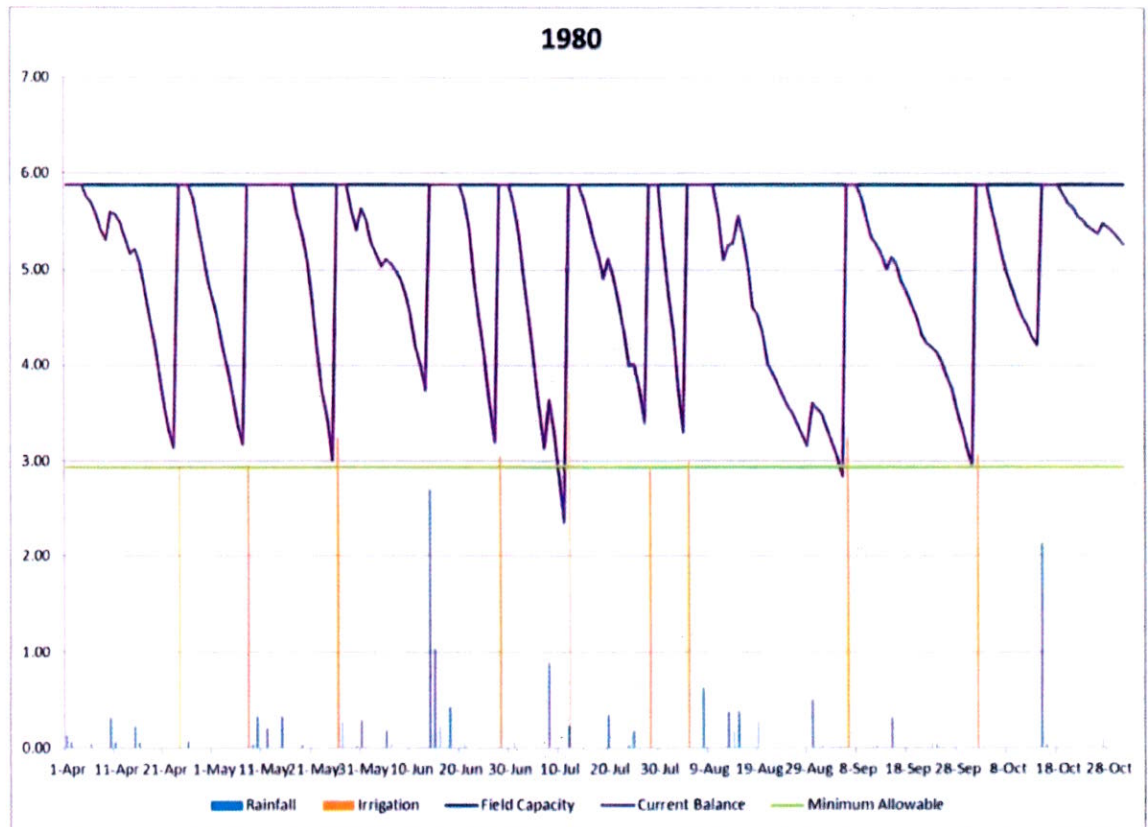


Figure A-11. Crop Water Use Calculation for Year 1980.

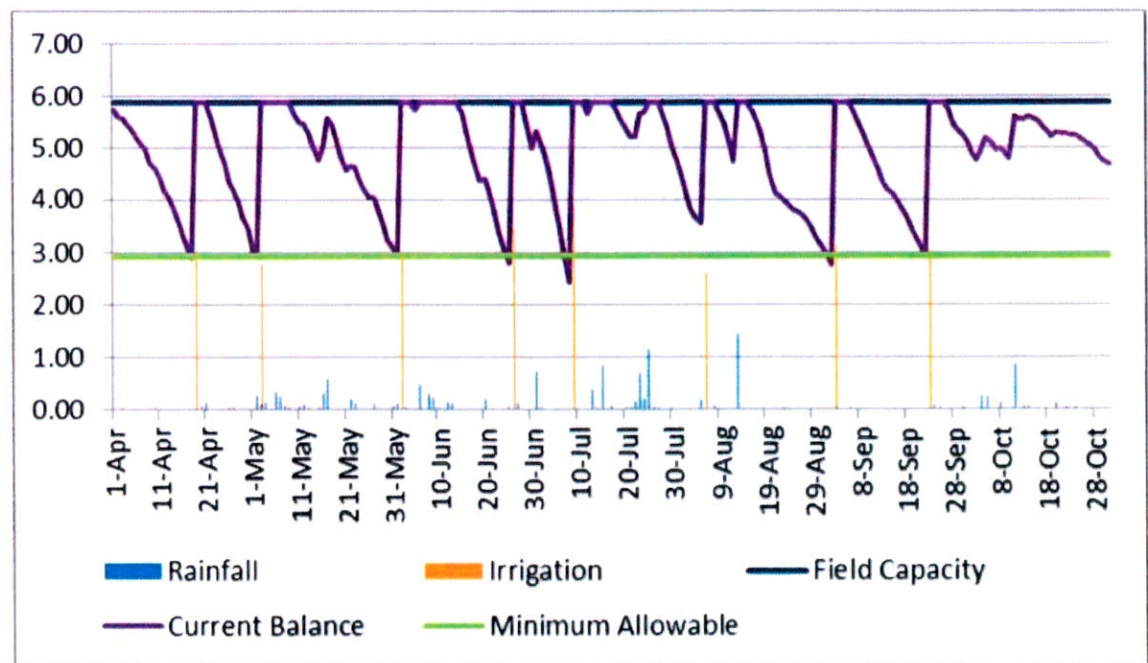


Figure A-12. Crop Water Use Calculation for Year 1981.

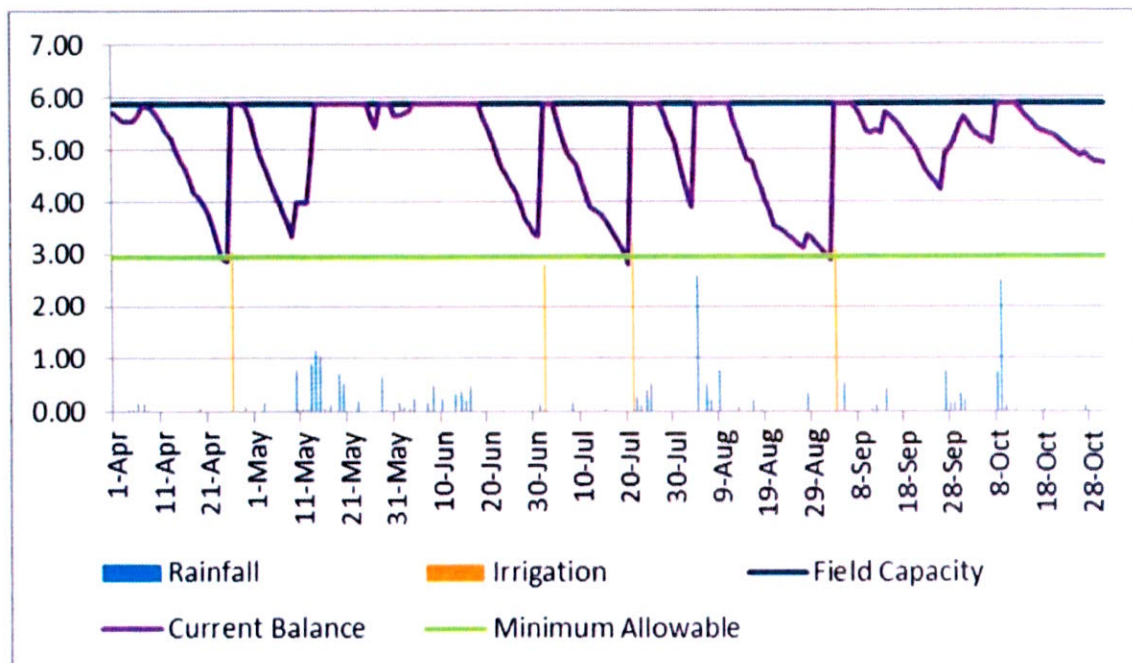


Figure A-13. Crop Water Use Calculation for Year 1982.

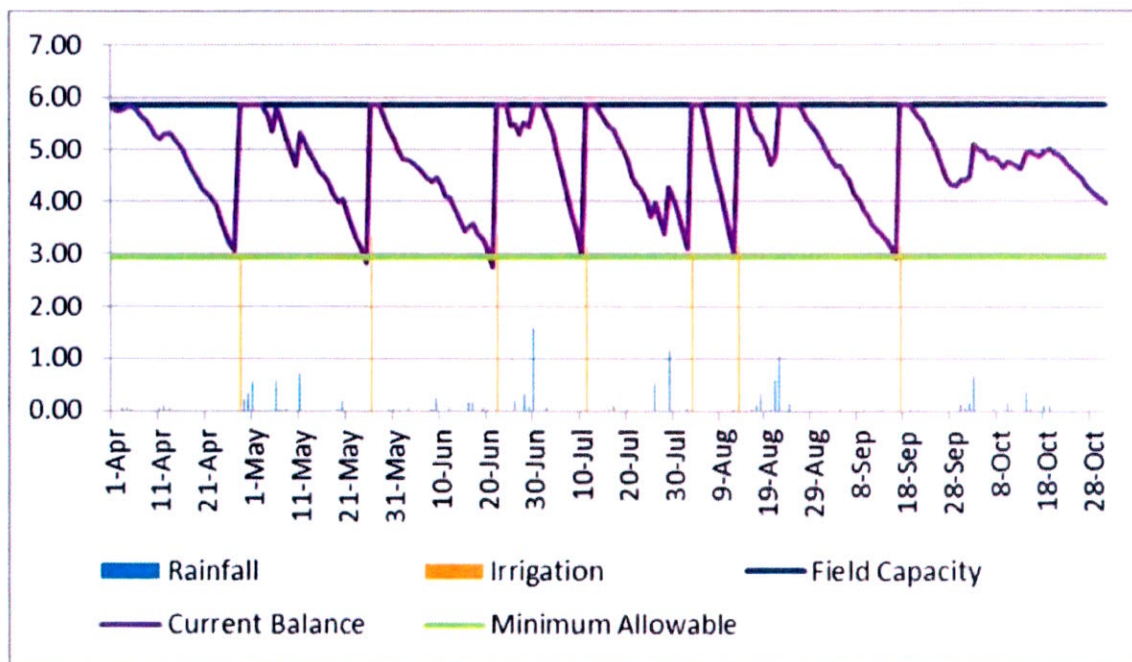


Figure A-14. Crop Water Use Calculation for Year 1983.

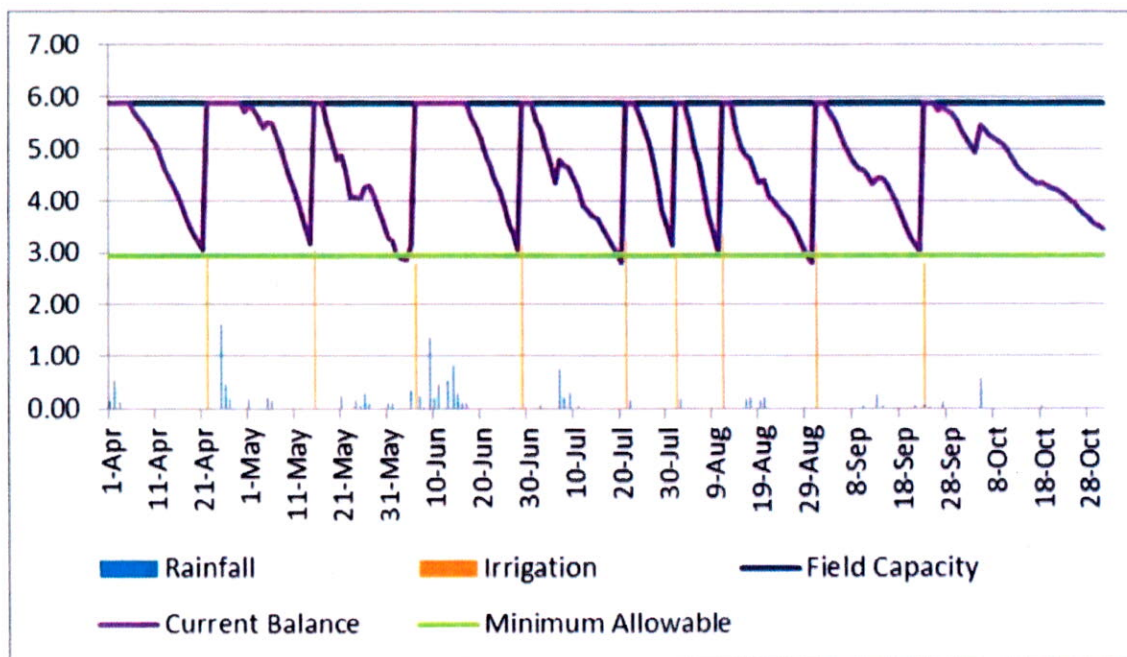


Figure A-15. Crop Water Use Calculation for Year 1984.

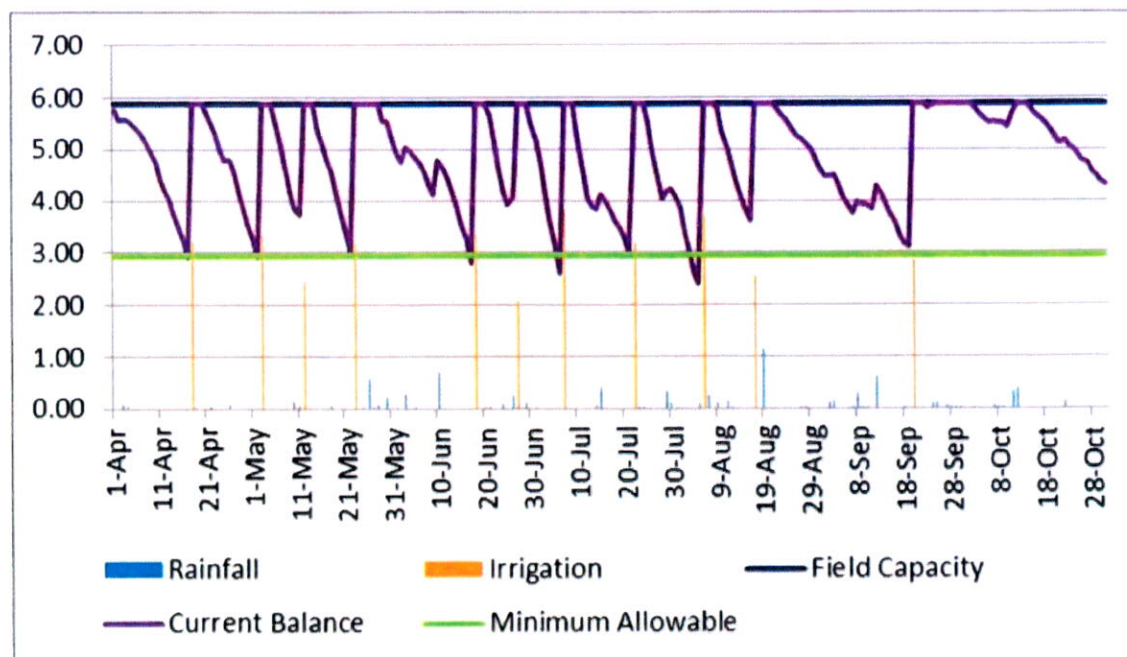


Figure A-16. Crop Water Use Calculation for Year 1985.

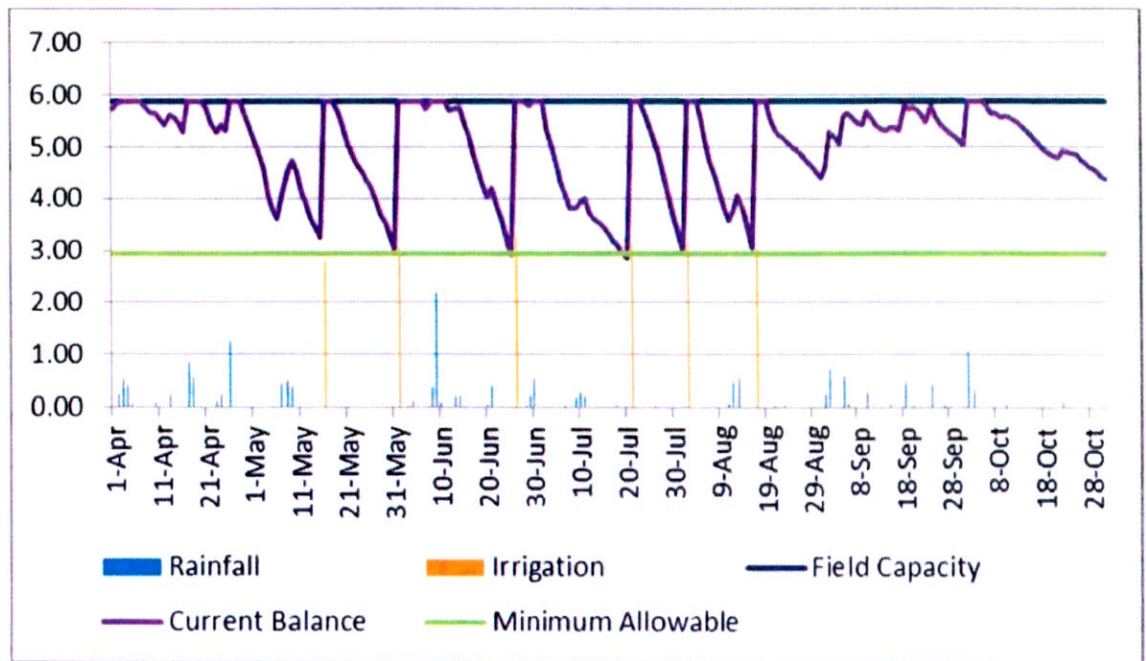


Figure A-17. Crop Water Use Calculation for Year 1986.

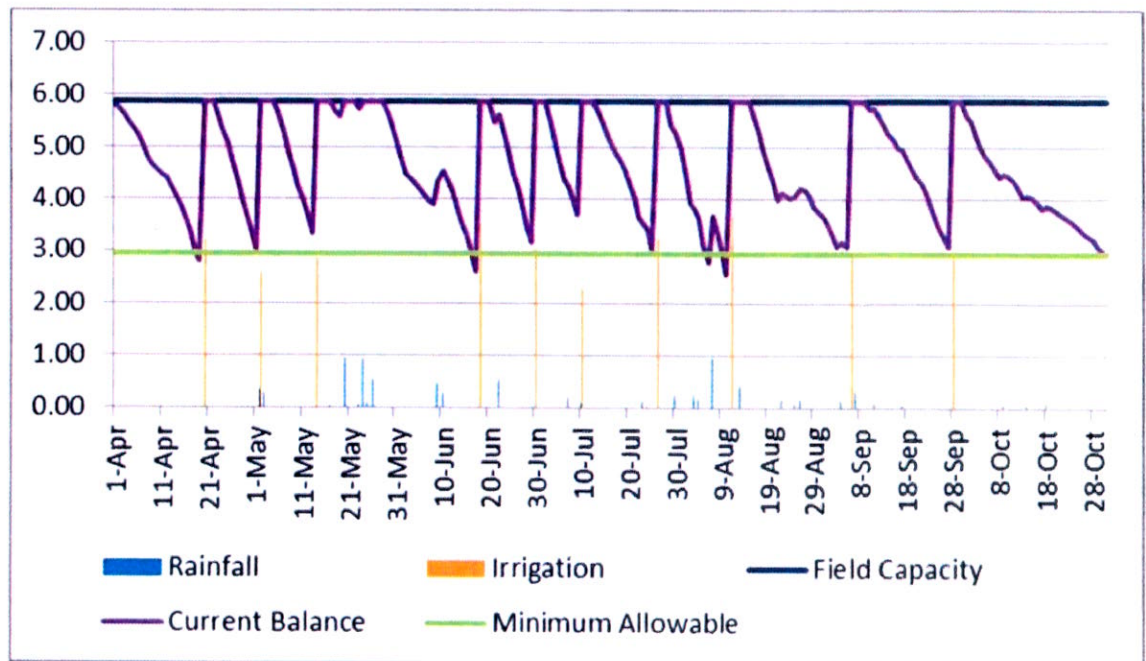


Figure A-18. Crop Water Use Calculation for Year 1987.

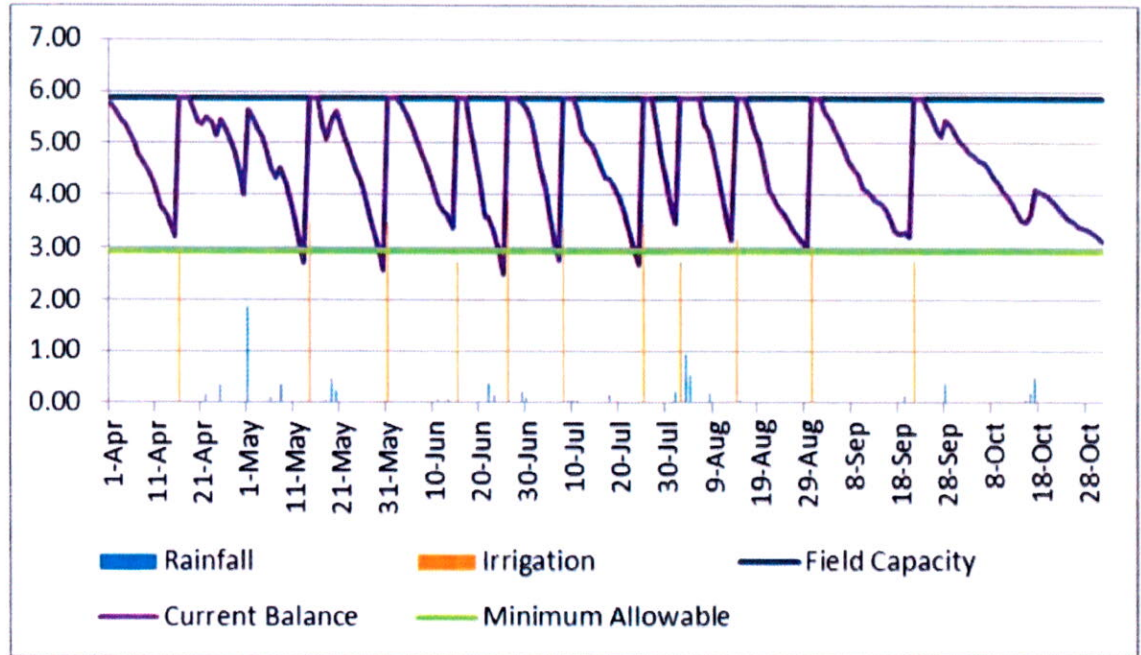


Figure A-19. Crop Water Use Calculation for Year 1988.

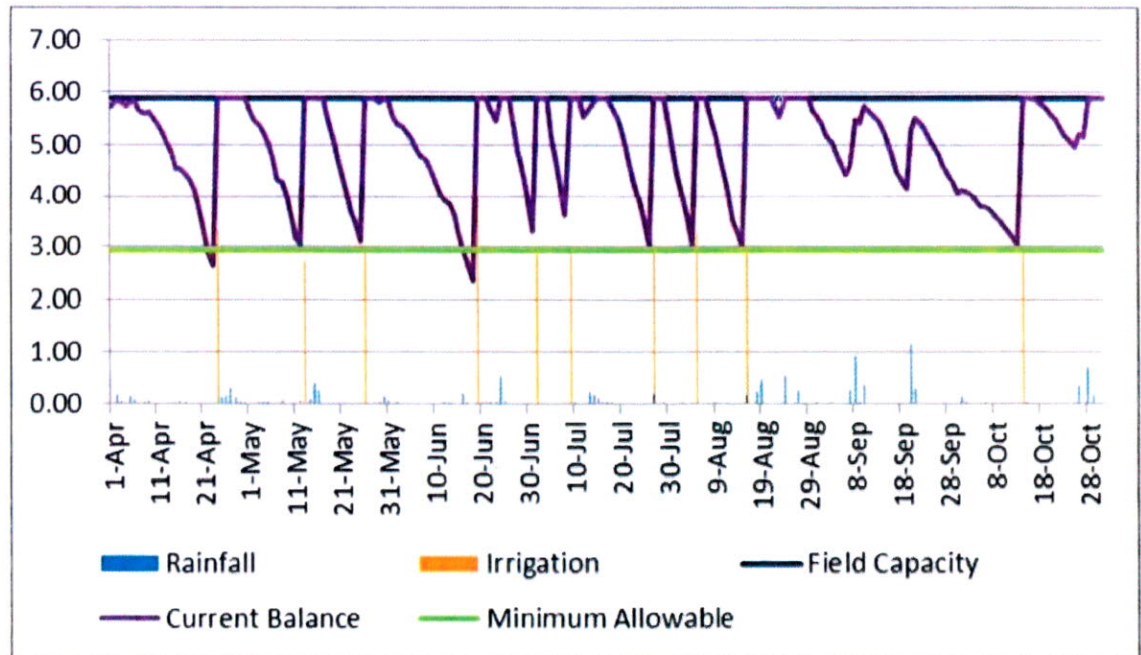


Figure A-20. Crop Water Use Calculation for Year 1989.

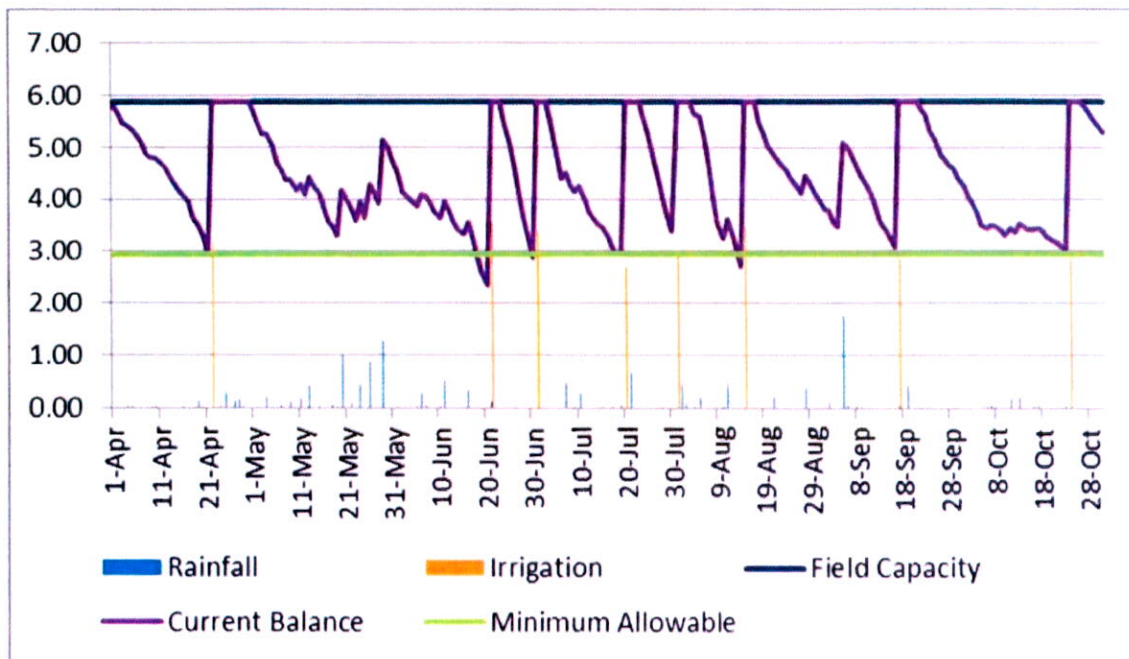


Figure A-21. Crop Water Use Calculation for Year 1990.

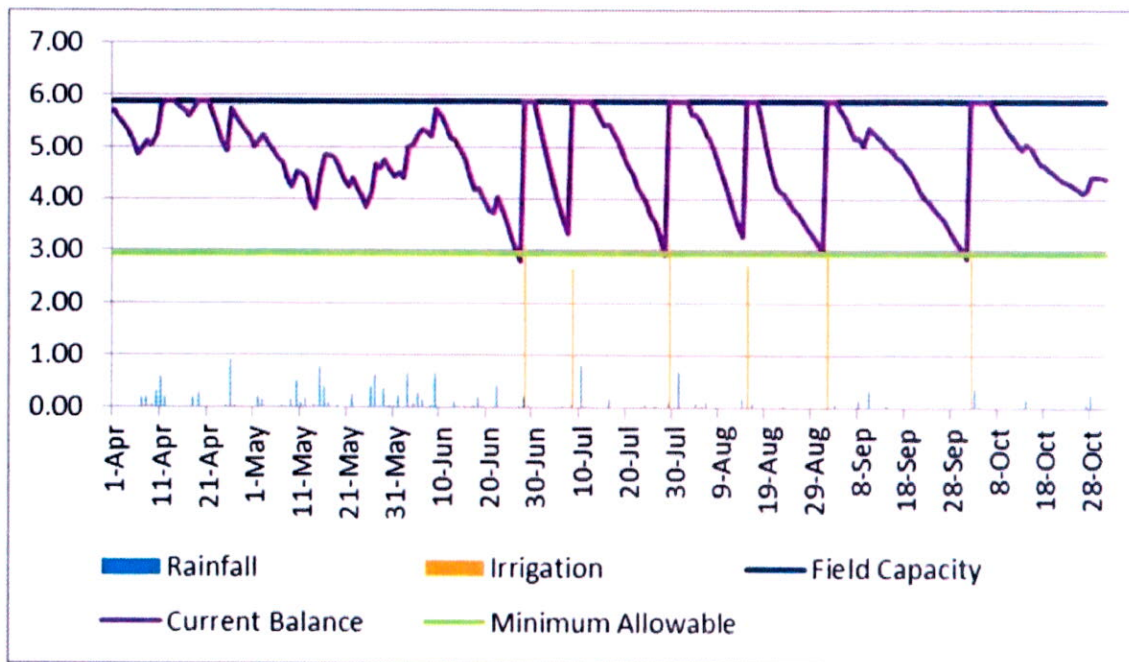


Figure A-22. Crop Water Use Calculation for Year 1991.

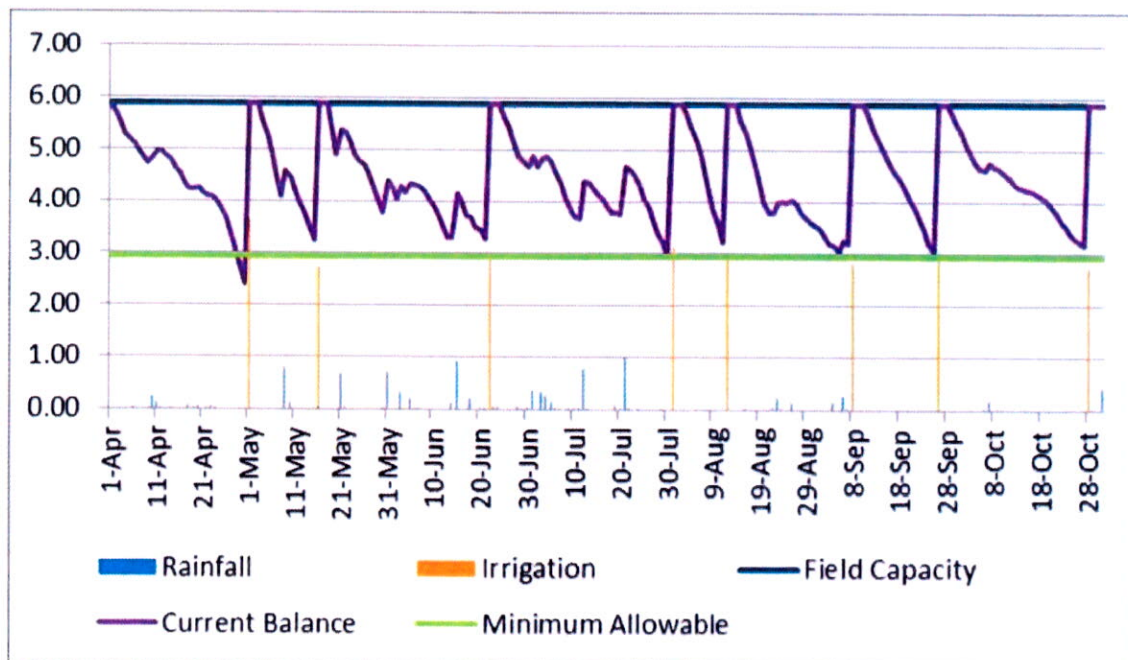


Figure A-23. Crop Water Use Calculation for Year 1992.

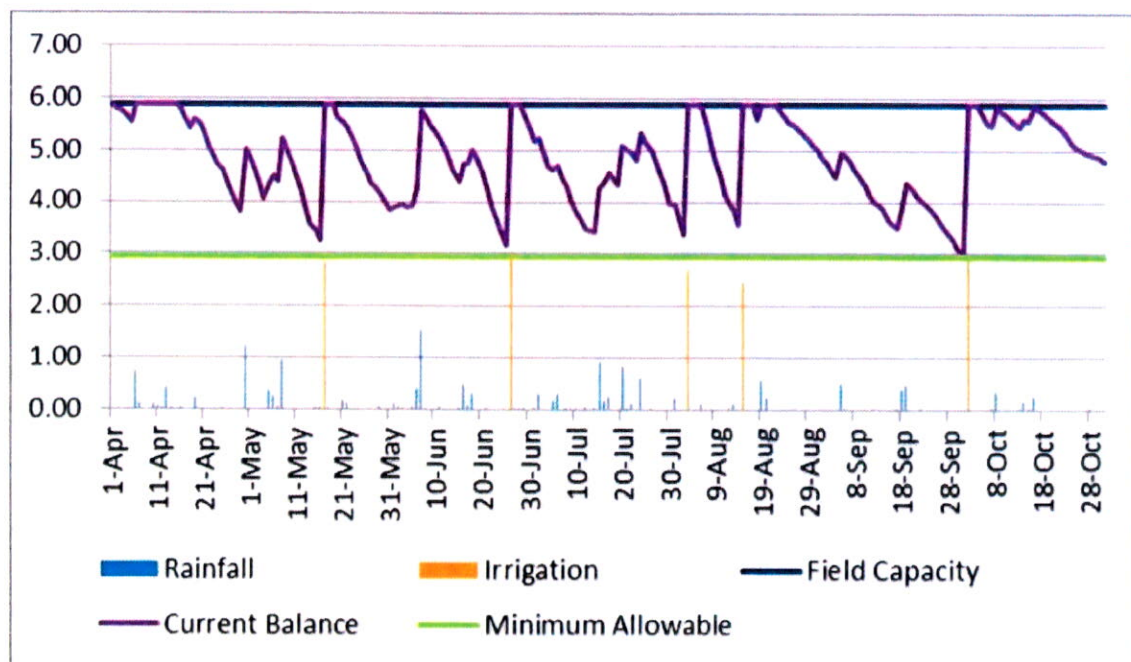


Figure A-24. Crop Water Use Calculation for Year 1993.

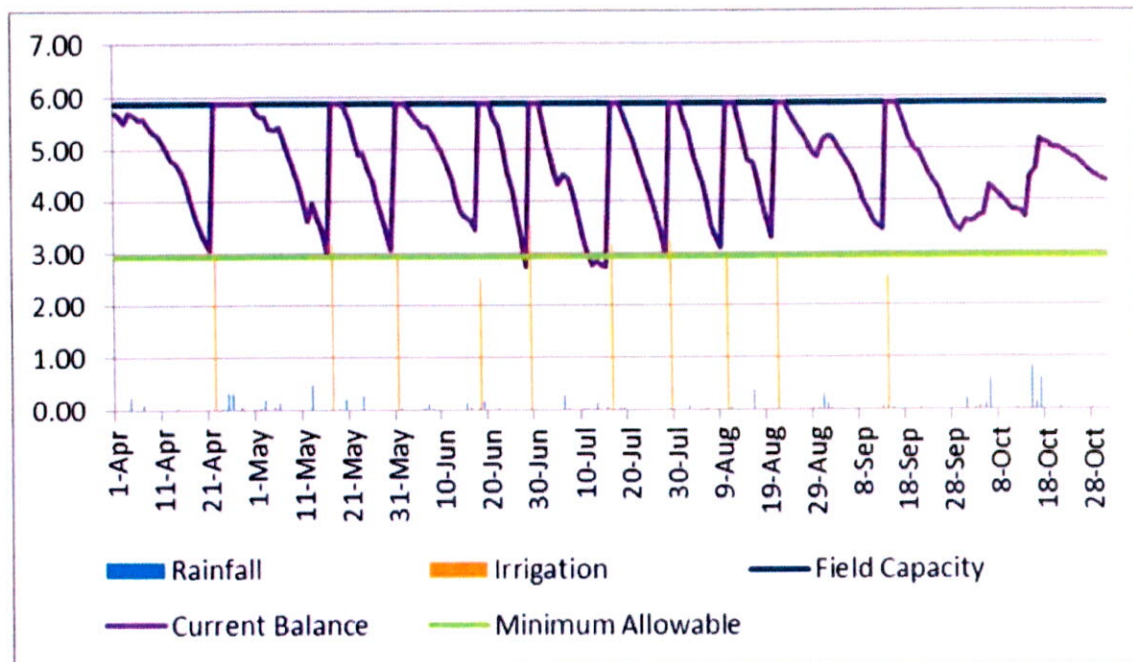


Figure A-25. Crop Water Use Calculation for Year 1994.

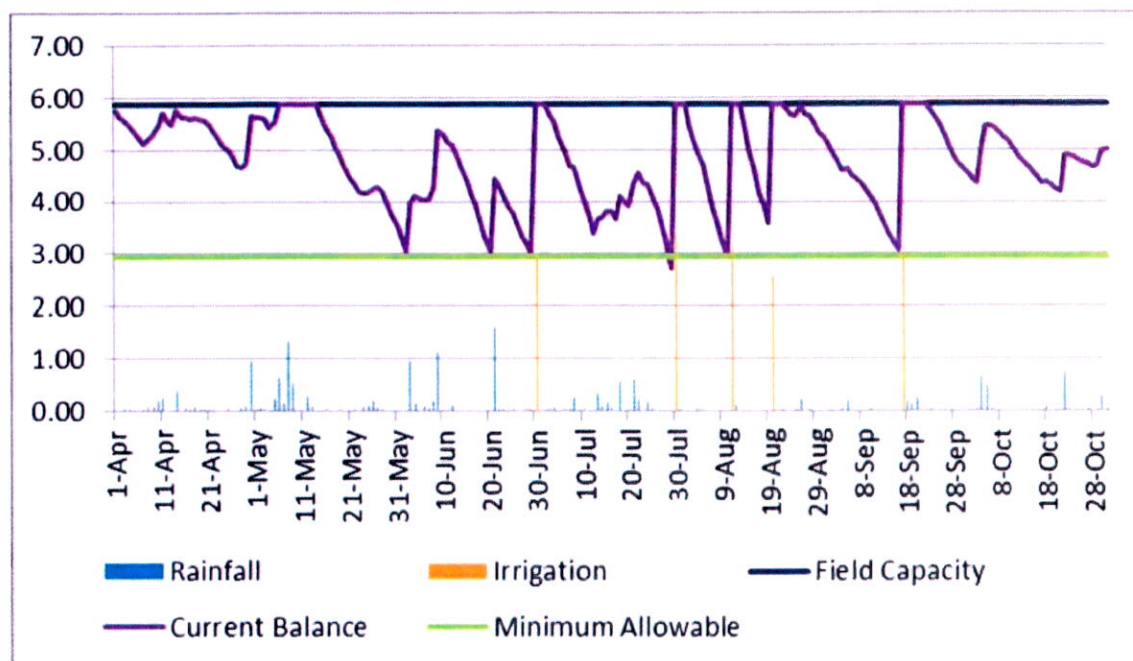


Figure A-26. Crop Water Use Calculation for Year 1995.

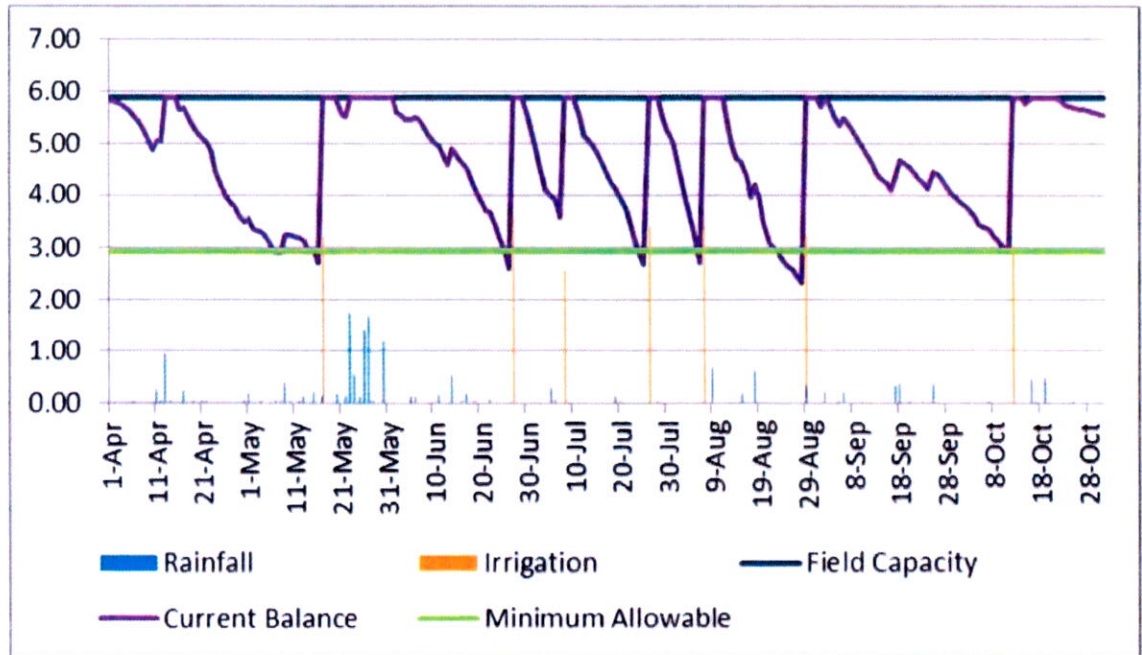


Figure A-27. Crop Water Use Calculation for Year 1996.

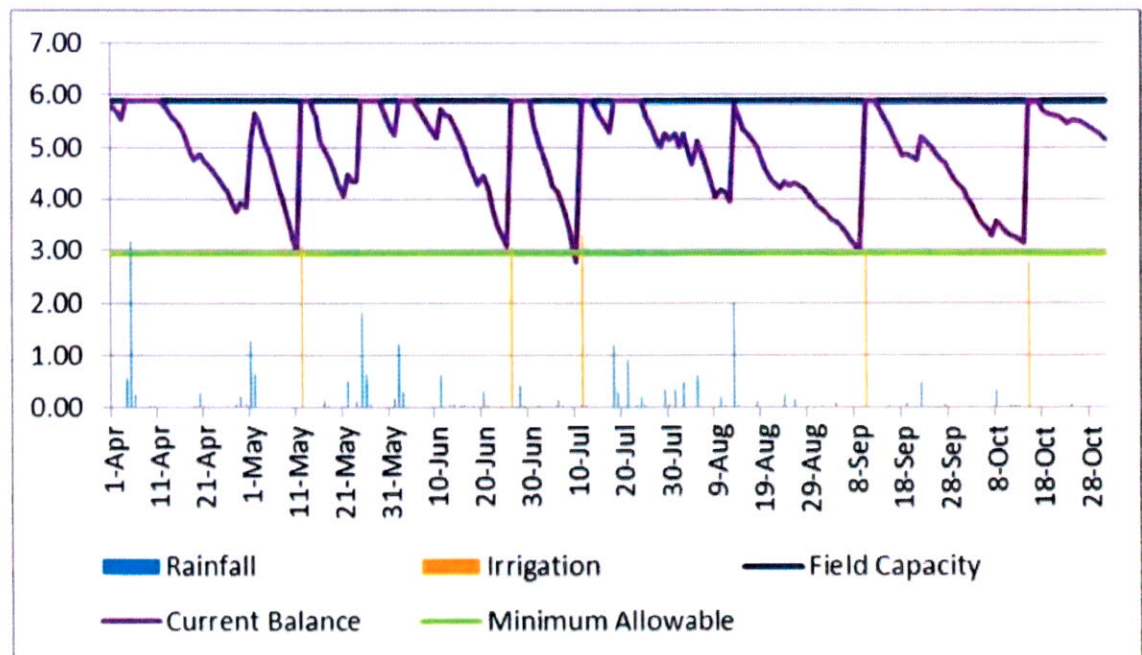


Figure A-28. Crop Water Use Calculation for Year 1997.

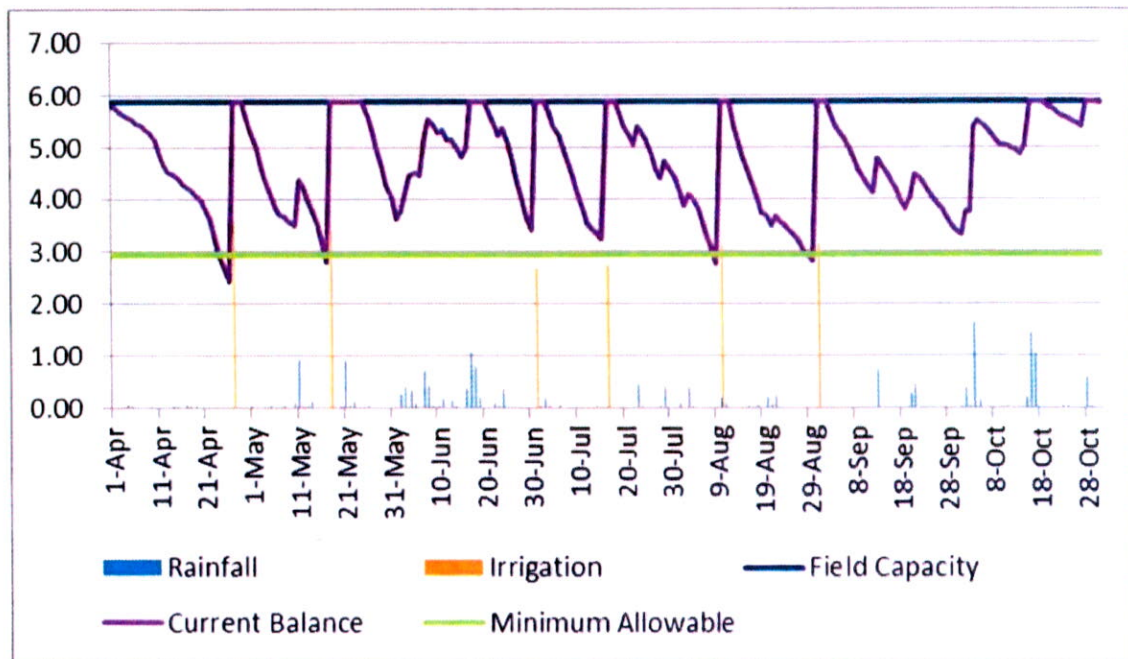


Figure A-29. Crop Water Use Calculation for Year 1998.

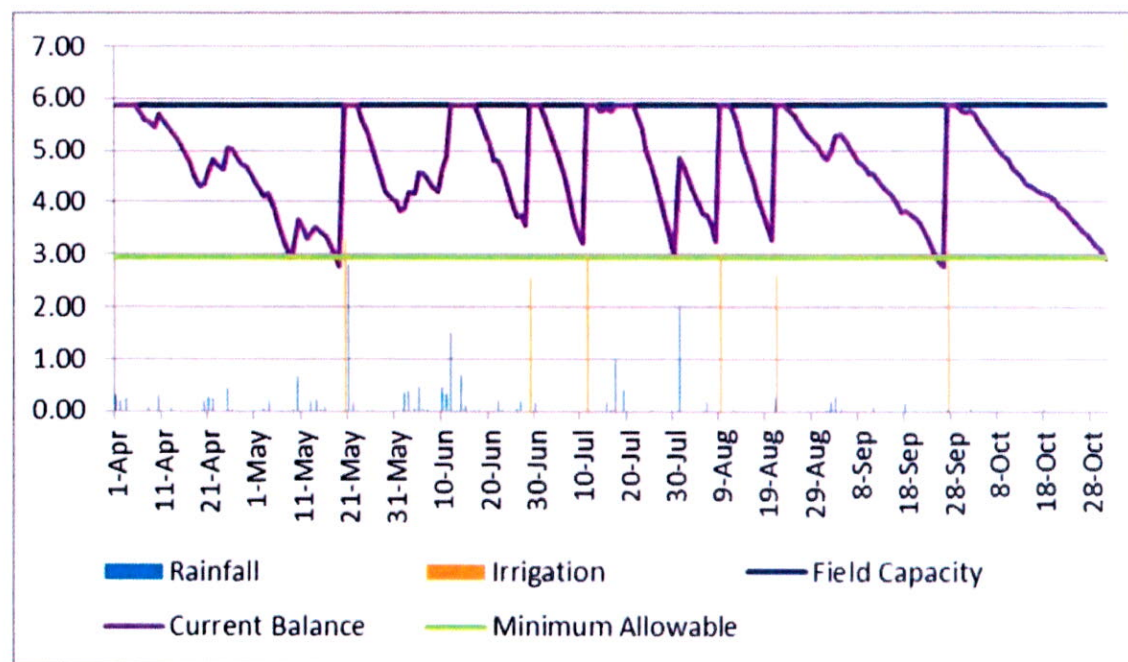


Figure A-30. Crop Water Use Calculation for Year 1999.

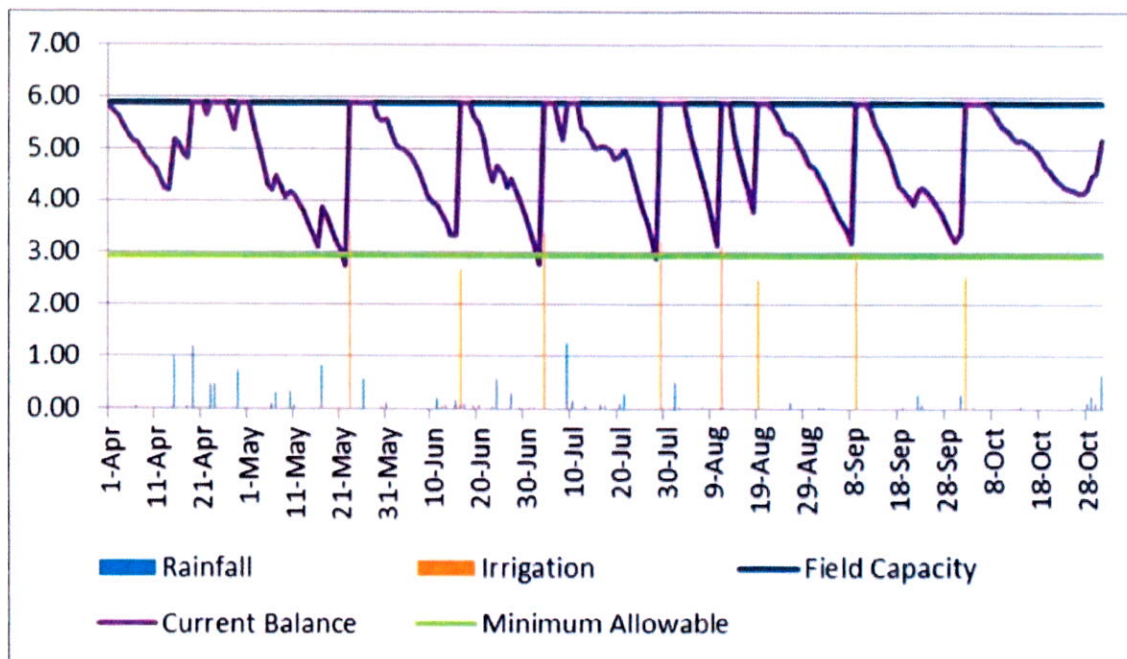


Figure A-31. Crop Water Use Calculation for Year 2000.

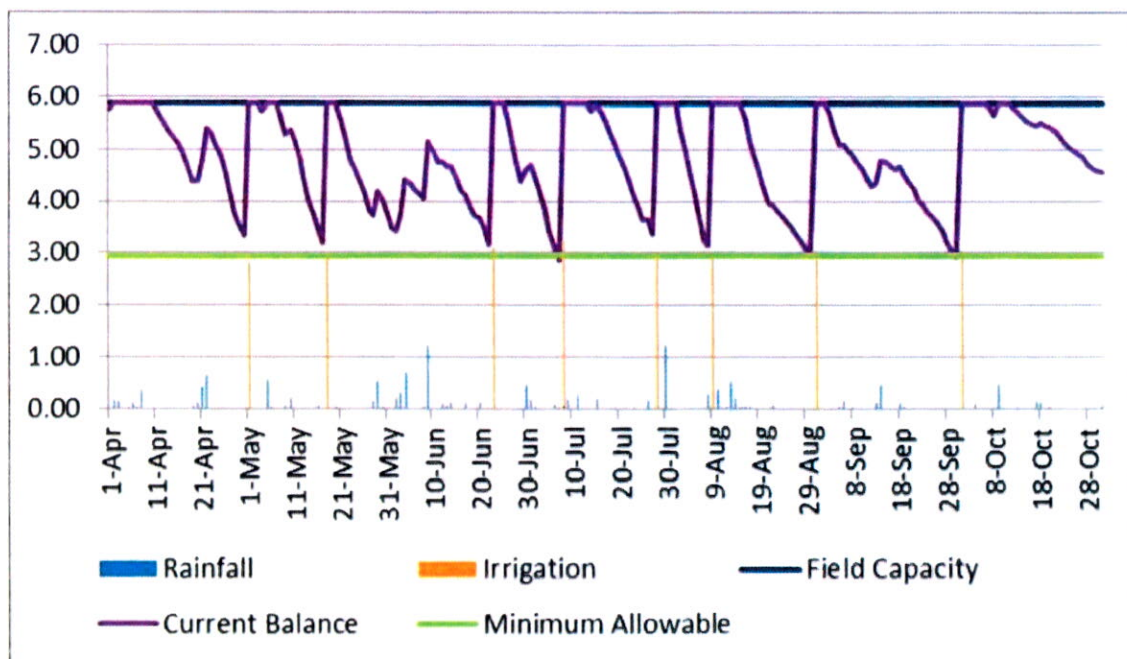


Figure A-32. Crop Water Use Calculation for Year 2001.

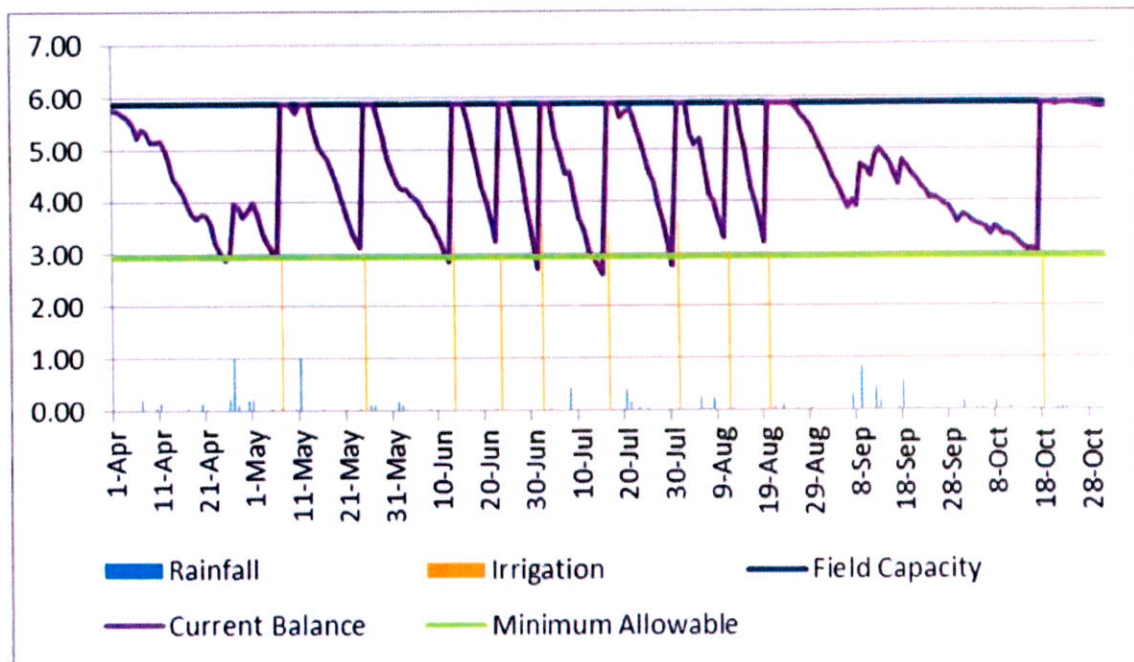


Figure A-33. Crop Water Use Calculation for Year 2002.

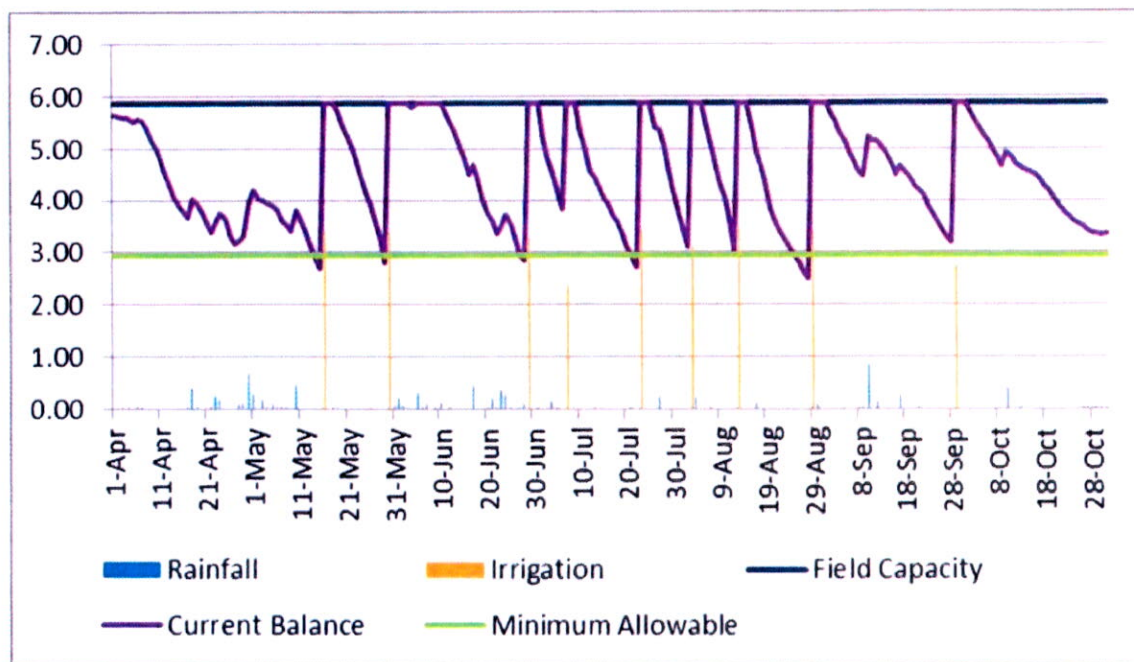


Figure A-34. Crop Water Use Calculation for Year 2003

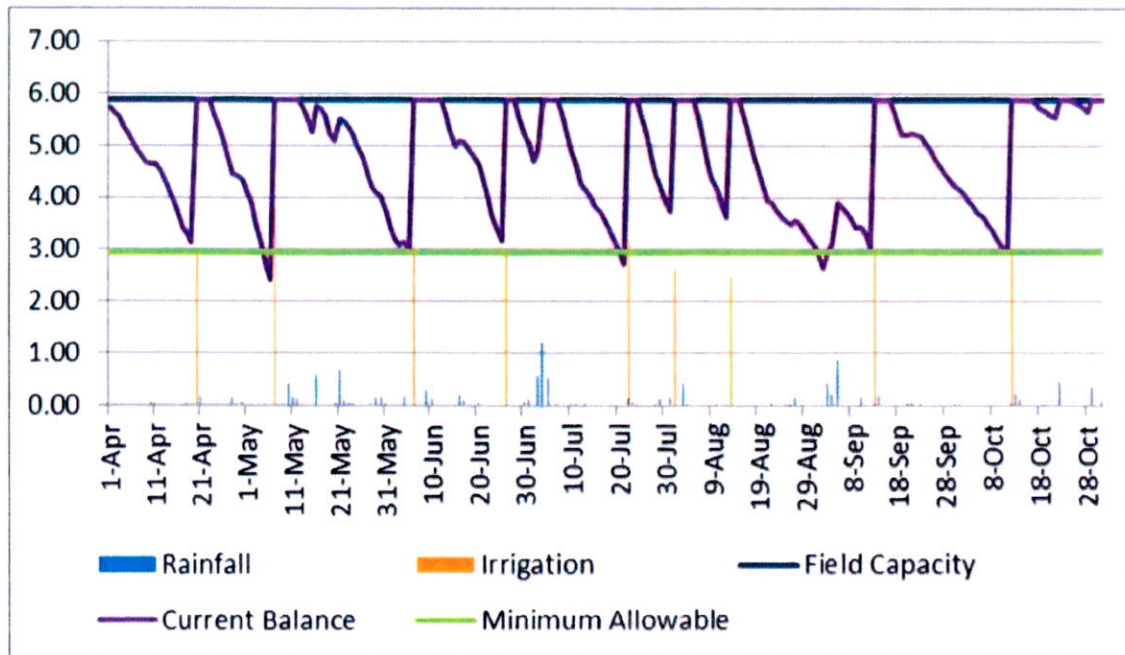


Figure A-35. Crop Water Use Calculation for Year 2004.

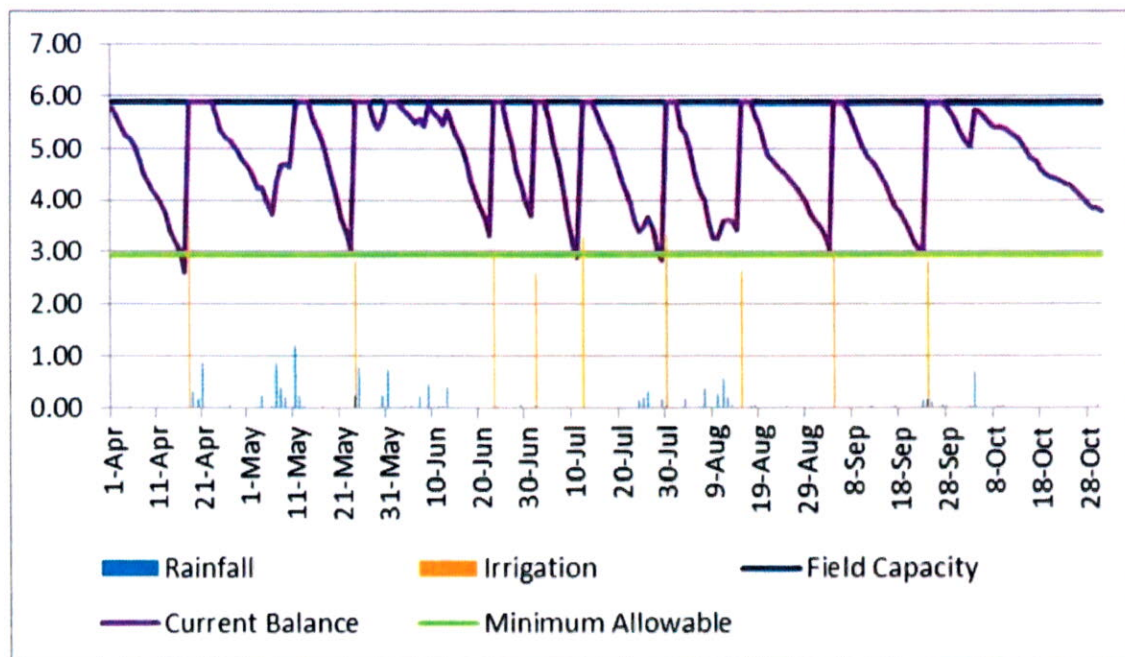


Figure A-36. Crop Water Use Calculation for Year 2005.

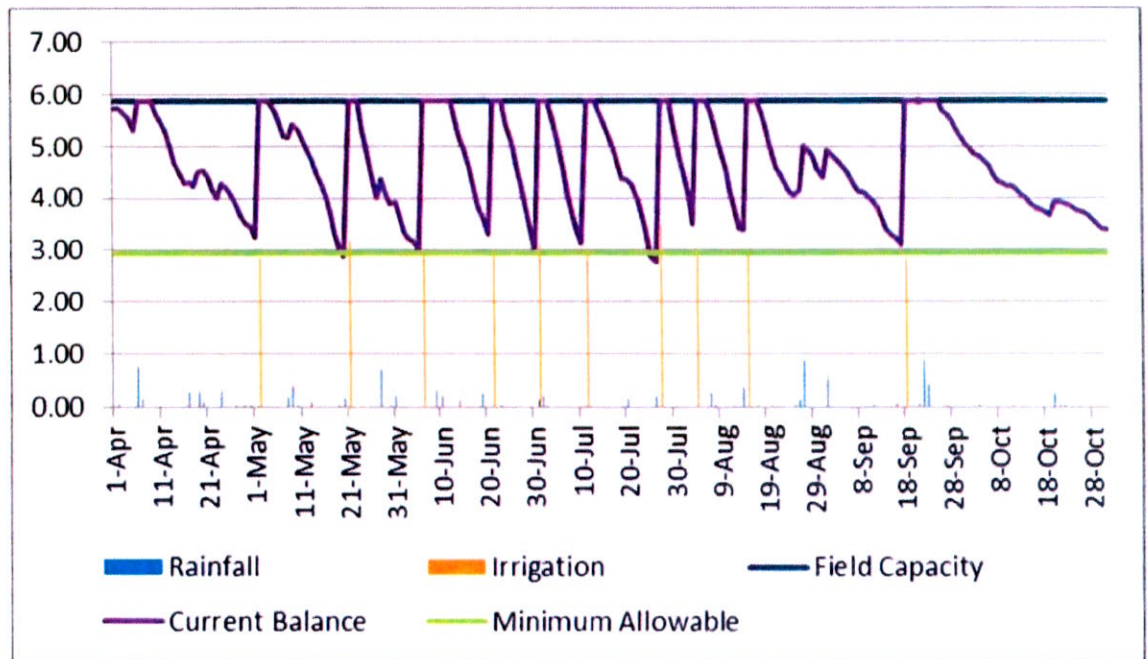


Figure A-37. Crop Water Use Calculation for Year 2006.

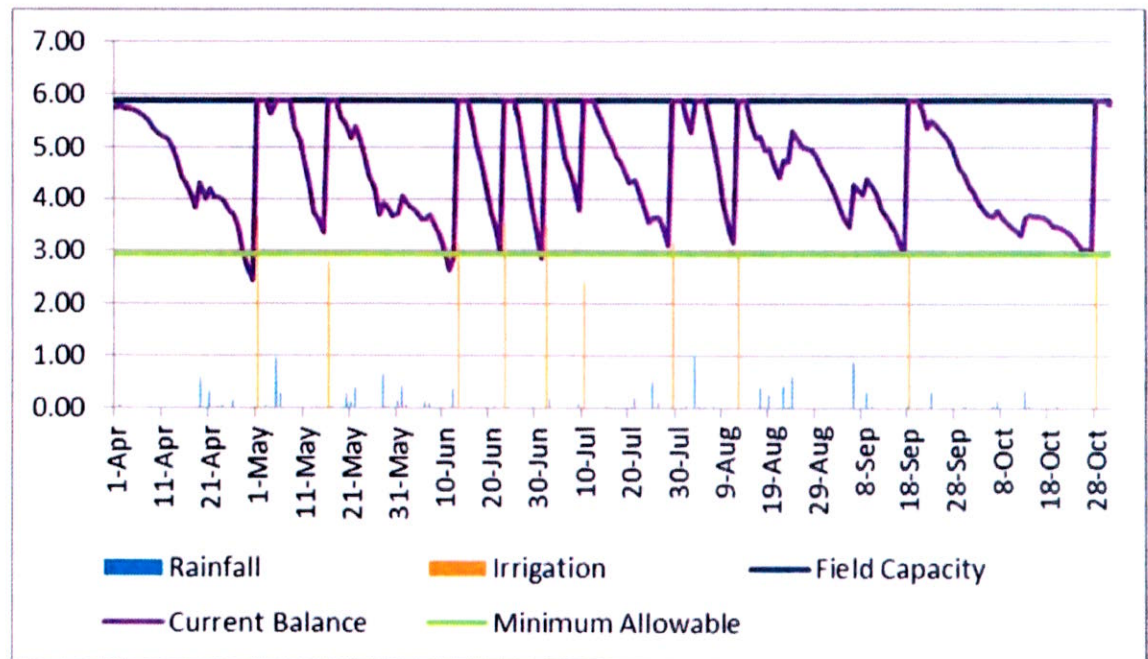


Figure A-38. Crop Water Use Calculation for Year 2007.

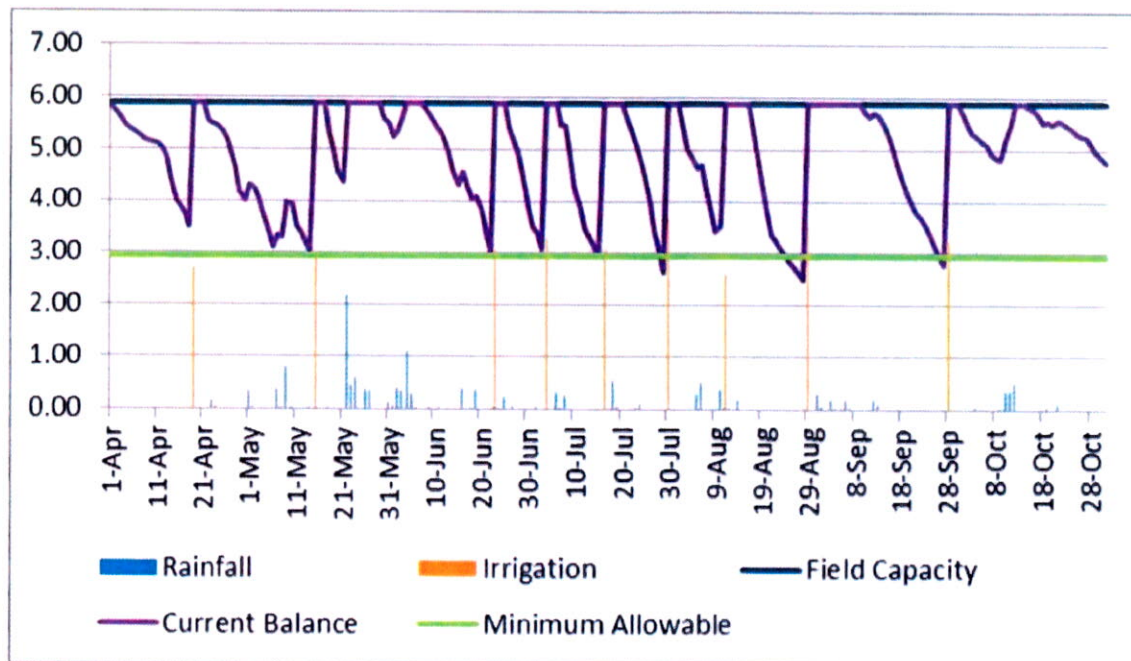


Figure A-39. Crop Water Use Calculation for Year 2008.

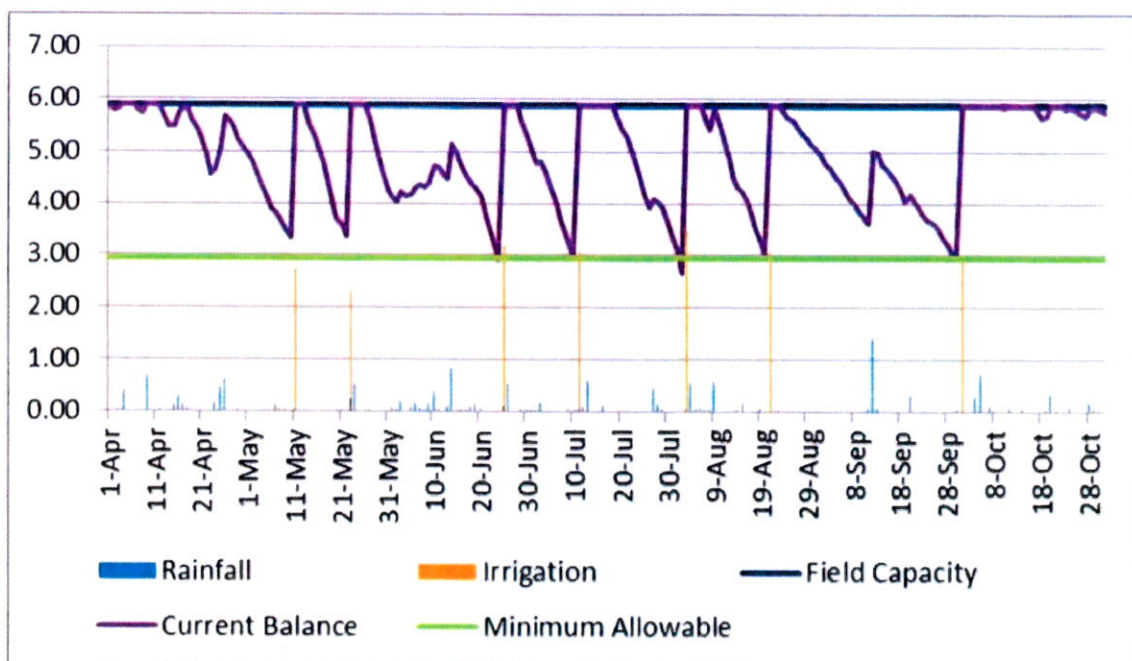


Figure A-40. Crop Water Use Calculation for Year 2009.

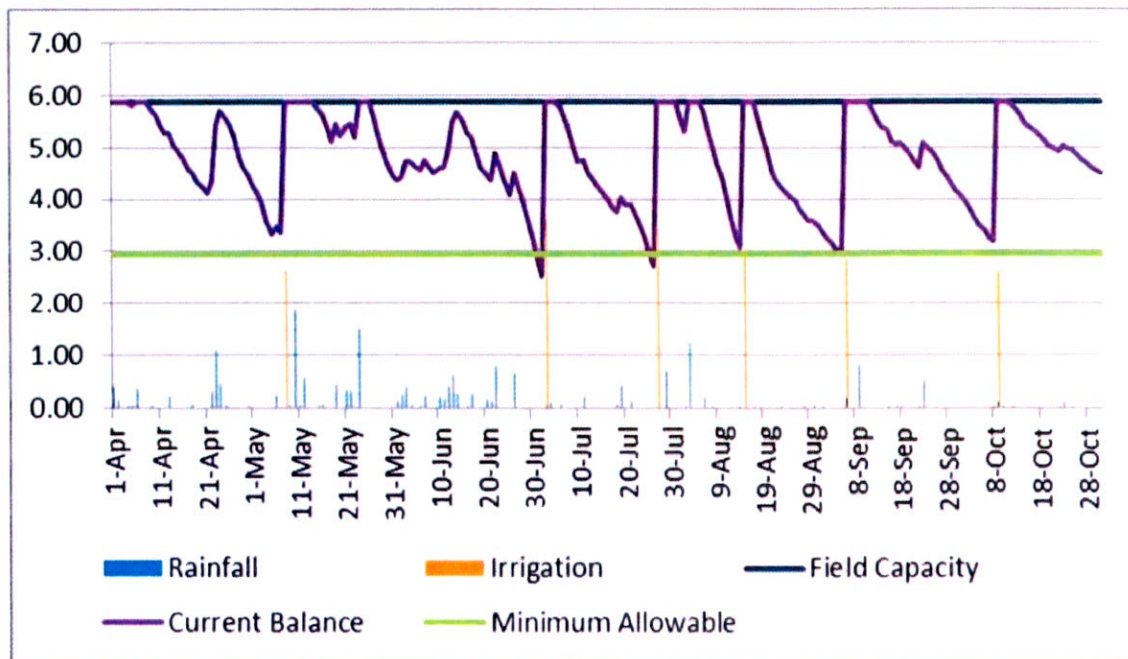


Figure A-41. Crop Water Use Calculation for Year 2010.

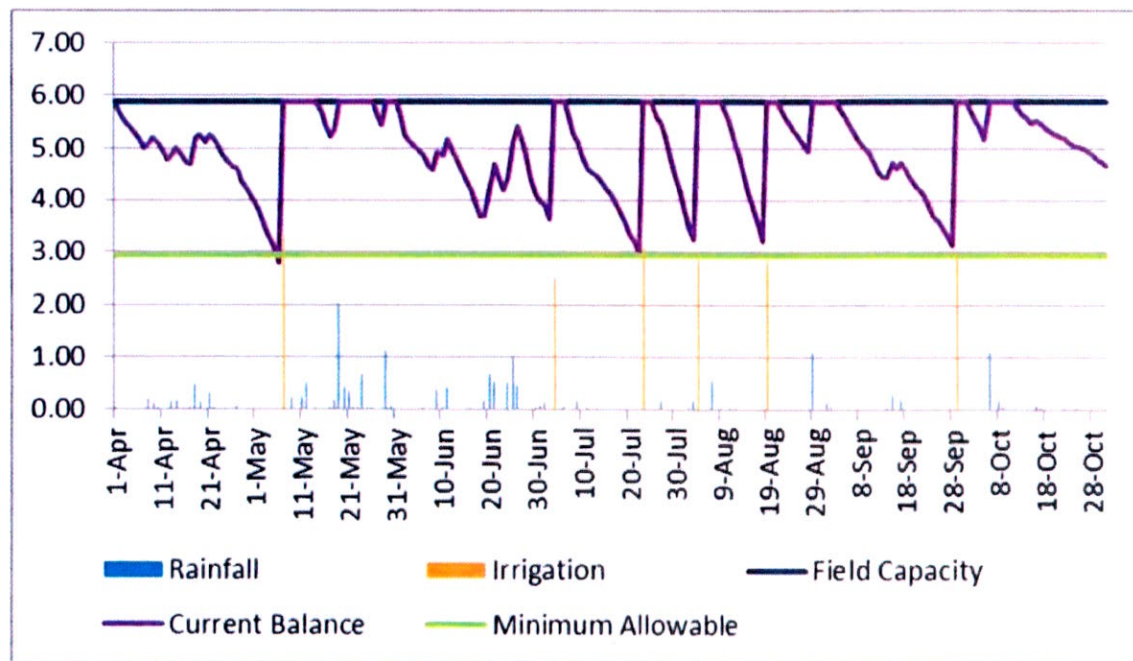


Figure A-42. Crop Water Use Calculation for Year 2011.

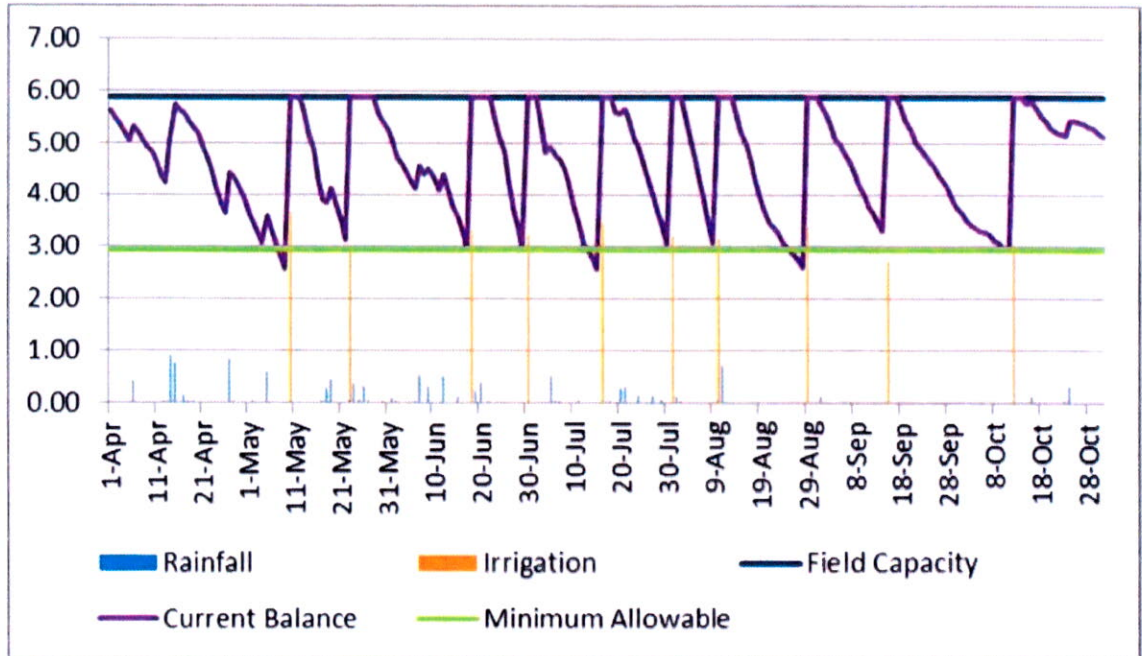


Figure A-43. Crop Water Use Calculation for Year 2012.

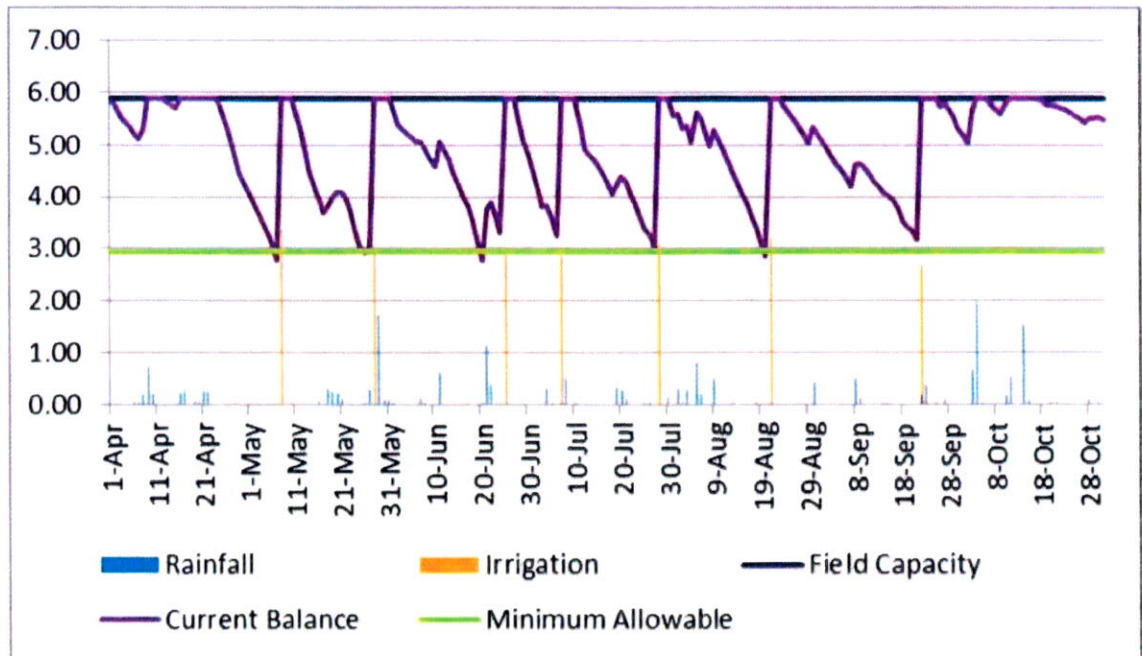


Figure A-44. Crop Water Use Calculation for Year 2013.

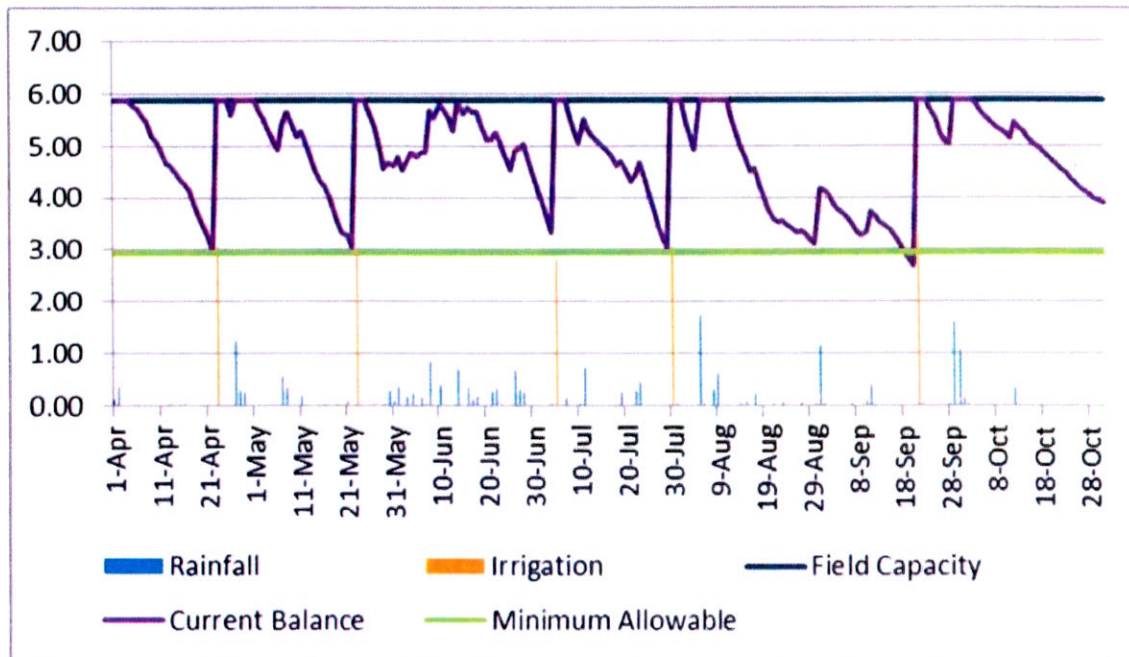


Figure A-45. Crop Water Use Calculation for Year 2014.

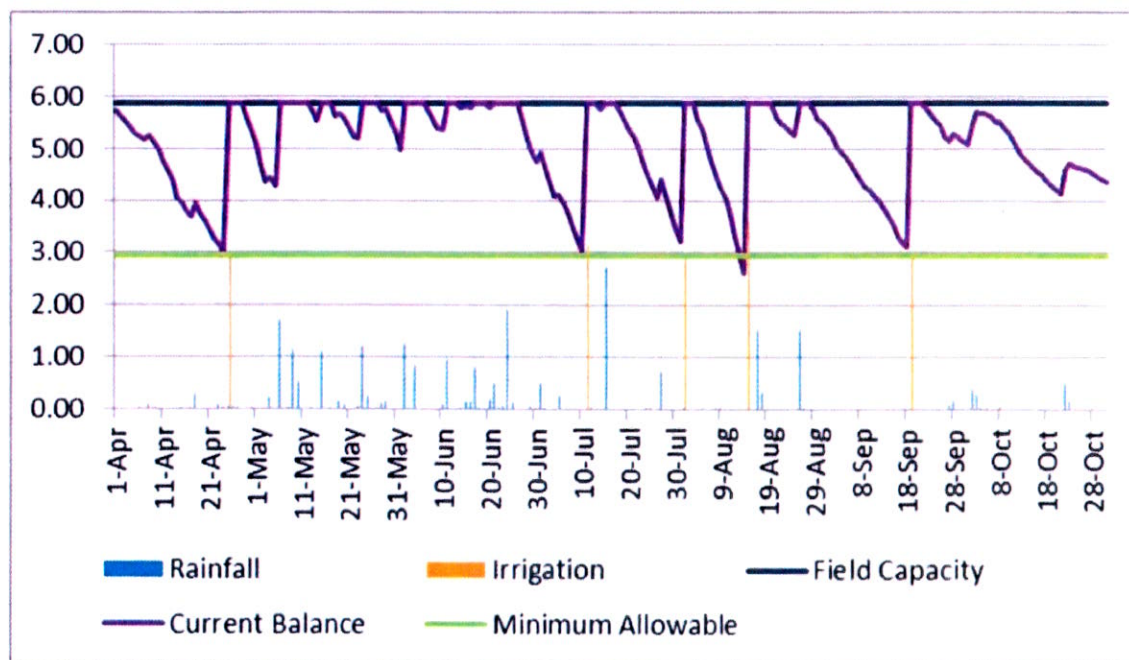


Figure A-46. Crop Water Use Calculation for Year 2015.

RECEIPT

WATER RIGHTS PROGRAM South Dakota Department of Agriculture and Natural Resources

Date January 9th 2025

RECEIVED OF Rapid Valley Sanitary District 4611 Teak Drive Rapid City SD 57703

The following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. <u>2884-2</u> to Appropriate Water, to construct and to put water to beneficial use	\$ <u>100.00</u>
Fee for Application for Permit No. _____ to Appropriate Water for Future use	\$ _____
Fee to retain Future Use Permit No. _____ after period of seven years.	\$ _____
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. <u>2884-2</u>	\$ <u>200.00</u>
Fee for Filing Transfer Form _____	\$ _____
Fee for _____	\$ _____
Fee for Issuing New Well Driller's License No. _____	\$ _____
Fee for Renewal of Well Driller's License No. _____	\$ _____
Fee for Issuing Well Pump Installer's License No. _____	\$ _____
Fee for Renewal of Well Pump Installer's License No. _____	\$ _____
(Any Other Work Provided by Law)	TOTAL
	\$ <u>300.00</u>

By Eric Groslund
Chief Engineer

SK

Duvall, Ron

Subject: FW: [EXT] [External] RE: Little Giant and South Side Application - RVSD/Buxton

From: Schultz, Ted <ted.schultz@foth.com>

Sent: Thursday, January 30, 2025 2:12 PM

To: Steen, Nakaila <Nakaila.Steen@state.sd.us>

Subject: RE: [EXT] [External] RE: Little Giant and South Side Application - RVSD/Buxton

Hello Nakaila,

We can update the report to show this below:

The discrepancy is due to rounding in Excel. If you extend the decimal out to the thousands then the numbers match up.

Apr	May	Jun	Jul	Aug	Sep	Oct	Total
6.30	11.44	17.40	20.85	26.45	17.40	9.84	109.68
6.3	11.4	17.4	20.9	26.5	17.4	9.8	109.7

Ted F. Schultz, PE

Senior Client Manager

Licensed in MN, WI, SD, ND, NE, WY



Foth Infrastructure & Environment, LLC

Mobile (605) 381-0433

foth.com

From: Steen, Nakaila <Nakaila.Steen@state.sd.us>

Sent: Thursday, January 30, 2025 8:26 AM

To: Schultz, Ted <ted.schultz@foth.com>

Subject: [External] RE: Little Giant and South Side Application - RVSD/Buxton

Good morning Ted,

When totaling the monthly volumes available for transfer for Water Permit Application No. 2884-2 on table 7, I am only getting 109.5 acre-feet. Are there decimal places I am not seeing from this view point, or do you agree on the 109.5 acre-feet available for transfer? Thanks for looking into this

Table 7 – South Side Ditch Transferable Right (all values in acre-feet)

South Side Ditch	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Historical Diversions to Ditch	0	350	532	638	809	532	0	2861.6
Pro-rata Diversions (Minus 9.8% Ditch Loss)	0	11.4	17.4	20.8	26.4	17.4	0	93.5
Crop Demand	3.2	20.2	33.6	43.5	36.9	20.1	4.9	162.2
Crop Demand at 50% Efficiency	6.3	40.3	67.2	86.9	73.8	40.1	9.8	324.5
Irrigation Right to Be Transferred	6.3	11.4	17.4	20.8	26.4	17.4	9.8	109.7

Sincerely,
Nakaila Steen

From: Schultz, Ted <ted.schultz@foth.com>
Sent: Thursday, January 9, 2025 11:42 AM
To: Steen, Nakaila <Nakaila.Steen@state.sd.us>
Subject: RE: [EXT] Little Giant and South Side Application - RVSD/Buxton

Hello Nakaila:

I thought I would check in and see if you need any other information from us on the RVSD Water Rights Applications that were sent in. Let me know if I can help in any way.

Ted F. Schultz, PE
 Senior Client Manager
 Licensed in MN, WI, SD, ND, NE, WY


Foth Infrastructure & Environment, LLC
 Mobile (605) 381-0433
foth.com

From: Schultz, Ted
Sent: Monday, December 16, 2024 1:31 PM
To: Steen, Nakaila <Nakaila.Steen@state.sd.us>
Subject: Little Giant and South Side Application - RVSD/Buxton

Nakaila:

The application is being mailed to Pierre with 2 checks. Here is the electronic pdf of the applications – both in the front of this in front of the report. Reply to me with any questions.

Ted F. Schultz, PE
 Senior Client Manager

Rodriguez, Rachel

From: Duvall, Ron
Sent: Monday, November 18, 2024 11:28 AM
To: Gronlund, Eric; Rodriguez, Rachel; Dewell, Amanda
Cc: Steen, Nakaila
Subject: RE: [EXT] RVSD - Buxton: SS / LG Transfers

I think we just tell them to submit separate applications because it is impacting two separate vested water rights. Aside from that, if there is any chance either gets contested, then it is easier to keep a clean record of the contested case hearing. Also, if only one of the applications is contested, it doesn't bog down the other application that is uncontested.

From: Gronlund, Eric <Eric.Gronlund@state.sd.us>
Sent: Monday, November 18, 2024 10:33 AM
To: Rodriguez, Rachel <Rachel.Rodriguez@state.sd.us>; Duvall, Ron <Ron.Duvall@state.sd.us>; Dewell, Amanda <Amanda.Dewell@state.sd.us>
Cc: Steen, Nakaila <Nakaila.Steen@state.sd.us>
Subject: FW: [EXT] RVSD - Buxton: SS / LG Transfers

Nakaila forwarded this email on applications to transfer portions of old Rapid Valley rights to municipal use. Amanda is out today.

My thought is if transferring from different ditches they should be separate application. Not sure it is outright prohibited just seems cleaner that they are separate applications. **Ron can weigh in with his thoughts.**

As for the fee. \$100 application filing fee and we still require licensing fee of \$200 for a total fee of \$300 per application. (In the case of RVSD 2807-2 they submitted \$700 and we refunded \$400). But in RVSD 2877-2 appears they submitted \$700 and we didn't refund). Pretty sure we consider these transfers an amendment which is only \$100.

I'll let Rachel and Amanda conduct completeness review.

As for where to submit – Water Rights address in Pierre.

From: Steen, Nakaila <Nakaila.Steen@state.sd.us>
Sent: Monday, November 18, 2024 9:39 AM
To: Gronlund, Eric <Eric.Gronlund@state.sd.us>; Dewell, Amanda <Amanda.Dewell@state.sd.us>
Subject: FW: [EXT] RVSD - Buxton: SS / LG Transfers

Please see below – engineer for RVSD may need assistance with application process for these potential transfers out of two Rapid Creek ditches

From: Schultz, Ted <ted.schultz@foth.com>
Sent: Sunday, November 17, 2024 11:22 PM
To: Steen, Nakaila <Nakaila.Steen@state.sd.us>
Subject: [EXT] RVSD - Buxton: SS / LG Transfers

Hello Nakaila:

I'm sending over the application and Water Transfer Report for a couple questions as we submit:

1. Do we need 2 separate applications? One for South Side and one for Little Giant?
2. I realize we need payment for the applications? \$50, \$100 or ?
3. Any other modifications to the application you would like to see?
4. Formal submittal to you or to?

Once we have these items finalized I will submit everything again. Thank you.

Ted F. Schultz, PE

Senior Client Manager

Licensed in MN, WI, SD, ND, NE, WY



Foth Infrastructure & Environment, LLC

Mobile (605) 381-0433

foth.com

From: Steen, Nakaila <Nakaila.Steen@state.sd.us>

Sent: Friday, September 27, 2024 9:00 AM

To: Schultz, Ted <ted.schultz@foth.com>

Subject: [External] SS / LG Transfers

Good morning

Would you please share with Kelcey, I agree with the acreage listed in her table for historically irrigated from both ditches, South Side and Little Giant at Buxton Property – and the method used to calculate available Buxton cfs.

Mark Rath was in office in Pierre briefly and indicated BOR records for annual ditch diversion reports are only up through 1989 so that is the best information available.

Sincerely,

Nakaila Steen

Natural Resources Engineer II

SD DANR-Water Rights Program

605-773-6707

CAUTION: This email originated from outside of Foth. Do not click on links or open attachments unless you recognize the sender and know the content to be safe.



**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 E. CAPITOL AVE
PIERRE SD 57501-3182
danr.sd.gov

**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 2884-2, Rapid Valley Sanitary District**

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Agriculture and Natural Resources concerning Water Permit Application No. 2884-2, Rapid Valley Sanitary District, c/o Rusty Schmidt, Manager, 4611 Teak Drive, Rapid City SD 57703.

The Chief Engineer is recommending APPROVAL of Application No. 2884-2 because 1) the proposed diversion can be developed without unlawful impairment of existing rights, 2) the proposed use is a beneficial use, and 3) it is in the public interest as it pertains to matters of public interest within the regulatory authority of the Water Management Board with the following qualifications:

1. Permit No. 2884-2 is limited to a diversion rate of 0.765 cubic feet of water per second for a total annual volume of 109.68 acre feet of water. The Rapid Valley Sanitary District shall measure diversions at the District's water treatment plant. The total monthly diversion shall not exceed the amount listed on the following table.

Month	Acre feet
April	6.3
May	11.44
June	17.4
July	20.85
Aug	26.45
Sept	17.4
Oct	9.84
Totals	109.68

2. The Rapid Valley Sanitary District shall report to the Chief Engineer annually the amount of water withdrawn each month as measured at the District's water treatment plant.
3. Permit No. 2884-2 authorizes diversion of only natural flow water by the Rapid Valley Sanitary District and does not include any right to stored irrigation water available under contract from Pactola Reservoir and Deerfield Reservoir.

(continued)

4. The Water Management Board retains jurisdiction of Permit No. 2884-2 in the event that changes occur in the system that require adjustments to be made in the monthly or total annual volumes authorized by Permit No. 2884-2.
5. Diversion under Permit No. 2884-2 may not interfere with existing water rights in effect prior to approval of No. 2884-2 or any domestic rights.
6. The amount of water with a May 3, 1880, priority date which may be appropriated under Vested Water Right No. 2040-2, is reduced by 0.765 cfs.
7. The permit holder, Rapid Valley Sanitary District, shall permanently render inoperable the structural means of diverting water to the land which is no longer subject to Vested Water Right No. 2040-2. This work shall be completed prior to the permit holder's diversion of the transferred water to beneficial use by the district. The permit holder must notify the Chief Engineer to schedule an inspection. This transfer is subject to the Chief Engineer's approval that the works are rendered inoperable. This qualification does not grant access to property owned by third parties for making structural changes. The permit holder is responsible for ensuring that access is obtained from such third parties for making structural changes. The permit holder is also responsible for ensuring that such third parties are notified that inspections will occur.

See report on application for additional information.



Eric Gronlund, Chief Engineer
February 20, 2025

Report to the Chief Engineer
On Water Permit Application No. 2884-2
Rapid Valley Sanitary District – Water Service

February 20, 2025

Water Permit Application No. 2884-2 proposes to transfer a portion of Rapid Creek's natural flows appropriated under Vested Water Right No. 2040-2 from irrigation use via South Side Ditch to use by the Rapid Valley Sanitary District (RVSD) in its water distribution system. The site of interest is located on the southeastern outskirts of Rapid City, SD. The transfer is for Rapid Creek water historically used for the irrigation of 68 acres located in the S $\frac{1}{2}$ NW $\frac{1}{4}$, NE $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 23-T1N-R8E (Buxton Property). The portion of Rapid Creek natural flows to be transferred to RVSD is 0.765 cubic feet of water per second (cfs) with an annual volume limitation of 109.68 acre-feet of water.

The existing diversion point on Rapid Creek for South Side Ditch is a shared headgate located in the SE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 15-T1N-R8E. Water Permit Application No. 2884-2 also requests to change the diversion point for 0.765 cfs (109.68 acre-feet) to a point used by RVSD located approximately three-tenths of a mile upstream, in the NE $\frac{1}{4}$ NW $\frac{1}{4}$ (Lot 3R) of Section 15-T1N-R8E. Water Permit Application No. 2884-2 does not authorize any new water to be appropriated from Rapid Creek. If approved, Water Permit Application No. 2884-2 will retain the May 3, 1880 priority date established by the South Side Ditch vested water right for natural flow from Rapid Creek.

REVIEW OF METHODOLOGY

Many previous City of Rapid City and Rapid Valley Sanitary District transfers of Rapid Creek water from irrigation to municipal have been completed under South Dakota Codified Law (SDCL) 46-5-34.1 (Water Rights, 2025).

SDCL 46-5-34.1. Transfer of irrigation rights apart from land--Restricted purposes--Protection of other users. *The provisions of SDCL 46-5-33 and 46-5-34 notwithstanding, irrigation rights may be transferred apart from the land to which they are appurtenant if they are transferred for domestic use or use within a water distribution system. Such irrigation rights may be transferred or leased in whole or in part and may be acquired only through the exercise of powers possessed independently of this section. No transfer, however, may be approved by the Water Management Board unless the transfer can be made without detriment to existing rights having a priority date before July 1, 1978, or to individual domestic users. No land which has had an irrigation right transferred from it pursuant to this section, may qualify for another irrigation right from any water source.*

A 2002 Water Management Board decision on Vested Water Right No. 2479-2 pertains to this application. In 1987, Lone Tree Ditch Company filed a vested water right claim and as a result, the Board validated Vested Water Right No. 2038-2 in 1988. In 1990, Lone Tree Ditch Company became aware that a number of acres had been inadvertently omitted from the validation

completed in 1988. Therefore, Lone Tree Ditch Company filed Vested Water Right Claim No. 2479-2 for the additional acres. In 2002, during the hearing for the validation of Vested Water Right No. 2479-2, Lone Tree Ditch Company's attorney successfully argued that based on a 1974 South Dakota Supreme Court ruling (*Jewett v. Redwater Ditch Co*) that Lone Tree Ditch Company is a stock-share irrigation company (established in corporate by-laws), holds a pre-1907 water right, and that the water right is not appurtenant to the land (SD Supreme Court, 1974). In the case of the stock-share ditch companies with pre-1907 water rights, the Board's decision allows the Chief Engineer to regulate the maximum diversion rate and where the water is taken but not where it is used. The Board determined that Lone Tree Ditch Company had continued to practice the allocation of irrigation water based upon the number of shares held by individual stockholders rather than the number of acres irrigated. As referenced in Conclusion of Law #3 in the water right file for Vested Water Right No. 2479-2, the Board concluded that pre-1907 water rights held by ditch companies are not appurtenant to any particular land unless the by-laws or organization of the company so provide (Water Rights, 2025). If the pre-1907 water rights are not appurtenant to the land, SDCL 46-5-34.1 is not applicable for these types of applications.

APPLICABLE STATUTES

SDCL 46-2A-12. Amendment of permit or license--When granted. *An amendment of an existing permit or license may be granted for a change in use, a change in point of diversion or other change only if the change does not unlawfully impair existing rights and is for a beneficial use and in the public interest.*

SDCL 46-5-30.4. Amendment of permits or rights. *Subject to the limitations in SDCL 46-5-33 and 46-5-34 governing changes in irrigation rights from one parcel of land to another, any water permit or right holder may apply for a change of use of the water, a change of location of the use or other amendment to the permit or right. Permits or rights may be amended pursuant to the procedure contained in chapter 46-2A. Priority shall be retained upon amendment. An amendment of a water permit or right may not increase the rate of diversion or increase the volume of water to be appropriated under the original water permit or right. The amendment may not impair existing rights.*

Both SDCL 46-2A-12 and SDCL 46-5-30.4 allow existing rights to be amended but do not allow the amendment to impair existing water right/permit holders and domestic uses. In the case of Water Permit Application No. 2884-2, Rapid Valley Sanitary District is proposing to transfer a portion of Vested Water Right No. 2040-2, a pre-1907 water right, held by South Side Ditch. South Side Ditch is an incorporated, stock-share irrigation ditch company with water being delivered based upon the number of shares the irrigator holds.

DISCUSSION

The applicant's proposed methodology in determining the transferable yield is to calculate the pro-rata share of water delivered to the shareholder's farm turnout. The pro rata deliveries are equal to the total ditch company's total authorized diversion for the South Side Ditch's May 3, 1880 priority right, less ditch carriage loss, times the shareholder's interest in the authorized

diversion. The volume of water which can be diverted to Rapid Valley Sanitary District's water system is 109.68 acre-feet annually with the monthly totals shown in Table 1 (Foth and WSWE, 2024).

Table 1. 1880 South Side Ditch Vested Water Right Transferable Volume to the Rapid Valley Sanitary District

Month	Volume Limitation (acre-feet)
April	6.3
May	11.44
June	17.4
July	20.85
August	26.45
September	17.4
October	9.84
TOTAL:	109.68

Return flows attributed to the inefficiency of flood irrigation have historically returned to Rapid Creek and would have been available for use by downstream water rights and domestic use. The Rapid Valley Sanitary District pipes its wastewater to Rapid City's Water Reclamation Facility for treatment with the effluent being discharged back to Rapid Creek. Like the irrigation return flows, this treated effluent will continue to be available for downstream existing water uses. If in the future the Sanitary District stops returning effluent to the reclamation facility, or if Water Reclamation Facility stops returning effluent to Rapid Creek, the diversion proposed by this application will need to be recalculated to reflect that condition.

The applicant is proposing a transferable diversion rate of 0.765 cfs. If this application is approved, it would not be expected to impair existing water rights/permits including domestic use. To protect existing rights from being unlawfully impaired, the transferable diversion rate is based on the pro-rata share of the ditch diversion rate decreased by a 9.8 percent carriage loss attributed to the seepage lost from the irrigation ditch prior to delivery at the farm headgates. This carriage loss is to remain as part of the ditch's authorized diversion rate and is consistent with previous South Side Ditch transfers.

Existing water rights/permits may be amended under SDCL 46-2A-12 and 46-5-30.4, but the amendments are not allowed to cause impairment to water right/permit holders or domestic users. The engineering analysis submitted with Water Permit Application No. 2884-2 demonstrates the portion of the South Side Ditch water right historically associated with irrigation of the Buxton property can be transferred to the Rapid Valley Sanitary District without unlawfully impairing existing rights (Foth and WSWE, 2024). This author concurs.

If this transfer is approved, the diversion rate authorized by the May 3, 1880, priority date of Vested Water Right No. 2040-2, held by South Side Ditch, should be decreased by 0.765 cfs due to the transfer. The water available for transfer is only from the natural flow in Rapid Creek and does not include water stored in or stored water released from Deerfield or Pactola Reservoirs.

If approved, Water Permit Application No. 2884-2 should contain the following qualifications:

- The Water Management Board retains the jurisdiction of Permit No. 2884-2 in the event additional information shows that changes need to be made in the month or total annual volumes authorized by Permit No. 2884-2;
- Rapid Valley Sanitary District shall report to the Chief Engineer annually the amount of water withdrawn each month at the District's water treatment plant diversion point.

REVIEW OF EXISTING WATER RIGHTS

Currently, there are 101 water rights/permits, collectively authorized to divert up to approximately 267.9 cfs from Rapid Creek, plus one pending application – Water Permit Application No. 2883-2 requesting to transfer 0.396 cfs (69.3 acre-feet) of Rapid Creek water previously used for irrigation from Little Giant Ditch to municipal use at RVSD (Water Rights, 2025). Additionally, there are two future use permits, both held by the City of Rapid City (each with reservation areas upstream of RVSD and South Side Ditch's diversion points), collectively reserving a total of 8,197 acre-feet of water from multiple sources, including Rapid Creek. Between the existing Little Giant Ditch diversion point and the proposed Sanitary District diversion point, there are zero existing water rights/permits authorized to appropriate water from Rapid Creek. Downstream of the proposed Sanitary District diversion point to the confluence of Rapid Creek with the Cheyenne River, there are 25 existing water rights/permits appropriating approximately 92.87 cfs (Water Rights, 2025). If Water Permit Application Nos. 2883-2 and 2884-2 are approved, the 25 downstream existing water rights/permits would be authorized to appropriate approximately 91.71 cfs, as Little Giant Ditch and South Side Ditch's respective permits will be reduced by the transferred amount (Water Rights, 2025).`

CONCLUSIONS

1. Water Permit Application No. 2884-2 proposes to transfer a portion of Rapid Creek's natural flows appropriated under Vested Water Right No. 2040-2 from irrigation use via South Side Ditch to use by the RVSD in its water distribution system. The site of interest is located on the southeastern outskirts of Rapid City, SD.
2. Existing water rights/permits may be amended under SDCL 46-2A-12 and 46-5-30.4, but the amendments are not allowed to cause impairment to water right/permit holders or domestic users with adequate wells.
3. The transfer is for Rapid Creek water historically used for the irrigation of 68 acres located in the S ½ NW ¼, NE ¼ SW ¼ of Section 23-T1N-R8E (Buxton Property). The portion of Rapid Creek natural flows to be transferred to RVSD is 0.765 cfs with an annual volume limitation of 109.68 acre-feet of water in accordance with the following table:

1880 South Side Ditch Vested Water Right Transferable Volume to the Rapid Valley Sanitary District

Month	Volume Limitation (acre-feet)
April	6.3
May	11.44
June	17.4
July	20.85
August	26.45
September	17.4
October	9.84
TOTAL:	109.68

4. The existing diversion point on Rapid Creek for South Side Ditch is a shared headgate located in the SE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 15-T1N-R8E. Water Permit Application No. 2884-2 also requests to change the diversion point for 0.765 cfs (109.68 acre-feet) to a point used by RVSD located approximately three-tenths of a mile upstream, in the NE $\frac{1}{4}$ NW $\frac{1}{4}$ (Lot 3R) of Section 15-T1N-R8E. Water Permit Application No. 2884-2 does not authorize any new water to be appropriated from Rapid Creek.
5. If approved, Water Permit Application No. 2884-2 will retain the May 3, 1880 priority date established by the South Side Ditch vested water right for natural flow from Rapid Creek.
6. The Foth Infrastructure & Environment, LLC and White Sands Water Engineers Inc. Engineering Report submitted with the application demonstrates this water right can be transferred without impairing existing rights. This author concurs.
7. If approved, the diversion rate authorized by the May 3, 1880 priority date of Vested Water Right No. 2040-2, South Side Ditch Company, should be decreased by 0.765 cfs due to the transfer.
8. If approved, Water Permit Application No. 2884-2 should contain the following qualifications:
 - The Water Management Board retains the jurisdiction of Permit No. 2884-2 in the event that additional information show that changes need to be made in the monthly or total annual volumes authorized by Permit No. 2884-2;
 - Rapid Valley Sanitary District shall report to the Chief Engineer annually the amount of water withdrawn each month at the District's water treatment plant diversion point.

Nakaila Steen

Nakaila Steen
Natural Resources Engineer II
SD DANR - Water Rights Program

References

Foth and WSWE, 2024. Foth Infrastructure & Environment, LLC and White Sand Water Engineers, Inc Engineering Report for Transfer of Little Giant Ditch and South Side Ditch Water Rights from Buxton to Rapid Valley Sanitary District – Water Service. Prepared by Ted Schultz, PE.

SD Supreme Court. 1974. O.A. Jewett et al. v. Redwater Irrigating Association and the State Water Resources Commission of the State of South Dakota.

Water Rights, 2025. Water Right/Permit Files, SD DANR-Water Rights Program, Joe Foss Bldg, Pierre, South Dakota.



**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 E CAPITOL AVE
PIERRE SD 57501-3182
danr.sd.gov

**NOTE: TO BE SURE OF PUBLICATION ON
THE CORRECT DATES, CONTACT
THE NEWSPAPER RIGHT AWAY.**

February 21, 2025

Rapid Valley Sanitary District
c/o Rusty Schmidt
4611 Teak Drive
Rapid City SD 57703

Dear Mr. Schmidt:

Water Permit Application No. 2884-2 for municipal use has been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice has been sent to the Rapid City Journal printed in Rapid City SD (online payment portal, see attachment). You will need to contact the newspaper and authorize publication of this notice. For your information, a copy of the notice, the recommendation of the Chief Engineer and report on the application are enclosed. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

Be sure to contact the above newspaper to authorize publication of your Notice and to arrange for payment. Early contact with the paper can eliminate delays. Upon receiving authorization from you, the publisher has been instructed to publish your notice. The newspaper has also been instructed to send us the Proof of Publication. We must receive Proof of Publication before action can be taken on the application.

Sincerely,

Rachel Rodriguez

Rachel Rodriguez
Water Rights Program
(605) 773-3352

enclosures

NOTE: If you plan to contest any part of the Chief Engineer's recommendation, you must file a petition pursuant to the procedures outlined in the attached notice of hearing. The Water Management Board will then consider your concerns during a hearing on the application.

NOTICE OF APPLICATION NO. 2884-2 TO CHANGE WATER USE AND MOVE PUMPING LOCATION

Notice is given that Rapid Valley Sanitary District – Water Service, 4611 Teak Drive, Rapid City SD 57703, has filed an application to transfer a portion of Rapid Creek’s natural flows appropriated under Vested Water Right No. 2040-2 from irrigation use via South Side Ditch to use by the Rapid Valley Sanitary District (RVSD) in its water distribution system. The transfer is for Rapid Creek water historically used for irrigation of 68 acres located in the S 1/2 NW 1/4, NE 1/4 SW 1/4 Section 23-T1N-R8E (Buxton property). The portion of Rapid Creek natural flows to be transferred to RVSD is 0.765 cubic feet of water per second (cfs) with an annual volume limitation of 109.68 acre-feet of water. The existing diversion point on Rapid Creek for South Side Ditch is a shared headgate located in the SE 1/4 NW 1/4 Section 15-T1N-R8E. This application also requests to change the diversion point for 0.765 cfs (109.68 acre-feet) to a point used by RVSD located approximately three-tenths of a mile upstream, in the NE 1/4 NW 1/4 (Lot 3R) Section 15-T1N-R8E. This application does not authorize any new water to be appropriated from Rapid Creek. If approved, this permit will retain the May 3, 1880, priority date established by the South Side Ditch vested water right for natural flow from Rapid Creek. This site is located on the southeastern outskirts of Rapid City SD.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 2884-2 because 1) the proposed diversion can be developed without unlawful impairment of existing rights, 2) the proposed use is a beneficial use, and 3) it is in the public interest as it pertains to matters of public interest within the regulatory authority of the Water Management Board. The Chief Engineer’s recommendation with qualifications, the application, and staff report are available at <https://danr.sd.gov/public> or contact Ron Duvall for this information, or other information, at the Water Rights Program address provided below.

Any person interested in opposing this application or recommendation shall allege that the application, upon approval, will cause injury to the person that is unique from any injury suffered by the public in general. The injury must concern a matter either within the regulatory authority found in SDCL 46-2A-9 for approval or denial of the application, or other matter concerning the application within the regulatory authority of the board to act upon as defined by SDCL 46-2-9 and 46-2-11, or both. Any person meeting the petitioner requirements and wishing to be a party of record in a contested case hearing shall file a written petition to oppose the application with BOTH the applicant and Chief Engineer. A petition opposing the application shall be filed on a form provided by the Chief Engineer. The petition form is available online at <https://danr.sd.gov/public> or by contacting the Chief Engineer. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501" or call (605) 773-3352. The applicant's mailing address is given above. If contesting the Chief Engineer's recommendation, the applicant shall also file a petition. A petition filed by either an interested person or the applicant must be filed by March 14, 2025.

The petition shall include a statement describing the unique injury upon approval of the application on the petitioner, the petitioner's reasons for opposing the application, and the name and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained.

Any interested person may file a comment on the application with the Chief Engineer. The comment shall be filed on a form provided by the Chief Engineer and is available online at <https://danr.sd.gov/public> or by calling (605) 773-3352 or writing the Chief Engineer at the address provided above. Filing a comment does not make the commenter a party of record or a participant in any hearing that may be held. Any comment must be filed by March 14, 2025.

If the applicant does not contest the recommendation of the Chief Engineer and no petition to oppose the application is received, the Chief Engineer shall act on the application pursuant to the recommendation with no hearing held before the Water Management Board. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled, and the Water Management Board will consider this application. Notice of the hearing will be given to the applicant and any person filing a petition.

Published once at the total approximate cost of_

Rodriguez, Rachel

From: Rodriguez, Rachel
Sent: Friday, February 21, 2025 11:43 AM
To: legals@rapidcityjournal.com
Subject: 2884-2 Rapid Valley Sanitary District
Attachments: 2884-2 public.short_final.docx; FORM8.FRM.doc

Attached is a notice to be published on March 4, 2025.

Rapid Valley Sanitary District – Water Service, 4611 Teak Drive, Rapid City SD 57703, 605-393-1050, rschmidt@rvsd.com has been notified to contact you to authorize publication and arrange for payment.

Please send the affidavit or return the attached Proof of Publication form ASAP to the Water Rights Program, 523 E Capitol Ave, Pierre SD 57501.

Let me know if you have questions. Please acknowledge receipt of this email.

Thank you,

Rachel Rodriguez
DANR | Program Assistant
Rachel.Rodriguez@state.sd.us



Rodriguez, Rachel

From: Bailee Liston <leelegals@column.us>
Sent: Friday, February 21, 2025 1:21 PM
To: Rodriguez, Rachel; rschmidt@rvsd.com
Subject: Re: [EXT] 2884-2 Rapid Valley Sanitary District
Attachments: slQe8wvThBXqjIMTqp1B_1740165628737.pdf

Hello,

Your notice is scheduled to be published in the The Rapid City Journal on March 4, 2025. Your Notice ID is:

[slQe8wvThBXqjIMTqp1B](#)

You will be receiving a notification from Column Support with your proof. If you don't see it, check your spam folder and any email restrictions you may have.

For the fastest and most reliable placement process, use [column.us](#) to quickly place notices yourself, get proofs, view pricing, and access your invoices and affidavits. Visit our [help center](#) for tips, or sign up for one of our [training webinars](#).

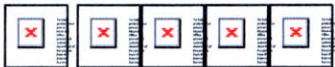
If you have any questions or concerns, please don't hesitate to let us know so we can look into it!

—
// Bailee Liston

// Column Pro Representative

// [Column.us](#) is an easy-to-use online platform where you can place public notices, and access your proofs, invoices and affidavits.

How did I do?



On February 21, 2025 at 9:43 AM PST rachel.rodriguez@state.sd.us wrote:

Attached is a notice to be published on March 4, 2025.

Rapid Valley Sanitary District – Water Service, 4611 Teak Drive, Rapid City SD 57703, 605-393-1050, rschmidt@rvsd.com has been notified to contact you to authorize publication and arrange for payment.

Please send the affidavit or return the attached Proof of Publication form ASAP to the Water Rights Program, 523 E Capitol Ave, Pierre SD 57501.

Let me know if you have questions. Please acknowledge receipt of this email.

Thank you,

Rachel Rodriguez
DANR | Program Assistant
Rachel.Rodriguez@state.sd.us

RECEIVED

MAR 17 2025

OFFICE OF
WATER

Rusty Schmidt

State of Florida, County of Orange, ss:

Stefani Beard, being first duly sworn, deposes and says: That (s)he is a duly authorized signatory of Column Software, PBC and duly authorized agent of The Rapid City Journal, a corporation of Rapid City, South Dakota, a legal and daily newspaper printed and published in Rapid City, in said County of Pennington, and has full and personal knowledge of all the facts herein stated as follows: that said newspaper is and at all of the times herein mentioned has been a legal and daily newspaper with a bonafide paid circulation of at least Two Hundred copies daily, and has been printed and published for at least one year prior to the first date of the published notice.

This affidavit is a true and corrected copy of notice which appeared in said newspaper on the following dates:

PUBLICATION DATES: March. 4 2025

NOTICE ID: slQe8wvThBXqjIMTqp1B

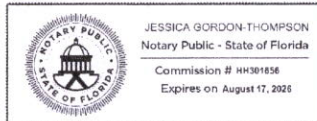
PUBLISHER ID: COL-SD-1977

NOTICE NAME: APPLICATION NO. 2884-2

TOTAL AD COST: \$93.11

FILED ON: Feb. 21, 2025

(Signed) Stefani Beard



VERIFICATION

State of Florida
County of Orange

Subscribed in my presence and sworn to before me on this: 03/06/2025



Notary Public

Notarized remotely online using communication technology via Proof.

**NOTICE OF APPLICATION NO.
2884-2 TO CHANGE WATER
USE AND MOVE PUMPING
LOCATION**

Notice is given that Rapid Valley Sanitary District - Water Service, 4611 Teak Drive, Rapid City SD 57703, has filed an application to transfer a portion of Rapid Creek's natural flows appropriated under Vested Water Right No. 2040-2 from irrigation use via South Side Ditch to use by the Rapid Valley Sanitary District (RVSD) in its water distribution system. The transfer is for Rapid Creek water historically used for irrigation of 68 acres located in the S 1/2 NW 1/4, NE 1/4 SW 1/4 Section 23-T1N-R8E (Buxton property). The portion of Rapid Creek natural flows to be transferred to RVSD is 0.765 cubic feet of water per second (cfs) with an annual volume limitation of 109.68 acre-feet of water. The existing diversion point on Rapid Creek for South Side Ditch is a shared headgate located in the SE 1/4 NW 1/4 Section 15-T1N-R8E. This application also requests to change the diversion point for 0.765 cfs (109.68 acre-feet) to a point used by RVSD located approximately three-tenths of a mile upstream, in the NE 1/4 NW 1/4 (Lot 3R) Section 15-T1N-R8E. This application does not authorize any new water to be appropriated from Rapid Creek. If approved, this permit will retain the May 3, 1880, priority date established by the South Side Ditch vested water right for natural flow from Rapid Creek. This site is located on the southeastern outskirts of Rapid City SD.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 2884-2 because 1) the proposed diversion can be developed without unlawful impairment of existing rights, 2) the proposed use is a beneficial use, and 3) it is in the public interest as it pertains to matters of public interest within the regulatory authority of the Water Management Board. The Chief Engineer's recommendation with qualifications, the application, and staff report are available at <https://danr.sd.gov/public> or contact Ron Duvall for this information, or other information, at the Water Rights Program address provided below.

Any person interested in opposing this application or recommendation shall allege that the application, upon approval, will cause injury to the person that is unique from any injury suffered by the public in general. The injury must concern a matter either within the regulatory authority found in SDCL 46-2A-9 for approval or denial of the application, or other matter concerning the application within the regulatory authority of the board to act upon as defined by SDCL 46-2-9 and 46-2-11, or both. Any person meeting the petitioner requirements and wishing to be a party of record in a contested case hearing shall file a written petition to oppose the application with BOTH the applicant and Chief Engineer. A

A petition opposing the application shall be filed on a form provided by the Chief Engineer. The petition form is available online at <https://danr.sd.gov/public> or by contacting the Chief Engineer. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501" or call (605) 773-3352. The applicant's mailing address is given above. If contesting the Chief Engineer's recommendation, the applicant shall also file a petition. A petition filed by either an interested person or the applicant must be filed by March 14, 2025.

The petition shall include a statement describing the unique injury upon approval of the application on the petitioner, the petitioner's reasons for opposing the application, and the name and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained.

Any interested person may file a comment on the application with the Chief Engineer. The comment shall be filed on a form provided by the Chief Engineer and is available online at <https://danr.sd.gov/public> or by calling (605) 773-3352 or writing the Chief Engineer at the address provided above. Filing a comment does not make the commenter a party of record or a participant in any hearing that may be held. Any comment must be filed by March 14, 2025.

If the applicant does not contest the recommendation of the Chief Engineer and no petition to oppose the application is received, the Chief Engineer shall act on the application pursuant to the recommendation with no hearing held before the Water Management Board. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled, and the Water Management Board will consider this application. Notice of the hearing will be given to the applicant and any person filing a petition.

(Published March 4, 2025 for a total approximate cost of \$93.11 and may be viewed for free at www.sd-publicnotices.com)
Legal No: COL-SD-1977

RECEIVED

MAR 17 2025

OFFICE OF
WATER

LCL7292A05A0AAA.013686.02.02.000000



Rodriguez, Rachel

From: Rodriguez, Rachel
Sent: Friday, February 21, 2025 1:33 PM
To: rschmidt@rvsd.com
Cc: rvsd@rapidnet.com
Subject: 2884-2 Rapid Valley Sanitary District - Public Notice
Attachments: 2884-2 Rec.pdf; 2884-2 Ltr.pdf; 2884-2 PubNotice.pdf; Re: [EXT] 2884-2 Rapid Valley Sanitary District

Good afternoon,

Attached is a copy of the report, chief engineer's recommendation, and information regarding the public notice for your water permit application. Please see attached email regarding the online payment portal. As stated in the letter, please contact the paper(s) as soon as possible to authorize publication and arrange for payment. This information is also being mailed to you today.

Let me know if you have questions. Please acknowledge receipt of this email.

Thank you,

Rachel Rodriguez
DANR | Program Assistant
Rachel.Rodriguez@state.sd.us





**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 E CAPITOL AVE
PIERRE SD 57501-3182
danr.sd.gov

APR 03 2025

Rapid Valley Sanitary District
c/o Rusty Schmidt
4611 Teak Drive
Rapid City SD 57703

Dear Mr. Schmidt:

Enclosed are Water Permit Nos. 2883-2 and 2884-2 authorizing construction of your water diversion systems and beneficial use of the water, not exceeding the limits as specified in the Water Permits.

Form 10's, *Notice of Completion of Works and Application of Water to Beneficial Use*, are enclosed. Please return the completed forms after you have finished the systems and have put the water to beneficial use. An investigation can then be scheduled so the water licenses may be issued, thus completing the acquisition of a water right.

An informational sheet ? *Common Water Right Questions?* is also enclosed. This sheet is intended to answer some of the questions associated with obtaining and keeping a water right.

Sincerely,

Mark Mayer, PE
Director of Office of Water

enclosures



**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 E. CAPITOL AVE
PIERRE SD 57501-3182
danr.sd.gov

STATE OF SOUTH DAKOTA)
) SS
COUNTY OF HUGHES)

**Affidavit of Public Notice
Posting on DANR Website**

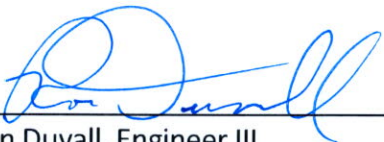
Pursuant to SDCL § 46-2A-4, public notice of the following application was posted on the DANR web site at <https://danr.sd.gov/public>. The posted public notice is the same notice as published in the pertinent newspaper(s) and a copy of the public notice is maintained in the application file. If the application is contested, the posting is moved to the DANR contested case website at <https://danr.sd.gov/public/ContestedCase.aspx> until final action is taken on the application pursuant to SDCL § 46-2A-4.

Application No.: 2884-2

Name of Applicant: Rapid Valley Sanitary District-Water Service, Rusty Schmidt

Date of Posting: 3/4/2025

Date of Removal: 4/3/2025



Ron Duvall, Engineer III

4/4/2025

Date

Subscribed and sworn to before me, a notary public, this 4th day of April, 20 25.



Notary Public - South Dakota
My commission expires:

(SEAL)

**Rachel Rodriguez
My Commission Expires
May 16, 2029**



2884-2

RECEIVED

MAY 08 2025

NOTICE OF COMPLETION OF WORKS AND
APPLICATION OF WATER TO BENEFICIAL USE

Water Rights
Program

Date 5-8-2025

TO: Water Rights Program, DANR
523 E. Capitol
Pierre, SD 57501-3181

FROM: Rapid Valley Sanitary District
(name)
4611 TEAK DR.
(address)
Rapid City S.D. 57703 605-393-1050
(city, state, zip) (phone)

I have completed the construction of the water use system and I have put the water to beneficial use to the maximum extent it is going to be used.

Water Permit No. 2884-2 states that the water use system is to be constructed by
3-14-2030 , and water is to be put to beneficial use by 3-10-2034
(date) (date)

The water use system was completed on 5-8-2025
(date)

Applying the water to beneficial use was completed on 5-8-2025
(date)

You may schedule an investigation so that the water license may be issued.

[Signature]
(signature)



