

**APPENDIX 2
TO
PLAN OF WATER MANAGEMENT
FOR
SPECIAL IMPROVEMENT DISTRICT NO. 1 OF THE RIO GRANDE WATER
CONSERVATION DISTRICT**

SURFACE WATER CREDIT CALCULATIONS

As set forth in the Plan of Water Management, the Board of Managers of Special Improvement District No. 1 of the Rio Grande Water Conservation District (“Subdistrict”) will annually calculate **Surface Water Credit (SWC)** allocated to each Farm or Farm Unit by May 1. Surface Water Credit may be carried over for one year to offset the following years pumping, either on the Farm or Farm Unit accumulating the **SWC** or via exchange, trade, lease or sale to other well water users within the Subdistrict as described below and in the Plan of Water Management.

Exchange, Trade, Lease or Sale of Surface Water Credit (SWC)

As provided for in the Plan of Water Management, **SWC** as calculated by the Subdistrict can be exchanged, traded, leased or sold to other well water users within the Subdistrict. Calculations involving adjustments to the **SWC** would be the same for these exchanges, trades, leases or sales of **SWC** as **SWC** owned by the well water user. **SWC** may be exchanged, traded, leased or sold if a balance remains after subtracting the well owner’s well pumping. The exchange, trade, lease or sale of Surface Water Credits are contracts between water users and must be reported to the Subdistrict as part of each of the contracting water users’ annual Farm Unit Data by June 1 of each Plan Year to ensure accurate accounting by the Subdistrict.

Methodology for Caclulating SWC

Two surface water usage conditions will be presented that result in adjustment of water included in the **SWC**. The methods may be best explained by using examples.

1. SWC Applied as Recharge

SWC obtained from surface water right(s) in a single surface water conveyance structure (a ditch) in which the owner or user of Subdistrict Well(s) has an ownership interest and where the surface water is used only for recharge of the underground aquifer will be derived as follows:

1. Quantify the total ownership interest in the ditch. This ownership in each ditch may be defined in several different manners, for example, total shares, total acres served or a percentage.

2. Obtain subject water user's ownership interest in the ditch in the same units used to define total ownership.
3. Obtain total annual headgate diversions for the ditch.
4. Using the above information, the **SWC** for a Subdistrict Well water user is derived by subtracting an evaporation loss of 5% from the five-year rolling average of total headgate diversions to obtain net diversions, and then multiply the net diversions by the well water user's percentage of ditch ownership or control. The following is an example of this calculation:

Example 1: Producer X farms one quarter of land. X uses ditch water for recharge, and irrigates 129 acres under a center pivot sprinkler. The remainder of the quarter is not farmed. Assume the following data:

- Well user owns or controls 10 shares of Ditch A.
- Total shares issued in Ditch A are equal to 1000.
- Total five-year rolling average of headgate diversions for Ditch A total 25,000 ac-ft/yr.

Calculation:

$$\text{SWC (Ditch)} = [25,000 \text{ ac-ft/yr.} - (5\% \times 25,000 \text{ ac-ft/yr.})] \times \frac{10 \text{ shares}}{1,000 \text{ shares}} = 237.5 \text{ ac-ft/yr.}$$

If surface water is used only for recharge, no adjustments will be required. In this case,

$$\begin{aligned} \text{SWC} &= \text{SWC (Ditch)} \\ &\text{or} \\ \text{SWC} &= 237.5 \text{ ac-ft/yr} \end{aligned}$$

Reduction of SWC for Flood Irrigation

When a portion of a well user's ditch diversions are utilized for flood irrigation of cropland, in excess of seven (7) acres per quarter (160 acres) as verified by the Subdistrict, an adjustment of **SWC** is derived as follows:

1. Measure the quantity of ditch surface water used for flood irrigation of cropland or pasture.
2. A reduction in SWC is then derived by multiplying the quantity of surface water used for flood irrigation by an irrigation efficiency of 60%. Following is an example calculation:

Example 2: Producer Y farms one quarter of land. Y uses ditch water for recharge, and irrigates 129 acres under a center pivot sprinkler. Recharge is accomplished on one corner. Y also flood irrigates cropland on 2 corners of the quarter. The remaining corner within the quarter is not farmed. Use Example 1 and assume the following additional data:

- Quantity of ditch water used for flood irrigation of 2 corners (totaling over 7 acres) = 20 ac-ft/yr.
- Flood irrigation efficiency = 60%

Calculation:

$$\text{SWC (Reduction for Flood)} = 20 \text{ ac-ft/yr} \times 60\% = 12 \text{ ac-ft/yr.}$$

(If none of the surface water is flood applied, this term will be 0.) In this case,

$$\text{SWC} = \text{SWC (Ditch)} - \text{SWC (Reduction for Flood)}$$

or

$$\text{SWC} = 237.5 \text{ ac-ft/yr} - 12 \text{ ac-ft/yr}$$

$$\text{SWC} = 225.5 \text{ ac-ft/yr}$$

2. SWC for Use of Ditch Water through Sprinkler

When all or a portion of a well user's ditch diversions are pumped through a sprinkler to irrigate cropland a reduction of **SWC** is derived by completing the following steps:

Alternate 1 – Using Meter on Sprinkler

1. Assume a water meter is installed on the pipeline from the well to the sprinkler and a second meter is installed on the total sprinkler supply pipeline, which includes both surface and well water.
2. With the use of a water meter, measure quantity of surface and well water pumped through the sprinkler supply pipeline.
3. With the use of a water meter, measure quantity of well water pumped through sprinkler
4. A reduction in **SWC** is then derived by subtracting quantity of well water pumped through the sprinkler from total water pumped through sprinkler. This is the amount of surface water that was applied through the sprinkler. Following are example calculations:

Example 3: Producer Z farms one quarter of land. Z uses ditch water for recharge, and irrigates 129 acres under a center pivot sprinkler. Z applies a portion of his ditch water directly through his sprinkler, mixed with the well water. The remainder of the quarter is not farmed. Use Example 1 and assume the following additional data:

- A total of 300 ac-ft/yr is pumped through sprinkler (surface water and well water).
- A total of 150 ac-ft/yr (WP) is pumped from well through sprinkler.

Calculation:

$$\text{SWC (Reduction for Sprinkler Alt1)} = 300 \text{ ac-ft/yr} - 150 \text{ ac-ft/yr} = 150 \text{ ac-ft/yr}$$

This is the amount of surface water that was applied through the center pivot sprinkler. (If none of the surface water is applied directly through a sprinkler, this term will be 0.) In this case,

$$\text{SWC} = \text{SWC (Ditch)} - \text{SWC (Reduction for Sprinkler Alt1)}$$

or

$$\text{SWC} = 237.5 \text{ ac-ft/yr} - 150 \text{ ac-ft/yr}$$

$$\text{SWC} = 87.5 \text{ ac-ft/yr}$$

Alternate 2 – Using Crop Irrigation Water Use

1. Obtain number of acres of cropland irrigated with sprinkler.
2. Document crop grown under sprinkler. The following crop water usages values will be used to determine total water usage (crop C.U. + spray loss + pre and post irrigation) of sprinkler: Alfalfa @ 4.0 ft/yr. and all others @ 3.0 ft/yr.
3. With the use of a water meter, measure total quantity of well water pumped through sprinkler.
4. A reduction in SWC is then derived by subtracting quantity of well water pumped through sprinkler from total crop water usage, which is obtained by multiplying acres of irrigated cropland by crop water usage. Following is an example calculation:

Example 4: Producer Q farms one quarter of land. Q uses ditch water for recharge, and irrigates 129 acres under a center pivot sprinkler. Q applies a portion of his ditch water directly through his sprinkler, mixed with the well water. Q has a meter on the well that supplies the sprinkler, but does not have a separate meter on the supply pipeline to the sprinkler. The remainder of the quarter is not farmed. Use Example 1 and assume the following additional data:

- 129 acres of potatoes grown under sprinkler.
- A total of 150 ac-ft/yr is pumped from well through sprinkler.

Calculation:

$$\text{SWC (Reduction for Sprinkler Alt2)} = (129 \text{ ac} \times 3.0 \text{ ft/yr}) - 150 \text{ ac-ft/yr} = 237.0 \text{ ac-ft/yr}$$

(If none of the surface water is applied directly through a sprinkler, this term will be 0.) In this case,

$$\text{SWC} = \text{SWC (Ditch)} - \text{SWC (Reduction for Sprinkler Alt2)}$$

or

$$\text{SWC} = 237.5 \text{ ac-ft/yr} - 237.0 \text{ ac-ft/yr}$$

$$\text{SWC} = 0.5 \text{ ac-ft/yr}$$