

GROUND WATER MANAGEMENT PLAN
FOR
SOUTH WEST IRRIGATION DISTRICT
AND
GOOSE CREEK IRRIGATION DISTRICT

SUBMITTED TO
IDAHO DEPARTMENT OF WATER RESOURCES
IN COMPLETION OF IDAHO CODE
42-233a AND 42-1416b

August 22, 2016

Approvals

Southwest Irrigation District and Goose Creek Irrigation District
Boards of Directors

Randy Brown
Randy Brown, Chairman - SWID

8-23-2016
Date

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8-23-2016
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State of Idaho

Department of Water Resources

Director

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1. Introduction

In compliance with statutes Idaho Code 42-233a and 42-1416b South West Irrigation District (SWID) and Goose Creek Irrigation District (GCID) submit details of a ground water management program. SWID/GCID have been involved in myriad aquifer enhancement programs since the late 1980's. This management program involves all past activities and builds upon those activities with increased ground water conservation to slow, and ultimately eliminate, the decline in the aquifer in the Oakley Valley.

SWID/GCID's program is a ten-year plan to stabilize the aquifer that is broken into three periods. Each period includes projects that will be undertaken if aquifer recovery is not achieved.

2. Current Aquifer Conditions

SWID has monitored the water table in 14 wells since 2004. In 2012, IDWR installed level logging transducers in many of those 14 wells and some additional wells throughout the Oakley Valley. Trends in the water table have been declining since monitoring began pre-1960. SWID aquifer management practices since 2009 have changed the rate of decline in most of the monitoring wells. Some wells have showed an average rise in the water table since 2009.

SWID consultants have completed two aquifer depletion analyses since fall, 2015. Aquifer depletion was calculated using the average decline in the water table over a period of time and aquifer characteristics, namely specific yield and surface area. Each analysis used slightly different parameters and inputs, but the same process was used.

The first analysis was completed in preparation for the 2016 annual meeting. The purpose was to provide a depletion estimate to district membership in order to create an aquifer recovery plan. This process used aquifer level declines from 2012 to 2015, an estimated aquifer boundary, and specific yields estimated using driller's logs and textbook values. A 20,000 acre-feet per year depletion volume was presented to the membership who discussed and planned recovery options.

The second analysis was in response to a draft memo provided by IDWR staff estimating depletion based on a basin water budget. The memo concluded that aquifer depletion is in excess of 107,000 acre-feet annually. Actual aquifer conditions based on water level trends does not support this depletion volume. An analysis using water table drop from 2012 to 2016, ESPAM 2.1 calibrated specific yields with additional specific yields from a report by Young & Newton from 1989, and the ESPAM 2.1 aquifer boundary clipped to the critical ground water areas yields an estimated depletion between 8,000 and 9,000 acre-feet annually. Addition of acreage outside of the ESPAM 2.1 boundary in the Oakley area increases that estimate to about 11,000 acre-feet.

SWID/GCID recognize the difficulties in estimating yearly aquifer depletion. One definition of a balanced aquifer is water level trends with a slope of zero. The greatest indicator of aquifer enhancement effectiveness is a decreasing slope in water level trends, as has been seen in many wells in the Oakley Valley. SWID/GCID therefore propose a monitoring program that will evaluate changes in water level trends to assess the management program progress. More details of the proposed monitoring program are in the section entitled "Metrics" below.

3. Past Practices

a. Conversions

Soft conversions, the act of temporarily replacing ground water with surface water, have been the main focus and largest part of SWID's ground water conservation efforts since the late 1980's. Nearly 40 users in SWID have participated in installation of diversion systems in the three major canal systems and a private pipeline.

All users who participate in soft conversions using district acquired water are required to reduce withdrawals on ground water wells equivalent to the volume pumped from the surface water source. Efficiency of conversion is 80-85%. Every user has a pre-conversion baseline from which efficiency is calculated. If a user does not perform the sufficient conversion efficiency, he is denied conversion water the following year. To date, all users have complied with the required conversion efficiency.

Where insufficient data for a baseline occurs, SWID provided one user the ability to participate in soft conversion based on a change in crop rotation. This user was required to have no less than 40% small grains (low consumptive use crops and/or idled acres in their rotation. Previously the percentage of small grains was 15-20% maximum. Monitoring of usage is also required on top of the crop rotation change.

Soft conversions in the district steadily increased from 2004 (average 25,000 acre-feet) to 2010. The West Cassia Pipeline was built in 2009 with its maximum capacity first available in 2010. From 2010 to 2014 SWID averaged 54,000 acre-feet of conversions. In 2015, users began maximizing their conversions and SWID provided over 68,000 acre feet of water (appendix 1).

b. Recharge

SWID has dedicated much time, effort, and money to recharge projects. Because of the nature of recharge, namely cost and water availability, SWID has not been able to accomplish the volumes of recharge desired. However, the district does have multiple recharge sites in place and have accomplished recharge every year.

SWID currently holds two recharge water rights and one recharge permit. The current recharge locations are at Cottonwood Creek, Murtaugh Lake, Dry Creek, West Cassia Pipeline,

and BID (figure 1). Currently, up to 12 wells are used annually for direct injection. From 2013 to 2012 SWID averaged just over 4,000 acre-feet annually. Board members and irrigators are continuously exploring recharge opportunities including various applications for injection currently submitted.

Recently, department staff met with SWID consultants to review recharge sites and monitoring programs. SWID/GC are committed to compliance with all regulations regarding direct injection.

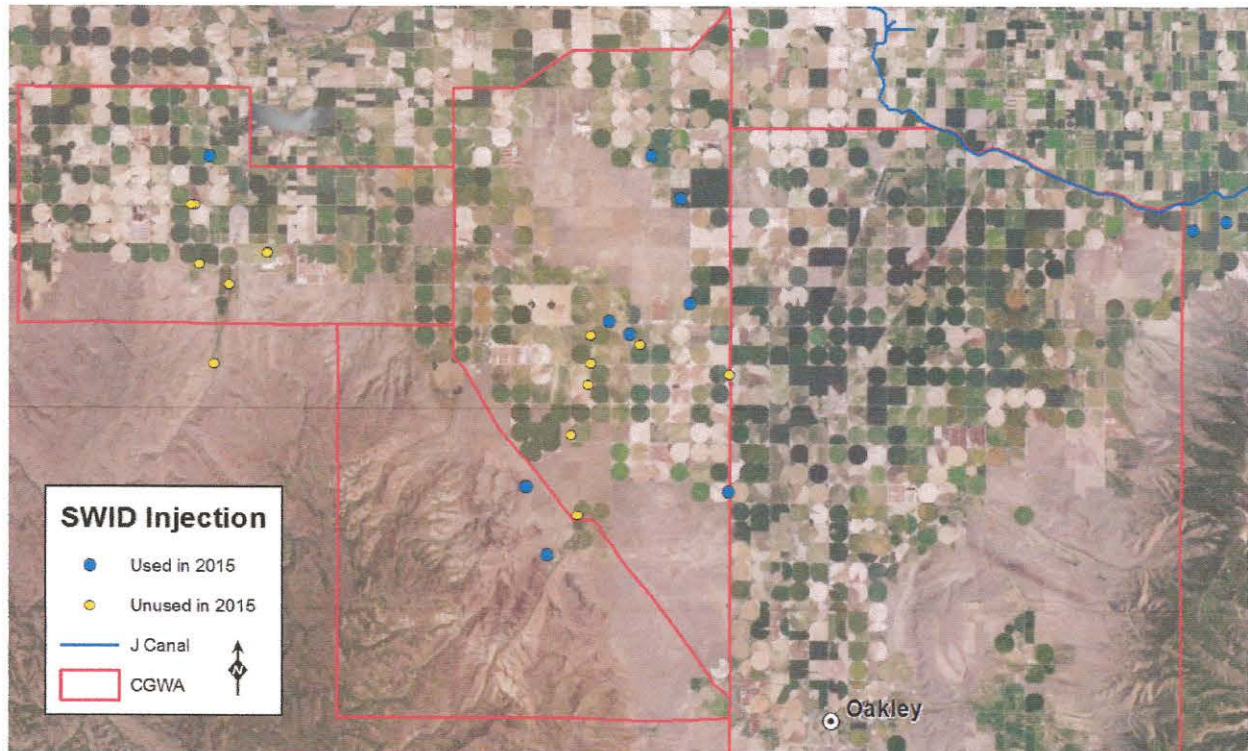


Figure 1. Location of injection wells in SWID. Many of these wells are permitted or an application is in for permit.

4. 2016 Aquifer Management

SWID board members presented an assessment of current aquifer conditions at the 2016 annual meeting. This assessment included an estimated yearly aquifer depletion volume of 20,000 acre-feet. The board presented three options for addressing the deficit: voluntary curtailment, increased soft conversions, and increased recharge. While the board and membership did not take any of these options off the table, they decided to maximize soft conversions and recharge before commencement of voluntary curtailment.

a. Increased Soft Conversions

In fall 2015, SWID began to analyze the condition of the aquifer to better understand which locations within the district should be targeted for aquifer enhancement projects. One such

area where yearly declines were greater than the surrounding area was target by two irrigators for soft conversion. These irrigators teamed with SWID to install a conversion pipeline from Milner Irrigation District, about five miles south to the Golden Valley area.

Construction was completed before the irrigation season in 2016. The pipeline targeted 600 inches of capacity on the Milner Irrigation District canal system, but was constructed to a 1000 inches capacity for increased conversion when water is available. It is estimated that this pipeline will contribute 4,000 acre feet of increased conversion during the 2016 season.

At the February, 2016 annual meeting, all members participating in conversions were encouraged to maximize their conversion systems. Conversion volumes will be equal to or in excess of 2015 volumes. More importantly, there will be a decrease in the volume of ground water pumped because of these conversions and a wet spring.

b. Recharge and Increased Assessment

Upon discussion of the requirements for recharge projects capable of offsetting aquifer depletion, members of SWID voted for an increase in annual assessment of \$4.00 per acre. The current \$1.00 recharge assessment will be increased to \$5.00 per acre in subsequent budgets. This increase will contribute nearly \$500,000 to the district's recharge budget. These monies will not be collected until December, 2016; however, all funds available in the district budget will be used to recharge during the 2016 season.

Construction on recharge facilities will limit the amount of recharge that will be completed in 2016 on the West Cassia Pipeline, but excellent spring runoff provided large volumes of recharge water to SWID's Cottonwood and Dry Creek recharge sites and through the Murtaugh Lake pipelines.

Twin Falls Canal Company has, in the past two years, kept Murtaugh Lake full through the winter months allowing SWID to recharge late into the season and in early spring. Additional permitted recharge locations in the Murtaugh area that have not been active previously will be used in fall 2016.

c. Expansion of Oakley Canal Company Boundary

In support Oakley Canal Company, SWID/GCID provided financial support for application to expand the company's delivery area. With increased efficiency in the canal company system water shares are regularly available for users within the SWID/GCID boundary to rent for soft conversion. Pipelines have been, and are being installed to facilitate delivery of rented water into some areas where soft conversions were previously unavailable. SWID/GCID will provide conversion details for Oakley Canal Company conversions to IDWR in the upcoming seasons.

5. Aquifer Management 2017 and Beyond

a. Buckhorn Pipeline

Following the 2016 annual meeting, West Cassia Pipeline users determined to move forward with an additional soft conversion system they had previously discussed. Since then, construction has commenced on the Buckhorn pipeline, capable of delivering over 56 cfs continuously (figure 2). Two new users were involved in order to allow participation for members who previously had no access to soft conversion water. Construction is slated for completion prior to the 2017 irrigation season.



Figure 2. Pipe installation near 1000 South. This represents only a small portion of the smaller pipe on the Buckhorn Pipeline project.

SWID secured a ten-year term 10,000 acre-feet per year lease in 2016 that will be dedicated to the buckhorn pipeline. Buckhorn pipeline users are committed to an estimated 16,000 acre-feet of soft conversions yearly.

This system is engineered for winter recharge as well as soft conversion. The Idaho Water Resource Board committed \$600,000 of funding for winterization of pumping stations, air vents, and injection well tie-ins. Winter weather conditions have previously limited recharge in SWID and this line provides access to facilities capable of recharge year-round.

SWID has been in talks with BID the BID canal manager and board of directors to determine the best way to maximize soft conversions on the canal system. Various ideas are being explored including enhancement/expansion of the J-Canal, partial season conversions, and pump-back systems. All options need additional exploration and will be itemized by feasibility before 2019 so projects can be completed if needed post-2019.

b. Recharge

Funding provided by the increase in assessment will provide \$250,000 to \$300,000 for winter recharge power costs on the Buckhorn Pipeline, BID recharge wells, and Murtaugh Lake

injection wells. With the systems currently in place, SWID hopes to accomplish 10,000 acre-feet of recharge in 2017, and will reach that goal in 2018.

SWID has explored additional recharge locations and will pursue them more rigorously with the additional funding available. Plans for drilling of two new injection wells were previously put on hold but will now be activated. These wells will be on the Dry Creek system and near the Snake River.

Plans are underway to construct a large recharge system using the BID canal system. Various users who have not previously benefited from soft conversions and recharge are working towards installation of a recharge-first system. Unofficially known as the "Wayment Pipelines," the system would be completed in phases. The first phase includes a pump station designed for winter use, targeting the BID J-Canal. Further phases include installation of pumps and pipe designed to divert water from the J-Canal on the shoulders of the irrigation season and winter months to deliver water to direct injection wells nearly five miles south of the canal. If the capacity in the BID canal could be increased, this system will be used for soft conversions.

c. Tiered Reduction Plan

At the SWID 2015 annual meeting, a conservation committee was formed which included many of the big water users in the district. The goal of the committee was to assess current water usage and determine the most effective methods to cut usage if and when necessary. It was determined that if current aquifer levels continued to decline, users wanted to have a last resort type tool to fairly distribute reductions.

In response to the goals of the committed and SWID board of directors, a tiered reduction plan was created. This plan is nearly identical in structure to the reduction plans employed by various districts in the ESPA for compliance in the Idaho Ground Water Appropriators – Surface Water Coalition agreement. SWID's plan identifies all water rights and current usage. This plan incorporates surface water and ground water usage.

According to this plan, each irrigator would have a foot per acre limit he must accomplish. Initially, users agreed that the foot per acre caps needed to include surface water usage. This would especially be the case where soft conversions involving SWID rented or leased water are occurring.

Details of the finalized plan will depend on the amount of water needed to offset aquifer depletion at the time of initialization. The main goal of the tiered reduction plan is to focus irrigators on crop rotation and other on-farm water conservation practices. Further development of this plan will occur in the next two to three years. If needed, this approach to self-curtailment has been accepted by the SWID board of directors and membership.

6. Metrics

a. Sentinel Wells

Cyclical weather patterns greatly affect short term water table trends. A single year of water table measurements do not characterize long term trends in the aquifer. A minimum of five years is the ideal scale for characterization, however because of the limited timeframe for plan implementation it is proposed that progress be assessed in full in 2019, 2022, and 2026.

There are currently over thirty monitoring wells in the Oakley Valley, including the Murtaugh area. Twenty-two of these wells are chosen as preliminary candidates for sentinel wells (figure 3). Some currently monitored wells were removed for redundancy because they were near other monitoring wells. Six locations are additionally targeted where monitoring is desired. These areas represent a spatial gap in the current monitoring system.

Each well will be reviewed and characterized. SWID/GCID propose collaboration with IDWR staff to vet all wells and determine if the spatial distribution is sufficient. All of these wells will be analyzed on a yearly basis to assess progress. As part of this monitoring program, data from each well must be analyzed individually, including determination of well elevation and measuring point. Following which, a normalized hydrograph of all wells will be created to assess the slope of the overall trend. A slope of zero denotes a balanced aquifer.

SWID/GCID are committed to collaboration with IDWR staff to finalize all details of this monitoring program before start of the 2017 irrigation season.

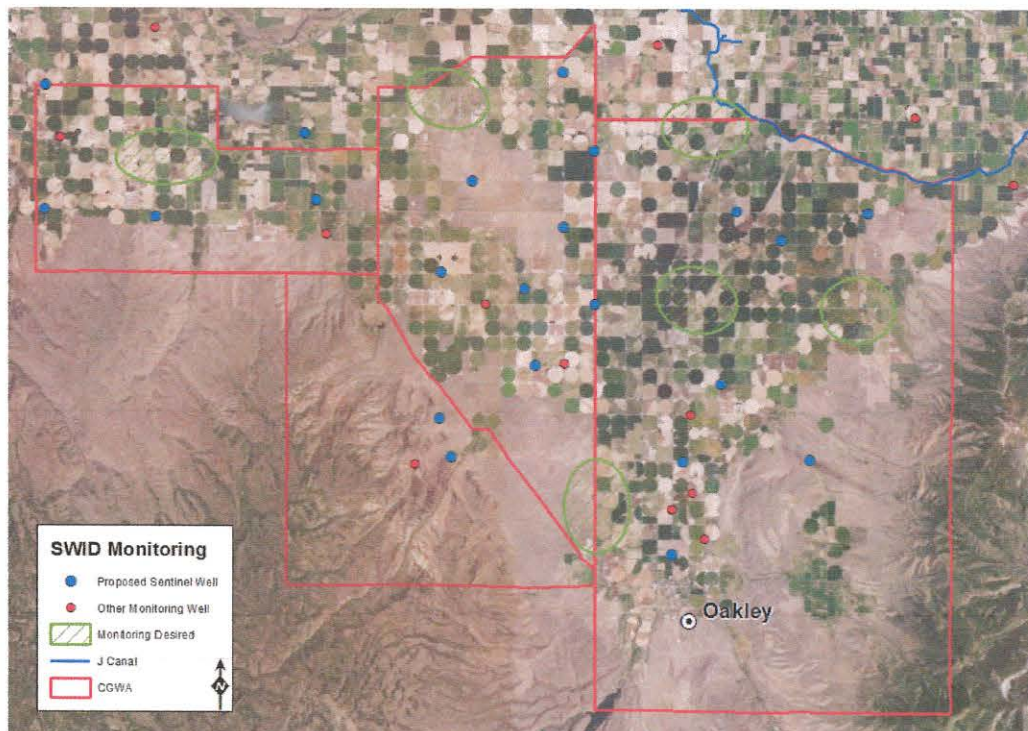


Figure 3. Proposed sentinel wells with areas of spatial gaps.

b. Associated Monitoring

Six areas of the district are not sufficiently monitored in comparison to the district as a whole. SWID/GCID is currently undertaking a survey of wells drilled in these areas. Two wells have been located in one area but still need to be assessed. If existing wells cannot be located, SWID commits to partner with IDWR to drill up to two monitoring wells.

SWID/GCID recognizes costs associated with extended monitoring. Where necessary and agreed upon, SWID commits to provide funds for level logger transducers and manpower.

7. Plan Outline/Adaptive Management

The following is a ten-year plan broken into three periods. Each period includes management practices SWID/GCID agrees to undertake to stabilize the aquifer. If practices employed during the first phase do not stabilize the aquifer, SWID agrees to undertake the second period management practices listed and likewise for the third period. Each practice listed in this program is to be completed in addition to pre-2016 practices. If the districts cannot complete the benchmarks listed in each period, or if aquifer levels continue to decline post-2026, SWID/GCID recognize the management program is no longer sufficiently effective.

a. 2017-2019

- i. 10,000 acre-feet average increased conversions
 - 1. Buckhorn Pipeline
 - 2. Pickett-Duncan 2016 Pipeline
 - 3. New soft conversions on Oakley Canal Company system
 - a. Needs accounting system between SWID & OCC
- ii. 10,000 acre-feet average recharge
 - 1. \$250,000 yearly on Buckhorn Pipeline and Murtaugh Lake stations
 - 2. Snake River Well construction

b. 2020-2022

- i. Minimum 5,000 acre-feet increased conversions
 - 1. Maximize Buckhorn Pipeline
 - a. Total 15,000 acre-feet annual
 - 2. Increased BID conversions
 - a. April-May & August-September
 - b. Increase canal capacity
- ii. Minimum 5,000 acre-feet increased recharge
 - 1. Buckhorn
 - 2. First phase of Wayment Pipelines
 - a. Winter pumps installed to fill J-Canal

3. Dry Creek Well construction
4. Additional active injection sites off of Murtaugh Lake

c. 2023-2026

- i. Second – Final phases of Wayment Pipelines
- ii. Tiered reduction program
 1. Volume dependent upon then current water table trends
 2. To be effective for 2023 irrigation season

8. Conclusion

SWID/GCID are unique entities in the State of Idaho because of their aggressive approach to stabilize the aquifer in their area. Many projects have been completed at great cost to membership. Although great progress has been made, efforts need to be increased to ensure long term stability of the aquifer. Various projects are currently underway targeting the estimated yearly depletion volume. A management program with specific targeted volumes and associate projects in three periods of three, three, and five years is proposed to avoid curtailment of the expanded acres within the Critical Ground Water Areas of the Oakley Valley and Murtaugh areas.

