

ALAMO CREEK WATERSHED IMPROVEMENTS PHASE ONE

South Big Horn Conservation District

Date: January 2018

Cooperation Statement: This project was conducted in cooperation with the State of Wyoming and the United States Environmental Protection Agency, Region 8 as well as NRCS.

State Project Number: NPS2016C

Grant Number: C900863016

Keywords: *E.coli*, Irrigation BMPs, Sediment, Water Quality Monitoring

SECTION 1.0 Executive Summary

Project Title: Alamo Creek Watershed Improvements Phase One

Project Start date: June 7, 2016

Project Completion date: January 2018

Budget Summary:

Total 319 Funds Awarded	\$89,711.10
Total 319 Funds Expended	\$89,711.10
Total Nonfederal Match Commitment	\$59,807.40
Total Nonfederal Match Expended	\$ 56,610.83
Total Project Budget	\$149,518.50
Total Project Expenditures	\$146,321.93

***** Summary of Accomplishments:**

The goal of the Alamo Creek Watershed Improvements Phase 1 project was to begin a large scale effort to reduce bacteria and sediment loading to the Big Horn River by addressing non-point sources from agricultural cropland and livestock grazing. Reduction in both bacteria and sediment initially began with the installation of a sediment pond and the conversion of two dirt ditches to pipelines.

The landowners involved in this project receive irrigating water from the Big Horn Canal, a major water delivery structure constructed in the Big Horn Basin to deliver water from the Boysen Dam to the arid farming lands in the Basin. Irrigation water is delivered to the Alamo watershed area from the south and follows the canal northward to the Basin/Greybull area farmers.

Task 2 of Phase I included constructing a settling pond on the east side of the canal next to the landowners' water outlet on the Big Horn Canal. Water from the canal is allowed to collect and stand in the pond in order for the sediment coming from the upstream canal to settle out before being transported to the various fields in the Alamo watershed. Previous to this 319 project there was no settling pond and the sediment was allowed to travel into the dirt irrigation ditches where even more sediment accumulated; water in the irrigation ditches ultimately travels towards the Big Horn River.

Replacing two open dirt ditches that ran parallel to one another with buried pipe was also a component of the second task of Phase I. For many years two landowners shared the water in one ditch and two other landowners shared the water in the other ditch. This task allowed the landowners to install four separate pipelines to transport their irrigation water. Two pipelines were installed in the current location of one ditch and the other two were installed in the same location as the second ditch. Approximately 5,200 linear feet of pipe was installed from the settling pond to Highway 433, replacing 2,300 linear feet of dirt ditch.

Sediment reductions from the canal water not entering the pipelines will be recognized over time with less ditch maintenance and no longer needing to clean sediment build up from the ditches. No eroding bank on 1,600 linear feet of ditch was a recognizable success for all involved and will reduce sediment loading to the Big Horn River.

In addition, landowner satisfaction after using the new pipelines for one irrigation season was significant. Each landowner now has complete control of their allocated water rights and the need for landowner cooperation has been reduced. Additional benefits were the near elimination of a weed

infestation on both open ditches, less mosquitoes because of open waters, and a neighbor's basement not flooding during the irrigation season from seepage from the dirt ditches. The benefits realized by landowners is helping to promote further adoption of BMPs within the watershed. Multiple landowners have seen this project and the benefits and are now helping improve the watershed by putting in a sediment pond, eliminating dirt ditches and installing pipeline.

SECTION 2.0 Background

The project encompasses the +/- 4,000 ac. Alamo Creek watershed, a sub-basin of the Big Horn River Basin that is located on the west side of the Big Horn River immediately south of the town of Manderson in north-central Wyoming. Irrigated croplands have been deployed on an alluvial bench area that is bisected by ephemeral streams. In general, the croplands are dominated by clay loam soils, and bisecting drainages are dominated by gravelly, sandy loams. Precipitation averages 7-8 inches. Land cover in the Alamo watershed includes irrigated cropland, shrub land, woody and emergent wetlands and deciduous riparian forest. Land use is primarily irrigated agriculture and rangeland grazing, with a limited number of private homes on small acreages. Land ownership is mixed private, state and federal: upland rangelands federal, and irrigated croplands private. The segment of the Big Horn River (from the confluence with the Nowood River to a point 36.1 miles upstream) that receives surface water from the Alamo Creek drainage is classified as a 2AB stream and is impaired for recreational use.

The goal of this project was to aid in remediating an impaired reach of the Big Horn River. It was a beginning step in addressing non-point sediment inputs to the river system. Past water quality monitoring results indicate that *E.coli* and fecal coliform bacteria concentrations are elevated above water quality standards and resulted in the listing of seven waterbodies in the Upper Big Horn River Basin on Wyoming's Impaired Waters list, including a segment of the Big Horn River from the confluence with the Nowood River to a point 36.1 miles upstream and another segment from the confluence of the Nowood River downstream to the confluence with the Greybull River. Alamo Creek confluent with the Big Horn River a short distance upstream of the confluence with the Nowood River. While this project primarily focused on sediment reduction, bacteria can attach to soil particles that can be deposited in surface waters through erosion. A reduction in sediment loads can often carry with it a reduction in bacteria concentrations. The Phase I project was designed to reduce sediment loading to the Big Horn River as well as begin the development of critical infrastructure to improve irrigation efficiency that will do more to address the bacteria concerns in the future.

In the long term, after more phases are completed, improved water quality will benefit local communities through enhancement of warm-season recreational activities and improved aquatic habitat directly impacting the health and productivity of fisheries. Improved irrigation efficiency will provide economic benefits to landowners and encourage further BMP projects in the watershed. This project is visioned by the South Big Horn Conservation District and local landowners in the Alamo watershed as the beginning stepping stones to many more bacteria and sediment reducing projects. Phase I primarily focused on sediment reduction as livestock in the immediate project area were not a major concern. The next proposed phase will begin to address more bacterial concerns that might be a result of livestock wintering on the existing fields.

In 2014, the TMDLs for the Big Horn River were approved; the TMDLs covered all of the impaired segments in the Upper Big Horn River Basin, including the impaired segments of the Big Horn River in the vicinity of the project area. In November 2014, South Big Horn Conservation District began meeting with landowners in the Alamo Watershed to evaluate voluntary participation in watershed improvement

projects. The Big Horn River Watershed TMDL Implementation Plan (RESPEC 2012) identifies Alamo Creek Watershed as a High Priority Implementation Area because of its contribution to *E.coli* bacteria impairments in the Big Horn River. This plan recommends specific BMPs for reduction of sediment and bacterial loading to the Big Horn River and/or its tributaries.

This project was the result of an educational meeting hosted by South Big Horn Conservation District in the fall of 2015 for all landowners in the District. Several presenters provided information on various watershed planning topics. A group of landowners from Washakie County explained how they were approaching bacterial loading and sediment concerns, and some of the funding avenues available to producers. One of the South Big Horn landowner attendees conveyed that there might be interest in the Manderson area for some watershed planning efforts. The SBHCD Board proceeded to schedule one-on-one meetings with landowners in that area to determine the level of interest. After visiting with numerous landowners, this group felt the project completed in Phase I was the number one priority concern for the area. A couple of the landowners involved had previously discussed implementing this project, but did not believe their individual businesses could justify the entire financial cost.

The District Board then began the 319 grant writing process and also submitted an application to NRCS for National Water Quality Initiative (NWQI) monies not knowing where either adventure would lead the group. In 2015 the District was successful in receiving a 319 grant to construct a sediment pond to filter Big Horn Canal water and to install the four pipelines for the individual landowners and eliminate the highly erosive ditch system of water transportation. The District also applied for a small amount of funds in that grant to do an off-channel livestock watering project that did not materialize. That will be addressed in another section of the report. Not long after being awarded the 319 monies, the Alamo Watershed was selected as a targeted watershed for the NWQI funding as well. Currently there have been 5 pivots completed and 249.9 acres affected. As previously stated, irrigation efficiency improvement projects in the watershed will further reduce sediment and bacteria loading to surface waters in the watershed.

The local landowners involved in the project are excited to pursue the next phases of the project as they have witnessed benefits already from having a good sediment pond to filter the incoming water and are not having to deal with erosion issues next to the canal. Landowners experienced the benefits of not having to clean the two ditches before the irrigation season and a reduction in weeds, with at least one of them being listed on the Wyoming Noxious weed list.

SECTION 3.0 Goals and Outcomes

The over-arching environmental goal of this project was to reduce sediment and bacterial loading to the Big Horn River. Due to total costs, the SBHCD needed to complete this project in phases. Objectives for BMPs proposed here are:

Outcome #1: Reduction in sediment and bacterial loading to Big Horn River

Objective # 1a: Change from open dirt ditch water transport to pipeline transport.

Currently, irrigation water for over 1,000 acres of cropland in the project area is delivered by open dirt ditches. These contribute bacteria to surface waters as bacteria is transported with sediment originating from lands adjacent to ditches, and from the unstable ditch sides and bottoms. Cattle are pastured over the winter months in areas with free access to ditches, and in the spring when ditches become active, bacteria are flushed out into receiving surface waters.

The first objective was to reduce or eliminate sediment and bacterial loading from approximately 2,300 LF of irrigation water transport by replacing two 1,150 LF of open ditches with four 1,150 LF of pipe. There were four separate pipelines constructed from the outlet at the Big Horn Canal to a point immediately east of WY 433 (West River Road). All four pipelines are complete at this point, but additional work on the pipelines will be completed under future phases of this project to deliver water to irrigated acreages. A settling pond equipped with a clean-out was constructed at the head gate on the Big Horn Canal to capture sediment and bacteria before entering the pipelines. This objective was completed with Phase I of the project.

Outcome # 2: Improved Irrigation Efficiency

Objective #2a: Improve irrigation efficiency to minimize water loss.

Transporting irrigation water from the supply source to the field irrigation system can be a significant source of water loss and can cause degradation to both surface and ground water. Therefore, irrigation water management plans will emphasize the use of efficient methods of water transportation that minimize evaporation, seepage, and flow-through water losses from canals and ditches.

Completion of the proposed pipelines improved irrigation water efficiency for 150 acres of cropland and provided the necessary infrastructure to continue with watershed improvements including the conversion of an additional +/- 19,000 LF of open dirt ditches with pipeline. Phase II conversion to pipeline will continue to reduce bacterial loading at an even larger scale.

A total of 2,300 LF of eroding dirt ditch was eliminated, resulting in reduced sediment loading to the Big Horn River. A seepage issue that was causing a nearby landowner to experience water in their basement during the irrigation season has conveyed that they did not have the unwanted water issue during the 2017 irrigation season. Water was conserved by not allowing it to seep away from the dirt ditches. The SBHCD Board and the local landowners feel that this objective was definitely achieved

Outcome # 3: Increased Public Awareness of Water Quality and Participation in Voluntary Cost-Share Programs

Objective # 3a: Continue operation of Alamo Creek Watershed Steering Committee.

The existing Alamo Creek Watershed Steering Committee will manage implementation of proposed projects and continue planning for future phases off the present project, or new projects.

Objective # 3b: Organize informal tour of new BMPs.

Outreach and education will be enhanced by implementation of BMPs, which will demonstrate benefits to landowners of watershed improvement, and engender discussion of further Alamo Creek Watershed Improvement projects.

A formal steering committee never really transpired, but there was a wonderful working relationship between the landowners involved. Through work done by the local NRCS District Conservationist with other landowners in the Alamo Watershed, the District board is getting reports that landowners on another ditch system transporting irrigation water from the Big Horn Canal would like to someday pursue efforts similar to what has been accomplished with Phase I.

Many local landowners and other agency personnel have stopped by to view the new sediment pond and pipeline project. The landowners have answered questions from interested individuals, as well. With the project being completed adjacent to a main Wyoming highway, many people who frequent that road are able to see the improvements to the resource.

Objective #4: Water quality monitoring.

In coordination with NRCS National Water Quality Initiative funded conservation practices in the watershed, SBHCD will conduct water quality monitoring activities at a minimum of three sites to evaluate water quality trends as BMPs are implemented in the watershed.

This objective was added to the scope of work as part of an amendment to the agreement to allow South Big Horn Conservation District to count monitoring expenses as match towards the project. In 2016, SBHCD began collecting water quality data at three sites in the watershed during the recreation season; the objective of the monitoring is to help evaluate the effectiveness of NWQI conservation practices implemented in the watershed. Monitoring at the three sites continued into 2017 as planned; however, costs for monitoring were not ultimately reported as match towards this project. Therefore, results from the monitoring are not reported as part of this project. SBHCD will work with DEQ and NRCS as needed to analyze data in the future to evaluate effectiveness of NWQI conservation practices.

SECTION 4.0 Task Activities

Task #	Task Title	Task Description	Actual Deliverables
1	Administration	Administer project efficiently and effectively, submit reimbursement requests, keep all records, file all reports, and obtain any necessary permits.	Quarterly reimbursement requests, complete progress reports with each reimbursement request, annual reports, annual MBE/WBE reports, final project report, and other documentation as requested.
2	Pipeline Construction Settling Pond and Clean-out construction	Construct four pipelines from outlet at Big Horn Canal to location across WY 433. Construct settling pond and cleaning structure associated with new pipelines	2640 LF of converted ditch to pipe, base infrastructure for an additional +/- 18,000 LF of ditch conversion to pipe.
3	Monitoring	Flow, field parameters, and E. coli monitoring at three sites in the Alamo Creek watershed.	Data collection occurred as planned in 2016 and 2017 through other funding sources.
4	Watershed Planning, Outreach, and Education	Continue and expand operation of Alamo Creek Watershed Steering Committee. Engage community in watershed improvement and voluntary cost share projects. Offer watershed tours to use implemented BMPs for demonstration and discussion	Planning for additional phases of watershed improvements, including completion of pipelines, implementation of additional off-site livestock watering locations.

SECTION 5.0 BMP Implementation

BMP Name/Description	HUC12	Date Completed	Targeted Pollutants(s)	Load Reduction Estimate(s)	Load Reduction Estimate Method(s)
Sediment Pond	100800071205	April 2017	Sediment	480 tons/Year	Wheel & Measuring tape, then compared to original design of sediment pond
Pipeline Construction (5,200' pipeline replacing 2,300' dirt ditch)	100800071205	April 2017	Sediment	344 tons/year*	STEPL

*Sediment load reduction estimate for the eliminated dirt ditches was provided by WDEQ NPS Program using the Spreadsheet Tool for Estimating Pollutant Loads (STEPL).

SECTION 6.0 Monitoring Results

The SBHCD felt that monitoring at this location would not be the best use of our monitoring resources due to the small scale of this first project phase and due to difficulties of sampling in the Big Horn River (i.e., finding a location that was safe to sample and where data would reflect changes in the project area). When applying for the Phase I grant, the Board of Supervisors and Jennifer Zygmunt, Nonpoint Source Program and Grants Coordinator, concurred that monitoring would not provide conclusive data. Thus, a monitoring task was not included with the original project agreement.

However, following award of the NWQI funding, the SBHCD opted to do some limited data collection, the objective of which is to evaluate effectiveness of BMP implementation in the watershed over time. SBHCD prepared and submitted an updated Sampling and Analysis Plan (SAP) that was approved by DEQ in 2016. The monitoring includes sampling twice a month (July, August, and September) at three fixed site locations on three different streams located below areas receiving BMPs or varying land uses. The 319 project agreement was modified in 2017 to allow SBHCD to use some of the monitoring expenses (equipment and staff time) as nonfederal match towards the project. However, none of the monitoring expenses were ultimately reported as match towards the project; therefore, results of the monitoring are not discussed in this final report. SBHCD will work with DEQ and NRCS as needed in the future to evaluate results of the monitoring to better understand effectiveness of BMP implementation as the NWQI efforts continue.

The District was also advised to document through photos showing the before and after. Attached to this report are photos of the area.

SECTION 7.0 Partners

Other than the landowners the only partner we had on Phase I was personnel from the NRCS. Monte Bush, District Conservationist, provided a great deal of technical assistance, leadership and expertise. Allan Croft, area NRCS Engineer provided many hours of technical assistance to the project making sure the sediment pond and the pipe installation was completed to NRCS standards.

When the District submitted the grant, there were plans in place to apply for a Wyoming Department of Agriculture water quality grant during the term of this grant. The timing with the 319 grant and the Department of Agriculture funds did not synchronize well, and the landowners were able to come up with the necessary match without the grant dollars.

There were really no shortfalls with the NRCS partnership. There was a good working relationship between both partners throughout the project. If there was a downside, the District Managers retired during the time of project completion and the new employee had to step into grant administration and report writing duties not being familiar with the project.

The NRCS/SBHCD partnership will continue as more projects are completed in the Alamo Watershed. The District has applied for and has been recommended FY2018 319 funding towards a Phase II grant to extend the pipeline infrastructures to the respective fields. After receiving the NWQI funding, the two partners will definitely be working together in the future. There is a tremendous amount of work in the area as it relates to bacterial loading and sedimentation concerns.

SECTION 8.0 Information and Education

Information and Education during Phase I took a very informal approach. The District did not schedule a formal tour of the project because there was not a great deal of educational value in doing a tour. As alluded to in Section 3, the project was a very visible project from Highway 433. Many local landowners, agency personnel, and others who are interested in resource management stopped by to view the project.

It is the hopes of the District that by seeing the benefits of this project to the landowners involved that other landowners in the area will be looking to do some of the same types of work on their properties. The District NRCS Conservationist has done some preliminary work with other landowners and stated that others will probably be willing to move forward with projects once more funding is available. Projects like this are very expensive and it is difficult for landowners to justify the total expense as it takes many years to realize the payout. By having NWQI monies available, the potential for sprinkler irrigation has risen. In order for some of the landowners to install center pivots, large infrastructure projects are going to need to be addressed.

SECTION 9.0 Complications

The pipeline/sediment phase of the project was completed as planned and engineered. Upon completion of this part of the grant the Board and NRCS discovered that match dollars were originally over-estimated. The District did not apply for the Department of Agriculture grant funding because of timing issues. If that state funding had been available for this project, the match monies would have been much closer to the original figures. After working with Jennifer Zygmunt, we were advised to amend the grant and not attempt the off-channel livestock watering project in this round of funding, due to the challenges with finding sufficient nonfederal match for the pipeline/sediment pond portion of the project. We did discuss with Jennifer how to incorporate off-channel livestock watering projects into future project phases. The one amendment completed for the project reduced the total 319 funding award, reduced the nonfederal match commitment, and revised the scope of work to remove the off-channel livestock watering task from the project.

Right after construction began, there were some minor communication issues between the Board, the NRCS, and the landowners even though those involved thought all of the issues had been addressed. NRCS personnel were able to resolve the problems by doing some additional communication and

education with a landowner family. Once the family better understood the scope of the project, the construction resumed as planned. The effects were not significant.

Similar issues could be avoided in the future by having more members of the Board, NRCS and landowners present in the beginning stages of grant writing. The District has currently applied for a Phase II grant and the District made sure the initial planning meeting with the District and the NRCS involved people the organizers had not realized had an interest in the construction of Phase I.

One of the District Board Supervisors informally visited with some of the landowners after a season of use, and everyone was pleased with the sediment pond and the closing of open ditches that caused sediment loading and a weed infestation. The management of individual landowner water allocations was much easier where every landowner had their own pipeline to distribute water to their crops. The neighbors who in the past have had water in their basement during the irrigation season were pleased to find that water seepage from the ditches was eliminated. No water savings figures are available, but not having this seepage issues is an indication that more water was available for crop irrigation.

SECTION 10.0 Recommendations

Completion of this project has been exciting for the District, the NRCS, and the landowners involved. One of the District's long-term goals has been to apply for cost-share funding and be able to complete some worthwhile BMPs that would not only improve water quality but would benefit the producers as well. It is very gratifying to drive by the project site and view the improvement to the natural resources.

As stated in other sections of this report, the District recently applied and was recommended for more 319 funding to continue with Phase II of this project. The next step will involve boring the four pipelines under Highway 433 and continue installation of up to 13,000 LF of buried pipelines. These pipelines would help eliminate many tons of sedimentation and *E.coli* contamination as all of the fields involved are stocked with cattle in the winter. Once the infrastructure pipelines are installed, the landowners will pursue installing more sprinklers as recommended in the Big Horn River TMDL implementation plan. The long-term benefits to the Big Horn River are going to be contingent on the landowners being able to obtain cost-share funding to install sprinkler systems. All of this work is extremely expensive and the landowners in the Alamo watershed cannot justify the total cost of the upgrades that are necessary to make major improvements in water quality monitoring data.

Working relations with the 319 program administrator were excellent, and the District has no suggestions at this time for improvement. The District experienced an employee change from the time of the initial grant writing until the closing of the project. Jennifer Zygmunt was very helpful through this transition process, and has been more than willing to assist in grant closing efforts and in final reporting both of which are unfamiliar tasks for both the District Manager and the current Board members.

SECTION 11.0 Financial Summary

Task #	Task Title	319 Funds Expended	Nonfederal Match Expended	Total NPS Expenditures	Other Federal Funds Expended
1	Administration	\$0	\$13,401.00	\$14,421.00	\$0
2	Pipeline Construction	\$89,711.10	\$42,432.83	\$132,143.93	\$0
3	Monitoring	\$0	\$0	\$3,004.57	\$0
4	Outreach & Education	\$0	\$777.00	\$3,004.57	\$0
	TOTALS	\$89,711.10	\$56,610.83	\$149,569.50	\$0

SECTION 12.0 Attachments

Project Photos

Project Map