COPY

TITLE PAGE

WaterSMART: Water and Energy Efficiency Grant Program

PROJECT TITLE:

Improving Greenfields Irrigation District Water Management to Improve Sun River Flow- Phase II

APPLICANT:

Greenfields Irrigation District
P.O. Box 157
Fairfield, Montana 59436

PROJECT MANAGER

Bob Hardin, GID Manager
Greenfields Irrigation District
P.O. Box 157
Fairfield, Montana 59436
406-467-2533 Office
406-467-2705 Fax
grid@3rivers.net

d. TABLE OF CONTENTS

e. TECHNICAL PROPOSAL

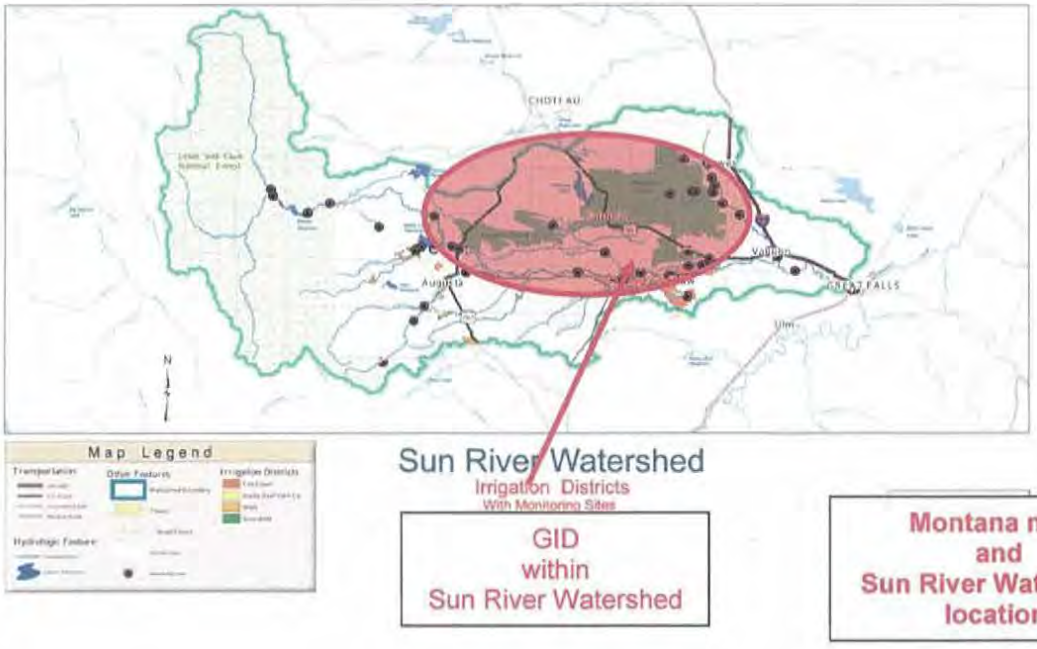
(1) Technical Proposal: Executive Summary

- **Date**: January 11, 2013
- **Applicant**: Greenfields Irrigation District
- **City**: Fairfield
- **County**: Teton
- **State**: Montana

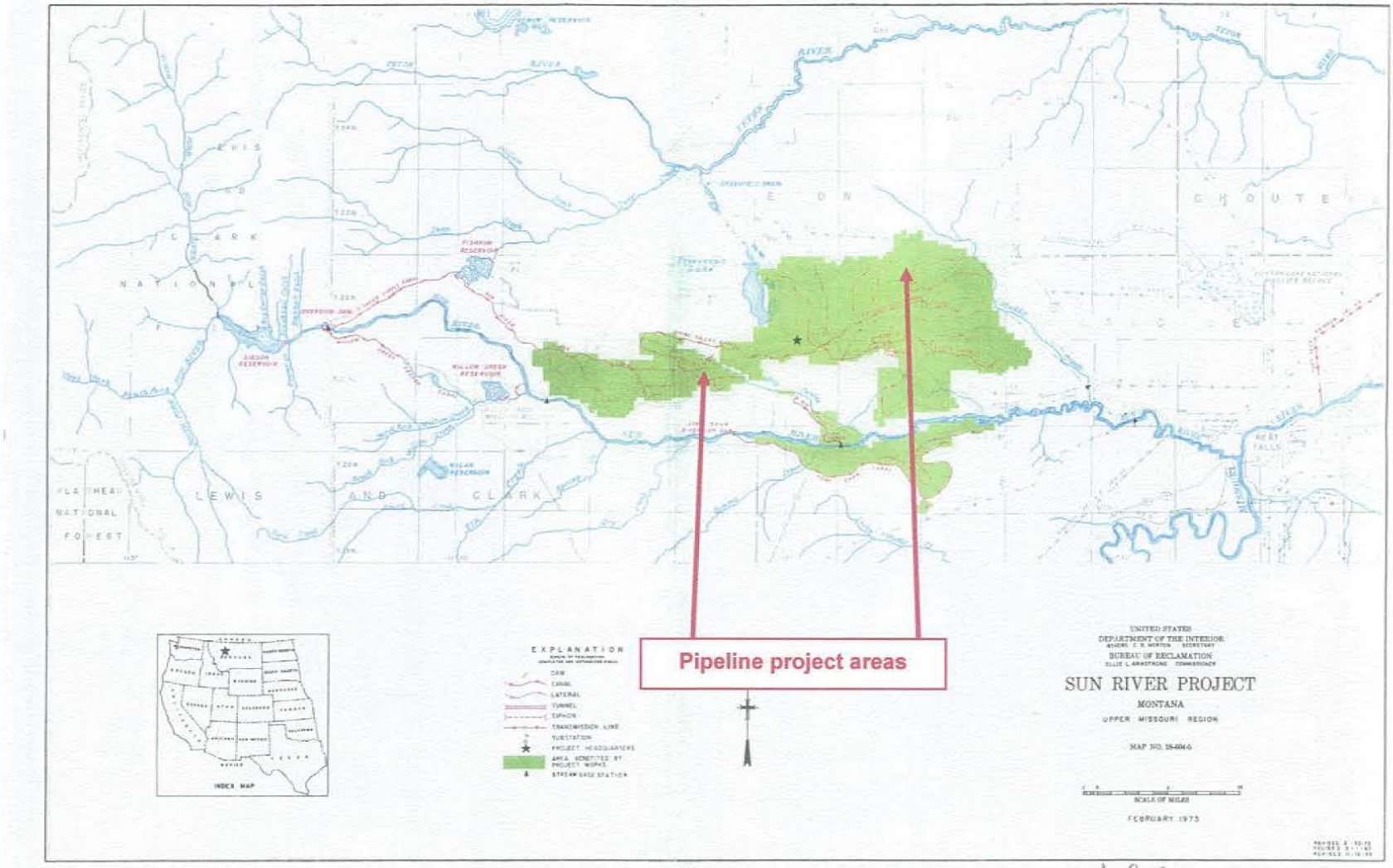
- **Project summary:** Task Area A - Water Conservation.
  The Greenfields Irrigation District (GID or District) is an aging Bureau of Reclamation (BoR) facility with a major water conservation need that will be addressed in this proposal. The project proposal will take a very wasteful delivery system and upgrade it to improve water management to reduce impaired wastewaters into Muddy Creek, Freezout, Big Coulee and Mill Coulee while improving instream flows in the Sun River. The water savings will be approximately 10 additional cfs (4,000 acre-feet) over the summer to the Sun River, which has frequently gone dry at several sites on numerous occasions over the past ten years. This will be accomplished by converting 8,650 feet of open ditches to pipelines to eliminate impaired wastewater that currently enters Muddy, Freezout, Big Coulee and Mill Coulee Creek which causes huge erosion and water quality problems in the Sun River basin.
- **Project length**: one year
- **Estimated completion** June 30, 2014

(2) Technical Proposal: Background Data –

- **Geographic location - state and watershed map:**



Greenfields Irrigation District's map



Sun River Watershed/County Boundary Map

Greenfields Irrigation District Background Data

The Greenfields Irrigation District (District) is located within the bounds of the Greenfields Division of the U.S. Bureau of Reclamation Sun River Project, Montana located in central Montana. The District is located along the Sun River drainage 35 miles northwest of the city of Great Falls. It contains 83,000 irrigable acres on 893 farm units. The project was authorized by the Secretary of the Interior on February 26, 1906, in accordance with the act of June 17, 1902. Construction on the Greenfields Division began in 1913 and the first water was delivered in 1920. The District operates and maintains the Division facilities. District headquarters are in Fairfield, Montana.

The main storage dam, Gibson, was constructed during 1926-1929. Gibson Reservoir is located on the Sun River above Augusta, Montana, and has a total capacity of 99,058 acre-feet. Pishkun Reservoir is an off stream reservoir, about 154 miles northeast of Gibson Dam, and has a capacity of 46,700 acre-feet. Willow Creek Dam is an earthfill structure on Willow Creek about 15 miles southeast of Gibson Dam. In addition to storing water from Willow Creek, the reservoir is fed from the Sun River through the Willow Creek Feeder Canal. The reservoir has a capacity of 32,400 acre-feet of water.

The Sun River Diversion Dam, located 3 miles downstream from Gibson Dam feeding the Pishkun Supply Canal 1,400 cubic feet per second. The Pishkun Supply Canal extends 12 miles from the Sun River Diversion Dam to the Pishkun Reservoir.

Stemming from Pishkun Supply Canal a short distance below the river diversion, the Willow Creek Feeder Canal has a maximum capacity of 500 cubic feet per second and is 7.5 miles long to the point where it enters a natural channel to Willow Creek Reservoir.

Sun River Slope and Spring Valley Canals combined extend 32 miles from Pishkun Reservoir to a drop at Fairfield, Montana. The diversion capacity is 1,600 cubic feet per second. Three major drops and various control structures and lateral turnouts are a part of the canals. Greenfields Main Canal heads at the end of Spring Valley Canal and extends 25.4 miles northeast. It has an initial capacity of 1,200 cubic feet per second but is gradually reduced in size to 10 cubic feet per second at its terminus. Greenfields South Canal is supplied by the Greenfields Main Canal at a point about 2 miles below the start of the main canal. The initial capacity is 425 cubic feet per second and the length is 16.7 miles. Mill Coulee Canal is supplied from the Greenfields South Canal. The initial capacity is 200 cubic feet per second and the length is 10.7 miles. In total there is about 119 miles of main canal, 384 miles of laterals, and 252 miles of drains for the project.

Hydromet stations at the diversion and outlet of Pishkun Reservoir measures all flows to the district. Water measurement devices have also been installed at other key locations. Water Inventory Data Estimation:

- Diverted from Sun River = 250,000 acre-feet
- Delivered to farm units = 150,000 acre-feet
- Transportation losses = 100,000 acre-feet
- On-farm efficiency is estimated at 50 - 75% depending upon soils and type of irrigation

All assessed lands within the district are taxed $16.50 for 2 acre/feet.

The District is located in a semi-arid climatic zone and is typical of the northern inter-mountain area. The climate is characterized by light and variable precipitation and warm and sunny days with cool nights throughout the summer months. The average annual precipitation is 11.9 inches, with an average for May through September of 8.7 inches. The Greenfields Bench receives about 30% of its water from precipitation and about 70% from irrigation supply canals. Gravity irrigation with contour ditches is the most common method of irrigation used in the area. Center Pivot, wheel lines, and gated pipe are also common irrigation methods used by many farm operations. The principal crops are barley, wheat, oats, alfalfa, silage, and pasture.

The average elevation of the District is approximately 3,800 feet above mean sea level. Most of the land lies within an alluvial valley floor or on adjacent terraces. Some undulation exists on those lands adjacent to the valley floor and the steeper slopes. The Greenfields Bench is composed of about 30 feet of gravel that overlies thick shale. The Greenfields bench geological cross-section is comprised of Quaternary terrace deposits on top of Marias River Formation (Colorado Shale), which lies on top of the Blackleaf Formation (Colorado Shale). Soils throughout the irrigation District vary significantly.

Those in the alluvial valley floor have medium to heavy textures and are underlain with sands and gravels. The old river terraces adjacent to the alluvium have medium gravelly-textured profiles.

Greenfields Irrigation District Past and Current Water Savings Activities

Greenfields is a proactive District that has an ongoing irrigation water conservation program. The process started in 1978 with a Rehabilitation and Betterment (R&B) Program. The R&B Program was completed in 1988 and included lining portions of the main canals and laterals, replacement of several open laterals and buried pipe, installation of automatic and telemetric equipment for control of water regulating facilities at Gibson and Pishkun Dams and at storage points on the irrigation system; and repairing, updating, and replacing of various structures and measuring devices.

The District has lined 120 miles of canal and lateral distribution system. The main canal was lined in areas of high seepage losses near Pishkun Reservoir as well as other areas of need. The major portion of the lateral system has been lined with slip-form concrete.

The District embarked on a water conservation measure to save water by converting open conveyance facilities to closed pipe facilities. To date, 36 miles of open lateral system has been converted to closed concrete and PVC pipeline. The water saved is used to make up annual shortages, due to system capacity limitations during periods of high demand, or remain in storage for future use.

Operation and Maintenance Program - Annual operation and maintenance costs have been drastically reduced by the conversion of the open conveyance system to the closed pipeline conveyance system. Approximately 20 miles of existing drains were converted from an open system to a tiled or closed system to facilitate a better use of the sprinkler systems which are used by a number of the water users in the District.

The District increased the size of the maintenance building to accommodate precasting of the concrete farm and lateral turnout structures, in-line checks and drop structures, division box structures (both open and closed system), in-line crossing structures, Parshall flumes, etc. during the winter months. These structures are then installed as time and weather conditions permit. All precast structures are standardized where possible. The lateral and farm turnout structures have been standardized to accommodate the propeller type water measurement device and to facilitate quick water turn-on, turnoffs, and delivery adjustments by the ditch rider. This has improved the system operation efficiency, therefore reducing waste water. To date approximately 1000 structures have been replaced which includes about 400 farm turnout structures and 80 Parshall flumes. Eventually all the farm turnouts will be replaced.

The District Manager has a highly technical background and knowledge in the engineering and irrigation field. The Manager has performed training sessions for the ditchriders to broaden their knowledge in irrigation system operation and maintenance, forecasting deliveries to water users, and maintaining accurate daily water

measurements and records. As a result, the District has developed a highly trained staff that can help in developing and improving the systems efficiency. District managers and staff have all had an excellent working knowledge of water conservation and management. The District manager, in conjunction with the board, support the ongoing review and work to improve the overall condition of District facilities for water conservation.

The District developed a computerized water ordering and scheduling program to improve the management of water orders and scheduling the water supply for distribution to the carriage facilities. The water users are informed by farm unit as to their usage and remaining water supply balance.

The District maintains an annual schedule of canal and lateral ditching and cleaning, berm removal and terrestrial weed control. The cleaning of silt, debris and vegetative growth from the carriage facilities in order to maintain the capacities to meet the irrigation demand. At the same time a small amount of water savings is realized by removal of the vegetation in the canal prisms. The District contracts for weed control along the canal banks at about $50,000/year. In addition, the District staff is active in weed control during the irrigation season from May through September. The ditchriders are trained to reuse drain water whenever possible to reduce spills and conserve water. The overall maintenance program includes items such as caulking and sealing concrete lined canal joints, concrete repairs of irrigation structures, and maintaining turnouts.

Two main check and two wasteway structures were rehabilitated and automated during the R&B Program. The waste water discharged into two main wasteways are also monitored through the automation system. The District also upgraded a main canal check structure with radial gates with electric hoists and automation equipment. The District recently automated Pishkun Reservoir and Pishkun Supply Canal and the Mary Taylor site to improve overall water management.

The District has HYDROMET stations at the North Fork of the Sun River, Gibson Reservoir, Diversion Dam, Pishkun Reservoir and Supply Canal, Willow Creek, and various SNOTEL sites. These stations assist the District in improved water management and inflow forecasting. The District has an Agrimet station to provide valuable data for improving on-farm efficiency of water-use. The basic components for the irrigation water management provided by Agrimet are a localized weather station capable of calculating evapo-transpiration rates for crops grown in a local area, information on the soil water holding capacity and crop water use information for stages of crop growth. A few water users within the District have been participating in the Agrimet Program over the last two years.

In summary, the District has calculated that about 40,000 acre-feet of water is being saved each year through the efforts of their water conservation program. The overall system efficiency has increased from 45% in 1979 to about 63% in 1996. The water savings and system efficiency will continue to improve as the District continues our water conservation programs.

Greenfields Irrigation District - The Problems

In 1982, the Bureau of Reclamation (BoR) reviewed the District's infrastructure status that identified many projects to enhance the District's efficiencies. Many of those proposed projects were accomplished in the 1980s through a Rehabilitation and Betterment Program. Despite all this activity there is much more to accomplish. In today's environment, it is more critical to find ways to work together which will include sharing the limited supply of water. The main problem areas that still eludes the District are: 1) an aging infrastructure that is getting harder to maintain, 2) a shortage of 30,000 acre-feet for water users in drought years, 3) controlling wastewater that enters Big Coulee causing severe erosion, 4) controlling wastewater that enters Mill Coulee causing erosion, 5) controlling wastewater into Muddy Creek contributing to major erosion issues, and 6) finding win-win solutions to sharing a limited water supply.

Muddy Creek in its worst days

Greenfields Irrigation District - Solutions to the Problems

The District is not an organization that sits around waiting for someone else to fix a problem - it is an organization that tackles problems head on, such as the items listed below:

- Problem #1: aging infrastructure that is getting harder to maintain. The District has an ongoing infrastructure maintenance schedule and is ALSO replacing some structures with better products. Examples include converting open ditches to buried PVC pipe.
- Problem #2: shortage of 30,000 acre-feet for water users in drought years. The District is tackling this issue from several fronts including a thorough review of how to increase storage in existing reservoirs so can capture some of the high spring runoff flows; reuse waste water before it leaves the district boundaries such as the J-Lake reregulating reservoir; pumpbacks and lining large canals.

Problem #3: Controlling wastewater that enters Big Coulee causing severe erosion. The District has flow gauges tracking waste water in Big Coulee so can reduce excess deliveries to that area.

Problem #4: Controlling wastewater that enters Mill Coulee causing erosion. The

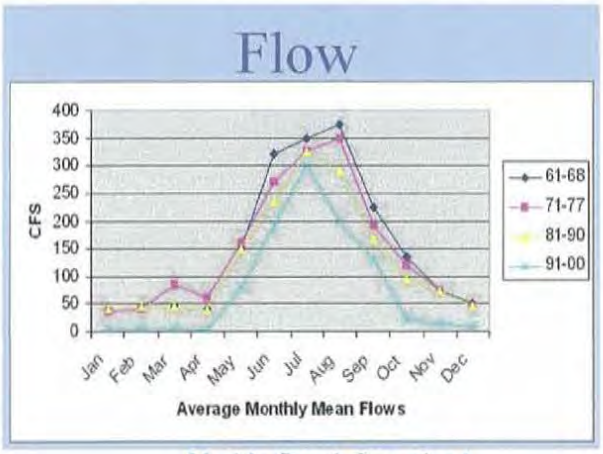
District has flow gauges tracking waste water in Mill Coulee so can reduce excess deliveries to that area.

Problem #5: Controlling wastewater into Muddy Creek contributing to major erosion issues. The District has flow gauges tracking waste water entering Muddy Creek so can reduce excess deliveries to that area; reusing waste water through pumpbacks; helping with stream projects that control erosion.

Problem #6: Finding win-win solutions to sharing a limited water supply. The District actively participates in the Sun River Watershed Group consensus effort that searches for win-win solutions to all natural resource problems.

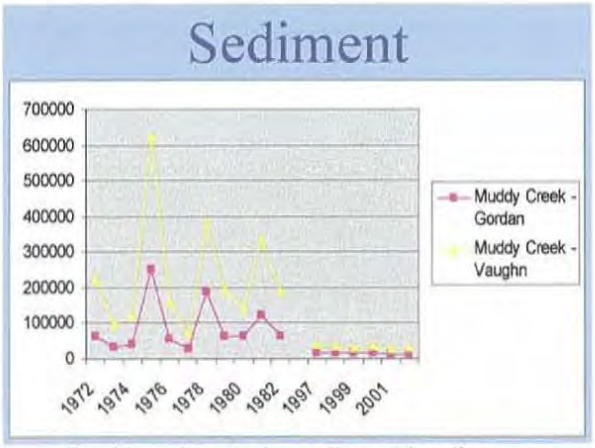
Greenfields Irrigation District - Solutions to the Muddy Creek Problem

For the past 20 years the District has actively worked with the Sun River Watershed Group implementing on-the-ground projects that have resulted in a real success story. A multi-prong approach to the excess waste water and high erosion problem has been used on this problem that has resulted in a 20% reduction in waste water and a 80% reduction in erosion that has reduced sediment loads into the Sun River. See attachments # 7-10 on pages 34-37 for additional Muddy Creek information.



Muddy Creek flow chart

Placing barbs to control bank erosion



Positive change in sediment loading

Banks stabilizing after bank work

Greenfields Irrigation District - This Project Solution to the Muddy Creek Problem

The District in cooperation with BoR and SRWG engaged in an extensive monitoring program to identify where the majority of the waste water and sediment loads were coming from. This data has allowed the District and SRWG to install several proactive projects. Each Muddy Creek tributary has a plan-of-attack that is in-progress for reducing waste water and sediment loads except for the one identified in this proposal.

One-Year of multiple year study on Muddy Creek wastewater

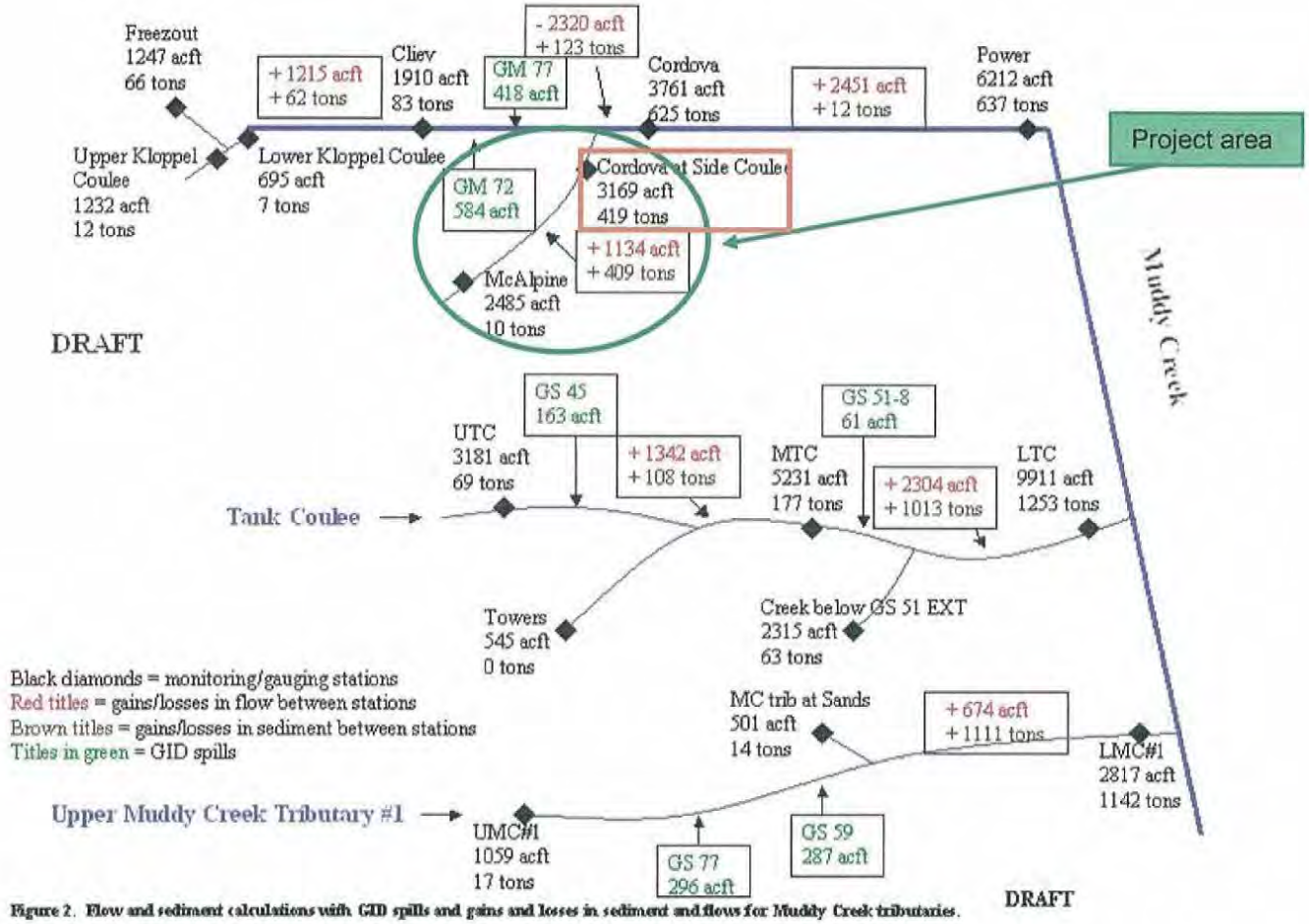


Figure 2. Flow and sediment calculations with GID spills and gains and losses in sediment and flows for Muddy Creek tributaries.

(3) Technical Proposal: Technical Project Description

The overall goal of this project is to improve the water management of the Greenfields Irrigation District to benefit the entire Sun River Watershed. This will be accomplished by converting 8,650 feet of open ditches to pipelines. The 8,650 conversion of open ditches to PVC pipe will reduce wastewater into Muddy Creek and Big Coulee conserving water, and reducing losses so they may be utilized for reuse by the irrigation district in water short years, save water for the basin to allow more water for fisheries, drinking water and other irrigators, and help improve the water quality and quantity impacted by return flows. Specifically:

Objective 1 - Improve water management of the District by 1% (4,000 acre/feet) by reducing wastewater into Muddy Creek, Freezout, Big Coulee and Mill Coulee

Task 1 - Bureau of Reclamation complete NEPA and NHPA Aug - Sep 2013
- Bureau of Reclamation with District assistance will complete environmental and historic compliance review for the proposed project.

Task 2 - Final engineering, review and certification of design Sep - Oct 2013
- District and BoR will work closely on final designs of project to meet all state and federal requirements

Task 3 - Install 8,650 feet of PVC pipe Oct 2013 - May 2014
- Solicit and award material bids PVC pipe
- GID 3-person crew assist excavator dig trench, place bedding material, lay PVC pipe, and pack around pipe
- GID dozer fills in trench
- GID manager oversee construction phase

Task 4 - Reporting, compliance review and monitoring Aug 2013 - Jun 2014
- GID manager bid materials, track funds, and file reports
- GID and BoR project compliance review
- GID test system for successful installation
- SRWG staff monitors water quantity in the Sun River for two years to track project success

Results - Water savings of approximately 4,000 acre-feet per year which will reduce wastewater into Muddy Creek and Big Coulee and improve water quantity/quality in the Sun River.

(4) Technical Proposal: Evaluation Criteria

Evaluation Criterion A: Water Conservation
- Subcriterion No. 1 - Water Conservation
- Subcriterion No. 1(a)—Quantifiable Water Savings:

Describe the amount of water saved. For projects that conserve water, state the estimated amount of water conserved in acre-feet per year that will result as a direct benefit from this project. Please provide sufficient detail supporting the estimate, including all supporting calculations. Please also include the following:

• What is the applicant's average annual acre-feet of water supply?

- Diverted from Sun River = 250,000 acre-feet
- Delivered to farm units = 150,000 acre-feet

• Where is that water currently going (i.e., back to the stream, spilled at the end of the ditch, seeping into the ground, etc.)?

- 100,000 acre-feet is spills seepage, evaporation, and transportation losses
- On-farm efficiency is estimated at 50 - 75% depending upon soils and type of irrigation

• Where will the conserved water go?

- 4,000 acre-feet will be conserved from improved water management with savings to be left in the Sun River increasing summer flows by approximately 10 cfs. This 10 cfs is crucial when current river flows reach as low as 30 cfs, which is almost half of the desired bare minimum flows of 50 cfs that the watershed partners are trying to maintain.

- Subcriterion No. 2—Percentage of Total Supply:

- **Describe the percentage of total water supply conserved:** State the applicant's total average annual water supply in acre-feet. Explain how this calculation was made.

- 250,000 acre-feet over the entire irrigation season that is measured in the canal at the diversion where water is diverted from the Sun River.
- 150,000 acre-feet to the farms is tallied from measurements at each farm turnout

- Subcriterion No. 3—Reasonableness of Costs:

Please include information related to the total project cost, annual acre-feet conserved (or better managed), and the expected life of the improvement. Use the following calculation:

$$\frac{\$373,415}{4,000 \text{ acre-feet} \times 40 \text{ years} = 160,000 \text{ acre-feet}}$$

Relating to a $2.33 per acre-foot cost

-- The above chart does not take into consideration the financial and water quality benefits the project will have on Muddy Creek and the Sun River.

- For all projects involving physical improvements, specify the expected life of the improvement in number of years.

- Life expectancy of the buried PVC pipe per NRCS field guide specification is approximately 25 years however past actual experience is closer to 40 years

Evaluation Criterion E: Other Contributions to Water Supply Sustainability

(1) Will the project make water available to address a specific concern? Example:

- Will the project address water supply shortages due to climate variability and/or heightened competition for finite water supplies (e.g. population growth or drought)

- The Sun River Watershed water rights are over three times average available water supply using known state water right records. The water conflict for this limited water supply become even more heightened in drought years which have been fairly frequent in the past ten years. In the past ten years the snowmelt and in-turn water runoff has been coming off sooner due to climate change making it less available for the irrigators and the aquatic life. Any water savings like this project that is beneficial for the District and the river need to be installed as soon as possible to help reduce water wars.

- Will the project market water to other users? If so, what is the significance (e.g., stretch water supplies in a water-short basin)?

  - The water will not be marketed to other users but will be part of a team effort to better share this limited resource in the water-short basin.

- Will the project make additional water available for Indian tribes?

  - No.

- Will the project help address an issue that could potentially result in an interruption to the water supply if unresolved? (e.g., will the project benefit endangered species)?

  - No, the water will not benefit any endangered species unless you count the limited farmers in this area as endangered. But it will help improve flows in the Sun River that will benefit other water users including the fisheries.

- Will the project generally make more water available in the water basin where the proposed work is located?

  - Yes, the project will benefit a segment of the Sun River that routinely gets too low in the summer to sustain any aquatic life. Even the small amount of 10 cfs may be enough to help turn around the low numbers of fish in this stretch of the Sun River. Fish numbers are approximately 40 per mile and should be around 400 per mile.

(2) Does the project promote and encourage collaboration among parties?

- Is there widespread support for the project?

  - Yes, there is widespread support for this project. The Sun River Watershed Group (SRWG) that is a key part of this project is comprised of over 40 different groups and agencies including recreational, communities, businesses, other irrigation projects and state and federal agencies. For over 15 years the SRWG has worked hard to bring together these diverse groups to help solve natural resource issues. There have been many successes storing including the other GID projects that have conserved annually almost 40,000 acre-feet of water.

- What is the significance of the collaboration/support?

  - When the SRWG was formed 15 years ago the area was in turmoil with irrigators fighting irrigators and irrigators fighting recreationists over the limited supply of this very important resource. Through hard-work and MANY meetings, the SRWG partners now work on solutions rather than pollution. To keep this team effort moving forward, more projects like this must be accomplished so even more water is available to share even in drought years.

- Will the project help prevent a water-related crisis or conflict?

  - Yes, the project will help divert a water related crisis in this watershed. Even though the SRWG has brought people together to solve local problems through local solutions there is a long ways to go. Getting this segment of the river to above 50 cfs is just another step in meeting the water demands (see attachment #10 on page 35 for Sun River flow data). If there is going to be a healthy fisheries, the flow in the river must be raised to 130 cfs. This and many other projects being pursued in the watershed will help reach that goal and reduce the chance of a fragile relationship between water users from failing.

  The project will also reduce a major conflict between water users and people who live along and/or downstream of Muddy Creek and Big Coulee. This erosion and water quality people have people ready to get really angry if the problem is not fixed in the near future. The problem also has people wondering why there is more water in Muddy Creek and Big Coulee during the summer months than there is in parts of the Sun River.

(3) Will the project increase awareness of water and/or energy conservation and efficiency efforts?

- Will the project serve as an example of water and/or energy conservation and efficiency within a community?

  - Yes, the project will serve as another example of teamwork and water conservation. By continuing to find ways to conserve water the community will see first-hand that the District is not giving up on ways to help other water users.

- Will the project increase the capability of future water conservation or energy efficiency efforts for use by others?

  - Yes, the project will increase the capability of water conservation efforts for use of others, primarily recreationists, communities and fish.

- Does the project integrate water and energy components?

  - No, the project does not integrate those two components.

Evaluation Criterion F: Implementation and Results
- Subcriterion No. 1 -- Project Planning

(1) Identify any district-wide, or system-wide, planning that provides support for the proposed project.

- The District completed a Water Management and Water Conservation Plan on June 20, 2006 with attachment #13 on page 41 showing cover pages. The District prepared this plan as a management tool to improve the efficient use of available water, prioritize projects, improve water quality in the Sun River, improve the agricultural economy within the district, and fulfill the water conservation planning requirements stipulated in the Reclamation Reform Act of 1982. The plan list as one water management tool to reduce waste water included pipelines throughout GID project.

(2) Identify and describe any engineering or design work performed specifically in support of the proposed project.

- Initial design has been accomplished but final engineering work still needs to be completed prior to construction beginning. See attachment #5 and #8 on pages 30 and 33 that shows aerial project information.

(3) Describe how the project conforms to and meets the goals of any applicable State or regional plans, and identify any aspect of the project that implements a feature of an existing water plan.

- Montana has a state water plan that can be seen on the web at: http://www.dnrc.mt.gov/wrd/water_mgmt/montana_state_waterplan/default.asp Part II of the plan includes "Subsection: Agriculture Water Use Efficiency" (See attachment #12 on pages 37. That subsection describes the need to improve efficiency so agriculture can withstand periods of drought; improve performance of aging irrigation facilities; and improved water quality. This project fits the state plan by accomplishing water conservation as a tool to improve flows in the state waters.

- Subcriterion No. 2 -- Readiness to Proceed

(1) Are all necessary plans/designs complete? Are there any delays expected to result from environmental compliance?

- Final design work is all that is needed and will be easily accomplished within six months of getting green light for the project to begin. The District and BoR have completed several other projects and are fully prepared to easily complete design and environmental compliance review.

- There are not any expected delays from environmental compliance review.

(2) Describe the implementation plan of the proposed project.

- The stages of project implementation include:
  - #1 - BoR complete NEPA and NHPA Aug - Sep 2013
  - # 2 - BoR and District complete final engineering design Sep - Oct 2013
  - # 3 - Install PVC pipe - Nov 2013 - May 2014
  - # 4 - Reporting, compliance review and monitoring - Aug 2012 - Jun 2014

(3) Explain any permits that will be required and the process for obtaining such permits.

No permits required

- Subcriterion No. 3 -- Performance Measures

Provide a brief summary describing the performance measure that will be used to quantify actual benefits upon project completion.

- Performance measures to document project benefits include the District comparing water delivered to the farms prior and after installing pipeline and the SRWG measuring flows in the Sun River for two years to comparing prior and post data changes that will occur after pipeline installed.

Evaluation Criterion G: Connection to Reclamation Project Activities

(1) How is the proposed project connected to Reclamation project activities?

- The BoR started construction of GID as part of the Sun River project in 1913 with first water delivery in 1920. Another part of the Sun River project is the Fort Shaw Irrigation District which this project will benefit also by increasing water availability to the river. BoR continues to be a major partner in District water conservation projects by providing people resources to find best ideas for the SRWG team effort.

(2) Does the applicant receive Reclamation project water?

- Yes. GID was a BoR built project.

(3) Is the project on Reclamation project lands or involving Reclamation facilities?

- Yes to BoR lands and BoR facilities.

(4) Is the project in the same basin as a Reclamation project or activity?

- Yes to same basin as a BoR project - the Sun River project.

(5) Will the proposed work contribute water to a basin where a Reclamation project is located?

- Yes, work will contribute water to same basin where BoR project is located.

- 4,000 acre-feet will be conserved by pumping waste water back into a GID canal with savings to be left in the Sun River increasing summer flows by approximately 10 cfs. This 10 cfs is crucial when current river flows reach as low as 30 cfs, which is almost half of the desired bare minimum flows of 50 cfs that the watershed partners are trying to maintain.

This project will be especially useful with meeting Sun River flow targets when combined with the other ongoing projects in the watershed.

f. Performance Measure for Quantifying Post-Project Benefits

Estimated water savings of approximately 4,000 acre/feet annually benefiting the reliability of water for the irrigation district while improving the water quality and quantity for all other uses in the basin.

Pre-project: Flow measurements have already been taken to identify potential savings
Post-project: Gauges on the Sun River, flow measurements on the canals, flow measurements on the wastewater by the District and SRWG will help track all water savings. See attachment #10 on page 35 for Sun River flow data; attachment #6 on page 3 for Muddy Creek flow data; and attachment #9 on page 34 for Muddy Creek flow data.

g. Environmental Compliance

(1) Will the project impact the surrounding environment (i.e., soil [dust], air, water [quality and quantity], animal habitat, etc.)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.

- The project will have minor air disturbance during construction phase as the earth work of trenching and back-filling occurs. This will be minimized by reducing the length of time project is in construction phase.
- With extensive farming in this area, no animal habitat impacts are expected

(2) Are you aware of any species listed or proposed to be listed as a Federal endangered or threatened species, or designated Critical Habitat in the project area? If so, would they be affected by any activities associated with the proposed project?

- There are no species either listed or proposed to be listed in this area

(3) Are there wetlands or other surface waters inside the project boundaries that potentially fall under Federal Clean Water Act jurisdiction as "waters of the United States?" If so, please describe and estimate any impacts the project may have.

- No impacts to any wetlands or streams

(4) When was the water delivery system constructed?

- GID delivery system construction started in 1913

(5) Will the project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.

- Will only modify existing ditches that are frequently cleaned

(6) Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.

- Cultural resource areas within the district do exist. Previous inventories by the BoR have located and identified the resources that should not be disturbed. All regulatory compliance requirements are not completed at this time; however they will be completed prior to initiation of this project. Greenfields Irrigation District will work closely with BoR to achieve compliance with both National Environmental Policy Act (NEPA) and National Historic Preservation Act (NHPA).

(7) Are there any known archeological sites in the proposed project area?

- There are no known archeological sites where this work will be accomplished

(8) Will the project have a disproportionately high and adverse effect on low income or minority populations?

- The project will have a beneficial impact on low income families as it improves their ability to increase production on what is currently waste land due to seeps

(9) Will the project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?

- There are no Indian sacred sites in this area

(10) Will the project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?

- There are noxious weeds in the area but GID staff takes proactive approached to controlling the weeds and will take extra precaution not to move equipment through known old patch sites that may still have weed seeds. After construction the sites will be monitored for new weed infestations that can be controlled immediately.

h. REQUIRED PERMITS OR APPROVALS

No permits required

i. FUNDING PLAN AND LETTERS OF COMMITMENT -

The District contributions to this project are $226,855 in-kind services of labor and equipment PVC pipe. SRWG will contribute $20,000 in-kind services to monitor instream flow changes over two years from this project. Program grant funds for $126,560 are requested. Total project cost is $373,415.

The Sun River Watershed Group has agreed to assist through cash match and in-kind services the monitoring program. See attachment # 2 on page 27 for commitment of these resources.

These non-Reclamation funds and in-kind services exceed the 50% match required from this Challenge Grant program.

Table 2. Summary of non-Federal and Federal funding sources

Funding Sources	**Funding Amount**
Non-Federal Entities	
1. GID - in-kind	$ 226,855
2. SRWG	$ 20,000
Non-Federal Subtotal:	$ 246,855
Other Federal Entities	
1. None	
Other Federal Subtotal:	-0-
Requested Reclamation Funding:	$126,560
Total Project Funding	$373,415

j. Official Resolution

- See attachment #1 on page 28 for GID resolution to commit $226,855 in-kind support to accomplish project within one-year.

k. Budget Proposal:

(1) General Requirements

Task 1 - BoR complete NEPA and NHPA
- BoR or contracted services and with District complete compliance work
  - BoR or contractor to accomplish - $ 5,000 - Grant
  - GID labor, District manager - 50 hours x $60/hour - $3,000 - In-kind

Task 2 - BoR and District complete engineering, review and certification of design
- BoR and District will work closely on final designs and permitting of project to meet all state and federal requirements
  - BoR resources to accomplish - $18,120 - Grant
  - GID labor, District manager - 50 hours @ $60/hour - $3,000 - In-kind

Task 3 - Install 8,650 feet of PVC pipe
- *GID prepare and award bid for PVC pipe*
  - GID labor, District manager and secretary ..... - $ 3,200 - In-kind
    - 40 hours @ $60/hour
    - 40 hours @ $20/hour
  - Buy PVC pipe, 8,650 feet of 15" & 12" pipe - $62,900 - Grant
  - Buy pipe bedding material 2,000 yards @ $4.00/yard - $20,000 - Grant
  - Buy turnouts and measurement boxes @ $7,500 - $ 7,500 - Grant

- *GID crew dig trench, pack, lay pipe and refill*
  - GID labor to accomplish core work
    - 1,800 total hours for 3 people @ $30/hour - $54,000 - In-kind
  - GID labor, District manager - to oversee proper installation
    - 300 hours @ $60/hour - $18,000 - In-kind
  - GID excavator to dig trench and place pipe bedding material
    - 600 hours @ $87/hour - $52,200 - In-kind
  - GID truck to haul pipe bedding material
    - 300 hours @ $75/hour - $22,500 - In-kind
  - GID dozer to backfill and pack trench
    - 400 hours @ $131/hour - $52,400 - In-kind

Task 4 - Reporting, compliance review and monitoring
- GID District manager and secretary accomplish required grant and project monthly and final reporting and billing
  - GID labor, District manager and secretary
    - 60 hours @ $60/hour - $ 3,600 - In-kind
    - 160 hours @ $20/hour - $ 3,200 - In-kind
- BoR resources for final project inspection - $ 2,000 - Grant
- SRWG technician travel and labor to monitor flow over 2 years
  - 500 hours @ $40/hour - $20,000 - In-kind

Other expenses - contingency and indirect
- Construction contingency @ 10% of total direct
  - $90,400 total direct of grant @ 10% = - $ 9,040 - Grant
- Indirect costs GID may incur including postage,

paper, and incidental labor
- $235,100 FSID in-kind @ 5% = - $11,755 - In-kind

TOTALS **$246,855 Match** **$126,560 Grant**

(2) Budget Table

BUDGET ITEM DESCRIPTION	COMPUTATION		RECIPIENT/ PARTNERS COST SHARE	RECLAMATION FUNDING	TOTAL COST
	Unit/price	Quantity			
SALARIES AND WAGES					
- Employee 1 - worker	$30/hour	600	$ 18,000	$ 0	$ 18,000
- Employee 2 - worker	$30/hour	600	$ 18,000	$ 0	$ 18,000
- Employee 3 - worker	$30/hour	600	$ 18,000	$ 0	$ 18,000
- Employee 4 - oversight	$60/hour	300	$ 18,000	$ 0	$ 18,000
EQUIPMENT					
- Excavator - trench work	$87/ hour	600	$ 52,200	$ 0	$ 52,200
- Dozer - refill trench	$131/hour	400	$ 52,400	$ 0	$ 52,400
- truck - haul fill	$75/hour	300	$ 22,500	$ 0	$ 22,500
SUPPLIES/MATERIALS					
- 15" PVC pipe	$10 /foot	2,750	$ 0	$ 27,500	$ 27,500
- 12" PVC pipe	$6/foot	5,900	$ 0	$ 35,400	$ 35,400
- pipe bedding material	$4/yard	5,000	$ 0	$ 20,000	$ 20,000
- turnouts/gates	$900/ea	5	$ 0	$ 4,500	$ 4,500
- measurement box	$600/ea	5	$ 0	$ 3,000	$ 3,000
CONTRACTUAL					
- NONE					
OTHER					
Reporting	$20.00/ hour	200	$ 4,000	$ 0	$ 4,000
Compliance & reporting	$60.00/hour	200	$ 12,000	$ 0	$ 12,000
Monitoring -labor + travel	$40.00/ hour	500	$ 20,000	$ 0	$ 20,000
NEPA/NHPA - USBR	30% const costs	$90,400	$ 0	$ 27,120	$ 27,120
TOTAL DIRECT COSTS			**$ 235,100**	**$ 117,520**	**$ 352,620**
Contingency funds - 10%	10%	$ 90,400	$ 0	$ 9,040	$ 9,040
INDIRECT COSTS - 5 %	5%	$235,100	$ 11,755	$ 0	$ 11,755
TOTAL PROJECT COSTS			**$ 246,855**	**$ 126,560**	**$ 373,415**

(3) Budget Narrative

Salaries & Wages

- GID Program manager, Bob Hardin
  - $60/hour for all work
    - 300 hours project oversight
    - 200 hours assisting in compliance review, design and permitting
- GID laborers - 3 person crew
  - $30/hour for all work
    - 1,800 total hours to dig trench, pack, lay pipe and refill
- GID secretary
  - $20 hour for all work
    - 200 hours to specifically help with reports and material bids

Fringe Benefits - NONE

Travel - NONE

Equipment

- GID excavator to dig trench, lay pipe bedding material and help backfill
  - $87/hour which is going rate per Corps worksheet
    - 600 hours for all tasks
- GID truck to deliver pipe bedding material to the trench
  - $75/hour which is going rate per Corps worksheet
    - 300 hours for all tasks
- GID dozer to backfill trench
  - $131/hour which is going rate per Corps worksheet
    - 400 hours for all tasks

Materials & Supplies

- All materials below are for construction purposes and were estimated by acquiring quotes from local distributors
  - 15" PVC pipe @ $10/foot x 2,750 feet = $27,500
  - 12" PVC pipe @ $6/foot x 5,9000 feet = $35,400
  - Precasted turnouts/gate 5 @ $900/each = $4,500
  - Precasted measurement boxes 5 @ $600/each = $3,000
  - Pipe bedding material @ $4.00/yard x 5,000 yards = $20,000

Contractual

- GID will contract with BoR for NEPA, NHPA, final engineer design and project inspection estimated at 30% of total materials costs ($90,400) = $27,120

Environmental and Regulatory Compliance Costs

- Part of BoR contractual costs listed above

Reporting

- GID Program manager, Bob Hardin
    - $60/hour for all work
        - 40 hours assisting in compliance review, permitting and project reporting
- GID secretary
    - $20 hour for all work
        - 40 hours to specifically help with writing financial, program performance, semi-annual and final reports

Other

- SRWG technician, Alan Rollo
    - $40/hour for all monitoring work
        - 500 hours - monitoring flow over 2 years

Indirect Costs

- 5% rate GID is using for any remaining costs not listed above including postage, paper, copies and other labor. 5% x $235,100 = $11,755

Contingency Costs

- 10% of construction costs to take in account inflation and/or possible material price increases. 10% x $90,400 = $9,040

Total costs

- Entire project = $373,415
- Non-federal cost-share = $246,855
- Federal cost-share = $126,560

OMB Approval No. 0348-0041

BUDGET INFORMATION - Construction Programs

NOTE: Certain Federal assistance programs require additional computations to arrive at the Federal share of project costs eligible for participation. If such is the case, you will be notified.

COST CLASSIFICATION	a. Total Cost	b. Costs Not Allowable for Participation	c. Total Allowable Costs (Columns a-b)
1. Administrative and legal expenses	$ 16,000 .00	$ .00	$ 16,000 .00
2. Land, structures, rights-of-way, appraisals, etc.	$ 4,000 .00	$ .00	$ 4,000 .00
3. Relocation expenses and payments	$ 0 .00	$ .00	$ 0 .00
4. Architectural and engineering fees	$ 21,120 .00	$ .00	$ 21,120 .00
5. Other architectural and engineering fees	$ 0 .00	$ .00	$ 0 .00
6. Project inspection fees	$ 2,000 .00	$ .00	$ 2,000 .00
7. Site work	$ 72,000 .00	$ .00	$ 72,000 .00
8. Demolition and removal	$ 0 .00	$ .00	$ 0 .00
9. Construction	$ 90,400 .00	$ .00	$ 90,400 .00
10. Equipment	$ 127,100 .00	$ .00	$ 127,100 .00
11. Miscellaneous	$ 31,755 .00	$ .00	$ 31,755 .00
12. SUBTOTAL *(sum of lines 1-11)*	$ 364,375 .00	$ 0.00	$ 364,375 .00
13. Contingencies	$ 9,040 .00	$ .00	$ 9,040 .00
14. SUBTOTAL	$ 373,415 .00	$ 0.00	$ 373,415 .00
15. Project (program) income	$ 0 .00	$ .00	$ 0 .00
16. TOTAL PROJECT COSTS *(subtract #15 from #14)*	$ 373,415 .00	$ 0.00	$ 373,415 .00
FEDERAL FUNDING			
17. Federal assistance requested, calculate as follows: (Consult Federal agency for Federal percentage share.) Enter the resulting Federal share.	Enter eligible costs from line 16c Multiply X _____%		$ 0.00

Previous Edition Usable **Authorized for Local Reproduction** **Standard Form 424C (Rev. 7-97)**
Prescribed by OMB Circular A-102

RESOLUTION

Greenfields Irrigation District
Board of Commissioners
Fairfield, MT 59436

RESOLUTION SPONSORING
BUREAU OF RECLAMATION 2013 WATER SMART GRANT
FOR INFRASTRUCTURE IMPROVEMENTS

WHEREAS, Greenfields Irrigation District's infrastructure is in dire need of immediate and long-term improvements to conserve water and enhance delivery to water users, and

WHEREAS, Greenfields Irrigation District's overall infrastructure is in need of many improvements to enhance its water management for this and future generations, therefore

BE IT RESOLVED, the Greenfields Irrigation District's Board of Commissioners has reviewed and authorizes the board chairman to pursue a Bureau of Reclamation 2013 WaterSMART grant for infrastructure improvements; and

BE IT FURTHER RESOLVED, the Greenfields Irrigation District's Board of Commissioners by the authority given to it by the State of Montana is committing the necessary resources and funds to complete the infrastructure project by June 30, 2014.

Dated this 8th day of January, 2013.

President

Attest: Vicky Whitmore

a non-profit organization benefiting all water users in the basin
816 Grizzly Drive Great Falls, Montana 59404 406-727-4437

January 6, 2013

Bureau of Reclamation
Acquisition Operations Group
Attn: Michelle Maher
Mail Code: 84-27810
P.O. Box 25004
Denver, CO 80225

RE: Letter of Commitment

Dear Bureau of Reclamation

The Sun River Watershed Group is writing this Letter of Commitment for Greenfields Irrigation District's 2013 Reclamation WaterSMARTgrant application. The Sun River Watershed Group (SRWG) and the Greenfields Irrigation District (GID) have been engaged for more than 15 years on several activities to improve the overall health of this basin. GID's past and current irrigation project's compliment the overall efforts of the watershed program.

We will commit $20,000 of in-kind resources to monitor water quantity and quality before and after project accomplishments to document any improvements.

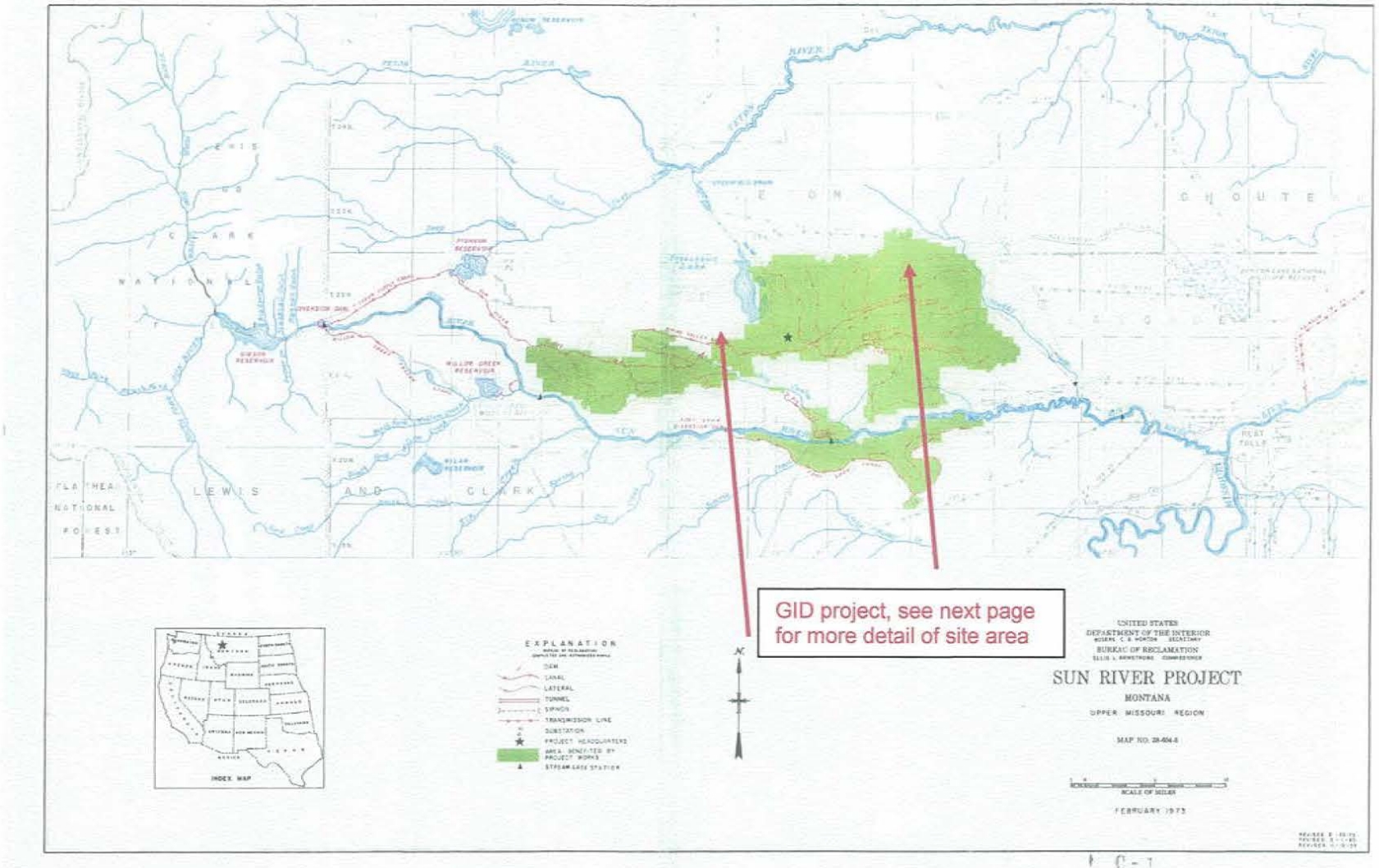
The key enhancements of this project will be improved water quantity and quality in the Sun River from more efficient use of the basin's limited water supply. This is a perfect fit of projects with positive goals under the SRWG's work-plan. The SRWG will assist GID in a monitoring program to ensure this project actually meets these goals.

Call me at 406-727-4437 if have any questions concerning this project.

Sincerely,

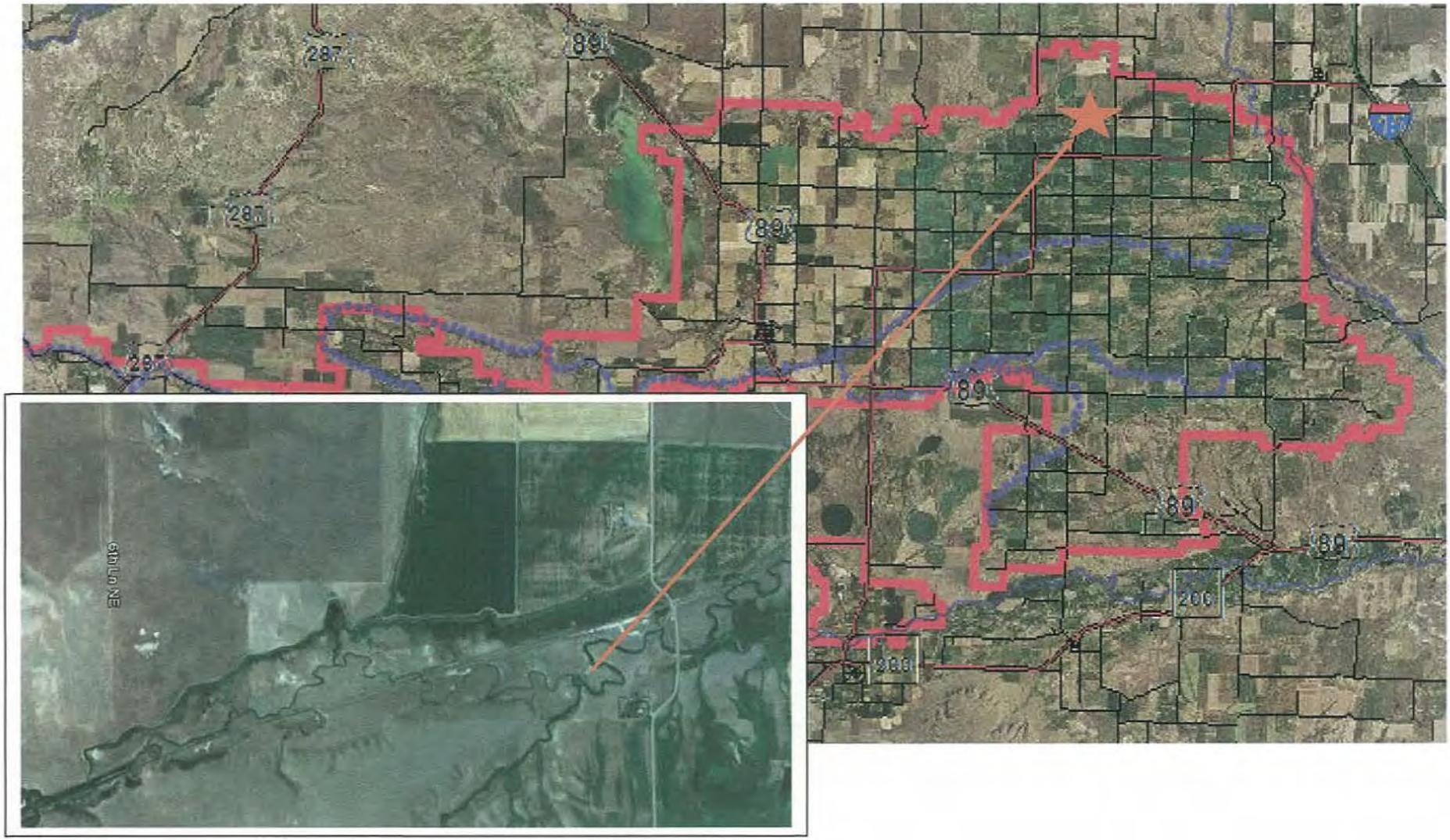
Alan Rollo, Coordinator
Sun River Watershed Group

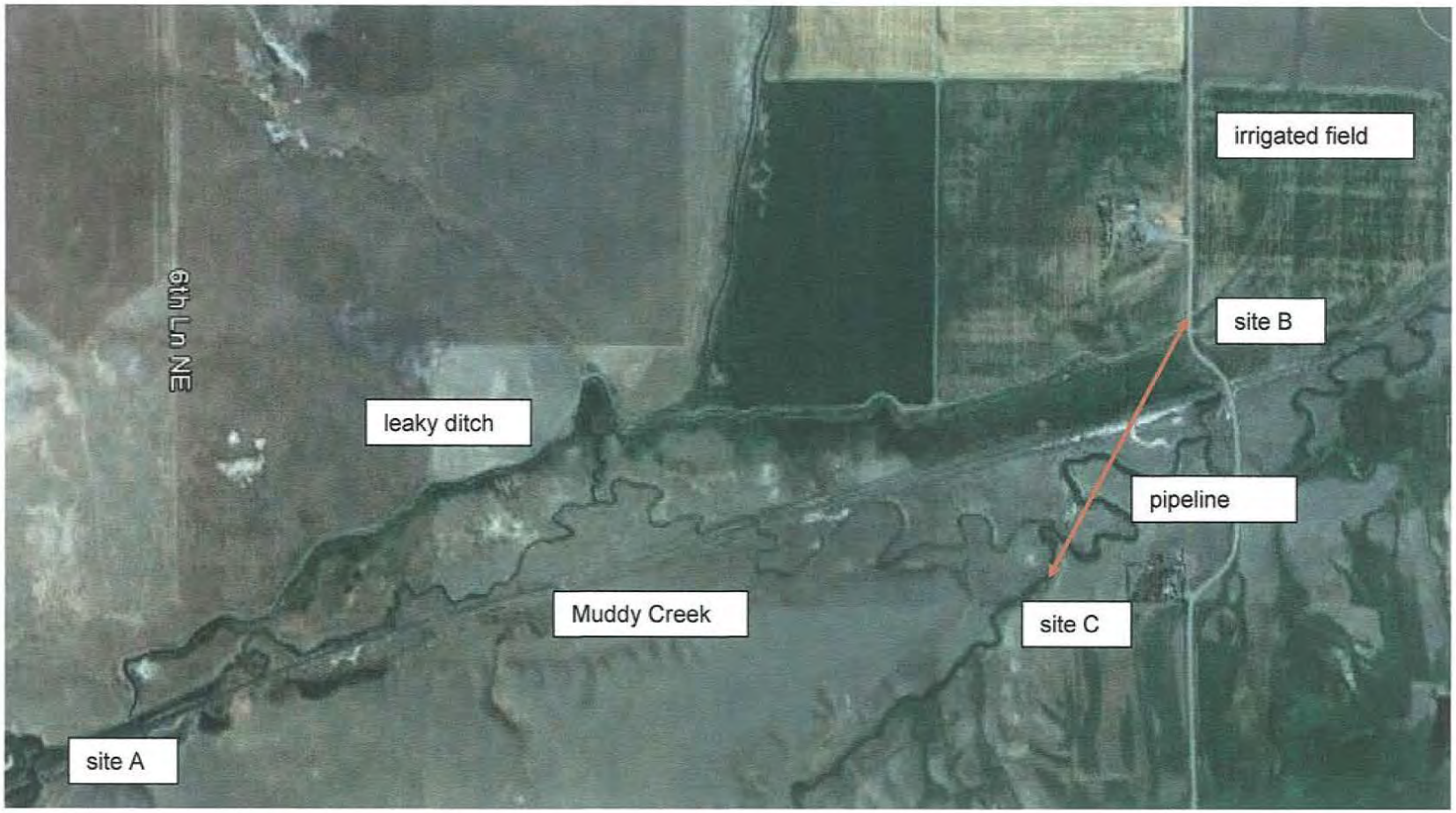
Cc: GID


GID project, see next page for more detail of site area
SUN RIVER PROJECT
MONTANA
UPPER MISSOURI REGION
EXPLANATION
INDEX MAP
LEWIS AND CLARK
CHOUTEAU
FLATHEAD NATIONAL FOREST

Greenfields Irrigation District Boundary

Site Specific Project Location- pipeline #1





Current method to deliver water to a GID farm is to dump water into Muddy Creek, then pick up into canal at "site A", deliver along leaky ditch to "site B"

Proposed method is to gravity feed from "site C" to "site B" eliminating need for 2 miles of leaky ditch and reducing waste water that causes erosion in Muddy Creek as shown in next attachment

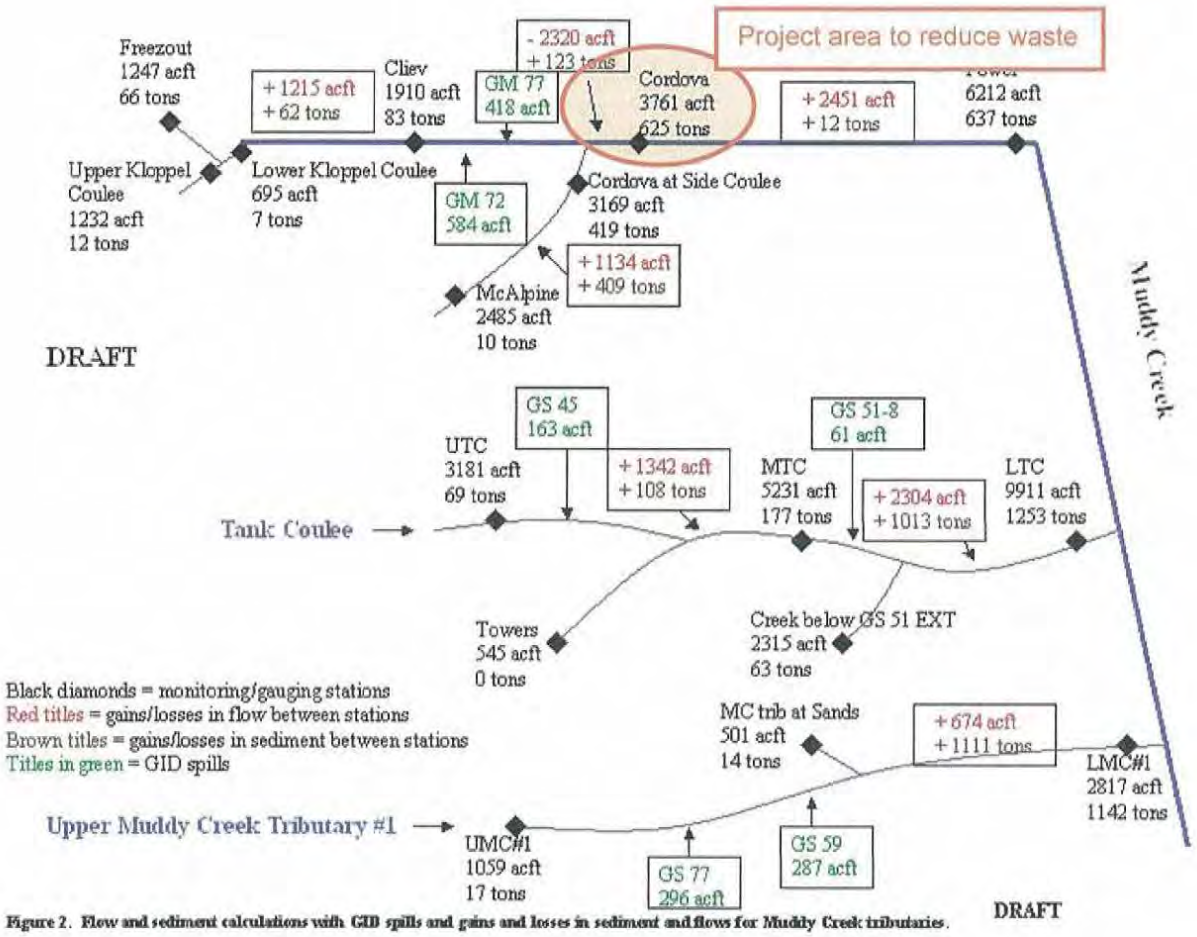
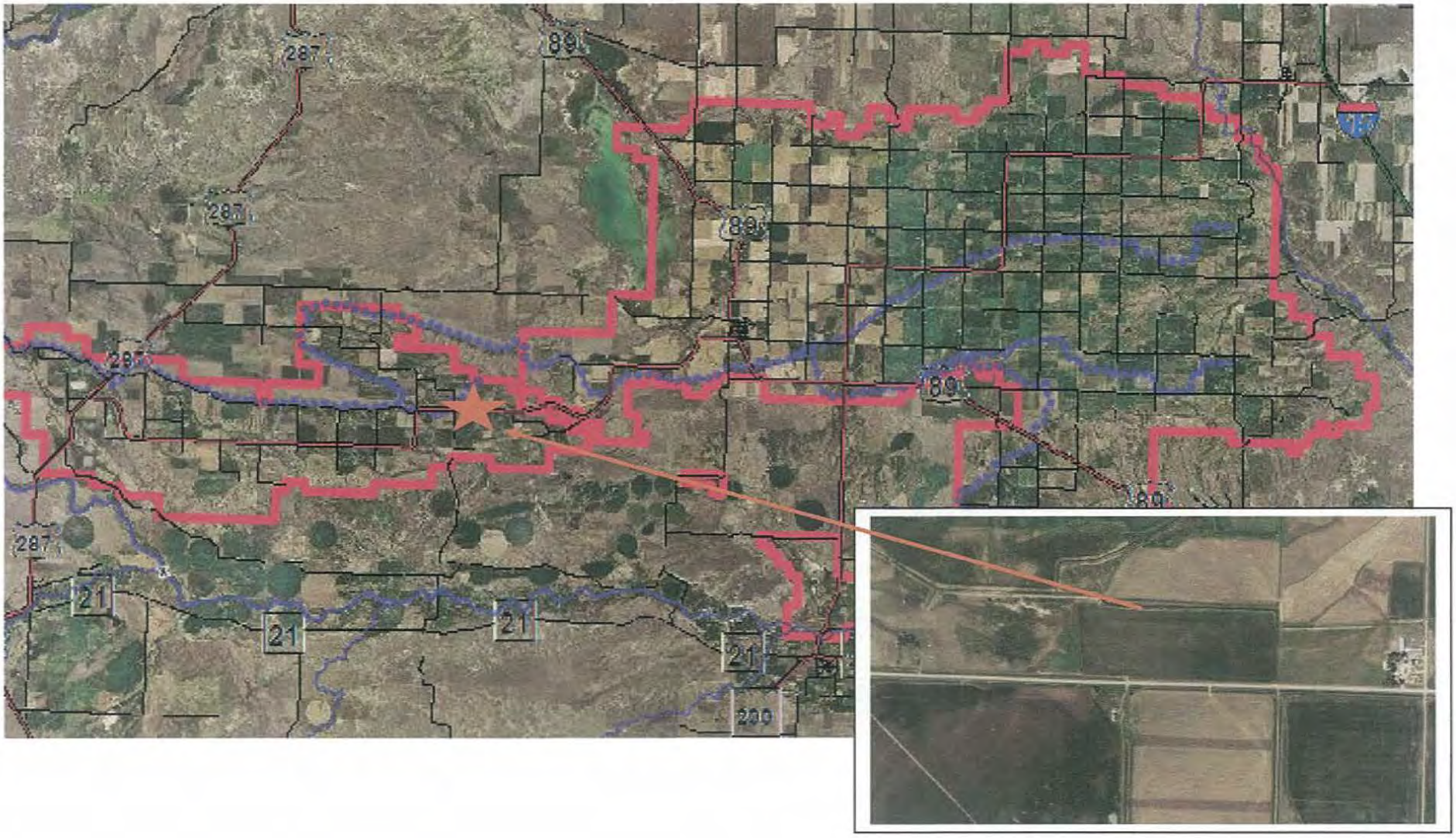


Figure 2. Flow and sediment calculations with GID spills and gains and losses in sediment and flows for Muddy Creek tributaries.

Proposed project will reduce 3,761 acre/feet of wastewater and 625 tons of sediment annually sent down Muddy Creek

Greenfields Irrigation District Boundary

Site Specific Project Location- pipeline #2



Current method to deliver water to GID farm is to deliver water though leaky ditch from "site A" to "site B" with lots of waste water ending up in Big Coulee

Proposed method is to put water into pipe from "site A" to "site B" eliminating need for 1,450 feet of leaky ditch and reducing waste water that causes erosion in Big Coulee as shown in next attachment

the project area. During the 2008 irrigation season, measurements indicated 7,740 acft of water and 515 tons of sediment at this station.

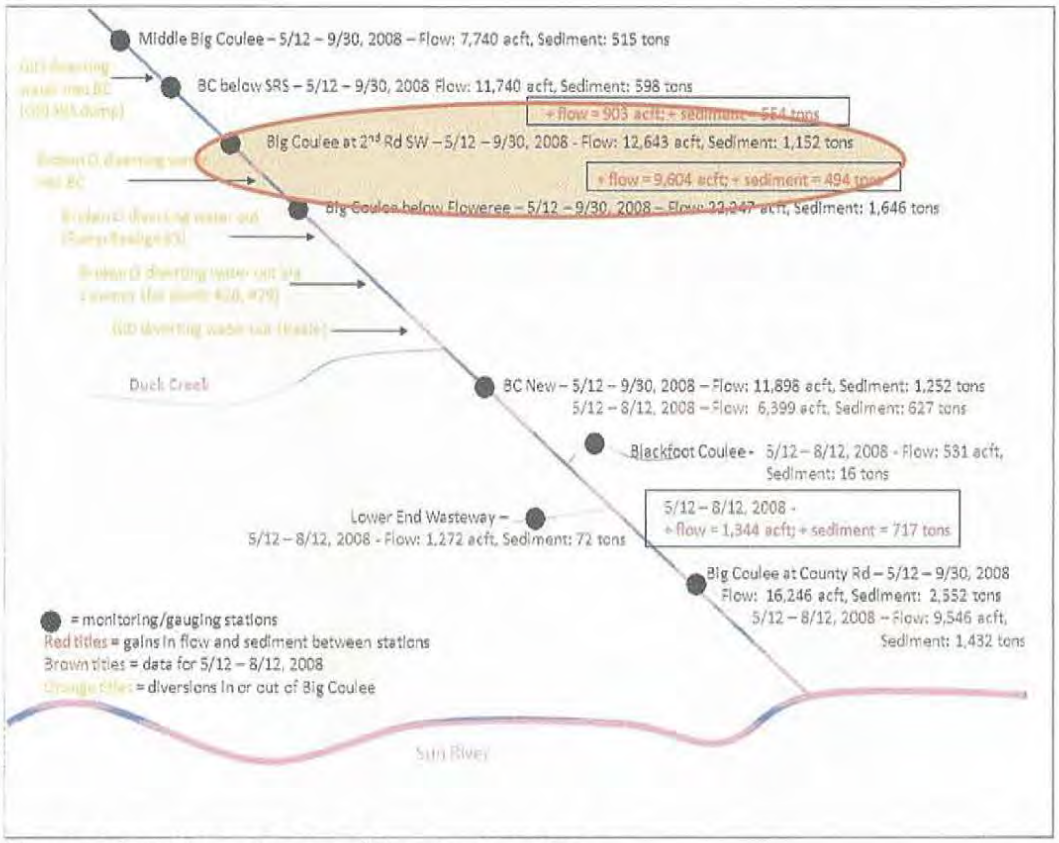
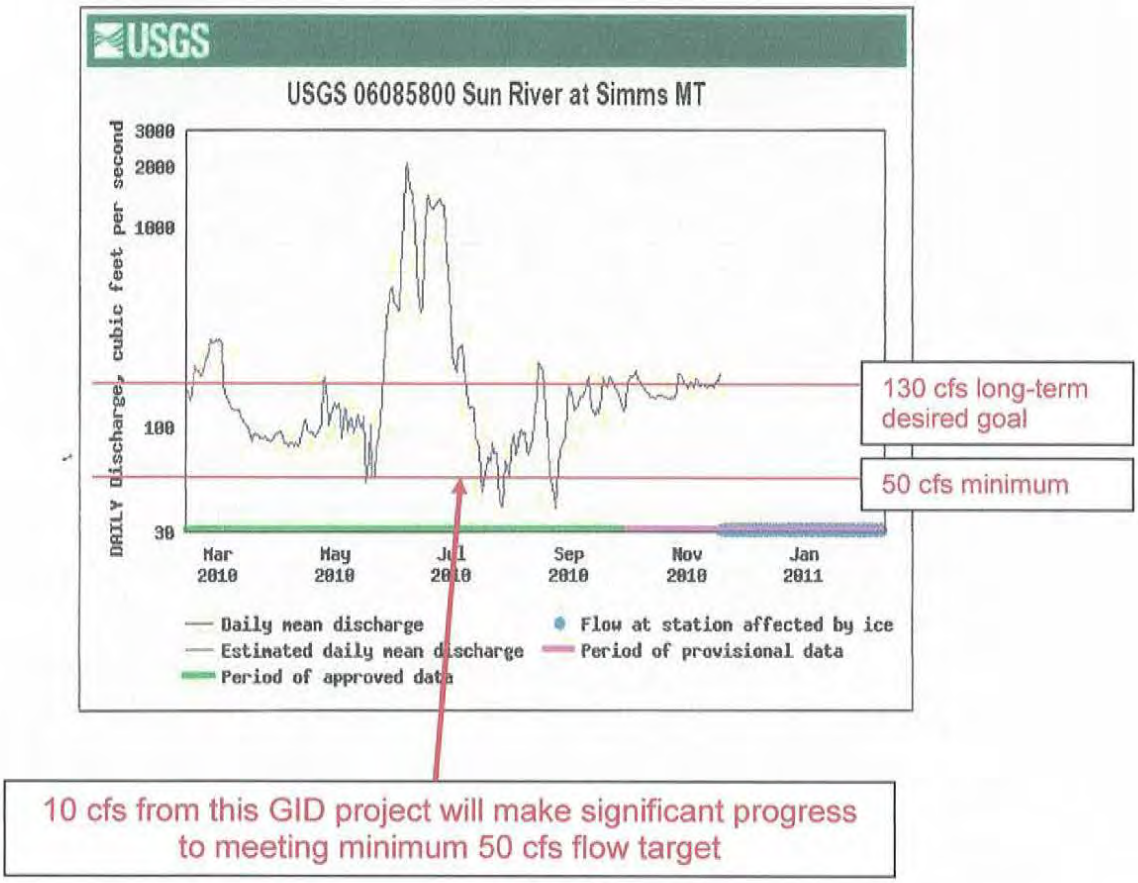


Figure 3. Big Coulee sediment and flow diagram, 2008.

Two focus areas were addressed in the 2008 study: 1) Big Coulee below SRS dump to Big Coulee below Floweree, and 2) Big Coulee New to Big Coulee at County Road. The 2007 study recommended that the 2008 study focus on identifying and quantifying circumstances related to sediment increases in these two reaches. A scoping trip with the SRWG coordinator did not net any new locations with significant contributions that needed to be gauged. Thus, existing monitoring sites were kept for the stretch of Big Coulee between Big Coulee below SRS dump to Big Coulee below Floweree. Figure 3 shows that **903 acft of flow and 554 tons was gained between Big Coulee below SRS and Big Coulee at 2nd Rd SW.** During 2006 a monitoring station was installed on a tributary (identified as BC Trib) that discharges into Big Coulee between these stations. This tributary contributed 961 acft of flow and 56 tons of sediment in 2006. While it is likely that much of the additional flow measured during 2008 is sourced from this tributary, there is still a good pickup of sediment between these two stations. **Downstream of**

USGS flow data in Sun River at Simms BELOW FSID headgate used to track lower Sun River flow conditions (50 desired bare minimum flow)



Technical Memorandum No. 2

GREENFIELDS IRRIGATION DISTRICT PRESSURIZED PIPE SIMMS AND ASHUELOT BENCH AREAS

Sun River Watershed Group
Sun River Special Study

PREPARED BY: Chuck Davis, P.E. – MMI

REVIEWED BY: Russ Anderson, P.E. – MMI

DATE: DRAFT - December 17, 2010
REVISED - February 11, 2011

2.1 Introduction

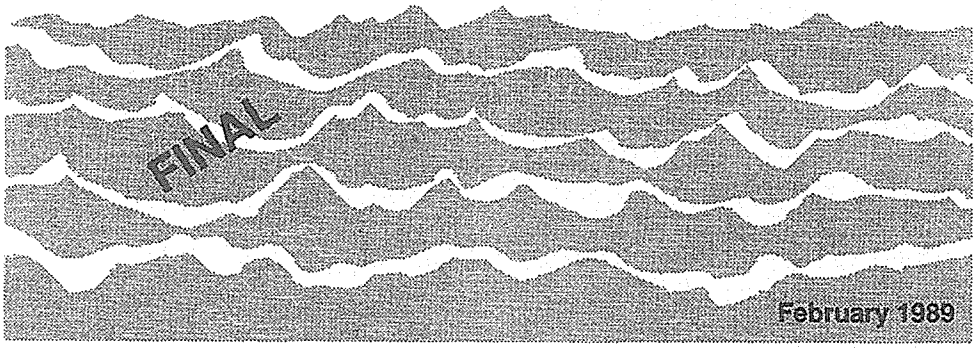
This technical memorandum summarizes the results of the pressurized pipe assessment (water savings, cost, etc.) for the Greenfields Irrigation District (GID) Simms and Ashuelot Bench areas. The goal of this evaluation was to identify opportunities to reduce waste and save water for the benefit of GID water users and the Sun River. Water savings would be accomplished through reduced seepage by eliminating canals and converting areas of flood irrigation to sprinkler irrigation. The sprinklers would be pressurized by gravity, thus eliminating the need for pumps.

Information was obtained from the GID GIS website (GID, 2010) to help layout pipe routes along property lines from the main canal turnout to each farm unit in the area. A water use demand to each farm unit was then determined by applying a peak ET demand of 8 GPM/AC to the number of irrigated acres of each farm unit. Pipe sizes were then calculated to maintain adequate pressure and velocity in the piping system.

Cost estimates were developed using bid prices for similar work. For this analysis, only the mainline piping was included in the cost estimate. Lateral piping from the mainline turnout to a pivot center was not included. The cost estimates are included in the Appendix.

Water savings through reduced seepage was determined by applying a seepage factor per CFS per length of canal. The seepage factor used in this analysis of 0.00021 AC-FT/LF-CFS was determine through dimensional analysis of the average seepage of

MONTANA WATER PLAN
Management Section



Subsection: Agricultural Water Use Efficiency

WATER RESOURCES DIVISION • DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
1520 EAST SIXTH AVENUE • HELENA, MONTANA 59620 - 2301 • (406) 444-6637

INTRODUCTION

Agriculture is Montana's largest business, providing about one-third of the total state income from primary industries. Irrigation contributes roughly one-quarter of agricultural income and, importantly, stabilizes agricultural production during the all-too-frequent dry years. Satisfying agriculture's vital demand for irrigation water requires the development and extension of water supplies through a combination of management strategies, including water storage. Another method is to improve the efficiency with which water is used.

The benefits of improved agricultural water use efficiency are diverse and include:

1. Improved ability to withstand periods of drought.
2. Increased irrigated acreage through the use of saved water.
3. Improved performance of aging irrigation facilities.
4. Increased irrigators' profits when the benefits of more efficient water use (increased crop production and sometimes decreased operating costs) are greater than the investment cost.
5. Reduced soil erosion and improved water quality.
6. Help in meeting the needs of current water users once the prior reserved rights of Indian tribes and the federal government are quantified and put to use.

Along with these benefits, improving water use efficiency may be important in terms of interstate water allocation. The U.S. Supreme Court has indicated that state conservation efforts will be considered if it is called upon to divide the waters of interstate rivers. The Court could decide to award smaller shares to states making no effort to increase water use efficiency, reasoning that these states could meet their future needs by saving more water.

BACKGROUND

Any strategy to improve agricultural water use efficiency must reflect an appreciation of several difficulties. First, because each irrigation situation is different, improving water use efficiency requires a case-by-case consideration of a number of complex geologic, hydrologic, and economic factors. Second, irrigation efficiency improvements can be very expensive. Third, water uses within a basin can be extremely interdependent. One irrigator's return flows or recharge to ground water can be another irrigator's water supply. Therefore, improving the efficiency of one water user could adversely affect the water supply of others. Fourth, while Montana law protects water users from adverse effects caused by other people's changes in water use, the law does not clearly establish who owns the right to water saved without adverse effects to others.

A number of options are already available to overcome some of these problems. The Montana Cooperative Extension Service, local conservation districts, and a number of other state and federal agencies provide technical assistance and information on water conservation measures. The Montana University System also supports research to improve our understanding of the complex factors that affect irrigation efficiency. Research may also help develop improved irrigation practices and technologies.

Funding assistance is available for irrigation efficiency improvements from a number of sources. These sources include the U. S. Agricultural Stabilization and Conservation Service, Farmers Home Administration, Soil Conservation Service, and the Montana Water Development Program administered by the Department of Natural Resources and Conservation (DNRC).

Given that one irrigator's water losses can be another irrigator's water supply, improvements in water use efficiency may adversely affect some water users. In light of this, the law provides potentially affected parties the right to object to certain changes in water use. Accordingly, the objective of increased water use efficiency is not to reduce the amount of water that is later reused. Rather, it is to decrease losses such as: (1) water used by weeds or other unwanted vegetation; (2) evaporation of standing water; (3) water that is not consumed but becomes inaccessible for reuse; or (4) water that becomes unusable because its quality has deteriorated.

The final difficulty stems from the fact that our water law is not clear on the question of who holds the right to salvaged water. In Montana, water rights are based on the amount of water historically put to beneficial use. If an irrigator decreases his use over time because of improved efficiencies, the legal status of the water no longer needed can be called into question. By one interpretation, this part of the water right would be considered abandoned and the water would go to the next junior user. Obviously, this would not encourage increased efficiency. Under a second interpretation, an irrigator who increases his efficiency retains the right to the salvaged water, so long as other water users would not be adversely affected by the change in water use. The irrigator may then have the option to expand

his irrigated acreage, sell, or otherwise benefit from the right to the salvaged water. Using this interpretation, an irrigator may be rewarded, rather than penalized, for becoming more efficient.

STATE WATER PLAN POLICY STATEMENT

Voluntary improvements in agricultural water use efficiency that expand water supplies for agriculture and other uses should be encouraged. Where improvements in water use would adversely affect other existing beneficial uses, such improvements should not be allowed.

ISSUES AND RECOMMENDATIONS

Issues

To encourage voluntary improvements in agricultural water use efficiency, three groups of issues must be successfully addressed.

1. Adequate information and educational opportunities must be readily available to irrigators, and research must be continued. How difficult is it for irrigators to obtain this information? Is it presented in a manner that is clear and persuasive? Are there adequate data for evaluating applications for water right changes in terms of adverse effects upon other water users? Is improving irrigation technologies and practices receiving adequate priority in the competition for agricultural research dollars?

2. Funding assistance may be necessary for those wishing to improve irrigation efficiency. Are existing programs capable of meeting future demands for funding? Are the kinds and levels of support adequate? Should the state Water Development Program give special consideration to irrigation efficiency-improving proposals? Are other sources of funding available, particularly for the rehabilitation and betterment of aging irrigation projects?

3. Laws clarifying who owns the right to salvaged water must be enacted to provide clear incentives for more efficient use. But when an irrigator increases efficiency, how will the amount of water salvaged be determined? Will it include water that otherwise would have been return flows? How will other water users be protected from adverse effects? Should restrictions be placed on how the saved water can be used?

Recommendations

In response to these issues, the following recommendations have been adopted:

1. The adequacy and effectiveness of existing information and research programs should be evaluated. Information should be provided to the state's irrigation districts and other organized irrigation associations on the availability of technical and financial assistance for improving irrigation efficiency. Further, these entities should be informed of their option under state law for the use of salvaged water.

2. Support for federal programs providing financial and other local level assistance to irrigators should be maintained. Special consideration should be given in the state Water Development Program for projects that would improve the efficiency of existing irrigation systems. Funds from the federal Pick-Sloan Missouri Basin Program should be allocated for use in the rehabilitation and betterment of irrigation projects.

3. The law should clearly provide that if an irrigator salvages water, he maintains the right to use the water. However, salvaged water must be defined to include only water that has not been available for reuse by other water users.

PLAN IMPLEMENTATION

Legislative Action

To provide effective financial support, the legislature should adopt a resolution urging Congress to authorize and appropriate funds from the Pick-Sloan Missouri Basin Program for the rehabilitation of irrigation projects. Such funding can be justified as compensation for water development projects promised to Montana under the 1944 Flood Control Act, but never received.

Legislation also should be passed that clarifies the rights of water users to salvaged water. Such legislation should carefully define "salvaged water" to include only the saved water that otherwise would have become consumed or unusable for other existing appropriators. The use of salvaged water for a different purpose, in a different place, from a different point of diversion, or from a different source of storage would require a change in water right in accordance with Montana law.

Administrative Action

To improve education and research on irrigation efficiency, the DNRC, in cooperation with the Montana Cooperative Extension Service and the U.S. Soil Conservation Service, should evaluate the effectiveness of existing research and public education programs. A report should be prepared to the State Water Plan Advisory Council that sets forth recommendations for any improvements in these programs.

The state's irrigation districts and other organized agricultural water user groups should be informed of available technical and financial assistance for improving irrigation efficiency. They should also be informed of the opportunity to use salvaged water if the legislation recommended above is enacted.

To assure continued federal government support for improving agricultural water use efficiency, the DNRC should continue to monitor and support federal funding for programs or projects that improve agricultural water use. In addition, the Water Development Program should give special consideration to project proposals that improve the efficiency of existing irrigation projects. The Governor's Office and the DNRC should also pursue all administrative and intergovernmental channels available to obtain Pick-Sloan funding for irrigation project rehabilitation.

Financial Requirements and Funding Strategies

It is anticipated that the administrative actions can be accomplished with current levels of funding.

Time Schedule

Activity	Responsibility	Deadline
A. Development and Implementation Tasks		
1. Draft Legislation	DNRC	January 1989
2. Enact Legislation	Legislature	April 1989
3. Contact irrigation districts and water users' associations	DNRC	May 1989
4. Complete evaluation report on irrigation efficiency information and research	DNRC	September 1989
B. Ongoing Tasks		
1. Rank irrigation efficiency project proposals to the Water Development Program	DNRC	
2. Monitor and support federal funding, including Pick-Sloan Program Funding	DNRC/Governor's Office	