WATERSMART: WATER AND ENERGY EFFICIENCY GRANTS FOR FY 2019

MAIN CANAL CONVERSION PROJECT

SIDNEY WATER USERS IRRIGATION DISTRICT

Funding Opportunity Announcement No.

BOR-DO-19-F004

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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

PERFORMANCE ENGINEERING

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MAIN CANAL CONVERSION PROJECT: TECHNICAL PROPOSAL & EVALUATION CRITERIA

SIDNEY WATER USERS IRRIGATION DISTRICT

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

PERFORMANCE ENGINEERING

TABLE OF CONTENTS

INDEX OF TABLES

LIST OF FIGURES

LIST OF EXHIBITS

LIST OF APPENDICES

1.0 EXECUTIVE SUMMARY

The Sidney Water Users Irrigation District (SWUID) is located adjacent to the Yellowstone River southeast of the town of Sidney, MT. The SWUID stretches approximately 13 miles south to north along the eastern banks of the Yellowstone River. The SWUID is made up of five sub-districts and currently serves 4,753 acres of irrigated farmland using water pumped from the Yellowstone River and distributed through canals and laterals. The SWUID infrastructure was constructed by the former Works Progress Administration in the 1930s and was officially operational in 1938. The infrastructure was owned by the Montana Department of Natural Resources and Conservation (DNRC) until 1995, at which time it was disposed of by the DNRC and transferred to the SWUID. The SWUID maintains a water right from the Yellowstone River to irrigate the acres within the District. The flow rate specified in the water right amounts to 133.22 cfs.

The District 3 Main Canal Project will convert the District 3 delivery system from open canal to closed conduit pipelines. The Phases 1 and 2 of the District 3 Main Canal Conversion Project was submitted to the DNRC for funding in 2018 and awarded funding in 2019. Under this application Phases 1 and 2 will be combined and called Phase I throughout this report and application. The Phase 1 section of the District 3 Main Canal Project will continue from the Yellowstone River pump station south along the Main Canal approximately 7,000 feet to the re-lift pump station and 5,200 feet to a pivot. Construction would include replacing both pumps at the head of the system, converting 7,000 feet of the main canal and an additional 5,200 feet of open canal to pipeline. Construction would occur starting in the fall of 2019 and likely will be completed in the fall of 2020. The maximum design capacity for the Main Canal is 12,000 gpm or 26.7 cfs based on flow data and pump curves from the SWUID.

2.0 BACKGROUND DATA

2.1 Irrigation Project Description and Location

The Phase 1 reach is approximately 12,000 feet long and provides irrigation water to approximately 936 acres of farmland and 10 farming operations. The crop rotation for this land consists of sugar beets, alfalfa hay, beans, and grains such as corn, wheat, and barley. Landowners within this area have made on-farm improvements such as the addition of center pivots or precision land leveling with gated pipe for flood irrigation to improve water management and increase irrigation efficiency. SWUID has worked with the USBR WaterSMART program on two previous pipeline conversion projects within District 5 which installed over 10 miles of pipeline to eliminate seeping open channel delivery infrastructure. This project will be the start of a full conversion of District 3's delivery infrastructure.

2.2 Project Type

The proposed project is an open canal to closed pipeline conversion project. A closed pipeline delivery system will replace the existing open canal system for increased irrigation efficiency. The SWUID will complete the construction of the Phase 1 Project and a Professional Engineer will cooperate and coordinate with the local NRCS engineering staff to provide engineering services as well as construction inspection as necessary. Based on past experience with similar projects construction will likely span two construction seasons, fall of 2019 and fall of 2020.

2.3 Proposed Canal-To-Pipeline Conversion Project

SWUID partnered with the local NRCS office to investigate and conduct water loss and efficiency measurements along the District 3 Main Canal in 2014. The investigation was conducted in August 2014 by NRCS and SWUID staff throughout the entire delivery system. The investigation found substantial water losses throughout the delivery system and areas of poor efficiency. Measurement data provided in Appendix B shows that between Site 1 and 2 (the extents of the Phase 1 project) there was a loss of 4.81 cfs or over 25% of the flow in the Main Canal. The project area was investigated and analyzed by the SWUID and Performance Engineering (PE) in October 2015 and again in February

2016 to verify the findings of the NRCS and identify poor conveyance and seepage losses. The investigation found the severe seepage and conveyance losses existed due to the condition of the existing Main Canal and soils beneath it. Due to its size, the Main Canal Project will be split into multiple phases with this application addressing the head of the system. The Phase 1 Project experiences substantial seepage and conveyance losses, resulting in periodic water shortages for users at the end of the District 3 system. Based on the experience and benefits provided by the recently completed High Canal Project the purpose of this project is to replace the open canal with a closed pipeline system and modifying the existing route where necessary to reduce the overall length. The proposed pipeline will eliminate seepage losses and minimize conveyance losses in turn optimizing beneficial use of the water pumped from the Yellowstone River. Pipeline installation has proven successful with both the SWUID and NRCS documenting notable water conservation and increases in irrigation efficiency from the High Canal Project. The Phase 1 Project will be the start of the substantial conservation and efficiency project undertaken by the SWUID for District 3.

3.0 PROJECT LOCATION

Phase 1 is located in Township 22N, Range 59E, Sections 15, 16, 20, and 21, approximately 4 miles southeast of Sidney, MT in Richland County. The latitude and longitude for the beginning of Phase 1 Project is 47°40'15"N and 104°09'28"W, respectively. The project is located within the Yellowstone River Basin (6-digit Hydrologic Unit (HU) = 100100). Figure 1 shows the general location of the Main Canal Project within District 3. Exhibit 1 shows the existing delivery system layout for District 3. Exhibit 2 shows the proposed improvements for the Phase 1 project.

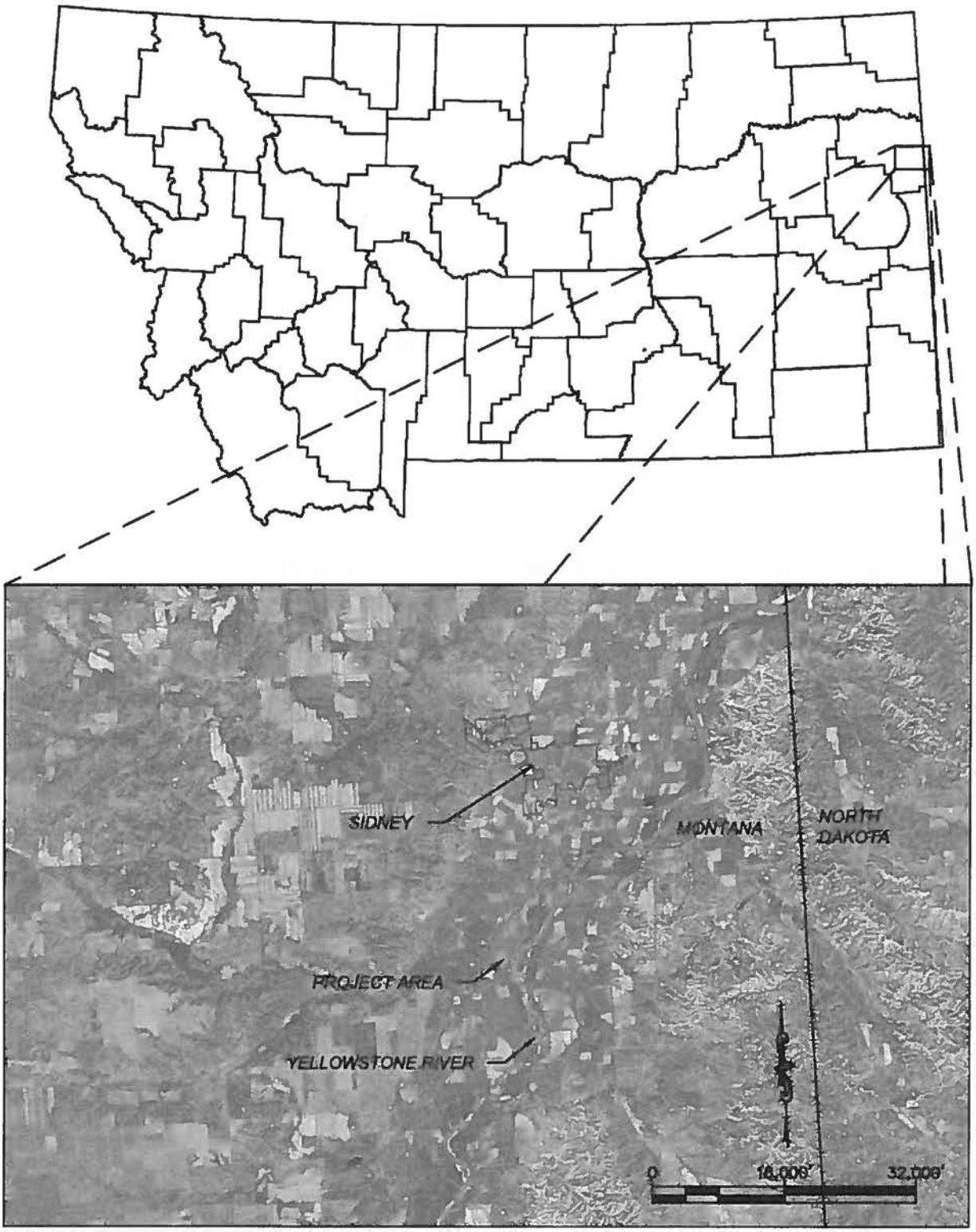


Figure 1: General Location Map

4.0 TECHNICAL PROJECT DESCRIPTON

4.1 Description

The Main Canal Conversion Project - Phase 1 involves replacing the existing open canal reach with a closed pipeline delivery system. Installation of the pipeline delivery system would mitigate the water losses present in the system and provide much needed bank stabilization as the Main Canal runs south along the bank of the Yellowstone River. The proposed pipeline would follow the existing canal route and be installed within the Main Canal easement. As displayed in Exhibit 2, the Phase 1 pipeline would start at river pump station and run south 7,000-feet to the re-lift pump station and 5,200-feet east. The pipeline will consist of 27-inch, 24-inch, and 15-inch PIP pipe with the installation of field turnouts and lateral stub outs for future phases of the project. Installation of flow measurement devices will be included at the pump station as well as every field turnout installed in Phase 1. The preliminary pipeline layout and hydraulic analysis was completed by PE using the assumptions and survey data provided by the NRCS as the basis for checking the preliminary hydraulics. The system, under its operational conditions, would maintain a maximum pressure of approximately 10 psi, well below the pressure rating of the pipe while still providing increased head at each field turnout.

The pipeline conversion would eliminate seepage and conveyance losses through the Phase 1 reach, resulting in substantial water conservation annually. Additionally, water resource management, both delivery and on-farm applications, would improve resulting in the optimization of the water resource's beneficial use. The pipeline would also provide an increase in pressure head at each field turnout, improving the ability to flood irrigate the acres quickly and decrease crop stress resulting in increased crop yields. Finally, the Phase 1 project would increase production throughout District 3 resulting in increased revenue generation for producers within the system and an increase in tax base.

5.0 EVALUATION CRITERIA

5.1 Quantifiable Water Savings

The NRCS Seepage measurements of the Main Canal Phase 1 area showed losses of

up to 4.8 cfs or 1,312 acre-feet per year. The existing irrigation system was designed to follow the natural topography of the land. The landscape is generally flat to semi-terraced on the glaciated and sedimentary plains of eastern Montana. The majority of the farmland consists of loams, silty loams, and sandy loam soils which are well drained and highly susceptible to significant seepage loss. Due to the nature of the soils and the subsurface conditions within the Phase 1 project area a significant portion of the conveyed irrigation water is lost to seepage in the open canals and highly permeable soils. Having documented the seepage and conveyance loss levels within the Main Canal and Phase 1 project area through NRCS field measurements, the inefficiencies of the delivery system are a key concern of the SWUID. Measured loss data from the NRCS is provided in Appendix B. During site inspections performed by PE in October 2015 and February 2016, the Phase 1 Project Area showed signs of seepage losses and exhibited the canal conditions typical of systems with impaired conveyance. This was consistent with the original system evaluations conducted by the local NRCS in 2014. Original photos taken by the SWUID and PE can be found in Appendix A.

According to data obtained from the NRCS Web Soil Survey website, the Phase 1 project area is located in an area of highly permeable soils primarily of the Havrelon and Lohler series, a deep, well drained silty clay loam. The soils are erosive in nature when surface flood irrigation is applied. Although the Havrelon and Lohler soils comprise the majority of the area, Trembles soils are present in the Main Canal terrace areas. Havrelon and Lohler soils are highly permeable with water being able to move through the canal bottom and sides resulting in high seepage and conveyance losses. These conditions are the primary reason for the high seepage losses and conveyance losses experienced in the Main Canal. The NRCS seepage measurements of the Main Canal Phase 1 area showed losses of up to 4.8 cfs or 1,312 acre-feet per year (426 million gallons annually). NRCS field measurement documentation is provided in Appendix B as are the NRCS soils data for the Phase 1 project area.

Conversion to pipeline of the Phase 1 project area will eliminate seepage losses, minimize conveyance losses, improve management of the water resource, and preserve the water

quality of the Yellowstone River. Inefficiencies in the delivery system will be eliminated, allowing for SWUID to ensure that water pumped will be put to beneficial use. The proposed project materials include 4,800 feet of 27" 80 psi PIP, 2,200 feet of 24" 80 psi PIP, 5,200 feet of 15" 80 psi PIP, associated 80 psi valves and fittings, and two vertical turbine pumps.

Flow meters will be installed at the river pump station to track flows and document water conservation. Flow meters used in previous projects within SWUID have proven useful in tracking instantaneous flows and maintaining total flows. Once the project is complete SWUID will be able to track total water pumped from the Yellowstone River. SWUID uses McCrometer McPropeller meters which maintain accuracies within 2%.

The Yellowstone River is one of Montana's most frequently utilized rivers. It has an average flow rate of 12,400 cfs at Sidney, MT (downstream of the project location) according to USGS gaging station 06329500. The river provides habitat for fish and wildlife as well as commercial and recreational uses. The proposed Main Canal Phase 1 Project improvements would eliminate seepage/leakage losses and conserve up to 1,312 acre-feet per year, periodically reducing the amount of water pumped from the Yellowstone River, increasing in-stream flows, minimizing sediment laden return flow back to the river, and optimizing the beneficial use of the irrigation water.

5.2 Water Supply Reliability

The SWUID experiences a water shortage throughout the District during peak irrigation months based on low flows in the Yellowstone River in late July and August. Additionally, northeastern Montana has experienced heightened drought conditions over the last 5 years making irrigation optimization even more important. Leakage and conveyance losses experienced through the Main Canal contribute to water shortages and water scheduling issues. NRCS Seepage measurements of the Main Canal Phase 1 area showed that the area losses 4.8 cfs through the operational season. The proposed project will eliminate water loses occurring in the open channel canal. The project will create times within the irrigation season in which SWUID can reduce its pumped diversion from

the Yellowstone River providing increases in instream flows. The periodic increases in instream flows will benefit downstream users, aquatic wildlife, and aquatic habitat. The project will ensure that up to 1,312 acre-feet of water annually remains in the Yellowstone River during periods of drought for the benefit of downstream users. All improvements to diverted water will be tracked through the new water meters installed at the pump station.

The Yellowstone River between Glendive and the Missouri-Yellowstone River Confluence is prime habitat for the Pallid Sturgeon, one of the rarest fish in North America. In 1990 the Pallid Sturgeon was federally listed as endangered due to extremely limited population, range, and habitat. The Pallid Sturgeon is highly vulnerable to extirpation in the state of Montana. The periodical increases in instream flows will benefit Pallid Sturgeon habitat and help work towards regional solution to protecting the fish and its habitat.

The proposed improvements will not directly benefit water availability for an Indian tribe in the area. However, the project will impact water availability for rural and disadvantaged communities such as Sidney, Fairview and Ridgelawn. Agricultural production is a primary driver to these small rural communities which have little other economic engines which aren't directly linked to agriculture. This is a primary indicator of the importance of water availability and the sustainability of irrigated agriculture to this area which the Main Canal project will help provide.

SWUID actively participates and partners with local and regional agricultural groups to better conserve water in the District. The Main Canal project has drawn large support from local, regional, and state agencies as well as businesses working in the area. SWUID has acquired funding from State of Montana DNRC. Letters of support from local banks, conservation districts, economic development groups, ag-based businesses, and local agricultural extension offices have been received and are included in Appendix C.

5.3 Complementing On-Farm Irrigation Improvements

The Main Canal serves approximately 936 acres within District 3 and provides supplementary water to 342 acres within District 4. Due to its location, near the head of the system, the Phase 1 Project will directly affect all 936 acres within District 3 and the 342 acres within District 4. The Phase 1 area primarily serves acres using flood irrigation as the on-farm irrigation application method. The average watering set durations in this area is 10 to 14 days in length because of the inefficiency of the current distribution system and the lack of pressure head at the field turnouts. This long duration results in decreased production from the irrigated acres, requiring more water to fully irrigate each field at an average on-farm application efficiency of 27% as determined by the local NRCS. Conversely, pivots installed in the SWUID and attached to pipeline delivery systems have operated at up to 80% efficiency according to irrigators and the NRCS. Empirically this local data results in up to a 60% reduction in on-farm irrigation application.

The project completed by SWUID, in partnership with USBR and the MT DNRC, in District 5 resulted in numerous on-farm improvements based on improved water delivery and reliability as well as provided pressure at the field turnouts. Multiple pivots have been installed in coordination with the NRCS as a result of the District 5 project. As seen in Exhibit 1, there are currently three pivot sprinkler systems installed within District 3. The installation of the Phase 1 improvements will help to improve operation of those systems and ensure more reliability in water supply for their continued use. Additionally, there are currently two large landowners having preliminary conversations with the local NRCS regarding pivot installation as a result of the Phase 1 project. The two new pivots would irrigate 100 acres each, replacing traditional flood irrigation within District 3. These projects are likely to move forward upon completion of the Phase 1 project.

5.4 Department of the Interior Priorities

The SWUID set its primary goals for the Main Canal Project to conserve water, improve water management, and reduce overall power consumption. These goals remain the same for the Main Canal project proposed in this application. Conservation of both the water resource and energy along with improved management of the water resource are

consistent with the primary goals set forth by the USBR to utilize best practices and science to adapt to changing environmental conditions. A secondary goal of the project is the preservation of water quantity and quality within the Yellowstone River through minimization of irrigation return flows. The goals outlined above not only benefit the District and local irrigators but also have a positive impact on local residents, recreationists, and fish and wildlife habitat in the area.

The continued working relationship between the SWUID and USBR has helped to restore trust with the local region. SWUID has partnered with the USBR in two successful pipeline conversion projects in the past and looks to make the Main Canal Phase 1 project the third in the successful partnership. Additionally, the WaterSMART funding will be used to further leverage $250,000 of infrastructure funding from the MT DNRC to maximize the benefit of both state and federal dollars. Continued coordination and cooperation with state funding agencies helps to build the relationships between the USBR and State of Montana. Lastly, the project will combine state, federal, and private partnerships in the construction of the Phase 1 improvements. The SWUID will build the project with its own staff and volunteer hours from local irrigators donating their time and equipment. This is the epitome of a Public/Private Partnership.

5.5 Implementation and Results

5.5.1 Project Planning

A Water Conservation Plan has been created and adopted by the SWUID. The plan outlines short-term and long-term goals with the primary objective being the conversation of its total system to pipeline delivery systems. The District 3 Main Canal is identified as one of the primary targets for the SWUID as it moves forward. The SWUID has worked with local NRCS officials over the past decade to determine and identify water conservation measures that could be implemented within the District. With the assistance of the NRCS, the SWUID reviewed and identified numerous areas within the District's infrastructure which exhibit moderate to severe conveyance and seepage losses. Areas were identified using NRCS periodic water loss measurements taken throughout the District's infrastructure. The SWUID has used the information to identify the overall

condition of the system and prioritize water conservation measures to be implemented. In the last 15 years SWUID has implemented numerous canal to pipeline conversion projects. The District has installed roughly 13.2 miles of irrigation pipeline. A copy of the Water Conservation Plan is included in Appendix D.

5.5.2 Performance Measures

Previous SWUID projects have included irrigation flow measurement. The Main Canal project will implement the same measurement devices and the same water measurement plan. Additional measurement of water pumped from the Yellowstone River will also be tracked as a part of the plan through the installation of water meters in the pump station. SWUID will continue to measure flows at each turnout when water is applied to the fields. Those records will be kept by District staff and compiled by the District Manager. Energy consumption will continue to be metered by WAPA and SWUID at the District 3 Pump Station and compiled and presented to the SWUID irrigators each year at the annual meeting.

The NRCS will be working with irrigators to improve and monitor their on-farm irrigation application rates and efficiency. The overall goal of the NRCS will be to continue the conversion of inefficient traditional flood irrigation to more efficient gated pipe or pivot installations. Computer programs are available through the NRCS and Richland Conservation District that will help the irrigators maximize on-farm water management. All conversion projects will be recorded and documented by the NRCS and SWUID.

5.5.3 Readiness to Proceed

The Main Canal project will be ready for construction beginning October 2019. The District has already secured grant funding from the MT DNRC. Preliminary engineering and planning for the project has been completed. The project does not include or require any easement or right-of-way acquisition as the project will be installed in the existing canal right-of-way. The SWUID has worked to make sure the project is shovel ready upon completion of the funding package.

The successful implementation of the Main Canal project will include the following major tasks:

- **Task 1 – USBR Grant Award.** It is anticipated that the grant awards will be released in August of 2019.
- **Task 2 – Pipeline Design.** SWUID will contract with a licensed professional engineer or the local NRCS engineer to develop the final pipeline system design, conduct inspections, and provide construction administration, as necessary. This task will be completed by September 2019.
- **Task 3 – Regulatory Compliance.** The Engineer or NRCS will obtain the required permits and ensure that the project meets all regulatory requirements. This task will run concurrently with Task 2.
- **Task 4 – Project Review.** The Engineer or NRCS will submit the pipeline design and specifications for review by the SWUID. All comments and concerns will be addressed and the plans and specifications will be finalized. This task will be completed by October 2019.
- **Task 5 – Materials Procurement.** The SWUID will solicit materials prices from multiple material suppliers for construction of the project. All material purchases will be done in a manner which meets procurement procedures of the State of Montana. This task will be completed in September-October 2019.
- **Task 6 – Pipeline Installation.** The SWUID will complete the construction and installation of the Main Canal project. It is estimated that construction will take two irrigation off seasons to install. This task will be completed from October 2019-April 2020 when it will shut down for the 2020 irrigation season and then final completion will be done October-December 2020.
- **Task 7 – Construction Closeout.** SWUID, in coordination with the Engineer, will work to assure that all issues with installation have been addressed. The Engineer or NRCS will also develop a set of as-built plans to document any changes in the field. This task will be completed in May 2021.
- **Task 8 – Grant Closeout.** SWUID will work with the Engineer or NRCS to assure that the proper documentation including invoices, reports, etc. have been submitted and the grants will be closed. This task will be completed in May 2021.

- **Task 9 – Project Completion.** The estimated project completion is June 2021 with construction having been completed prior to the 2021 irrigation season.

Coordination of the project will take place between all local, state, and federal agencies involved. The majority of project coordination will occur between the SWUID, DNRC, USBR, and the contracted engineering firm. Project Manager Raymond Bell will be responsible for facilitation of communication and cooperation between the agencies and organizations involved in the project.

The project will include quarterly progress reports to be submitted by the SWUID to the DNRC and USBR during design and monthly progress reports during construction by the contracted engineering firm. The progress reports will keep the various agencies and organizations up-to-date on the project progress, schedule, and budget. Should any changes or problems arise during the design or construction phases of the project, all involved parties will be notified immediately. The construction phase of the project will include monthly updates to the SWUID from the Project Manager and contracted construction inspector on progress made. The SWUID Project Manager will be responsible for the completion and submittal of all necessary documentation and billing to the DNRC and SWUID board. The contracted engineer's responsibilities include progress reporting and grant quarterly reporting. SWUID Project Manager Raymond Bell will be the final authority on all payments, reports, and contracts for the project.

5.6 Nexus to Reclamation Project Activities

Over the last decade the SWUID has maintained its focus on water conservation and improved management of the water resource. When the SWUID assumed ownership and operation of the system from the DNRC in 1995, it was determined that an emphasis on conservation and management of the water resource was necessary to continue operation of the system for future generations. In 2003 the SWUID engaged the local NRCS field staff to assist them in reviewing and analyzing the existing condition of the irrigation infrastructure. Working in coordination with the NRCS, SWUID developed a

canal-to-pipeline conversion plan and program. The initial focus of the program was the conversion of main canals, such as the High Canal, throughout the SWUID. To date the SWUID has completed the High Canal Project totaling 8.2-miles of pipeline installed. Additional pipeline projects have also been completed by the SWUID since 2006. Table 1 shows a list of pipeline conversion projects within SWUID that have been completed and future projects SWUID plans on constructing.

Table 1: Completed and Future Canal-To- Pipeline Projects

Completed Canal to Pipeline Conversion Projects		
Year	**Project**	**Pipeline Length (mi)**
2006-2008	District 1&2 – High Canal Phase 1	2.5
2009	District 1&2 – High Canal Phase 2	0.4
2010-2011	District 1&2 – High Canal Phase 3	1.7
2011-2012	District 3 - Lateral 1 Pipeline	1.1
2012	District 5 - Lateral 2 Pipeline	2.0
2013	District 1&2 – Lat. 3 Sheetz Pipeline	0.4
2013	District 1&2 – High Canal Phase 4	1.1
2014	District 2 – Mercer Relift Lat. 1-2C	0.9
2015	District 5 – Dahl Pipeline	0.2
2015-2016	District 1&2 – High Canal Phase 5	2.5
2017	District 2 – Mercer Relift Lat. 1-2C	0.4
Target Date 2019[1]	***District 3 – Main Canal Phase 1***	***0.6***
Target Date 2020[1]	***District 3 – Main Canal Phase 2***	***0.7***
Target Date 2022[1]	***District 3 – North Lateral***	***1.8***
Target Date 2023[1]	***District 3 – Lateral 2***	***1.7***

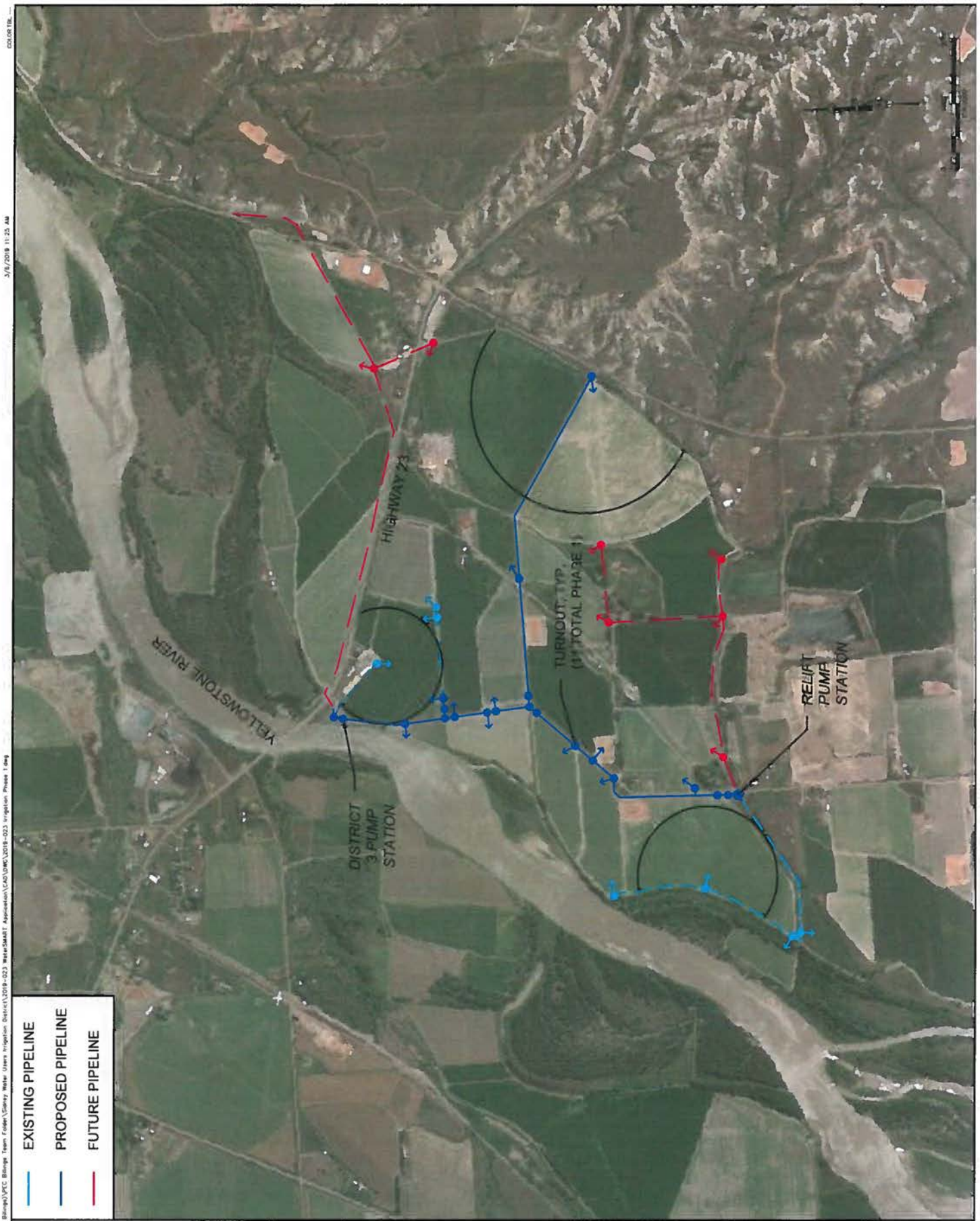
1 – Represents Future Projects

SWUID is a contracted irrigation district with Reclamation and uses Pick-Sloan power administered through the USBR. The project does not include Reclamation lands or facilities. SWUID is however located directly adjacent to the Lower Yellowstone Irrigation Project which has undergone major construction on its intake in the Yellowstone River to accommodate the Pallid Sturgeon under the Endangered Species Act. The proposed Main Canal project will complement the Lower Yellowstone Irrigation Project work by further contributing to in-stream flows and fisheries habitat.

5.7 Additional Non-Federal Funding

The Montana DNRC has committed $250,000 of that budget while the SWUID has committed $96,115.86 for completion of Phase 1. That leaves $300,000 being applied for through this WaterSMART application. The overall construction cost for the Phase 1 project is $646,115.86. The non-federal percentage of funding for the project is 53.6% which exceeds the 50% WaterSMART requirement.

Exhibits



PROJECT TITLE
DISTRICT 3 PHASE 1
PIPELINE ROUTE

SHEET TITLE
PHASING EXHIBIT

DRAWN BY: TFC
DATE: Mar-19
CHECKED BY: SAA

CLIENT
SIDNEY WATER USERS
IRRIGATION DISTRICT
1101 11TH STREET SW
SIDNEY, MT 59270
406-433-1733

PERFORMANCE ENGINEERING
608 NORTH 29TH STREET
BILLINGS, MT 59101
(406) 384-0080
www.performance-ec.com

EXHIBIT
1

PROJECT TITLE DISTRICT 3 PHASE 1 PIPELINE ROUTE SHEET TITLE PHASE 1 EXHIBIT	DRAWN BY TFC DATE Mar-19 CHECKED BY SAA	CLIENT SIDNEY WATER USERS IRRIGATION DISTRICT 1101 11TH STREET SW SIDNEY, MT 59270 406-433-1733	PERFORMANCE ENGINEERING 608 NORTH 29TH STREET BILLINGS, MT 59101 (406) 384-0080 www.performance-ec.com	EXHIBIT 2 COPYRIGHT 2018 ©

Appendix A

Photos

Appendix B

Supporting Documentation

8-19-2014

2014 Sidney Water Users Ditch Flow Measurements

Site	Flow (CFS)	Flow (GPM)	Area (SF)	Mean Velocity (FPS)	Site Description
1	17.86	8,014.22	22.43	0.77	Bridge Pump Near start of Main Ditch, One pump running
2	13.05	5,856.81	29.83	0.44	Bridge Pump Main Ditch before relift station, One pump running
3	15.28	6,859.65	15.23	0.97	Lorentz's relift Lateral #2 in concrete ditch, One pump running
4	7.46	3,346.03	8.83	0.86	Mercer relift Lateral #1 South, One pump running
5	2.67	1,200.00			Scheetz's flowmeter, One pump running, 10" diameter pipe
6	8.08	3,625.24	26.83	0.29	Lorentz's Relift Lateral #2 (at highway), One pump running
7	2.19	982.85	8.43	0.26	District 5 Lateral #1 Downstream End, One pump running
8	6.19	2,778.57	9.13	0.58	District 5 Lateral #1 Upstream End, One pump running

6850

5150

Losses per site

Site		CFS	GPM	% Loss	Notes
Site 1 - Site 2		4.81	2,157.41	26.9	
Site 3 - Site 6		7.21	3,234.40	47.2	This site may be backing water in the ditch up due to blockage at culvert & check in side ditch at site 6
Site 4 - Site 5		4.78	2,146.03	64.1	This site may be backing water in the ditch up due to flow only going through flowmeter
Site 8 - Site 7		4.00	1,795.72	64.6	

Losses per section

Section		Length (FT)	Losses per FT (CFS)	Losses per FT (GPM)	Notes
Site 1 - Site 2		6,318	0.00076	0.34147	
Site 3 - Site 6		10,340	0.00070	0.31280	
Site 4 - Site 5		1,713	0.00279	1.25279	
Site 8 - Site 7		2,600	0.00154	0.69066	

CURRENT METER INVENTORY SHEET

Site Description: Bridge Pump Near start of Main Ditch, One pump running — **Date:** August 19, 2014

Meter Type: Marsh McBirney Model 2000 current meter. — **By:** Tim Hendricks, Raymond Bell

	General Data				Two-Point Method					0.6 D Method		
VERT OBSERV #	DISTANCE ON TAPE (FT)	TOTAL DEPTH (FT)	AREA (FT^2)	OBSERV TIME (SEC)	OBSERV DEPTH 0.2 D (FT)	OBSERV DEPTH 0.8 D (FT)	VELOCITY @ 0.2 D (FT/SEC)	VELOCITY @ 0.8 D (FT/SEC)	MEAN VEL (FT/SEC)	OBSERV DEPTH 0.6 D (FT)	MEAN VELOCITY @ 0.6 D (FT/SEC)	FLOW RATE (CFS)
1	0.0	0.00	0.00		0.00	0.00	0.00	0.00	0.00			0.00
2	1.0	0.50	2.03	15 SEC	0.10	0.40	0.32	0.30	0.31			0.63
3	2.0	0.80	1.60	15 SEC	0.10	0.60	0.53	0.98	0.76			1.21
4	3.0	1.25	2.50	15 SEC	0.30	1.20	0.69	1.34	1.02			2.54
5	4.0	1.40	2.80	15 SEC	0.30	1.20	0.66	1.26	0.96			2.69
6	5.0	1.40	2.80	15 SEC	0.20	1.20	0.71	1.07	0.89			2.49
7	6.0	1.40	2.80	15 SEC	0.30	1.20	0.55	0.93	0.74			2.07
8	7.0	1.30	2.60	15 SEC	0.30	1.20	0.63	0.98	0.81			2.09
9	8.0	1.20	2.40	15 SEC	0.20	0.80	0.82	0.94	0.88			2.11
10	9.0	0.95	1.90	15 SEC	0.20	0.80	0.76	0.74	0.76			1.44
11	10.0	0.50	1.00	15 SEC	0.10	0.40	0.48	0.68	0.58			0.58
12	11.0	0.00	0.00	15 SEC	0.00	0.00	0.00	0.00	0.00			0.00
	Total Area (ft2)		22.43		Mean Velocity (ft/sec)		0.77			Total Flow (CFS)		17.9

Some 15 sec measurements were taken 2 or 3 times and then averaged.

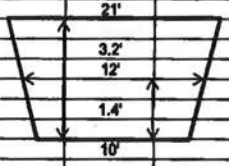
Raymond Bell-rod man. Tim Hendricks-meter operator and notes.

Mean velocity was calculated as the average of the mean velocities for the vertical observations; not including the 0.0 velocities at each end

Looking upstream of site #1

At site #1

Looking downstream of site #1



Typical shape of ditch

CURRENT METER INVENTORY SHEET

Site Description: Bridge Pump Main Ditch before relift station, One pump running **Date:** August 19, 2014

Meter Type: Marsh McBirney Model 2000 current meter. **By:** Tim Hendricks, Raymond Bell

	General Data				Two-Point Method					0.6 D Method		
VERT OBSERV #	DISTANCE ON TAPE (FT)	TOTAL DEPTH (FT)	AREA (FT^2)	OBSERV TIME (SEC)	OBSERV DEPTH 0.2 D (FT)	OBSERV DEPTH 0.8 D (FT)	VELOCITY @ 0.2 D (FT/SEC)	VELOCITY @ 0.8 D (FT/SEC)	MEAN VEL (FT/SEC)	OBSERV DEPTH 0.6 D (FT)	MEAN VELOCITY @ 0.6 D (FT/SEC)	FLOW RATE (CFS)
1	0.0	0.00	0.00		0.00	0.00	0.00	0.00	0.00			0.00
2	1.0	0.90	2.03	15 SEC	0.20	0.80	0.27	0.40	0.34			0.68
3	2.0	1.60	3.20	15 SEC	0.30	1.20	0.11	0.56	0.34			1.07
4	3.0	1.60	3.60	15 SEC	0.40	1.60	0.06	0.67	0.37			1.31
5	4.0	2.10	4.20	15 SEC	0.40	1.60	0.07	0.79	0.43			1.81
6	5.0	2.10	4.20	15 SEC	0.40	1.60	0.01	0.86	0.44			1.83
7	6.0	1.60	3.60	15 SEC	0.40	1.60	0.02	0.87	0.45			1.60
8	7.0	1.90	3.80	15 SEC	0.40	1.60	0.20	0.78	0.49			1.86
9	8.0	1.70	3.40	15 SEC	0.30	1.20	0.42	0.69	0.56			1.89
10	9.0	0.90	1.80	15 SEC	0.20	0.80	0.48	0.63	0.56			1.00
11	10.0	0.00	0.00		0.00	0.00	0.00	0.00	0.00			0.00
	Total Area (ft2)		**29.83**		**Mean Velocity (ft/sec)**		**0.44**			**Total Flow (CFS)**		**13.0**

Some 15 sec measurements were taken 2 or 3 times and then averaged.

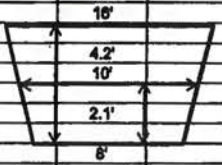
Raymond Bell-rod man. Tim Hendricks-meter operator and notes.

Mean velocity was calculated as the average of the mean velocities for the vertical observations; not including the 0.0 velocities at each end

Looking upstream of site #2

At site #2

Looking downstream of site #2



Typical shape of ditch

CURRENT METER INVENTORY SHEET

Site Description: Lorentz's relift Lateral #2 in concrete ditch, One pump running — **Date:** August 19, 2014

Meter Type: Marsh McBirney Model 2000 current meter. — **By:** Tim Hendricks, Raymond Bell

	General Data				Two-Point Method					0.6 D Method		
VERT OBSERV #	DISTANCE ON TAPE (FT)	TOTAL DEPTH (FT)	AREA (FT^2)	OBSERV TIME (SEC)	OBSERV DEPTH 0.2 D (FT)	OBSERV DEPTH 0.8 D (FT)	VELOCITY @ 0.2 D (FT/SEC)	VELOCITY @ 0.8 D (FT/SEC)	MEAN VEL (FT/SEC)	OBSERV DEPTH 0.6 D (FT)	MEAN VELOCITY @ 0.6 D (FT/SEC)	FLOW RATE (CFS)
1	2.0	0.00	0.00		0.00	0.00	0.00	0.00	0.00			0.00
2	3.0	0.70	2.03	15 SEC	0.10	0.40	1.04	0.72	0.88			1.79
3	4.0	1.50	3.00	15 SEC	0.30	1.20	1.12	1.33	1.23			3.68
4	5.0	1.70	3.40	15 SEC	0.30	1.20	1.01	1.20	1.11			3.76
5	6.0	1.50	3.00	15 SEC	0.30	1.20	0.89	1.11	1.00			3.00
6	7.0	1.10	2.20	15 SEC	0.20	0.80	0.79	0.92	0.86			1.88
7	8.0	0.80	1.60	15 SEC	0.20	0.80	0.72	0.76	0.74			1.18
8	9.0	0.00	0.00		0.00	0.00	0.00	0.00	0.00			0.00
	Total Area (ft2)		**15.23**		**Mean Velocity (ft/sec)**		**0.97**			**Total Flow (CFS)**		**15.3**

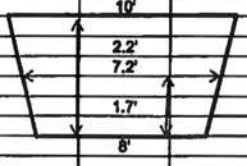
Some 15 sec measurements were taken 2 or 3 times and then averaged.

Raymond Bell-rod man. Tim Hendricks-meter operator and notes.

Mean velocity was calculated as the average of the mean velocities for the vertical observations; not including the 0.0 velocities at each end

Looking downstream of site #3

At site #3



Typical shape of ditch

CURRENT METER INVENTORY SHEET

Site Description: Lorentz's Relift Lateral #2 (at highway), One pump running — **Date:** August 19, 2014

Meter Type: Marsh McBirney Model 2000 current meter. — **By:** Tim Hendricks, Raymond Bell

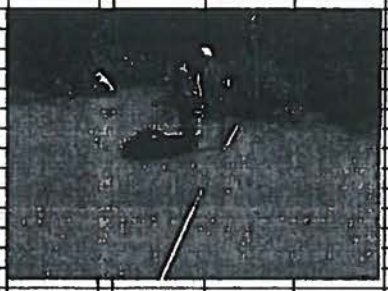
	General Data				Two-Point Method					0.6 D Method		
VERT OBSERV #	DISTANCE ON TAPE (FT)	TOTAL DEPTH (FT)	AREA (FT^2)	OBSERV TIME (SEC)	OBSERV DEPTH 0.2 D (FT)	OBSERV DEPTH 0.8 D (FT)	VELOCITY @ 0.2 D (FT/SEC)	VELOCITY @ 0.8 D (FT/SEC)	MEAN VEL (FT/SEC)	OBSERV DEPTH 0.6 D (FT)	MEAN VELOCITY @ 0.6 D (FT/SEC)	FLOW RATE (CFS)
1	0.0	0.00	0.00		0.00	0.00	0.00	0.00	0.00			0.00
2	1.0	0.30	2.03	15 SEC						0.20	0.07	0.14
3	2.0	0.80	1.60	15 SEC	0.20	0.70	0.06	0.32	0.19			0.30
4	3.0	1.40	2.60	15 SEC	0.30	1.20	0.27	0.45	0.36			1.01
5	4.0	1.90	3.80	15 SEC	0.40	1.60	0.09	0.48	0.29			1.08
6	5.0	1.90	3.80	15 SEC	0.40	1.60	0.04	0.51	0.28			1.05
7	6.0	2.10	4.20	15 SEC	0.40	1.60	0.09	0.53	0.31			1.30
8	7.0	2.00	4.00	15 SEC	0.40	1.60	0.02	0.56	0.29			1.16
9	8.0	1.50	3.00	15 SEC	0.30	1.20	0.35	0.60	0.48			1.43
10	9.0	0.80	1.60	15 SEC	0.20	0.80	0.38	0.40	0.38			0.61
11	10.0	0.00	0.00		0.00	0.00	0.00	0.00	0.00			0.00
	Total Area (ft2)		28.83		Mean Velocity (ft/sec)		0.29			Total Flow (CFS)		8.1

Some 15 sec measurements were taken 2 or 3 times and then averaged.

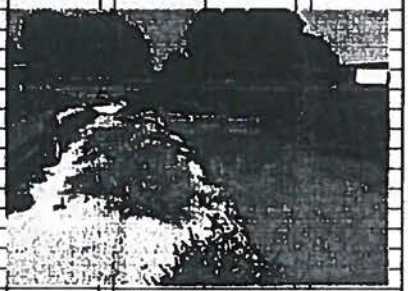
Raymond Bell-rod man. Tim Hendricks-meter operator and notes.

Mean velocity was calculated as the average of the mean velocities for the vertical observations; not including the 0.0 velocities at each end

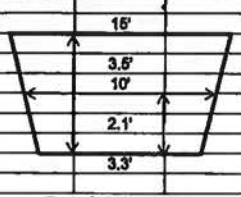
Looking upstream at site #6



At site #6



Looking downstream of site #6



Typical shape of ditch

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Richland County, Montana

SWUID District 3 Main Canal Pipeline Conversion Project - Phase 2

April 18, 2018

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

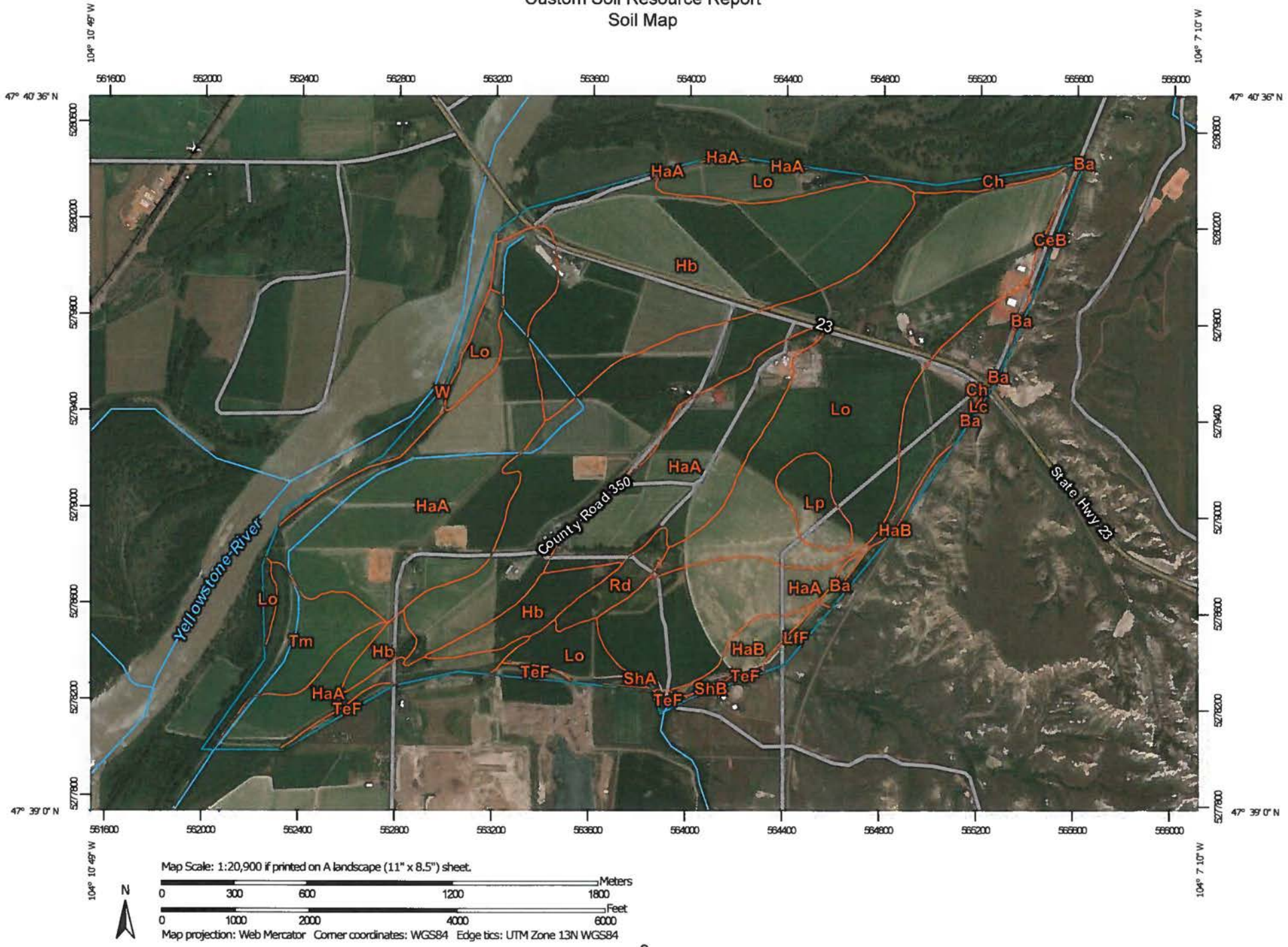
Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Richland County, Montana
Survey Area Data: Version 15, Sep 26, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 20, 2014—Jul 17, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ba	Badland	3.7	0.3%
CeB	Cherry silty clay loam, 2 to 4 percent slopes	5.5	0.4%
Ch	Cherry, Havrelon, and Trembles soils, occasionally flooded	7.8	0.6%
HaA	Havrelon silt loam, 0 to 1 percent slopes	438.4	34.9%
HaB	Havrelon silt loam, 1 to 4 percent slopes	19.1	1.5%
Hb	Havrelon silty clay loam	240.3	19.1%
Lc	Lambert-Badland complex	0.2	0.0%
LfF	Lambert-Dimyaw complex, 15 to 65 percent slopes	5.7	0.5%
Lo	Lohler silty clay loam	439.2	34.9%
Lp	Lohler clay	19.3	1.5%
Rd	Ridgelawn loam	14.9	1.2%
ShA	Shambo loam, 0 to 2 percent slopes	0.4	0.0%
ShB	Shambo loam, 2 to 4 percent slopes	0.8	0.1%
TeF	Tinsley soils, 15 to 65 percent slopes	10.1	0.8%
Tm	Trembles fine sandy loam	39.0	3.1%
W	Water	13.4	1.1%
Totals for Area of Interest		**1,257.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made

up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Richland County, Montana

Ba—Badland

Map Unit Setting

National map unit symbol: clbf
Elevation: 1,800 to 5,000 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Badland: 90 percent
Blanchard and similar soils: 2 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blanchard

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 6 inches: loamy fine sand
C - 6 to 60 inches: loamy fine sand

Properties and qualities

Slope: 8 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Sands (Sa) RRU 58A-E 10-14" p.z. (R058AE018MT)
Hydric soil rating: No

Minor Components

Dast

Percent of map unit: 3 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Sandy (Sy) RRU 58A-E 10-14" p.z. (R058AE003MT)

Description of Cherry

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

Ap - 0 to 11 inches: silty clay loam
Bw - 11 to 21 inches: silty clay loam
Bk - 21 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 3.0 mmhos/cm)
Available water storage in profile: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

Minor Components

Savage

Percent of map unit: 4 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) RRU 58A-E 10-14" p.z. (R058AE002MT)
Hydric soil rating: No

Shambo

Percent of map unit: 3 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

Marias

Percent of map unit: 3 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) RRU 58A-E 10-14" p.z. (R058AE002MT)

Hydric soil rating: No

Ch—Cherry, Havrelon, and Trembles soils, occasionally flooded

Map Unit Setting

National map unit symbol: clbp
Elevation: 1,600 to 5,000 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60

Map Unit Composition

Cherry and similar soils: 30 percent
Havrelon and similar soils: 30 percent
Trembles and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cherry

Setting

Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

Ap - 0 to 11 inches: silty clay loam
Bw - 11 to 21 inches: silty clay loam
Bk - 21 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 3.0 mmhos/cm)
Available water storage in profile: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: Overflow (Ov) RRU 58A-E 10-14" p.z. (R058AE007MT)

Hydric soil rating: No

Description of Havrelon

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 8 inches: silt loam
C - 8 to 60 inches: stratified very fine sandy loam to loam to silty clay loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Available water storage in profile: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B
Ecological site: Overflow (Ov) RRU 58A-E 10-14" p.z. (R058AE007MT)
Hydric soil rating: No

Description of Trembles

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 7 inches: fine sandy loam
C1 - 7 to 30 inches: stratified fine sandy loam to loam
C2 - 30 to 60 inches: stratified fine sandy loam to loamy sand

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A
Ecological site: Overflow (Ov) RRU 58A-E 10-14" p.z. (R058AE007MT)
Hydric soil rating: No

Minor Components

Somewhat poorly drained soils

Percent of map unit: 5 percent
Landform: Flood plains, stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Shambo

Percent of map unit: 2 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

Banks

Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Sands (Sa) 10-14" p.z. (R053AE076MT)
Hydric soil rating: No

Farnuf

Percent of map unit: 1 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R053AE060MT)
Hydric soil rating: No

HaA—Havrelon silt loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: clbw
Elevation: 1,900 to 5,000 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 130 days

Farmland classification: Prime farmland if irrigated

Map Unit Composition

Havrelon and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Havrelon

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 8 inches: silt loam
C - 8 to 60 inches: stratified very fine sandy loam to loam to silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Available water storage in profile: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: Silty (Si) 10-14" p.z. (R053AE060MT)
Hydric soil rating: No

Minor Components

Cherry

Percent of map unit: 5 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

Lohler

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) LRU 53A-Y (R053AE061MT)
Hydric soil rating: No

Trembles

Percent of map unit: 2 percent
Landform: Flood plains

Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Sandy (Sy) 10-14" p.z. (R053AE062MT)
Hydric soil rating: No

HaB—Havrelon silt loam, 1 to 4 percent slopes

Map Unit Setting

National map unit symbol: clbx
Elevation: 1,900 to 5,000 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Havrelon and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Havrelon

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 8 inches: silt loam
C - 8 to 60 inches: stratified very fine sandy loam to loam to silty clay loam

Properties and qualities

Slope: 1 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Available water storage in profile: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: Silty (Si) 10-14" p.z. (R053AE060MT)
Hydric soil rating: No

Minor Components

Cherry

Percent of map unit: 4 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Overflow (Ov) RRU 58A-E 10-14" p.z. (R058AE007MT)
Hydric soil rating: No

Lohler

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) LRU 53A-Y (R053AE061MT)
Hydric soil rating: No

Trembles

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Sandy (Sy) 10-14" p.z. (R053AE062MT)
Hydric soil rating: No

Hb—Havrelon silty clay loam

Map Unit Setting

National map unit symbol: clby
Elevation: 1,900 to 5,000 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Havrelon and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Havrelon

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 8 inches: silty clay loam

C - 8 to 60 inches: stratified very fine sandy loam to loam to silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Available water storage in profile: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: Silty (Si) 10-14" p.z. (R053AE060MT)
Hydric soil rating: No

Minor Components

Cherry

Percent of map unit: 4 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

Trembles

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Sandy (Sy) 10-14" p.z. (R053AE062MT)
Hydric soil rating: No

Lohler

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) LRU 53A-Y (R053AE061MT)
Hydric soil rating: No

Lc—Lambert-Badland complex

Map Unit Setting

National map unit symbol: clc3

Elevation: 1,800 to 5,000 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition

Lambert and similar soils: 50 percent
Badland: 40 percent
Blanchard and similar soils: 3 percent
Minor components: 7 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lambert

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 4 inches: silt loam
C - 4 to 18 inches: silt loam
Cr - 18 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 40 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Available water storage in profile: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Silty-Steep (SiStp) RRU 58A-E 10-14" p.z. (R058AE004MT)
Hydric soil rating: No

Description of Blanchard

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 6 inches: loamy fine sand
C - 6 to 60 inches: loamy fine sand

Properties and qualities

Slope: 8 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Sands (Sa) RRU 58A-E 10-14" p.z. (R058AE018MT)
Hydric soil rating: No

Minor Components

Zahill

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty-Steep (SiStp) 10-14" p.z. (R053AE064MT)
Hydric soil rating: No

Dast

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Sandy (Sy) RRU 58A-E 10-14" p.z. (R058AE003MT)
Hydric soil rating: No

Tinsley

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Gravelly (Gr) LRU 53A-Y (R053AE621MT)
Hydric soil rating: No

Ringling

Percent of map unit: 1 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Very Shallow (VSw) RRU 58A-E 10-14" p.z. (R058AE017MT)
Hydric soil rating: No

LfF—Lambert-Dimyaw complex, 15 to 65 percent slopes

Map Unit Setting

National map unit symbol: 2wbx4
Elevation: 1,900 to 3,500 feet
Mean annual precipitation: 11 to 14 inches
Mean annual air temperature: 41 to 45 degrees F
Frost-free period: 100 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Lambert and similar soils: 50 percent
Dimyaw and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lambert

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, summit, backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from calcareous siltstone

Typical profile

A - 0 to 4 inches: silt loam
Bk - 4 to 19 inches: clay loam
Cr - 19 to 60 inches: bedrock

Properties and qualities

Slope: 15 to 65 percent
Depth to restrictive feature: 12 to 24 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Ecological site: Silty-Steep (SiStp) RRU 58A-E 10-14" p.z. (R058AE004MT)
Hydric soil rating: No

Description of Dimyaw

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey residuum weathered from calcareous shale

Typical profile

A - 0 to 8 inches: silty clay loam
C - 8 to 60 inches: silty clay

Properties and qualities

Slope: 15 to 65 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: Clayey-Steep (CyStp) RRU 58A-E 10-14" p.z. (R058AE005MT)
Hydric soil rating: No

Minor Components

Twilight

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Sandy (Sy) RRU 58A-E 10-14" p.z. (R058AE003MT)
Hydric soil rating: No

Kirby

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Very Shallow (VSw) RRU 58A-E 10-14" p.z. (R058AE017MT)

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Available water storage in profile: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: Clayey (Cy) LRU 53A-Y (R053AE061MT)
Hydric soil rating: No

Minor Components

Marias

Percent of map unit: 3 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) RRU 58A-E 10-14" p.z. (R058AE002MT)
Hydric soil rating: No

Havrelon

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R053AE060MT)
Hydric soil rating: No

Ridgelawn

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

Cherry

Percent of map unit: 2 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

Hoffmanville

Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear

Across-slope shape: Linear
Ecological site: Clayey (Cy) RRU 58A-E 10-14" p.z. (R058AE002MT)
Hydric soil rating: No

Trembles

Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Sandy (Sy) 10-14" p.z. (R053AE062MT)
Hydric soil rating: No

Lp—Lohler clay

Map Unit Setting

National map unit symbol: clc9
Elevation: 1,900 to 4,500 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 115 to 130 days
Farmland classification: Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60

Map Unit Composition

Lohler and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lohler

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium

Typical profile

A - 0 to 8 inches: clay
C - 8 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Available water storage in profile: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C
Ecological site: Dense Clay (DC) LRU 53A-Y (R053AE073MT)
Hydric soil rating: No

Minor Components

Havrelon

Percent of map unit: 6 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R053AE060MT)
Hydric soil rating: No

Vanda

Percent of map unit: 4 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Dense Clay (DC) RRU 58A-E 10-14" p.z. (R058AE014MT)
Hydric soil rating: No

Rd—Ridgelawn loam

Map Unit Setting

National map unit symbol: clcd
Elevation: 1,900 to 6,000 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60

Map Unit Composition

Ridgelawn and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgelawn

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 7 inches: loam

C1 - 7 to 24 inches: loam
2C2 - 24 to 60 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

Minor Components

Hoffmanville

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) RRU 58A-E 10-14" p.z. (R058AE002MT)
Hydric soil rating: No

Havrelon

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R053AE060MT)
Hydric soil rating: No

Trembles

Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Sandy (Sy) 10-14" p.z. (R053AE062MT)
Hydric soil rating: No

Lohler

Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) LRU 53A-Y (R053AE061MT)
Hydric soil rating: No

ShA—Shambo loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: clcj
Elevation: 1,900 to 5,000 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Shambo and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Shambo

Setting

Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 6 inches: loam
Bw - 6 to 31 inches: loam
Bk - 31 to 60 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

Minor Components

Cherry

Percent of map unit: 4 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

Farnuf

Percent of map unit: 3 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R053AE060MT)
Hydric soil rating: No

Turner

Percent of map unit: 3 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

ShB—Shambo loam, 2 to 4 percent slopes

Map Unit Setting

National map unit symbol: clck
Elevation: 1,900 to 5,000 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Shambo and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Shambo

Setting

Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 6 inches: loam

Bw - 6 to 31 inches: loam
Bk - 31 to 60 inches: loam

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

Minor Components

Cherry

Percent of map unit: 3 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

Farnuf

Percent of map unit: 3 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R053AE060MT)
Hydric soil rating: No

Lambert

Percent of map unit: 2 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

Turner

Percent of map unit: 2 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

TeF—Tinsley soils, 15 to 65 percent slopes

Map Unit Setting

National map unit symbol: clcw
Elevation: 1,800 to 5,000 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Tinsley and similar soils: 45 percent
Tinsley and similar soils: 45 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tinsley

Setting

Landform: Paleoterraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 3 inches: gravelly loamy sand
C - 3 to 60 inches: very gravelly sand

Properties and qualities

Slope: 15 to 65 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 1.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: Gravelly (Gr) LRU 53A-Y (R053AE621MT)
Hydric soil rating: No

Description of Tinsley

Setting

Landform: Paleoterraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 3 inches: gravelly sandy loam
C - 3 to 60 inches: very gravelly sand

Properties and qualities

Slope: 15 to 65 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 1.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: Gravelly (Gr) LRU 53A-Y (R053AE621MT)
Hydric soil rating: No

Minor Components

Beaverton

Percent of map unit: 3 percent
Landform: Paleoterraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Shallow to Gravel (SwGr) RRU 58A-E 10-14" p.z. (R058AE191MT)
Hydric soil rating: No

Lihen

Percent of map unit: 2 percent
Landform: Paleoterraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Sands (Sa) RRU 58A-E 10-14" p.z. (R058AE018MT)
Hydric soil rating: No

Lambert

Percent of map unit: 2 percent
Landform: Paleoterraces

Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty-Steep (SiStp) 10-14" p.z. (R053AE064MT)
Hydric soil rating: No

Farnuf

Percent of map unit: 1 percent
Landform: Paleoterraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R053AE060MT)
Hydric soil rating: No

Turner

Percent of map unit: 1 percent
Landform: Paleoterraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

Zahill

Percent of map unit: 1 percent
Landform: Paleoterraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty-Steep (SiStp) 10-14" p.z. (R053AE064MT)
Hydric soil rating: No

Tm—Trembles fine sandy loam

Map Unit Setting

National map unit symbol: clcx
Elevation: 1,600 to 6,000 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 105 to 130 days
Farmland classification: Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60

Map Unit Composition

Trembles and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trembles

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

A - 0 to 7 inches: fine sandy loam
C1 - 7 to 30 inches: stratified fine sandy loam to loam
C2 - 30 to 60 inches: stratified fine sandy loam to loamy sand

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: Sandy (Sy) 10-14" p.z. (R053AE062MT)
Hydric soil rating: No

Minor Components

Ridgelawn

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

Banks

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Sands (Sa) 10-14" p.z. (R053AE076MT)
Hydric soil rating: No

Hoffmanville

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) RRU 58A-E 10-14" p.z. (R058AE002MT)

Hydric soil rating: No

Cherry

Percent of map unit: 2 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) RRU 58A-E 10-14 P.Z. (R058AE001MT)
Hydric soil rating: No

Lohler

Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) LRU 53A-Y (R053AE061MT)
Hydric soil rating: No

Havrelon

Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R053AE060MT)
Hydric soil rating: No

W—Water

Map Unit Setting

National map unit symbol: cld4
Mean annual precipitation: 13 to 15 inches
Frost-free period: 105 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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SIDNEY, MONTANA (247560)

Period of Record Monthly Climate Summary

Period of Record : 10/16/1910 to 06/09/2016

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	23.4	30.0	42.0	58.7	69.9	78.1	85.2	84.2	72.7	59.5	41.2	28.5	56.1
Average Min. Temperature (F)	1.5	7.6	17.7	30.5	41.5	50.5	55.2	52.9	42.7	32.3	19.1	7.5	29.9
Average Total Precipitation (in.)	0.40	0.35	0.54	1.14	2.06	2.76	2.14	1.42	1.32	0.97	0.48	0.43	14.02
Average Total SnowFall (in.)	6.1	5.2	5.0	2.6	0.6	0.0	0.0	0.0	0.3	1.5	4.8	6.7	32.8
Average Snow Depth (in.)	5	4	2	0	0	0	0	0	0	0	1	3	1

Percent of possible observations for period of record.
Max. Temp.: 68.3% Min. Temp.: 68.3% Precipitation: 68.2% Snowfall: 66.8% Snow Depth: 63.3%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

U.S. Fish and Wildlife Service

National Wetlands Inventory

SWUID Wetlands Map

April 23, 2018

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Appendix C

Letters of Support

Sidney Sugars
INCORPORATED
35140 County Road 125
Sidney, Montana 59270
Ag Dept: (406) 433-3309

April 9, 2018

Montana DNRC
Resource Development Bureau
PO Box 201601
Helena, MT 59620-1601

Re: SWUID Grant District 3, Phase 2

I'm writing in support of the grant application from the Sidney Water Users. This improvement to the irrigation district will benefit growers and the community in several ways. Sugar beets are a high value crop that requires water at critical times. This project will help provide that water. It will also insure that the amount of water needed is there.

Another benefit is provided by covering the water supply and reducing the amount of weed seed in the water. This is a double benefit, both reducing the weed competition for the crop and reducing the amount of herbicide needed to protect the crop from weeds.

Growers in this district have been helping themselves by purchasing and using gated pipe and pivot irrigation. This project will help them increase their efficiency and conserve water at the same time.

Thank you for your consideration.

Vanessa Pooch

Vanessa Pooch
Agriculturist
Sidney Sugars, Inc.

RICHLAND ECONOMIC DEVELOPMENT

Leslie Messer, Executive Director
Katie Dasinger, Program Coordinator

1060 S. Central Avenue
Sidney, Montana 59270
Phone: (406) 482-4679
Fax: (406) 482-5552
E-mail: redc@midrivers.com
www.richlandeconomicdevelopment.com

A Non-Profit Countywide Economic Development Corporation

April 10, 2018

Montana DNRC
Resource Development Bureau
PO Box 201601
Helena, MT 59620-1601

DNRC Council Members:

It is with great pleasure that I submit this letter in support of the Sidney Water Users Renewable Resource Grant Application. Richland Economic Development Corp's mission is "To take action or encourage action by others which will assist potential new or existing businesses to improve their chances of survival and contribution to the economic growth in Richland County, Montana". We believe that a healthy, vibrant, prosperous community includes businesses and residents, as well as diversified Agricultural development projects.

Sidney Water Users have clearly demonstrated themselves as great stewards of the precious resources in our region. The measures taken to improve the efficiency of the water delivery system by replacing open canal and supply ditches with buried PVC pipes supports this mission.

There is a positive relationship between the levels of economic activities and the land values. Irrigation development increases the tax base, increases the land values, and allows the opportunity for young farmers to make a living on the land that their fathers and/or grandfathers owned. As more and more irrigated crops are grown, the profits from the value-added products will be infused into the economy. Furthermore, the reliability of irrigation, as in the Sidney Water Users project, helps to stabilize the "boom and bust" of other industry impacts on our economy.

The continued support of irrigated acres with a more reliable water supply and the production of advanced specialty crops continue to be an impetus for the attraction of food processors to locate in our region. Agricultural processors would directly equate to an increase of job opportunities.

The indirect effects of irrigated Agriculture on economic development can be significant. The benefits accrued to non-farmers in terms of the increase in personal income and employment may actually exceed the benefits to the farmers. The increase to local businesses is an estimated $3.1 million from the 4,700 acres within the Sidney Water Users Project.

Thank you for your time and consideration of this very worthy application. If you require additional information please feel free to contact me.

Leslie Messer

Leslie Messer, Executive Director
Richland Economic Development Corp.

MONTANA
STATE UNIVERSITY
College of
AGRICULTURE
&
MONTANA AGRICULTURAL
EXPERIMENT STATION

Department
of
Research Centers

Eastern Agricultural
Research Center

1501 North Central Avenue
Sidney, MT 59270

Tel (406) 433-2208
Fax (406) 433-7336
http://ag.montana.edu/earc

April 11, 2018

Montana DNRC
Resource Development Bureau
PO Box 201601
Helena, MT 59620-1601

To Whom It May Concern:

This letter is written in support of the application by the Sidney Water Users Irrigation District (SWUID) for funding to improve their delivery system. The SWUID is one of the oldest irrigation districts in the state, and its infrastructure continues to need major improvements to remain viable.

The grant would directly benefit water conservation and environmental programs in the Lower Yellowstone River by replacing open canal and supply ditches with buried PVC pipe. The buried PVC piping would greatly reduce seepage losses, reduce weed problems, electrical pumping costs, and will encourage the conversion from low efficiency surface irrigation systems to high efficiency irrigation methods like center pivots to reduce irrigation runoff. More water would remain in the river to help contribute to higher value crops by supplying water at critical times. Our research as well as research in other areas shows that ecological benefits would accrue due to reduced soil erosion and the lower water/agrochemical inputs required under more efficient irrigation methods.

In conclusion, I strongly recommend that the SWUID receive serious consideration for funding. The improvement of the SWUID is a high priority for this region of Montana.

Sincerely,

Chengci Chen
MSU-EARC Superintendent

Cell (406) 366-5137

CC/cbg

AGRI INDUSTRIES

4/12/2018

Lee Candee
Agri Industries
1775 S Central
Sidney, MT 59270

Montana DNRC
Resource Development Bureau
PO Box 201601
Helena, MT 59620-1601

Regards: Sidney Water Users District 3 Phase 2 Pipeline Project

To whom it may concern

Water conservation is a vital issue in Eastern Montana. The Endangered Species Act and the fact that our population is growing will make water conservation an ever bigger issue in the future.

Sidney Water Users have taken the initiative to improve their irrigation system in the past by burying laterals and promoting pivot irrigation. It is vital to Montana that irrigation districts like Sidney Water Users remain a viable part of our communities. Sidney Water Users helps attract economic development and people to our rural communities.

Sidney Water User's application for a renewable resource grant will help them reach their goal of conserving our natural resources. It is our recommendation that this application be approved.

Sincerely,

Stockman Bank
301 West Holly Street, Sidney, Montana 59270-4123
406.433.8600 FAX 406.433.8633

May 7, 2018

Montana DNRC
Resource Development Bureau
PO Box 201601
625 11th Avenue
Helena, MT 59620-1601

Re: Sidney Water Users Irrigation District (District 3 Main Canal Phase 2)

Dear Sirs:

What a great opportunity to write this letter in support of the **"Sidney Water Users Renewable Resource Grant Application".** Stockman Bank views this project as a win/win/win for Water Conversation, Producers, and our Local Economy.

Stockman Bank is the largest AG Lender in this area and recognizes the importance of this worthwhile project to our customers/producers. This project reduces operating expenses and creates new opportunities for production which in turn attracts other new business to our trade area. We just can't underestimate the significant direct and indirect positive impact of this project.

There is a direct correlation between improving Richland County Economics and improving the efficiency of our farmers/producers. Irrigation development increases land values, tax base and provides more dollars to support the businesses necessary to sustain growth in our community. Adding efficiency from this project provides more profits for our farmer/producers to expand their operations, update equipment, and provide financial stability for their operation and families.

Agriculture is the main-stay and life-blood of our community. This project applied for by the Sidney Water Users Association demonstrates forward thinking, conservation, and will benefit future water users/producers and businesses for generations.

Thank you for considering this worthwhile project.

Sincerely,

Garth N Kallevig
President Sidney Office

GNK/db

Appendix D

Water Conservation Plan

Draft Water Conservation Plan – 2014

Sidney Water Users Irrigation District

In the interest of future infrastructure planning and water conservation implementation the Sidney Water Users Irrigation District (SWUID) developed short range Water Conservation Plan. The goal of the Plan is to track and maintain record of the water conservation measures implemented over time as well as identify projects targeted for completion over the next five years. The Plan continues to outline the goals and objectives for the SWUID for infrastructure improvements with an emphasis on water conservation measures.

The SWUID has worked with local UDSA Natural Resource Conservation Service officials over the past decade to determine and identify water conservation measures that could be implemented within the District. With the assistance of the NRCS, the SWUID reviewed and identified numerous areas within the District's infrastructure which exhibit moderate to severe conveyance and seepage losses. In concert with the NRCS periodic water loss measurements were taken throughout the District's infrastructure to identify areas of concern. The SWUID has used that information to identify the overall condition of the system and prioritize water conservation measures to be implemented. Table 1 is a summary of all water conservation projects completed by the District since 2006.

Table 1. Completed Water Conservation Projects

Project Location	Project	Pipeline Installed (miles)	Open Canal Removed (miles)	Year Completed
District 1 & 2	Highline Canal Phase 1	2.5	2.9	2006-2008
District 1 & 2	Highline Canal Phase 2	0.4	0.5	2009
District 1 & 2	Highline Canal Phase 3	1.7	1.9	2010-2011
District 3	Lateral 1 Conversion	1.1	1.1	2011-2012
District 5	Lateral 2 Conversion	2.0	3.5	2012
District 1	Scheetz Pipeline	0.4	0.4	2013
District 2	Highline Canal Phase 4	1.1	1.7	2013

The SWUID has identified the following projects listed in Table 2 as water conservation projects to be completed over the next 5 years. The District has focused its primary efforts on installing pipelines as opposed to canal lining projects. Because the SWUID is a pumped system installation of pipelines achieves conservation goals but also allows for pressurized turnouts at the field. The District has seen irrigators convert traditional flood irrigation to sprinkler irrigation through the implementation of previous pipeline projects. This trend adds additional value and further water conservation, encouraging the District to continue to focus on pipeline projects. Completion of these projects are all dependent on funding availability through state and federal agencies as well as budgetary constraints within the SWUID.

Table 2. Targeted Water Conservation Projects

Project Location	Project	Pipeline to be Installed (miles)	Open Canal to be Removed (miles)	Targeted Year of Completion
District 2	Lateral 1-2B	0.75	1.0	2014
District 2	Highline Canal Phase 5	2.1	2.8	2014-2015
District 3	Lateral 2 Conversion	1.9	1.9	2017-2018
District 5	Lateral 2A Conversion	0.6	0.8	2019
District 3	Mainline North Conversion	0.75	0.75	2020

The SWUID discusses the Target Water Conservation Projects list on an annual basis to reevaluate and identify its priorities. The projects listed in Table 2 are the current priorities of the SWUID. SWUID has seen priorities of pipeline installations change due to change of conditions or change in federal funding assistance, primarily tied to adjacent on-farm improvements such as sprinkler installation. The priority and target completion dates of these projects are subject to change however the overall goal of water conservation remains the same.

WATER CONSERVATION AND FIELD SERVICE PROGRAM

DISTRICT 3 MAIN CANAL CONVERSION PHASE 1: FINANCIAL REPORT

SIDNEY WATER USERS IRRIGATION DISTRICT

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

PERFORMANCE ENGINEERING

TABLE OF CONTENTS

INDEX OF TABLES

1.0 DIRECT COST BUDGET ELEMENTS

The following subsections under Section 1.0 – Direct Cost Budget Elements, will outline the SWUID's process in the development of cost data for the proposed budget. Further estimate clarification or documentation regarding personnel costs, staff wages, and benefits can be provided upon request but is only summarized in this document for employee privacy rights.

1.1 Personnel Costs

The personnel costs presented in the proposed project budget are actual salary costs and benefits paid by the District. The District maintains a full-time crew which completes construction projects during non-irrigation months. Those costs are hard costs and well documented by the District through their financial budgets. Projected costs are reasonable for the area and fit within the budgetary limits of the District. Salaries projected are anticipated to have a slight increase from the time of this application through implementation of the project. Any increase that should occur between the time of application and construction will be absorbed by the District. The per hour wages for the employees listed in the budget are as presented in Table 1.

Table 1. Employee Title and Wage Data

Position	Wage	Units
Project Manager – Raymond Bell	$25.00	HR
Assistant Project Manager	$25.00	HR
Equipment Operator	$20.00	HR
Laborer	$15.00	HR

Fringe benefits associated with the above listed employees include social security, State Fund worker's comp, retirement, unemployment, and healthcare. These categories are presented in an hourly rate and are included in the employee compensation package for District employees. Table 2 presents the fringe benefits applied in the project budget.

Table 2. Fringe Benefits

Fringe	Benefit	Units
Project Manager – Raymond Bell	$6.25	HR
Assistant Project Manager	$6.25	HR
Equipment Operator	$5.00	HR
Laborer	$3.75	HR

1.2 Equipment Costs

All of the equipment proposed for use in the construction of the Project is owned by the SWUID or its irrigators. The hourly rates have been developed using the USCOE rate tables for equipment in the region. The SWUID has extensive construction experience within the District and is fully capable of developing a construction schedule, equipment projections, and a likely budget for the work to be completed by its crew. No equipment will be leased or purchased as a result of this project. Equipment and rates used in the Project Budget are presented in Table 3.

Table 3. Equipment Rates

Equipment	Rate	Units
Excavator	$40.68	HR
Dump Truck	$43.65	HR
Dozer	$38.03	HR
Grader	$51.70	HR
Loader	$57.13	HR
Equipment Transport	$50.67	HR
Survey Equipment	$25.25	HR
Soil Compactor	$32.35	HR
Field Truck	$19.57	HR
Manager's Truck	$18.25	HR

1.3 Construction Items

The Sidney Water Users Irrigation District will complete all of the construction associated with the project. The construction item list used in the Project Budget was derived from the preliminary engineering completed by Performance Engineering (PE) as well as the District's experience. Major components such as the pumps, plastic irrigation pipe and fittings were priced through a regional supplier to gain conservative budget numbers. All items were adjusted for inflation through construction to account for any market price adjustments of that manner. Construction item prices are presented in Table 4.

Table 4. Construction Item Prices

Budget Item Description	Computation			
	Quantity	Unit	Unit Cost	Total Cost
Vertical Turbine Pump	2	EA	$14,000.00	$28,000.00
Energy Dissipator	1	EA	$4,000.00	$4,000.00
27" PIP	4,765	LF	$31.89	$151,955.85
24" PIP	2,160	LF	$24.16	$52,185.60
18" PIP	40	LF	$13.31	$532.40
15" PIP	5,220	LF	$8.67	$45,257.40
12" PIP	400	LF	$5.53	$2,212.00
24" Isolation Valve Assembly	2	EA	$7,050.00	$14,100.00
18" Isolation Valve Assembly	1	EA	$7,050.00	$7,050.00
12" Drain/Flush Out	2	EA	$1,250.00	$2,500.00
27" - 45° Bend	3	EA	$1,400.00	$4,200.00
27x18 TEE	2	EA	$2,000.00	$4,000.00
27x15 TEE	1	EA	$1,900.00	$1,900.00
27x12 TEE	11	EA	$1,800.00	$19,800.00
27" to 24" Reducer	1	EA	$1,100.00	$1,100.00
27" to 18" Reducer	2	EA	$1,500.00	$3,000.00
Pump Manifold / Back Flush	1	EA	$16,000.00	$16,000.00
Flowmeter Assembly	2	EA	$4,000.00	$8,000.00
Turnout Assembly	11	EA	$5,000.00	$55,000.00
Turnout Bollard Settings	11	EA	$500.00	$5,500.00
Air Vent Assembly	5	EA	$750.00	$3,750.00
Concrete Thrust Blocks	24	EA	$250.00	$6,000.00
Revegetation	4	AC	$350.00	$1,400.00
			Subtotal	$437,443.25

1.4 Environmental & Regulatory Compliance Costs

Because this is a SWUID facility it is understood that a NEPA and historical preservation review will be completed by the SWUID. Those funds will come from the SWUID. Because the project is located within the active canal channel few state permits will be required. The SWUID will be responsible for obtaining a SWPPP permit from the Montana DEQ to regulate stormwater runoff. SWUID will also be responsible for submitting a 310 Permit to the local Conservation District. Both permits will be obtained at the time of construction.

The costs associated with obtaining those permits are included in the engineering budget for the contracted engineer.

1.5 Travel Costs

District travel costs were included in the proposed budget as the "Manager's Pickup and Field Pickup" as seen in Table 3. Project oversight and travel associate with construction oversight were not included and are assumed to be done during daily project rounds. These costs are incorporated into the general operating budget of the District and will not be identified or calculated as contributions to the project.

1.6 Contingencies

A 10% contingency was included in the proposed budget to protect against unforeseen costs, overruns, or dramatic price increases. Using the SWUID's recent experience in construction they have shown that they have an ability keep projects within the projected budget with minimal overruns. Additionally, based on PE's recent experience in irrigation facility construction on USBR facilities a 10% contingency is standard and necessary. The contingency was developed using 10% of the construction costs only, excluding administration, engineering, and permitting costs. The budget includes $53,458.26 for a 10% construction contingency for this project. The District believes that this will satisfy and cover any unforeseen costs which may arise.

2.0 INDIRECT COSTS

All indirect costs associated with the project will be covered by the SWUID. No indirect costs were included in the development of the budget and none are foreseen for the project that haven't already been accounted for in the annual O&M budget for the District.

3.0 COST SHARE BREAKDOWN

There are three proposed partners/sponsors in the Main Canal Pipeline Conversion Project. Reclamation, DNRC, and the applicant are included in the proposed budget for the project. The budget proposal proposes splitting a portion of the construction costs between Reclamation, DNRC, and Applicant as those items are easy to track. The DNRC has awarded $250,000 to SWUID from two Renewable Resource Grants. Reclamation's entire budget will be used for construction materials for the project making the USBR

contribution to $300,000.00. The salaries/wages will be covered by the SWUID along with fringe benefits. The DNRC will fund the construction materials not covered by the USBR contribution along with consultant fees, equipment costs, and a portion of the construction contingency for the project. This approach aimed to easily track the matching amounts and show the funding match was made. The cost share summary for the project is as shown in Table 5.

Table 5. Cost Share Summary

Construction Component	Reclamation	RRGL Grants	SWUID In-Kind/Cash	Total Cost
Salaries & Wages	$0.00	$0.00	$32,300.00	$32,300.00
Fringe Benefits	$0.00	$0.00	$8,075.00	$8,075.00
Equipment	$0.00	$64,839.35	$0.00	$64,839.35
Construction Materials	$300,000.00	$133,443.25	$4,000.00	$437,443.25
Construction Contingency	$0.00	$1,717.40	$51,740.86	$53,458.26
Consultant Fees	$0.00	$50,000.00	$0.00	$50,000.00
Indirect Costs	$0.00	$0.00	$0.00	$0.00
Total	***$300,000.00***	***$250,000.00***	***$96,115.86***	***$646,115.86***

Reclamation funds are the only uncommitted dollars associated with the project at this time. SWUID has committed to in-kind services to provide some of the project budget. The SWUID has approved the construction budget for project and will fit some of the costs presented in the budget above in their operational and special projects budgets.

SWUID District 3 Canal Conversion Phase 1

Construction Budget

Sidney Water Users Irrigation District

Revised March 13, 2019

Budget Item Description	Computation				State DNRC Funding	Reclamation Funding	Recipient Funding
	Quantity	Unit	Unit Cost	Total Cost			
Salaries & Wages							
Project Manager	380	HR	$25.00	$9,500.00	---	---	$9,500.00
Assistant Project Manager	380	HR	$25.00	$9,500.00	---	---	$9,500.00
Equipment Operator	380	HR	$20.00	$7,600.00	---	---	$7,600.00
Laborer	380	HR	$15.00	$5,700.00	---	---	$5,700.00
			Subtotal	$32,300.00	$0.00	$0.00	$32,300.00
Fringe Benefits							
Fringe Benefits 25% of Salary	1	LS	---	$8,075.00	---	---	$8,075.00
			Subtotal	$8,075.00	$0.00	$0.00	$8,075.00
Equipment							
Excavator	320	HR	$40.68	$13,017.60	$13,017.60	---	---
Dump Truck	150	HR	$43.65	$6,547.50	$6,547.50	---	---
Dozer	150	HR	$38.03	$5,704.50	$5,704.50	---	---
Grader	150	HR	$51.70	$7,755.00	$7,755.00	---	---
Loader	150	HR	$57.13	$8,569.50	$8,569.50	---	---
Equipment Transport	55	HR	$50.67	$2,786.85	$2,786.85	---	---
Survey Equipment	190	HR	$25.25	$4,797.50	$4,797.50	---	---
Soil Compactor	110	HR	$32.35	$3,558.50	$3,558.50	---	---
Field Truck	320	HR	$19.57	$6,262.40	$6,262.40	---	---
Manager's Truck	320	HR	$18.25	$5,840.00	$5,840.00	---	---
			Subtotal	$64,839.35	$64,839.35	$0.00	$0.00
Construction Materials							
Vertical Turbine Pump	2	EA	$14,000.00	$28,000.00	---	$28,000.00	---
Energy Dissipator	1	EA	$4,000.00	$4,000.00	---	---	$4,000.00
27" PIP	4,765	LF	$31.89	$151,955.85	$6,699.55	$145,256.30	---
24" PIP	2,160	LF	$24.16	$52,185.60	$26,092.80	$26,092.80	---
18" PIP	40	LF	$13.31	$532.40	$266.20	$266.20	---
15" PIP	5,220	LF	$8.67	$45,257.40	$22,628.70	$22,628.70	---
12" PIP	400	LF	$5.53	$2,212.00	$1,106.00	$1,106.00	---
24" Isolation Valve Assembly	2	EA	$7,050.00	$14,100.00	$7,050.00	$7,050.00	---
18" Isolation Valve Assembly	1	EA	$7,050.00	$7,050.00	$3,525.00	$3,525.00	---
12" Drain/Flush Out	2	EA	$1,250.00	$2,500.00	$1,250.00	$1,250.00	---
27" - 45° Bend	3	EA	$1,400.00	$4,200.00	$2,100.00	$2,100.00	---
27x18 TEE	2	EA	$2,000.00	$4,000.00	$2,000.00	$2,000.00	---
27x15 TEE	1	EA	$1,900.00	$1,900.00	$950.00	$950.00	---
27x12 TEE	11	EA	$1,800.00	$19,800.00	$9,900.00	$9,900.00	---
27" to 24" Reducer	1	EA	$1,100.00	$1,100.00	$550.00	$550.00	---
27" to 18" Reducer	2	EA	$1,500.00	$3,000.00	$1,500.00	$1,500.00	---
Pump Manifold / Back Flush	1	EA	$16,000.00	$16,000.00	$8,000.00	$8,000.00	---
Flowmeter Assembly	2	EA	$4,000.00	$8,000.00	$4,000.00	$4,000.00	---
Turnout Assembly	11	EA	$5,000.00	$55,000.00	$27,500.00	$27,500.00	---
Turnout Bollard Settings	11	EA	$500.00	$5,500.00	$2,750.00	$2,750.00	---
Air Vent Assembly	5	EA	$750.00	$3,750.00	$1,875.00	$1,875.00	---
Concrete Thrust Blocks	24	EA	$250.00	$6,000.00	$3,000.00	$3,000.00	---
Revegetation	4	AC	$350.00	$1,400.00	$700.00	$700.00	---
			Subtotal	$437,443.25	$133,443.25	$300,000.00	$4,000.00
Construction Contingency							
10% Contingency	1	LS	$53,458.26	$53,458.26	$1,717.40	---	$51,740.86
			Subtotal	$53,458.26	$1,717.40	$0.00	$51,740.86
Consultant Fees							
Engineering/Permitting (see attached)	1	LS	$50,000.00	$50,000.00	$50,000.00	---	---
			Subtotal	$50,000.00	$50,000.00	$0.00	$0.00
Indirect Costs							
Indirect Costs	0	LS	$0.00	$0.00	---	---	---
			Subtotal	$0.00	$0.00	$0.00	$0.00
				Total Construction Cost	***State DNRC Funding***	***Reclamation Funding***	***Recipient Funding***
Total Project Cost				***$646,115.86***	***$250,000.00***	***$300,000.00***	***$96,115.86***

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

STEVE BULLOCK, GOVERNOR
1539 ELEVENTH AVENUE
STATE OF MONTANA
DIRECTOR'S OFFICE: (406) 444-2074
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HELENA, MONTANA 59620-1601

03/06/2019

Raymond Bell
Sidney Water Users Irrigation District
1101 11th St SW
Sidney, MT 59270

RE: Funding Status SWUID District 3 Main Canal Pipeline Conversion Project-Phase 2 and Reconsideration Main Canal Pipeline Conversion Projects

Dear Raymond,

Thank you for submitting applications to the RRGL program for your projects. The applications are currently ranked 29 and 31 and will be funded through House Bill 6. A formal letter will be sent out in May once the Bill is final with award amounts of $125,000 each.

House Bill 6 is effective July 1, 2019. Funding will be available to projects based on rank and funding availability. I will need an updated scope, schedule and budget to enter into an agreement for the RRGL program funds.

Please contact me to discuss the follow up questions. I look forward to working with you to reach your resource goals on these projects.

Respectfully,

Lindsay Volpe

RRGL Program Manager
406-444-9766 lmvolpe@mt.gov

Enclosure:
RRGL Ranked List

cc: file

Renewable Resource Grant and Loan Program
2021 Biennium Ranking and Funding Recommendations

Rank	Applicant Name	Project Title	County	Project Type	Recommended Amount	Cumulative Amount
Projects Unfunded in 2017 Special Session Requesting Funding Reconsideration						
18*	Malta Irrigation District	Reconsideration: Exeter Siphon	Phillips	Irrigation	$125,000	$125,000
21*	Broadwater Conservation District	Reconsideration: Big Springs Ditch Water Conservation, Phase 2	Broadwater	Irrigation	$125,000	$250,000
29*	Sidney Water Users Irrigation District	Reconsideration: Main Canal Pipeline Conversion	Richland	Irrigation	$125,000	$375,000
35*	Buffalo Rapids Irrigation Project District 2	Reconsideration: Shirley Main Canal Rehabilitation	Custer	Irrigation	$125,000	$500,000
				Total Reconsideration Projects		$500,000
2018 Applications Requesting Funding in 2021 Biennium						
1	Seeley Lake - Missoula County Sewer District	Seeley Lake Sewer District Wastewater Improvements, Phase 2	Missoula	Waste Water	$125,000	$125,000
2	Granite County	Flint Creek Dam Rehabilitation	Granite	Dam	$125,000	$250,000
3	Whitefish, City of	Whitefish Wastewater Treatment System Improvements	Flathead	Waste Water	$125,000	$375,000
4	Missoula, City of Parks and Recreation Department	Rattlesnake Dam Removal	Missoula	Water Management	$125,000	$500,000
5	Montana Department of Natural Resources and Conservation-Water Resources Division State Water Projects Bureau	Douglas Canal Rehabilitation	Powell	Irrigation	$125,000	$625,000
6	Flathead Conservation District	Trumbull Creek Restoration and Aquifer Protection	Flathead	Water Management	$125,000	$750,000
7	Canyon Creek Irrigation District	Canyon Lake Dam Rehabilitation	Ravalli	Dam	$125,000	$875,000
8	Harlowton, City of	Harlowton Roundhouse Wetland Restoration	Wheatland	Water Management	$125,000	$1,000,000
9	Thompson Falls, City of	Thompson Falls Wastewater System Improvements	Sanders	Waste Water	$125,000	$1,125,000
10	Montana Department of Natural Resources and Conservation-Water Resources Division State Water Projects Bureau	Broadwater Missouri Canal System Master Plan	Broadwater	Irrigation/ Study	$125,000	$1,250,000
11	Winnett, Town of	Winnett Wastewater System Retrofit	Petroleum	Waste Water	$125,000	$1,375,000
12	Bitter Root Irrigation District	Como Dam Water Resource Enhancement	Ravalli	Irrigation/ Dam	$125,000	$1,500,000
13	Harlowton, City of	Harlowton Wastewater Improvements	Wheatland	Waste Water	$125,000	$1,625,000
14	Milk River Joint Board of Control	St. Mary Canal Drop 2 Replacement	Blaine, Glacier, Hill, Phillips, Valley	Irrigation	$125,000	$1,750,000
15	Whitehall, Town of	Whitehall Water Treatment Plant Improvements	Jefferson	Drinking Water	$125,000	$1,875,000
16	Lewis and Clark Conservation District	Willow Creek Feeder Canal Rehabilitation	Lewis and Clark	Irrigation	$125,000	$2,000,000
17	Fort Belknap Indian Community	Fort Belknap Threemile Creek Pump Station Rehabilitation	Blaine, Roosevelt	Irrigation	$125,000	$2,125,000
19	Roundup, City of	Roundup Water System Improvements	Musselshell	Drinking Water	$125,000	$2,250,000
20	Glasgow Irrigation District	Glasgow V-63 Lateral Conversion	Valley	Irrigation	$125,000	$2,375,000
22	Pondera County Conservation District	Pondera Swift Dam Rehabilitation	Pondera	Irrigation	$125,000	$2,500,000
23	Simms County Sewer District	Simms County Sewer District Wastewater System Improvements, Phase 2	Cascade	Waste Water	$125,000	$2,625,000
24	Malta Irrigation District	Malta ID Costin Lateral Pipeline Conversion	Phillips	Irrigation	$125,000	$2,750,000

Lindsay Volpe lmvolpe@mt.gov

Updated 11/15/2018

Renewable Resource Grant and Loan Program
2021 Biennium Ranking and Funding Recommendations

Rank	Applicant Name	Project Title	County	Project Type	Recommended Amount	Cumulative Amount
25	Power-Teton County Water and Sewer District	Power-Teton County Water and Sewer District Water System Improvements	Teton	Drinking Water	$125,000	$2,875,000
26	Scobey, City of	Scobey Water System Improvement, Phase 2	Daniels	Drinking Water	$125,000	$3,000,000
27	Bigfork County Water and Sewer District	Bigfork County Water and Sewer District Wastewater System Improvements	Flathead	Waste Water	$125,000	$3,125,000
28	Buffalo Rapids Irrigation Project District 2	BRIP 2 - Lateral 1.6 Pipeline Conversion	Custer, Prairie	Irrigation	$125,000	$3,250,000
30	Hill County	Beaver Creek Dam Spillway Improvements	Hill	Dam	$125,000	$3,375,000
31	Sidney Water Users Irrigation District	SWUID District 3 Main Canal Pipeline Conversion, Phase 2	Richland	Irrigation	$125,000	$3,500,000
32	Flathead Conservation District	Krause Creek Restoration	Flathead	Water Management	$125,000	$3,625,000
33	Alfalfa Valley Irrigation District	Alfalfa Valley ID East Flynn Canal Rehabilitation	Blaine	Irrigation	$125,000	$3,750,000
34	Lower Musselshell County Conservation District	Delphi Melstone Water Users Association Irrigation Efficiency & Water Measurement	Musselshell	Irrigation	$117,050	$3,867,050
36	Columbia Falls, City of	Columbia Falls Water System Improvements	Flathead	Drinking Water	$125,000	$3,992,050
37	Buffalo Rapids Irrigation Project District 1	Buffalo Rapids Irrigation Project 1 - Lateral 1.7 Pipeline Conversion	Dawson	Irrigation	$125,000	$4,117,050
38	Hardin, City of	Hardin Wastewater Treatment Plant improvements	Big Horn	Waste Water	$125,000	$4,242,050
39	Dillon, City of	Dillon Water Transmission and Distribution Main Replacement	Beaverhead	Drinking Water	$125,000	$4,367,050
40	Helena Valley Irrigation District	Helena Valley Irrigation District Lateral 14.8 Headgate Rehabilitation, Phase 2	Lewis and Clark	Irrigation	$125,000	$4,492,050
41	Polson, City of	Polson Wastewater System Improvement, Phase 2	Lake	Waste Water	$125,000	$4,617,050
42	Carbon County Conservation District	Golden Ditch Company Clark Fork Diversion Rehabilitation	Carbon	Irrigation	$125,000	$4,742,050
43	Savage Irrigation District	Savage Irrigation District Infrastructure Rehabilitation	Richland	Irrigation	$125,000	$4,867,050
44	Petroleum County Conservation District	Horse Creek Coulee Water Storage	Garfield, Musselshell, Petroleum, Rosebud	Irrigation	$125,000	$4,992,050
45	Wibaux, Town of	Wibaux Wastewater Treatment System Improvements	Wibaux	Waste Water	$125,000	$5,117,050
46	Alberton, Town of	Alberton Water System Improvements	Mineral	Drinking Water	$125,000	$5,242,050
47	Geraldine, Town Of	Geraldine Wastewater System Improvements	Chouteau	Waste Water	$125,000	$5,367,050
48	Missoula, City of	Caras Park Outfall Storm Water Treatment Retrofit, Phase 2	Missoula	Water Management	$125,000	$5,492,050
49	Black Eagle-Cascade County Water & Sewer District	Black Eagle-Cascade County Water & Sewer District Water & Sewer System Improvements	Cascade	Waste Water	$125,000	$5,617,050
50	East Helena, City of	East Helena Water System Improvements	Lewis and Clark	Drinking Water	$125,000	$5,742,050
51	Plentywood, City of	Plentywood Wastewater Collection Improvement, Phase 2	Sheridan	Waste Water	$125,000	$5,867,050
52	Missoula County	Lewis & Clark Subdivision Wastewater Improvements	Missoula	Waste Water	$125,000	$5,992,050
53	Wilsall Water District	Wilsall Water District Water System Improvements	Park	Drinking Water	$125,000	$6,117,050
54	Lower Yellowstone Irrigation Project	Lower Yellowstone Irrigation Project Crane Wasteway & Pump Station Rehabilitation	Dawson, Richland	Irrigation	$125,000	$6,242,050

Lindsay Volpe lmvolpe@mt.gov

Updated 11/15/2018

Renewable Resource Grant and Loan Program
2021 Biennium Ranking and Funding Recommendations

Rank	Applicant Name	Project Title	County	Project Type	Recommended Amount	Cumulative Amount
55	Missoula County Conservation District	Grass Valley French Ditch Clark Fork Diversion Rehabilitation	Missoula	Irrigation	$125,000	$6,367,050
56	Montana Bureau of Mines and Geology	Reducing Mobilization of Oil-Brine Salt to Streams	Musselshell, Petroleum	Study	$125,000	$6,492,050
57	Winifred, Town of	Winifred Water System Improvements	Fergus	Drinking Water	$125,000	$6,617,050
58	Hysham, Town of	Hysham Wastewater System Rehabilitation, Phase 1	Treasure	Waste Water	$125,000	$6,742,050
59	Vaughn Cascade County Water and Sewer District	Vaughn Cascade County Water and Sewer District Water Improvements	Cascade	Drinking Water	$125,000	$6,867,050
60	Stillwater Conservation District	Yanzick/Brey,Riddle Ditches Irrigation System Improvements, Phase 2	Stillwater	Irrigation	$125,000	$6,992,050
61	Lockwood Water and Sewer District	Lockwood WSD Drinking Water System Improvements	Yellowstone	Drinking Water	$125,000	$7,117,050
62	Circle, Town of	Circle Water System Improvements	McCone	Drinking Water	$125,000	$7,242,050
63	Yellowstone County DES	Billings Bench Water Users Association Main Canal Rehabilitation, Phase 1	Yellowstone	Irrigation	$125,000	$7,367,050
64	Hysham Irrigation District	Re-Lift Canal Improvement	Treasure	Irrigation	$125,000	$7,492,050
65	Clyde Park, Town of	Clyde Park Water System Improvements	Park	Drinking Water	$125,000	$7,617,050
66	Libby, City of	Libby Water System Improvements	Lincoln	Drinking Water	$125,000	$7,742,050
67	Chinook, City of	Chinook Water System Improvements	Blaine	Drinking Water	$125,000	$7,867,050
68	Cut Bank, City of	Cut Bank Water System Improvements	Glacier	Drinking Water	$125,000	$7,992,050
69	North Havre County Waster District	North Havre County Water District Water System Improvements	Hill	Drinking Water	$125,000	$8,117,050
70	Plains, Town of	Plains Wastewater System Protection	Sanders	Waste Water	$125,000	$8,242,050
71	Montana Bureau of Mines and Geology	Measuring Groundwater Recharge in Flood to Pivot Irrigation Conversions	Carbon	Study	$125,000	$8,367,050
72	Cascade, Town of	Cascade Water System Improvements	Cascade	Drinking Water	$125,000	$8,492,050
73	Fallon County	Baker Lake Restoration	Fallon	Water Management	$100,000	$8,592,050
74	Pondera County Conservation District	Kingsbury Turnout Automation	Pondera	Irrigation	$125,000	$8,717,050
75	Tin Cup County Water and Sewer District	Tin Cup County Water and Sewer District Water Conservation	Ravalli	Irrigation	$125,000	$8,842,050
76	Clancy Water and Sewer District	Clancy Water and Sewer District Water Improvements	Jefferson	Drinking Water	$125,000	$8,967,050
				Total Ranked Projects 1-72		**$8,967,050**

Shaded projects are included in HB 6
Non-shaded projects are included in HB 14

* Reconsideration projects were awarded funding by the 2017 Legislature and were unfunded in the 2017 Special Session. HB 6 places these projects at the top of the RRGL ranked list.

Lindsay Volpe lmvolpe@mt.gov

Sidney Water Users Irrigation District Environmental Compliance
Main Canal Pipeline Conversion Project

The Main Canal pipeline conversion project improvements will reduce water withdrawn from the Yellowstone River by up to 1,312 acre-feet annually; have a positive impact on the water quality in the Yellowstone River; and optimizing the beneficial use of the irrigation water.

Environmental Resources Present & Detailed Effects

Installation of the Main Canal pipeline conversion improvements will include ground disturbances which are generally maintained to a 30-foot wide disturbance corridor. The project will be accessed by existing access roads or two-track access roads which will be improved to support the construction activities. Outside of materials and equipment staging, all construction activity will be done within the canal right-of-way which serves as active irrigation infrastructure. Any material or debris removed from the site will be disposed of either in a permitted landfill or within the District's storage yard. The majority of the area has been previously disturbed and is actively used for irrigation activities. Dust could become a concern at different points through construction, however the area is typically damp due to irrigation practices. Should dust become of concern the SWUID will take measures to ensure dust abatement such as water applications in the area. Construction staging areas will be reclaimed to their previous condition upon completion of the project. This should help to minimize the impacts on wildlife and safety in the area. Construction noise will be present but only temporary in nature. Construction activities will take place within the interior of the District in places well away from the public or local residences in the area.

Wildlife is present within the boundaries of the SWUID but little activity is present in the Main Canal area. Wildlife within and around the SWUID is plentiful and includes many species of common birds, animal, and fish. Within the Main Canal project area there are no species listed on the US Fish and Wildlife Services Endangered or Threatened Species List. The Main Canal project will result in an improvement of instream flows in the Yellowstone River which will provide improved fisheries habitat. It is important to look at the benefits provided by the Main Canal project in the context of long term conservation

of both water and the environment. This project will have a notable long term positive impact on fisheries and wildlife habitat in the Yellowstone River Basin for decades to come.

Wetlands

An inventory of the wetlands within the project area was conducted by Performance Engineering (PE) staff in the spring of 2018. Wetlands were identified by the National Wetlands Inventory (NWI) and are located adjacent to the project area. The wetlands are classified as freshwater emergent wetland, freshwater forested wetland, or riverine. All portions of work will occur in the canal's right-of-way and any disturbances during construction will be mitigated immediately. SWUID will complete all permitting and documentation required and will ensure safety precautions will be in place when construction activities occur adjacent to the wetlands. The proposed project area will experience construction disturbances lasting approximately six months during active construction. Seepage from the canal has created isolated areas which contain water through the irrigation season and dry out once the canal is shut down upstream of the project area which will not be disturbed. It is NRCS national policy, as stated in the NRCS General Manual, Part 190-410, that it is not required to mitigate for artificial wetlands created by seepage from leaking canal systems. The District intends to follow the referenced NRCS national guidance in design and construction of the Main Canal project within the project corridor.

The proposed Main Canal Pipeline conversion project may improve surface water quality and riparian areas both upstream and downstream of the project. By supplementing instream flows through conservation when possible, general riparian habitat will see long term benefits downstream of the project. Furthermore, the project will have a positive impact on the water quality in the Yellowstone River through a reduction in sediment loading from erosion. Additionally, installation of more efficient on-farm irrigation methods such as pivots, which will result from completion of the project, will also reduce sediment and chemical laden runoff return flows through the drain system.

Historical and Cultural Resources

The SWUID infrastructure was constructed and put into operation in the 1940s. There have been numerous changes made to the delivery system since it was first constructed. To this point there has not been any components of the SWUID infrastructure nominated or listed as having historical significance. Additionally, work has been done within the project area and within the canal within the last 10 years. The current structures and canals are considered working irrigation infrastructure and are subject to change based on operations and improvement required to maintain operation of the SWUID system.

There are no known Native American sacred sites or burial grounds within the identified project area. Additionally, there is no tribal or trust lands located within or adjacent to the project. Therefore no detrimental impact will result to tribal or Native American sites as result of the project.

There are no unique natural features, wilderness or public lands within the Main Canal project area. Some District facilities, canals, and irrigated infrastructure within the immediate project area are located inside the Yellowstone River floodplain. No construction, excavation, or fill activities associated with the Main Canal project will alter the designated floodplain area.

Demographics & Social Structure

The Main Canal project is located in Richland County and includes the towns of Sidney, Lambert, and Fairview, Montana in a historically rural agricultural area. The project is likely to create short-term construction work for local laborers and operators during installation of the project. Canals within the SWUID serve as a critical production base for many of the regions large commodity processing and market facilities. Companies like United Grain Corp. and Sidney Sugars rely on the production base to keep their operations viable which add good paying jobs and economic stability to eastern Montana. Letters of support from a number of businesses and the local economic development organization have been included in this application. Additionally, completion of the Main Canal project will ensure the continued operation of the SWUID for future generations which is a critical component to the local economy.

Sidney Sugars
INCORPORATED

35140 County Road 125
Sidney, Montana 59270
Ag Dept: (406) 433-3309

April 9, 2018

Montana DNRC
Resource Development Bureau
PO Box 201601
Helena, MT 59620-1601

Re: SWUID Grant District 3, Phase 2

I'm writing in support of the grant application from the Sidney Water Users. This improvement to the irrigation district will benefit growers and the community in several ways. Sugar beets are a high value crop that requires water at critical times. This project will help provide that water. It will also insure that the amount of water needed is there.

Another benefit is provided by covering the water supply and reducing the amount of weed seed in the water. This is a double benefit, both reducing the weed competition for the crop and reducing the amount of herbicide needed to protect the crop from weeds.

Growers in this district have been helping themselves by purchasing and using gated pipe and pivot irrigation. This project will help them increase their efficiency and conserve water at the same time.

Thank you for your consideration.

Vanessa Pooch

Vanessa Pooch
Agriculturist
Sidney Sugars, Inc.

RICHLAND ECONOMIC DEVELOPMENT

Leslie Messer, Executive Director
Katie Dasinger, Program Coordinator

1060 S. Central Avenue
Sidney, Montana 59270
Phone: (406) 482-4679
Fax: (406) 482-5552
E-mail: redc@midrivers.com
www.richlandeconomicdevelopment.com

A Non-Profit Countywide Economic Development Corporation

April 10, 2018

Montana DNRC
Resource Development Bureau
PO Box 201601
Helena, MT 59620-1601

DNRC Council Members:

It is with great pleasure that I submit this letter in support of the Sidney Water Users Renewable Resource Grant Application. Richland Economic Development Corp's mission is "To take action or encourage action by others which will assist potential new or existing businesses to improve their chances of survival and contribution to the economic growth in Richland County, Montana". We believe that a healthy, vibrant, prosperous community includes businesses and residents, as well as diversified Agricultural development projects.

Sidney Water Users have clearly demonstrated themselves as great stewards of the precious resources in our region. The measures taken to improve the efficiency of the water delivery system by replacing open canal and supply ditches with buried PVC pipes supports this mission.

There is a positive relationship between the levels of economic activities and the land values. Irrigation development increases the tax base, increases the land values, and allows the opportunity for young farmers to make a living on the land that their fathers and/or grandfathers owned. As more and more irrigated crops are grown, the profits from the value-added products will be infused into the economy. Furthermore, the reliability of irrigation, as in the Sidney Water Users project, helps to stabilize the "boom and bust" of other industry impacts on our economy.

The continued support of irrigated acres with a more reliable water supply and the production of advanced specialty crops continue to be an impetus for the attraction of food processors to locate in our region. Agricultural processors would directly equate to an increase of job opportunities.

The indirect effects of irrigated Agriculture on economic development can be significant. The benefits accrued to non-farmers in terms of the increase in personal income and employment may actually exceed the benefits to the farmers. The increase to local businesses is an estimated $3.1 million from the 4,700 acres within the Sidney Water Users Project.

Thank you for your time and consideration of this very worthy application. If you require additional information please feel free to contact me.

Leslie Messer

Leslie Messer, Executive Director
Richland Economic Development Corp.

MONTANA
STATE UNIVERSITY
College of
AGRICULTURE
&
MONTANA AGRICULTURAL
EXPERIMENT STATION

Department
of
Research Centers

Eastern Agricultural Research Center

1501 North Central Avenue
Sidney, MT 59270

Tel (406) 433-2208
Fax (406) 433-7336
http://ag.montana.edu/earc

April 11, 2018

Montana DNRC
Resource Development Bureau
PO Box 201601
Helena, MT 59620-1601

To Whom It May Concern:

This letter is written in support of the application by the Sidney Water Users Irrigation District (SWUID) for funding to improve their delivery system. The SWUID is one of the oldest irrigation districts in the state, and its infrastructure continues to need major improvements to remain viable.

The grant would directly benefit water conservation and environmental programs in the Lower Yellowstone River by replacing open canal and supply ditches with buried PVC pipe. The buried PVC piping would greatly reduce seepage losses, reduce weed problems, electrical pumping costs, and will encourage the conversion from low efficiency surface irrigation systems to high efficiency irrigation methods like center pivots to reduce irrigation runoff. More water would remain in the river to help contribute to higher value crops by supplying water at critical times. Our research as well as research in other areas shows that ecological benefits would accrue due to reduced soil erosion and the lower water/agrochemical inputs required under more efficient irrigation methods.

In conclusion, I strongly recommend that the SWUID receive serious consideration for funding. The improvement of the SWUID is a high priority for this region of Montana.

Sincerely,

Chengci Chen
MSU-EARC Superintendent

Cell (406) 366-5137

CC/cbg

AGRI INDUSTRIES

4/12/2018

Lee Candee
Agri Industries
1775 S Central
Sidney, MT 59270

Montana DNRC
Resource Development Bureau
PO Box 201601
Helena, MT 59620-1601

Regards: Sidney Water Users District 3 Phase 2 Pipeline Project

To whom it may concern

Water conservation is a vital issue in Eastern Montana. The Endangered Species Act and the fact that our population is growing will make water conservation an ever bigger issue in the future.

Sidney Water Users have taken the initiative to improve their irrigation system in the past by burying laterals and promoting pivot irrigation. It is vital to Montana that irrigation districts like Sidney Water Users remain a viable part of our communities. Sidney Water Users helps attract economic development and people to our rural communities.

Sidney Water User's application for a renewable resource grant will help them reach their goal of conserving our natural resources. It is our recommendation that this application be approved.

Sincerely,

1775 South Central Avenue Sidney, MT 59270 Ph: 406-488-8066 Fax: 406-488-8067

Stockman Bank
301 West Holly Street, Sidney, Montana 59270-4123
406.433.8600 FAX 406.433.8633

May 7, 2018

Montana DNRC
Resource Development Bureau
PO Box 201601
625 11th Avenue
Helena, MT 59620-1601

Re: Sidney Water Users Irrigation District (District 3 Main Canal Phase 2)

Dear Sirs:

What a great opportunity to write this letter in support of the **"Sidney Water Users Renewable Resource Grant Application".** Stockman Bank views this project as a win/win/win for Water Conversation, Producers, and our Local Economy.

Stockman Bank is the largest AG Lender in this area and recognizes the importance of this worthwhile project to our customers/producers. This project reduces operating expenses and creates new opportunities for production which in turn attracts other new business to our trade area. We just can't underestimate the significant direct and indirect positive impact of this project.

There is a direct correlation between improving Richland County Economics and improving the efficiency of our farmers/producers. Irrigation development increases land values, tax base and provides more dollars to support the businesses necessary to sustain growth in our community. Adding efficiency from this project provides more profits for our farmer/producers to expand their operations, update equipment, and provide financial stability for their operation and families.

Agriculture is the main-stay and life-blood of our community. This project applied for by the Sidney Water Users Association demonstrates forward thinking, conservation, and will benefit future water users/producers and businesses for generations.

Thank you for considering this worthwhile project.

Sincerely,

Garth N Kallevig
President Sidney Office

GNK/db

CERTIFICATE

The undersigned, Raymond Bell and Patricia Bell, hereby certify that they are the President and Secretary, respectively of the Board of Commissioners (Board) of Sidney Water Users Irrigation District (SWUID) and that at a monthly meeting of the Board, held in Sidney, MT on March 12, 2019, a quorum of the Board was present and the following Resolution was regularly moved, seconded, and adopted by a majority vote.

RESOLUTION

WHEREAS, the Board is the governing body of Sidney Water Users Irrigation District by the authority of its Bylaws; **AND**

WHEREAS, the Board has legal authority and desire to enter into the Bureau of Reclamation's WaterSMART program for FY2019; **AND**

WHEREAS, a grant proposal entitled "District 3 Main Canal Pipeline Project" has been reviewed by the Board; **AND**

WHEREAS, the Board understands that a grant of up to 50 percent of the total cost of the grant proposal will be paid by the Bureau of Reclamation to the SWUID as satisfactory progression of the project is made; **AND**

WHEREAS, the SWUID expects to enter into an agreement with the Bureau of Reclamation if the grant is awarded, for the purpose of, among other items, scheduling the completion of the project; **NOW THEREFORE BE IT**

RESOLVED, that the Board supports "District 3 Main Canal Pipeline Project" and that an application be made to Bureau of Reclamation for assistance under the WaterSMART Program; **NOW THEREFORE BE IT FURTHER**

RESOLVED, that the Board verifies the SWUID has the capability to provide the funding and in-kind contributions specified in the funding plan; **NOW THEREFORE BE IT FURTHER**

RESOLVED, that the Board authorizes its President, Raymond Bell, to enter into an agreement with the Bureau of Reclamation to perform the activities described in SWUID's "District 3 Main Canal Pipeline Project" WaterSMART Program application.

Dated this 12th day of March, 2019.

Raymond Bell
President

ATTEST:

Patricia Bell
Secretary

PERFORMANCE ENGINEERING

608 N. 29th Street
Billings, MT 59101
(406) 384-0080
performance-ec.com

LETTER OF TRANSMITTAL

DATE 3-15-2019	JOB 2019-023
TO **Mr. Darren Olson**	
RE **Application Submission SWUID**	
WATERSMART	

TO **Bureau of Reclamation**
PO Box 25007, MS 84-27814
Denver, CO 80225

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☐ _____

COPIES	DESCRIPTION
1	WaterSMART Grant Application 2019 for SWUID

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Reviewed as submitted ☐ Resubmit _____ copies for approval

☐ For your use ☐ Reviewed as noted ☐ Submit _____ copies for distribution

☒ As requested ☐ Returned for corrections ☐ Return _____ corrected prints

☐ For review and comment ☐ _____

☐ FOR BIDS DUE _____ 20____ ☐ PRINTS RETURNED AFTER LOAN TO US

Remarks: _____

Copy to: *File*

Signed: *Tamara Frank*