WATERSMART: WATER AND ENERGY EFFICIENCY GRANTS FOR FY 2020

LATERAL 1.6 CONVERSION PROJECT: TECHNICAL PROPOSAL & EVALUATION CRITERIA

BUFFALO RAPIDS IRRIGATION PROJECT - DISTRICT 2

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

PERFORMANCE ENGINEERING

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1.0 EXECUTIVE SUMMARY

The Buffalo Rapids Irrigation Project (BRIP) is located in southeastern Montana, covering a distance of nearly 64 miles from Miles City to Glendive. BRIP is split into two districts that supplies nearly 23,000 acres with irrigation water. District 1 is located in between Glendive and Fallon along the north side of the Yellowstone River. District 2 is located approximately 17 miles east of Miles City stretching just east Fallon along the south side of the Yellowstone River, where the project is located. There are five pumping locations along the Yellowstone River that are used to transport irrigation water. Other existing irrigation water delivery systems are gravity canals, laterals, and drains. BRIP has converted several open channel laterals to pipeline distributions to contend with the inefficiencies and ineffectiveness that are associated with open channel laterals.

The water delivery system for BRIP-2 consists of an approximately 30-mile Main Canal with multiple laterals and drains. Lateral 1.6 extracts water from the Main Canal and transports it roughly 4.0 miles before discharging back into the Yellowstone River. The BRIP infrastructure was constructed in the 1930's and has experienced significant overgrowth and degradation throughout the years.

The District 2 Lateral 1.6 Project will convert approximately 8,660 feet of the delivery system for Lateral 1.6 from open canal to closed conduit pipelines. In past projects by BRIP, the pipeline conversions have been a major success and have displayed considerable improvements in water delivery efficiency and effectiveness. Additionally, the pipeline conversions have Pipeline conversions have become a priority for BRIP because of these past successes and the inefficiencies present in the existing lateral systems throughout District 2.

Construction for Lateral 1.6 would include installing closed conduit pipe along an approximately 8,660 feet length of the lateral within the existing irrigation easement. Construction would occur starting in the fall of 2020 and likely will be completed in the spring of 2021. The maximum design capacity for Lateral 1.6 ranges from 13,240 to 7,225 gpm or 29.5 to 16.1 cfs based on channel geometry and a Bentley® FlowMaster® model

which can be found in Appendix A.

2.0 BACKGROUND DATA

2.1 Irrigation Project Description and Location

Lateral 1.6 is approximately 21,120 feet long, however this project will only be focusing on just under half of the overall length. The proposed project area is 8,660 feet long and provides irrigation water to approximately 440 acres of farmland. 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. The Montana NRCS Environmental Quality Incentives Program (EQIP) program has provided cost-share money for projects that conserve resources and it has been the primary source of funding for nearly every project completed within the BRIP.

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. BRIP-2 will complete the construction of the Lateral 1.6 Project and a Professional Engineer will provide engineering services as well as construction inspection as necessary. Based on past experience with similar projects construction will likely span one construction season.

2.3 Proposed Canal-To-Pipeline Conversion Project

Lateral 1.6 has been identified by BRIP as a lateral for conversion to a pipeline delivery system due to the significant transport inefficiencies and poor existing physical conditions happening along the entire length of the lateral. The substantial seepage loss from the existing open channel system results in an insufficient amount of water for the users near the end of the Lateral and requiring more water to be diverted from the Yellowstone River than is necessary. The pipeline system will reduce the amount of water taken from the Yellowstone River, eliminate seepage losses, increase conveyance efficiency and

effectiveness and reduce power consumption at the pump station. In past projects by BRIP, the pipeline conversions have displayed considerable improvements in water delivery efficiency and effectiveness. Pipeline conversions have become a priority for BRIP because of these past successes and the inefficiencies present in the existing lateral systems throughout District 2.

The project area was investigated and inspected by the BRIP and Performance Engineering (PE) to determine potential problem areas. A site visit revealed dense vegetative overgrowth throughout the entire system, poor channel conditions, aging structures that are deteriorating, and significant sediment build-up at headgates as well as the outfall back into the Yellowstone River. Based on the experience and benefits provided by recently completed projects within BRIP-2, the purpose of this project is to replace a large portion of the open canal with a closed pipeline system. The proposed pipeline will eliminate seepage losses and minimize conveyance losses in turn optimizing beneficial use of the water diverted from the Yellowstone River. See Section 5.6 of this report for a list of recent pipeline conversion projects within BRIP.

3.0 PROJECT LOCATION

The focus of this project will specifically be Lateral 1.6 which starts in Section 19, Township 12N, Range 51E, and ends in Section 16, Township 12N, Range 51E. The project is located approximately 1 mile west of Terry, MT. The latitude and longitude for the beginning of Lateral 1.6 is 46° 46' 41.21" N and 105° 21' 07.9" W, respectively. The latitude and longitude for the end of Lateral 1.6 is 46° 47' 55.73" N and 105° 19' 25.53" W, respectively. The project is located within the Yellowstone River Basin; Figure 1 shows the general location of Lateral 1.6 within BRIP District 2 in Prairie County.

Exhibit 1 shows the existing delivery system layout for District 2. Exhibit 2 shows the proposed improvements for the project.

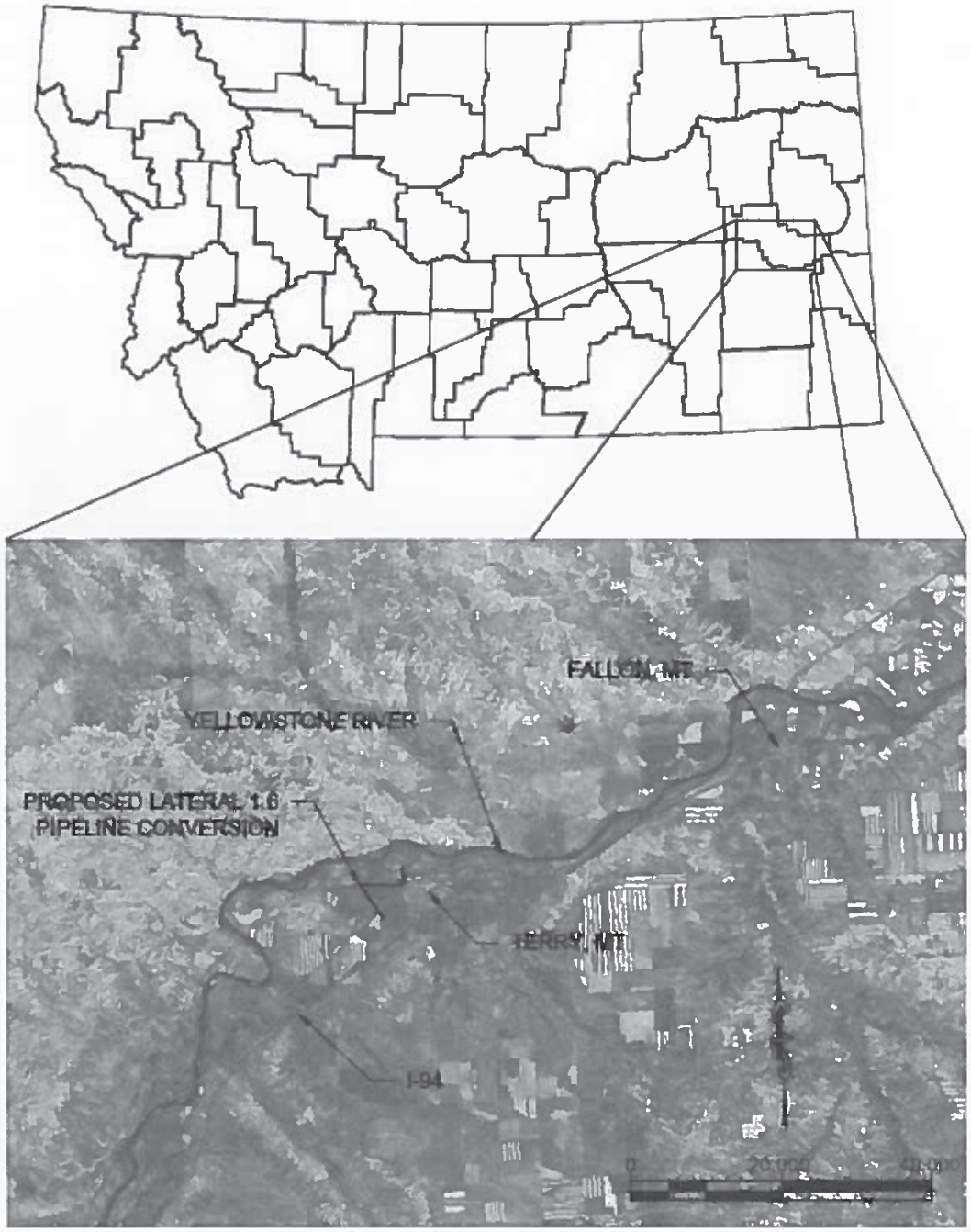


Figure 1: General Location Map

4.0 TECHNICAL PROJECT DESCRIPTON

4.1 Description

The Lateral 1.6 Conversion Project 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. The proposed pipeline would follow the existing canal route and be installed within the easement for Lateral 1.6. As displayed in Exhibit 2, the Lateral 1.6 pipeline would start at the existing intake on the Main Canal. The pipeline will consist of 24-inch, 21-inch, and 18-inch PIP pipe with the installation of field turnouts. Installation of flow measurement devices will be included at the field turnouts installed along Lateral 1.6. 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 Lateral 1.6, 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 Lateral 1.6 project would increase production throughout BRIP-2 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

Based on an Area Resource Management Plan and an Environmental Assessment done for BRIP in 1999, Lateral 1.6 serves a 440-acre area and has a total annual demand of 1,990 ac-ft (6.69 cfs; assuming a 150-day irrigation season) of water. The project will only address 8,660 feet of lateral. Lateral 1.6's estimated design capacity is a range from 29.5

to 16.1 cfs based on the Bentley® Flowmaster® model included in Appendix A. The current losses of the Lateral 1.6 system consist of the 3.66 cfs from seepage loss, and other minor losses such as evapotranspiration, conveyance inefficiencies, etc. However, these losses are not at a constant rate. At peak times, long watering sets result in more water being drawn from the Lateral than during other times of the season. This directly affects those turnouts near the end of the system as observed by BRIP personnel. For the existing system, an annual demand of 15 gpm/ac, and acreages of the fields served by Lateral 1.6 were assumed. Using soils information obtained from the NRCS Web Soil Survey website and approximate channel dimensions that were obtained by plan and profile of Lateral 1.6, a seepage loss was calculated. Seepage loss calculations can be found in Appendix B.

Conversion to pipeline for the Lateral 1.6 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 BRIP-2 to ensure that approximately 3.66 cfs or 355 million gallons per year of diverted water that was previous lost to seepage will be put to beneficial use. The proposed project materials include 4,680 feet of 24" 80 psi PIP, 3560 feet of 21" 80 psi PIP, 420 feet of 18" 80 psi PIP and associated 80 psi valves and fittings.

Flow meters will be installed at the field turnouts to track flows and document water conservation. Flow meters used in previous projects have proven useful in tracking instantaneous flows and maintaining total flows. Once the project is complete BRIP-2 will be able to track total water diverted from the Main Canal. BRIP-2 uses McCrometer McPropeller meters which maintain accuracies within 2%.

The Yellowstone River is one of Montana's largest and most frequently used rivers. It has an average flow rate of 10,500 cfs at Miles City, MT (upstream of the project location) according to USGS gaging station 06309000. The river is habitat for fish and wildlife as well as commercial and recreational uses. The proposed lateral conversion to a pipeline system would conserve up to 3.66 cfs during the irrigation season, therefore reducing the

amount of water diverted from the Yellowstone River, improving downstream flows, and decreasing sediment discharged back into the river.

5.2 Water Supply Reliability

The BRIP-2 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. At peak times, long watering sets result in more water being drawn from the Lateral than during other times of the season. This directly affects those turnouts near the end of the system as observed by BRIP personnel. Leakage and conveyance losses experienced through Lateral 1.6 contribute to water shortages and water scheduling issues. NRCS Seepage calculations of the Lateral 1.6 area showed that the area loses 3.66 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 BRIP-2 can reduce the amount of water diverted from the Yellowstone River while providing increases in Lateral 1.6 flows. The project will ensure that up to 1,088 acre-feet of water annually (355 million gallons) 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 flow meters installed at the Lateral 1.6 intake and field turnouts.

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 Shirley, Terry and Fallon. 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 Lateral 1.6 project will help provide.

BRIP-2 actively participates and partners with local and regional agricultural groups to better conserve water in the District. The Lateral 1.6 project is part of an over 25 year effort by BRIP and local agencies to improve irrigation in the area. BRIP-2 has acquired funding from the Montana DNRC and NRCS EQIP program for previous projects and continues to strive toward water conservation and effective resource production. Letters of support from local banks, hospitals, 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

Lateral 1.6 provides water for approximately 440 acres of land and is the second largest (in terms of acres served) lateral within District 2. Due to its size, the Lateral 1.6 Project will directly affect all irrigable acres within District 2. In the Buffalo Rapids area, the average watering duration is 10 to 14 days in length because of the inefficiency of the current distribution system. This long duration results in a decreased production from the irrigable fields and requires more water to adequately irrigate the land. Landowners often turn to flood irrigation in order to supply more water to their fields; in doing so puts their crops under a significant amount of strain caused by such irrigation methods. Flood irrigation techniques cause the plants closest to the water diversion point to become over-saturated and the plants furthest away from that point tend to not get enough water. Over-saturation puts the crop's root system under intense strain, resulting in limited growth and production. Furthermore, water lost to infiltration is common in these over-saturated areas because of the soil's moderate to high hydraulic conductivities.

5.4 Department of the Interior Priorities

The BRIP's primary goals for the Lateral 1.6 Project are to improve the efficiency and effectiveness, focusing on water conservation, provide resource production, create a more effective water delivery system and to improve irrigation efficiency. 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 BRIP has been assisted by this program on previous occasions where water conservation and irrigation efficiency were major project goals. It is the intention of BRIP to continue their work with the Montana DNRC while continuing conversations about potential future projects. Lastly, the project will combine state, federal, and private partnerships in the construction of the Lateral 1.6 improvements. BRIP will complete the installation of the pipeline conversion.

5.5 Implementation and Results

5.5.1 Project Planning

With the primary objective for the District being the conversion of its total system to pipeline delivery systems in order to meet short-term and long-term goals as described in the previous section, the Lateral 1.6 project helps to meet those goals. Over the past 25 years BRIP has converted approximately 80 percent of the open laterals to a pipeline delivery system. The District has installed roughly 26.0 miles of irrigation pipeline. "Improving Irrigation Efficiency and Water Quality" was originally funded as an EQIP Priority Area in 1998. Conservation plans and contracts have been completed on over 22,000 acres with EQIP funding at over $3 million and State funding at $750,000.

5.5.2 Performance Measures

The Lateral 1.6 project will implement and include irrigation flow measurement devices. BRIP-2 will continue to measure flows at each turnout when water is applied to the fields for existing pipeline conversions with flow meters. Those records will be kept by District staff and compiled by the District Manager. Energy consumption will continue to be metered and presented to the BRIP-2 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 Prairie County Conservation District that will help the irrigators maximize on-farm water management. All conversion projects will be recorded and documented by the NRCS and BRIP.

5.5.3 Readiness to Proceed

The Lateral 1.6 project will be ready for construction beginning October 2020. 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 BRIP-2 has worked to make sure the project is shovel ready upon completion of the funding package.

The successful implementation of Preferred Alternative will include the following tasks:

- **Task 1 – RRGL Grant Award.** It is anticipated that the grant awards will be released in July 2020.
- **Task 2 – Pipeline Design.** BRIP will contract with a licensed professional engineer to develop the final pipeline system design, conduct inspections, and provide construction administration, as necessary. This task will be completed by August - October 2020.

- **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 will submit the pipeline design and specifications for review by BRIP. All comments and concerns will be addressed and the plans and specifications will be finalized. This task will be completed by October 2020.
- **Task 5 – Materials Procurement.** BRIP will solicit materials prices from multiple material suppliers for construction of the project. All materials purchases will be done in a manner which meets procurement procedures of the State of Montana. This task will be completed in October 2020.
- **Task 6 – Pipeline Installation.** BRIP will complete the construction and installation of the Preferred Alternative. This task will be completed in March 2021.
- **Task 7 – Construction Closeout.** BRIP, in coordination with the Engineer, will work to assure that all issues with installation have been addressed. The Engineer will also develop a set of as-built plans to document any changes in the field. This task will be completed in April 2021.
- **Task 8 – Grant Closeout.** BRIP will work with the Engineer to assure that proper documentation including invoices, reports, etc. have been submitted and the grant will be closed. This task will be completed in May 2021.
- **Task 9 – Project Completion.** The estimated project completion is May 2021.

Coordination of the project will take place between all local, state, and federal agencies involved. The majority of project coordination will occur between the BRIP, DNRC, USBR, and the contracted engineering firm. Project Manager Tim Kortum (BRIP) 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 BRIP 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 BRIP from the Project Manager and contracted construction inspector on progress made. The BRIP Project Manager will be responsible for the completion and submittal of all necessary documentation and billing to the DNRC and BRIP board. The contracted engineer's responsibilities include progress reporting and grant quarterly reporting. BRIP Project Manager Tim Kortum will be the final authority on all payments, reports, and contracts for the project.

5.6 Nexus to Reclamation Project Activities

Over the past 25 years BRIP has converted approximately 80 percent of the open laterals to a pipeline delivery system. The District has installed roughly 26.0 miles of irrigation pipeline. Table 1 shows a list of pipeline conversion projects within BRIP that are in progress or have been completed.

Table 1: Completed Canal To Pipeline Projects

Completed Canal to Pipeline Conversion Projects		
Year	**Lateral**	**Pipeline Length (ft)**
2014	Lat 20.6 Phase 1	9,977
2012	Lat 26.4	10,400
2011	Lat 7.6	10,952
2011	Lat 8.7	1,500
2009 & 2010	Lat 2.9	20,162
2009	Lat 10.2	3,980
2008-2010	Lat 34.5	9,940
2006	Lat 34.0	4,435
2007	Lat 30.0	7,709
2007	Lat 20.4	4,027
2007	Lat 20.0	2,482
2006	Lat 34.5	1,800
2006	Lat 15.4	5,455
2005	Lat 11.8	7,270
2005	Lat 10.9	4,720
2005	Lat 28.7 #1	9,067

2005	Lat 28.7 #2	10,802
2001	Lat 4.7	12,610

BRIP is a contracted irrigation district with Reclamation and the USBR. The project does not include Reclamation lands or facilities.

5.7 Additional Non-Federal Funding

The Montana DNRC has committed $125,000 of that budget while the BRIP has committed $241,307.40 for completion of Lateral 1.6. That leaves $300,000 being applied for through this WaterSMART application. The overall construction cost for the Lateral 1.6 project is $666,307.40. The non-federal percentage of funding for the project is 55.0% which exceeds the 50% WaterSMART requirement.

EXHIBITS

EXISTING & PROPOSED

PERFORMANCE ENGINEERING

PROJECT TITLE: DISTRICT 2 - LATERAL 1.6 PIPELINE CONVERSION	DRAWN BY: XXX	CLIENT: BUFFALO RAPIDS IRRIG. PROJECT - DISTRICT 2 P.O. Box 907 TERRY, MT 59349 (406) 989-0498	PERFORMANCE ENGINEERING 608 NORTH 29TH STREET BILLINGS, MT 59101 (406) 384-0080 www.performance-ec.com	EXHIBIT EX 1
SHEET TITLE: EXISTING SYSTEM	DATE: Sep-19			
	CHECKED BY: XXX			

PROJECT TITLE: DISTRICT 2 - LATERAL 1.6 PIPELINE CONVERSION	DRAWN BY: XXX	CLIENT: BUFFALO RAPIDS IRRIG. PROJECT - DISTRICT 2 P.O. Box 907 TERRY, MT 59349 (406) 989-0498	PERFORMANCE ENGINEERING 609 NORTH 29TH STREET BILLINGS, MT 59101 (406) 384-0080 www.performance-e.com	EXHIBIT EX 2
SHEET TITLE: PROPOSED SYSTEM	DATE: Sep-19			COPYRIGHT 2019 ©
	CHECKED BY: XXX			

APPENDIX A

PRELIMINARY HYDRAULIC ANALYSIS

PERFORMANCE ENGINEERING

BRIP District 2 - Lateral 1.6 Conversion

Preliminary Hydraulic Analysis - FlowMaster Results

Buffalo Rapids Irrigation Project - District No. 2

Revised September 27, 2019

Location	Input Data					Results											
Existing Channel	Roughness Coefficient	Channel Slope (ft/ft)	Side Slopes (H:V)	Bottom Width (ft)	Q (cfs)	Normal Depth (ft)	Flow Area (sf)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Top Width (ft)	Critical Depth (ft)	Critical Slope (ft/ft)	Velocity (fps)	Velocity Head (ft)	Specific Energy (ft)	Froude Number	Flow Type
STA: 0+00 to 1+70	0.025	0.0005	1.5	4.0	29.5	2.3	17.62	12.45	1.41	11.03	1.04	0.01093	1.67	0.04	2.39	0.23	Sub
STA: 1+70 to 25+20	0.025	0.001	1.5	4.0	29.0	1.95	13.49	11.02	1.22	9.84	1.03	0.01096	2.15	0.07	2.02	0.32	Sub
STA: 25+20 to 39+00	0.025	0.001	1.5	3.0	26.4	2.1	12.45	10.39	1.20	9.15	1.11	0.01115	2.12	0.07	2.12	0.32	Sub
STA: 39+00 to 64+90	0.025	0.00085	1.5	3.0	26.7	2.14	13.33	10.73	1.24	9.43	1.11	0.01113	2.00	0.06	2.21	0.30	Sub
STA: 64+90 to 84+90	0.025	0.001	1.5	3.0	26.4	2.1	12.45	10.39	1.20	9.15	1.11	0.01115	2.12	0.07	2.12	0.32	Sub
STA: 84+90 to 95+20	0.025	0.0005	1.5	3.0	24.6	2.34	15.28	11.45	1.33	10.03	1.06	0.01125	1.61	0.04	2.38	0.23	Sub
STA: 95+20 to 117+00	0.025	0.0005	1.5	3.0	18.5	2.0	12.37	10.36	1.19	9.12	0.90	0.01165	1.50	0.03	2.08	0.23	Sub
STA: 117+00 to 138+10	0.025	0.0009	1.5	3.0	16.1	1.64	8.99	8.93	1.01	7.93	0.83	0.01186	1.79	0.05	1.69	0.30	Sub

Location	Input Data							Results								
Proposed Pipeline	Roughness Coefficient	Pressure 1 (psi)	Elev. 1 (ft)	Elev. 2 (ft)	Length (ft)	Diameter (in)	Q (cfs)	Pressure 2 (psi)	Headloss (ft)	Energy Grade 1 (ft)	Energy Grade 2 (ft)	Hydraulic Grade 1 (ft)	Hydraulic Grade 2 (ft)	Flow Area (sf)	Wetted Perimeter (ft)	Velocity/ V. Head (fps/ft)	Friction Slope (ft/ft)
STA: 0+00 to 47+00 (24")	0.01	15	2273.80	2256.50	4700	24.0	15.0	17	12.2	2308.06	2295.83	2307.71	2295.48	3.1	6.3	4.77/0.35	0.003
STA: 47+00 to 90+00 (21")	0.01	21	2256.60	2247.83	4300	21.0	12.0	24	14.6	2311.25	2296.65	2310.86	2296.27	2.4	5.5	4.99/0.39	0.003
STA: 90+00 to 138+10 (18")	0.01	15 *	2247.83	2238.82	4810	18.0	9.2	21 *	21.8	2295.67	2273.84	2295.25	2273.42	1.8	4.7	5.21/0.42	0.005

* Pressure locations are swapped for this scenario. There is 15 psi @ Pressure 2 and 21 psi @ Pressure 1.

APPENDIX B

SUPPORTING DOCUMENTATION

PERFORMANCE ENGINEERING

Water Loss Calculations

Job Name: Lateral 1.6
Job No.: 2018-004
Date: 3/1/2018
Name: TRT

Track		0+00 - 1+70	1+70 - 25+20	25+20 - 39+00	39+00 - 64+90	64+90 - 84+90	84+90 - 95+20	95+20 - 117+00	117+00 - 138+20	Totals
L	ft	170	2350	1380	2590	2000	1030	2180	2120	13820
s	ft/ft	0.0005	0.001	0.001	0.00085	0.001	0.0005	0.0005	0.0009	
Q	cfs	29.5	29	26.4	26.7	26.4	24.6	18.5	16.1	
Q_{SEEP}	cfs	0.05	0.67	0.36	0.68	0.53	0.30	0.57	0.50	3.66
Q_{SEEP}	ac-ft/yr	15.78	197.96	107.89	202.48	156.36	89.35	170.43	147.57	1087.82
Q_{SEEP}	MG/yr	5.14	64.51	35.16	65.98	50.95	29.12	55.53	48.09	354.47
Pipe Size	inches	42	36	36	36	36	42	36	30	

K_{SAT} Calculations			
Soil Type	Low K_{SAT}	High K_{SAT}	
42-Degrand loam	0.57	1.98	in/hr
73-Kobase silty clay loam	0.06	0.2	in/hr
76-Kremlin loam	0.57	1.98	in/hr
93-Marias silty clay	0	0.06	in/hr
94-Marvan silty clay	0	0.06	in/hr
115-Spinekop silty clay loam	0.2	0.57	in/hr
132-Yamacall loam	0.57	1.98	in/hr
141-Zatoville silty clay loam	0.06	0.2	in/hr
Average	0.25	0.88	in/hr
Average	0.5075	1.7575	ft/day

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.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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: Prairie County, Montana
Survey Area Data: Version 17, Sep 13, 2017

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

Date(s) aerial images were photographed: Jul 27, 2014—Sep 26, 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
42	Degrand loam, 0 to 4 percent slopes	12.9	3.4%
73	Kobase silty clay loam, 0 to 2 percent slopes	52.0	13.5%
76	Kremlin loam, 0 to 2 percent slopes	119.9	31.2%
93	Marias silty clay, 0 to 2 percent slopes	3.3	0.8%
94	Marvan silty clay, warm, 0 to 2 percent slopes	146.0	38.0%
115	Spinekop silty clay loam, 0 to 2 percent slopes	39.7	10.3%
132	Yamacall loam, warm, 2 to 8 percent slopes	1.3	0.3%
141	Zatoville silty clay loam, loamy substratum, 0 to 2 percent slopes	9.2	2.4%
Totals for Area of Interest		**384.4**	**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

GLENDIVE, MONTANA (243581)

Period of Record Monthly Climate Summary

Period of Record : 01/01/1893 to 06/10/2016

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	26.4	31.3	43.3	60.1	71.2	80.0	89.0	87.7	75.6	62.2	43.4	30.9	58.4
Average Min. Temperature (F)	4.0	7.7	19.1	33.0	43.7	53.0	58.8	56.0	44.9	33.8	20.9	9.6	32.0
Average Total Precipitation (in.)	0.44	0.37	0.65	1.17	2.08	3.07	1.82	1.38	1.19	0.85	0.45	0.45	13.93
Average Total SnowFall (in.)	5.8	4.6	5.6	1.9	0.4	0.0	0.0	0.0	0.1	1.1	3.6	5.4	28.6
Average Snow Depth (in.)	4	3	1	0	0	0	0	0	0	0	1	2	1

Percent of possible observations for period of record.
Max. Temp.: 97.4% Min. Temp.: 97.5% Precipitation: 97.7% Snowfall: 94.4% Snow Depth: 54.9%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

TERRY, MONTANA (248165)

Period of Record Monthly Climate Summary

Period of Record : 05/01/1949 to 06/10/2016

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	26.1	33.3	43.9	58.1	69.3	78.8	88.0	87.2	74.7	61.2	43.9	31.8	58.0
Average Min. Temperature (F)	1.0	7.9	17.8	30.4	41.6	51.1	56.5	53.7	41.9	30.6	17.8	6.3	29.7
Average Total Precipitation (in.)	0.26	0.26	0.41	1.10	2.05	2.35	1.60	1.30	1.05	0.80	0.30	0.23	11.71
Average Total SnowFall (in.)	3.7	2.9	2.7	0.8	0.2	0.0	0.0	0.0	0.1	0.3	1.1	2.5	14.3
Average Snow Depth (in.)	1	1	0	0	0	0	0	0	0	0	0	1	0

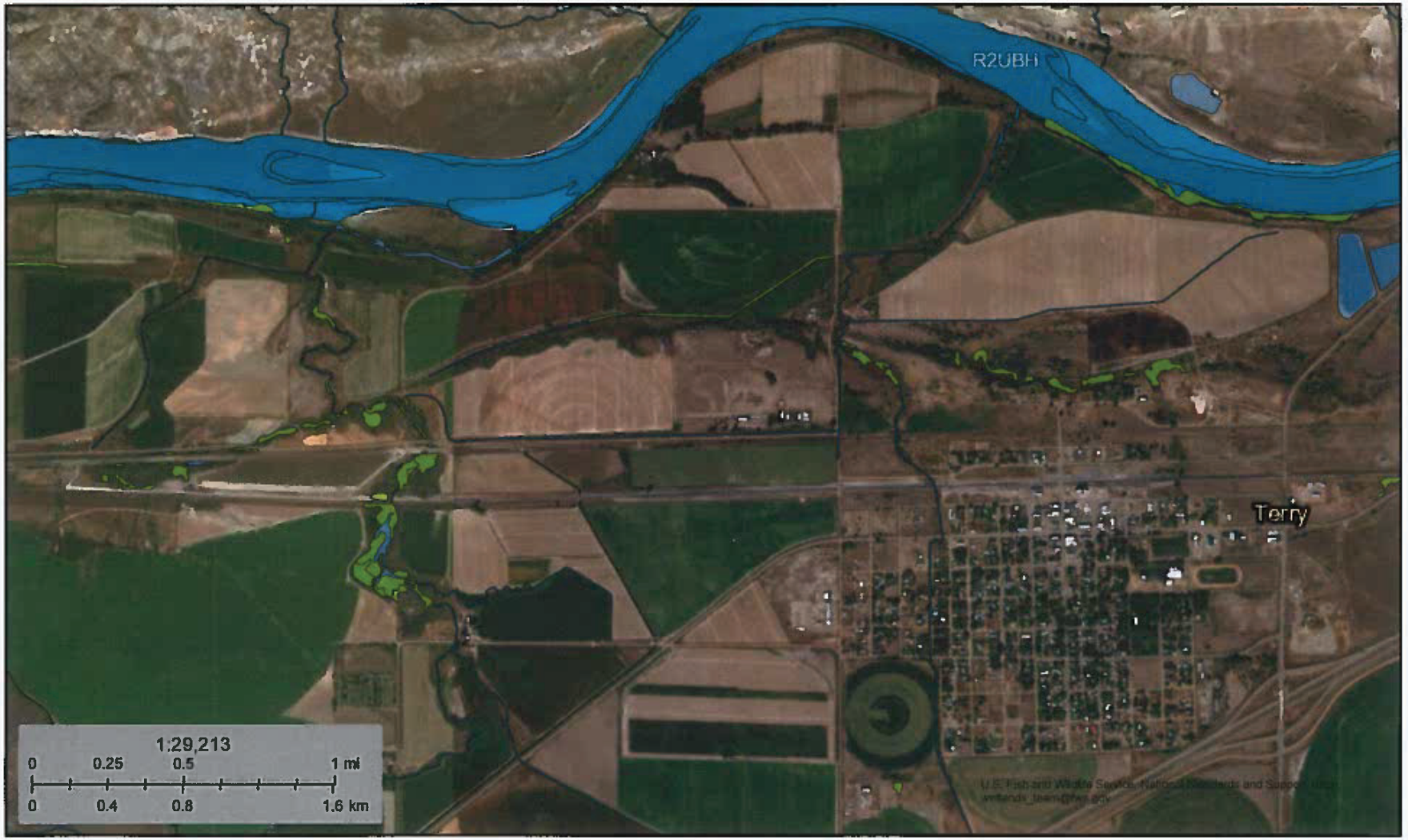
Percent of possible observations for period of record.
Max. Temp.: 97.8% Min. Temp.: 97.8% Precipitation: 94.4% Snowfall: 83.9% Snow Depth: 59.5%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

U.S. Fish and Wildlife Service

National Wetlands Inventory

BRID 2 Lateral 1.6



January 29, 2018

Wetlands

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

APPENDIX C

LETTERS OF SUPPORT

PERFORMANCE ENGINEERING

Prairie County
Economic Development
Council

Lance Kalfell
Chairman
42 Montana Road
Terry, MT 59349
(406) 635-5312

•••••

Sharla Sackman
Secretary/Treasurer
P.O Box 7
Terry, MT 59349
(406) 635-2121

A coordinated Prairie County effort which improves the quality of life and produces a sustainable population through a viable and diversified economy.

March 1, 2018

Buffalo Rapids Irrigation District No. 2
PO Box 907
Terry, MT 59349

To Whom It May Concern:

The Prairie County Economic Development Council supports Buffalo Rapids Irrigation District No. 2's application for a grant for water conservation and irrigation efficiency projects in the Shirley, Terry, and Fallon Units.

Prairie County's economy mirrors that of the rest of the state in that agriculture is the most important industry in the county. The Yellowstone Valley offers agriculture producers the opportunity to irrigate cash crops such as wheat, sugar beets soybeans, and pinto beans, and forage crops intended for livestock consumption such as alfalfa and silage corn, adding to the value of the ag industry in Prairie County.

Historically, irrigation of land under the Buffalo Rapids Irrigation Project has played an important role in fostering permanent settlement and a stable economy for the local area. It is imperative that Buffalo Rapids continues to update and improve its infrastructure to provide for the modern demands of farming practices and efficient water use. Not only do infrastructure improvements contribute to farm efficiency, but they are also important for public safety as Buffalo Rapids transitions from open ditches and siphons to pipelines.

The Prairie County Economic Development Council appreciates the influence that Buffalo Rapids Irrigation District has on Prairie County's local economy beyond agriculture with respect to cultural tourism based on the history and natural resources in the Yellowstone Valley as well as enhanced hunting and fishing opportunities in the county that area businesses have come to depend on.

For these reasons, the Prairie County Economic Development Council enthusiastically supports Buffalo Rapids Irrigation District No. 2's application for a grant for water conservation and irrigation efficiency projects in the Shirley, Terry, and Fallon Units. Thank you for your consideration of this worthwhile project.

Sincerely,

Sharla Sackman
PCEDC Secretary/Treasurer

Prairie Plumbing LLC

Tanner Schillinger, Owner / Plumber
PO Box 567, Terry, MT 59349
(406) 951-3680
prairieplumbing45@gmail.com

4/1/18

To whom it may concern:

As a business owner and resident of Prairie County and the town of Terry, I strongly support the installation of any pipeline conversion throughout District #2. The more economical and efficient the project can be, the more profitable our community will be.

As a former employee of Buffalo Rapids, I have been part of both the installation and operation of current pipelines in the project. Installing more pipelines will greatly diminish the workload placed on the employees, thus allowing them to be more available to the farmers they serve and their own families.

Lateral 1.6 serves a large portion of the Terry area. It also runs adjacent to the Prairie County Fairgrounds. This adds a high level of insecurity for people and families who frequent the activities that are held at the fairgrounds. A new pipeline will also benefit the fairgrounds property by allowing more efficient watering of the grounds. In conclusion, efficiency equals a successful and profitable community.

Tanner Schillinger, owner
Prairie Plumbing LLC

TERRY PUBLIC SCHOOLS

P.O. Box 187 | 215 E. Park | Terry, MT 59349 | 406-635-5533 | Fax: 406-635-5705
Bolin School Gr. K-3 Grandey School Gr. 4-6 High School Gr. 7-12
Learning Today...Leading Tomorrow

Buffalo Rapids Irrigation District No. 2
PO Box 907
Terry, MT 59349
April 2, 2018

To Whom It May Concern:

This letter is being written in support of the Lateral 1.6 Pipeline Conversion Project, Terry Division that Buffalo Rapids Irrigation District No. 2 is applying for. Terry Public Schools has 143 students, with many of them living in the town of Terry. We feel the pipeline will create a safer environment for our young people, as well as promote our Terry as being a more attractive town for more families to relocate.

If I may be of further assistance, please do not hesitate to contact me, (406) 635-5533.

Sincerely,

Angela Williams

Angela Williams, Superintendent

TRUST WORTHY HARDWARE STORES

NETZER HARDWARE COMPANY

Household appliances - Plumbing - Heating - Paints

March 2, 2018

Buffalo Rapids Irrigation District 2

PO Box 907

Terry, MT 59349

To Whom It May Concern:

Netzer Trustworthy Hardware supports Buffalo Rapids Irrigation District No. 2's request for a grant for its water conservation and irrigation efficiency projects in the Shirley, Terry and Fallon units. Agriculture is a very important industry in Prairie County. This project would allow our area farmers to irrigate crops such as wheat, sugar beets, soybeans and pinto beans as well as the crops used to feed livestock in the area.

We feel this grant would allow Buffalo Rapids to continue its role in providing water to area famers in a safe and efficient manner by allowing them to update and improve its system transitioning from open ditches and siphons to pipelines.

We would appreciate your consideration of this very worthwhile project for Prairie County.

Laris and Elden Netzer

Laris and Elden Netzer

DALE I GALLAND

BUFFALO RAPIDS IRRIGATIONS DISTRICT NO. 2
PO BOX 907 | TERRY MT 59349

PRAIRIE UNIQUE
114 S Logan Ave, PO BOX 5
TERRY MT 59349
prairieunique@hotmail.com
406-635-5598

March 5, 2018

Dear Buffalo Rapids Irrigations District No. 2,

To Whom It May Concern:

This letter is in support of the Buffalo Rapids Irrigation District No. 2's application for a grant for water conservation and irrigation efficiency projects in the Shirley, Terry and Fallon units.

Our local economy is very agriculturally based and the efforts of the Buffalo Rapids Irrigation District has played and continues to play a very important role for Prairie County.

My retail business is enhanced by tourism and efficient water use will provide a strong future for opportunities of tourists coming to hunt or fish or safely explore the area.

I sincerely support the grants for water conservation and irrigations efficiency projects the BRBOC is seeking.

Sincerely,

Dale I Galland

406.874.1804

WATTS Insurance

406.635.5555

2503 Main St. PO Box 370
Miles City, MT 59301

116 S Logan Ave PO Box 35
Terry, MT 59349

March 7, 2018

To whom it may concern:

Watts Insurance is highly in favor of the lateral 1.6 pipeline conversion project. From an insurance company standpoint, with this open ditch being so close to town and the county fairgrounds, putting the water in a pipeline would be much safer.

From an old farmer that grew up on the Buffalo Rapids Irrigation Project, the function and dependability from the pipeline is a huge benefit. Terry & Prairie County are both dependent on the continuing success of agriculture in our area, and firmly believe the aggressive approach is very wise.

Watts Insurance is highly supportive of this endeavor to improve the water system.

Sincerely,

Ron

Ron Watts

Farmer's Union Oil Co.

P.O. Box 460
Circle, Montana 59215
(406) 485-3475

P.O. Box 67
Terry, Montana 59349
(406) 635-5479

03/01/2018

Proudly Serving Our Customers for Over 80 Years

To Whom It May Concern:

The Farmer's Union Oil Co. Of Terry are in full support of the Lateral 1.6 Pipeline Conversion Project.

We would like to see this project move in a forward direction. We feel the safety and water conservation needs addressed.

We fully endorse Lateral 1.6 Pipeline Conversion Project

Sincerely,

Dawnya Kirkpatrick

Dawnya Kirkpatrick

Secretary at Farmer's Union Oil

GET R DONE REPAIR L.L.C

107 SPRING STREET, TERRY, MT. 59349

03/01/2018

To Whom It May Concern:

Get R Done Repair L.L.C of Terry would like to show their support of the Lateral 1.6 Pipeline Conversion Project. We believe this project would address the Safety issues and conserve on our water resources that would benefit our community.

We fully endorse Lateral 1.6 Pipeline Conversion Project

Sincerely,

Daniel Kirkpatrick

March 5, 2018

Kristy Shannon
PO Box 328
Terry, MT 59349

Buffalo Rapid Irrigation District 5
PO Box 907
Terry, MT 59349

To Whom It May Concern:

As a parent and 4-H Leader in Prairie County I support Buffalo Rapids Irrigation District No. 2's application for the Department of Natural Resources and Bureau of Reclamation grant funding to install a pipeline for Lateral 1.6 that would convert it from an open ditch.

The current open ditch runs adjacent to our local Fairgrounds, so many of our children, family, and friends gather for a wide variety of activities. The open ditch poses a large danger to our children and pets. The installation of a pipeline would remove this danger.

Along with improving the safety of our community it would also increase crop production which will increase producer profits as well as boost our local economy.

Please consider Buffalo Rapids Irrigation District No. 2 for your grant.

Sincerely,

Kristy Shannon

Prairie
Est. 1915
County

BOARD OF COUNTY COMMISSIONERS
Dennis Teske, Chairman Deanna Bockness, Member Todd Devlin, Member

P.O. BOX 125, Terry, MT 59349
Phone: 406-635-5575 Fax 406-635-5576
Email: clerkrecorder@prairiecounty.org
www.prairie.mt.com

March 6, 2018

Buffalo Rapids Irrigation District No. 2
Po Box 907
Terry, MT 59349

To Whom It May Concern:

The Prairie County Commissioners support the Buffalo Rapids Irrigation District No. 2's application for a grant for water conservation and Irrigation Efficiency Projects in the Shirley, Terry and Fallon Units.

Buffalo Rapids Irrigation District provides a critical service to the agriculture producers that are the back bone of the economy in Prairie County. The Prairie County Commissioners recognize how important it is for Buffalo Rapids to continue to update and improve its infrastructure to provide for the modern demands of farming practices and efficient water use. Not only do infrastructure improvements contribute to farm efficiency, but they are also important for public safety as Buffalo Rapids transitions from open ditches and siphons to pipelines. This is especially relevant to Prairie County as the project would replace a siphon and open lateral that runs along the entire southern boundary of the Prairie County Fairgrounds property with a pressurized pipeline. Currently the open lateral, as well as siphon, pose a safety risk to fairgrounds users that could be mitigated with the installation of the pipeline.

The conversion of open canals to enclosed or pressurized pipeline, installation of canal liners, and upgrade of pumps will contribute significantly to conservation of precious water resources in Prairie County while also improving public health and safety.
Your careful consideration of the worthwhile project is appreciated.

Sincerely,

Prairie County Commissioners

March 12, 2018

Buffalo Rapids Irrigation District No.2
PO Box 907
Terry, MT 59349

To Whom It May Concern:

Prairie Action League, a non-profit organization, supports Buffalo Rapids Irrigation District No. 2's application for the grant which will fund the Lateral 1.6 pipeline conversion project.

Prairie Action League along with many residents of Prairie County are in favor of a pipeline being installed, replacing the open ditch. Safety for children has been a concern especially the area by the fairgrounds where the open ditch runs right by the fairgrounds.

The members of the organization support the Buffalo Rapids District 2 in going forth with the conversion project.

Sincerely,

Heather L Carter

Heather Carter- Secretary

March 13, 2018

Buffalo Rapids Irrigation District No. 2
PO Box 907
Terry, MT 59349

To Whom It May Concern:

Harding Land & Cattle Co., a farming and ranch operation in Prairie and Custer County, is in support and endorses the Lateral 1.6 Pipeline Conversion Project. Harding Land & Cattle recognizes how important it is for Buffalo Rapids to continue to improve their operation for water conservation and lessen the risk factors for its employees and community members associated with open ditches and siphons.

Harding Land and Cattle has benefited from an existing pipeline that supplies water to the farmland which has increased crop production and quality of the land.

Harding Land & Cattle supports the District's application for a grant to fund the Lateral 1.6 pipeline project.

Sincerely,

Richard Harding
President

Prairie County 4-H Council
PO Box 7
Terry, MT 59349

(406) 635-2121
prairie@montana.edu

March 1, 2018

To Whom It May Concern:

The Prairie County 4-H Council supports Buffalo Rapids Irrigation District No. 2's application for a grant for water conservation and irrigation efficiency projects.

The Prairie County Fairgrounds is directly impacted by the Lateral 1.6 Pipeline Conversion Project in the Terry Unit. Prairie County 4-H members utilize the Prairie County Fairgrounds not only during the Prairie County Fair, but for 4-H club meetings, project workshops, and community service project.

The grant project would replace an open lateral running along the entire southern boundary of the Prairie County Fairgrounds property with a pressurized pipeline. The open lateral runs next to the livestock show arena and also has to be crossed to access the west end of the grandstands. Consequently, the open lateral as well as siphon do pose a safety risk to 4-H members and volunteers.

For these reasons, the Prairie County 4-H Council fully supports Buffalo Rapids Irrigation District No. 2's application for a grant for water conservation and irrigation efficiency projects.

Sincerely,

Holly Eaton

Holly Eaton
Prairie County 4-H Council President

Prairie Community Hospital

Foundation

3/22/2017

Buffalo Rapids Irrigation District No. 2
Po Box 907
Terry, MT 59349

To whom it may concern:

I write on behalf of Prairie Community Hospital Foundation in support of the Buffalo Rapids Irrigation District No. 2's application for a grant to fund water conservation and irrigation efficiency projects in the Terry, Shirley, and Fallon Units. We strongly support this grant application to ensure safety around the current area. The current irrigation system poses a safety risk around Prairie County Fairgrounds due to children showing their 4-H projects at the fairgrounds near the open ditch.

Prairie Community Hospital Foundation recognizes the importance of Buffalo Rapids plans to update and improve infrastructure around this community. Irrigation plays a major role in this community and provides families in Prairie County to make a living. Also, allowing new opportunities for community growth. Growth in our community impacts businesses and the healthcare system of Prairie County.

The Prairie Community Hospital Foundation would like to emphasize the safety in installing a Lateral 1.6 Pipeline Conversion. In conclusion the Prairie Community Hospital Foundation strongly supports the Buffalo Rapids Irrigation District No. 2's application for a grant for water conservation and irrigation efficiency projects in Shirley, Terry and Fallon Units.

Sincerely,

Kaylee Rowlison

Kaylee Rowlison
Foundation Director

312 S Adams Ave – PO Box 66 • Terry, MT 59349-0066
Phone: (406) 635-5511 Fax: (406) 635-5510 E-Mail: pchfoundation@pchc-mt.com

PO BOX 100 TERRY MT 59349 (406)951-1834

TERRY ROPING CLUB

March 16th, 2018

Buffalo Rapids Irrigation District No. 2
Po Box 907
Terry MT 59349

To Whom It May Concern,

The Terry Roping Club would like to extend their support to Buffalo Rapids Irrigation District No. 2 for the Lateral 1.6 Pipeline Conversion Project. We believe this project would improve the safety around the publicly used fairgrounds by which the open ditch runs next too. This project would benefit the farmers along the upgrade area whom use it to water crops. It would be more efficient than the current ditch as well by conserving water, power, and maintenance time. The fairgrounds would then be able to add features that safely and efficiently water grass. As well as have the possibilities of using such water to fill water trucks for maintenance projects, events held at the fairgrounds, or possibly fire trucks north of the tracks in case of emergencies. Prairie County is very largely populated by farm land and Buffalo Rapids has helped in the improvements and efficiency of making sure it is economically possible for some of those farms to irrigate many cash crops.

In closing the Terry Roping Club would like to generously extend their support to the Buffalo rapids irrigation Districts No. 2's application for a grant to help in the completion of the lateral 1.6 Pipeline Conversion Project.

Sincerely,

Aaron Martinson
Terry Roping Club President

Eastern Montana LAND & HOME

www.mtlandhome.com

Tracey R. Feickert, Broker
Cell/Text: (406) 855-1696
Office: (406) 635-LAND Fax: (406) 635-HOME
Email: bigsky@mtlandhome.com

March 22, 2018

Buffalo Rapids Irrigation District No. 2
P.O. Box 907
Terry, MT 59349

To Whom it May Concern:

My name is Tracey Feickert and I own a real estate brokerage company headquartered out of Prairie County. I have been in the real estate business here for 16 years. I am writing in support of this pipeline because I believe it provides more efficient irrigation opportunities for producers, which positively contributes to the agriculture industry in Prairie County.

Currently the operators along the open ditch lateral struggle to water their crops. I personally live near the open ditch lateral and I believe that it is wasting and leaking a lot of water as I have noticed the county road, road ditches and areas along the lateral to be flooded. In July 2017, I saw a farmer's pickup sit for over a week in a mudhole created by the lateral's seepage. The lateral is obviously archaic and has outlived its usefulness.

This area relies on the irrigation of crops to provide a stable economy for the local area. I believe it is extremely important for Buffalo Rapids to update and improve their existing infrastructure.

Sincerely,

Tracey R. Feickert, Broker/Owner

March 22, 2018

Buffalo Rapids Irrigation District No. 2
P.O. Box 907
Terry, MT 59349

To Whom It May Concern:

The purpose of this letter is to support the Lateral 1.6 Pipeline Conversion Project.

We currently operate approximately 420 acres of irrigated land which will be directly affected by this pipeline. The current open ditch lateral has become dilapidated and obsolete. The water loss from both evaporation and seepage has become alarming. The open ditch lateral requires constant attention by Buffalo Rapids employees in order to supply almost enough water for the fields it serves. Our operation currently has to run a diesel tractor 24 hours a day during the irrigation season in order to irrigate with the open ditch lateral. If approved, the new pipeline will require little to no attention, therefore reducing the workload and carbon footprint of not only the Buffalo Rapids Irrigation District but also of the local farms it serves. Agriculture is the most important industry in Prairie County and the ability to save thousands of dollars alone on our farm frees up resources and money that could be used elsewhere for improvements. We also believe that a pressurized pipeline would increase crop production and quality, having water more readily available when needed.

Beyond the scope of our personal agenda, the open ditch lateral has become a danger to the public by seeping along county roads and causing adverse driving conditions and also being too easily accessible by small children as it passes directly by the Fairgrounds and playground.

We currently anticipate the majority of our acres to be seeded into alfalfa and corn, which are both high water usage crops. Knowing this, we are concerned about whether or not this new pipeline will be able to supply enough water. Oversizing of the pipe could be very important, as all farmers seem to need water at the same time. In the past 3 years, our water consumption has exceeded the allowable amount of water, resulting in water overage charges, increased workload, increased pumping costs, and an overall inefficient irrigation system.

Thank you for considering this project.

Sincerely,

H. Jackson Dion

H. Jackson Dion
Yellowstone River Farms, LLC

Prairie County Fair

Address: P.O. Box 7
Terry, MT 59349

Phone: 406-635-2121
406-635-5505

Fax: 406-635-5576

March 2, 2018

Buffalo Rapids Irrigation District No. 2
PO Box 907
Terry, MT 59349

To Whom It May Concern:

The Prairie County Fair Board supports Buffalo Rapids Irrigation District No. 2's application for a grant for water conservation and irrigation efficiency projects in the Shirley, Terry, and Fallon Units.

The Prairie County Fairgrounds is directly impacted by the Lateral 1.6 Pipeline Conversion Project in the Terry Unit. This project would replace an open lateral running along the entire southern boundary of the Prairie County Fairgrounds property with a pressurized pipeline. The open lateral runs next to the livestock show arena and also has to be crossed to access the west end of the grandstands. Consequently, the open lateral as well as siphon do pose a safety risk to fairgrounds users. The Prairie County Fairgrounds has historically irrigated from that lateral so the upgrade to pressurized pipeline would also benefit the Fairgrounds in that manner.

Indirectly, the Prairie County Fair also benefits from the positive economic effects of Buffalo Rapids Irrigation District No. 2's water conservation and irrigation efficiency project. Agriculture operations are primary taxpayers in Prairie County which fund county operations like the Prairie County Fair.

For these reasons, the Prairie County Fair Board fully supports Buffalo Rapids Irrigation District No. 2's application for a grant for water conservation and irrigation efficiency projects in the Shirley, Terry, and Fallon Units.

Sincerely,

Travis Choat
Chairman, Prairie County Fair Board

PRAIRIE COUNTY
CONSERVATION DISTRICT
P.O. Box 622
Terry, Montana 59349
Phone: (406) 635-5868
Fax: (406) 635-4210
E-mail: sbrown@mt.nrcs.usda.gov

To: Buffalo Rapids
12 Hwy 253
Terry, MT 59349

September 12, 2017

From: Prairie County Conservation District
PO Box 622
Terry, MT 59349

To Whom It May Concern,

The purpose of this letter is to support and endorse the Lateral 1.6 Pipeline Conversion Project. The Prairie County Conservation District would like to see this conversion go forward for the public safety and water conservation issues it addresses. In addition, a more reliable water delivery will increase crop production and quality which will increase producer profits as well as boosting the local economy. In conclusion, the Prairie County Conservation District fully endorses the Lateral 1.6 Pipeline Conversion Project.

Sincerely,

DeLynn Meidinger – Chairman

Buffalo Rapids Irrigation Project – District #2 Environmental Compliance
Lateral 1.6 Pipeline Conversion Project

Implementation of the Lateral 1.6 pipeline conversion project will conserve, manage, develop, and preserve Montana's renewable resources. The proposed project will preserve irrigable acres, conserve water, protects the public's health and safety, preserve fish and wildlife habitat, and improve water resource management, therefore benefitting the local irrigators and residents as well as the local, state, and regional economy.

Environmental Resources Present & Detailed Effects

Installation of the Lateral 1.6 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 existing lateral 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 District 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 District, but little activity is present in the Lateral 1.6 area. Wildlife within and around BRIP-2 is plentiful and includes many species of common birds, animal, and fish. Within the Lateral 1.6 project area there are no species listed on the US Fish and Wildlife Services Endangered or Threatened Species List. The Lateral 1.6 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 Lateral 1.6 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. Using the National Wetlands Inventory (NWI), it was discovered that there are no wetlands within or adjacent to the project area. The proposed project area will experience construction disturbances lasting approximately 4 months during active construction. All permits necessary for completion of the project will be obtained by the contractor and GDC, and all construction activities will be conducted with the proper use of BMP's as necessary.

The proposed Lateral 1.6 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 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 BRIP-2 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 Lateral 1.6 project will alter the designated floodplain area.

Demographics & Social Structure

The Lateral 1.6 project is located in Prairie County and includes the towns of Terry, Fallon, and Saugus, 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. Laterals within the BRIP-2 serve as a critical production base for many of the region's large commodity processing and market facilities. Letters of support from a number of businesses and the local economic development organization have been included in this application. Additionally, completion of the Lateral 1.6 project will ensure the continued operation of the District for future generations which is a critical component to the local economy.

WATER CONSERVATION AND FIELD SERVICE PROGRAM

LATERAL 1.6 CONVERSION: FINANCIAL REPORT

BUFFALO RAPIDS IRRIGATION PROJECT – DISTRICT #2

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

PERFORMANCE
ENGINEERING & CONSULTING

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1.0 DIRECT COST BUDGET ELEMENTS

The following subsections under Section 1.0 – Direct Cost Budget Elements, will outline Buffalo Rapids Irrigation Project – District #2's (BRIP-2) 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. Projected costs are reasonable for the area and fit within the budgetary limits of BRIP-2. 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 – Tim Kortum	$20.00	HR
Assistant Project Manager	$13.00	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 – Tim Kortum	$6.25	HR
Assistant Project Manager	$4.50	HR

1.2 Equipment Costs

All of the equipment proposed for use in the construction of the Project will be owned or operated by the awarded contractor, the District or its irrigators. The hourly rates have

been developed using the USCOE rate tables for equipment in the region. No equipment will be leased or purchased by the District as a result of this project. The District will be soliciting a licensed contractor to complete the work for rehabilitation of the diversion structure. The only equipment used to support the project will be the District Manager's truck to travel back and forth form the site for management of the project. Equipment and rates used in the Project Budget are presented in Table 3.

Table 3. Equipment Rates

Equipment	Rate	Units
315 Cat Excavator	$40.68	HR
Dump Truck (10yd)	$50.67	HR
Cat D-4 Dozer	$38.03	HR
Grader	$51.70	HR
980 Case Loader	$57.13	HR
Equipment Transport	$50.67	HR
Manager's Truck	$18.25	HR
Field Trucks	$19.57	HR
Survey Equipment	$25.25	HR
Soil Compactor	$32.35	HR

1.3 Construction Items

The District will complete all 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 from other projects completed in the area. Major components such as 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
Grading	4,605	SY	$2.00	$9,210.00
Revegetation	9	AC	$2,750.00	$24,750.00
Concrete Thrust Blocks	11	EA	$250.00	$2,750.00
27" Bore & Casing (Railroad Crossing)	100	LF	$800.00	$80,000.00
24" PIP	4,680	LF	$24.25	$113,490.00
21" PIP	3,560	LF	$18.75	$66,750.00

18" PIP	420	LF	$13.50	$5,670.00
21" - 45° Bend	2	EA	$660.00	$1,320.00
18" - 45° Bend	1	EA	$443.00	$443.00
18" - 22.5° Bend	1	EA	$144.50	$144.50
18" - 11.25° Bend	1	EA	$403.50	$403.50
24" X 21" Reducer	1	EA	$934.00	$934.00
21" X 18" Reducer	1	EA	$548.00	$548.00
Turnout Assembly w/ Bollards	7	EA	$5,500.00	$38,500.00
			Subtotal	$344,913.00
10% Mobilization/Demobilization	1	LS	$34,491.30	$34,491.30
			Total	$379,404.30

1.4 Environmental & Regulatory Compliance Costs

Because this is a BRIP-2 facility it is understood that a NEPA and historical preservation review will be completed by the District. Those funds will come from the District. Because the project is located within the active canal channel few state permits will be required. The District will be responsible for obtaining a SWPPP permit from the Montana DEQ to regulate stormwater runoff. The District 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

BRIP-2 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 7% contingency was included in the proposed budget to protect against unforeseen costs, overruns, or dramatic price increases. Using the District's recent experience with pipeline conversion projects they have shown that they have an ability to keep projects within the projected budget with minimal overruns. Additionally, based on PE's recent experience in irrigation facility construction on USBR facilities a 7% contingency is

standard and necessary. The contingency was developed using 7% of the construction costs only, excluding administration, engineering, and permitting costs. The budget includes $26,558.30 for a 7% 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 District. 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 Lateral 1.6 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 $125,000 to BRIP-2 from two Renewable Resource Grants. Reclamation's entire budget will be used for construction materials and splitting the consultant fees for the project making the USBR contribution to $300,000. The salaries/wages will be covered by the District along with fringe benefits and equipment costs. The DNRC will fund the construction materials and consultant fees not covered by the USBR contribution. This approach aimed to easily track the matching amounts and show the funding match was made. The cost share summary for the project is shown in Table 5.

Table 5. Cost Share Summary

Construction Component	Reclamation	RRGL Grants	BRIP - 2 In-Kind/Cash	Total Cost
Salaries & Wages	$0.00	$0.00	$101,360.00	$101,360.00
Fringe Benefits	$0.00	$0.00	$4,540.00	$4,540.00
Equipment	$0.00	$0.00	$98,444.80	$98,444.80
Construction Materials	$272,500.00	$97,500.00	$9,404.30	$379,404.30
Construction Contingency	$0.00	$0.00	$26,558.30	$26,558.30
Consultant Fees	$27,500.00	$27,500.00	$1,000.00	$56,000.00
Indirect Costs	$0.00	$0.00	$0.00	$0.00
Total	***$300,000.00***	***$125,000.00***	***$241,307.40***	***$666,307.40***

Reclamation funds are the only uncommitted dollars associated with the project at this time. BRIP-2 has committed to funding the match through funds on hand from the construction reserve funds. The District has approved the in-kind construction budget for project and can easily fit the costs presented in the budget above in their operational and special projects budgets.

BRIP District 2 - Lateral 1.6 Conversion

Construction Budget

Buffalo Rapids Irrigation Project - District No. 2

Revised September 27, 2019

Budget Item Description	Computation				State DNRC Funding	Reclamation Funding	Recipient Funding
	Quantity	Unit	Unit Cost	Total Cost			
Salaries & Wages							
Project Manager	640	HR	$25.00	$16,000.00	---	---	$16,000.00
Office Manager	120	HR	$18.00	$2,160.00	---	---	$2,160.00
Equipment Operator	1280	HR	$20.00	$25,600.00	---	---	$25,600.00
Laborer	3840	HR	$15.00	$57,600.00	---	---	$57,600.00
			Subtotal	$101,360.00	$0.00	$0.00	$101,360.00
Fringe Benefits							
Project Manager	640	HR	$6.25	$4,000.00	---	---	$4,000.00
Assistant Project Manager	120	HR	$4.50	$540.00	---	---	$540.00
Equipment Operator	1280	HR	$0.00	$0.00	---	---	$0.00
Laborer	3840	HR	$0.00	$0.00	---	---	$0.00
			Subtotal	$4,540.00	$0.00	$0.00	$4,540.00
Equipment							
315 Cat Excavator	600	HR	$40.68	$24,408.00	---	---	$24,408.00
Dump Truck (10yd)	80	HR	$50.67	$4,053.60	---	---	$4,053.60
Cat D-4 Dozer	120	HR	$38.03	$4,563.60	---	---	$4,563.60
Grader	40	HR	$51.70	$2,068.00	---	---	$2,068.00
980 Case Loader	40	HR	$57.13	$2,285.20	---	---	$2,285.20
Equipment Transport	40	HR	$50.67	$2,026.80	---	---	$2,026.80
Manager's Truck	600	HR	$18.25	$10,950.00	---	---	$10,950.00
Field Trucks	1280	HR	$19.57	$25,049.60	---	---	$25,049.60
Survey Equipment	400	HR	$25.25	$10,100.00	---	---	$10,100.00
Soil Compactor	400	HR	$32.35	$12,940.00	---	---	$12,940.00
			Subtotal	$98,444.80	$0.00	$0.00	$98,444.80
Construction Materials							
Mobilization/Demobilization	1	LS	$34,491.30	$34,491.30	---	$34,491.30	---
Grading	4,605	SY	$2.00	$9,210.00	---	$9,210.00	---
Revegetation	9	AC	$2,750.00	$24,750.00	---	$24,750.00	---
Concrete Thrust Blocks	11	EA	$250.00	$2,750.00	---	$2,750.00	---
27" Bore & Casing (Railroad Crossing)	100	LF	$800.00	$80,000.00	---	$80,000.00	---
24" PIP	4,680	LF	$24.25	$113,490.00	---	$113,490.00	---
21" PIP	3,560	LF	$18.75	$66,750.00	$49,537.00	$7,808.70	$9,404.30
18" PIP	420	LF	$13.50	$5,670.00	$5,670.00	---	---
21" - 45° Bend	2	EA	$660.00	$1,320.00	$1,320.00	---	---
18" - 45° Bend	1	EA	$443.00	$443.00	$443.00	---	---
18" - 22.5° Bend	1	EA	$144.50	$144.50	$144.50	---	---
18" - 11.25° Bend	1	EA	$403.50	$403.50	$403.50	---	---
24" X 21" Reducer	1	EA	$934.00	$934.00	$934.00	---	---
21" X 18" Reducer	1	EA	$548.00	$548.00	$548.00	---	---
Turnout Assembly w/ Bollards	7	EA	$5,500.00	$38,500.00	$38,500.00	---	---
			Subtotal	$379,404.30	$97,500.00	$272,500.00	$9,404.30
Construction Contingency							
7% Contingency	1	LS	$26,558.30	$26,558.30	---	---	$26,558.30
			Subtotal	$26,558.30	$0.00	$0.00	$26,558.30
Consultant Fees							
Engineering/Permitting	1	LS	$55,000.00	$55,000.00	$27,500.00	$27,500.00	---
Legal (BRIP)	1	LS	$1,000.00	$1,000.00	---	---	$1,000.00
			Subtotal	$56,000.00	$27,500.00	$27,500.00	$1,000.00
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				***$666,307.40***	***$125,000.00***	***$300,000.00***	***$241,307.40***

CERTIFICATE OF RESOLUTION

BUFFALO RAPIDS IRRIGATION DISTRICT NO. 2

RESOLUTION NO. 2019-11

RESOLUTION OF THE BOARD OF COMMISSIONERS OF BUFFALO RAPIDS IRRIGATION DISTRICTS NO. 2

ENTER INTO THE BUREAU OF RECLAMATION WATERSMART PROGRAM FY2020

LATERAL 1.6 PIPELINE CONVERSION PROJECT

The undersigned, Barry Rakes and Tim Kortum, hereby certify that they are the President and Secretary, respectively of the Board of Commissioners (Board) of Buffalo Rapids Irrigation District No. 2 (BRID 2) and that at a monthly meeting of the Board, held in Terry, MT on September 11, 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 Buffalo Rapids Irrigation District No. 2 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 FY2020; **AND**

WHEREAS, a grant proposal entitled "Lateral 1.6 Pipeline Conversion 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 BRID 2 as satisfactory progression of the project is made; **AND**

WHEREAS, the BRID 2 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 "Lateral 1.6 Pipeline Conversion 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 BRID 2 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, Barry Rakes, to enter into an agreement with the Bureau of Reclamation to perform the activities described in BRID 2's "Lateral 1.6 Pipeline Conversion Project" WaterSMART Program application.

Dated this 11 day of September, 2019.

Barry Rakes

President

ATTEST:

Secretary