# *BIG SPRINGS DITCH, LLC WATER CONSERVATION PROJECT*



BROADWATER COUNTY, MT

Funding Opportunity: R15AS00002

WaterSMART: Water and Energy Efficiency Grants for Fiscal Year (FY) 2015

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## EXECUTIVE SUMMARY

January 14, 2015

Applicant: Big Springs Ditch, LLC
Applicant Town: Townsend
Applicant County: Broadwater
Applicant State: Montana

The Big Springs Ditch, is proposing a Water Conservation Project that will conserve water, increase in-stream water flows for fish habitat, and reduce the risk of catastrophic embankment failure of Montana Rail Link's main rail line. A 3,050 foot segment of the canal has been identified as having a high amount of seepage. The water lost to seepage amounts to 12.6 cubic feet per second (cfs), which is 4,500 acre-feet annually. By conserving the water lost to seepage Big Springs Ditch would be able to improve crop yield on 2,600 acres of prime farmland and allocate 3 cfs of the conserved water to enhance or expand an existing fish spawning bed. Funds from the WaterSMART grant will be used to purchase the 54-inch diameter pipe and for final engineering design.

Phase I of the Water Conservation Project will convert over 3,000 feet of open canal to pipeline with construction beginning in October 2015 and completing in November 2015. Site grading, final seeding and as built drawings are to be completed by June 1, 2016.

Phases II and III of this project are not included in this Grant Application, but are in the planning stages. Phase II of the Water Conservation Project will continue to pipe Big Springs Ditch to state land where a spring creek will be constructed for Fish Wildlife and Parks. Phase II is scheduled to start in Fall 2016 and last one year. Phase III will continue to pipe the Big Springs Ditch and create a pressurized pipeline to each farm and convert all farm irrigation to energy and water efficient center pivots. Phase III is scheduled to begin in Fall 2017 and last one year.

The proposed Phase I project will occur at the headwaters of the Big Springs and is not on a Federal facility.

## BACKGROUND DATA

The source of water for the Big Springs Ditch is the Big Springs, a series of springs located above the Missouri River in central Montana. The springs of the Big Springs stretch for about 500 feet and feed into a one-eighth acre pond. The Big Springs were first tapped for water use in the 1860's, decades before Montana became a state. Water rights for 52 cubic feet per second (cfs) from the Big Springs were filed on May 23, 1869. The original Northern Pacific railroad's main line transverses the Big Springs pond and parallels the ditch for a mile along the Missouri River.

Water rights for the Big Springs are held by eight irrigators as follows:

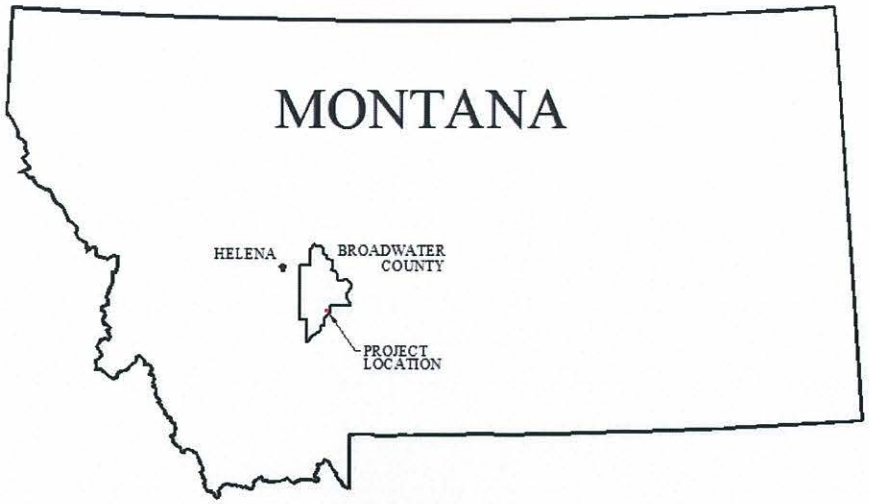
| | | |
|---|---|---|
| • Tri G Inc | 41I-11117 00 | 7.43 cfs |
| • Sterrett/Nelson | 41I-11140 00 | 3.72 |
| • Elliott Ranch LLC/Sterrett | 41I-11137 00 | 3.72 |
| • Triangle T Ranch/Harper/R&L | 41I-11134 00 | 9.29 |
| • Elliott Ranch LLC | 41I-11131 00 | 7.43 |
| • Gloria Davis | 41I-11128 00 | 5.57 |
| • Flynn Ranch of Townsend | 41I-11125 00 | 7.43 |
| • Elliott Ranch LLC | 41I-11122 00 | 7.43 |
| | | 52.02 cfs total allocation |

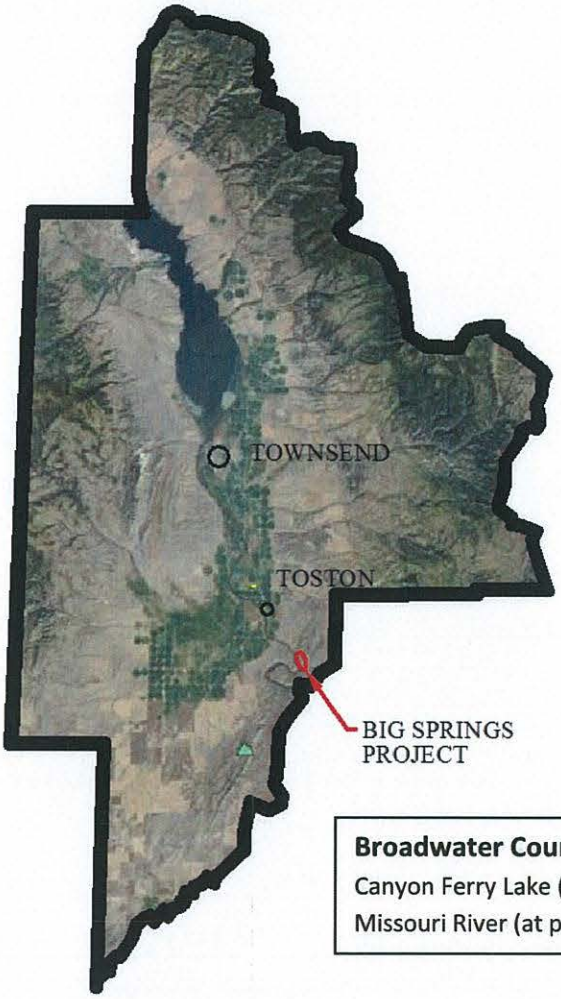
Irrigated land served by the Big Springs Ditch is shown in Drawing A.1 in **Appendix A.**

In addition to the irrigation water rights shown above, each water right holder has the same allocation for "fish raceway" as well as "stock water" for each location. At the headwaters of the Big Springs Ditch the irrigators have allocated 3 cfs to a fish spawning channel and send the remaining 49 cfs down their open canal to farmland. The main crop is forage (alfalfa and grass hay) with cereal grains being the second most planted.

Due to canal leakage the irrigators of the Big Springs do not receive their water allotments at their farm diversions. They have to supplement their water with water from the Broadwater-Missouri Water Users Association (BMWUA), a canal located upgradient of the Big Springs canal. With the completion of Phase I of the project it is anticipated that all of the existing demand will be met with water from the Big Springs.

The Big Springs canal flows a total of 9½ miles from the source at the Big Springs to the canal outlet at Dry Creek. The canal transverses 5 miles from the source to the first irrigated property west of Toston. For a portion of the canal the canal parallels Montana Rail Link's main rail line. The canal is about 15 feet below the elevation of the rail line which contributes to an unstable embankment for the rail line. The Big Springs Ditch comprises several hundred feet of laterals that are mostly for on-farm delivery. Vicinity maps of the project area are shown on page 3.




**Broadwater County**
Canyon Ferry Lake (top)
Missouri River (at project)

## TECHNICAL PROJECT DESCRIPTION

### PROJECT IDENTIFICATION

The Big Springs Ditch (BSD), is undertaking a Water Conservation project (Project). The BSD is located in Broadwater County south of the town of Toston and eight-tenths of a mile downstream of the Toston Dam. The project extents are shown in Drawing A.2 in **Appendix** A. The BSD was constructed in the 1860s and remains today in very much the same condition as when it was first built. In 1917 there were 7 shares in the BSD; each entitled to 1/7th the flow. BSD has an 1869 water right for 52 cfs from the Big Springs - an artesian spring that has remained flowing at 52 cfs for over a hundred and fifty years (measurements have been verified in 1921, 1977 and 2011).

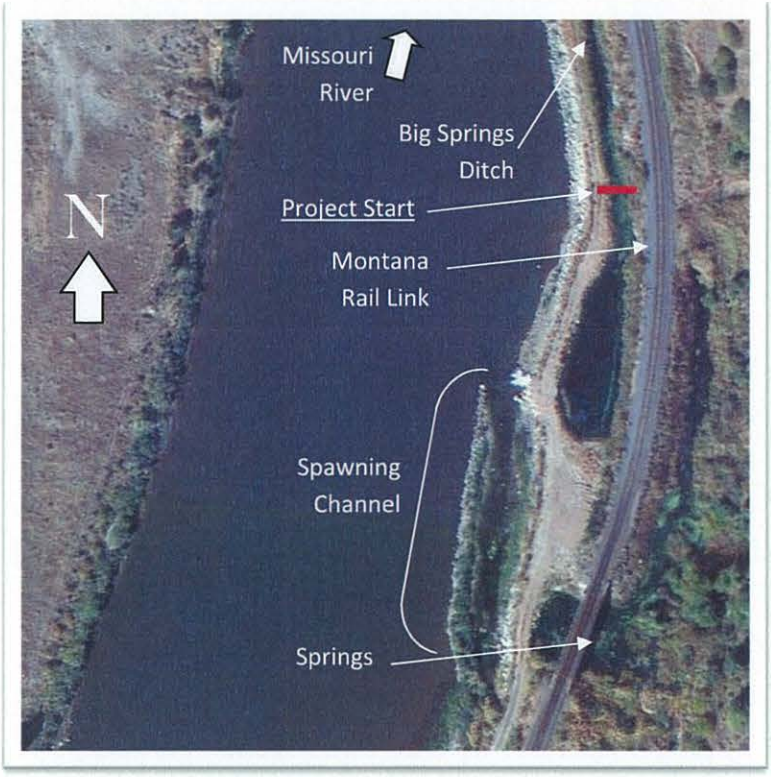



**Photo 1.1-1:** Big Springs Ditch.

The BSD starts at a set of ponds located along the north side of the Missouri River. The ponds are fed by a series of springs located about 20 vertical feet above the river. The flow out of the ponds is into the BSD, a natural bottom canal with an embankment on the north, and a levee on the south. The levee separates the canal from the Missouri River. Montana Rail Link (MRL) has a rail line above the canal. The canal traverses along the Missouri River for approximately 5 miles and then meanders across the Townsend valley for approximately 4 miles before ending at Dry Creek. The project start point is north of the ponds (46°07'32"N latitude, 111°23'36"W longitude) at a point

where the canal begins. The project will be completed approximately a half mile downstream at an existing culvert (46°08'00"N latitude, 111°23'51"W longitude). The project will encompass approximately 3,050 linear feet of canal.

The BSD proposes to upgrade a section of their canal to eliminate seepage from the unlined canal. The project will include hydraulic and structural design, permitting, construction administration and construction activities.

The Big Springs Ditch water conservation project is a construction project to be performed by the irrigation district. The project will rehabilitate a 3,050 foot reach of the BSD canal by installing HDPE pipe to prevent the seepage of water from the canal. The open natural canal is causing two major problems. First, the BSD is losing approximately 26% of the canal water in the first 3,050 feet of the canal. Secondly, the open natural channel is causing instability to the Montana Rail Link railroad line built directly above the canal. The canal bank has been reinforced with stone walls in some sections in order to stabilize the railroad bed. Part of this stone wall has begun to fail and is affecting both the conveyance of water and the stability of the railroad bed.

The project will place HDPE pipe in this reach reducing the amount of water lost to seepage which will ensure the majority of the canal water will be retained for irrigation and the enclosed canal will stabilize the railroad embankment.

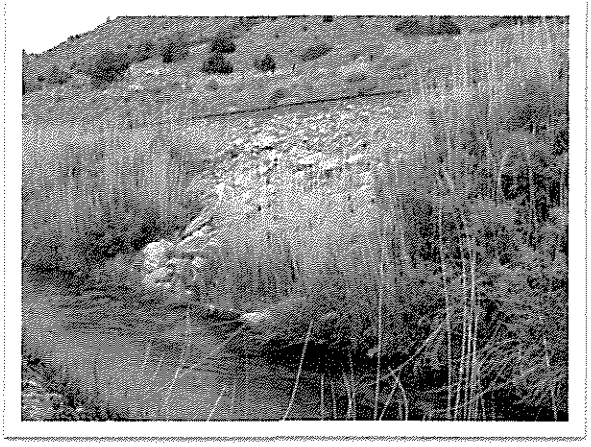


**Photo 1.3-1** Big Springs Ditch with MRL rail line above, and rock reinforced embankment.

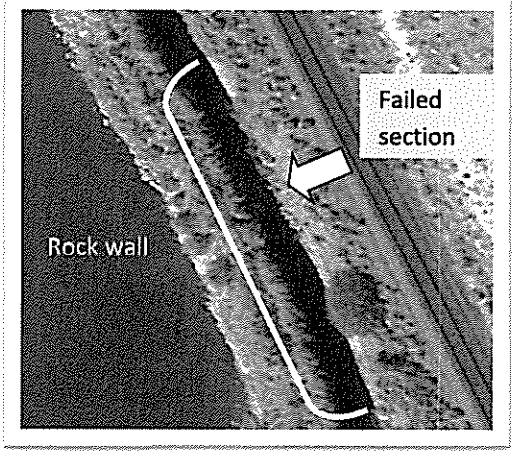



**Photo 1.3-2** Aerial view of 200 ln ft. rock reinforced wall and failed section.

## PROJECT DESCRIPTION

The Big Springs Ditch Water Conservation Project, Phase I is a construction project that will replace an open canal with HDPE pipe. Construction activities will include canal preparation, the placing of bedding material, installing the HDPE pipe, and backfilling around the pipe.

Canal Preparation

The existing canal is approximately 12 feet wide and five feet deep. The canal is trapezoidal in shape and formed from native material with a rock and soil bottom and sides. The canal bottom will be smoothed and shaped to a constant slope.

Bedding Material

Approximately six inches of bedding material will be placed in the center of the canal, shaped to the radius of the pipe and sloped to the design grade. The bedding material will be shipped via rail and either air-dumped from the tracks or stockpiled at one end of the project.

DuroMaxx HDPE Pipe

The pipe chosen for the Project is a steel-reinforced HDPE pipe 54 inches in diameter. The pipe material was chosen for its long lifespan and smooth interior and the steel reinforcing was chosen for its strength. The DuroMaxx pipe will be purchased from the manufacturer (Contech) and shipped directly to the site from the factory in Utah. The pipe will be placed by excavator and a three-man crew. The pipe comes furnished with a bell and spigot joint watertight to 15 psi. No bands or welding is necessary for this joint type.

Backfill

Similar to the bedding material, the backfill material will arrive at the project site via rail and be placed by air-dump from the rail or stockpiled and trucked to the section of canal being converted.

Final contouring of the backfill material over the pipe will include shaping for drainage purposes and reseeding all disturbed areas.

***Technical Project Description- Evaluation Criteria A***

**Water Conservation**

## A.1 Quantifiable Water Savings

**Describe the amount of water saved.**
*What is the applicant's average annual acre-feet of water supply?*

The Big Springs Ditch has water rights for 52 cubic feet per second (cfs) from the Big Springs, a collection of springs that feed into a one-eighth acre pond. The Big Springs have produced 52 cfs consistently for 145 years since the springs were first measured in 1869. Three subsequent recorded canal measurements have shown only a 1 cfs variation in production.

Although the irrigators of the Big Springs Ditch have water rights of 52 cfs, due to canal leakage they do not receive their full allotment on their individual farms. Most farms supplement their irrigation with water from the Broadwater-Missouri Water User's Association (BMWUA) ditch – a larger irrigation ditch that spans the same valley as the Big Springs and is slightly upgradient from the Big Springs' canal. BMWUA is a State of Montana water marketing association.

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

During the irrigation season 49 cfs of the 52 cfs produced by the springs flows into the Big Springs Ditch. The other 3 cfs flows out of the pond into a fish spawning channel. Of the 49 cfs entering the ditch about 12.6 cfs is lost to seepage within the first 3,050 linear feet of the canal. Of the remaining 36.6 cfs it is assumed that the majority of water reaches the first farm diversion in Toston, MT. During the main growing season all of the remaining water is used for irrigation on over 2,000 acres of farmland. When harvest begins and some farmers reduce or cease using water, the excess ditch water is spilled into Dry Creek located at the end of the Big Springs Ditch.

*Where will the conserved water go?*

Since there is a shortage of water in the Big Springs Ditch during the high use growing season, water conserved from this project will go to irrigate existing fields and will reduce the amount of water irrigators need to purchase from the BMWUA.

In addition, the irrigators of the Big Springs Ditch will contribute a portion of the conserved water for use by Montana Fish Wildlife and Parks (FWP) for use in a spring creek for fish spawning habitat. The Big Springs Ditch currently contributes 3 cfs for use in a constructed fish spawning channel adjacent to the Big Springs pond. FWP proposes a spring creek to be created on State land downstream of the proposed water conservation project (to be constructed in Phase II of project). During the irrigation

season a sustaining 3 cfs would be dedicated to the spring creek with upwards of the full canal flow during the non-irrigation season.

*Please include a specific quantifiable water savings estimate, do not include a range of potential water savings.*

This project will save 12.6 cfs based on measurements of in-stream water loss. This equates to 4,496 acre-feet (AF) of water savings during a typical 180-day irrigation season.

**A.1.(1) Canal Lining/Piping**: *Canal lining/piping projects can provide water savings when irrigation delivery systems experience significant losses due to canal seepage. Applicants proposing lining/piping projects should address the following:*

*(a) How has the estimated average annual water savings that will result from the project been determined? Please provide all relevant calculations, assumptions, and supporting data.*

The estimated average annual water savings from the canal to pipeline conversion project is 12.60 cfs which equates to 24.98 AF per day or 4,496 AF per 180 day irrigation season. This value is based upon canal flow measurements during the 2011 irrigation season. Three cross sections were measured for velocity at one-foot cross sectional distances. Three velocities were measured for each cross section-foot and the average velocity was calculated. The water depth at each cross section foot was measured and an average one-foot cross section area was obtained. Flow volume was calculated as the average velocity times the one-foot cross section area. Flow volumes for each cross section were then determined as the sum of all one-foot cross section volumes.

Three cross sections were measured including at the beginning of the canal, at approximately 800 feet from beginning, and at a location 3,026 feet from beginning, a location were an existing 190 foot section of canal has already been converted to pipeline.

The beginning of the canal (cross section #1) had a cross sectional area of 29.39 square feet ($ft^2$) with average velocities up to 1.93 feet per second (fps). The calculated flow rate at the beginning of the canal was 49.22 cubic feet per second (cfs).

Cross section #2, at Station (Sta.) 8+50 had a cross sectional area of 31.20 $ft^2$ and a calculated flow rate of 44.30 cfs. This results in a 4.92 cfs loss to leakage in the beginning 850 feet of the canal.

Cross section #3, at Sta. 30+26 had a cross sectional area of 21.50 $ft^2$ with average velocities up to 1.94 fps. The calculated flow rate at Sta. 30+26 (near

the end of the proposed pipeline) was 36.62 cfs. This results in a 7.68 cfs loss from Sta. 8+50 and an overall loss of 12.60 cfs from the beginning of the canal.

A water study of the Big Springs Ditch conducted in 1977 measured the beginning of the canal at 51.1 cfs and at the half-mile distance (Sta. 26+40) as 41.8 cfs. The 1977 measurement was prior to the creation of a fish spawning bed located at the Big Springs and which 3 cfs is provided from the ditch company.

Averaged over 3,050 feet, the 2011 study would show a loss of 10.9 cfs at Sta. 26+40, very similar to the 1977 study.

Cross sections, depths and flow velocities are shown in **Appendix B**.

*(b) How have average annual canal seepage losses been determined? Have ponding and/or inflow/outflow tests been conducted to determine seepage rates under varying conditions? If so, please provide detailed descriptions of testing methods and all results. If not, please provide an explanation of the method(s) used to calculate seepage losses. All estimates should be supported with multiple sets of data/measurements from representative sections of canals.*

Average annual canal seepage losses have been determined by in-stream flow measurements. The Big Springs Ditch is feed from the Big Springs, a series of springs that feed an approximate one-eighth acre pond. Flows from the pond are split between a fish spawning channel (3 cfs) and an outlet from the main pond to a starting pond for the canal (remaining flow, about 49 cfs). From the starting pond all flow goes into the Big Springs Ditch. There are no headgates at the entrance to the ditch, all flow in excess of 3 cfs travels down the ditch during the irrigation season (during the non-irrigation season, most flow is released down the spawning channel. There is a ditch release at Sta. 8+50 that is opened during the non-irrigation season to release any flow that develops in the ditch due to springs.

Flow measurements in 1869, 1921, 1977 and 2011 show that the springs produce between 51.1 and 53.0 cfs. The flows down the Big Spring Ditch are near 49 cfs for the duration of the irrigation season. There are not varying flow conditions in this portion of the ditch.

*(c) What are the expected post-project seepage/leakage losses and how were these estimates determined (e.g., can data specific to the type of material being used in the project be provided)?*

In stream measurements have shown a loss of 12.6 cfs in the first 3,050 linear feet of the Big Springs Ditch. It is anticipated that the full 12.6 cfs will be captured with the conversion from open canal to pipeline. The proposed project will utilize an HDPE pipe with water-tight joints up to 15 psi. Two water conveyance models have shown that the maximum pressure developed in the proposed pipeline will not exceed 3 psi, therefore we anticipate negligible water loss for the length of pipeline being proposed.

*(d) What are the anticipated annual transit loss reductions in terms of acre-feet per mile for the overall project and for each section of canal included in the project?*

The current annual transit loss for the proposed project section has been measured and calculated as 4,496 acre-feet for the 180 day irrigation season. This amounts to a water savings of 7,784 acre-feet per mile per season. The proposed project is 3,050 feet with a total project savings of 4,496 acre-feet per irrigation season.

*(e) How will actual canal loss seepage reductions be verified?*

Actual canal loss seepage reductions will be verified by measuring inflow into the proposed pipeline (beginning of canal) and measuring outflow from the pipeline (flow in the canal downstream of the proposed pipeline outlet). These measurements will be compared to the open-canal measurements to show a savings of leakage reduction.

*(f) Include a detailed description of the materials being used.*

The proposed pipeline will use 54-inch steel reinforced HDPE pipe (DuroMaxx). The DuroMaxx pipe has been shown to have a 100-year lifespan and will utilize bell and spigot joints capable of being watertight up to 15 psi (5 times the anticipated maximum pipe pressure). Material specifications for DuroMaxx pipe can be found in **Appendix C**.

*A.1.(2)* ***Municipal Metering****: N/A*

*A.1.(3)* ***Irrigation Flow Measurement****: N/A*

*A.1.(4)* ***SCADA and Automation****: N/A*

*A.1.(5)* ***Groundwater Recharge****: N/A*

*A.1.(6)* ***Landscape Irrigation Measures:*** *N/A*

*A.1.(7)* ***High-Efficiency Indoor Appliances and Fixtures:*** *N/A*

***Subcriterion No. A.2: Percentage of Total Supply***
***Provide the percentage of total water supply conserved:*** *State the applicant's total average annual water supply in acre-feet. Please use the following formula:*

The percentage of total water supply conserved is calculated below. These values are based on a measured streamflow at the head of the canal (49.2 cfs) and a measured streamflow at Sta. 30+26 (36.6 cfs), the location of the project terminus.

$$\frac{\text{Estimated Amount of Water Conserved}}{\text{Average Annual Water Supply}}$$

$$\frac{4{,}496\ Acre - Feet\ Conserved}{17{,}569\ Acre - Feet\ Annual\ Water\ Supply}\ x\ 100 = \mathbf{25.5\%\ Water\ Conserved}$$

**Technical Project Description - Evaluation Criterion B**

**Energy-Water Nexus**
*Up to 16 points may be awarded based on the extent to which the project increases the use of renewable energy or otherwise results in increased energy efficiency.*

***Subcriterion No.B.1: Implementing Renewable Energy Projects Related to Water Management and Delivery:***

No renewable energy components are being proposed on this project.

***Subcriterion No.B.2: Increasing Energy Efficiency in Water Management:***

Phase III of the Water Conservation Project (not included in this Water Conservation Grant) will create a pressurized pipeline to each farm and convert all farm irrigation to energy and water efficient center pivots. This will result in an estimated energy savings of 300 horse power, or 712,000 kilowatt hours per year.

***Technical Project Description- Evaluation Criteria C***

## Benefits to Endangered Species

### Federally-Recognized Candidate Species

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

The Big Springs Ditch has water rights for 52 cubic feet per second (cfs) from the Big Springs, a collection of springs that feed into a one-eighth acre pond. A total of 49 cfs is directed down the Big Springs Ditch while 3 cfs is used for a fish spawning channel adjacent to the Big Springs. The 49 cfs is equivalent to 17,569 acre-feet of water supply for the 180 day irrigation season. All 52 cfs is sent to the fish spawning channel during the non-irrigation season.

*For projects that will directly benefit federally-recognized candidate species, please include the following elements:*

- *What is the relationship of the species to water supply?*

The spring waters that forms the Big Springs are a natural treasure that have been shown to provide excellent fish habitat. The springs produce crystal clear water that fish thrive in. In addition to providing 3 cfs to the existing fish spawning channel a portion of water savings from this project (and all of the water savings during the non-irrigation season) will be used to provide a spring channel for fish.

Fish in the Big Spring pond.

*•What is the extent to which the proposed project would reduce the likelihood of listing or would otherwise improve the status of the species?*

The combination of the fish spawning channel and the addition of the spring channel with water supplied by the Big Springs will provide the rainbow trout, brown trout and other salmonids prime spawning habitat in an area of the Missouri River where fish species have been cut off to historical spawning streams due to the effects of the upstream Toston Dam and the downstream Canyon Ferry Dam.

***Technical Project Description - Evaluation Criterion D***

**Energy-Water Marketing**
*Up to 12 points may be awarded for projects that propose developing a new water market.*

Currently, Big Springs Ditch is supplementing their water needs by purchasing water from the Broadwater Missouri Canal. Up to 800 Acre Feet of water is purchased every irrigation season. Water conserved in Phase I of this project will reduce the need for Big Springs Ditch members to supplement irrigation water from the BMWUA. Conserved water in the Broadway Missouri Canal will be available for downstream farmers irrigation needs.

***Technical Project Description - Evaluation Criterion E***

**Other Contributions To Water Supply Sustainability**
*Up to 14 points may be awarded for projects expected to contribute to a more sustainable water supply.*

***Subcriterion No.E.1: Addressing Adaption Strategies in a WaterSMART Basin Study:***
*Up to 14 points may be awarded for projects that address an adaption strategy identified in a completed WaterSMART Basin Study.*

A WaterSMART Basin Study, funded in 2014, is currently being done for the Missouri River Headwaters Basin. Due to the close proximity of Big Springs Ditch to the Missouri River, coordination with the Basin Study Team will be mutually beneficial. Contact with the Basin Study Lead has already been made.

***Subcriterion No.E.2: Expediting Future On-Farm Irrigation Improvements:***
*Up to 14 points may be awarded for projects that describe in detail how they will directly expedite future on-farm irrigation improvements, including future on-farm improvements that may be eligible for NRCS funding.*

*If the proposed projects will help expedite future on-farm improvements please address the following:*

- *Include a detailed listing of the fields and acreage that may be improved in the future:*

| BIG SPRINGS DITCH, LLC | | | |
|---|---|---|---|
| **Irrigation Water Rights (cfs)** | | | **Acres** |
| 7.43 | 41-11117 00 | Tri G Inc | 380 |
| 3.72 | 41-11140 00 | Sterrett/Nelson | 212 |
| 3.72 | 41-11137 00 | Elliott Ranch LLC/Sterrett | 251 |
| 9.29 | 41-11134 00 | Triangle T Ranch/R&L Ranch Co. | 321 |
| 7.43 | 41-11131 00 | Elliott Ranch LLC | 267.65 |
| 5.57 | 41-11128 00 | Gloria Davis | 214 |
| 7.43 | 41-11125 00 | Flynn Ranch of Townsend | 155 |
| 7.43 | 41-11122 00 | Elliott Ranch LLC | 234 |
| **52.02 cfs** | | | **2034.65 Acres** |

- *Describe in detail the on-farm improvements that can be made as a result of this project. Include discussion of any planned or ongoing efforts by farmers/ranchers that receive water from the applicant.*

Phase III of this project will be centered on the individual farms in the area north west of Toston (five miles downstream of the Big Springs ponds). This phase of the project is being headed by the Natural Resource and Conservation Service (NRCS) and is being designed to deliver irrigation water more efficiently and to convert all remaining flood irrigation to center pivot irrigation. The proposed phase will create a pump station at Toston and deliver the irrigation water in a pressurized pipeline to each farm's center pivot.

- *Provide a detailed explanation of how the proposed WaterSMART Grant project would help to expedite such on-farm efficiency improvements.*

The WaterSMART grant project is the first phase of a three-phase project. This first phase will conserve diverted irrigation water that currently is lost to leakage. A portion of the saved water will be used for fish habitat in Phase II. The majority of the saved water will be used for irrigation within the district. The saved water quantity will be enough to fulfill the needs of the Big Spring Ditch irrigators and they will then not have to purchase water from the Broadwater-Missouri Water User's Assocation (BMWUA). There are currently 3 pipelines from the BMWUA canal to the Big Springs Ditch in order for

annual purchase and delivery of water necessary to compensate for short falls in the Big Springs delivery.

The pipelines from the BMWUA are gravity lines and would be downgradient of the proposed pump station. Therefore, in order for the Phase III on-farm improvements to occur, all of the necessary irrigation water would need to be in the canal prior to the pump station, which the BMWUA pipelines are not.

With the conserved water from this project, all of the seasonal needs of the Big Springs will be satisfied and no water will need to be purchased from the BMWUA.

- *Fully describe the on-farm water conservation or water use efficiency benefits that would result from the enabled on-farm component of this project. Estimate the potential on-farm water savings that could result in acre-feet per year. Include support or backup documentation for any calculations or assumptions.*

The water conserved in this project (Phase I) will enable water conservation and water use efficiency for the Phase III project. Phase III will provide a pressurized pipeline to each farm's center pivot eliminating individual farm's pumps. With the current delivery system, excess water has to be sent to each farm's center pivot's pump so that each pump does not suck dry. With a pressurized pipeline only water used by the center pivot would be used. All excess water will remain in the pipeline and pressurized for use by other irrigators.

The conversion from open ditch to pressurized pipeline will also increase efficiency in the delivery of irrigation water by preventing moss from growing. Algae and aquatic vegetation is a serious issue for the Big Springs Ditch. Algae and aquatic vegetation grows in the irrigation water as it travels in an open canal from the Big Spring ponds five miles to Toston and an additional four miles through the farms of the Big Spring Ditch. The algae and aquatic vegetation reduces the flow velocity in the ditch and plugs the intake screens at each center pivot, therefore requiring even more flow to prevent the pumps from sucking dry.

It is estimated that hundreds of acre-feet annually will be saved when Phase III converts the on-farm delivery of irrigation water from open canal and individual center pivot pumps to a pipeline served by a single pump station.

- *Projects that include significant on-farm irrigation improvements should demonstrate the eligibility, commitment, and number or percentage of shareholders who plan to participate in any available NRCS funding programs. Applicants should provide letters of intent from farmers/ranchers in the affected project areas.*

  100 percent of the farms within the Big Springs Ditch will be eligible for on-farm improvements and all farms have committed to supporting the three project phases.

- *Describe the extent to which this project compliments an existing or newly awarded NRCS funded project.*

  This project is integral to the Big Springs Ditch Water Conservation Phase III project, a project that is currently being designed by NRCS. The Phase III project will only be implemented if enough water savings are realized in this Phase I project to eliminate all purchased water from the BMWUA.

***Subcriterion No.E.3: Building Drought Resiliency:***
***Up to 14 points may be awarded for projects that build long-term drought resilience in an area affected by drought.***

*If the proposed project will make water available to alleviate water supply shortages resulting from drought, please address the following:*

- *Explain in detail the existing or recent drought conditions in the project area. Describe the severity and duration of drought conditions in the project area. Describe how the water source that is the focus of this project (river, aquifer, or other source of supply) is impacted by drought.*

  In July 2014 Montana's governor along with the National Drought Resilience Partnership (NDRP) announced the Upper Missouri River Basin climate resilience demonstration project. The announcement occurred at the Gates of the Mountains on the Missouri River just downstream from the Big Springs project.

  The Big Springs Ditch Water Conservation Project will save water from the Big Springs which is currently lost to seepage. The Big Springs have been flowing steadily since before Montana statehood. In the intervening 140 years the Upper Missouri Basin has gone through numerous serious droughts. At no time during the recorded history of the Big Springs has flow

from the springs ever been noted as being anything but the 52 cfs that numerous flow measurements been recorded.

By utilizing all of the drought resistant flows from the Big Springs, there will not be a need to purchase additional waters from the BMWUA. The BMWUA receives its allocation of flows directly from the Missouri River, and is therefore dependent upon river flows. The Upper Missouri River Basin is feed from melting snow and is therefore highly affected by drought (even a single winter's drought will have adverse effects on the next irrigation season). Utilizing all of Big Springs water will allow for BMWUA allotment to go to downstream users.

*Describe the impacts that are occurring now or are expected to occur as a result of drought conditions. Provide a detailed explanation of how the proposed WaterSMART Grant project will improve the reliability of water supplies during times of drought. For example, will the proposed project prevent the loss of permanent crops and/or minimize economic losses from drought conditions? Will the project improve the reliability of water supplies for people, agriculture, and/or the environment during times of drought? Please note that all proposed projects must meet the project eligibility requirements described in Section III.B. of this FOA. In accordance with those requirements, project proposals requesting compensation for economic losses resulting from drought, and proposals for the purchase of water are not eligible for funding under this program. Please see Section III.B. of this FOA for a detailed description of the types of projects eligible for funding.*

The Big Springs has historically produced 52 cfs for 145 years and has been proven to be drought resilient. This reliable water source has been losing 12.6 cfs to seepage, which will be conserved with this project. This project allows Big Springs Ditch users to maximize their access to such a reliable water source and will ensure that in times of drought their crops will flourish.

Although the Upper Missouri River Basin is not experiencing drought conditions at this time, this project is within the headwaters of the Missouri River. Therefore, any water conserved and used for fish habitat near the project (at least 3 cfs) will be in the Missouri River for downstream use. The Missouri River passes through North and South Dakota who, along with Minnesota, are experiencing abnormally dry and moderate drought conditions (U.S. Drought Monitor, through Jan 6, 2015; droughtmonitor.unl.edu).

When the Upper Missouri Basin does experience drought conditions, the irrigators of the Big Springs will not need to supplement their water with that from the BMWUA

leaving the hundreds or thousands of acre-feet normally purchased from the BMWUA available to those irrigators who do not have another option.

***Subcriterion No.E.4: Other Water Supply Sustainability Benefits:***

*Up to **10 points** may be awarded for projects that include **other benefits** to water supply sustainability.*

*Projects may receive up to 10 points under this sub-criterion by thoroughly explaining additional project benefits, not already described above. Please provide sufficient explanation of the additional expected project benefits and their significance. Additional project benefits may include, but are not limited to, the following:*

*Will the project help to address an issue that could potentially result in an interruption to the water supply if unresolved?*

In Phase I, The entire 3,050 linear feet of the Big Springs Ditch runs directly adjacent to Montana Rail Link with an unstable slope of 1:1 (100% slope). The Big Springs Ditch is in danger of this bank collapsing, blocking the canal, and cutting off the water supply. It is a currently a huge maintenance issue, and this project would provide a fix to the problem.

*Does the project promote and encourage collaboration among parties?*

There is widespread support for this project. Currently there is support from the DNRC, NRCS, Montana Rail Link, Fish Wildlife and Parks, and all of the Big Springs Ditch members. This project is a win-win for all parties involved. Water is conserved, Montana Rail Link gets their bank stabilized, and Fish Wildlife and Parks gets water for fish spawning channels.

***Technical Project Description- Evaluation Criteria F***

## Implementation And Results

***Subcriterion No. F.1: Project Planning***
*Does the project have a Water Conservation Plan, System Optimization Review (SOR), and/or district or geographic area drought contingency plans in place? Does the project relate/have a nexus to an adaptation strategy developed as part of a WaterSMART Basin Study)? Please self-certify, or provide copies of these plans where appropriate, to verify that such a plan is in place.*

*Provide the following information regarding project planning:*

*(1) Identify any district-wide, or system-wide, planning that provides support for the proposed project. This could include a Water Conservation Plan, SOR, Basin Study, drought contingency plan, or other planning efforts done to determine the priority of this project in relation to other potential projects.*

The Big Springs Water Conservation Project is within the Upper Missouri River Basin and part of the *Montana State Water Plan's Montana Water Supply Initiative – 2015.* The Upper Missouri Basin Advisory Council Recommendations Development Report (shown in **Appendix H**) states as one of its goals is to *"Improve Water Use Efficiency and Conservation"* (part F: Water Use Efficiency and Conservation, pg. 18). The Big Springs Water Conservation Project will assist in fulfilling Objective 1 – *"Water use efficiency improvements are in place. There is recognition that certain irrigation methods can have return flow benefits, and that irrigation methods have trade-offs among all water users."* The water savings from the Big Springs Water Conservation Project will be available for use in irrigation, fish habitats and in return flows. All conserved water will be available for fish habitat and return flows for the entire non-irrigation season. These savings will be a large asset to the State in meeting their plan goals.

*(2) Describe how the project conforms to and meets the goals of any applicable planning efforts, and identify any aspect of the project that implements a feature of an existing water plan(s).*

The Big Springs Water Conservation Project is being supported by the NRCS, Montana FWP and Broadwater Conservation District due to the large amount of water savings it will produce (4,496 acre-feet annually). The large water savings will allow for water currently being used by Big Springs irrigators from other irrigation canals to be used by other irrigators and other resource benefits. This is a strategic project that will affect multiple portions of Broadwater County.

***Subcriterion No. F.2: Readiness to Proceed***
*Describe the implementation plan of the proposed project. Please include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates.*

The Big Springs Water Conservation Project will move forward with final design as soon as the multiple grants are awarded. A site topographic survey will be completed prior to application and paired with preliminary design already conducted for this project it is

anticipated that the final design would be ready by August 2015 and materials stockpiled at the construction site by September 2015. Actual construction would begin in October 2015 once the irrigation season has been completed (and the Big Springs Ditch would be dry). Construction would last about 30 days with 20 days being dedicated to pipeline placement. It is anticipated that final ground contouring and seeding would take place in November 2015 with the ability to finish in the spring of 2016 if needed. A final post-construction walk through and as-built drawings would finalize the project in summer of 2016.

**Schedule**

1. Project topographic survey (proposed for Jan 2015)
2. Apply for BOR WaterSMART grant (Jan 2015),
3. Award for WaterSMART (spring 2015)
4. Grant distribution (RRG and WaterSMART) (July 2015)
5. Order pipe material and ship to site (August 2015)
6. Begin Construction (Oct 2015)
7. Complete Construction (May 2016)
8. Asbuilt Drawings / Project Closeout (June 2016)

*Please explain any permits that will be required, along with the process for obtaining such permits. Identify and describe any engineering or design work performed specifically in support of the proposed project.*

Effects on regulated features are not anticipated during the Big Springs Ditch project. The installation of the pipeline will occur after irrigation season when the canal is dry. Backfill material will be applied after the pipeline is installed and will be confined to the current extents of the open canal. The project area is large enough that a permit for Storm Water Pollution Prevention Plan associated with Construction Activities will be required through Montana Department of Environmental Quality.

The Department of Natural Resources and Conservation (DNRC) and the Broadwater County Floodplain Administrator have been notified regarding the proposed project and permit requirements will be satisfied during final design.

A Section 404 of the Clean Water Act permit through the U.S. Army Corps of Engineers (USACE) is not anticipated for this project. Section 404(f) of the Clean Water Act states that activities related to the construction and maintenance of irrigation ditches and associated structures are exempt from permit requirements. USACE will be consulted to verify exemption from Section 404 regulatory requirements for work on the Big Springs Ditch.

Preliminary design of the Big Springs Water Conservation project has been completed allowing for the material type and size to be determined as well as the location for proposed construction. Final design will be required to make the connection at the end

of the pipeline to an existing culvert and at the beginning of the pipeline to create an appropriate headwall. The proposed project will have a uniform grade and an almost constant 3,000 foot radius curvature.

***Subcriterion No. F.3: Performance Measures***
*Provide a brief summary describing the performance measure that will be used to quantify actual benefits upon completion of the project (e.g., water saved, marketed, or better managed, or energy saved).*

Pre-Project Estimation

Pre-project estimations of baseline data were calculated using inflow/outflow testing at the proposed project beginning and ending stations. Canal flow measurements were conducted during the 2011 irrigation season. Three cross sections were measured for velocity at one-foot cross sectional distances. Three velocities were measured for each cross section-foot and the average velocity was calculated. The water depth at each cross section foot was measured and an average one-foot cross section area was obtained. Flow volume was calculated as the average velocity times the one-foot cross section area. Flow volumes for each cross section were then determined as the sum of all one-foot cross section volumes.

Three cross sections were measured at the locations of the beginning of the canal, at approximately 800 feet from beginning, and at a location 3,050 feet from beginning, a location were an existing 190 foot section of canal has already been converted to pipeline.

The beginning of the canal (cross section #1) had a cross sectional area of 29.39 square feet ($ft^2$) with average velocities up to 1.93 feet per second (fps). The calculated flow rate at the beginning of the canal was 49.22 cubic feet per second (cfs).

Cross section #2, at Station (Sta.) 8+50 had a cross sectional area of 31.20 $ft^2$ and a calculated flow rate of 44.30 cfs. This results in a 4.92 cfs loss to leakage in the beginning 850 feet of the canal.

Cross section #3, at Sta. 30+26 had a cross sectional area of 21.50 $ft^2$ with average velocities up to 1.94 fps. The calculated flow rate at Sta. 30+26 (near the end of the proposed pipeline) was 36.62 cfs. This results in a 7.68 cfs loss from Sta. 8+50 and an overall loss of 12.60 cfs from the beginning of the canal.

A water study of the Big Springs Ditch conducted in 1977 measured the beginning of the canal at 51.1 cfs and at the half-mile distance (Sta. 26+40) as 41.8 cfs. The 1977 measurement was prior to the creation of a fish spawning bed located at the Big Springs and which 3 cfs is provided from the ditch company.

Averaged over 3,050 feet, the 2011 study would show a loss of 10.9 cfs at Sta. 26+40, very similar to the 1977 study.

***Post-project methods for quantifying the benefits of canal lining or piping projects:***
*•Using tests listed above, compare pre-project and post-project test results to calculate water savings. For canal lining projects, evaporation should be calculated based on weather data and then subtracted from the total loss measured by testing.*

Post-Project Estimation

The success of the project will be determined in the irrigation season after construction is completed. Using the same in-stream input/output methodology as was used prior to construction, flow will be measured at the inlet to the new pipeline and at the outlet of the pipeline. There should be negligible difference in the two flow rates since it is assumed that the pipeline material and joints are water tight and that there is no storage within the system.

***Subcriterion No. F.4: Reasonableness of Costs***
*Please include information related to the total project cost, annual acre-feet conserved, energy capacity, or other project benefits and the expected life of the improvement(s).*

The Big Springs Ditch Water Conservation Project, Phase I is being designed with a total project cost of $914,953. The majority of this cost is in material costs for the pipe ($366,000) and for the pipe bedding and backfill ($311,077). The remaining budget is in labor and equipment charges, engineering and administration.

The Big Springs Ditch Water Conservation Project, Phase I will conserve a total of 4,496 acre-feet annually. The project will utilize a steel-reinforced HDPE pipe that has a gravity flow life-span of 100 years (see manufacturer's data in **Appendix C**).

Based on a 100 year life-span, the per acre-feet cost of the project is

$$\frac{\$914{,}953}{(4{,}496\frac{AF}{yr}x\ 100\ yr)} = \$2\ \boldsymbol{per\ acre - feet\ Conserved\ Water}$$

***Evaluation criterion G: Additional Non-Federal Funding***

**Non-Federal Funding**
*State the percentage of non-Federal funding provided.*

$$\frac{\text{Non-Federal Funding}}{\text{Total Project Cost}}$$

$$\frac{\$614{,}953}{\$914{,}953}\ x\ 100 = \boldsymbol{67.2\%\ Non - Federal\ Funding}$$

***Evaluation criterion H: Connection to Reclamation Project Activities***

*How is the proposed project connected to Reclamation project activities?*

The Big Springs Ditch Water Conservation Project is in an area of the Missouri River where fish species have been cut off to historical spawning streams due to the effects of the upstream Toston Dam and the downstream Canyon Ferry Dam Reclamation Project. The combination of the fish spawning channel and the addition of the spring channel with water supplied by the Big Springs will provide the rainbow trout, brown trout and other salmonids prime spawning habitat.

## IV.D.1 ENVIRONMENTAL AND CULTURAL RESOURCES COMPLIANCE

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

It will involve the placement of bedding material, pipe and backfill within the extents of the existing footprint of the irrigation ditch. The proposed pipeline will be down the center of the existing open channel and the pipe itself is less than half the existing width of the channel. There will be some mechanical cleaning and shaping of the canal prior to the placement of the bedding and pipe. The major impact to the surrounding environment will occur when the bedding and fill material is stockpiled at the site and when transported to the section of canal currently under construction. During these times there will be a projected increase in dust. The contractor will be responsible to keep dust to a minimum. There are no residential homes or commercial facilities within a half mile of the project. A Storm Water Pollution Prevention Plan (SWPPP) will be completed for the project and Best Management Practices (BMPs) will be implemented. No effects on regulated features are anticipated as all construction will occur outside the active channel of the Missouri River.

The Broadwater County Floodplain Administrator has been notified regarding the proposed project and permit requirements will be satisfied during final design.

Section 404(f) of the Clean Water Act states that activities related to the construction and maintenance of irrigation ditches are exempt from permit requirements. USACE will be consulted to verify exemption from Section 404 regulatory requirements for work on the Big Springs Ditch.

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

Based on the October 2014 USFWS list of threatened, endangered, and proposed species that may be present in Montana Counties, the following species are known to occur in Broadwater County:

***Threatened***

- Canada lynx, *Lynx canadensis*
- Ute ladies' tresses, *Spiranthes diluvialis*

***Candidate***

- Whitebark pine, *Pinus albicaulis*
- Sprague's pipit, *Anthus spragueii*

Canada lynx
Canada lynx inhabit subalpine forests between 4,000 and 7,050 feet above mean sea level. They require cover for stalking prey and for security. Canada lynx do not occur in the project area as suitable habitat is not present. Likewise, the project area does not occur within designated critical habitat for Canada lynx. This species is not likely to be affected by the proposed project.

Ute ladies' tresses
According to the Montana Field Guide maintained by the Montana Natural Heritage Program (MNHP), Ute ladies' tresses are restricted in area by specific hydrologic requirements. Preferred habitat characteristics include alkaline wetlands, swales, and old meanders. MNHP also states that habitat for this species is limited to areas within major river drainages. While leaks and seeps in the Big Springs Ditch may create wetland habitat within the project area, it is unlikely that other necessary habitat characteristics for this species are present.

There are known occurrences of Ute ladies' tresses approximately 5 to 10 miles north and south of the project area in Broadwater County. However, MNHP records do not indicate that any known population of Ute ladies' tresses occurs within the Big Springs Ditch project area.

To ensure that proposed project activities do not disturb a population of Ute ladies' tresses, the project area will be surveyed for this species during its peak flowering season that occurs in late July and early August. In the unlikely chance this plant is observed within the project area, Morrison-Maierle staff will work closely with the US Fish and Wildlife Service to develop a mitigation strategy to ensure that the project can move forward without detriment to the species.

Whitebark pine
Whitebark pine occurs in subalpine habitat between 6,500 and 8,800 feet above mean sea level. Whitebark pine does not occur in the project area as suitable habitat is not present. This species is not likely to be affected by the proposed project.

Sprague's pipit
Sprague's pipit is a migratory songbird that inhabits grasslands dominated by native species. They arrive in Montana in early May and depart in late August. Construction activities are anticipated to occur outside of the migratory season and therefore this species is not likely to be affected by the proposed project.

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

The proposed project occurs adjacent to the Missouri River. Section 404(f) of the Clean Water Act states that activities related to the construction and maintenance of irrigation ditches are exempt from permit requirements. The proposed project is for improvement

of existing irrigation infrastructure and construction will occur within the existing footprint. USACE will be consulted to verify that the Section 404(f) exemption is applicable to the proposed project. If the project is exempt, no wetland delineation will be required. In the event that the project is not exempt, a wetland delineation of the project area will be conducted to determine the presence and extent of wetlands and identify any potential impacts.

A map is provided which depicts all USFWS mapped National Wetlands Inventory (NWI) wetlands within one mile of the project area (Drawing A.3, **Appendix A**). According to the NWI data, there are wetlands within the project area identified as PSSA (Palustrine, Scrub-Shrub, Temporarily Flooded), PABFx (Palustrine, Aquatic Bed, Semi-permanently flooded, Excavated), and R4SBCx (Riverine, Intermittent, Streambed, Seasonally Flooded, Excavated).

4) *When was the water delivery system constructed?*

The Big Springs Ditch is believed to have been constructed in the 1860's. The exact date is unknown. Water rights for the Big Spring date to 1869. A Northern Pacific Right-of-Way document of 1864 shows the irrigation ditch along with a permission dated 1907 to construct a wall within the ROW.

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

This project will alter the existing canal ditch, which was constructed in the 1860's, and eliminate the use of a turnout upgraded in the 1980's. The canal, which is believed to have been built prior to 1869, was constructed on a bench of the Missouri River in native material. This project will shape and grade the first 3,050 feet of the canal and place bedding material, an HDPE pipeline and backfill material in the canal. An inlet structure will be built at the head of the pipeline at a location where no structure currently exists. The pipeline will bypass a turnout (to the Missouri River) at Station 8+50 that will no longer be used. No other irrigation structures will be disturbed during this project.

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

The project area will be inventoried for cultural resources and the results will be submitted to the Montana State Historic Preservation Office (SHPO). SHPO will be consulted to determine whether the project will impact any historic resource and whether additional measures will be required to comply with the National Historic Preservation Act (NHPA). No historic properties, cultural or archaeological resources are anticipated to be found in the project area.

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

There are no known archeological sites in the proposed project area.

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

The project will not have an effect on low income or minority populations.

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

There are no known Indian sites or tribal lands within the project area.

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

There is a potential for noxious weeds to establish themselves in disturbed ground areas. To combat the potential, the site will be hydro seeded at the end of the project to establish native grasses on all disturbed soils.

## IV.D.2 REQUIRED PERMITS OR APPROVALS

1) *Applicants must state in the application whether any permits or approvals are required and explain the plan for obtaining such permits or approvals.*

The Department of Natural Resources and Conservation (DNRC) and the Broadwater County Floodplain Administrator have been notified regarding the proposed project and permit requirements will be satisfied during final design. The proposed project will also comply with regulatory requirements associated with the Montana Stream Protection Act 124 Permit through FWP, Navigable Rivers Land Use or Easement through DNRC's Trust Lands Management Division, Storm Water Discharges Associated with Construction Activities through MDEQ, Section 10 of the Federal Rivers and Harbors Act, and Section 404 of the Clean Water Act through the U.S. Army Corps of Engineers (USACE). Section 404(f) of the Clean Water Act states that activities related to the construction and maintenance of irrigation ditches and associated structures are exempt from permit requirements. USACE will be consulted to verify exemption from Section 404 regulatory requirements for work on the Big Springs Ditch.

## LETTERS OF SUPPORT

Letters of support from County and Federal agencies as well as irrigators and business people of Broadwater County can be found in **Appendix D**.

## IV.D.3 OFFICAL RESOLUTION

**Appendix E** includes a resolution by the Board of Directors of Big Springs Ditch, LLC. authorizing the preparation of this application and funding for the applicant's share of costs. This resolution was adopted at the January 14, 2015 BSD Board meeting.

## IV.D.4 PROJECT BUDGET

### Funding Plan and Letters of Commitment

**Describe how the non-Reclamation share of project costs will be obtained. Reclamation will use this information in making a determination of financial capability.**

1) *How you will make your contribution to the cost share requirement, such as monetary and/or in-kind contributions and source funds contributed by the applicant (e.g., reserve account, tax revenue, and/or assessments).*

   The Big Springs Ditch LLC (BSD) will contribute approximately 18 percent of the project cost through both cash-on-hand and through a bank loan. The BSD currently has $70,000 of cash allocated to for this project, and has secured a bank loan of $100,000 from the State Bank of Townsend (in Townsend, MT) specifically for this project. BSD will also perform the Project Manager and grant administration as in-kind services. The two funding sources are enough to cover the BSD's cash contribution portion of the project estimated to be $162,073.

2) *Describe any in-kind costs incurred before the anticipated project start date that you seek to include as project costs.*

   No in-kind costs incurred before the project start date will be included as project costs. All in-kind costs shown in budgets for this project are costs that will occur once the project is started.

3) *What project expenses have been incurred?*

   The project expenses that have been incurred are the expenses associated with this application. This application is being prepared by two consultants who will be paid with a combination of a state grant and cash from BSD.

4) *Provide the identity and amount of funding to be provided by funding partners, as well as the required letters of commitment.*

   Funding partners which are a part of the Big Springs Ditch Water Conservation Project, Phase I include the State of Montana Department of Natural Resources and Conservation (DNRC), and Montana Rail Link.

The DNRC has provided two loans for this project: a Renewable Resource Grant ($100,000) and an Irrigation Development Grant ($7,500). Both of these grants have been awarded to the Broadwater Conservation District (BCD). BCD will be administering both grants. Award letters are provided in **Appendix F.**

Montana Rail Link (MRL) is a major partner in this project and will be providing over 10,000 CY of material for pipe bedding and backfill. MRL will be providing the material and delivering the material to the site as in-kind services with an estimated value of $345,380. A letter of commitment from MRL is provided in **Appendix F.**

5) *Describe any funding requested or received from other Federal partners.*

No other Federal sources are a part of this project. Fish and Wildlife Service (FWS) and Natural Resource and Conservation Service (NRCS) will be major partners in Phase II and III. Both Phase II and III are not part of the WaterSMART grant.

6) *Describe any pending funding requests that have not yet been approved, and explain how the project will be affected if such funding is denied.*

With the exception of this project, all funding for the Big Springs Ditch Water Conservation Project, Phase I has been secured. In the event that this grant application is not funded the project will continue, but a shorter pipe length will be constructed. Without this WaterSMART grant, only 860 feet of pipe will be installed with an estimated water savings of 4.9 cfs (1,755 AF) versus the full 12.6 cfs (4,496 AF) savings. All other funding sources will remain at current funding levels except for MRL's contribution, which is based on linear feet of installed pipeline.

Table 1. – Summary of non-Federal and Federal funding sources

| Funding sources | Funding amount |
|---|---|
| **Non-Federal entities** | |
| **Big Springs Ditch LLC** | $162,073 |
| **DNRC Renewable Resource Grant** | $100,000 |
| **DNRC Irrigation Development Grant** | $ 7,500 |
| **Montana Rail Link** | $345,380 |
| | |
| ***Non-Federal subtotal:*** | ***$614,953*** |
| | |
| **Other Federal entities** | |
| | |
| ***Other Federal subtotal:*** | ***$ 0*** |
| | |
| ***Requested Reclamation funding:*** | ***$300,000*** |
| | |
| ***Total project funding:*** | **$914,953** |

## BUDGET PROPOSAL

**Describe how the non-Reclamation share of project costs will be obtained. Reclamation will use this information in making a determination of financial capability.**

*The project budget shall include detailed information on the categories listed below and must clearly identify all project costs. Unit costs shall be provided for all budget items including the cost of work to be provided by contractors. Additionally, applicants shall include a narrative description of the items included in the project budget, including the value of in-kind contributions of goods and services provided to complete the project. It is strongly advised that applicants use the budget proposal format shown below on tables 3 and 4 or a similar format that provides this information. If selected for award, successful applicants must submit detailed supporting documentation for all budgeted costs.*

Table 2. – Project Budget

| Budget Item | Computation | | Quantity Type | Total Cost |
|---|---|---|---|---|
| **Description** | $/Unit | Quantity | (hrs/days) | |
| **Salaries and wages** | | | | |
| **Project Manager** | $ 40 | 152.5 | hours | $ 6,100 |
| **Grant Administer** | $ 40 | 100 | hours | $ 4,000 |
| **Fringe Benefits** | | | | |
| **Travel** | | | | |
| **Equipment** | | | | |
| **Supplies/Materials** | | | | |
| **DuroMaxx 54" HDPE Pipe** | $ 120 | 3,050 | feet | $366,000 |
| **Pipe Bedding** | $ 19.35 | 820 | CY | $ 15,867 |
| **Pipe Backfill** | $ 30.69 | 9,620 | CY | $295,210 |
| **Ditch Relief** | $ 2 | 3,050 | feet | $ 6,100 |
| **Contractual/Construction** | | | | |
| **Grant Administration** | $ 40 | 268.75 | hours | $ 10,750 |
| **Project Administration** | $ 120 | 168 | hours | $ 20,100 |
| **Construction Observation** | $ 85 | 152.5 | hours | $ 12,963 |
| **Construction (pipe installation)** | $ 85,312 | 1 | lump sum | $ 85,312 |
| **Contract Labor (Survey)** | $ 165 | 55.5 | hours | $ 9,150 |
| **Contract Labor (Engineer)** | $ 120 | 51 | hours | $ 6,100 |
| **Environmental Compliance** | $ 96 | 155 | hours | $ 14,861 |
| **Contingency** | $ 59,442 | 1 | lump sum | $ 59,442 |
| **Reporting** | $ 40 | 75 | hours | $ 3,000 |
| | | | | |
| **Total Direct Costs** | $914,953 | | | $914,953 |
| | | | | |
| **Indirect costs – 0%** | $ 0 | | | $ 0 |
| | | | | |
| **Total Project Costs** | $914,953 | | | $914,953 |
| **Total Federal Share (33%)** | | | | $300,000 |
| **Total Applicant Share (67%)** | | | | $614,953 |

## BUDGET NARRATIVE

A detailed construction cost estimate for the project can be found in **Appendix G.**

**Salaries and Wages** – The Big Springs Ditch (BSD) will be performing the Project Manager and Grant Administer (Federal) as in-kind services. The wage shown is the market rate for a project manager or grant administrator based on current contracts and previous contracts with the State of Montana.

The Project Manager/Grant Administrator for BSD will be Bob Davis. The Project Manager effort is calculated as one hour per assumed pipe installation hour. Effort for reporting is allocated under the heading "Reporting". The BSD employee will not receive compensation for his time.

**Fringe Benefits** – There are no fringe benefits associated with the wages for the BSD in-kind services.

**Travel** – The cost to travel the 5 miles to the site are included in the market rate wage shown for the BSD project manager.

**Equipment** – All equipment to be used on the project are owned and operated by the hired consultants and contractors. No BSD owned equipment is projected to be used on the project.

**Materials/Supplies** – There are four major materials being supplied for this project. The pipe to be used for the pipeline will be purchased by BSD directly from the manufacturer (Contech) using funds from both the State and Federal grants as well as from BSD cash/loan.

The two types of aggregate, pipe bedding and pipe backfill, will be supplied by Montana Rail Link (MRL) as in-kind services. The cost associated with the aggregate is based on MRL's cost to purchase, load, deliver and unload the material (the material will be shipped to the construction site via railroad and will be unloaded by MRL contractor). The costs for the materials is less than the commercial price for a delivered cubic yard of material ($35/CY) used in previous federal construction projects performed by BSD's engineer.

The ditch relief line item is an estimated cost to supply perforated pipe, gravels and conduit to relieve natural springs located along the canal and to discharge the spring water away from the ditch. This line item is an estimate based on providing 4" PVC pipe (perforated and solid) and ¾" minus gravels for approximately one-fourth of the ditch length. The actual length will be determined during the upcoming survey. The one-fourth estimate is overly conservative.

**Contractual/Construction** – BSD will hire consultants to perform grant administration, project administration, final design, survey and required construction observation. BSD will also hire a single contractor to perform the construction of the pipeline.

Grant Administration – Grant administration for two State of Montana grants will be performed by the Broadwater Conservation District. The District requires administration fees of 10% of the grant. BSD will perform grant administration of the federal grant.

Project Administration – BSD has two consultants on board that have worked with the BSD since first applying for the state grant. Morrison-Maierle, Inc. is the project engineer and has assisted in grant writing and Tate Management has been involved in grant writing and will be the project administrator.

Construction Observation – BSD will contract with one of their consultants to act as owner representation during construction. Construction observation is based on 1 hour of observation per segment of pipe (24 feet) which equates to 1 hour of construction time. The construction observation rate of $85 an hour is the actual consultants billing rate for a "Resident Project Representative I".

Construction (pipe installation) – BSD will contract with BSE Excavation (BSE) to perform the site work and pipe installation. BSE is a local contractor and has been BSD's sole contractor for previous canal work. BSE provided a cost estimate to perform the necessary site work, canal shaping, onsite transporting of material, material placement, pipe installation and backfill material placement. The BSE cost estimate is provided in **Appendix G**. Values for labor and equipment rates are in line with similar projects in Montana.

Contract Labor (Survey) – BSD is contracting with Morrison-Maierle to perform a topographic survey of the project area. The contract unit rate includes two surveyors, travel and equipment. The contract price is based on 30 cross sections of the canal in addition to a survey around the ponds which feed the canal. It is estimated that the 2-man survey crew ($165/hr) will be able to complete the survey in 4 days. An additional 18 hours is allocated to processing the data, creating an electronic topographic map and other CAD functions. Equipment, per diem and travel is included in the contract cost.

Contract Labor (Engineering) – BSD is contracting with Morrison-Maierle to perform final design for the project. Final design includes analysis of the topographic survey, modeling of the pipeline, construction drawings and as-built drawings. The contract rate is for a senior engineer.

Environmental Compliance – BSD will contract with one of their consultants to provide environmental compliance services including permits, field surveys and reports. The contract rate is for a senior environmental scientist.

Reporting – The semi-annual and final reports will be prepared by the BSD grant administer. The cost is estimated on the person-hours and comparable billing rates. Reporting will be done as an in-kind service.

Other – There is a project contingency of $59,000 allocated to cover any items that might come up during construction. The contingency is spread out between a state grant, the federal grant and a project partner, MRL, which is contributing more than a third of the project cost. MRL's contingency is in the form of in-kind material and can be used for any short falls in the quantity of material placed.

Indirect Costs – The Project will not have indirect costs.

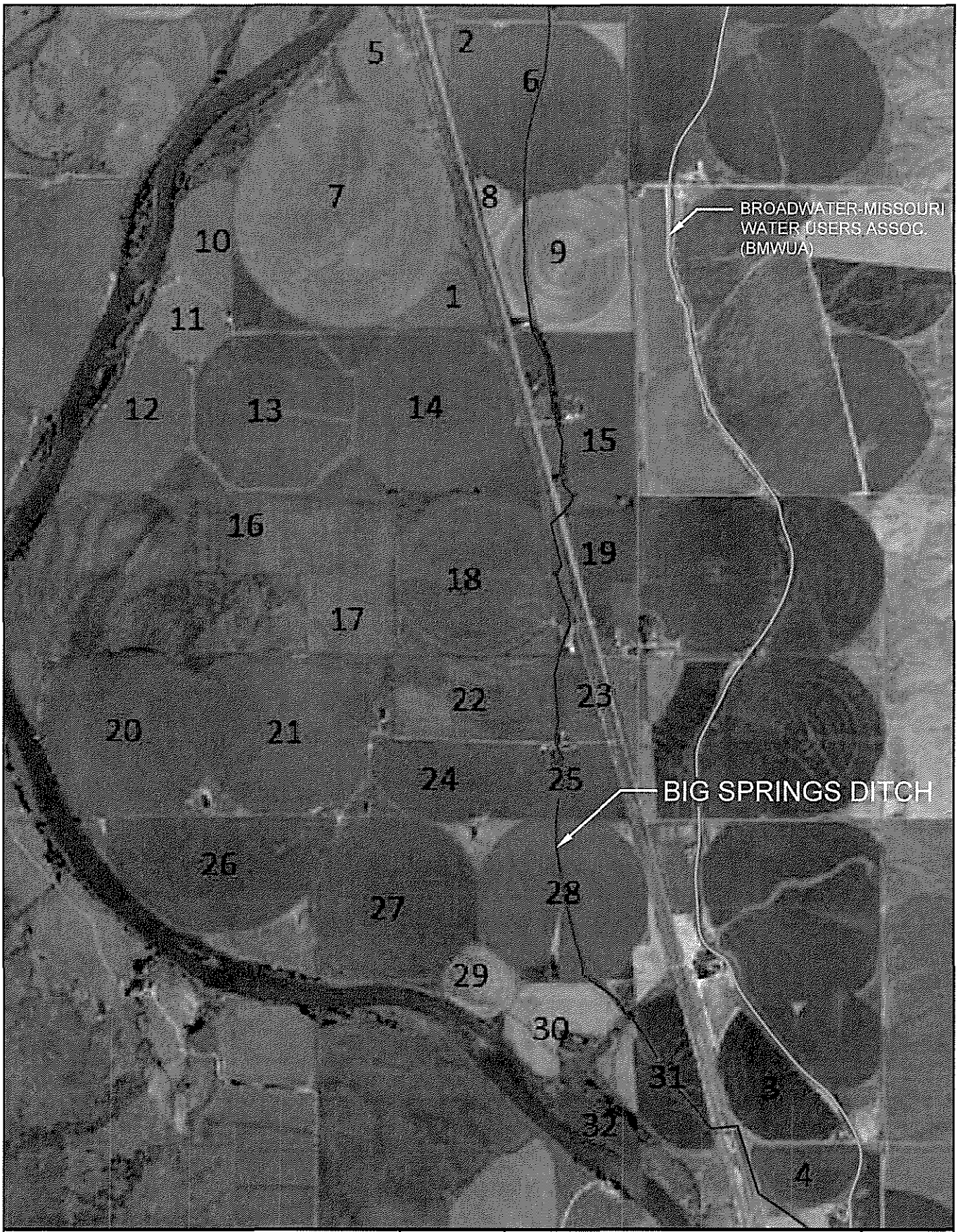
Total Cost – The Total Project Cost is estimated to be $914,953. The Federal share will be $300,000 (32.8% of the Total Project cost); and the applicant share will be $614,953 (67.2% of the Total Project cost) and includes State grants, in-kind services of project partners and monies directly from the Big Springs Ditch.

BIG SPRINGS DITCH, LLC

WATERSMART GRANT APPLICATION

WATER CONSERVATION PROJECT

# APPENDIX A - DRAWINGS




MORRISON MAIERLE, INC.
*An Employee-Owned Company*

*Engineers*
*Surveyors*
*Scientists*
*Planners*

3011 Palmer Street
Missoula, MT 59808

Phone: (406) 542-6860
Fax: (406) 542-4801



M:\5039\002\ACAD\Exhibits\IRRIGATED LANDS.dwg Plotted by:tmonroe on Jan/21/2015

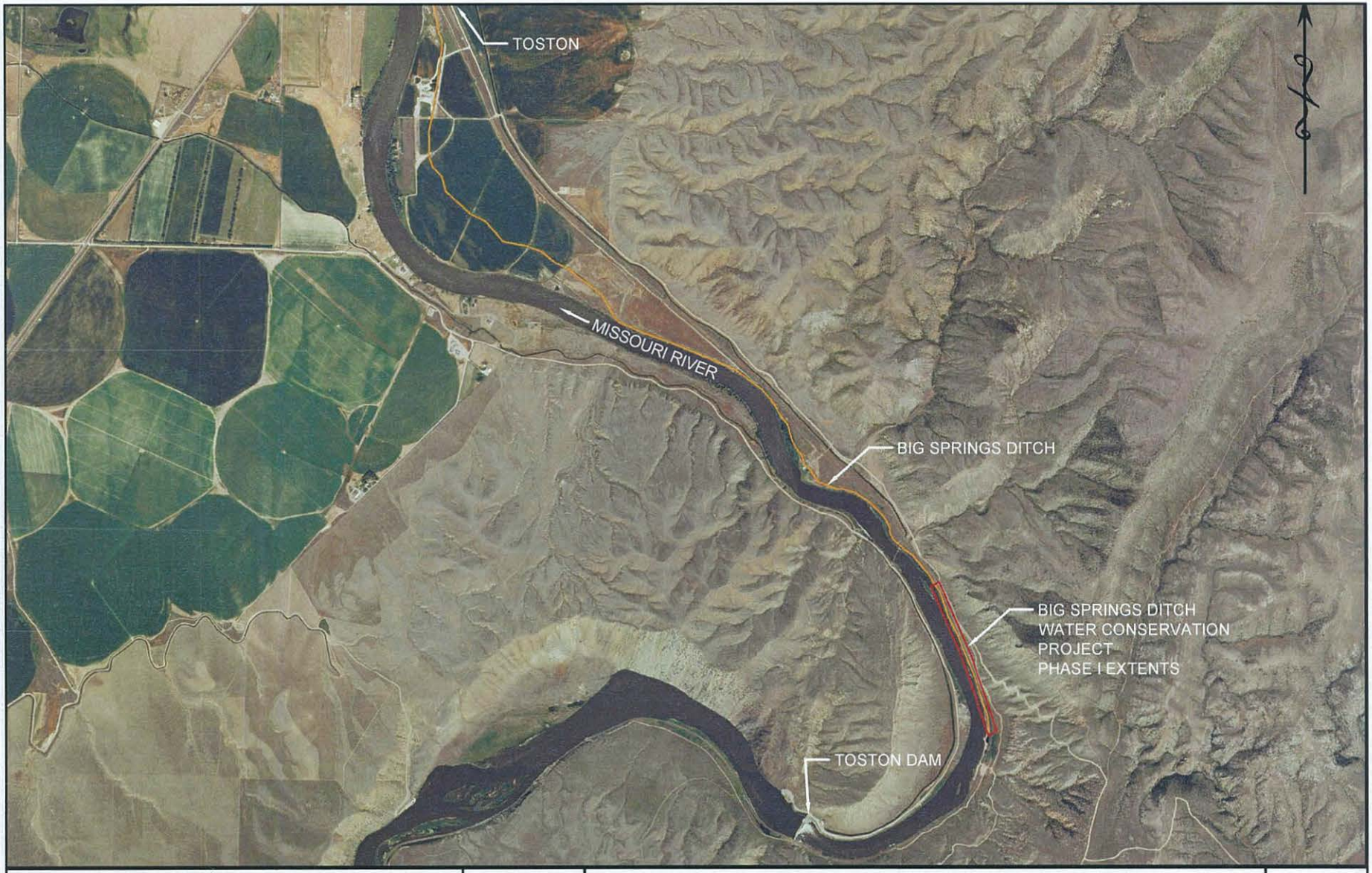
DRAWN BY: TDM
DSGN. BY: ???
APPR. BY: ???
DATE: 01/20/15

BIG SPRINGS DITCH
BROADWATER COUNTY MONTANA

IRRIGATED LANDS

PROJECT NO.
5039.002

FIGURE NUMBER
A.1

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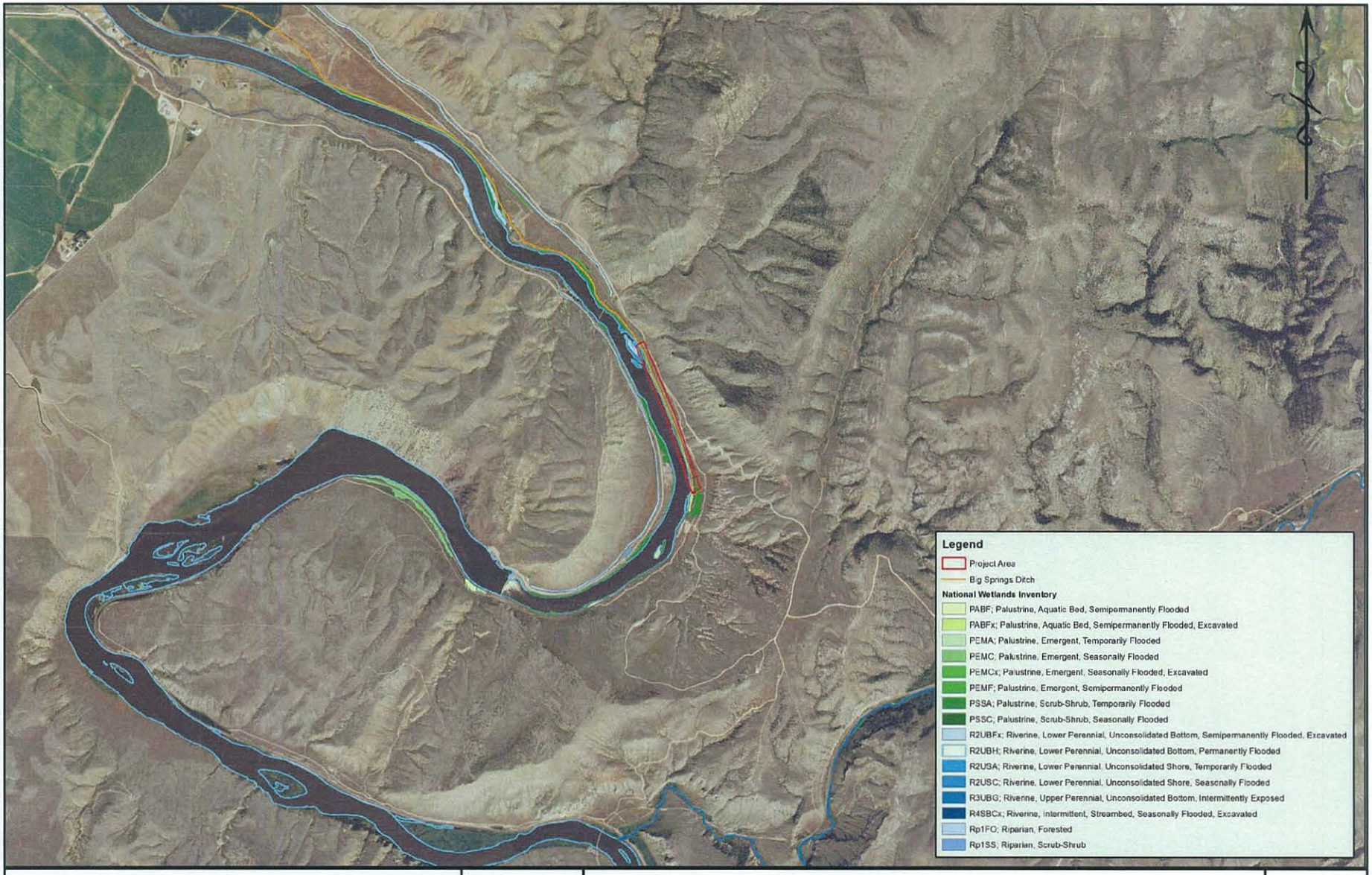
BIG SPRINGS DITCH
BROADWATER COUNTY MONTANA
AERIAL PHOTO PROJECT AREA

PROJECT NO.
5039.002

FIGURE NUMBER
A.2

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BIG SPRINGS DITCH
BROADWATER COUNTY MONTANA

NATIONAL WETLANDS INVENTORY MAP

PROJECT NO. 5039.002

FIGURE NUMBER A.3

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BIG SPRINGS DITCH, LLC

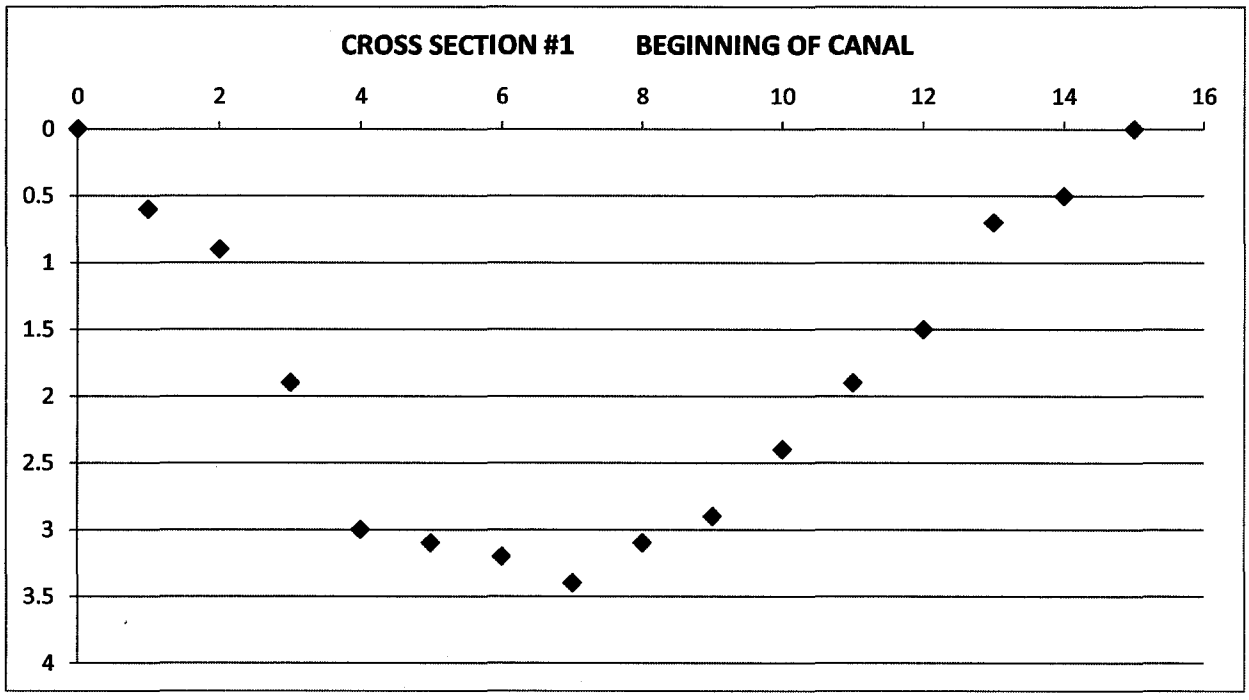
WATERSMART GRANT APPLICATION

WATER CONSERVATION PROJECT

# APPENDIX B – FIELD MEASUREMENTS

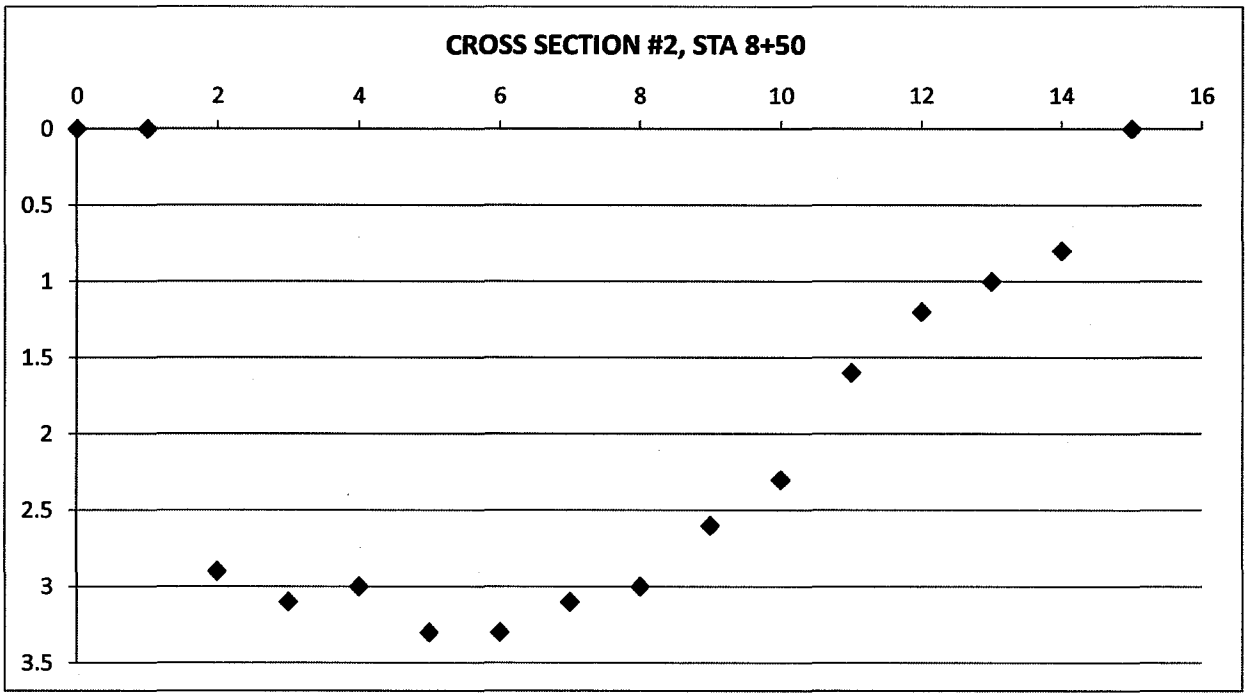
CROSS SECTION 1 (Sta 0+00) BEGINNING OF CANAL

| Horizontal Width (ft) | Depth (ft) | Area (ft2) | Velocity (ft/s) | Flow Rate (CFS) |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0.6 | 0.61 | 0.1 | 0.055 |
| 2 | 0.9 | 0.92 | 1.47 | 1.352 |
| 3 | 1.9 | 1.92 | 1.58 | 3.034 |
| 4 | 3 | 3.04 | 1.83 | 5.563 |
| 5 | 3.1 | 3.13 | 1.89 | 5.916 |
| 6 | 3.2 | 3.2 | 1.93 | 6.176 |
| 7 | 3.4 | 3.41 | 1.66 | 5.661 |
| 8 | 3.1 | 3.14 | 1.70 | 5.338 |
| 9 | 2.9 | 2.93 | 1.80 | 5.274 |
| 10 | 2.4 | 2.42 | 1.78 | 4.316 |
| 11 | 1.9 | 1.91 | 1.75 | 3.349 |
| 12 | 1.5 | 1.54 | 1.40 | 2.156 |
| 13 | 0.7 | 0.72 | 1.36 | 0.977 |
| 14 | 0.5 | 0.5 | 0.10 | 0.050 |
| 15 | 0 | 0 | 0 | 0 |
| | **Total** | **29.39 ft2** | | **49.22 cfs** |



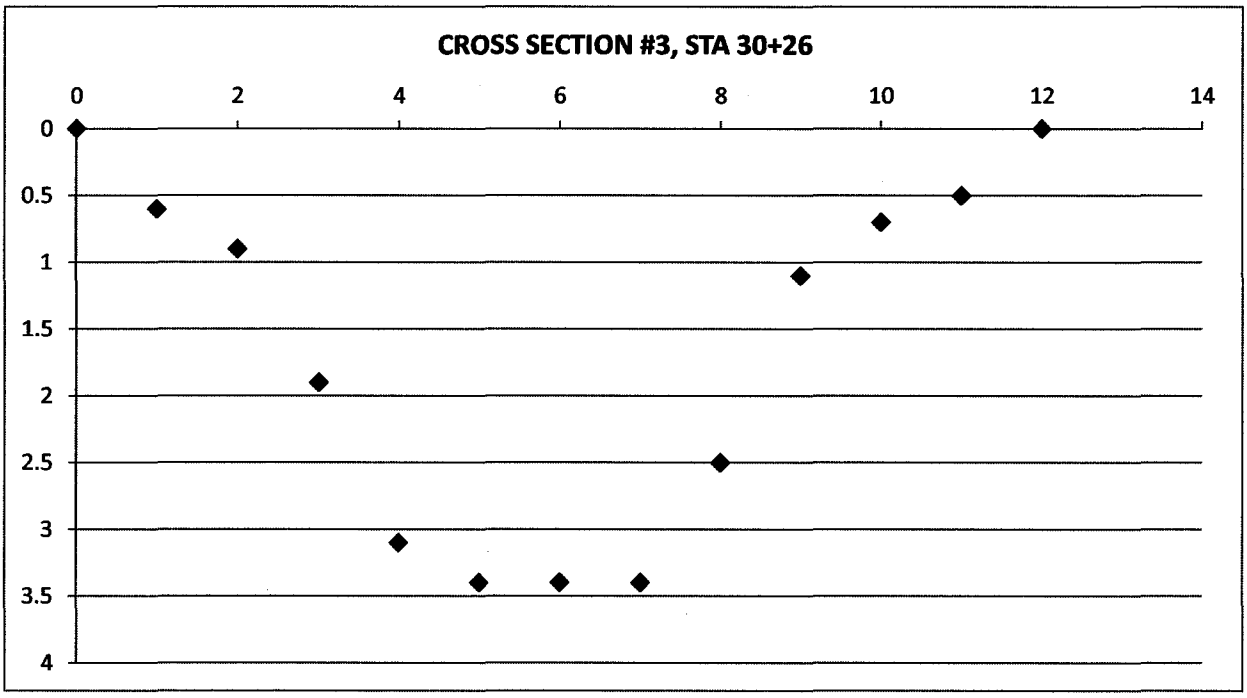
CROSS SECTION #2 (Sta 8+50)

| Horizontal Width (ft) | Depth (ft) | Area (ft2) | Velocity (ft/s) | Flow Rate (CFS) |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 |
| 2 | 2.9 | 2.9 | 2 | 5.075 |
| 3 | 3.1 | 3.1 | 1.68 | 5.208 |
| 4 | 3 | 3.0 | 1.85 | 5.560 |
| 5 | 3.3 | 3.3 | 1.73 | 5.709 |
| 6 | 3.3 | 3.3 | 2.01 | 6.633 |
| 7 | 3.1 | 3.1 | 1.78 | 5.518 |
| 8 | 3 | 3.0 | 1.81 | 5.430 |
| 9 | 2.6 | 2.6 | 1.28 | 3.328 |
| 10 | 2.3 | 2.3 | 0.48 | 1.112 |
| 11 | 1.6 | 1.6 | 0.26 | 0.421 |
| 12 | 1.2 | 1.2 | 0.15 | 0.184 |
| 13 | 1 | 1.0 | 0.08 | 0.080 |
| 14 | 0.8 | 0.8 | 0.05 | 0.040 |
| 15 | 0 | 0 | 0 | 0 |
| | **Total** | **31.20 ft2** | | **44.30 cfs** |



CROSS SECTION #3 (Sta 30+26)

| Horizontal Width (ft) | Depth (ft) | Area (ft2) | Velocity (ft/s) | Flow Rate (CFS) |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0.6 | 0.6 | 0 | 0 |
| 2 | 0.9 | 0.9 | 1.47 | 1.323 |
| 3 | 1.9 | 1.9 | 1.75 | 3.331 |
| 4 | 3.1 | 3.1 | 1.90 | 5.900 |
| 5 | 3.4 | 3.4 | 1.94 | 6.607 |
| 6 | 3.4 | 3.4 | 1.69 | 5.746 |
| 7 | 3.4 | 3.4 | 1.79 | 6.075 |
| 8 | 2.5 | 2.5 | 1.87 | 4.675 |
| 9 | 1.1 | 1.1 | 1.78 | 1.962 |
| 10 | 0.7 | 0.7 | 1.36 | 0.950 |
| 11 | 0.5 | 0.5 | 0.10 | 0.050 |
| 12 | 0 | 0 | 0 | 0 |
| | **Total** | **21.50 ft2** | | **36.62 cfs** |



BIG SPRINGS DITCH, LLC

WATERSMART GRANT APPLICATION

WATER CONSERVATION PROJECT

# APPENDIX C – DUROMAXX HDPE PIPE SPECIFICATIONS

DuroMaxx®
STEEL REINFORCED PE TECHNOLOGY

# DuroMaxx® Specification Sheet

## Scope

This specification describes DuroMaxx® pipe for use such as storm sewers, sanitary sewers, industrial waste applications, drainage pipes, underground detention, infiltration, cistern or rainwater harvesting systems in 30" (750 mm) through 120" (2400 mm) nominal diameters.

## Description

DuroMaxx is a reinforced polyethylene pipe with a smooth waterway wall and exterior profile that is reinforced with high strength galvanized steel ribs. The continuous reinforcing ribs are completely encased within the polyethylene profile. DuroMaxx is manufactured using a helical winding process that results in a continuously fusion welded lap seam. The pipe profile is manufactured using a high quality stress-rated thermoplastic meeting the requirements of ASTM F2562 "Standard Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage" or AASHTO Designation MP-20, Bridge Construction Section 26 & Design Section 12. For the purpose of hydraulic design, the recommended Manning's "n" value shall be 0.012 for pipe diameters included within this specification.

## Material Properties

Virgin high density polyethylene stress-rated resins are used to manufacture DuroMaxx pipe and complimentary fabricated fittings. Resins shall conform to the minimum requirements of cell classification 345464C as defined and described in the latest version of ASTM D3350 "Standard Specification for Polyethylene Plastics Pipe and Fittings Materials".

## Joint Performance

Pipe lengths shall be joined on site using coupling bands, bell & spigots or welded couplers especially designed for DuroMaxx pipe. Joints shall meet one of the performance levels as required and specified:

- **Soil Tight (ST) Joints** (30" – 96") shall be plain ended DuroMaxx pipe with Aluminized Type 2 (or optional Polymeric coated) CMP coupling bands and elastomeric gaskets (see Standard Drawings 1012802).

- **Low Head (LH) Joints** (30" – 72") shall be gasketed, stress-rated high density polyethylene bell and spigot joints (meeting the requirements set forth in the above Material Properties paragraph) that have been laboratory tested to 3 psi when tested in accordance with ASTM D3212 "Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals" (see Standard Drawing 1012803).

- **High Performance (HP) Joints** (30" – 72") shall be gasketed, bell and spigot joints where both the bell and spigot are reinforced with steel that is fully encased in stress-rated high density polyethylene (meeting the requirements set forth in the above Material Properties paragraph) and that have been laboratory tested to 15 psi when tested in accordance with ASTM D3212 "Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals" (see Standard Drawing 1012804).

- **Welded Coupler (WC) Joints** (36" – 120") shall utilize plain ended DuroMaxx pipe welded together with a polyethylene coupler by way of electrofusion welding or extrusion welding technology. The welded connections provide a true, infield watertight system. The field installed welded coupler joints shall remain watertight and can achieve zero leakage rates on appropriate applications. The welded coupler joints have been laboratory tested to 30 psi in accordance with ASTM D3212.

## Fittings

All fabricated fittings and couplings supplied by the manufacturer shall be constructed to ensure no loss of structural integrity or joint tightness at welded seams and joints. Only those fittings supplied by or recommended by the manufacturer shall be used.

**Installation**
Installation shall be in accordance with ASTM D2321 "Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications" along with product-specific recommendations contained in Contech Installation Guidelines for DuroMaxx pipe, available from local Contech representatives or from www.ContechES.com.

**Pipe Dimensions and Cover Limits**

| Nominal Pipe Size | Minimum Pipe Stiffness (Class 1) | Outside Diameter | Unit Weight** | Minimum Waterway Wall Thickness ($t_1$) | | Minimum Cover*** | | Maximum Cover | |
|---|---|---|---|---|---|---|---|---|---|
| inch | lb/in/in | in. [mm] | lbs./ft | in. | [mm] | ft. | [m] | ft. | [m] |
| 30 | 28 | 30.9 [785] | 18.8 | .082 | [2.08] | 1 | [.305] | 50 | [15.2] |
| 36 | 22 | 37.1 [942] | 23.6 | .082 | [2.08] | 1 | [.305] | 50 | [15.2] |
| 42 | 20 | 43.2 [1097] | 27.0 | .082 | [2.08] | 1 | [.305] | 50 | [15.2] |
| 48 | 18 | 49.5 [1257] | 30.8 | .130 | [3.30] | 1 | [.305] | 30 | [9.1] |
| 54 | 16 | 55.5 [1410] | 36.1 | .130 | [3.30] | 1 | [.305] | 30 | [9.1] |
| 60 | 14 | 61.4 [1560] | 42.9 | .130 | [3.30] | 1 | [.305] | 30 | [9.1] |
| 66 | 14 | 67.8 [1722] | 56.9 | .220 | [5.58] | 1.5 | [.457] | 30 | [9.1] |
| 72 | 14 | 73.7 [1872] | 65.6 | .220 | [5.58] | 1.5 | [.457] | 30 | [9.1] |
| 84 | 14* | 85.9 [2182] | 76.3 | .220 | [5.58] | 2 | [.610] | 30 | [9.1] |
| 96 | 10* | 97.8 [2484] | 87.0 | .220 | [5.58] | 2 | [.610] | 30 | [9.1] |
| 120 | 5* | 121.9 [3097] | 109.0 | .220 | [5.58] | 3 | [.914] | 25 | [7.6] |

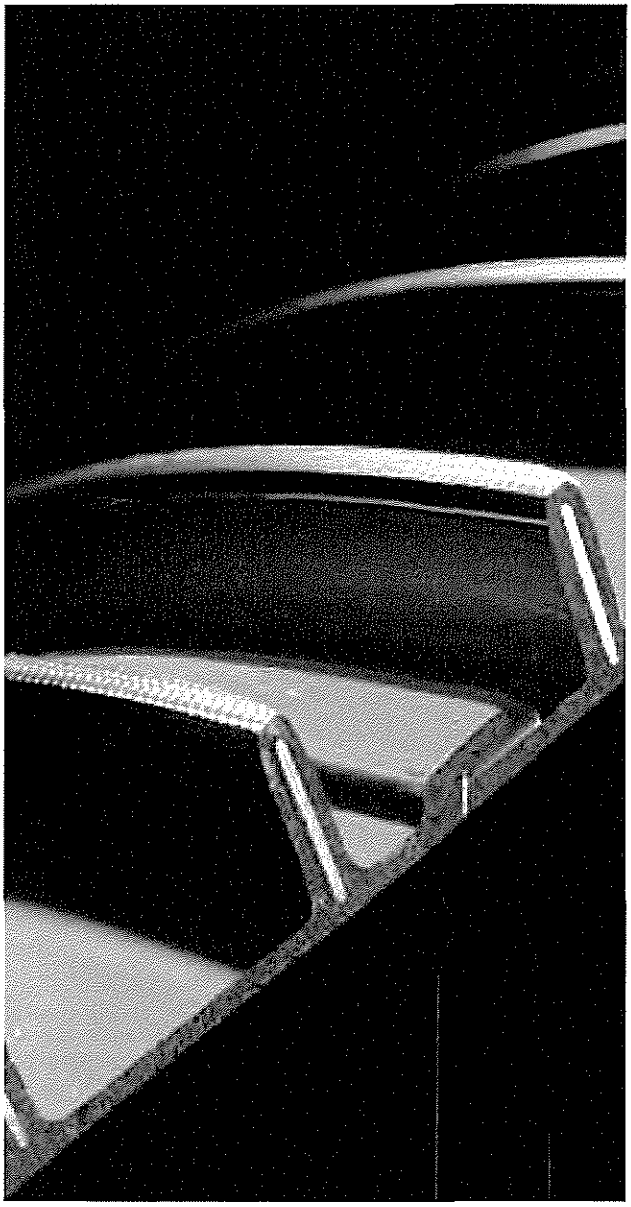
* 84", 96" and 120" min. pipe stiffness is not currently defined in ASTM Specification F2562 for Class 1 pipe. Contech has developed the required minimum pipe stiffness for these pipe diameters.
** Approximate weights. Actual weight will vary with length and joint type.
***Minimum and maximum cover limits are for H20/H25 loading.

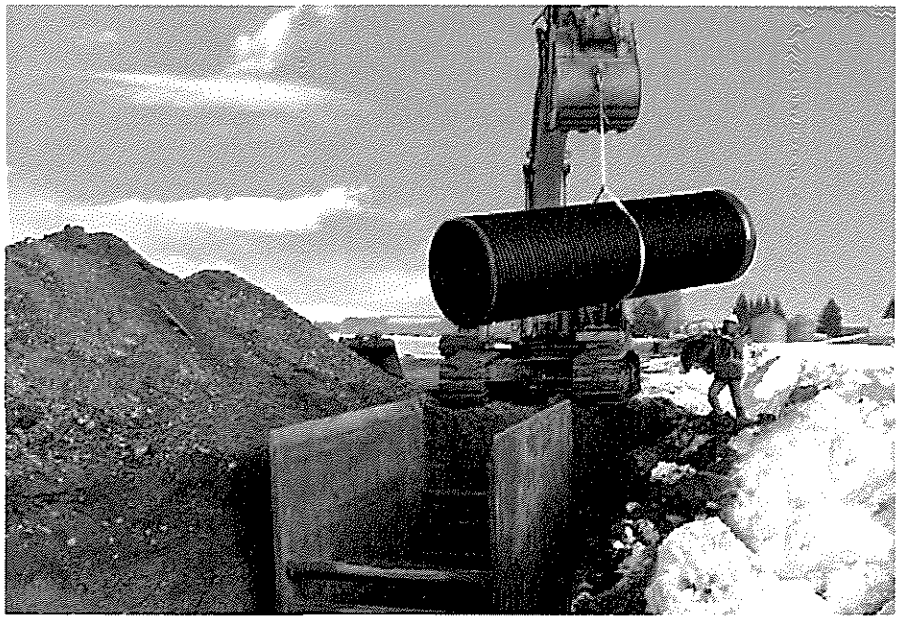
**The Contech Environmental Commitment**

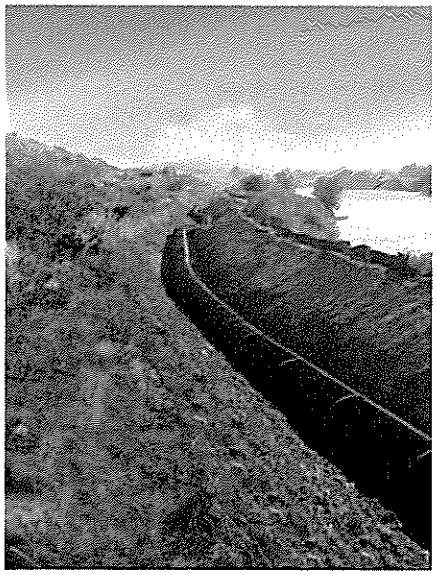
Contech Engineering Solutions LLC is an environmentally conscious company committed to shaping the future of green building and design. DuroMaxx is Contech's newest contribution to our ecofriendly portfolio of civil engineering solutions. Starting with the manufacturing process, DuroMaxx consumes less than 37% of natural resources to produce AASHTO M294 HDPE pipe. The green design continues with DuroMaxx's steel reinforced ribs which are made of recycled steel in content levels ranging from 55-80%. Plus, when utilized appropriately, it can contribute to a variety of the U.S. Green Building Council's LEED credits in the categories for sustainable sites, water efficiency and landscaping, and materials and resources.

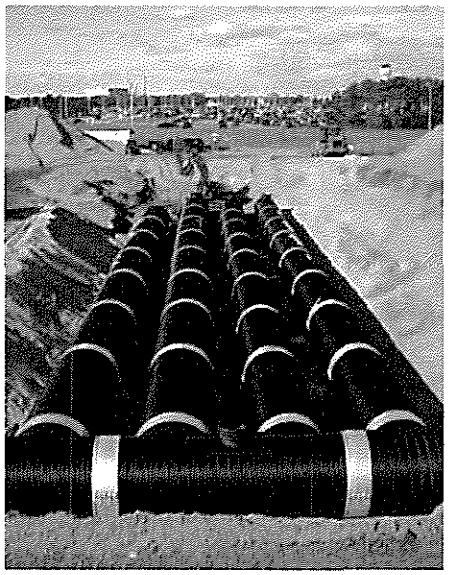
CONTECH®
ENGINEERED SOLUTIONS

# DuroMaxx® – Steel Reinforced Polyethylene Technology









DuroMaxx®
STEEL REINFORCED PE TECHNOLOGY

Sanitary & Storm Sewer | Reline | Irrigation | Detention | Wastewater

LEED with Contech®

# Key Performance Advantages

**» Manufactured in accordance with ASTM F2562 and AASHTO MP-20.**

## The Strength of Steel. The Durability of Plastic.

It's the ideal combination of materials that makes DuroMaxx an exceptional pipe. 80 ksi steel reinforcing ribs provide the strength, and pressure rated Polyethylene Resin (PE) provides the durability. This combination of materials results in an extraordinarily strong and durable pipe. DuroMaxx is designed with a smooth inner wall for outstanding hydraulic capacity and provides the properties you can count on for long-term service and performance in the most demanding environments.

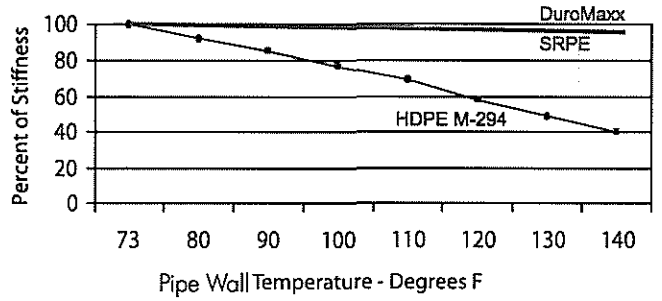
## Lifelong Performance

DuroMaxx steel reinforced ribbed profile wall construction will not creep or buckle. The built-in capacity of the high strength steel eliminates concerns that have long plagued profile wall HDPE pipe. Today, it is possible to design with confidence to meet the long-term structural demands of the most difficult **sanitary & storm sewer, reline, irrigation, detention** and **wastewater** projects.

## Temperature Effects on Strength

All flexible pipes must be designed to have adequate pipe stiffness to resist handling, installation and construction loads and to minimize deflection, ensuring a successful installation. Published pipe stiffness levels are measured at 73°F in a laboratory. The actual or apparent field pipe stiffness due to the effects of sunlight and a modest 80° temperature can produce results that are very different in the field – where it counts. A pipe wall temperature in excess of 110°results in a loss of pipe stiffness greater than 30% for a non-reinforced profile wall polyethylene pipe. Steel reinforced DuroMaxx pipe loses less than 1% of its stiffness under the same conditions because the steel provides the pipe stiffness, not the PE plastic. As a result, DuroMaxx can be twice as stiff as non-steel reinforced HDPE pipe.

**Effective Pipe Stiffness vs. Temperature***




*The information in this graph is an average stiffness loss observed over several diameters of one AASHTO M-294 HDPE profile wall product.

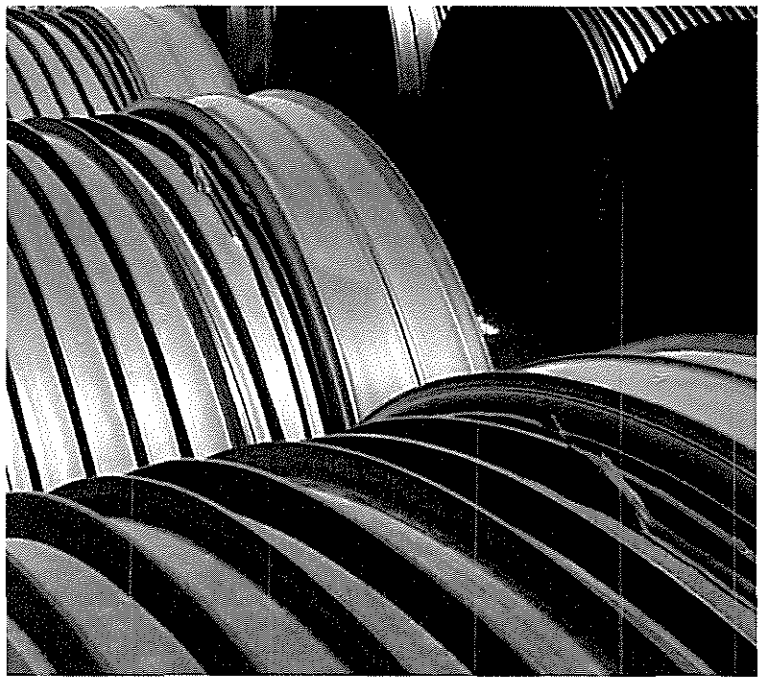
## High Strength Steel & High Performance Pressure Rated Resins

Predictable service life demands predictable material properties. DuroMaxx uses only high quality pressure rated PE resin that provides predictable engineering properties including crack resistance, tensile strength and modulus of elasticity. Hydrostatic Design Basis (HDB) testing verifies and documents important 50 and 100 year design properties that aid the professional engineer when designing piping systems.

Unlike unreinforced plastic pipes which rely fully on time/strain sensitive materials for their structural performance, DuroMaxx's steel reinforcement provides 100% of the load carrying capacity. Therefore the strength of DuroMaxx does not diminish over time, nor is it significantly impacted by elevated summertime temperatures.

## Steel Reinforced Watertight Joints

DuroMaxx's steel reinforced bell and spigot achieves a level of watertight joint performance that sets it apart from conventional pipe products. The DuroMaxx joint is designed to meet, exceed and maintain the highest standards of performance when tested in accordance with ASTM D3212. Tested to 15 psi, DuroMaxx steel reinforced high performance (HP) joints greatly exceed D3212 10.8 psi requirement. For lower performance applications, 3 psi low head (LH) or soil tight (ST) joints are available. Welded coupler (WC) and electrofusion (EF) joints tested to 30 psi are also an option.



## Savings

**High flow rates** are achieved with a smooth polyethylene waterway wall for optimal savings. Target flow rates can be assured with DuroMaxx by contacting your local Contech sales engineer for the appropriate information. Manning's "n" values will range between 0.011 to 0.013, depending on velocity and flow rate.

DuroMaxx pipe is lightweight and can be easily handled and quickly installed, often eliminating the need to use heavy construction equipment. The outside diameter (OD) of DuroMaxx is smaller than other conventional pipe materials, resulting in less trench excavation. As the two main cost drivers to install water conveyance products are manpower and machinery, DuroMaxx provides the opportunity to save in both, resulting in less overall spending. The longer lengths and easy joint assembly are just some of the DuroMaxx installation advantages. DuroMaxx should be installed in accordance with nationally accepted ASTM D2321 installation practices. Contact your local Contech representative for the DuroMaxx Installation Guide.

## Fittings

DuroMaxx pipe is available with a full range of fabricated fittings such as elbows, tees, wyes, slope junctions and reducers. Both standard and custom fittings can be readily fabricated, which can result in fewer concrete structures and lower project costs.

## Sizes

Available in diameters from 30 to 120 inches and manufactured in standard lengths of 14 or 24 feet with bell and spigot joints, DuroMaxx has fewer joints to assemble on site, resulting in faster installation rates for the contractor. If your project requires custom lengths, contact your Contech representative for details and availability.

**Pipe Dimensions & Handling Weights**

| Nom. Pipe Dia.(in) | Pipe OD (in) | Pipe ID (in) | Bell OD (in) | Min. Cover (ft) | Max. Cover (ft) | Approx. Weight (lbs/ft) |
|---|---|---|---|---|---|---|
| 30 | 30.9 | 29.5 | 34.0 | 1.0 | 50 | 18.8 |
| 36 | 37.1 | 35.4 | 39.9 | 1.0 | 50 | 23.6 |
| 42 | 43.2 | 41.3 | 45.8 | 1.0 | 50 | 27.0 |
| 48 | 49.5 | 47.2 | 52.3 | 1.0 | 30 | 30.8 |
| 54 | 55.5 | 53.2 | 58.2 | 1.0 | 30 | 36.1 |
| 60 | 61.4 | 59.1 | 64.1 | 1.0 | 30 | 42.9 |
| 66 | 67.8 | 65.0 | 71.6* | 1.5 | 30 | 56.9 |
| 72 | 73.7 | 70.9 | 77.6 | 1.5 | 30 | 65.6 |
| 84 | 85.9 | 82.7 | 88.9* | 2.0 | 30 | 76.3 |
| 96 | 97.8 | 94.5 | NA** | 2.0 | 30 | 87.0 |
| 120 | 121.9 | 118.1 | NA** | 3.0 | 25 | 109.0 |

* Low head (LH) joints only.
** Currently available with welded coupler (WC) and electrofusion (EF) joints or plain ended with or without soil tight (ST) joints.



## Environmental Benefits

Contech is an environmentally conscious company committed to shaping the future of green building and design. Contech offers a wide range of site solutions that respond to green building and construction needs and can contribute towards LEED and NAHB green credits. DuroMaxx has the potential to contribute to a variety of LEED credits in the categories for sustainable sites, water efficiency, materials and resources, innovation in design and regional priority. DuroMaxx consumes 35% less of the natural resources required to produce AASHTO M-294 pipe. The steel reinforcing ribs in the profile wall that provide the structural integrity for the pipe are made out of steel with recycled content levels ranging from 55-80%.

## About LEED

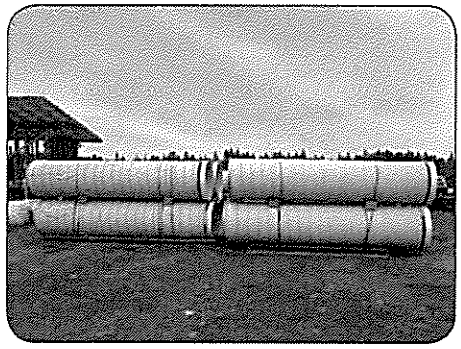
A third party certification program, U.S. Green Building Council's LEED (Leadership in Energy and Environmental Design) Green Building Rating System™ is based on points and evaluates the overall performance of a green building project by assessing each of the materials and systems used in aggregate.

# Sanitary Sewer Conveyance & Yard Piping

Large diameter sanitary sewer projects can be tough to deal with for many agencies. These long interceptors or trunk lines can run for miles, from manhole to manhole, eating away at an already constrained budget. Much of the costs can be contributed to installation realities for large quantities of very large diameters. These costs can include:

- Freight and number of trucks needed
- Number of picks and weight of those picks
- Number of joints and procedure to meet watertight standard
- Other material costs

DuroMaxx provides real answers that help make the agency's and engineer's job easier. Outstanding performance and value are clearly evident when comparing DuroMaxx to a wide variety of other products such as RCP, HDPE, Polypropylene, PVC and fiberglass pipe.



## Benefits

- Large diameters up to 120'.
- Predictable, high strength for deep covers, shape and deflection control.
- Joint tightness that meets initial testing requirements and long-term infiltration/exfiltration needs.
- Resistant to corrosive effluent.
- Smooth inner walls allow for minimum slope designs and longer runs.
- Lightweight for installation efficiency

Shelley, Idaho
14 miles installed up to 48" diameter

DuroMaxx
Sanitary System

Barker Ranch,
Washington
3 miles
54" & 60" diameter

DuroMaxx
Irrigation System

# Irrigation Applications

Agriculture and irrigation agencies are in need of more dependable and cost effective solutions to conserve their most valuable resource, water. Many are enclosing ditches and canals with pipe conveyance systems in remote areas of the country. These projects can be challenging to any engineer or project manager, especially when hydraulic parameters require larger diameter pipe sizes. DuroMaxx has proven solutions to these problems.

## Benefits

- HDB pressure rated PE resins provide superior corrosion resistance.
- A variety of joint configurations and joint tightness levels are available to meet your specific project needs. See page 2 for more details.
- Installation cost advantages important for remote locations.
- Versatile fabrication supports unique fittings and components.
- Excels in short and long-term cost analysis for irrigation applications.

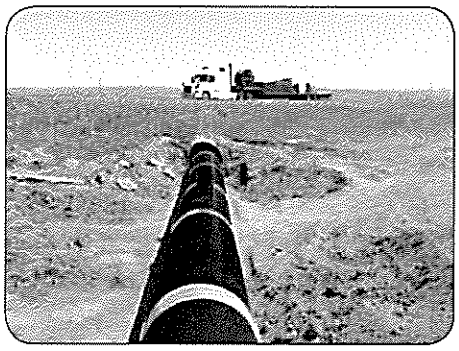
100-Year Gravity Flow Capabilities
50-Year Pressurized Service Period

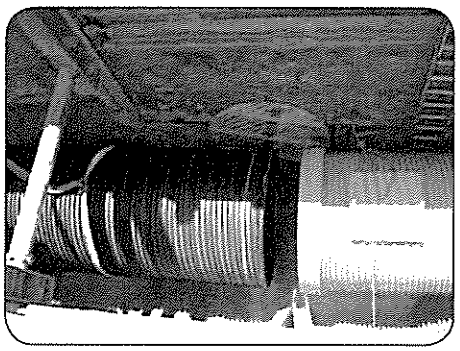
| Diameters (in) | 9 Months | Continuous (50 years) |
|---|---|---|
| 30-42 | 9.5 psi | 6.75 psi |
| 48-60 | 12.0 psi | 8.5 psi |
| 66-120 | 15.0 psi* | 15.0 psi |

* The use of welded coupler (WC) and eletrofusion (EF) joints may allow for higher pressure.

# Storm Sewer/Culvert Direct Bury & Reline Applications

DuroMaxx drainage pipe is ideally suited for the collection and removal of stormwater from highway, urban, industrial and residential projects. Its unique combination of steel reinforcement and pressure rated PE resin allows it to perform like no other drainage pipe on the market.





## Benefits

- 80 ksi high strength steel provides maximum load carrying capabilities with allowable cover limits ranging from 30 to 50 feet.
- High strength steel provides exceptional shape and deflection control even on warm, sunny days where typical corrugated HDPE drainage pipes fall short.
- Pressure rated PE resin provides unmatched durability.
- Abrasion and chemical resistance is unaffected by water pH levels unlike reinforced concrete pipe, where abrasion resistance varies with water pH levels.
- Available with soil tight, 3 psi low head, steel reinforced 15 psi high performance and welded coupler joint options. If your project requires extreme joint tightness for the life of the system, then rely on DuroMaxx's steel reinforced high performance or welded coupler joints.
- While DuroMaxx may not be the least expensive storm sewer pipe on the market, it outperforms when other products fall short. Long-term, DuroMaxx's outstanding performance and durability generate value.
- The efficient wall profile makes DuroMaxx ideally suited for reline of deteriorating culverts.

Albuquerque, New Mexico
2,400 lf
96" diameter

DuroMaxx
Storm Sewer System

Monticello, Indiana
395,000 gal. storage
96", 84" & 72"
diameters

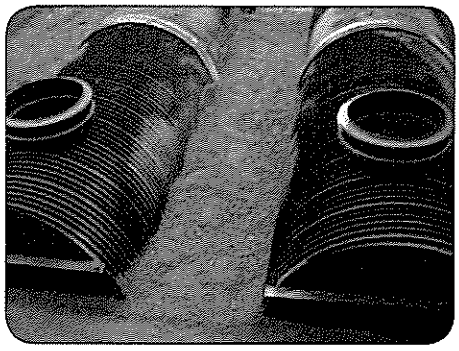
DuroMaxx
CSO System

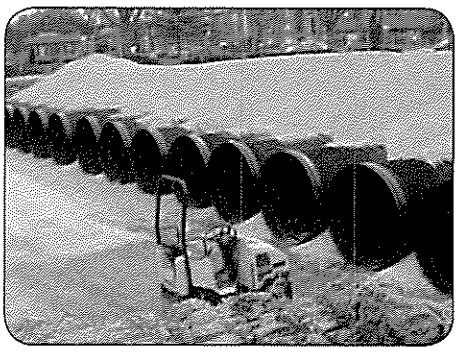
# Tank Applications

## Detention/Rainwater Harvesting/Combined Sewer Overflow

Detention systems are used to regulate stormwater flow through main pipelines by acting as a buffer during peak loads. DuroMaxx systems are designed to contain the water and slowly release it into the main system over a period of time. These systems are often custom made to watertight specifications in order to suit the project requirements.

DuroMaxx detention systems can incorporate a wide range of fittings such as bends, risers, bulk headed ends and inlet/outlet pipes. The systems can be custom manufactured to individual lengths in sizes and configurations that can be economically transported and assembled on site.



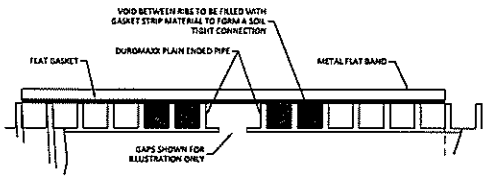


## Benefits

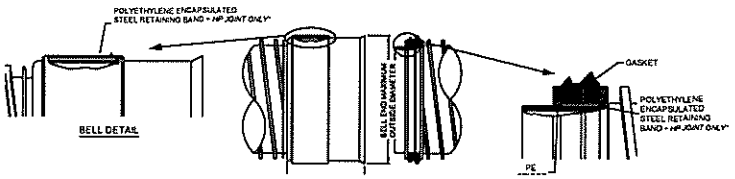
- Utilizing larger diameters whenever possible reduces storage cost per gallon. DuroMaxx is available up to 120 inches.
- Steel reinforcing results in smaller outside diameter dimensions when compared to corrugated HDPE pipe or reinforced concrete pipe. When maximum diameter selection is limited by minimal cover, DuroMaxx can typically be upsized by 6 inches or more, resulting in reduced overall water storage cost.
- Reinforced steel fittings create a stronger and more reliable system when compared to non-reinforced HDPE pipe materials.
- Available with perforations for retention and recharge applications.
- A variety of joint configurations and joint tightness levels are available to meet your specific project needs. See page 2 for more details.

# THE DESIGN BEHIND THE PERFORMANCE

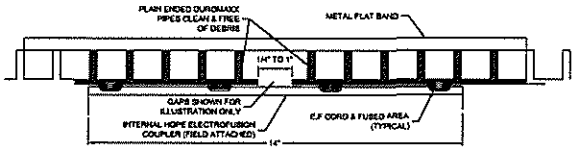
## Soil Tight (ST) Joint Detail



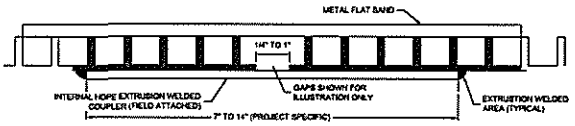

## High Performance (HP) and Low Head (LH) Joint Details




## Electrofusion (EF) Joint Detail




## Welded Coupler (WC) Joint Detail




Contech Engineered Solutions provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, retaining walls, sanitary sewer, stormwater, erosion control, soil stabilization and wastewater treatment products.

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| | |
|---|---|
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| Colorado (Denver) | 720-587-2700 |
| Florida (Orlando) | 321-348-3520 |
| Maine (Scarborough) | 207-885-9830 |
| Maryland (Baltimore) | 410-740-8490 |
| Oregon (Portland) | 503-258-3180 |
| Texas (Dallas) | 972-590-2000 |

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BIG SPRINGS DITCH, LLC

WATERSMART GRANT APPLICATION

WATER CONSERVATION PROJECT

# APPENDIX D – LETTERS OF SUPPORT

Broadwater Conservation District

"Local Common Sense Conservation"

415 South Front Street Townsend, MT 59644

Phone: 406-266-3146 Ext. 104
Fax: 406-266-5429
Denise.Thompson@mt.nacdnet.net

January 13, 2015

Bureau of
Reclamation
PO Box 25007
Denver, CO 80225

RE: Big Springs Ditch Water Conservation Project, Phase 1

To Whom It May Concern:

The Board of Supervisors of the Broadwater Conservation District is writing to provide support of the Big Springs Ditch Water Conservation Project (Phase 1), which addresses water conservation concerns and in-stream flows for fish habitat, and reduces the risk of catastrophic embankment failure of Montana Rail Link's main rail line.

The Big Springs Ditch was constructed in 1869 to harness a set of natural springs, which have produced the same 52 cubic feet per second (cfs) ever since. A 3,050 foot segment of the canal has been identified as having a high amount of seepage, which equates to 4,500 acre-feet annually. By conserving the water lost to seepage Big Springs Ditch would be able to allocate an additional 3 cfs of conserved water to enhance or expand an existing fish spawning bed. Converting the ditch segment to a pipeline would not only conserve water but also stabilize the canal's north bank which is currently failing and in need of repair. Phase 1 will play a vital role in moving toward phase 2 which includes multiple on-farm water conservation and energy savings projects and the potential development of a spring creek benefiting the Missouri River and providing a unique fishing experience.

The ditch company and partners working to ensure this project moves forward are to be commended for their due diligence in bringing conservation, fisheries and the safety and protection of a unique irrigation and fish spawning system to the forefront.

Sincerely,

Darrell Baum

Darrell Baum
Chairman

USDA

United States Department of Agriculture

Natural Resources
Conservation Service

Townsend Field Office

415 S Front Street
Townsend
Montana, 59644
Voice 406.266.3146
Fax 855.510.7025

January 13, 2015

Bureau of Reclamation
PO BOX 25007
Denver, CO 80225

RE: Big Springs Ditch Lining

I am writing to provide support of the Big Springs Ditch Water Users' proposal for the Big Springs Ditch Pipeline Project, which will address water quantity, water quality, and fisheries resource concerns in the Upper Missouri River.

The Townsend NRCS Field Office supports this proposal since it would result in reduced seepage of irrigation water through the banks of the canal resulting in additional Big Springs water to be available for fisheries improvements.

This proposal is an integral part of the on farm irrigation reorganization that the Townsend NRCS field office is working on with the Big Springs Ditch Water Users. These projects if funded would result in further conversion of open ditch to gravity assist pipeline. This would result in additional water savings and a decrease in energy demand by reducing the horsepower needed.

I commend the Big Springs Water Users for their willingness to address resource concerns with in their project area.

Respectfully,

Justin Meissner
District Conservationist

JAN 15 2015

Bureau of Reclamation
P.O. Box 25007
Denver, Colorado 80225

**RE: Big Spring Ditch Water Conservation Project**

To Whom It May Concern –

I am writing in support of the water conservation project for the Big Springs Ditch. As one of the irrigators on the Ditch I can testify of the value this project has on our ability to supply 100% of our needed irrigation water.

The Big Springs have been lifeblood to our family and our neighbors. We greatly support all efforts to ensure the continued use of the springs. Those of us who use the Big Springs are grateful for this natural resource and we appreciate all of the effort being put into conserving this resource and supporting our farming community.

Our family takes great strides to ensure that we use all of our water in an appropriate manor. We have switched to center pivot irrigation systems to increase our efficient use of this resource. It will be great to also have our ditch be as efficient as possible.

Sincerely,

Cory L. Davis

Cory L. Davis
406-266-3097

JAN 15 2015

Bureau of Reclamation
P.O. Box 25007
Denver, Colorado 80225

Regarding Big Spring Ditch Project

Dear Sirs –

Thank You for this opportunity to write in support of our ditch project. Our family farm takes great strides to ensure that we use all of our water in an appropriate manor. We have switched to center pivots to be as efficient as possible. It will be great to have our ditch be as efficient. The Big Springs are a wonderful resource that should be used to the greatest extent possible. Giving us the opportunity to be a self-sufficient group of farmers, to not have to purchase water when our need is the greatest, will be a great savings and a great feeling.

Thank you, once again.

Sincerely,

Bill L Davis
406 - 266 - 3568

feel free to call me if you want any info on The Big Springs Ditch as I am the oldest member on the Ditch.

Bill

Bureau of Reclamation
P.O. Box 25007
Denver, Colorado 80225

**RE: Big Spring Ditch Water Conservation Project**

To Whom It May Concern –

I am writing in support of the water conservation project for Big Springs Ditch. As one of the irrigators on the Ditch I can attest to the value this project has on our ability to supply 100% of our needed irrigation water.

The Big Springs have been lifeblood to our family and for our friends. We greatly support all efforts to ensure the continued use of the springs.

Sincerely,

Bob Davis

BIG SPRINGS DITCH, LLC

WATERSMART GRANT APPLICATION

WATER CONSERVATION PROJECT

# APPENDIX E – OFFICIAL RESOLUTION

BEFORE THE BOARD OF DIRECTORS OF THE BIG SPRINGS DITCH

IN THE MATTER OF THE WATERSMART
WATER AND ENERGY EFFICIENCY RESOLUTION NO. 2015-1
GRANT PROGRAM FOR FY 2015.

Director Davis offered the following Resolution and moved for its adoption.

WHEREAS, the Big Springs Ditch (BSD) is obligated by law to manage and conserve water it receives from Phase 1 of the Water Conservation Project; and WHEREAS, the Board of Directors of the BSD support the Project as described in the attached Project Description and the water conservation benefits provided thereby; and

WHEREAS, Big Springs Ditch desires to apply for and secure funds that may be made available from the U.S. Bureau of Reclamation (Reclamation) through the WaterSMART Water and Energy Efficiency Grant Program for FY 2015 (Grant Program) for said Project; and

WHEREAS, Big Springs Ditch has the capability to provide funding and in-kind contributions as specified in the Project Funding Plan; and

WHEREAS, the Big Springs Ditch pledges to cooperate with Reclamation in meeting deadlines established thereby for the purpose of entering into a Cooperative Agreement therewith. NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Big Springs Ditch that it (a) has reviewed and supports the proposed Project and (b) that the BSD has in its possession sufficient funds and can furnish in-kind contributions to fulfill its funding requirements as identified in the Project Funding Plan.

BE IT FURTHER RESOLVED that, if selected by Reclamation for a grant from the Grant Program, the President of the BSD is hereby authorized to execute a Cooperative Agreement therewith and Big Springs Ditch shall cooperate with Reclamation to ensure execution of said Agreement.

THE FOREGOING RESOLUTION WAS ADOPTED at a regular meeting of the Board of Directors of the Big Springs Ditch held this 14 day of January, 2015, by the following votes:

AYES: 4

NOES: 0

ABSTAIN: 0

ABSENT: 3

Big Springs Ditch

By: Bob Davis Bob Davis, President

BIG SPRINGS DITCH, LLC

WATERSMART GRANT APPLICATION

WATER CONSERVATION PROJECT

# APPENDIX F – LETTERS OF AWARD AND COMMITTMENT

# DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

STEVE BULLOCK, GOVERNOR
1625 ELEVENTH AVENUE
STATE OF MONTANA
DIRECTOR'S OFFICE: (406) 444-2074
FAX: (406) 444-2684
PO BOX 201601
HELENA, MONTANA 59620-1601

May 8, 2013

MAY 13 2013

Gary Flynn
Broadwater Conservation District
415 South Front Street, Suite 104
Townsend, MT 59644

RE: Big Springs Ditch Water Conservation and Spawning Bed Project

Dear Gary:

Congratulations! We are pleased to announce that House Bill 6 from the 63rd legislative session was recently signed by the Governor and your project was awarded funding for a Renewable Resource Grant. The Legislature appropriated $8.9 million for renewable resource grants in House Bill 6 and as a result we will be able to fund 90 projects. Enclosed is a ranked list illustrating the funded projects.

Prior to beginning any work that would be reimbursed with grant funds, a grant agreement between you, the project sponsor and the Department of Natural Resources and Conservation must be prepared and agreed upon by both parties. A grant manager from DNRC will be assigned in the next few weeks and you will be contacted by them. The grant manager will request an updated scope of work, budget and time line for the contract to be negotiated.

We look forward to working with you on your project. Please feel free to contact me at 444-6839 if you have any questions or concerns.

Sincerely,

Pam Smith
Program Manager, RRGL

Cc: Bob Davis
131 Dry Hollow Road
Townsend, MT 59644

File

Troy Monroe
3011 Palmer Street
Missoula, MT 59808

**Troy Monroe**

**From:** Kulczyk, Ann <akulczyk@mt.gov>
**Sent:** Monday, January 12, 2015 3:24 PM
**To:** Troy Monroe
**Subject:** RE: Status of grant application for Big Springs

Hi Troy,

The grant contract has been written and is currently being routed through Helena for approval before it goes out for signature...

Please call if you have any questions.

Thank you,

Ann L. Kulczyk
Program Specialist
Glasgow Conservation and Resource Development
406-228-4129
akulczyk@mt.gov

---

**From:** Troy Monroe [mailto:tmonroe@m-m.net]
**Sent:** Monday, January 12, 2015 9:36 AM
**To:** Kulczyk, Ann
**Subject:** Status of grant application for Big Springs

Good morning, Ann –

Just checking in on the status of the Irrigation Development grant for Big Springs and to make sure you are not needing anything from me or the conservation district.

Thanks,

**Troy Monroe, PE**
**Senior Engineer**

MORRISON MAIERLE, INC.
ENGINEERS•SURVEYORS•PLANNERS•SCIENTISTS

3011 Palmer Street
Missoula, MT 59808
Main: 406.542.8880
Direct: 406.542.4829

Montana Rail Link

Montana Rail Link, Inc.
101 International Drive
Post Office Box 16390
Missoula, Montana
USA 59808

(406) 523-1500
(800) 338-4750
www.montanarail.com

January 15, 2015

Bureau of Reclamation
P.O. Box 25007
Denver, Colorado 80225

Montana Rail Link (MRL) is partnering with the Big Springs Ditch to construct a water conservation pipeline in the Big Springs Ditch canal. MRL will commit to contributing material for the pipeline conversion project. MRL will deliver to the construction site 820 CY (1,148 ton) of pipe bedding and 9,620 CY (15,392 ton) of backfill. An additional 82 CY (114.8 ton) of bedding and 962 CY (1,539 ton) of backfill will be available as a 10% contingency.

These quantities will be provided by MRL at no cost to the Ditch company or any partnering agency. The quantities are based on 3,050 feet of canal being converted to pipeline and will be reduced proportionally for any changes in pipeline length due to funding short falls or constructability issues.

MRL will be able to provide these materials starting in July 2015 to correspond to the actual pipeline construction timetable. There are no time constraints on the availability of the material and no additional contingencies associated with the material commitment.

Please contact Jim Bieber at (406) 523-1550 if you require further information.

Sincerely,

Randall A. Gustin
Chief Engineer

RG/C-42....Stations/Toston

BIG SPRINGS DITCH, LLC

WATERSMART GRANT APPLICATION

WATER CONSERVATION PROJECT

# APPENDIX G – CONSTRUCTION COST ESTIMATE

# BSE Excavating

266-3772

**Estimate to install 3050 ft. of 54" pipe in the Spring Ditch**

-Move approximately 10,500 yds. of material by dump truck from ponds to work site.
1050 dump truck loads@ 25 minutes/ load
437.5 hrs. loader/ dump truck combo @ $100 $43,750

-Install approximately 127 24 ft. pieces of 24 ft. pipe and bedding gravel with 320 excavator and 2 guys at $200/hr. Compact hunches to spring line using jumping jack compactor.
1.2 hrs. per piece
1.2 x 127 x $200 $30,480

-Move each piece to site. ½ hr. per piece moving to site with Multiterrain Telehandler @ $100/ hr.
127 x ½ hr. x $100 $6350

-20 Minutes D5 dozer @ $110/ hr. pushing fill over each pipe (approximately 75 yds. per pipe) and contouring to existing bank
127 x 1/3 hr. x $110 $4730

Total for installation portion $85,310

Unload train 12 hrs. telehandler @ $100 $1200
Move and stack fill and bedding from tracks
50 hrs. dozer and or loader @ $110 $5500

BIG SPRINGS DITCH, LLC

WATERSMART GRANT APPLICATION

WATER CONSERVATION PROJECT

# APPENDIX H – PAGES FROM WATER PLAN

# Upper Missouri Basin Advisory Council Recommendations Development Report

***Water Resource Issues and Recommendations for Solving Them***
***for Incorporation in the Upper Missouri Basin Watershed Management Plan***
*(Phase 2 Technical Review and Phase 3 Recommendation Development of the Council's Charge)*

**June 19, 2014**


**Prepared by**

**The Upper Missouri Basin Advisory Council**
**Jim Beck, Chair and Vicki Baker, Vice Chair**

**and**

**Susan H. Higgins, LLC**
**7012 Lorelei Drive**
**Bozeman, MT 59715**
**(406) 209-3613**
**susanhhiggins@gmail.com**

## F. WATER USE EFFICIENCY AND CONSERVATION

*Goal: Improve Water Use Efficiency and Conservation*

The Issue

With limited supplies, water use efficiency is playing a bigger role in the Upper Missouri Basin, especially in ranching and municipal operations. Many irrigators are converting their fields from flood to sprinkler irrigation systems to decrease labor costs and to improve crop yields. People recognize that these changes in irrigation practices can affect the hydrologic regime and return flow rates. From a flow management perspective, it might make sense to continue flood irrigation practices in some areas, such as headwaters, and convert to sprinkler irrigation in others. Where a particular irrigation system type is most beneficial to the producer will vary depending on local geology and soil type, economics, infiltration return rates, source (groundwater versus surface water), competing uses and time of year. In the end, economic considerations probably will compel most producers to continue to change flood irrigation systems to sprinkler systems. Although improving water efficiency and conservation is important and probably necessary for many ranches to stay economically viable, it also leads to questions about the cumulative impacts of these irrigation system changes on the timing of return flows, depletions, and the legal uses of any associated "saved" water. In municipalities with limited water rights for expanding populations, efficiency measures and storage potentials are the subject of intensive analyses.

Objectives

1. Water use efficiency improvements are in place. There is recognition that certain irrigation methods can have return flow benefits, and that irrigation methods have trade-offs among all water users.

   ***RECOMMENDATION 22:*** Support irrigation improvements at the local level (flood to sprinkler, conveyance system upgrades) where it makes economic and hydrologic sense; Identify opportunities to offset or mitigate impacts of sprinkler conversion systems on return flow, and create and fund mechanisms for capturing water (aquifer recharge, constructed wetlands) to offset the impacts of sprinkler conversions.

   ***RECOMMENDATION 23:*** Develop a local groundwater assessment for each sub-basin that characterizes geology, infiltration rates and groundwater availability; to compliment these studies, create a basin-wide Council or group that can recommend when efficiency projects are best to implement with public funding (e.g., locations where pivots or canal lining make sense and others where groundwater storage from flood irrigation is desirable).

   ***RECOMMENDATION 24:*** Assess banking, leasing and mitigation opportunities to offset water saved through efficiencies for recharge and other uses, without expanding the consumptive or historic use portion of a water right.

2. Municipal water systems promote and employ water conservation measures wherever feasible.

   ***RECOMMENDATION 25:*** Implement incentivized conservation programs in high-density municipal areas.

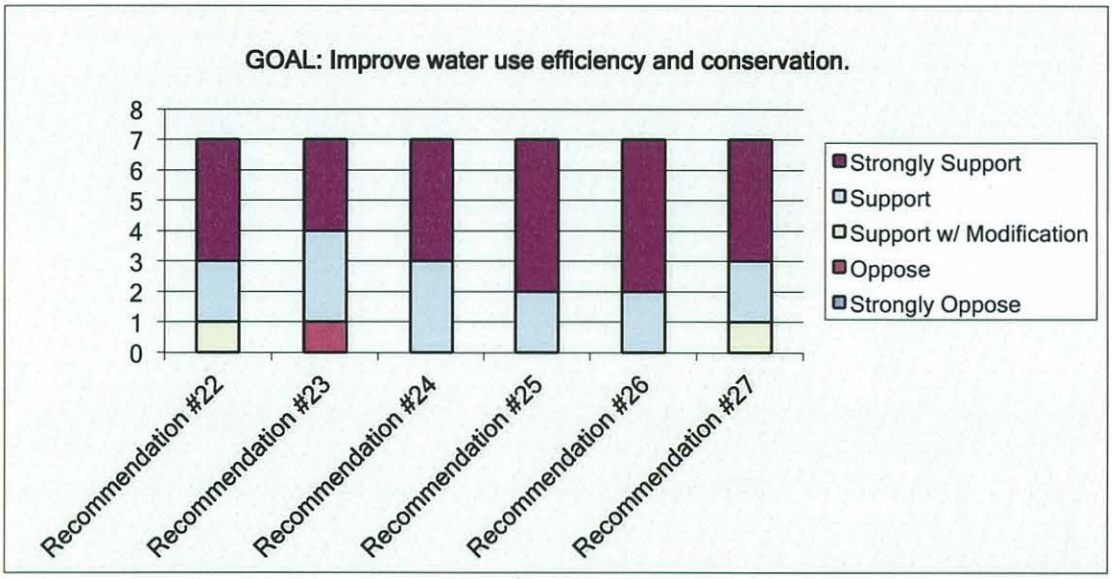
   ***RECOMMENDATION 26:*** Assess the legal aspects of wastewater reuse

3. There is public awareness of the effects of water use efficiencies and mitigation measures on local basin hydrology.

   ***RECOMMENDATION 27:*** Create a public awareness program, delivered by Conservation Districts, Water Quality Districts, municipalities and watershed groups that describes the benefits and consequences of sprinkler and flood irrigation systems, municipal water conservation measures, and other water efficiency-related topics[2].

Public Comment

All respondents supported all recommendations in this section, except for one who felt that Recommendation #23 would be a staff and time sink. The BAC responds that this kind of effort is critical for setting priorities for improving efficiencies. No changes were made to this section.




[2] Note Colorado SB 14-023 Water Efficiency Savings Bill as one example