Installation of a SCADA System and Ditch Lining on the Farmers Ditch in Kearny County, Kansas

Prepared For: US Bureau of Reclamation
WaterSMART – Water and Energy Efficiency Grants for FY 2018

Applicant: Southwest Kansas Groundwater Management District No. 3

Contact: Mr. Mark Rude, Executive Director
Southwest Kansas Groundwater Management District No. 3
2009 E Spruce St.
Garden City, KS 67846

Table of Contents

Technical Proposal and Evaluation Criteria

Executive Summary

Application Date: May 10, 2018

Applicant Name: Southwest Kansas Groundwater Management District No. 3

Nearest City: Deerfield

County: Kearny and Finney

State: Kansas

This is a proposal to replace the existing headgate structure of the Farmers Ditch in Kearny County, KS with a new structure that utilizes a more modern, efficient supervisory control and data acquisition (SCADA) architecture. This project also includes lining of 3 miles of canal with locally-sourced clay to reduce loss in flow to infiltration. This project will create annaul water savings of 587 AF of water for a water supply that can be distributed to as many as 10,000 acres. $300,000 is being sought from the United States Department of the Interior, Bureau of Reclamation's (Reclamation) Water SMART Water and Energy Efficiency Grants program, Funding Group 1 to assist in completing the project.

The proposed project will be completed from the winter of 2018 through the spring of 2019. All work should be completed by May 1st, 2019. In the event that an environmental compliance review cannot be completed in time to finish the project by May, 2019, or if there is another unforeseen delay, construction may be delayed by 1 year and finished in May, 2020.

The proposed project is not located on a Federal facility.

Background Data

The Southwest Kansas Groundwater Management District Number 3 (GMD3) was formed in 1976 under the State of Kansas's GMD Act (K.S.A. 82a-1020), which grants the right of locally formed districts, acting through their governing body politic and corporate, to determine their destiny regarding water use and conduct the affairs of groundwater management as a public agency for that purpose using an adopted management program to advise other public jurisdictions in matters of water supply and use. GMD3 has an interest in this project because it will reduce withdrawal from the Ogallala Aquifer and will also reduce infiltration of poor quality water from the Arkansas River, improving the local water quality.

As a result of litigation filed in the United States Supreme Court (Kansas v. Colorado, No. 105 Original), the State of Kansas received more than $34.7 million in damage award from the State of Colorado for actual Kansas losses to crops and fields in southwest Kansas, including interest. The cash damage award was quantified from the effects for certain Colorado violations of the Arkansas River Compact (Compact, K.S.A. 82a-520). The cash damages paid back the state

litigation cost, with 1/3 of the remainder going to the Kansas Water Plan and 2/3 to the actual affected area in southwest Kansas in the form of the Western Water Conservation Projects Fund (WWCPF). GMD3 and the Associated Ditches, comprised of a representative from the Frontier Ditch, the Amazon Canal, the Great Eastern Canal, the South Side Ditch, the Farmers Ditch, and the Garden City Ditch, hold regular meetings to manage the expenditures of this fund and plan future conservation projects that improve overall irrigation efficiency in the damaged area. This proposal came about as part of that planning effort.

The Farmers Ditch diverts water from the Arkansas River near Deerfield, KS. It is owned and operated by the Finney County Water Users Association. The canal is 14.5 miles long and includes 48 miles of laterals. It has surface water rights to deliver water to about 10,000 irrigated acres. The canal is operated under a Kansas vested water right, allowing it to legally divert up to 20,000 acre feet annually at a rate of up to 250 cfs. Occurrences of this much flow in the Arkansas River at the Farmers Ditch headgate are exceedingly rare. The Farmers Ditch shares a legal point of diversion at its headgate with the Garden City Ditch and can be used as a conveyance to meet its water right of 4,000 acre feet at a rate of 80 cfs as well. All current water uses under these water rights are for agricultural irrigation. Major crops include corn, wheat, alfalfa, and sorghum. These water rights are rarely able to be met, since the Arkansas River flows intermittently at the point of diversion. The average quantity of water diverted over the last 10 years was 4,692 acre feet. Due to the inability to consistently meet irrigation demand with surface water flow, members of the Finney County Water Users Association are allowed to supplement their unused surface water rights with pumping from the Ogallala Aquifer. Therefore, any water reaching irrigated fields through the surface water canal can be considered water that does not need to be pumped out of the Ogallala Aquifer, a critical and diminishing water resource for most of the High Plains region of the United States. See Figure 1 for a map of the Farmers Ditch.

Table 1 lists average losses recorded from United States Geological Survey (USGS) data in Arkansas River flow between the Deerfield and Garden City gages. This data was calculated by Spronk Water Engineers as part of a Reclamation-funded System Optimization Review completed in 2014. The portion of the ditch to be lined is over the Arkansas River alluvium between Deerfield and Garden City, so losses in cfs/mile should be similar. It should be noted that this table is intended to represent a wet system, where flows reach Garden City. At low flows, this rarely happens, and even with high flows, losses are far greater than the table describes until the channel becomes saturated. Over the past 9 years, average ditch flow during diversions was 31 cfs. The measurement of flow occurs 3 miles downstream of the headgate, so using table 1, the average amount of water diverted at the headgate was about 34 cfs. Of the years where diversions occurred, there was an average of 93 days with flow greater than 0 cfs. This period includes years of extreme drought, so flows over the next 10 years are expected to be greater. The estimated water savings due to lining are 0.9 cfs per mile. Average annual savings due to canal lining are expected to total 553 acre ft. This number will vary greatly depending on the amount of water diverted each year.

Flow Range, cfs	Avg Flow at Deerfield, cfs	Avg Flow at Garden City, cfs	Stream Loss, cfs/mile
0-5	2.2	0.1	0.1
5-10	7.3	0.0	0.4
10-20	15.6	0.1	0.7
20-30	25.7	0.1	0.8
30-40	35.1	0.6	0.9
40-50	45.5	0.7	1.1
50-60	55.3	0.1	1.8
60-70	65.5	2.4	2.5
70-80	75.1	1.5	2.7
80-90	85.4	1.6	3.0
90-100	95.4	4.9	2.7
100-150	125.3	27.2	4.7
150-200	168.0	52.9	6.1
200-250	227.6	162.5	3.3
250-300	273.8	258.4	0.2
300-350	322.3	279.3	2.5

Table 1. Summertime flow losses in the Arkansas River between Deerfield and Garden City

The water in the Arkansas River is of poor quality due to diminished stream flows, underlying geology, and irrigation return flows. The Colorado Department of Health and Environment Water Quality Control Commission has identified John Martin Reservoir and the Arkansas River on their list of impaired waters due to selenium and uranium contamination. The Kansas Department of Health and Environment has identified the Arkansas River within the project area as impaired waters due to gross alpha (bundled with uranium), fluoride, total suspended solids, boron, selenium, and sulfate. Infiltration of this water into the Ogallala Aquifer has degraded the quality of readily-available drinking water for the cities of Lakin, Deerfield, Holcomb, and Garden City, KS. Lakin has recently been required to install a nano-filtration facility and deep wastewater disposal well to provide a safe drinking water supply, at a cost of roughly $6 million. By improving the efficiency of the Farmers Ditch, this project will both reduce the amount of poor-quality water infiltrating into the Ogallala Aquifer and reduce the amount of water being pumped out of it. This will improve the quality of drinking water for the 29,000 people who live immediately downstream of the project.

GMD3 has worked with Reclamation on past projects. These projects include a System Optimization Review, completed in 2014, an Upper Arkansas River Basin Public Water Supply Alternatives Viability Analysis, completed in 2014, and a Plan of Study: Arkansas Basin Study from John Martin Reservoir to Garden City, Kansas, completed in 2015.

Project Location

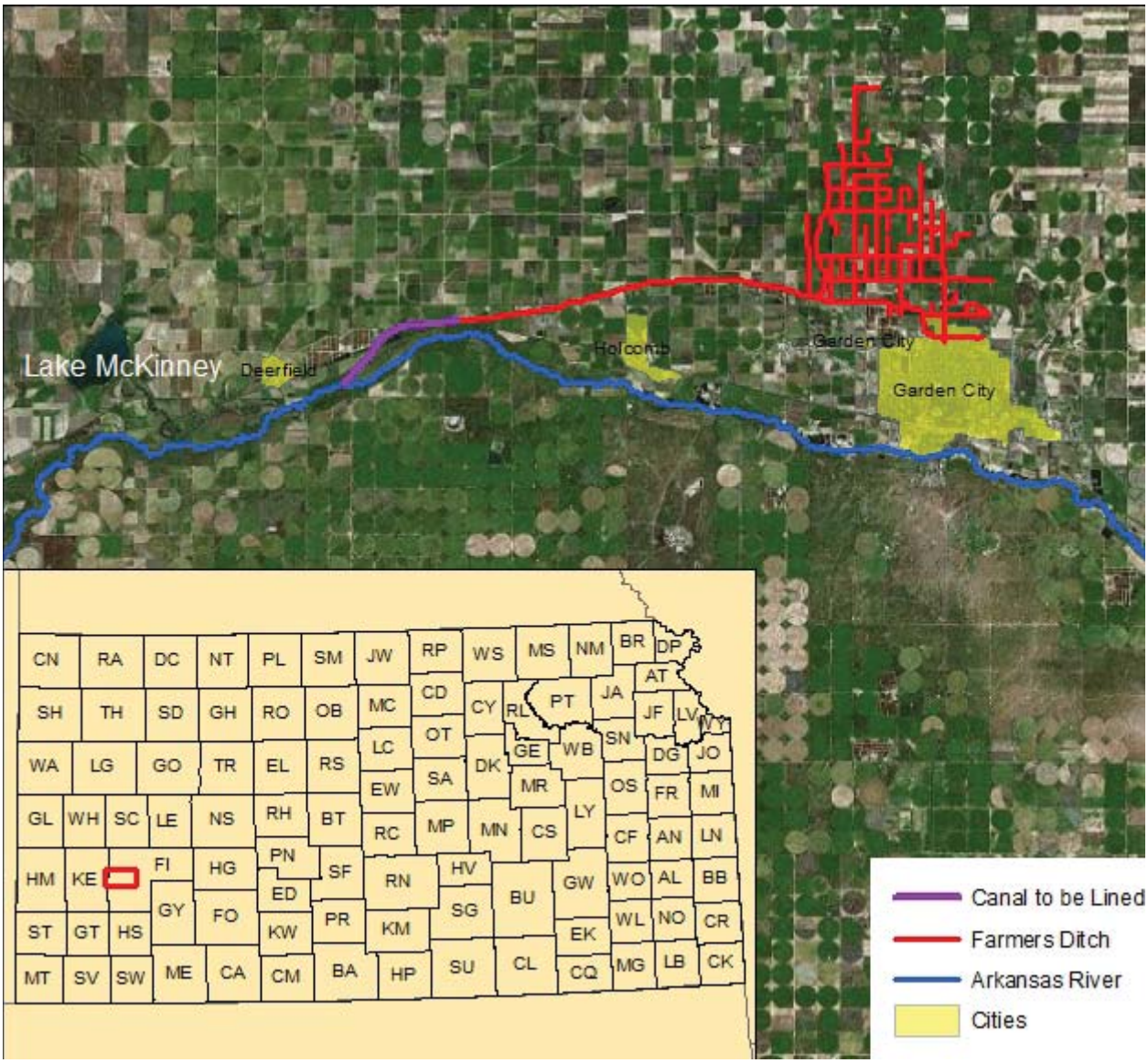


Figure 1: Map of the Farmers Ditch

The project is located in Kearny and Finney Counties, Kansas, approximately 1.5 miles east of Deerfield. The latitude of the headgate location is 37°58.6'N and longitude is 101°6.4'W. A map of the project area is also included in this application as a PDF file.

Technical Project Description

The proposed project will replace the Farmers Ditch headgate with a more efficient structure that incorporates SCADA technology. The existing headgate was constructed in the 1880s and is very inefficient. It has seen some minor improvements over the years, but is still on its original foundation and is somewhat labor-intensive to operate. The proposed SCADA system improvement will allow operations personnel to operate the headgate remotely, saving time and

mileage and improving operational efficiency. Operations personnel currently spend many hours getting to and from the site to operate the gates. The remote control function will allow the operator to have immediate control of the gates. When making deliveries, there will be no loss of time on startup. Sometimes deliveries are based on flood events that rise and fall quickly, and time lost on startup means water available for diversion is lost to the river inefficiencies downstream. Timely opening of the gates allows diversion of flows from runoff events that would otherwise be lost.

The project also includes the lining of 3 miles of canal with locally-sourced clay material from the Lake McKinney bed. Clay lining will be applied at a thickness of 12 inches and buried 18 inches deep so that it is protected from erosion and damage from local cattle and deer. A geotechnical investigation conducted by Michael W. West and Associates, Inc. in 2007 to assess conditions of the Lake McKinney Dam states the following about the soils:

"The foundation soils beneath the dikes generally classify, according to ASTM D 2487, as lean clay with sand (CL), with some fat clay with sand (CH) and silty sand (SM) encountered in TH-4. These soils are likely relatively shallow sediments that have been recently deposited in Lake McKinney reservoir prior to construction of the dikes. The implication is that the clay material covers the entire lake bed and is suitable for use as a liner."

This material has been used as a liner for the nearby South Side Ditch, which returns water to the Arkansas River about 2.9 miles upstream of the Farmers Ditch headgate. It creates an impermeable layer once saturated, effectively eliminating loss in flow due to infiltration. Advantages of using this material are as follows:

- Use of the material will increase storage capacity of Lake McKinney, benefitting the water users of the Great Eastern Canal, who use Lake McKinney to improve the reliability of their system. The material will not need to be purchased.
- Earthen liners are self-repairing. Minor cracks in the liner will reseal once the soil becomes saturated.
- Repairs to the liner can be made with equipment and materials readily available to the Finney County Water Users Association.
- With the proposed 18 inch cover layer, the liner will be protected from damage and will provide a very long life span.
- The liner will require little maintenance.

GMD3 will work with the Finney County Water Users Association to accept bids from contractors to perform the work. Cost estimates for lining used in this proposal are based upon converting costs from the lining of the South Side Ditch in 2009 to present day values. Estimates for headgate cost were provided by Kaw Valley Engineering, who has performed the design work for the new structure.

Evaluation Criteria

Evaluation Criteria A – Quantifiable Water Savings

Describe the amount of estimated water savings.
This project will save an average of 587 acre feet per year. These savings include 553 acre feet from installing a clay liner over the first three miles of canal and 34 acre feet due to the installation of SCADA controls on the headgate.

USGS measurements of the canal since 2009 log an average flow rate of 31 cfs on days with flow. The USGS measuring station is located 3 miles downstream from the headgate. Using Table 1 on page 4 of this proposal to estimate losses of 0.9 cfs/mile between the headgate and measuring station, the flow diverted at the headgate averages about 34 cfs. On average, the canal runs 93 days per year. Total savings from lining the first 3 miles of canal are as follows:

$$3\ \frac{ft^3}{s} \times 86{,}400 \frac{s}{day} \times 93\ days \times \frac{1\ acre\ foot}{43{,}560\ ft^3} = 553\ acre\ feet$$

Total savings from the installation of the SCADA system are based upon reducing travel time to operate the headgate by 12 hours per year.

$$34\ \frac{ft^3}{s} \times 12 \frac{hr}{yr} \times 3600 \frac{s}{hr} \times \frac{1\ acre\ foot}{43{,}560\ ft^3} = 34\ acre\ feet$$

It should be noted that this is the ditch furthest downstream that receives water from the Arkansas River in the region. It is very rare that the Arkansas River has more flow than is diverted. All savings due to this project will directly benefit water users.

Describe the current losses.
Of the 587 acre feet of losses that this project will eliminate, 553 acre feet are infiltrating into the ground and 34 acre feet are flowing past the headgate and down the river channel.

Describe the support/documentation of estimated water savings.

Canal Lining/Piping
Water losses to infiltration were calculated from a table compiled by Spronk Water Engineers in 2014 as part of a Reclamation System Optimization Review. These losses were calculated by comparing measured flow at the Deerfield gage to measured flow at Garden City. This data was compiled over several decades and is considered accurate. Supporting data is included in Table 1 on page 4 of this proposal.

This project is expected to eliminate seepage losses for all flows under 100 cfs. Once saturated, the 12 inch thick clay layer should provide an impermeable barrier, eliminating all seepage for flows that do not produce head that exceeds the lined portion of the canal.

Anticipated annual transit loss reductions are 184 acre feet per mile.

Actual canal loss seepage reductions will be verified by taking weekly measurements at the headgate and comparing them to measurements at the USGS station 3 miles downstream during the first year of operation.

The material being used is lean clay with sand (CL), with some fat clay with sand (CH) and silty sand (SM). This material will be sourced from Lake McKinney, located about 5 miles to the northwest of the project. Lake McKinney is used as a storage facility for the Great Eastern Canal, and removal of this material will serve to increase the storage capacity of the lake.

Smart Irrigation Controllers

Annual water savings from the installation of the SCADA system were calculated based upon an assumption of an annual savings of 12 hours driving time. The recent average flow rate into the headgate of 34 cfs was used to calculate the amount of water not being diverted during the driving time. The calculation is as follows:

$$34\ \frac{ft^3}{s} \times 12 \frac{hr}{yr} \times 3600 \frac{s}{hr} \times \frac{1\ acre\ foot}{43560\ ft^3} = 34\ acre\ feet$$

Evaluation Criteria B – Water Supply Reliability

Flows in the Arkansas River in Kansas are shared among 6 irrigation canals, each with vested surface water rights. This gives them equal priority under Kansas water law. The canals include the Frontier Ditch, The Amazon Canal, the Great Eastern Canal, the South Side Ditch, the Farmers Ditch, and the Garden City Ditch. Representatives from each of these ditches hold regular meetings of the Associated Ditches. They manage expenditures from the Western Water Conservation Projects Fund (WWCPF) with GMD3. This fund was created from damage funds awarded Kansas in Kansas v. Colorado (2001). It is dedicated to improving water use efficiencies in the damaged area.

The Associated Ditches operate on a rotation, where they take turns utilizing surface water flows. This ensures that ditches at the end of the system will get water during years of low flow. Representatives from the ditch companies can form agreements to suspend the rotation. This typically happens when flows are high enough for all of the ditches to divert water. Any improvement to efficiencies of the ditch system makes suspending the rotation more feasible, increasing the overall water supply reliability not only for the ditch being improved, but for the system as a whole. The Associated Ditches have agreed to apply WWCPF funding to this project in part because it will improve the overall water supply reliability for the entire ditch system.

This project will increase reliability during drought, since infiltration accounts for a greater percentage of overall flow during low flow events. This is important because the demand for irrigation water is far greater during drought. Any potential savings to groundwater use is critical.

The project will increase the reliability of the water supplies of the cities of Holcomb and Garden City. The river water being run for irrigation in this project is of poor quality and impairs

drinking water quality in local cities. This project will ensure that more of this water is utilized on the surface and less of the water infiltrates into the local aquifer. This reduces the rate of recharge, and water level declines are a concern. However, water users affected by the project have groundwater rights they can use when surface water is unavailable. When surface water cannot be utilized, water is pumped out of the ground instead. This project will reduce the amount of water pumped out of the Ogallala Aquifer.

Evaluation Criteria C – Implementing Hydropower

This project does not include construction or installation of a hydropower system.

Evaluation Criteria D – Complementing On-Farm Irrigation Improvements

All farms in the project area are eligible for EQIP funding. All farms in the project area are also eligible for a Regional Conservation Partnership Program (RCPP) for installation of soil moisture technology through an NRCS grant applied for by GMD3.

Some producers have installed or are planning to install pits to convert surface water flood irrigation to center pivot irrigation. This practice has recently been applied to 1,163 acres. There are plans to convert an additional 500 acres from flood irrigation to center pivot in the near future. According to irrigation specialists at Kansas State University, converting from flood irrigation to center pivot increases efficiency by about 40%. Some producers have also recently converted standard drop nozzle packages on their center pivots to bubbler packages. This practice has been applied on 426 acres. Converting standard nozzles to bubblers improves efficiency by about 7%.

This project will directly facilitate these on-farm improvements by providing a source of irrigation supply to them. It will improve the annual quantity these projects are able to use for irrigation and improve the overall reliability of these systems.

Evaluation Criterion E – Department of the Interior Priorities

This project supports Reclamation priorities 1-a, 1-e, 5-a, and 5-b. Details are below.

1. Creating a conservation stewardship legacy second only to Teddy Roosevelt

a. Utilize science to identify the best practices to manage land and water

This project uses methods proven by science to greatly reduce the amount of water lost in the Farmers Ditch system. The SCADA controls on the headgate will greatly reduce operation time and the clay lining material will greatly reduce seepage losses in the canal.

e. Foster relationships with conservation organizations advocating for balanced stewardship and use of public lands

GMD3 is a conservation organization advocating for a private ditch company to modernize their headgate structure, which is located on the Arkansas River, a public land owned by the State of Kansas.

5. Modernizing our infrastructure

a. Support the White House Public/Private Partnership Initiative to modernize U.S. infrastructure

This is a project that will use public and private resources to modernize existing water infrastructure. It will make more water available for users and will reduce the amount of water pumped out of the Ogallala Aquifer, a critical water resource for most of the High Plains region of the United States.

b. Remove impediments to infrastructure development and facilitate private sector efforts to construct infrastructure projects serving American needs

This project will provide federal funding to assist a private entity to build a structure on a state-owned land to serve the needs of private irrigators who are producing food that helps feed America.

Evaluation Criterion F – Implementation and Results

Subcriterion F.1 – Project Planning

A system optimization review was conducted on the ditch system and finished in 2014. This review determined losses in flow along the river system and identified the need for efficiency improvements. This project is consistent with those identified in the system optimization review.

The project is also consistent with K.S.A. 82a-1803, where the Kansas Legislature established in the state treasury the water conservation projects fund. This legislation determined that the types of projects eligible for funding include:

1. Efficiency improvements to canals or laterals owned by a ditch company or projects to improve the operational efficiency or management of such canals or laterals;
2. Water use efficiency devices, tailwater systems or irrigation system efficiency upgrades;
3. Water measurement flumes, meters, gauges, data collection platforms or related monitoring equipment;
4. Artificial recharge or purchase of water rights for stream recovery or aquifer restoration;
5. Maintenance of the Arkansas River channel; or
6. Monitoring and enforcement of Colorado's compliance with the Arkansas River Compact.

In order to implement K.S.A. 82a-1803, GMD3 works with the Associated Ditches to manage the WWCPF and meets regularly to plan for implementation of projects that will improve water use efficiency. This project was chosen as a priority as a result of this planning process. The new structure will be far more efficient than the structure it is replacing, and the ditch channel will be

lined to reduce seepage loss. The headgate structure has already been fully engineered. Engineering plans are available upon request.

Subcriterion F.2 – Performance Measures

Weekly flow measurements will be taken at the headgate during operation throughout the first year of the project and compared to flow at the measurement station to ensure that the project goals are met. Once saturated, it is expected that the liner will eliminate seepage and that only slight losses due to evaporation will remain.

Evaluation Criterion G – Nexus to Reclamation Project Activities

The project area is located in the Arkansas River basin, which is home to the Trinidad Reservoir and Pueblo Reservoir projects, both of which are Reclamation projects. The proposed work will conserve, and therefore contribute, usable water to the Kansas portion of the basin by increasing the management efficiencies and usability of stateline flows to Kansas.

Evaluation Criterion H – Additional Non-Federal Funding

Total non-Federal funding for this project is $1,312,148. Total Reclamation funding requested is $300,000.

$$\frac{Non - Federal\ Funding}{Total\ Project\ Cost} = \frac{\$1{,}312{,}148}{\$1{,}612{,}148} = \mathbf{81.4}\%$$

Project Budget

Funding Plan and Letters of Commitment

The non-Federal share of project costs will be obtained from the Western Water Conservation Projects Fund (WWCPF). This fund is managed by GMD3 and the Associated Ditches. One of the purposes of the fund is to "make efficiency improvements to canals and laterals owned by a ditch company or projects to improve the operational efficiency or management of such canals or laterals." This project is consistent with that purpose and both the Associated Ditches and GMD3 Board of Directors have already approved the non-Federal expenditure detailed in this proposal. A resolution from the GMD3 Board of Directors will be submitted within 30 days of this submittal.

FUNDING SOURCES	Amount
Non-Federal Entities	
1. GMD3	$1,312,148
Non-Federal Subtotal	**$1,312,148**
Other Federal Entities	
None	$0
Other Federal Subtotal	**$0**
REQUESTED RECLAMATION FUNDING	**$300,000**

Table 2. Summary of Non-Federal and Federal Funding Sources

Budget Proposal

BUDGET ITEM DESCRIPTION	COMPUTATION		Quantity Type	TOTAL COST
	$/Unit	Quantity		
Materials and Supplies				
Mobilization for headgate constr.	$75,000.00	1	L.S.	$75,000.00
Demolition of existing headgate	$125,000.00	1	L.S.	$125,000.00
Temporary Cofferdam	$150,000.00	1	L.S.	$150,000.00
Headgates	$30,000.00	10	Ea.	$300,000.00
Lighting	$35,000.00	1	L.S.	$35,000.00
Trench Drain	$175.00	55	L.F.	$9,625.00
Concrete	$210.00	555	C.Y.	$116,550.00
Erosion Control	$25,000.00	1	L.S.	$25,000.00
Seeding	$5,500.00	1	L.S.	$5,500.00
Gravel Surfacing	$110.00	2,043	C.Y.	$224,730.00
Fencing Chain Link	$22.00	215	L.F.	$4,730.00
Walkway	$300.00	180	L.F.	$54,000.00
Fencing – Barbed Wire	$18.00	340	L.F.	$6,120.00
Flexamat	$58.00	939	S.Y.	$54,462.00
Mobilization for Canal Lining	$10,000.00	1	L.S.	$10,000.00
Excavation	$2.15	59,664	C.Y.	$128,278.00
Placement of Clay Lining	$3.18	23,918	C.Y.	$76,059.00
Hauling of Clay Material	$2.74	23,918	C.Y.	$65,535.00
TOTAL DIRECT COSTS				**$1,465,589.00**
Indirect Costs				
10% Contingency	10%	$1,465,589.00		**$146,559.00**
TOTAL ESTIMATED PROJECT COSTS				**$1,612,148.00**

Table 3. Budget Proposal

Budget Narrative

The budget is broken down into cost of materials, with a 10% contingency in case costs end up slightly higher than anticipated. Bids will go out to contractors to complete the work. The budget provided is an estimate of total cost using the best available information on the cost of material

to complete the project. Costs provided are all materials and supplies, with an indirect cost that includes a 10% contingency.

Materials and Supplies

Construction of the headgate will require a mobilization cost of $75,000. It will require demolition of the existing headgate, at a cost of $125,000. A temporary cofferdam will need to be built to keep water out of the construction site. This will cost $150,000. The project requires 10 headgates, each at a cost of $30,000. The budget includes $35,000 for lighting at the construction site. A 55 foot trench drain will be necessary for the construction site, at a cost of $9,625. 555 cubic yards of concrete will be required, at a cost of $116,550. Erosion control will be necessary to preserve the shape of the channel and prevent damage to nearby riparian habitat during construction. The budget includes $25,000 for this. Gravel surfacing will be necessary to move heavy equipment to the construction site. This will cost $224,730. Chain link fencing around the construction site will cost $4,730. A walkway will be constructed across the top of the headgate structure at a cost of $54,000. Barbed wire fencing will be constructed to keep cattle out of the construction site. This will cost $6,120. Flexamat material will be used as a form of riprap. This will cost $54,462.

Installation of the clay lining material will require a mobilization cost of $10,000. 30 inches of the channel, up the walls to a height of 2 feet from the channel floor, will be excavated. The channel is trapezoidal in shape, with an average base width of 30 inches, a southern wall that slopes 2.9:1, and a northern wall that slopes 2.1:1. The surface area of excavation is 11.3 yd^2, and the length of canal to be excavated is 5,280 yards, so the total volume of excavation is 59,664 yd^3. Total excavation cost will be $128,278. 12 inches of clay liner will then be placed below 18 inches of excavated material. This will cost $76,059. Hauling of the clay material from Lake McKinney is expected to cost $65,535.

Indirect Costs

All costs in this proposal are estimates based upon the best available information. A 10% contingency has been added to these estimates to allow for any unforeseen costs. This contingency amounts to $146,559.

Environmental and Cultural Resources Compliance

Will the proposed 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.

This project will include earth-disturbing work. The channel of a 3 mile stretch of canal will be excavated 30 inches deep. 12 inches of clay will be buried beneath 18 inches of excavated material from the channel. All construction will occur during winter months when the canal would not be running water under any circumstance, so any disruption of local wildlife habitat

should be temporary and minimal. This project will improve the water quality of the underlying Ogallala Aquifer by reducing the amount of infiltration through canal seepage of poor quality Arkansas River water.

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?

The lesser prairie-chicken, Arkansas River shiner, and whooping crane are located in Kearny and Finney Counties, Kansas. The lesser prairie-chicken is under review, the Arkansas River shiner is threatened, and the whooping crane is endangered. None of these species will be affected by this project.

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 proposed project may have.

The Arkansas River at the project site is not navigable and therefore not subject to the CWA.

When was the water delivery system constructed?

The Farmers Ditch was constructed in the 1880s.

Will the proposed 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 of those features completed previously.

The proposed project will result in a reconstruction of the headgates to a more efficient structure with SCADA capabilities. It will also line the first 3 miles of canal with clay. The headgate and canal were constructed in the 1880s. The headgates have undergone slight modifications over the years, but are still on the original foundation.

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.

There are no buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places.

Are there any known archeological sites in the proposed area?

There are no known archeological sites in the proposed area.

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

The proposed project will not have a disproportionately high or adverse effect on low income or minority populations.

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

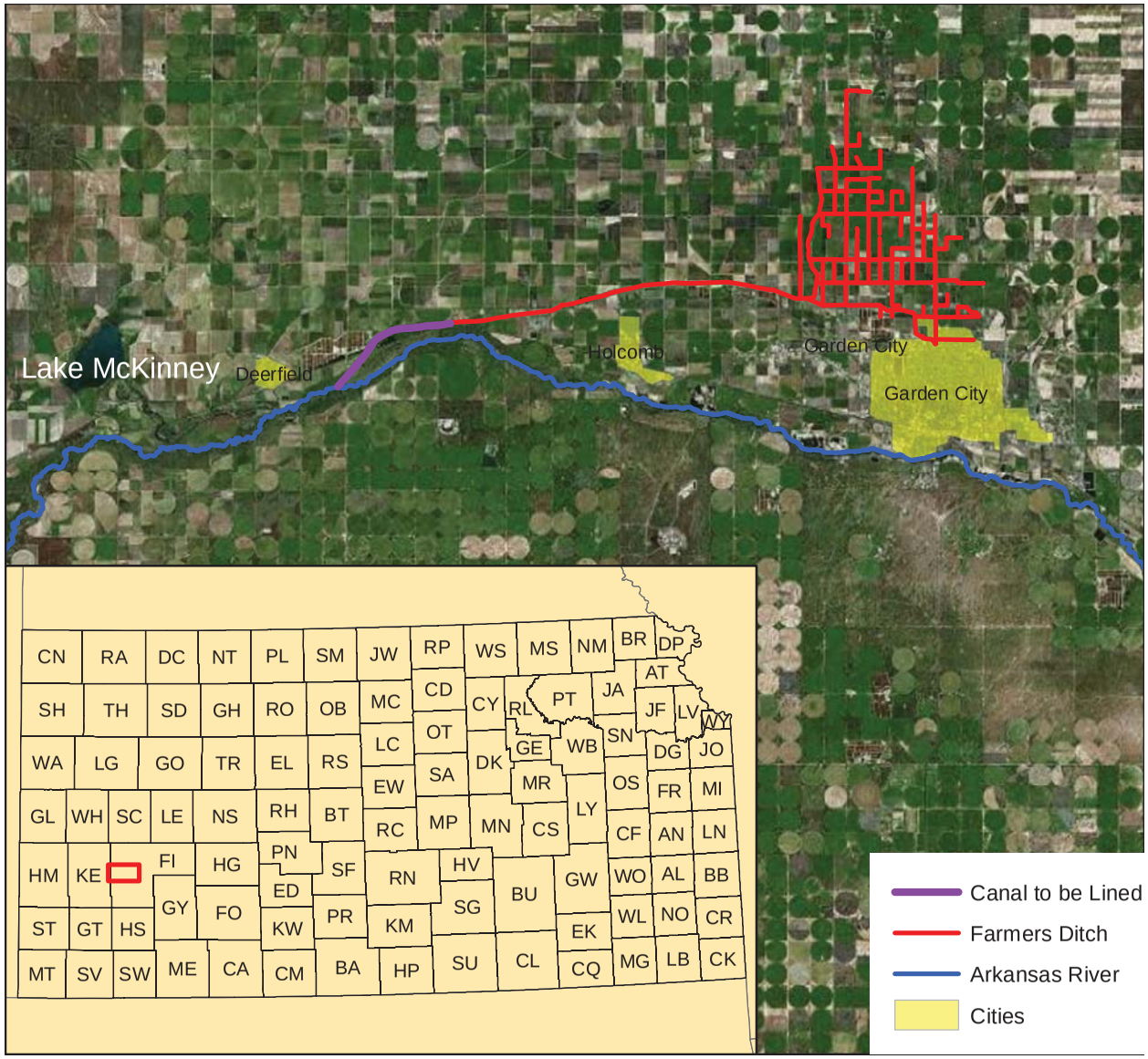
The proposed project will not limit access to and ceremonial use of Indian sacred sites or result in any impacts on tribal lands.

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

This project will not contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area.

Required Permits or Approvals

This project will not require any permitting because it is replacing a structure that already exists, and all lining is being installed on privately-owned land. Officials at the Kansas Department of Agriculture, Division of Water Resources Structures Department and at the US Army Corps of Engineers have been contacted to verify if any permitting will be required.


Lake McKinney
Deerfield
Holcomb
Garden City
Garden City
CN RA DC NT PL SM JW RP WS MS NM BR DP
AT
SH TH SD GH RO OB MC CD CY RL PT JA JF LV WY
OT
WA LG GO TR EL RS LC GE WB SN DG JO
SA DK MR OS
EW
GL WH SC LE NS RH BT RC MP MN CS LY FR MI
CF AN LN
PN SF
HM KE FI HG RN HV BU GW WO AL BB
ED
GY FO PR KM SG EK WL NO CR
KW
ST GT HS
ME CA CM BA HP SU CL CQ MG LB CK
MT SV SW
Canal to be Lined
Farmers Ditch
Arkansas River
Cities