WaterSMART Grants: Small-Scale Water Efficiency Projects for Fiscal Year 2018

Main Canal Seepage Loss Correction

Prepared by

KITTITAS RECLAMATION DISTRICT

315 North Water
Ellensburg, Washington 98926-3053

Office Phone: 509-925-6158
Fax: 509-925-7425
Manager: Urban Eberhart
urban@krdistrict.org

July 31, 2018

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EXECUTIVE SUMMARY

Date: July 31, 2018

Applicant: Kittitas Reclamation District

City/County/State: Ellensburg, Kittitas, Washington

Reclamation Area: Yakima Project

This project will address seepage issues in concrete lined section of the Kittitas Reclamation District's (KRD) Main Canal by applying polyuria sealant (AquaLastic) over all cracks and joints within the wetted perimeter of the canal. The concrete liner preparation and application of the sealant will be done by a contractor. The project will conserve approximately 270 acre-feet of water annually.

The project will take place between October 16, 2018 and April 1, 2019.

BACKGROUND DATA

SERVICE AREA AND PROJECT MAP

KRD lies in Kittitas County in central Washington State and is part of Reclamation's 'Yakima Basin Project' (Fig. 1). Headquartered in the city of Ellensburg, KRD diverts water from the Yakima River near Lake Easton and serves lands along both sides of the Yakima River through the Kittitas Valley. The total service area encompasses about 104,588 acres and is approximately 40 miles long by 10 miles wide.

KRD was organized under Revised Code of Washington Title 87, Irrigation Laws of the State of Washington, on September 25, 1911, and in accordance with KRD's Federal Repayment Contract. KRD assesses and delivers water to customers that irrigate 59,478 acres. Primary crops within KRD's service area include fruit orchards (apple, pear, cherry) and hay (timothy, alfalfa), all under combinations of pivots, sprinklers, and flood irrigation systems.

KRD's water source is surface water from the Yakima River headwaters. The source typically provides water from mid-April thru mid-October for the 178 day growing season (avg). KRD's water right authorizes diversion from April 1 through October 15. However, KRD's water right is 'proratable' due to its priority date of 1905. In the Yakima Basin project operations this means KRD's annual water supply depends on total water supply available. In a full supply year, KRD receives 336,000 Acre feet (AF) and may deliver up to 5.0 AF/assessed acre.

KRD receives water from two storage reservoirs, Keechelus and Kachess—both owned and operated by Reclamation. Water from the reservoirs enters the Yakima River and KRD diverts its irrigation water at the Easton Diversion Dam (Fig. 1). The diversion structure is a drum gate, two radial gates, fish ladder, and fish screening facilities and is designed to divert the KRD's maximum authorized instantaneous flow of 1,320 cubic feet per second (cfs).

From the Easton Diversion Dam, diverted water enters an open-channel canal system, with over 330 miles of canals and laterals. Water is conveyed from the point of diversion through the 26-mile long, and mostly concrete lined, Main Canal. The Main Canal's initial capacity is 1,320 cfs and includes two tunnels, eight siphons, and three wasteways. The Main Canal splits into two smaller canals: the North and South Branches.

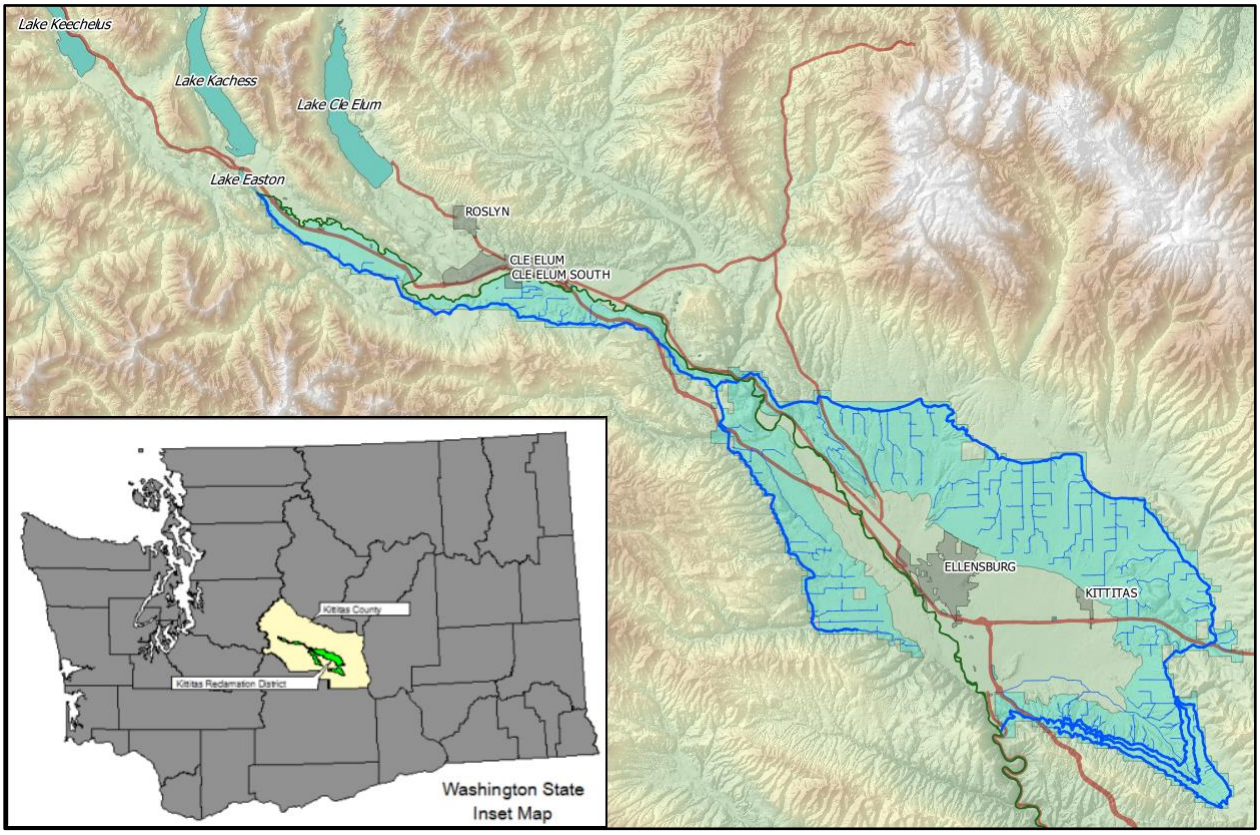


Figure 1 - KRD Overview

TECHNICAL PROJECT DESCRIPTION

The lined sections of the KRD Canal have lining drains running longitudinally under the concrete liner with exits spaced about every 0.2 miles at locations where the water could gravity flow away from the Main Canal. The lining drains were intended for carrying ground water away from the liner during the fall and winter months to prevent liner damage caused by freeze/thaw cycles. These drains also help to prevent oversaturation of the Main Canal embankment during the irrigation season, so they must be kept open and operational even during the irrigation season.

In the concrete lined sections of the Main Canal, when water passes through the cracks and joints in the liner most of it passes out through the lining drains. The drains allow the seepage water a free path away, which allows more water to flow through the cracks and joints. Districts that do not have drains under their concrete do not have as much loss through the cracks and expansion joints. When the cracks in the concrete liner are sealed these lining drains tend to reduce flow considerably or, most often, dry up completely.

This project will seal all cracks and expansion joints in 3000 feet of concrete lined canal starting at the outlet of Tillman siphon at milepost MB12.5. A contractor will sandblast the areas to be sealed and then apply AquaLastic over all cracks and joints at a thickness of 60 to 70 mils and approximately 4 to 6 inches on either side of the cracks. This will save approximately 0.75 CFS of instantaneous flow, or 270 acre-feet annually.

EVALUATION CRITERIA

A: PROJECT BENEFITS

This project will conserve about 270 acre-feet annually. This is water that passes through the concrete liner to the lining drains and out the lining drain exits. Some of the water seeps into the ground, some flows to drains and back to the Yakima River, and most of the water is captured in irrigation ponds downstream from the Main Canal.

The project will reduce KRD diversions during non-drought years, leaving more water available in the Yakima Project. This water will be available as part of Total Water Supply Available for other uses. This helps with water supply certainty within an over-appropriated basin, and water carryover within the reservoirs from one season to the next.

B: PLANNING EFFORTS

This project is part of the KRD's Water Conservation Plan implementation. The Water Conservation Plan has identified 123,000 acre-feet of water savings opportunities with the KRD system (see Appendix A for summary). Our Water Conservation Plan is a keystone for the Yakima Basin Integrated Plan which provides an approach to improving water management in the Yakima River basin. It was developed by Reclamation and the Washington State Department of Ecology in conjunction with the Yakama Nation and Yakima River basin stakeholders. The goals of the Integrated Plan are to protect, mitigate, and enhance fish and wildlife habitat; provide increased operational flexibility to manage instream flows to meet ecological objectives, and improve the reliability of the water supply for irrigation, municipal supply and domestic uses.

Lorri J. Lee, Reclamation Regional Director Pacific Northwest Region U.S., signed and approved the Record of Decision for the Yakima River Basin Integrated Water Resource Management Plan (Integrated Plan) Final Programmatic Environmental Impact Statement Yakima Project, Washington. District canal modifications to reduce seepage and enhance tributary flows are specifically listed as a priority in the Record of Decision under Structural and Operational Changes goals. KRD is uniquely situated to provide multiple benefits to improve water supply for agriculture and fish and improve the ability of water and fisheries managers to adapt to climate change because of KRD's location relative to many important tributaries in the upper Yakima River Basin.

C: PROJECT IMPLEMENTATION

The KRD turns off October 15th, and it will take several days for the canal to drain. The contractor will begin site preparation and sandblasting by October 22nd. Sandblasting will take approximately six days and AquaLastic application about two days.

If weather does not permit a fall application, the contractor will have until April 1, 2019 to complete the project.

No permits, engineering, or environmental compliance documents are necessary to complete this project.

D: NEXUS TO RECLAMATION

KRD is part of Reclamation's Yakima Basin Project. The proposed lining would be within lands owned by Reclamation. KRD receives water from Reclamation owned/operated reservoirs within the Yakima Project. The project adds to the Total Water Supply Available in the Yakima Basin. This in turn makes more water available for USBR to manage with regard to any trust responsibilities it has to Tribes.

E: DEPARTMENT OF INTERIOR PRIORITIES

The KRD's water conservation projects are a key part of the Yakima Integrated Plan, which has been held in high regard in the United States as an example of a river basin conservation plan where water users with competing interests have stepped up and worked together to create a lasting legacy for all those presently living in the basin as well as future generations to come. This project is a very small but tangible step to bring all of us closer to meeting the goals created by this consensus plan for the health of our environment and conservation of our natural resources.

BUDGET

BUDGET PROPOSAL

BUDGET ITEM DESCRIPTION	COMPUTATION		Quantity Type	TOTAL COST
	$/Unit	Quantity		
Salaries and Wages				
Employee 1				$ -
Employee 2				$ -
Employee 3				$ -
Fringe Benefits				
Full-Time Employees				$ -
Part-Time Employees				$ -
Travel				
Trip 1				$ -
Trip 2				$ -
Trip 3				$ -
Equipment				
Item A				$ -
Item B				$ -
Supplies and Materials				
Item A				$ -
Item B				$ -
Contractual/Construction				
Construction/engineering contractors				$ 150,000.00
TOTAL DIRECT COSTS				$ 150,000.00
Indirect Costs				
Schedule & Market Condition				$ -
TOTAL ESTIMATED PROJECT COSTS				$ 150,000.00

SALARIES AND WAGES

KRD is not requesting or claiming any salary or wage related expenses from this project.

FRINGE BENEFITS

KRD is not requesting or claiming fringe benefits related expenses from this project.

TRAVEL

KRD is not requesting or claiming travel-related expenses from this project.

EQUIPMENT

KRD is not requesting or claiming equipment-related expenses from this project.

MATERIALS AND SUPPLIES

KRD will furnish materials and supplies and expects minimal costs from this action and excludes it from the project budget.

CONTRACTUAL (CONSTRUCTION)

The total contractual budget is for contractor construction costs. Project costs are based on a similar project done in the fall of 2017 in the same area.

ENVIRONMENTAL AND REGULATORY COMPLIANCE

No environmental and regulatory permitting is required for this project.

INDIRECT COSTS

For this project, the recipient will not have any indirect costs. All costs associated with the project are direct and can be documented as such.

TOTAL COSTS

The estimated total project cost is $150,000.

OFFICIAL RESOLUTION

The KRD Board of Directors will approve an Official Resolution at the next scheduled meeting on August 7, 2018. A copy will be forwarded to Reclamation after that date.

ATTACHMENTS

Appendix A: KRD Water Conservation Plan Summary

APPENDIX A– KRD WATER CONSERVATION PLAN SUMMARY

Water Conservation Projects Benefits and Costs

ID No.	Facility Name	Estimated Length of Canal Lining or Piping (LF)	Estimated Annual Water Savings (Acre Feet)	Estimate Project Cost (Millions)
1	MB 13.6 Pipe	9,497	743	$3.1
2	MB Lining	35,892	2,526	$15.0
3	Main Branch Weep Drains	N/A	3,570	$1.4
4	Lateral NB 4.1	33,230	900	$7.0
5	Lateral NB 5.8	4,860	400	$0.9
6	Lateral NB 6.4	6,890	900	$1.4
7	Lateral NB 7.7 Sub Laterals 1.59, 2.9R	26,640	1,300	$5.7
8	Lateral NB 8.3	22,110	2,100	$5.9
9	NB 4.0 – 14.7	54,235	4,925	$20.8
10	Lateral NB 20.2	8,590	1,400	$2.5
11	Sub Lateral NB 20.8-0.8	8,060	1,400	$2.5
12	Lateral NB 22.0	9,230	3,800	$4.7
13	Lateral NB 22.8	650	300	$0.3
14	NB 23.3 – 31.1	43,582	3,958	$16.8
15	Lateral NB 26.7 Sub Laterals 1.7, 3.1, 4.4, 4.61 Sub Sub Lateral 4.4-0.4	40,790	3,200	$11.4
16	Lateral NB 27.5	5,330	700	$1.1
17	Lateral NB 28.6	2,100	200	$0.6
18	NB 31.3 – NB to Johnson Spill	N/A	1,000	$1.4
19	Lateral NB 33.5 Sub Laterals 2.0, 3.0 Sub Sub Lateral 2.0-1.8	35,050	2,200	$8.2
20*	North Branch Canal lining between Johnson Siphon and Wippel Pumping Plant	17,109	2,715	$5.8
21	Lateral NB 35.1	4,420	500	$1.0
22	WW 0.0 – Wippel Headworks>100cfs	N/A	1,949	$1.0
23*	Pump Ditch Piping (includes 2018 PD lining 5-mile project)	76,200	4,400	$29.7
24	Turbine Ditch Lining	48,188	4,376	$18.5
25	Gravity Ditch Lining	71,824	6,522	$27.6
26	Turbine 12.0 – Billiter Spill	N/A	1,428	$1.0
27	Turbine Ditch Piping	21,650	2,400	$6.7
28	Lateral SB 14.3	16,500	600	$4.1
29	SB Extension	12,390	600	$4.2
30	SB 14.0 – SB to Manastash Spill	N/A	2,019	$1.0
31	SB Canal Lining from Robinson Canyon to Manastash	21,648	1,427	$8.0
32	Lateral SB 11.7	6,190	300	$1.4
33*	Lateral SB 9.9	6,584	400	$0.9
34	TD 7.0 – Taneum Ditch Tail Spill	N/A	2,133	$1.0
35*	SB Canal Lining from Swede Tunnel to Robinson Canyon	13,862	2,000	$5.8
36	SB 3.9 – 7.0	16,560	1,078	$5.8
37	Lateral SB 4.8	2,540	300	$0.8
38	Turner Ditch	7,187	520	$2.0
39	Taneum Ditch	8,634	624	$2.4
40	TD 0.00 – Taneum Chute Spill	N/A	1,317	$1.0
41	Lateral SB 1.7	7,210	200	$1.6
42	SB 0.9 – 1.7	4,182	272	$1.5
A**	NB 1.0	N/A	21,363	$147.0
B**	NB 14.7	N/A	8,892	$35.1
C**	NB 29.2	N/A	5,122	$11.5
D**	NB 30.4	N/A	3,893	$11.9
E**	PD 1.0	N/A	3,017	$62.1
F**	SB 7.7	N/A	5,707	$38.1
G**	SB 5.15	N/A	1,498	$17.1
TOTALS			**123,094 AF**	**$566.30**

Note: All costs and water savings are preliminary and subject to refinement during conceptual and preliminary design. Water saving figures were generated utilizing information provided by the Kittitas Reclamation District Feasibility Investigation, dated March 2015, Yakima River Basin Study KRD Canal Modifications Technical Memorandum, dated March 2011 and various technical data provided by the Kittitas Reclamation District.

These Projects are in whole or in part construction ready

****Water Storage Location***

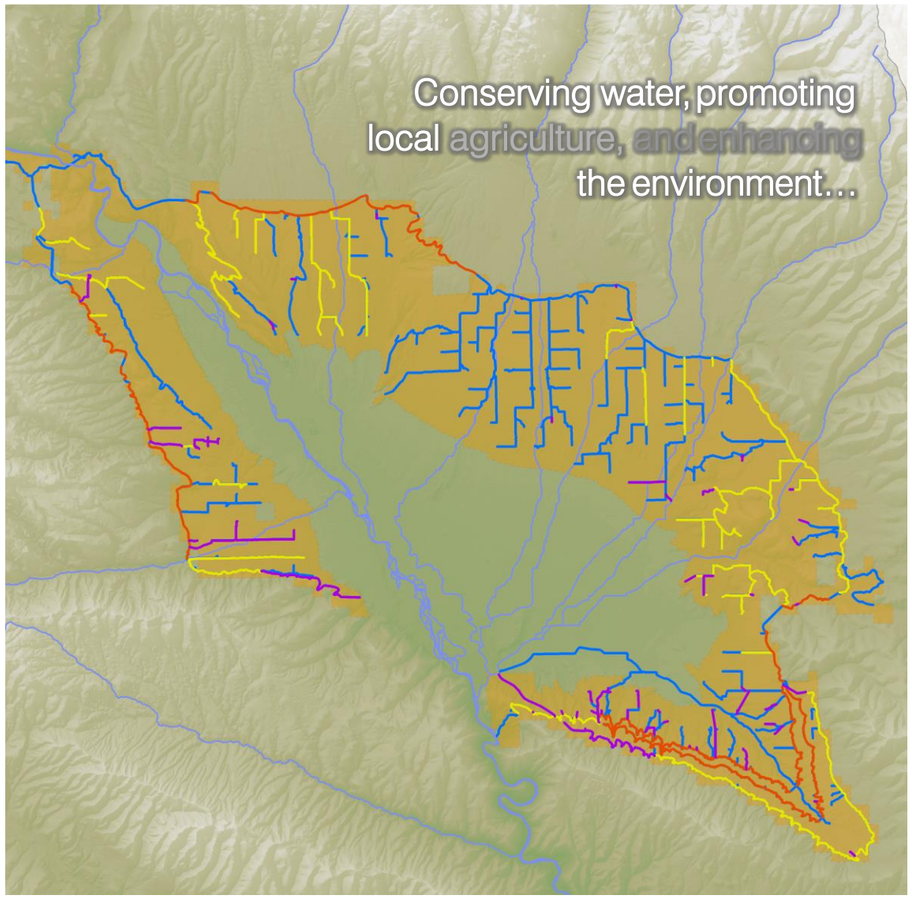
For more information:

Urban Eberhart (Kittitas Reclamation District)
509.925.6158
Urban@krdistrict.org

Craig Broadhead (Jacobs Engineering Group Inc.)
509.312.0375
Craig.Broadhead@jacobs.com

May 18, 2018

Kittitas Reclamation District
Water Conservation and Habitat Improvement Program



DEPARTMENT OF ECOLOGY State of Washington

KITTITAS RECLAMATION DISTRICT KRD

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

Kittitas County Conservation District

JACOBS

YAKIMA BASIN
BUILDING A FUTURE FOR WATER, WILDLIFE & WORKING LANDS

Kittitas Reclamation District
Water Conservation and Habitat Improvement Program

Conserving water through strategic capital improvements will offset anticipated water shortages, promote the regional economy, and enhance the environment

KRD Boundary
Existing Open Channel (Canal, Ditch, Lateral)
Existing Piped Lateral
Proposed Canal Lining
Proposed Lateral to be Piped
5 Proposed Project (see back page)
Potential Water Storage Location
Canal Spill Location
Road
Stream

0 1 2 Miles

N

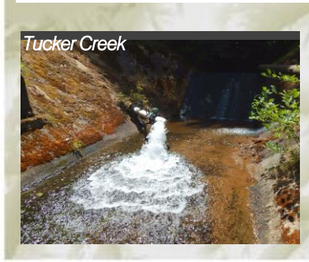
Tributary Supplementation Program

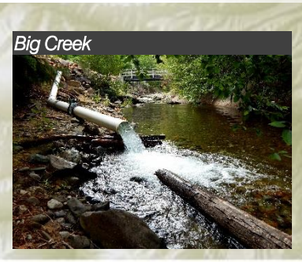
During the severe drought of 2015, the KRD secured outside funding to help save endangered fish through tributary supplementation by transporting water through Kittitas Reclamation District (KRD) canals to downstream tributaries in the Yakima River. Throughout the summer the KRD spilled water into multiple tributaries that were going dry due to extraordinary drought conditions in the Yakima Basin.

Water delivered to creeks via the KRD canal system prevented the mortality of thousands of fish stranded in pools that were drying up in creek beds. Washington State Fish and Wildlife documented listed salmonids in multiple life stages that were “rescued” by the cold, clean water delivered to the creeks by the KRD.

The supplemental water also prevented riparian vegetation losses. Riparian habitats are important to foster and maintain healthy stream functions. Streambanks not supported by the root-structures found in functioning riparian areas are easily eroded, which can lead to flooding, higher stream temperatures, and loss of habitat.

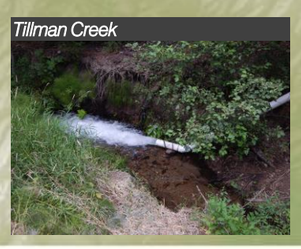
The KRD continues to work with the Yakima Basin Integrated Plan partners to implement additional conservation measures, which will free up more capacity in the KRD canal system to continue and expand the supplementation program.


Tucker Creek

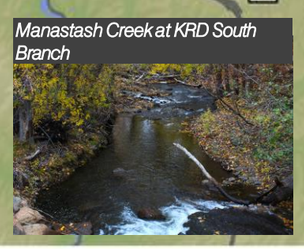

Big Creek


Little Creek


Spex Arth


Tillman Creek


Taneum Creek


Manastash Creek at KRD South Branch


Manastash Creek at KRD Bridge

May 18, 2018