WaterSMART

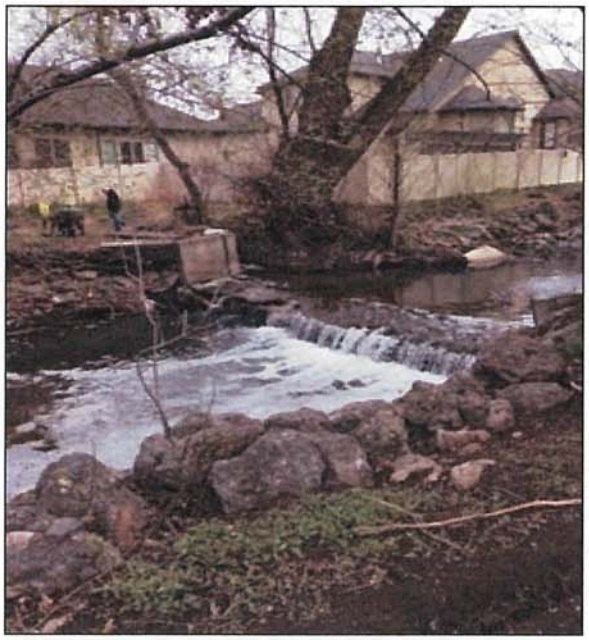
Water and Energy Efficiency Grants for FY 2018

Funding Opportunity Announcement No. BOR-DO-18-F006

Funding Group II

LC Brown Ditch Rehabilitation Project

Murray, Utah



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May 10, 2018

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Executive Summary

Date:	May 10, 2018
Applicant:	Little Cottonwood Brown Ditch Company (LCBDC) Murray, Salt Lake County, Utah
Project Title:	LC Brown Ditch Rehabilitation Project

Project Summary:

The project is rehabilitating the Little Cottonwood (LC) Brown Ditch System. A critical component is replacing the existing diversion dam. The existing diversion uses planks to back the water up into the ditch. The replacement diversion will consist of two radial gates to more efficiently and effectively control the water into the ditch while allowing for high flows to be safely passed downstream. The company experiences a significant loss of water at the diversion dam.

The project will also replace nearly 4.1 miles of open ditch and pipe through the existing area to create a more efficient pressurized delivery system for the shareholders of the company. The new pipeline will be HDPE pipe with a beginning diameter of 24-inch reducing to 12-inch near the end of the system. The new pipeline will be 2.7 miles long. Each turnout will have meters installed to monitor the use of the water. A tiered rate structure will be used to encourage conservation. The water is used for lawns and gardens within the original project area. The users currently pump with individual pumps from the ditch. With the new pipeline the need for pumps will be eliminated and result in a net 42,000 kwh/year of energy being conserved for other uses within Murray City. Salt Lake County Parks and Recreation is also a shareholder of the company which uses the water for the irrigation of the Mick Riley Golf Course, built in 1967. The County is doing a $1.6 million improvement of the irrigation system for the golf course. While the County project is not part of the LC Brown Ditch Rehabilitation Project, it will also conserve and more efficiently use water from the LCBDC.

The project is estimated to conserve 2,020 acre-feet of water per year between the diversion dam and the ditch rehabilitation. The cost of the project is estimated at $2,526,300. The cost is $1,250 per acre-foot of conserved water. This is significantly below the price of water in the Salt Lake area urban environment. The conserved water will decrease the demand on the local groundwater resources which are used for culinary purposes.

Approximate Length:	30 months, some winter construction
Completion Date:	March 2021, assuming a start in October 2018
Federal Facility:	The project is not located on a Federal facility

Background Data

Applicant

LC Brown Ditch Background

The LC Brown Ditch began diverting water in 1867. The ditch draws water from the Little Cottonwood Creek at N 500 feet, E 2500 feet from SW corner, Sec. 17, T2S, R1E, SLBM. There are 1,250 acres within LCBDC boundaries as stated in the company's by-laws. The LCBDC covers parts of 6 sections in Township 2 South, Range 1 West and Township 2 South, Range 1 East of the Salt Lake Base and Meridian.

LCBDC operates and manages the assets of the LC Brown Ditch. The management of the company is comprised of a board of directors consisting of five members who are elected by shareholders. The LCBDC is a nonprofit organization and operates consistent with those powers described in the Utah Revised Nonprofit Corporation Act.

Applicant's Water Supply

As applicable, describe the source of water supply, the water rights involved, current water uses (e.g., agricultural, municipal, domestic, or industrial), the number of water users served, and the current and projected water demand. Also, identify potential shortfalls in water supply. If water is primarily used for irrigation, describe major crops and total acres served.

The Little Cottonwood Brown Ditch began diverting water from Little Cottonwood Creek in 1867 for the purpose of irrigating approximately 800 acres of farmland. The Little Cottonwood Creek is a tributary to the Jordan River, which flows to the Great Salt Lake. Little Cottonwood Creek originates in the Wasatch Mountains to the east of the company service area. The Little Cottonwood Creek has an annual flow of 49,000 acre-feet.

Little Cottonwood Creek Background

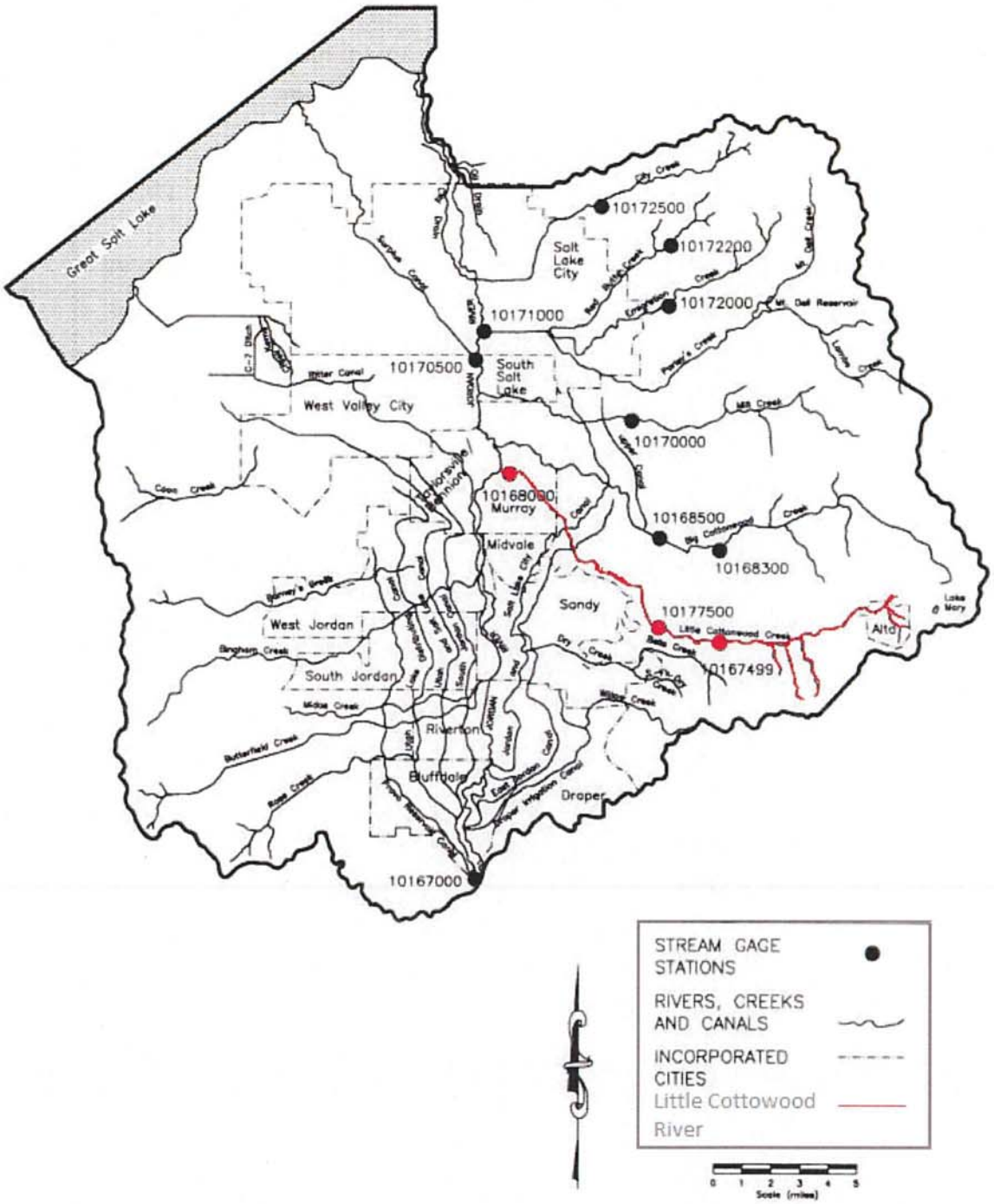
The Little Cottonwood Creek originates in the Little Cottonwood Canyon, in the southern part of the Salt Lake Valley. The Creek is shown on Figures 1, 2, and 4. The early Mormon Pioneers began using its water supply for irrigation in the year 1850. The Little Cottonwood Creek provides an average water supply of 46,190 acre-foot per year to the Salt Lake Valley, with a reliable supply of 32,950 acre-foot per year (90% reliability). Stream gages are used to measure flows at different locations along the Little Cottonwood Creek. The results are shown in Table 1. Figure 1 shows the Jordan River Basin with the stream gages marked. (UDWR, 2010)

Table 1: Gaging Stations on Tributary Streams

Gaging Stations on Tributary Steams:			
Station #	Location	Years of Record	annual flow (ac-ft/yr)
10167499	Little Cottonwood Creek	1981-1991	22,730
10167500	LCC near Salk Lake City	1964-1968, 1980	35,910
10168000	LCC at Jordan River	1980-1991	39,870

* UDWR, 1997

Figure 1: Map of Jordan River Basin with Stream Gages (UDWR, 1997)



The Brown Ditch Diversion is the lowest diversion on Little Cottonwood Creek before it empties into the Jordan River. There are 10 diversions upstream of the Brown Ditch Diversion. These are listed in Table 2 and summarize the water rights involved. There are also two canals that intersect with the Little Cottonwood Creek, the East Jordan Canal and the Jordan and Salt Lake City Canal. These two canals are discussed later. The competition for water is significant, especially during the

late summer. Being the last ditch on the system, the need for water management and efficiency is critical.

Table 2: Diversion Points on the Little Cottonwood Creek

Summary of Water Rights on the Little Cottonwood Creek				
Legend #	Ditch Diversion Name	Diversion Location	Approximate Flow	Acres Served
1	Last Chance	9030 Canyon Gate Rd. Between the water treatment Plant and Quail Hollow Park	17.52 cfs	N/A
2	Big Nicol	9031 Canyon Gate Rd. Between the water treatment Plant and Quail Hollow Park	Unspecified	N/A
3	Richard's	Right off Creek Rd. where Royal Ln Crosses the Creek NW of Willow Park Country Club	16 cfs	500
4	Greenwood	Right behind 2219 Lorita Way, Sandy Ut, Little Cottonwood Creek Valley housing area	Unspecified	N/A
5	Brady	1950 Forest Bend Dr. just west of Highland Dr. intersection with 7780 S.	Unspecified	N/A
6	Van Valkenburg	Behind 1860 Forest Bend Dr	Unspecified	N/A
7	Tanner	1320 Milne Ln Sandy, Ut. Just to the South East of the Fort Union Park area.	35.5 cfs	1,260
8	Union & Jordan	7425 Creek Rd, Sandy, Ut. Just South East of the Fort Union Park area.	Unspecified	1,700
9	Cahoon & Mayfield	7425 Creek Rd, Sandy, Ut. Just South East of the Fort Union Park area.	23.125 cfs	N/A
10	Walker	East of the Walmart Supercenter Parking Lot, in the Fort Union Park Area	16 cfs	500
11	East Jordan Canal	Intersect with the LCC at Union Park Ave. and S 1300 E.		6,700
12	Jordan and Salt Lake City Canal	Intersects with the LCC just south of Wheeler Historic Farms off of 6600 S and South 900 E		9,300

* Sources:

Jordan River Basin, Utah State Water Plan. Salt Lake City, UT: Utah Division of Water Resources (UDWR), 1997. https://water.utah.gov/Planning/SWP/Jord_riv/jor_riv1997.pdf

Jordan River Basin Planning for the Future: Utah State Water Plan. Salt Lake City, UT: Utah Division of Water Resources (UDWR), 2010. https://water.utah.gov/Planning/SWP/Jord_riv/Jordan%20River%20Basin%20Final0610t.pdf.

Applicant's Water Rights

The LC Brown Ditch's water rights are shown in Table 3. The Little Cottonwood Creek water rights were decreed in 1910 by the Third Judicial District Court of Utah in what is known as the Morse Decree. A flow of 11.2 cfs is contained in the decree and represents approximately 4,000 acre-feet of water (11.2 cfs x 1.98 acre-feet/day x 180 days). The duty for the Salt Lake Valley is 5 acre-feet/ac. The Morse Decree does not list the acreage served for the LC Brown Ditch. However, based on the flow of 11.2 cfs and the duty, the calculated acreage for the ditch at the time of the decree was 800 acres.

Table 3: Water Rights diverted into the LC Brown Ditch

Water Right	Source	Flow (cfs)	Type	Priority
57-9024	Little Cottonwood	11.2	Decree	06/01/1867
	Little Cottonwood	11.2- return flow	Decree	06/01/1867

Other Waters Besides Little Cottonwood Creek

Two major canals were constructed in the late 1800's delivering water from Utah Lake to the east side of the Salt Lake Valley (East Jordan Canal and the Jordan and Salt Lake City Canal). These two canals intersect the Little Cottonwood Creek between the Walker Diversion and the LC Brown Ditch Diversion. The East Jordan Canal was put into service in 1878. The Jordan and Salt Lake City Canal was put into service in 1882. These canals are shown on Figure 1 and included in Table 2. In addition to directly irrigating agriculture lands below each canal, water was delivered

from the canals to both Little and Big Cottonwood Creeks in an exchange with Salt Lake City. For example, Salt Lake City would take creek water for its use near the mouth of the canyon and replace it with Utah Lake water from the two canals. In addition, the service area in the Little Cottonwood Creek Basin of these two canals is approximately 1,500 acres. The return flows from irrigating these lands go into Little Cottonwood Creek above the Brown Ditch Diversion. Thus, in addition to the direct flows of Little Cottonwood Creek, the Brown Ditch diverts water supplied for exchange and return flows from these two canals.

The Morse Decree allows the Walker Ditch (which is located approximately 1.4 miles upstream of the Brown Ditch Diversion) to dry dam the Little Cottonwood Creek when the flows are less than 94.79 cfs. While the decree does not specify return flows or exchanges, but with the existence of the two canals from Utah Lake and the Walker Ditch stipulation, it is obvious that Judge C.W. Morse, who entered the decree, intended for a portion of Brown Ditch's water supply to be made up of these exchange flows and return flows from the two canals from Utah Lake.

Summary of Applicants Water Supply

It is understandable that the water supply today is not the same as it was in 1910 due to growth and urban development. The water is not used directly for agriculture as it was then, but the water from the LC Brown Ditch is beneficially used for irrigation of lawns, gardens, and turf areas at parks, including the 100-acre Mick Riley Golf Course owned by Salt Lake County Parks and Recreation. There are currently 563 shares receiving water from the system.

Based on current information and analysis, the annual demand for water is 2,900 acre-feet as compared with 4,000 acre-feet in 1910. This reduction is due to the urbanization which has occurred. However, the actual water currently being delivered is severely limited by the inefficiencies of the delivery system. The residents (stockholders) make up the difference by using (purchasing) water from Murray City. The project will conserve the water necessary to allow the stockholders to use the water that is diverted from Little Cottonwood Creek without having to supplement from groundwater reserves.

With the project, it is also anticipated that additional parks (approximately 82 acres = 410 acre-feet) could be irrigated with the conserved water. There are also additional residential areas who would be able to use water, if water were available through this conservation and management project. Once the project is in place, the LCBDC plans on expanding delivery to these residential areas.

The conversion of surface water from Murray City's groundwater for both residential areas and parks would be both a conservation of groundwater for future growth and conservation of energy due to decreased pumping of the groundwater. The additional demand would be 1,800 acre-feet and could be met by the conserved water from the project.

Murray City Background

Murray City Water System currently serves a population of 31,000, with a total of 7,956 connections. Their main sources include springs, wells, and wholesale. Murray City currently has a groundwater supply capacity of 11,590 acre-feet per year. Murray City's public water use for 2005 was a potable use of 7,347 acre-feet per year, with a non-potable use of 300 acre-feet per

year. The future demand for Murray City for 2030 and 2060 are 12,154 acre-feet, and 11,365 acre-feet respectively. The 2010 dry-year supply for Murray City was 13,958 acre-feet giving the city a surplus of water (UDWR, 2010). The project would extend the city's water supply even further into the future.

Applicant's Water Delivery System

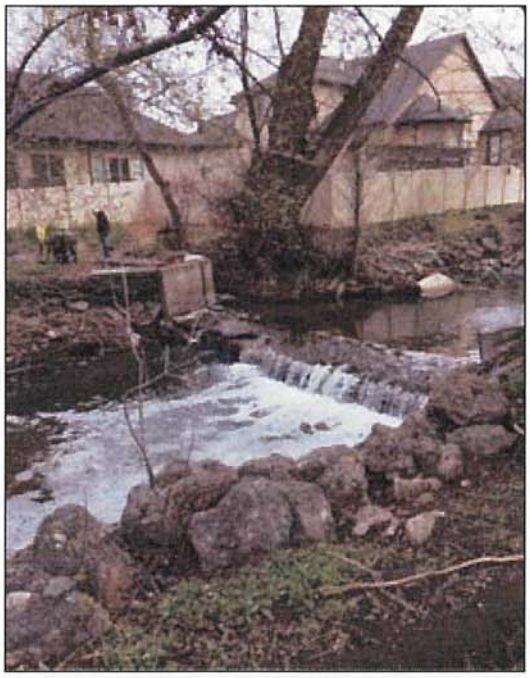
Describe the applicant's water delivery system as appropriate. For agricultural systems, please include the miles of canals, miles of laterals, and existing irrigation improvements (e.g., type, miles, and acres). For municipal systems, please include the number of connections and/or number of water users served and any other relevant information describing the system.

Little Cottonwood Diversion Dam:

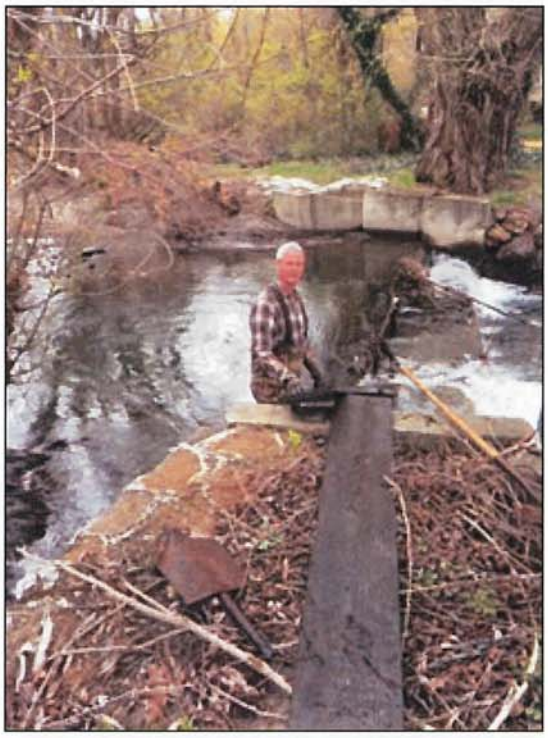
The LC Brown Ditch draws water from the Little Cottonwood Creek at N 500 feet, E 2500 feet from SW corner of Sec. 17, T2S, R1E, SLBM. The diversion dam is old and inefficient in diverting water into the Brown Ditch. The current operation requires three sets of 2 inches x12 inches x 14 feet wooden planks in length to span the channel with removable pipe inserts into the floor of the diversion with channel iron welded to hold the end of the planks. Sand bags are also used to stabilize the planks. This configuration leaks and is difficult to install. In addition, the floor of the diversion slopes away from the entry to the ditch, so water flows over the south end of the diversion instead of being diverted into the ditch.

Due to the condition of the LC Brown Ditch Diversion Dam, calculations indicated that 52% (1,500 acre-feet) of the flow they are entitled to is being lost downstream to Little Cottonwood Creek.

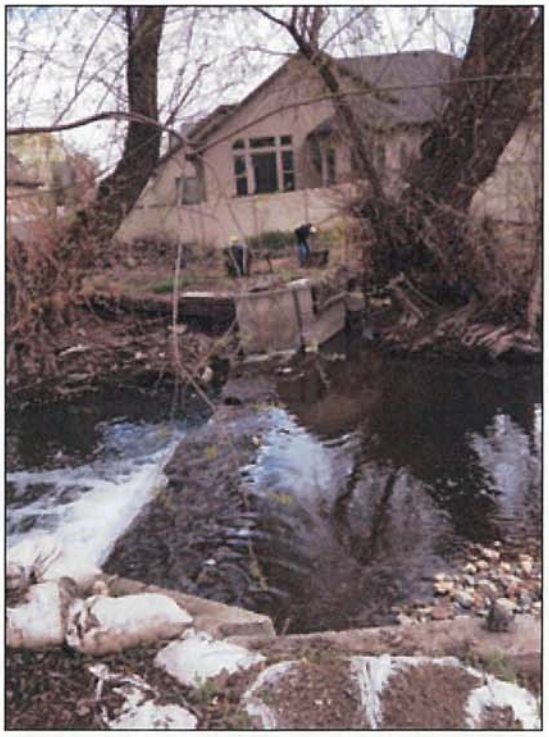
Several photographs are included to show the condition of the diversion dam.



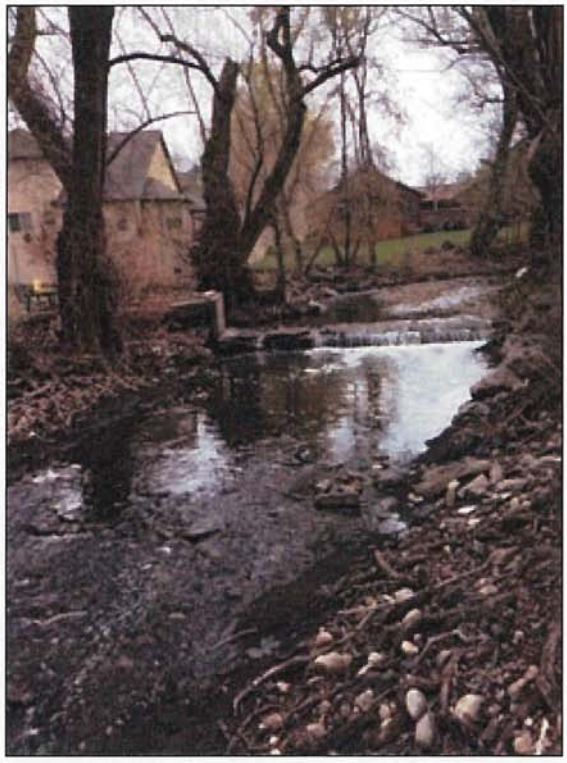
Photograph A: Diversion Dam taken from the South Bank looking North



Photograph B: Removing the Planks from the LC Brown Ditch Diversion



Photograph C: Diversion taken from South Bank of Little Cottonwood Creek



Photograph D: Diversion Dam looking upstream at Little Cottonwood Creek

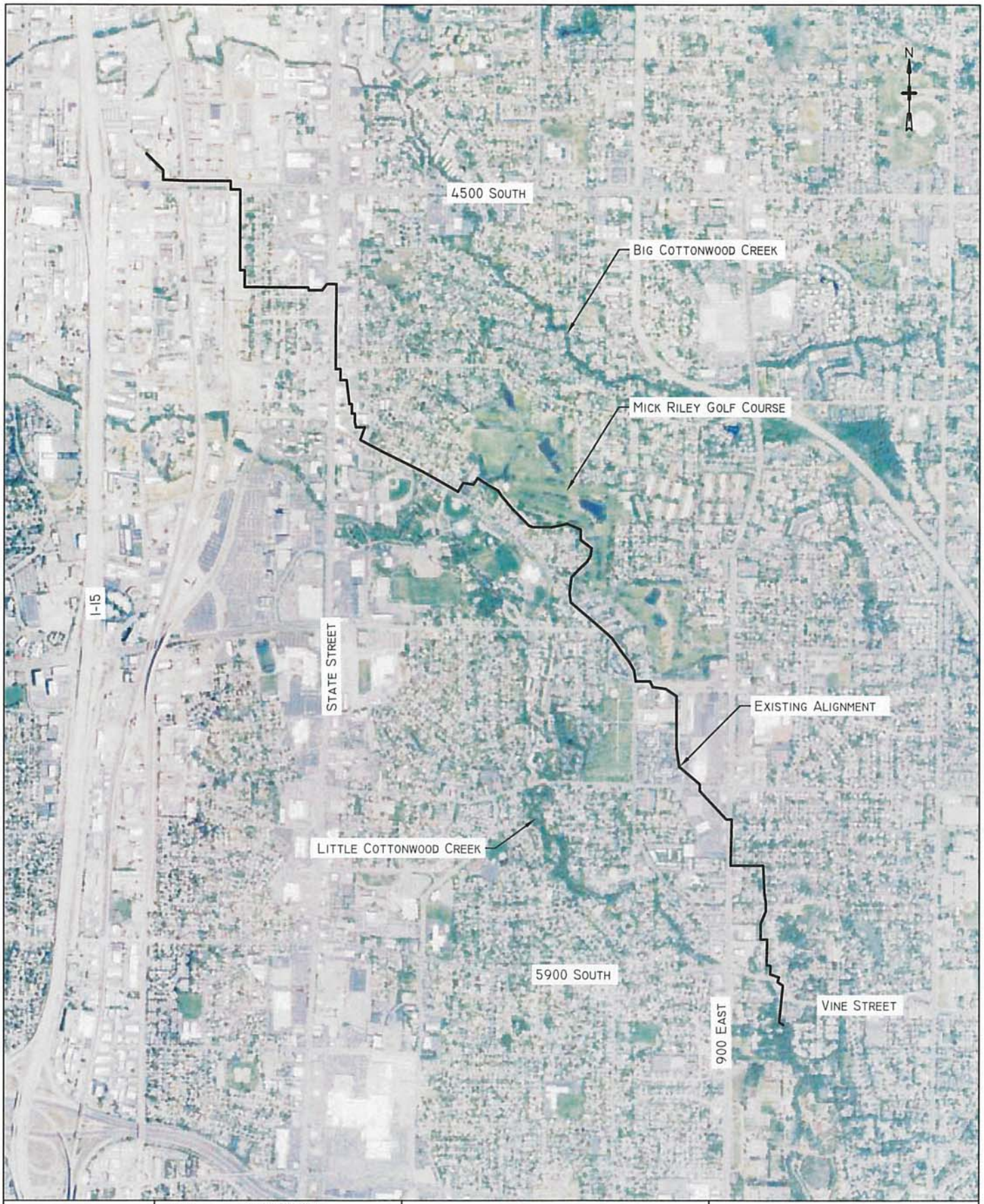
Little Cottonwood Brown Ditch:

The LC Brown Ditch System begins at the diversion dam and proceeds in a northwesterly direction. The system ends at approximately State Street and 4500 South. The ditch traverses subdivisions, streets, and commercial developments. The ditch is between Little and Big Cottonwood Creeks. The length of the current system is 19,700 feet. See Figure 2. The large park areas can be seen near the center of the system.

There are no turnouts in the first 6,200 feet of the ditch. In this first section of the ditch, 1,000 feet is open ditch, 4,800 feet is 24-inch concrete pipe, and 400 feet is 24-inch corrugated pipe. The first turnout for the ditch is at the end of this section and is for the Mick Riley Golf Course. The golf course uses approximately 500 acre-feet of water annually.

The second major reach of ditch is 6,000 feet and serves many of the shareholders. There are 284 shares receiving water in this section. This area should receive about 570 acre-feet. In this second section of the ditch, 500 feet is open ditch, 2,600 feet is 20-inch or 24-inch concrete pipe, and 2,700 feet is 20-inch or 24-inch corrugated pipe.

The third major reach of the ditch is 7,700 feet with approximately 3,000 feet through downtown Murray with no turnouts. Most of the turnouts in this reach which receive water are west of state street in the last 2,800 feet. There are currently 47 shares receiving 94 acre-feet in third section. In this section of the ditch, 4,700 feet is 20-inch or 24-inch concrete pipe, 900 feet is 20-inch or 24-inch corrugated pipe, and 2,000 is 20-inch poly pipe.



FRANSON CIVIL ENGINEERS	DATE: April 27, 2018 SCALE: 1" = 2,000' Watersmart Figure.dwg P:\UT\SL Metro\Brown Ditch Irr. Com\Drawings	Little Cottonwood Brown Ditch	Figure 2 Existing System

The following is a detailed description of the alignment:

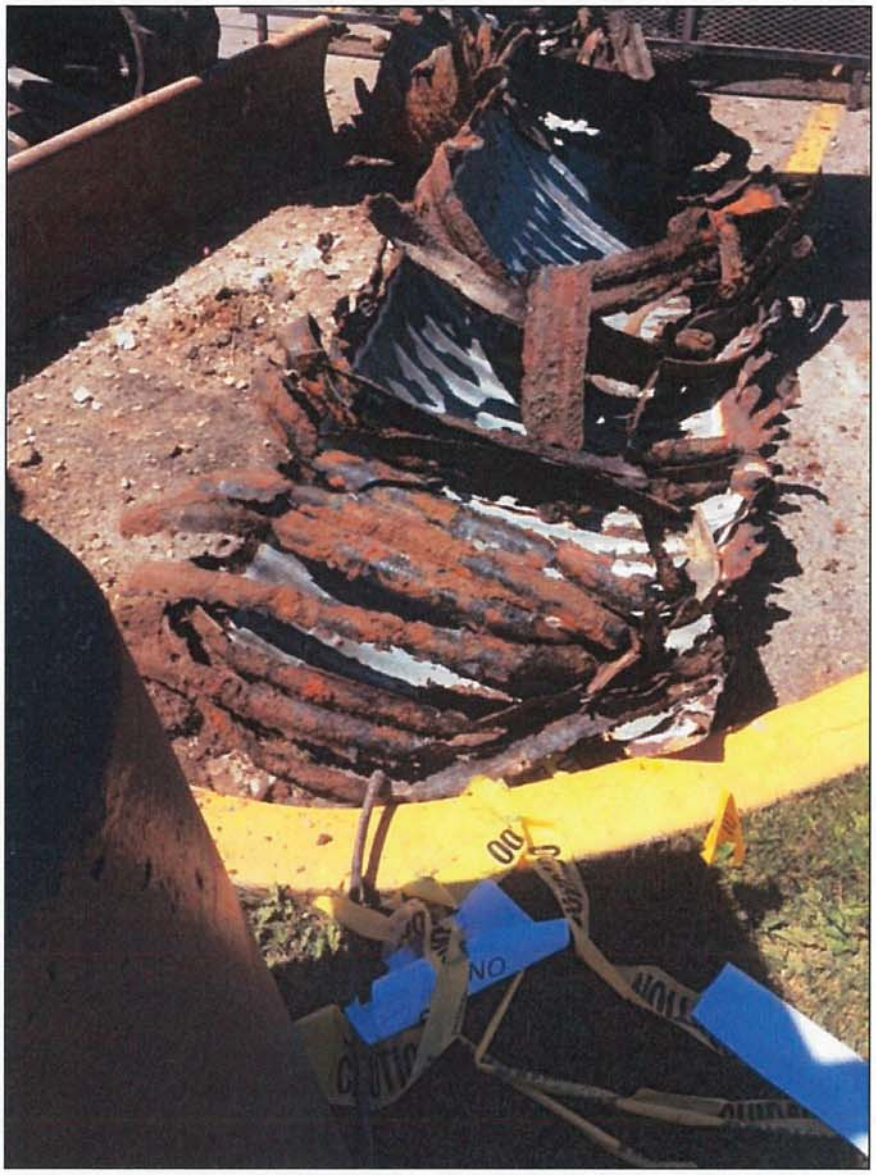
The LC Brown Ditch is diverted from the Little Cottonwood Creek south of Corbin Creek Cove, which is right off Vine Street. After the diversion point, the ditch goes under Corbin Creek Cove and cuts over to Vine Street at about 1000 East. The ditch crosses under Vine Street and continues north parallel to Ragsdale Drive. The ditch then goes under Hyland Lake Drive and Birchwood Drive after which it turns west and cuts over to 900 East at about 5775 South. Once at 900 East, the ditch heads north until the intersection with 5700 South where it crosses underneath 900 East and cuts under the Fresh Market parking lot until it gets to 5600 South. The ditch then crosses under 5600 South and goes behind Sports Authority until it meets up with Brookridge Drive. The ditch follows Brookridge Drive north until the street ends, then continues under several parking lots until it meets up with Woodoak Lane. After crossing underneath Woodoak Lane, the ditch turns west and follows Woodoak Lane until it intersects with Vine Street once again. After the ditch comes to the intersection, it stays on the east side of Vine Street and continues until about 5770 South Vine Street where it veers slightly east into the Mick Riley Golf Course. The ditch loops around Virginia Street and Benbow Street and continues to follow along the edge of the golf course until coming back to Vine Street next to the LDS Church at 363 East Vine Street. LC Brown Ditch then continues to follow Vine Street towards the northwest until 163 East where it heads north again and goes behind several business buildings until meeting up with State Street at the intersection with 4800 South. The ditch then continues along State Street until Rainbow Drive where it crosses underneath State Street and goes underneath the Murdock car dealership. The ditch continues west and goes under both Hanauer Street and Box Elder Street where it meets up with the VM Nutritional Complex parking lot. Then, the ditch turns north again until it intersects with 4500 South at 59 West. The ditch crosses underneath 4500 South and continues west along the frontage road until 220 West 4500 South, where it turns north again and completes its course.

The following photographs display the condition of the corrugated pipe within the system.

Photograph E: Rusted corrugated pipe

Photograph F: Rusted out bottom of corrugated pipe

Photograph G: Rusted out bottom of corrugated pipe



Photograph H: Remnants of corrugated pipe

The losses through the open ditch are significant. The concrete pipe itself has low losses; however, the pipe has joints every 12 feet which allow water to seep out. The corrugated pipe is old and corroded with high losses (see Photographs E, F, G, and H). Thus, in addition to the losses at the diversion, the total estimated loss through the open ditch and old corrugated pipe is 520 acre-feet.

The following Table 4 details the condition of the ditch, including the type of material, pipe lengths, etc.

Table 4: Description of LC Brown Ditch System by Station

Beg. Station	End Station	Length (feet)	Pipe Size (inches)	Description
Section #1				
0+00	2+00	200		
2+00	7+00	500	24	24" concrete
7+00	8+00	100	12	12" poly
8+00	15+00	700	24	24" concrete
15+00	16+00	100		open
16+00	28+00	1,200	20	20" concrete
28+00	31+00	300	18	18" corrugated
31+00	32+00	100		bubble up
32+00	33+00	100	18	18" corrugated
33+00	40+00	700		open
40+00	62+00	2,200	24	24" concrete
Section #2				
62+00	86+00	2,400	24	24" concrete
86+00	88+00	200		open
88+00	89+00	100	18	18" corrugated
89+00	92+00	300		open
92+00	93+00	100	18	18" concrete
93+00	94+00	100	20	20" concrete
94+00	97+00	300	24	24" corrugated
97+00	98+00	100		open
98+00	99+00	100	24	24" corrugated
99+00	100+00	100		open
100+00	107+00	700	18	18" corrugated
107+00	117+00	1,000	24	24" corrugated
117+00	122+00	500	20	20" corrugated
Section #3				
122+00	139+00	1,700		Murray City poly
139+00	152+00	1,300	20	20" concrete
152+00	153+00	100	20	20" poly
153+00	154+00	100	dual 12	dual 12" under road
154+00	166+00	1,200	24	24" concrete
166+00	167+00	100	dual 12	dual 12" under road
167+00	168+00	100	36x24	36"x24" rectangle concrete
168+00	173+00	500	24	24" concrete
173+00	179+00	600	24	24" corrugated
179+00	182+00	300	20	20" corrugated
182+00	198+00	1,600	36 V	36" V-channel concrete
Total Length:		**19,800**		

Hydropower or Energy Efficiency

The shareholders of the LCBDC pump water from the ditch. The energy comes from Murray City which is a preference customer of the Colorado River Storage Project.

The average monthly usage during the summer months is approximately 286 kwh per shareholder. With the implementation of the project, this project will conserve 68,700 kwh on a yearly basis. However, the project will require a small (16 hp) pump to pressurize the center portion of the system. The net savings in energy is 42,000 kwh.

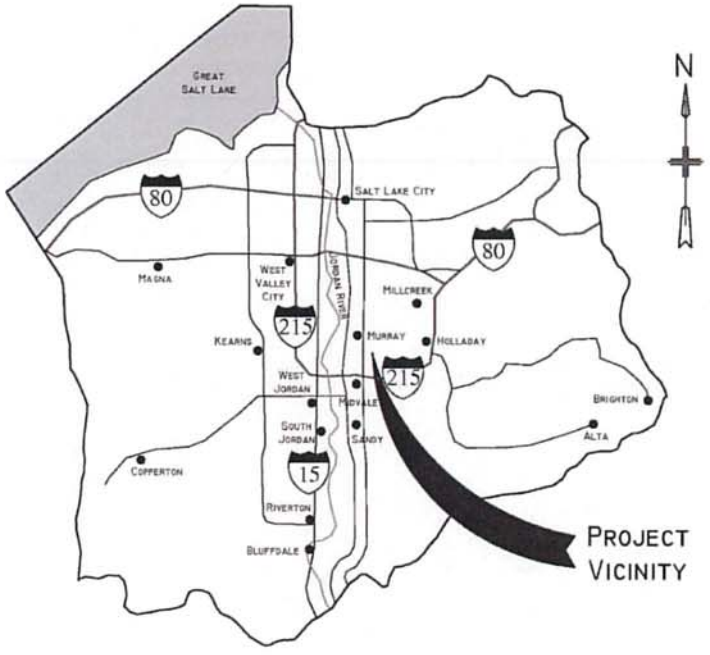
Prior Work with Reclamation

There have been no direct working relationships between the Little Cottonwood Brown Ditch Company and Reclamation.

Project Location

The project is located in Salt Lake County, Utah as shown on Figure 3. The project is approximately 9 miles south of downtown Salt Lake City within the boundaries of Murray City. The LCBDC covers portions of 6 sections in Township 2 South, Range 1 West and Township 2 South, Range 1 East of the Salt Lake Base and Meridian. The project is approximately 2 miles east of Interstate 15 and 2 miles north of Interstate 215.

Figure 3: Location Map



Salt Lake County

Technical Project Description

The technical project description should describe the work in detail, including specific activities that will be accomplished. This description shall have sufficient detail to permit a comprehensive evaluation of the proposal.

The project involves facilities for the LCBDC to more efficiently and effectively use their water right.

LC Brown Ditch Diversion Dam:

The work consists of replacing the existing diversion dam. The replacement diversion will consist of completely removing the existing structure to replace it with a more efficient and safer structure. A new floor will be constructed with two abutments and a center pier (2-foot wide x 8-foot in length). In between each abutment and center pier, a 3-foot high x 14-foot wide radial gate will be installed. Each gate will have a separate actuator (motor) to allow for individual operation. This allows for the gates to be operated to manage the flows in Little Cottonwood Creek; i.e. open the gates during high spring flows. An advantage of radial gates is also to keep the channel upstream of the diversion clear of debris and sediments by allowing those materials to periodically pass under the gates.

A measurement device will be installed at the inlet to the pipeline. The existing slide gate as the inlet to the ditch will be retrofitted with an actuator for operational purposes. A walkway will be installed across the abutments and center pier to allow for access to both sides. The floor, abutments, and center pier will require approximately 64 cubic yards of reinforced concrete.

To meet the requirements of Section 404 of the Clean Water Act, a Stream Alteration Permit will be obtained from the Utah State Division of Water Rights – Dam Safety section before work begins in the channel.

Replacement of the diversion dam is the most critical aspect of the project.

LC Brown Ditch:

The work consists of converting existing combinations of open ditches and piped sections through subdivisions to a pressurized secondary system for the service area.

The "replacement" of the ditch will utilize as much of the existing concrete pipe and corrugated pipe as possible to reduce the impacts of construction in the streets of Murray. The concrete pipe and corrugated pipe have losses so SR-32.5 (thin walled) HDPE pipe will be inserted into the existing pipe. This will reduce the diameter of the pipe, but because of increased efficiency, the pipe will still meet the demands of shareholders. *(options for insert are also: Cured-in-Place Pipe (CIPP), fusible PVC pipe, and Geopolymer Mortar (spray application).)*

The proposed alignment will utilize major portions (9,700 feet) of Vine Street out of the total 18,130 feet or 53%. Of the 9,700 feet in Vine Street, 2,850 feet (29%) already has pipe that will be used as described in the above paragraph. This will reduce the impact and cost of installing pipe in Vine Street which is a major collector road for Murray City. Other streets in Murray include Wasatch

Street (1,440 feet), 4800 South (200 feet), Rainbow Drive (1,880 feet), and Box Elder Street (1,350 feet) will be used in the revised system.

5,400 feet of the first 6,200 feet of the ditch will be used by Murray City for storm water. Over 2,100 feet of ditch will be abandoned in the downtown area of Murray.

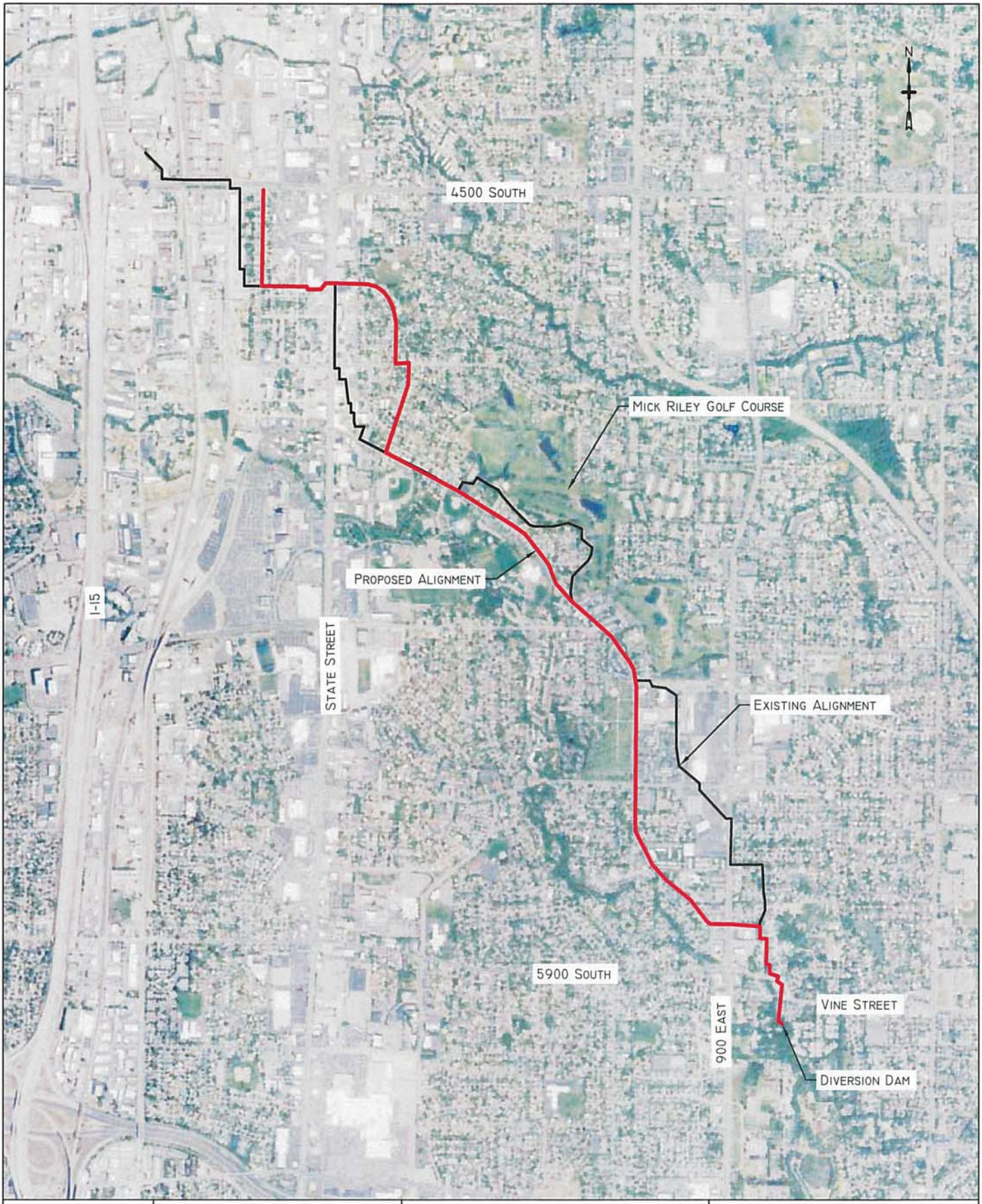
The plan involves using 24% of the existing system without replacing it. This effort will not require the replacement of asphalt in the streets. The remaining 76% of the project will require the placement of new pipeline. The proposed alignment is shown in Figure 4. Table 5 displays the lengths, pipe dimensions, and actions needed for the project. The table also displays sections are using existing pipe and where new pipe will be installed.

Table 5: Summary of Proposed Project

Use	Beg. Station	End Station	Pipe Dia.	Pipe Type	Insert Lining	Lengths		Actions Needed
						existing	new	
	0+00							Redo inlet
**	0+00	7+00	24	concrete		700		Leave as-is
**	7+00	8+00	12	?		100		City replacing storm drain - City pays for connection at both ends
	8+00	22+50	24	DR-32.5 HDPE			1,450	Use existing - in backyard Murray - storm drain
	22+50	66+00	24	DR-32.5 HDPE			4,350	New pipe - in Vine Street to Mick Riley - use existing 24" concrete - reverse flow
**	66+00	82+00	24	concrete	*	1,600		Use existing 24" concrete in Vine Street
	82+00	107+00	20	DR-32.5 HDPE			2,500	New pipe - in Vine Street
**	107+00	119+60	20	poly		1,250		Use Murray 20" poly - in Vine Street
	119+60	134+00	18	DR-32.5 HDPE			1,440	New pipe - in Wasatch State Street area - storm drain - Murray
	134+00	136+00	18	DR-32.5 HDPE			200	New pipe - in 4800 South
	136+00	154+80	16	DR-32.5 HDPE			1,880	New pipe - in Rainbow to State
**	154+80	156+00	16	concrete box 36"x24"	*	120		Insert HDPE under State Street
**	156+00	161+00	12	concrete	*	500		
	161+00	167+90	12	DR-32.5 HDPE			690	New pipe - to Box Elder
	167+90	181+40	12	DR-32.5 HDPE			1,350	New pipe - in Box Elder
					18,130 Total	**4,270**	**13,860**	Plus laterals & meters
						24%	76%	

* Either HDPE insert, fusible PVC, CIPP, or GeoSpray (geopolymer mortar)

** Utilize existing system



FRANSON CIVIL ENGINEERS

DATE:	APRIL 27, 2018
SCALE:	1" = 2,000'

Watersmart Figure.dwg
P:\UT\SL Metro\Brown Ditch Irr. Com\Drawings

LITTLE COTTONWOOD

BROWN DITCH

FIGURE 4

PROPOSED ALIGNMENT

The first turnout of the system will be at Station 66+00 and will provide the water for the Mick Riley Golf Course. The existing 24-inch concrete pipe along the old ditch alignment (from Station 62+00 to 69+30) along Woodoak Lane will be used to deliver the water to the golf course. The water in this section of pipe (930 feet) will flow in a reverse direction than it does now. The elevation to the golf course will be uphill six feet from the new pipe. The existing concrete pipe will be able to accommodate this low head.

Immediately downstream of the Mick Riley turnout, a 16 hp booster pump will be installed at Station 66+00. This booster pump will add a small amount of pressure to the system so the shareholders can eliminate the individual pumps they currently use. By reducing the individual pumping, it is estimated the net reduction of energy as a result of the project will be net of 42,000 kwh.

Laterals will be installed off the main line. The laterals will be in residential streets. These laterals will provide access to the individual shareholders lots. Each turnout to lots will be installed with a meter.

Evaluation Criteria

Evaluation Criterion A: Quantifiable Water Savings

Up to 30 points may be awarded for this criterion. This criterion prioritizes projects that will conserve water and improve water use efficiency by modernizing existing infrastructure. Points will be allocated based on the quantifiable water savings expected as a result of the project. Points will be allocated to give greater consideration to projects that are expected to result in more significant water savings.

Water Savings / Current Water Losses

Describe the amount of estimated water savings. *For projects that conserve water, please state the estimated amount of water expected to be conserved (in acre-feet per year) as a direct result of this project.*
Describe current losses: *Please explain where the water that will be conserved is currently going (e.g., back to the stream, spilled at the end of the ditch, seeping into the ground)?*

The estimated water saved is a result of four sources. Each of the sources is discussed in the preceding Background section of this application. Also shown in Table 6 is the destination of this water.

Table 6: Estimated Water to be Saved

	Volume (ac-ft per year)	Destination of Lost Water
Diversion Dam	1,500	Stays in stream
Section #1 of Ditch	156	Seeping into the ground
Section #2 of Ditch	353	Seeping into the ground
Section #3 of Ditch	11	Seeping into the ground
Total:	**2,020**	

With the project implementation, the "lost" water will go to the individual shareholders to reduce their shortages. In summary, the lost water will be put to use and ultimately, reduce the demand on the culinary system to water lawns, gardens, and parks. When the pipe is full due to reduced or non-use of the water, the water will continue in Little Cottonwood Creek (overflow the pipe) instead of flowing into the ditch and subsequently out the end of the ditch. There is no easy way at this time to quantify the benefit to Little Cottonwood Creek of these flows, but it is reasonable to assume some benefit will occur to the stream instead of the flows bypassing the stream through the ditch.

Support/Documentation of Water Savings

Describe the support/documentation of estimated water savings: *Please provide sufficient detail supporting how the estimate was determined, including all supporting calculations. Note: projects that do not provide sufficient supporting detail/calculations may not receive credit under this section. Please be sure to consider the questions associated with your project type (listed below) when determining the estimated water savings, along with the necessary support needed for a full review of your proposal.*

LC Brown Ditch Diversion Dam

The diversion dam is old and inefficient in diverting water into the Brown Ditch. The current operation requires three sets of 2-inch x 12-inch x 12-foot wooden planks in length to span the channel with removable pipe inserts into the floor of the diversion with channel iron welded to hold the end of the planks. Sand bags are also used to stabilize the planks. This configuration leaks and is difficult to install each spring. In addition, the floor of the diversion slopes away from the entry to the ditch so water flows over the south end of the diversion instead of being diverted into the ditch. See Photographs A and D. Also, refer to Photograph B which highlights the water flowing over the planks.

Due to the condition of the diversion dam, calculations indicate that 52% (1,500 acre-feet) of the flow the company is entitled to is being lost downstream to the Little Cottonwood Creek. This number is determined from measurement of the water flowing into the ditch being subtracted from the water required to meet the existing demand.

LC Brown Ditch Section #1

There are no turnouts in the first 6,200 feet of the ditch. In this first section of the ditch, 1,000 feet is open ditch, 4,800 feet is 24-inch concrete pipe, and 400 feet is 24-inch corrugated pipe. The first turnout for the ditch is at the end of this section and is for the Mick Riley Golf Course. The golf course uses approximately 500 acre-feet. However, the amount of water available for diversion to the golf course shows a loss of 156 acre-feet per year. This loss occurs in the open ditch and corrugated pipe sections. See Photographs for condition of the corrugated pipe. As can been seen from the photographs, the bottom of the pipe is almost non-existent. This pipe was installed with gravel bedding. Thus, the water seeps directly into the gravel and is lost to the users.

LC Brown Ditch Section #2

The second major reach of ditch is 6,000 feet and serves many of the shareholders of the company. There are 284 shares delivered to this section. This area should receive about 570 acre-feet, but does not due to the losses in Section #1. In this second section of the ditch, 353 feet is open ditch,

2,600 feet is 20-inch or 24-inch concrete pipe, and 2,700 feet is 20-inch or 24-inch corrugated pipe. This section loses 500 acre-feet of water per year through the same mechanism as Section #1, but this section has much more open ditch and corrugated pipe and thus higher losses.

LC Brown Ditch Section #3

The third major reach of the ditch is 7,700 feet with approximately 3,000 feet going through downtown Murray where there no turnouts. Most of the turnouts in this reach which receive water are west of State Street in the last 2,800 feet. This section has 47 shares and should receive 94 acre-feet, but again does not due to losses in the previous sections of the ditch. In this section of the ditch, 4,700 feet is 20-inch or 24-inch concrete pipe, 900 feet is 20-inch or 24-inch corrugated pipe, and 2,000 is 20-inch poly pipe. This section has a loss of 11 acre-feet with the same mechanism as Sections #1 and #2. There is very little water that currently reaches the end of the system.

The estimated losses are the result of measurements and observations with respect to the four sections described above. The water savings calculations are included in Appendix C.

Project Types

Please address the following questions according to the type of infrastructure improvement you are proposing for funding.

(1) ***Canal Lining / Piping:*** *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.

b. How have average annual canal seepage losses been determined

The ditch was divided into three distinct sections where the flows were available. See Table 4 for the configuration of the types of materials currently in use with the ditch and the division into three sections. The loss through each section was distributed through the combination of open ditch and corroded corrugated pipes by using the combined length. The losses in these materials is high due to direct seepage into the ground. Even though there may be some losses through the joints of the concrete pipe sections, no loss from concrete pipe was assumed for the values used in Table 6 above.

In addition to the ditch, the LC Brown Ditch Diversion is part of the project. As seen in Table 6, the losses as a result of the current condition of the diversion dam is the major portion of the losses associated with the project. If the diversion dam were working properly the losses in the ditch would be higher. The ditch losses are currently reduced because the diversion dam is not able to divert the water into the ditch.

The calculations for water lost are shown in Appendix C – Water Savings Calculations.

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)?

d. Include a detailed description of the materials being used.

The plan is for the complete ditch to be piped using materials that allow for pressurizing the system. The only losses while using this configuration should be operation losses as valves are opened for cleaning or draining the system.

Once the final design of the system is undertaken, a cost comparison will be done to determine the most cost-effective material for the direct piping or insertion into the existing concrete pipe. The materials to be evaluated include HDPE (high density polyethylene pipe), cured-in-place pipe (CIPP), fusible PVC (poly vinyl chloride), and geopolymer mortar (spray application). Each of these materials is certified and intended to be used in pressurized situations and therefore have no leaks.

e. 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 calculated losses for seepage are (156+353+11) = 520 acre-feet, divided by (19,800/5280) = 3.75 miles. Reduction per mile is 139 acre-feet/mile/year.

f. How will actual canal loss seepage reductions be verified?

Once the system has been piped and the measurement devices installed, an account of the water in and the water out will be available. This will be accomplished because of the meters to be installed with the project. This information will be used as defined in the Water Conservation Plan to appropriately encourage conservation. A specific discussion is given in the Performance Measures Section.

(2) ***Municipal Metering:*** *Municipal metering projects can provide water savings when individual user meters are installed where none exist to allow for unit or tiered pricing and when new meters are installed within a distribution system to assist with leakage reduction.*

The project plan envisions main line meters to identify flows as a major point with the system. The plan also calls for individual meters to each shareholder. The combination of these two actions will allow accounting of water in and out of the system resulting in better management. The individual meters will allow for water charges based on usage.

(3) ***Irrigation Flow Measurement:*** *Irrigation flow measurement improvements can provide water savings when improved measurement accuracy results in reduced spills and over-deliveries to irrigators.*

In addition to meters for the individual connections, meters will be installed to account for overall water use and efficiency of the system. Meters will be read and use will be determined. Water conservation will be emphasized.

(4) ***Turf Removal:*** *Applicants proposing turf removal projects should address the following:*

This project does not anticipate any turf removal. The questions in this section are not applicable.

(5) ***Smart Irrigation Controllers and High-Efficiency Nozzles:*** *Applicants proposing smart controller or high-efficiency nozzle projects should address the following:*

This project does anticipate any smart irrigation controllers or high-efficiency nozzles. The questions in this section are not applicable.

a. *How will actual water savings be verified upon completion of the project?*

With the completion of the project, measurement devices and meters will be able to determine the usage of water and account for the water. Implementation of the Water Conservation Plan will occur. See the Performance Measures Section for further detail.

Evaluation Criterion B: Water Supply Reliability

Up to 18 points may be awarded under this criterion. This criterion prioritizes projects that address water reliability concerns, including making water available for multiple beneficial uses and resolving water related conflicts in the region.

Please address how the project will increase water supply reliability. Proposals that will address more significant water supply shortfalls benefitting multiple sectors and multiple water users, will be prioritized. General water supply reliability benefits (e.g., proposals that will increase resiliency to drought) will also be considered. Please provide sufficient explanation of the project benefits and their significance. These benefits may include, but are not limited to, the following:

- *Does the project promote and encourage collaboration among parties in a way that helps increase the reliability of the water supply?*
  - *Is there widespread support for the project?*
  - *What is the significance of the collaboration/support?*
  - *Is the possibility of future water conservation improvements by other water users enhanced by completion of this project?*

Due to the losses described earlier, the shareholders of the company typically use culinary water to make up the difference. With the project, this practice should be eliminated. In addition, it is anticipated that the conserved water will allow additional residents to convert from culinary water. While details are not finalized, the conserved water will be made available to water parks and recreational areas which now use culinary grade water.

The ditch, while originally an irrigation project, is now in an urban environment. As Murray City has developed, the ditch has been encroached upon by subdivision and commercial developments. Consequently, many people do not even know the ditch exists and the potential benefit to them, even indirectly, as it would benefit the city's future water resources.

The city spends tens of thousand dollars a month to pump groundwater to provide water for parks and recreation areas.

A major shareholder is a Salt Lake County operated golf course. Water from the company provides the water for the course. They are very supportive of the project due to protecting their water supply, which is critical to the future of the course. The county is spending $1.6 million to improve the efficiency of their irrigation system. This shareholder is the Salt Lake County Parks and Recreation Department. They are upgrading the irrigation system for the Mick Riley Golf Course.

When the shareholders are limited due to losses in the system, they have to rely on water from the Murray City culinary system. Thus, the result of the project will be a decrease in demand on the culinary system. Consequently, this would be a benefit to the city as the groundwater resource is preserved for the future.

- *Will the project make water available to address a specific water reliability concern? Please address:*
  - *Explain and provide detail of the specific issue(s) in the area that is impacting water reliability, such as shortages due to drought, increased demand, or reduced deliveries.*
  - *Describe where the conserved water will go/how it will be used. Will the project directly address a heightened competition for finite water supplies and over-allocation (e.g., population growth)? Will it be left in the river system?*
  - *Describe how the project will address the water reliability concern.*
  - *Will the project help to prevent a water-related crisis or conflict? Is there frequently tension or litigation over water in the basin?*
  - *Provide a description of the mechanism that will be used, if necessary, to put the conserved water to the intended use.*
  - *Describe the roles of any partners in the process. Please attach any relevant supporting documents.*
  - *Indicate the quantity of conserved water that will be used for the intended purpose.*

The Little Cottonwood Creek is under the Morse decree of 1910. It is understandable that the water supply today is not the same as it was in 1910 due to growth and urban development. The water is not used directly for agriculture as it was then, but the water from the Brown Ditch is beneficially used for irrigation of lawns, gardens, and turf areas at parks, including the 100-acre Mick Riley Golf Course owned by Salt Lake County Parks and Recreation. There are currently 563 shares receiving water from the system.

Based on current information and analysis, the annual demand for water is 2,900 acre-feet as compared with 4,000 acre-feet in 1910. This reduction is due to the urbanization which has occurred. However, the actual water currently being delivered is severely limited by the inefficiencies of the delivery system. The residents (stockholders) make up the difference by using (purchasing) water from Murray City. The project will conserve the water necessary to allow the stockholders to use the water that is diverted from Little Cottonwood Creek without having to supplement from groundwater reserves.

With the project, it is also anticipated that additional parks (~82 acres = 410 acre-feet) could be irrigated with the conserved water. There are also additional residential areas who would be able to use water, if water were available through the conservation and management project. Once the

project is in place, the LCBDC plans on expanding delivery to residential areas which also preserve groundwater for the future by using the surface water; i.e. compatible water quality considerations.

The conversion of surface water from Murray City's groundwater for both residential areas and parks would be both a conservation of groundwater for future growth and conservation of energy due to decreased pumping of the groundwater. (The additional demand would be 1,800 acre-feet and could be met by the conserved water from the project.)

While not a typical "on-farm" improvement and definitely not with NRCS assistance, a significant shareholder using water from the LCBDC is spending $1.6 million to improve the efficiency of their irrigation system. This shareholder is the Salt Lake County Parks and Recreation Department. They are upgrading the irrigation system for the Mick Riley Golf Course.

- *Will the project benefit Indian tribes?*

The project will not benefit any native American tribes.

- *Will the project benefit rural or economically disadvantaged communities?*

The project will not benefit any rural or economically disadvantage communities.

- *Will the project benefit species (e.g., federally threatened or endangered, a federally recognized candidate species, a state listed species, or a species of particular recreational, or economic importance)? Please describe the relationship of the species to the water supply, and whether the species is adversely affected by a Reclamation project.*

Due to the existing urban environment, the project will not benefit any federal threatened or endangered species. The IPaC system of the U.S. Fish and Wildlife Service indicates that there are none in the area.

Will the project address water supply reliability in other ways not described above?

By efficiently using surface water instead of groundwater, the long-term reliability of the groundwater will be extended. This is particularly valid when you consider the water quality parameters of culinary water versus quality needed for lawns and gardens.

Evaluation Criterion C: Implementing Hydropower

Up to 18 points may be awarded for this criterion. This criterion prioritizes projects that will install new hydropower capacity in order to utilize our natural resources to ensure energy is available to meet our security and economic needs.

Not applicable as no hydropower development is proposed.

However, while the project does not develop a hydropower component, the project does benefit the energy system by conserving energy by reducing the amount of pumping necessary for shareholders to use the water. The current usage of energy is estimated at 1,717 kwh for the

irrigation season per connection. The total amount conserved on a yearly basis is a net of 42,000 kwh. With the implementation of the pressurized system, this energy will be available for other uses by Murray City. This is equivalent to developing a like amount of energy through other sources.

Conserving energy is just like conserving water in that it makes more energy available and usually conserving is more efficient than creating new energy.

Evaluation Criterion D: Complementing Future On-Farm Irrigation Improvements

Up to 10 points may be awarded for projects that describe in detail how they will ***complement on-farm irrigation improvements*** *eligible for NRCS financial or technical assistance.*

Not applicable.

While not a typical "on-farm" improvement and definitely not with NRCS assistance, a significant shareholder using water from the LCBDC is spending $1.6 million to improve the efficiency of their irrigation system. This shareholder is the Salt Lake County Parks and Recreation Department and they are upgrading the irrigation system for the Mick Riley Golf Course.

Evaluation Criterion E: Department of the Interior Priorities

Up to 10 points may be awarded based on the extent that the proposal demonstrates that the project supports the Department of the Interior priorities. Please address those priorities that are applicable to your project. It is not necessary to address priorities that are not applicable to your project. A project will not necessarily receive more points simply because multiple priorities are addressed. Points will be allocated based on the degree to which the project supports one or more of the priorities listed, and whether the connection to the priority(ies) is well supported in the proposal.

1. *Creating a conservation stewardship legacy second only to Teddy Roosevelt*
   a. *Utilize science to identify best practices to manage land and water resources and adapt to changes in the environment;*
   b. *Review DOI water storage, transportation, and distribution systems to identify opportunities to resolve conflicts and expand capacity;*

The ditch as displayed in Table 4 is a combination of various materials, pipe configurations, and open ditch. This project will modernize the ditch by creating a pressure system that will save both water and energy. The utilization of both surface and groundwater is a current management practice which allows for the use of water to match appropriate water quality considerations. High quality groundwater is used in indoor culinary use. Untreated surface water is used for lawns, gardens, and recreational turf areas.

The ditch will be easier to maintain and operate. Leakage reduction will eliminate water problems in streets and other areas. The conserved water will be used to reduce the need for culinary water for

outdoor use on lawns and gardens. This is a great benefit to conserve the groundwater resource for future use.

2. *Utilizing our natural resources*
    a. *Ensure American Energy is available to meet our security and economic needs;*

This project will conserve 68,700 kwh of energy. This is accomplished by replacing the current users pumping at each user with pressurized water; thus, eliminating the need for their pumping. The net savings in energy is 42,000 kwh.

3. *Restoring trust with local communities*
    a. *Be a better neighbor with those closest to our resources by improving dialogue and relationships with persons and entities bordering our lands;*
    b. *Expand the lines of communication with Governors, state natural resource offices, Fish and Wildlife offices, water authorities, county commissioners, Tribes, and local communities.*
4. *Modernizing our infrastructure*
    a. *Support the White House Public/Private Partnership Initiative to modernize U.S. infrastructure;*
    b. *Remove impediments to infrastructure development and facilitate private sector efforts to construct infrastructure projects serving American needs;*
    c. *Prioritize DOI infrastructure needs to highlight:*
        1. *Construction of infrastructure;*
        2. *Cyclical maintenance;*
        3. *Deferred maintenance.*

The ditch as seen in Table 4 is a combination of various materials, pipe configuration, and open ditch. The project modernizes the ditch by creating a pressure system with will save both water and energy. The ditch will be easier to maintain and operate. Leakage reduction will eliminate water problems in streets and other areas. The conserved water will be used to reduce the need for culinary water for outdoor use on lawns and gardens. This is a great benefit to conserve the groundwater resource for future use.

Evaluation Criterion F: Implementation and Results

Up to 6 points may be awarded for these subcriteria.

Subcriterion No. F.1 – Project Planning

Points may be awarded for proposals with planning efforts that provide support for the proposed project.

Does the applicant have a Water Conservation Plan and/or System Optimization Review (SOR) in place? *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, Drought Contingency Plan or other planning efforts done to determine the priority of this project in relation to other potential projects.

(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 LCBDC has a Water Conservation Plan. These plans are also required as part of the process for a loan from the Utah Division of Water Resources. The implementation of the project is part of the plan. Metering of use is also part of the plan.

The Utah State Water Plan encourages metering and the Utah Division of Water Resources provides low interest loans for the installation of meters.

Subcriterion No. F.2 – Performance Measures

Points may be awarded based on the description and development of performance measures to quantify actual project benefits upon completion of the project.

The goal of the project is to meet the needs of the shareholders by diverting the water from Little Cottonwood Creek according to the water right for the LCBDC. The secondary goal is to deliver that same amount of water to the individual shareholders without loss due to leakage of the system. The evaluation of performance for these two goals will be accomplished using meters to measure flows and account for the volume of water used.

The performance of the LC Brown Ditch Diversion will involve reading the meter installed at the beginning of the LC Brown Ditch. The data record developed will document the amount of water being diverted. If the LC Brown Ditch Pipeline is full, the water will spill back to Little Cottonwood Creek. If the water from the LC Brown Ditch Pipeline is being used, the meter readings will document the amount of water going into the system. The individual meters will document where the water is being used. The total of the individual meters should equal the meter reading at the LC Brown Ditch Diversion. The in/out accounting will be over a period of several hours as the pipeline is pressurized and therefore when full will act as a short-term reservoir. The volume of water diverted in a day, for example, should equal the volume of water used at the individual meters in the same period. Thus, the instantaneous flow will be averaged over a period to calculate the volume for that period. This calculation process will occur on both the input side and output side of the equation.

If the calculation shows more water is being diverted into the pipeline than is being used, then there is a leak or loss to the system. If this situation occurs, the LCBDC will be able to identify where the loss is occurring and take the necessary steps to solve the loss. The project will have several meters on the main line to help isolate the reach where the loss is occurring.

Periodic reports summarizing the data from the meters will be used by the company to efficiently manage the water within the system.

While the total benefit of the water management / meters will not occur until the pipeline is in place, there will be immediate benefits once the LC Brown Ditch Diversion Dam is complete. The meter will accurately identify the amount of "wet" water available to the company. This information will be useful in designing and sizing the pipeline features. The availability of water will determine the number of connections may be appropriate to add to the system to use the water that is being presently lost. The availability of water will also assist in a process to use the water on Murray City parks.

The conserved energy estimate will occur directly as there will be no ditch to pump from. The shareholders will be connected to the pipeline, so the energy they were using to pump will be conserved.

Evaluation Criterion G: Nexus to Reclamation Project Activities

Up to 4 points may be awarded if the proposed project is in a basin with connections to Reclamation project activities. No points will be awarded for proposals without connection to a Reclamation project or Reclamation activity.

- *Is the proposed project connected to Reclamation project activities?*
  - *Does the applicant receive Reclamation project water?*
  - *Is the project on Reclamation project lands or involving Reclamation facilities?*
  - *Is the project in the same basin as a Reclamation project or activity?*
  - *Will the proposed work contribute water to a basin where a Reclamation project is located?*

The LCBDC is not directly connected to a Reclamation project, does not receive Reclamation project water, does not serve any Reclamation project lands, and is not involved with Reclamation facilities.

The LCBDC is in the Salt Lake Valley east of the Jordan River. Thus, the project is in the same basin as water supplies are delivered for the Provo River Project and the Bonneville Unit of the Central Utah Project. The efficient use of surface water from Little Cottonwood Creek will help reduce the need for water from the two Reclamation projects which serve municipal and industrial purposes in the valley.

Murray City which supplies the energy is a preference customer of the Colorado River Storage Project.

- *Will the project benefit any tribe(s)?*

This project has no direct connection to any native American tribes.

Evaluation Criterion H: Additional Non-Federal Funding

Up to 4 points may be awarded to proposals that provide non-Federal funding in excess of 50 percent of the project costs. State the percentage of non-Federal funding provided using the following calculation:

$$\frac{\textit{Non-Federal Funding}}{\textit{Total Project Cost}} = \frac{\$ \quad 1{,}526{,}300}{\$ \quad 2{,}526{,}300} = \mathbf{60.4\%}$$

Project Budget

Funding Plan and Letters of Commitment

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

The funding plan must include all Project costs, as follows:

- *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 LCBDC intends to use a combination of funding sources to construct the project. In addition to the USBR grant, the company intends to obtain two different loans from the Utah Division of Water Resources. The first loan is from the C&D fund. This fund provides for low interest loans and requires a 15% cost-share component. The State of Utah also has a specific funding program to encourage the installation of meters, which also has a cost-share of 15%. This program has an even lower interest rate (please see the support letter from the Utah Division of Water Resources in Appendix A). The company is also planning on charging a connection fee from shareholders to hook on to the system. The benefit being they get a dependable water supply and can eliminate the pumping they now have to do from the ditch. In addition, the LCBDC will utilize their time to provide in-kind contributions. The assessment per share holder will be adjusted to cover the repayment of the loans. The funding and connection fees will be used by LCBDC to cover their cost share of the Utah State loans.

- *Describe any costs incurred before the anticipated Project start date that you seek to include as project costs. For each cost, identify:*
  - *The project expenditure and amount*
  - *The date of cost incurrence*
  - *How the expenditure benefits the Project*
  - *Provide the identity and amount of funding to be provided by funding partners*

The company does not expect any major expenses until being notified of an award from the USBR. There may be some minor expenses in continuing the planning of the project and in coordinating with project stakeholders in anticipation of the project.

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

The LCBDC does not intend to use any other Federal funds besides the proposed grant from USBR.

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

The applications for proposed loans from the Utah Division of Water Resources will be made when the notice of award is made. See the letter of support from the Utah Division of Water Resources in Appendix A. We do not anticipate any problems obtaining these loans. However, the Division does not want a lot of loans on their books until the matching funds are secured.

The connection fees will be obtained at the time of project implementation. In addition to the connection fees, shareholders will pay assessments to meet the terms of the loans.

Please include the following chart to summarize all funding sources. Denote in-kind contributions with an asterisk (*).

Table 7: Summary of Non-Federal and Federal Funding Sources

FUNDING SOURCES	AMOUNT
Non-Federal Entities	
1. Board of Water Resources Loan (C&D fund)	$1,126,300
2. Board of Water Resource Loan (meter fund)	$400,000
Non-Federal Subtotal	**$1,526,300**
Other Federal Entities	
1. none	$0
Other Federal Subtotal	**$0**
REQUESTED RECLAMATION FUNDING	**$1,000,000**

Budget Proposal

*The budget proposal shall include detailed information on the categories listed below and must clearly identify **all** Project costs, including those that will be contributed as non-Federal cost share. Unit costs must be provided for all budget items including the cost of work to be provided by contractors. The budget proposal should also include any in-kind contributions or donations of goods and services that will be provided to complete the project. It is strongly advised that applicants use the budget proposal format shown below or a similar format that provides this information. If selected for award, successful applicants must submit detailed supporting documentation for all budgeted costs.*

The plan is to have an engineering firm prepare plans and specifications for the various features of the project as described above. Several different construction contracts are anticipated to accomplish the work. These will be issued after all necessary permits and NEPA compliance is

completed. Contractors will perform the work with Construction Management being performed by the engineering firm who designed the project.

The project costs are summarized in Table 8. The table includes a Reclamation Reporting line which represents quarterly reports over 2½ years or 10 reports.

Any effort expended by the company will be used as a cost-share on the Utah Division of Water Resources Loan (C&D Fund) which are shown in Table 7. These loans require a 15% cost-share by the company.

Table 8: Budget Proposal

BUDGET ITEM DESCRIPTION	COMPUTATION		QUANTITY TYPE	TOTAL COST
	$/Unit	Quantity		
Legal Services	$200/hr	150	Hours	$30,000
Environmental Services	$140/hr	500	Hours	$70,000
Engineering Services	See Appendix D			$164,200
Construction Management	See Appendix D			$137,600
Construction Contracts	See Appendix E			$2,094,500,
Reclamation Reporting	$100/hr	300	Hours	$30,000
TOTAL ESTIMATED PROJECT COSTS				**$2,526,300**

Budget Narrative

Submission of a budget narrative is mandatory. An award will not be made to any applicant who fails to fully disclose this information. The budget narrative provides a discussion of, or explanation for, items included in the budget proposal. If in-kind contributions or donations of goods and services are included in the budget proposal, the narrative should identify the source(s) and describe how the value of the goods and services was determined. The types of information to describe in the narrative include, but are not limited to, those listed in the following subsections. Costs, including the valuation of in-kind contributions and donations, must comply with the applicable cost principles contained in 2 CFR Part §200, available at the Electronic Code of Federal Regulations (www.ecfr.gov).

LCBDC employees will not earn salary, wages, fringe benefits, or reimbursements from the Federal funding obtained to implement this project. All funding secured from Reclamation will be used to pay contractual agreements to implement the project including the construction contracts and fee for engineering services, environmental services, and cultural compliance.

The contributions of company employees will serve as in-kind to the Water Resources loans. The funding secured from the State of Utah and Reclamation will be used to pay contractual agreements for environmental services, legal services, engineering services, report activities to meet Reclamation requirements, and construction implementation contracts.

Table 8 summarizes the cost components of the project.

Contractual

Identify all work that will be accomplished by subrecipients, consultants, or contractors, including a breakdown of all tasks to be completed, and a detailed budget estimate of time, rates, supplies, and materials that will be required for each task. Identify how the budgeted costs for sub-recipients, consultants, or contractors were determined to be fair and reasonable.

See Table 8 for the Budget Proposal. Costs are estimated at $2,526,300 as detailed in Appendix E.

As seen in the table these services include contracts for legal assistance, environmental analysis, cultural resources evaluation, design services, construction management services, and several construction contracts. Detailed tasks to be completed, labor hours, and rates for each contractual task are outlined in the appendices as follows:

Appendix D – Probable Cost for Engineering Services
Appendix E – Probable Cost for Construction Services
Appendix F – Probable Cost for Environmental Services

There will be contracts for the purchase of the radial gates, for the construction of the diversion dam structure and installation of the radial gates. It is anticipated that due to the length of the system to be rehabilitated, the different types of work, and the requirements due to seasonal restrictions, there will be several separate contracts awarded for the pipeline work.

The LCBDC anticipates two loans from the Utah Board of Water Resources. The first is a low interest loan designed to encourage water users to install meters. This loan will be used for the meters. The other Utah loan would be for the remaining cost of the project after the Reclamation grant and Utah meter loan. The loans from Utah Water Resources require a 15% cost share component. The company will use assessments and connection fees to meet this requirement.

Environmental and Regulatory Compliance Costs

Applicants must include a line item in their budget to cover environmental compliance costs. "Environmental compliance costs" refer to costs incurred by Reclamation and the recipient in complying with environmental regulations applicable to an award under this FOA, including costs associated with any required documentation of environmental compliance, analyses, permits, or approvals. Applicable Federal environmental laws could include National Environmental Policy Act (NEPA), Endangered Species Act (ESA), National Historic Preservation Act (NHPA), Clean Water Act (CWA), and other regulations depending on the project. Such costs may include, but are not limited to:

- *The cost incurred by Reclamation to determine the level of environmental compliance required for the project*
- *The cost incurred by Reclamation, the recipient, or a consultant to prepare any necessary environmental compliance documents or reports*

- *The cost incurred by Reclamation to review any environmental compliance documents prepared by a consultant*
- *The cost incurred by the recipient in acquiring any required approvals or permits, or in implementing any required mitigation measures*

The amount of the line item should be based on the actual expected environmental compliance costs for the project, including Reclamation's cost to review environmental compliance documentation. How environmental compliance activities will be performed (e.g., by Reclamation, the applicant, or a consultant) and how the environmental compliance funds will be spent, will be determined pursuant to subsequent agreement between Reclamation and the applicant. The amount of funding required for Reclamation to conduct any environmental compliance activities, including Reclamation's cost to review environmental compliance documentation, will be withheld from the Federal award amount and placed in an environmental compliance account to cover such costs. If any portion of the funds budgeted for environmental compliance is not required for compliance activities, such funds may be reallocated to the project, if appropriate.

The summary of the Probable Cost for Environmental Services is given in Appendix F. This budget for a Environmental Assessment is a little higher than we normally budget; i.e., $70,000. The reason for this is that extra time to involve public meetings to inform the citizens of the propose project has been added. A contract for cultural resources work is planned. Due to the urban environment, we do not anticipate extensive wildlife or fisheries or wetlands work.

Total Costs

Indicate total amount of project costs, including the Federal and non-Federal cost-share amounts.

The total project cost is $2,526,300. This cost is summarized in Table 7.

Environmental and Cultural Resources Compliance

To allow Reclamation to assess the probable environmental and cultural resources impacts and costs associated with each application, all applicants must respond to the following list of questions focusing on the NEPA, ESA, and NHPA requirements. Please answer the following questions to the best of your knowledge. If any question is not applicable to the project, please explain why. The application should include answers to:

- *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.*

The project work will consist of activities on previously disturbed areas; i.e. city streets, backyards of subdivisions, etc. The replacement of the diversion dam is also in a previously disturbed area.

However, before work is undertaken, a "Stream Alteration" permit is required by the Utah Division of Water Rights. See the permits section for further detail.

Because federal money is involved, a document meeting the requirements of the Environmental Protection Act (NEPA) is required prior to beginning construction. The LCBDC through its engineering consultant will coordinate with the USBR to meet this requirement. A preliminary check of the National Register of Historic Places, the National Wetlands Inventory, and IPaC (US Fish & Wildlife) show no apparent issues. It anticipated that an Environmental Assessment with a categorical conclusion will meet the requirements of NEPA.

- *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?*

A check of the IPaC service provided by the US Fish and Wildlife Service indicates there are no threatened or endangered species. The project area is an urban environment.

- *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.*

No wetland issues. See permits for discussion of the Stream Alteration process.

- *When was the water delivery system constructed?*
- *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 to those features completed previously.*

The LC Brown Ditch began diverting water in 1867. However, the ditch ad related facilities have been continuously modified as Murray City has developed and been urbanized.

- *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.*
- *Are there any known archeological sites in the proposed project area?*
- *Will the proposed project have a disproportionately high and 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?*
- *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?*

Not Applicable.

Required Permits or Approvals

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

In order to meet the requirements of Section 404 of the Clean Water Act, a Stream Alteration Permit from the Utah Division of Water Rights will be obtained before any work is done in Little Cottonwood Creek. The State of Utah has a reciprocal agreement with the US Army Corps of Engineers to serve as a clearing house for applications within the State. The State coordinates with the Corps on sensitive applications and projects. The permit application will be prepared and submitted to the State. The State, after review and approval, issues an Order of the State Engineer with approval and conditions which must be met during the project.

A Storm Water Pollution Prevention Plan (SWPPP) is required on all projects which disturb soil during the project. The various contracts which are anticipated on the project will require the contractor to obtain and implement a SWPPP permit from the State.

The project involves installing pipe in Murray City streets. The LCBDC will coordinate with Murray City during the design process to obtain the necessary clearances and permits. It is anticipated that several provisions during the design process will require the involvement of Murray City and related utilities. This will include such items as traffic control, boring under 900 East Street, and related stormwater coordination points along the existing ditch.

Letters of Support

Please include letters from interested stakeholders supporting the proposed project. To ensure your proposal is accurately reviewed, please attach all letters of support/partnership letters as an appendix.

Letters of Support are included in Appendix A.

Salt Lake County Department of Parks and Recreation

Utah Division of Water Resources

Official Resolution

Include an official resolution adopted by the applicant's board of directors or governing body, or for State government entities, an official authorized to commit the applicant to the financial and legal obligations associated with receipt of a financial assistance award under this FOA, verifying:

- *The identity of the official with legal authority to enter into an agreement*
- *The board of directors, governing body, or appropriate official who has reviewed and supports the application submitted*
- *The capability of the applicant to provide the amount of funding and/or in-kind contributions specified in the funding plan*
- *That the applicant will work with Reclamation to meet established deadlines for entering into a grant or cooperative agreement*

The signed Official Resolution is shown in Appendix B.

Unique Entity Identifier and System for Award Management

The Little Cottonwood Brown Ditch Company has registered for SAM registration. The USERNAME is LCBrownDC. The application has been made for the GAGE code. As soon as the GAGE number is identified, the SAM process will be completed with the results forwarded to Reclamation. The DUNS number 09-637-4579.

The company will maintain an active registration throughout the duration of the project.

Appendix A

Letters of Support

(not counted in page limitations)

SALT LAKE COUNTY
PARKS & RECREATION

April 25, 2018

Karl Moody, President
Little Cottonwood Brown Ditch Company
501 East Vine Street
Murray, UT 84107

Re: WaterSMART: Water & Energy Efficiency Grants for FY 2018
Little Cottonwood Brown Ditch Co. – System Improvements

BEN McADAMS
Salt Lake County
Mayor

Holly Yocom
Community Services
Department Director

PARKS & RECREATION
DIVISION

Martin Jensen
Division Director

Salt Lake County
Government Center
2001 South State Street
Suite S4 700
Salt Lake City UT 84114

385 / 468-1800
385 / 468-1799 fax

Dear Mr. Moody:

The Salt Lake County Parks and Recreation Division oversees the operation of the Mick Riley Golf Course in Murray, Utah. We receive water for the course from the Little Cottonwood Brown Ditch. This water from the ditch is critical to our continued operation.

By having the surface flow from Little Cottonwood Creek, we do not have to rely on groundwater. Thus, the groundwater can be conserved for future use by the surrounding city. Consequently, the improvement of the ditch system will benefit the golf course and our operations. The water conservation proposed by the project should increase our water supply over its current availability.

While not part of the Brown Ditch project, the golf course is modernizing our irrigation system by installing automated controllers, new pipes, heads and valves, improving our irrigation efficiency. It is encouraging to us that the company is looking forward and helping to improve the water reliability of our water supply. This complements our efforts to update our system and conserve our water supply for the operation of the course. We are appreciative of the cooperative approach the company is taking on the project.

We would strongly support the Bureau of Reclamation help to advance this project through the WaterSMART program. I can be reached at 1-385-468-1821 if you have any questions.

Thank you,

Walt Gilmore, PLA
Associate Division Director

cc: Maryann Christensen, Secretary
Little Cottonwood Brown Ditch Company
583 East Benbow Street
Murray, UT 84107

GARY R. HERBERT
Governor
SPENCER J. COX
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES
MICHAEL R. STYLER
Executive Director
Division of Water Resources
ERIC L. MILLIS
Division Director

April 9, 2018

Maryann Christensen, Secretary
Little Cottonwood Brown Ditch Company
583 Benbow Drive
Murray, UT 84107

RE: **WaterSMART: Water & Energy Efficiency Grants for FY 2018**
Little Cottonwood Brown Ditch Co. – System Improvements and Secondary Metering Project

Ms. Christensen:

The Utah State Division of Water Resources understands that Little Cottonwood Brown Ditch Company is seeking federal funds to replace an existing open-ditch secondary system project in and around Murray City with a fully pressured irrigation system, including meters on all connections, through the Bureau of Reclamation's WaterSMART grant program.

As an agency, our mission is to plan, conserve, develop, and protect Utah's water resources. Replacing old and inefficient secondary irrigation delivery systems with pressurized pipeline and customer meters fits into this mission perfectly. This project will conserve water and greatly improve the overall management of this important resource, and will help the state improve its water use estimates in the highly-urbanized Salt Lake Valley. We have set up funds to help water providers construct these types of projects through low interest loans.

We therefore recommend that the Bureau of Reclamation helps to fund this project to help ensure its success. Please do not hesitate to call me at 801-538-7277 if you have any questions.

Respectfully,

Todd Stonely

Todd Stonely, P.E.
Project Funding Manager

1594 West North Temple, Suite 310, PO Box 146201, Salt Lake City, UT 84114-6201
telephone (801) 538-7230 • facsimile (801) 538-7279 • TTY (801) 538-7458 • *www.water.utah.gov*

Appendix B

Signed Official Resolution

(not counted in page limitations)

OFFICIAL RESOLUTION
OF THE
Little Cottonwood Brown Ditch Company - Approving an Application for Funding through the *WaterSMART Water and Energy Efficiency Grants*

RESOLUTION NO. 2018-1

WHEREAS, the United States Department of the Interior, Bureau of Reclamation has announced the *WaterSMART Water and Energy Efficiency Grants* (the "**Grant**") in order to prevent water supply crises and ease conflict in the western United States, and has requested proposals from eligible entities to be included in the WaterSMART Program, and

WHEREAS, the Little Cottonwood Brown Ditch Company has need for funding to complete a secondary project that will rehabilitate a diversion dam, enclose LC Brown Ditch, install meters, and connect the secondary water system between subdivisions. The project is intended to conserve water, promote collaboration, efficiently deliver water to shareholders, and create better water management practices.

NOW, THEREFORE, BE IT RESOLVED that the Little Cottonwood Brown Ditch Company Board of Directors resolves, agrees, and authorizes as follows:

1. The Little Cottonwood Brown Ditch Company Board of Directors has reviewed and supports the application for the Grant to be submitted;

2. The Little Cottonwood Brown Ditch Company, as the applicant, is capable of providing the amount of funding and/or in-kind contributions, specified in the funding plan; and

3. If selected for a WaterSMART Grant, the Little Cottonwood Brown Ditch Company, as the applicant, will work with the Bureau of Reclamation to meet established deadlines for entering into a grant or cooperative agreement; and

4. That the Company and its Officers, Directors, consultants, engineers, and attorneys may take actions necessary to pursue and qualify for the funding through the Grant; and

5. This Resolution shall take effect immediately upon passage.

DATED: May 7, 2018

Karl Moody, President
Little Cottonwood Brown Ditch Company

ATTEST:

Maryann Christensen
Secretary

Appendix C

Water Savings Calculations

Water Savings Calculations

This appendix summarizes the specific calculations that are described in the support/documentation of Water Savings earlier in the application. Please see the earlier section for the written discussion. The losses given in Table 6 are summarized below.

LC Brown Ditch Diversion Dam

As described in the water supply section, the amount of water available in Little Cottonwood Creek at the diversion point is based on three components depending on the time of year. These are direct flows, water from two canals for exchange purposes, and return flows from the same two canals. In summary, there is always water in the creek available for diversion into the LC Brown Ditch. However, because of the diversion dam condition, the company is not able to divert their water right into the ditch.

Water Right*	= 2,900 acre-feet
minus Measured flow (av.)	= 1,400 acre-feet
Lost Water	1,500 acre-feet

* The Morse Decree amount was for 4,000 acre-feet but urbanization has reduced the demand.

If the diversion were able to divert the appropriate flow, the losses in the ditch would be higher. However, the losses in the ditch are calculated based on the flow of 1,400 acre-feet.

The losses were calculated based on the length of corrugated pipe and open ditch in each section. Table 4 gives the length of corrugated pipe and open ditch in each section. This is a result of the condition of the corrugated pipe. See Photographs E, F, G, and H for a picture of the corrugated pipe. As can been seen from the photographs, the bottom of the pipe is almost non-existent. This pipe was installed with gravel bedding. Thus, the water seeps directly into the gravel and is lost to the users.

A loss rate of 50% per foot was used for the rusted corrugated pipe and open ditch. The loss per section was calculated by multiplying the loss rate times the length of open ditch times the water at the beginning of that section.

Summary of calculations

	Loss Rate	Length (feet)		Volume	Loss
		Open Ditch	Corr. Pipe	at beg. of section	
Section #1	0.5	1,000	400	1,400	156
Section #2	0.5	700	2,700	1,244	353
Section #3	0.5	0	900	45	11

Appendix D

Probable Cost for Engineering Services

(Engineering Design and Construction Management)

Little Cottonwood Brown Ditch Rehabilation Project

Probable Cost Opinion for Engineering Services

(Rate Table Attached)

Task Description	Hours By Personnel Category							Total Hours	Total Labor Charges	Other Direct Costs	Total Fee
	1	2	3	4	7	14	15				
	Principal	Project Manager	Senior Engineer	Staff Engineer	Designer	Office Assistant	Clerk				
Phase 1 - Project Management & Coordination											
Task 1. General Project Management Tasks	6	30	8	8		4		56	$7,444	$0	$7,444
Task 2. Coordination with Reclamation		24	8			2		34	$4,600	$0	$4,600
SUBTOTAL	6	54	16	8	0	6	0	90	$12,044	$0	$12,000
Phase 2 - Engineering Design											
Task 1. Design Team Management	8	40	20					68	$9,620	$0	$9,620
Task 2. Coordination with Residents/ Murray		100	60	20	10	8	8	206	$26,030	$0	$26,030
Task 3. Construction Drawings Draft		80	60	120	160			420	$47,900	$0	$47,900
Task 4. Construction Drawings Final	2	20	20	60	100			202	$22,110	$140	$22,250
Task 5. Construction Specifications	2	16	80	110		8	8	224	$25,410	$100	$25,510
Task 6. Bid & Award Coordination	4	30	40	80		30	8	192	$20,850	$20	$20,870
SUBTOTAL	16	286	280	390	270	46	24	1,312	$151,920	$260	$152,200
Phase 3 - Construction Management											
Task 1. Construction Team Management	6	40						46	$6,790	$0	$6,790
Task 2. On-Site Observation and Documentation		20	32	860				912	$99,780	$2,500	$102,280
Task 3. Submittal Reviews		10	20	6		4		40	$4,838	$100	$4,938
Task 4. Contractor Coordination	4	30	40	20				94	$12,170	$0	$12,170
Task 5. Record Drawings Preparation		8	4	16	30			58	$6,358	$60	$6,418
Task 6. Project Closeout	2	20	10			8		40	$4,960	$50	$5,010
SUBTOTAL	12	128	106	902	30	12	0	1,190	$134,896	$2,710	$137,600
Project Totals	34	468	402	1300	300	64	24	2,592	$298,860	$2,970	$301,800

Personnel Rates
(Calendar Year - 2018)

	Classification	Rate
1	Principal	$165
2	Senior Manager	$145
3	Senior Engineer	$125
4	Staff Engineer	$108
5	Senior Field Manager	$120
6	Engineer I	$90
7	Senior Designer	$99
8	Reports - Writer/Editor	$89
9	Designer	$85
10	Engineering Assistant	$85
11	Engineering Intern	$70
12	CAD Operator	$0
13	Technician	$0
14	Office Assistant	$60
15	Clerk	$50
16	Field Engineer	$0

NOTE: Personnel rates are estimates used for cost estimation. Actual charges will vary.

Appendix E

Probable Cost for Construction Services

Construction Estimate
LC Brown Ditch Diversion Dam

Item No.	Description	Dimensions (W x H x L)	Quan.	Unit	Unit Bid Price	Probable Cost
1	Mobilization		1	LS	$12,000	$12,000
2	Construction Surveying and Quality Control		1	LS	$4,500	$4,500
3	Provide and Execute SWPPP		1	LS	$3,500	$3,500
4	Implement Stream Alteration Provisions		1	LS	$4,000	$4,000
5	Clearing, Grubbing, and Grading		1	LS	$3,000	$3,000
6	Remove & Dispose of Existing Concrete		16	CY	$280	$4,500
7	Refurbish Existing Inlet with Actuator for Gate		1	LS	$6,000	$6,000
8	Prepare Foundation		15	CY	$100	$1,500
9	Furnish and Install Diversion Floor with Cut-Off Walls	334'x1.5'x12'	31	CY	$770	$23,900
10	Furnish and Install Abutments with Pin, with Slide	3'x7.5'x12'	14	CY	$880	$12,300
11	Furnish and Install Wing Walls with Footers	1'x7.5'x9'	7	CY	$880	$6,200
12	Furnish and Install Center Pier with Pins, with Slides	4'x7.5'x10'	12	CY	$880	$10,600
13	Furnish Radial Gate	3'x13'	2	Each	$37,730	$75,500
14	Install Radial Gate, Lift Shaft and Actuators, Elect.		2	Each	$17,970	$35,900
15	Furnish and Install Walkways		2	Each	$4,100	$8,200
16	Furnish and Install Backfill at Both Abutments		20	CY	$110	$2,200
17	Refurbish Existing Measurement Box		1	LS	$1,200	$1,200
18	Install Weir at Measurement Box and Pressure Transducer		1	LS	$2,400	$2,400
19	Unlisted Items		1	LS	$2,600	$2,600
20	Urban Construction ~ +.02		1	LS	$4,000	$4,000
					Total:	**$224,000**

Construction Estimate
LC Brown Ditch Rehabilitation

Item No.	Description	Notes	Quan.	Unit	Unit Bid Price	Probable Cost
1.00	Mobilization, Urban Constr.		1	LS	$90,000	$90,000
1.10	Construction Surveying and Quality Control		1	LS	$40,000	$40,000
1.20	Provide and Execute SWPPP		1	LS	$12,000	$12,000
1.30	Utility Coordination		1	LS	$35,000	$35,000
1.40	Traffic Control		1	LS	$198,128	$198,100
2.00	Furnish and Install 24" DR-32.5 HDPR	Backyards	1,450	LF	$33.81	$49,000
3.00	Furnish and Install 24" DR-32.5 HDPR	Bore 900 E	120	LF	$130.02	$15,600
4.00	Furnish and Install 24" DR-32.5 HDPR	Vine St.	4,350	LF	$33.81	$147,100
4.10	Saw Cut Asphalt	Vine St.	4,350	LF	$1.70	$7,400
4.11	Remove and Replace Asphalt - 4"	Vine St.	640	SY	$53.30	$34,100
4.20	Furnish and Install 24"x24"x18" DR-32.5 HDPR Tee		1	EA	$6,539	$6,500
4.21	Furnish and Install 18" Valve	M.Riley T.O.	1	EA	$5,870	$5,900
4.22	Furnish and Install 10'- 18" HDPE and 18" Meter		1	EA	$12,060	$12,100
4.23	Connect 18" HDPE to 24" Concrete		1	EA	$1,900	$1,900
5.00	Furnish and Install Booster Pump - 16 Hp		1	EA	$26,000	$26,000
6.00	Furnish and Insert 20" DR-32.5 HDPE	24" concrete	1,600	LF	$25.29	$40,500
7.00	Furnish and Install Ultrasonic Meter - 20"		1	EA	$12,060	$12,100
7.10	Furnish and Install 20" DR-32.5 HDPE	Vine St.	2,500	LF	$23.48	$58,700
7.20	Furnish and Install Turnout Tees 20"x8"x20"		4	EA	$6,541	$26,200
7.21	Furnish and Install 8" Laterals		1,400	LF	$4.37	$6,100
7.22	Furnish and Install 1-1/2" Dual Prop. Conn.		100	EA	$1,330	$133,000
7.23	Furnish and Install Meters		200	EA	$850	$170,000
7.30	Saw Cut Asphalt		2,500	FT	$1.70	$4,300
7.31	Remove and Replace Asphalt - 4"		370	SY	$53.30	$19,700
8.00	Furnish and Install Connect 20" HDPE to 20" Poly		1	EA	$4,100	$4,100
9.00	Furnish Reducing Elbow 20" Poly Conn. to 18" HDPE		1	EA	$4,100	$4,100
9.10	Furnish and Install 18" Isolation Valve		1	EA	$5,870	$5,900
10.00	Furnish and Install 18" DR-32.5 HDPE	Wasatch	1,440	LF	$19.02	$27,400
10.10	Furnish and Install Ultrasonic Meter - 18"		1	EA	$12,060	$12,100
10.20	Saw Cut Asphalt		1,440	FT	$1.70	$2,400
10.21	Remove and Replace Asphalt - 4"		210	SY	$53.30	$11,200
10.30	Furnish and Install Turnout Tees 20"x8"x20"		5	EA	$6,534.40	$32,700
10.31	Furnish and Install 8" Laterals		1,200	LF	$4.37	$5,200
10.32	Furnish and Install 1-1/2" Dual Prop. Conn.		80	EA	$1,330	$106,400

Item No.	Description	Notes	Quan.	Unit	Unit Bid Price	Probable Cost
10.33	Furnish and Install Meters		160	EA	$850	$136,000
11.00	Furnish and Install 18" DR-32.5 HDPE - Elbow		1	EA	$3,100	$3,100
12.00	Furnish and Install 18" DR-32.5 HDPE	4800 So.	200	LF	$19.02	$3,800
12.10	Furnish and Install Turnout Tees 18"x8"x18"		1	EA	$6,630	$6,600
12.20	Furnish and Install 8" Laterals		200	LF	$4.37	$900
12.21	Furnish and Install 1-1/2" Dual Prop. Conn.		4	LF	$1,330	$5,320
12.22	Furnish and Install Meters		8	EA	$850	$6,800
12.30	Saw Cut Asphalt		200	LF	$1.70	$300
12.31	Remove and Replace Asphalt - 4"		30	SY	$53.30	$1,600
13.00	Furnish and Install 18" DR-32.5 HDPE - Elbow		1	EA	$3,100	$3,100
14.00	Furnish and Install HDPE Reducer 18"x16"		1	EA	$3,100	$3,100
15.00	Furnish and Install 16" DR-32.5 HDPE	Rainbow	1,880	LF	$15.03	$28,300
15.10	Furnish and Install Turnout Tees 16"x8"x16"		4	EA	$3,100	$12,400
15.20	Furnish and Install 8" Laterals		400	LF	$4.37	$1,700
15.21	Furnish and Install 1-1/2" Dual Prop. Conn.		25	EA	$1,330	$33,250
15.22	Furnish and Install Meters		50	EA	$850	$42,500
15.30	Saw Cut Asphalt		1,880	LF	$1.70	$3,200
15.31	Remove and Replace Asphalt - 4"		240	SY	$53.30	$12,800
16.00	Furnish and Insert 16" DR-32.5 HDPE in 36"x24" Box	State St	120	LF	$17.34	$2,100
17.00	Furnish and Insert 12" DR-32.5 HDPE in 24" Concrete		500	LF	$10.27	$5,100
18.00	Furnish and Install 12" DR-32.5 HDPE	to Box Elder	690	LF	$9.54	$6,600
18.10	Furnish and Install Turnout Tees 12"x2"x12"		3	EA	$1,900	$5,700
18.20	Furnish and Install 1-1/2" Dual Prop. Conn.		10	EA	$1,330	$13,300
18.21	Furnish and Install Meters		20	EA	$850	$17,000
18.30	Saw Cut Asphalt		690	LF	$1.70	$1,200
18.31	Remove and Replace Asphalt - 4"		80	SY	$53.30	$4,300
19.00	Furnish and Install 12" DR-32.5 HDPE - Elbow		1	EA	$1,900	$1,900
20.00	Furnish and Install 12" DR-32.5 HDPE	Box Elder	1,350	LF	$34	$45,600
20.10	Furnish and Install Turnout Tees 12"x2"x12"		5	EA	$1,900	$9,500
20.20	Furnish and Install 1-1/2" Dual Prop. Conn.		15	LF	$1,330	$19,950
20.21	Furnish and Install Meters		30	EA	$850	$25,500
20.30	Saw Cut Asphalt		1,350	LF	$1.70	$2,300
20.31	Remove and Replace Asphalt - 4"		150	SY	$53.30	$8,000
21.00	Furnish and Install 12" Valve		1	EA	$4,890	$4,900
22.00	Unlisted Items, AMR Reader		1	LS	$30,000	$30,000
					Total:	**$1,870,500**

Appendix F

Probable Cost for Environmental Services

(Environmental and Cultural Resources Compliance)

Little Cottonwood Brown Ditch Rehabilation Project

Probable Cost Opinion for Environmental and Cultural Resources Services

(Rate Table Attached)

Task Description	Hours By Personnel Category							Total Hours	Total Labor Charges	Other Direct Costs	Total Fee
	1	2	3	4	7	14	15				
	Principal	Project Manager	Senior Engineer	Staff Engineer	Designer	Office Assistant	Clerk				
NEPA Compliance											
Task 1. Cultural Resources Survey/Report		4		8				12	$1,444	$12,000	$13,444
Task 2. Preparation of Environmental Assessment Draft	2	8	120	20	40	4		194	$22,850		$22,850
Task 3. Public Involvement		6	20		10	4		40	$4,600		$4,600
Task 4. Coordination with Reclamation[1]		4	8					12	$1,580	$12,000	$13,580
Task 5. Coordination with Other Agencies		4	12	12				28	$3,376		$3,376
Task 6. Preparation of Environmental Assessment Final	2	8	40	20	10	8		88	$10,120		$10,120
Task 7. FONSI	1	4	8			4		17	$1,985		$1,985
SUBTOTAL	5	38	208	60	60	20	0	391	$45,955	$24,000	$70,000
Project Totals	5	38	208	60	60	20	0	391	$45,955	$24,000	$70,000

[1] Includes Reclamation Charges for Review

Personnel Rates
(Calendar Year - 2018)

	Classification	Rate
1	Principal	$165
2	Senior Manager	$145
3	Senior Engineer	$125
4	Staff Engineer	$108
5	Senior Field Manager	$120
6	Engineer I	$90
7	Senior Designer	$99
8	Reports - Writer/Editor	$89
9	Designer	$85
10	Engineering Assistant	$85
11	Engineering Intern	$70
12	CAD Operator	$0
13	Technician	$0
14	Office Assistant	$60
15	Clerk	$50
16	Field Engineer	$0

NOTE: Personnel rates are estimates used for cost estimation. Actual charges will vary.

Appendix G

Proposed Schedule

Little Cottonwood Brown Ditch

ID	Task Name	Duration
1	LC Brown Ditch Rehabilitation	
2	**Project Management**	**680 days**
3	Notice of Award	0 days
4	Project Management	680 days
5	Coordination w/ USBR, qtrly rpts	680 days
6	Execute contract with Reclamation	30 days
7	Environmental Process	80 days
8	**Coordination and Design**	**650 days**
9	Stakeholder coord.	650 days
10	Diversion dam design process	40 days
11	Stream Alteration permit process	60 days
12	Ditch design process	110 days
13	**Diversion Dam**	**220 days**
14	Order radial gates	10 days
15	Manufacturing of gates	60 days
16	Construct div. structure	55 days
17	install radial gates	20 days
18	Divert water into system	0 days
19	Irrigation season one	120 days
20	**Ditch Rehabilitation**	**455 days**
21	**Construction Phase 1**	**180 days**
22	Insert pipe into exist. sections	180 days
23	Irrigation season two	120 days
24	Construction Phase II- new pipe	140 days
25	Irrigation season three begins	0 days