COLORADO WATER CONSERVATION BOARD

ALERNATIVE AGRICULTURAL WATER TRANSFER METHODS COMPETITIVE GRANT PROGRAM

GRANT APPLICATION FORM

Potential Impacts to Long-Term Farm Financial Planning Resulting from Water Transfers – Arkansas River Basin

Program/Project Name

River Basin Name

Amount of Funds Requested

Amount of Matching Funds

*** The deadline for Grant Applications is November 26, 2010 for consideration at the January 2011CWCB meeting.** It is anticipated that there will be one round of application submittals, yet if funds are not exhausted, the Board will determine when it will consider the next round of grant applications at their January 2011 meeting.

* In completing the application you may attach additional sheets if the form does not provide adequate space. If additional sheets are attached please be sure to reference the section number of the application that you are addressing (i.e., A.1. etc.).

Instructions: This application form must be submitted in electronic format (Microsoft Word or Original PDF). The application can be emailed or a disc can be mailed to the address at the end of the application form. The Alternative Agricultural Water Transfer Methods Competitive Grant Program, Criteria and Guidelines can be found at http://cwcb.state.co.us/LoansGrants/alternative-agricultural-water-transfer-methods-grants/Pages/main.aspx. **The criteria and guidelines must be reviewed and followed when completing this application**. You may attach additional sheets as necessary to fully answer any question, or to provide additional information that you feel would be helpful in evaluating this application. Include with your application a cover letter summarizing your request for a grant. If you have difficulty with any part of the application, contact Todd Doherty of the Water Supply Planning Section (Colorado Water Conservation Board) for assistance, at (303) 866-3441 x3210 or email at todd.doherty@state.co.us.

Generally, the applicant is also the prospective owner and sponsor of the proposed program/project. If this is not the case, contact Todd before completing this application.

Alternative Agricultural Water Transfer Methods – Grant Application Form
October 2010

Part A. - Description of the Applicant(s) (Program/Project Sponsor);

1. Applicant Name(s): Lower Arkansas Valley Water Conservancy District; attn: Jay Winner, General Manager

Mailing address: 801 Swink Ave.
Rocky Ford, Colo. 81067

Taxpayer ID#: 481298144 Email address: jwinner@centurytel.net

Phone Numbers: Business: 719-254-5115
Home: 719-469-8935
Fax: 719-254-5150

2. Person to contact regarding this application if different from above:

Name: Peter Nichols, Trout, Raley, Montaño, Witwer & Freeman, P.C.
1120 Lincoln Ste. 1600, Denver, CO 80203 tel: 303-339-5825

Position/Title Special Counsel to LAVWCD

3. If the Contracting Entity is different then the Applicant, please describe the Contracting Entity here.

Not applicable.

4. Provide a brief description of your organization. The applicant may be a public or private entity. Given the diverse range of potential applicants, not all of the following information may be relevant. Where applicable and relevant the description should include the following:

a) Type of organization, official name, the year formed, and the statutes under which the entity was formed, a contact person and that person's position or title, address and phone number. For private entities, a copy of the Articles of Incorporation and By-laws should be appended to the application.

The Lower Arkansas Valley Water Conservancy District ("LAVWCD" or "Lower Ark District") is a water conservancy district established in 2002 pursuant to Colorado law, C.R.S. § 37-45-101 et seq. (2010).

Contacts: Jay Winner, General Manager, LAVWCD,
801 Swink Ave.
Rocky Ford, Colo. 81067
719-469-8935
or

Peter Nichols, Esq.,
Special Counsel, LAVWCD
Trout, Raley, Montaño, Witwer & Freeman, P.C.
1120 Lincoln Street, Suite 1600
Denver, Colo. 80203
303-339-5825

b) For waters suppliers, information regarding the number of customers, taps, service area, and current water usage, and future growth plans, water related facilities owned or used, funding/revenue sources (existing service charges, tap fees, share assessments, etc.), the number of members or shareholders and shares of stock outstanding or a description of other means of ownership.

Not applicable.

c) For other entities, background, organizational size, staffing and budget, and funding related to water that is relevant in determining whether the applicant has the ability to accomplish the program/project for which funding is sought.

The Lower Ark District encompasses most of the Lower Arkansas River Basin, from above Pueblo Reservoir to the Kansas state line, including Pueblo and John Martin Reservoirs, and Pueblo, Otero, Crowley, Bent and Prowers Counties.

The District has a general fund budget of approximately $1.7 million per year, funded primarily by a 1.5 mill levy on real property within the District. All of the budget is spent on water related activities, as described in more detail in (d) below.

The full-time staff of four includes the General Manager, Jay Winner; Project Manager, Bill Hancock; Financial Officer, Kim Chavez; and Administrative Assistant, Carla Quezada. In addition, the District extensively uses the services of its outside General Counsel, Bart Mendenhall, and Special Counsel, Peter Nichols and Trout, Raley, Montaño, Witwer & Freeman, P.C., as well as the services of consulting engineers such as Leonard Rice Engineers.

d) A brief history of the Applicant(s).

The Lower Ark District was formed by a vote of the electorate in 2002 to conserve water resources for their greatest beneficial use within the District, essentially the Lower Arkansas Valley. The District has been active in five primary program areas since its formation:

1. Development of alternatives to the permanent dry-up and transfer of irrigation water rights for use outside the Lower Valley;

2. Education and research to promote improved financial returns from irrigated agriculture;

3. Development of so-called Rule 10 Compact Compliance Plans to facilitate the operation of existing and installation of new irrigation improvements to support irrigated agriculture.

4. Preservation of irrigated agriculture through conservation easements and as purchaser-of-last-resort of irrigated farms and ranches in the Lower Valley;

5. Purchase of strategic water rights for use in the Lower Valley, such as augmentation water; and

6. Lease of water for augmentation use in the Lower Valley and to repay Colorado's water debt to Kansas.

The District is the recognized leader in Colorado in developing a fallowing-leasing program to meet the water needs of Front Range municipalities while preserving irrigated agriculture and the economic future of rural Colorado. This work began in 2003 and has grown over time, as described in more detail below.

The District was also a leader in the use of conservation easements to preserve working farms and ranches. Moreover, the District has been the leader in Southeast Colorado and a primary leader statewide in efforts to prevent and correct abuses of the conservation easement tax credit program, and to reform the program for the long-term benefit of irrigated agriculture.

e) Please include any relevant Tabor issues relating to the funding request that may affect the Contracting Entity.

The Lower Ark District's 1.5 mill property tax levy is exempt from TABOR pursuant to the election that formed the District in 2002.

The District formed a Water Activity Enterprise in 2003 to manage the District's water assets and provide services to the District on a reimbursable basis. The Lower Arkansas Valley Water Enterprise Fund would be the contracting entity for this project.

Part B. - Description of the Alternative Water Transfer Program/Project –

1. Purpose of the Program/Project

Please provide a summary of the proposed program/project, including a statement of what the program/project is intended to accomplish, the need for the program/project, the problems and opportunities to be addressed, the expectations of the applicant(s), and why the program/project is important to the applicant(s). The summary must include a description of the technical, institutional (i.e., how the program/project will be organized and operated), and legal elements that will and/or have been addressed by the applicant and proposed program/project. The summary should also discuss relevant project history, if applicable, and any other relevant issues.

The Goal. The purpose of the "Super Ditch Company" is to create an alternative to historical "buy-and-dry" of irrigation water rights for M&I uses. More specifically, the Super Ditch Company would create a viable alternative to historical M&I purchases, permanent transfers, and dry-up of irrigated land that would both make irrigation water rights available for municipal use and also preserve irrigated agriculture, the economic lifeblood and future of rural communities in the Lower Arkansas Valley.

The Problem. The Statewide Water Supply Initiative ("SWSI") estimates that water demand in the Arkansas River Basin will increase by 98,000 acre-feet by 2030. CDM, SWSI Executive Summary, at ES-10 (Nov. 2004). SWSI further estimates that 22,000 to 72,000 acres of additional irrigated land will be dried up in the Arkansas River Basin as M&I water providers continue to acquire and transfer agricultural water rights from outside their service area for use inside their service area. *Id*., at ES-10 - 11. This additional dry up would come on top of the more than 78,169 acres of irrigated land in the basin already dried up by the acquisition and transfer of agricultural water rights by M&I water providers. Charles W. Howe, The Regional Economic Impacts of Transfers of Water from Irrigated Agriculture in the Arkansas Valley of Colorado to In-Basin and Out-of-Basin Non-Agricultural Uses, at 6 (Dec. 2, 2002). To put these numbers in perspective, SWSI estimated the Arkansas Basin had 538,100 irrigated acres in 2004. Thus, additional M&I demands could dry up a further 13.4 percent of irrigated land in the basin, on top of the 14.5 percent already dried up. In short, the Arkansas River Basin could lose well over a quarter of its irrigated lands to M&I water providers by 2030.

Significant on-going residential development in El Paso, Douglas and Arapahoe counties depends on Denver Basin groundwater. Development is "mining" the ground water resources of the four aquifers, which are evidencing declining water levels. Water providers throughout the Denver Basin are working to develop renewable water supplies to recharge the aquifers to maintain water levels and extend aquifer life. Lower Valley irrigation water rights are principal options for this purpose. *See, e.g.,* South Metro Water Supply Authority, "Regional Water Master Plan" (2007).

The Opportunity. Front Range M&I users are seeking additional water supplies to address the reliability of their supplies in light of the unprecedented drought of 2002. They are also seeking insurance against a potential call on the Colorado River, which would negatively impact relatively junior municipal trans-basin diversions. In addition, M&I users need additional water supplies to meet the demands of growth, as documented by SWSI.

Expectations of the Lower District. Creation of the Super Ditch to provide a voluntary

alternative option to Lower Valley irrigators for the economic use of their water is the number one priority of the Board of Directors of the Lower Ark District. Special counsel, staff and board members of the Lower District have been working on this concept for nearly five years. In furtherance of this effort, the Lower District has expended roughly $2,000,000 to date on technical, institutional, and legal analyses to further the Super Ditch Company. The District worked closely with irrigator-representatives of Lower Valley ditch companies in 2007 and 2008 on the institutional aspects of the Super Ditch, culminating in the incorporation of the Lower Arkansas Valley Super Ditch Company Inc. (Super Ditch) in May 2008. The District began negotiating with potential lessees in 2004, and entered into two assignable letters of intent with M&I lessees. The Super Ditch Company followed up and has signed two agreements with M&I lessees (Pikes Peak Regional Water Authority; Aurora) in 2010. Accordingly, the Lower District expects that in late 2010, many Lower Valley irrigators will formally indicate their interest in entering into individual leases with PPRWA and Aurora, and adopt necessary changes to ditch company articles of incorporation and bylaws at their annual meetings in December 2010 through February 2011.

Importance to Lower Ark District. The Lower Ark District was "established for the purposes of conservation of the water resources within the District, [and] for their greatest beneficial use." *In the Matter of the Lower Arkansas Valley Water Conservancy District*, Case No. 02CV793 (Pueblo County, Colo. Dist. Court, 2002). The District has undertaken development of the Super Ditch Company for several reasons:

1. The Super Ditch furthers the primary mission that the voters in SE Colorado mandated to the Lower District. Creation of the Super Ditch Company is the number one priority of the Board of the District.

2. An alternative to historical buy-and-dry is urgently needed to provide owners of irrigation water rights an economically viable attractive alternative to selling their water rights outright.

3. Land fallowing and water leasing has been discussed in water circles and academia for decades, has been successfully tested and implemented in California in a much simpler institutional and legal setting, but has yet to be proven in Colorado.

4. The complexity and resources required to develop the Super Ditch are beyond the capacity of individual shareholders, ditch companies, and potential water users/lessees. In other words, someone has to step up and try to make fallowing-leasing work, and the District has both volunteered and committed to the challenge.

Description of the Technical, Institutional and Legal Elements.

Overview. The Super Ditch is an institutional and legal mechanism whereby irrigators who voluntarily forego irrigation can lease water to municipal or other water users. The Super Ditch will allow irrigators to lease their water, made available from forgoing historical irrigation, to municipalities and other water users.

Technical details. The water leases may take various forms, including long term

leases, interruptible water supply agreements, and water banking, as the Super Ditch negotiates with water users to meet their water needs. The leases will be written on uniform forms to facilitate the sale and transfer of the underlying ditch company shares, but the Leases will take into account the varying yields of each ditch company's shares.

Water leases will be for specific terms of years, and binding upon both the municipal/water user-lessees and the irrigator-lessors, their successors and assigns. The leases will constitute a legal encumbrance upon the ditch company shares leased by the irrigators to the Super Ditch Company, and constitute a continuing obligation of the owner, assignor, or successor of the ditch company shares. In this manner, the leases will provide certainty to the municipal/water user lessees. Undoubtedly, there will be a variety of lease terms necessary to meet the differing needs of lessees, but it is expected that leases will run for as long as 40 years with a right of renewal. The Agreement with PPRWA is for up to 40 years, while the Aurora Agreement is for 38 years. Municipalities have demonstrated their comfort with such lease periods through contracts with the Bureau of Reclamation. It is, of course, impossible to predict whether climate change, domestic energy demands, and/or agricultural economics will support irrigated agriculture any farther into the future, a question of paramount importance to the duration of the program.

Water rights. The rights to be leased through the Super Ditch will be water rights that are diverted from or stored on the mainstem of the Arkansas River and its tributaries (exclusive of Fountain Creek) at or below Pueblo Dam and above John Martin Reservoir and located so that the leased water can be delivered to municipalities and other water users without prohibitive transit losses. The water rights will be in the form of stock held in ditch and reservoir companies diverting or storing water from the mainstem and its tributaries, and may include the Bessemer Ditch, Rocky Ford High Line Canal, Oxford Farmers Ditch, Otero Canal, Catlin Canal, Holbrook Canal, the Fort Lyon Canal, and other ditches (provided that such leasing is permitted by the ditch company's articles of incorporation and bylaws). The Super Ditch will lease ditch company shares from Participating Irrigators taking into account their varying "yields" as determined by the ditch companies' water rights priorities and historic consumptive use. Shares in different ditch companies will lease for different amounts because of varying yields; more reliable shares, such as those that were not called in 2002, fetching a higher lease price than less reliable shares, but the same lease price per acre-foot of water delivered.

Specific information on water sources, location, yield, hydrologic variation, extent of development and water rights is available in HDR's Preliminary Engineering Study, Rotational Land Fallowing-Water Leasing Program (Nov. 2007).

Water rights owners-lessors. Irrigators may participate with 100 percent of their irrigated land, or some lesser percentage, as they individually choose. Irrigators will have considerable flexibility to decide which land not to irrigate, and when. Irrigators can participate individually, as part of a family group, or part of another formal or informal group, e.g., LLC, or ditch lateral. Participating irrigators will be responsible for weed and erosion control on their fallowed land. Land irrigated by participating irrigators must be fallowed to make the historical consumptive use of their water rights available for other uses. Fallowing may be on a rotational or other basis.

Water users-lessees. M&I users that could lease water through the Super Ditch Company may include among others the following: Pikes Peak Regional Water Authority, Colorado Springs Utilities, Aurora, Pueblo Board of Water Works, Pueblo West, Fountain Valley Authority, Cañon City, Security, Widefield, St. Charles Mesa, Arkansas Valley Conduit, other municipalities, Colorado State Parks, Colorado Division of Wildlife, the Colorado Water Conservation Board, energy and industrial users, and other agricultural users. In order to avoid undermining the potential for the success of the program, a condition of leasing water is expected to be a voluntary agreement by the Municipality or other Water User not to purchase and permanently transfer irrigation water rights out of the Lower Valley for so long as they are receiving the benefits of water leased from the Company. Municipalities or other Water Users would not, however, be expected to forgo the purchase of irrigation water rights while the program is operating, although they would be expected to make those water rights available for lease through the program -- just like any other irrigation water right owner -- so that every water right owner would be treated alike.

Some M&I users have voluntarily entered into intergovernmental agreements ("IGAs") that address, among other things, the use and transfer of irrigation water rights for municipal purposes. Other agreements concern flows below Pueblo Reservoir. The Rotational Land Fallowing-Water Leasing program would necessarily operate within the confines of such agreements for so long as they are in effect.

Operational details. On behalf of the irrigators, the Super Ditch will negotiate leases with M&I users, including lease terms and conditions, including the price of water per acre-foot (base price), periodic price escalation factors (inflation and market adjustments), length of lease, payment terms, delivery points, and delivery schedule. Irrigators will then decide whether to participate or not.

The Super Ditch will be responsible for administering the leases with M&I users. For example, the Company will necessarily track which lands will be fallowed each year to meet lease demands. In addition, the Super Ditch will be responsible for lease accounting and reporting under SWSPs and water court decrees.

Leases will provide that irrigators receive revenues directly from the water user-lessee. This will avoid double taxation, i.e., taxation of income to the Company and to the irrigator.

Institutional details. Irrigators will own and control the Super Ditch Company. Each irrigator whose water rights are leased to another user will hold shares of classified stock that evidences that the Participating Irrigator's water rights are under lease and of a number reflecting the value of those water rights measured in accordance with their yield and other factors. An irrigator whose lease of water has expired will cease to hold the shares acquired.

The Super Ditch is managed under the direction of a Board of Directors elected by the shareholders. Governance will forever remain in the hands of Participating Irrigators pursuant to the articles of incorporation. The Board of Directors may establish any number of committees, including advisory committees that include committee members who are not themselves

shareholders but bring expertise in matters such as water law, finance, trading mechanisms and the like.

The Super Ditch will earn revenues to operate the program from two sources. First, the Company may charge membership fees to M&I users to lease water. Second, the Company may charge irrigators for operating the leases, similar to ditch company assessments.

Legal details. Although many forms of legal entities – from corporations to cooperatives and limited liability companies, although not mutual ditch and reservoir companies or non-profits – are available for enterprises such as the Super Ditch, the Company incorporated as a for-profit Colorado corporation. The Company could be converted to a cooperative in the future.

The Super Ditch will be responsible for engineering, drafting, and filing substitute water supply plans pursuant to CRS § 37-92-308(4), and adjudicating any necessary changes of water rights for the leases, purusant to CRS § 37-92-305(3). Each lease may require separate adjudications because the places and types of the new uses will be unique to the lessees, although multiple entities may particpate in one single lease. The Super Ditch will also be responsible for obtaining necessary land use permits, i.e., county 1041 permits from Pueblo, Prowers, Otero and Bent counties, as necessary based on the location of irrgated land included in the leases.

Project History. Shortly after the formation of the Lower Ark District in 2002, special counsel initiated informal discussions of leasing rather than purchasing water with an M&I user that historically purchased Lower Valley irrigation water rights to meet their future water supply needs. In depth discussions about the creation of a water leasing program began with another M&I user that historically purchased Lower Valley irrigation rights in 2004, and expanded to include a working group of attorneys representing the District, Colorado Springs, Aurora, Pueblo Board of Water Works, and the Southeastern Colorado Water Conservancy District in 2005. Meeting bi-monthly for nearly a year, the attorneys' working group developed a detailed outline for the formation and operation of a fallowing-leasing program by early 2006.

TheDistrict commissioned an engineering feasibility study – proof of concept – in 2006. HDR prepared the study, which concluded that the formation of leasing program was feasible encompassing ditches diverting from Pueblo Reservoir to John Martin Reservoir. HDR Engineering, Inc., "Lower Arkansas Valley Water Leasing Potential, Preliminary Feasibility Investigation" (June 19, 2006 – Draft). The Lower District subsequently commissioned a detailed engineering study of a water leasing program, which HDR completed in 2007. HDR Engineering, Inc., Rotational Land Fallowing-Water, "Leasing Program Engineering and Economic Feasibility Analysis, Final Report" (Nov. 2007).

The Lower District also instructed special counsel to investigate the legal aspects of a water leasing program in 2006. Special counsel concluded that a water leasing program could be implemented under existing law through an adjudication of a change of water right. Special counsel also identified institutional hurdles to a water leasing program, including restrictions on place of use in ditch company articles of incorporation and bylaws, and so-called 1041 permitting requirements of Lower Valley counties.

Also in 2006, special counsel contacted board members of the Palo Verde (Cal.) Irrigation District ("PVID") and the general counsel of the Metropolitan Water District of Southern California concerning the water leasing program they were negotiating, and ultimately consummated at the end of 2006. In early 2007, the Lower District invited representatives of Lower Valley ditch companies to participate in a fact-finding trip to the Imperial Valley of California to meet with irrigator-water lessors of the PVID. The trip resulted in formation of a Steering Committee composed of Lower Valley irrigators to work with the Lower District, its engineers, consultants, and attorneys on the formation of the Super Ditch Company. The Steering Committee met bi-monthly with the engineers, consultants, and attorneys to craft the organizational and operational details of the Super Ditch Company, culminating in incorporation of the Super Ditch in May 2008.

The Super Ditch invited potential lessees to discuss possible leasing in 2008, and then began negotiations with three potential groups of lessees. A negotiating committee met with PPRWA, Aurora and Colorado Springs numerous times over the next couple of years, culminating in agreements with PPRWA and Aurora in 2010; negotiations continue with Colorado Springs.

Previous Studies

To the maximum extent possible, the results of any previous studies and investigation should be utilized and incorporated into the proposed program/project. The application for funding should include a brief summary of the results of previous studies and how they will be utilized.

The Lower District evaluated the feasibility of a Lower Valley water leasing program, to prove the concept, and to address essential antecedent issues to the formation of the Super Ditch Company. Principle studies and investigations to date include:

a. Technical proof of concept. HDR Engineering; Inc., "Lower Arkansas Valley Water Leasing Potential Preliminary Feasibility Investigation," Aug. 2006. This engineering investigation confirmed that adequate water rights would be available for lease in the Lower Valley to meet the demands of water users. For example, approximately 250,000 acre feet of water would be available for lease in an average year, and over 100,000 acre-feet in an exceptionally dry year, like 2002.

b. Preliminary water engineering for water leasing program. HDR Engineering, Inc., "Rotational Land Fallowing-Water Leasing Program Engineering and Economic Feasibility Analysis, Final Report," Nov. 2007. This engineering study refined yield estimates of potential water available for lease and also analyzed exchange, storage and water quality issues. In addition, the study included a macro-economic analysis of water leasing, including water pricing, lease payments, and third party impacts.

c. Economic analyses of regional water markets, alternative leasing structures, ditch company and shareholder revenues, and regional economic impacts. George Oamek, Honey Creek Resources, Jan. 2008. This study built upon the programmatic economic analyses in the Feasibility Analysis, developing specific scenarios for leases by ditch, compared to selling out and continuing farming. The Steering Committee used this information to reach decisions

on operational and organizational aspects of the Super Ditch Company.

d. Legal analysis of alternative forms of Super Ditch Company (Anthony van Westrum, LLC, Jan. 2007). This report reviewed all of the potential legal structures available for the Super Ditch Company with regard to essential operational and organizational issues. Most options were eliminated because they could not meet one or more critical objectives of the irrigators, leaving a for-profit Colorado corporation as the leading candidate.

e. Draft articles of incorporation and bylaws for Lower Arkansas Valley Super Ditch Company (van Westrum; July 2007 – March 2008, on-going). Following review of initial drafts of articles of incorporation and bylaws, several subsequent drafts have been developed to respond to concerns and to refine organizational and operational objectives of the Steering Committee.

f. Legal analysis of the ditch companies' articles of incorporation and bylaws with regard to water leasing. Trout, Raley, Montaño, Witwer & Freeman, PC, Oct. 2006. This was a review of the existing restrictions in the articles of incorporatoin and bylaws of the ditch companies whose shareholders are interested in water leasing. Two ditch companies clearly would allow water leasing under their current organizational documents, a third has historically allowed the use of water outside the company's service area although the organizational documents are not entirely clear concerning a shareholder's right to do so, while the shareholders of four other ditch companies would need to amend their organizational documents to permit water leasing. Trout, Raley, Montaño, Witwer & Freeman subsequently developed model language to permit water leasing, and identified the procedures for shareholders to make such changes.

g. Legal analysis of 1041 land use permitting requirements. Trout, Raley, Montaño, Witwer & Freeman, P.C., Aug. 2006. Water leasing would trigger so-called 1041 permitting requirements in up to four counties where irrigators may wish to participate in water leasing, including Bent, Otero, Prowers and Pueblo.

h. Legal investigation of municipal authority to work with the Super Ditch Company. Kelly McMullin, Esq. and Mark Shea, Esq., Colorado Springs Utilities, Moey Hammond, Esq., Carlson, Hammond & Paddock, David Robbins, Esq., Hill & Robbins, Anthony van Westrum, LLC, and Trout, Raley, Montaño, Witwer & Freeman, P.C. on-going. This joint effort has focused on legal impediments to municipal water leasing and the development of solutions to identified issues.

i. Preliminary engineering report for pipeline from Lower Arkansas Valley to northeast El Paso County. Boyle Engineering, under contract to Pikes Peak Regional Water Authority, Lower Ark WCD, and Morley Investments, draft expected fall 2008. This engineering analysis was commissioned to look at the feasibility of combing four planned pipelines into one pipeline. Specifically, PureCycle, Morley Investments and the Pikes Peak Regional Water Authority, in addition to the Lower District for the Super Ditch Company, plan pipelines to deliver water from the Lower Arkansas River to northeast El Paso County. This study is to examine the feasibilty of a single pipeline project that would meet the needs of all four entities, although it would include branches to serve specific needs of the individual participants.

j. Antitrust Implications of Plan by Lower Arkansas Valley Super Ditch Company to Collectively Lease Water Rights. Thomas P. McMahon, Esq., Jones & Keller (July 15, 2008). This legal analysis was commissioned at the request of the CWCB to address potential antitrust issues of the water leasing program. The analysis concluded that the courts would likely consider the Super Ditch Company a "new product" that would pass legal muster.

k. Alternative Water Transfers Methods – Task B, Storage Faciliteis, AEOCM, April 5, 2010.

l. Draft Report A Proposed Method for Incorporating Rural Population-Business Thresholds, or "Tipping Points," in Water Transfer Evaluations, Honey Creek Resources *et al*., May 2010.

m. Key study results, memorandum from George Oamek of Honey Creek Resources to Peter Nichols, Super Ditch legal counsel, dated June 2, 2010.

n. Alternative Water Transfer Methods – Task F, Conveyance Alternatives and Task G, Water Quality, AECOM, June 17, 2010.

o. Draft Report Rotational Land Fallowing Water Leasing Program Lower Arkansas Valley Super Ditch Company, Aqua Engineering, Inc., July 2, 2010.

2. Study Area/Service Area Description

The study area/service area is generally the geographic area that is the subject of the proposed program/project (include both the source of supply and location and type of new use). The description should include the following items:

a) A narrative description of the study area/service area including: the county, the location of towns or cities, topography, and locations of major surface and ground water features.

Source of supply. The study area for water leasing includes irrigated land in the Lower Arkansas Valley from diversions from the Arkansas River from Pueblo Dam to John Martin Reservoir. The major surface water feature is the Arkansas River, and the major ground water feature is the alluvium associated with the River. The area includes irrigated portions of Pueblo, Otero, Bent, Crowley and Prowers counties. Principal cities and towns within the area include Manzanola, Fowler, Rocky Ford, and La Junta.

Service area. The major surface water features in the service area include, in addition to the main stem of the Lower Arkansas River to the confluence of Fountain Creek, Monument and Fountain Creeks, and the South Platte River basin, including tributaries from the east, from the foothills to Sand Creek. The major ground water features of the service area are the Denver Basin aquifers, and the Upper Black Squirrel Creek designated ground water basin. The service area includes portions of Pueblo, El Paso, Douglas, and Arapahoe counties, and the Cities and Towns of Colorado Springs, Aurora, Monument, Fountain, and Palmer Lake, as well as developed but unincorporated areas served by metropolitan, water and developer

districts, such as Academy Water and Sanitation District, Cherokee Metropolitan District, Donala Water and Sanitation District, Triview Metropolitan District, Woodmoor Water and Sanitation District, and the Morley Companies.

b) An area map showing each of the items above, as well as the locations of existing facilities, proposed project facilities and boundaries of lands involved in the proposed program/project.

A map of the Lower Arkansas River showing major surface water features and the boundaries of the alluvial aquifer is attached as Map 1. The map also shows cities, towns, and county boundaries.

A map of the irrigated acres under the Bessemer, Catlin, Fort Lyon, Holbrook, Otero, Oxford and Rocky Ford High Line ditches is attached as Map 2. These are the principal irrigated acres that would be the source of water for water leasing.

A map of the Study area is attached as Map 3. This map shows county boundaries, cities, towns, principal highways, and surface water features. In addition, it shows some of the routes for pipelines being considered by the Lower District, Morley Investments, and Pikes Peak Regional Water Authority.

c) Information regarding the irrigated lands that are involved in the program/project. This must include a tabulation of total irrigated acreage, description of cropping types, crop yields, and total average annual water diversions for existing agricultural lands.

This information is attached as Tables 1 through 3.

d) Information regarding the location of the new water use(s) that will be served by transferred water including the estimated number of users/taps and/or uses served.

While the service area encompasses perhaps a quarter of the population of the state, the Super Ditch Company would serve only a portion. Target service locations include municipalities that have expressed an interest in leasing water to supplement their existing supplies, including Colorado Springs and Aurora. In addition, water providers dependent upon Denver Basin ground water are actively looking for water to recharge the aquifers to extend their life. For example, the Pikes Peak Regional Water Authority, with over 15 member municipalities and water districts, has entered into a letter of intent to lease 12,000 acre-feet of water per year. The Morley Companies have entered into a similar letter of intent for 3,000 acre-feet per year. Other potential water users include the South Metro Water Supply Authority, with members in Douglas and Arapahoe counties, which is actively looking for renewable water supplies to recharge the declining Denver Basin supplies upon which they depend.

Because leased water is expected to be a supplemental supply during times of drought, for drought recovery, and for aquifer recharge, it is impossible to estimate the number of users or taps that would be served until leases are consummated. For example, municipal water use declines significantly during times of drought and water supplies serve more users than in

average or wet years. Conversely, drought recovery supplies ultimately benefit all of the service users of the provider if it prevents mandatory rationing during drought. On the other hand, it may simply spill from reservoirs if there is an extended period of average or above average precipitation post drought. Different still are Denver Basin ground water dependant providers who will lease water to recharge the aquifers. Recharge will extend the lives of the aquifers, benefiting not only their users but all users dependent upon the aquifers throughout the Denver Basin.

A better measure of the users and uses that would be served by water leasing is the amount of water that the Super Ditch Company could make available. HDR and Honey Creek Resources ran a number of scenarios as part of the detailed engineering study of water leasing. Their estimates show that all of the water that SWSI projected would be needed from irrigated agriculture in the Arkansas River basin by 2030 could be met through water leasing. Specifically, they concluded that the following amounts of water would be available for lease under very conservative assumptions:

Wet Year	42,215 ac-ft
Average Year	28,629
Dry Year	14,020

For example, the estimates assume only 65 percent participation by irrigators, compared to approximately 90 percent participation by High Line Canal shareholders in the 2005—2006 Aurora lease, and over 90 percent participation in the 35-year PVID-MWD lease in California. Irrigators on the Steering Committee similarly expect over 90 percent participation. Moreover, the estimates assume a fallowing rate of 25 percent, or three in twelve years, while a more realistic assumption is probably three in ten years. Finally, in dry years, many irrigators do not have adequate water to finish crops, and would prefer to lease all of their water, which would increase the water available for lease under extreme hydrological conditions, which correspond to maximum demands of surface water-dependant municipalities.

Estimating the number of users to be served is further complicated by the fact that M&I user-lessees have different demand schedules with regard to hydrological years. For example, Colorado Springs needs to lease water to hedge against a Colorado River call, and to recover from drawing down reservoirs during a drought. Aurora apparently needs additional water during drought. The Pikes Peak Regional Water Authority is interested in average and wet year leases to recharge and extend the lives of their Denver Basin ground water supplies, but could rely on the aquifers in times of drought when other M&I user-lessees dependant upon surface water supplies might need leased water more.

e) Socio-economic characteristics of the area such as population, employment and land use.

The Lower Valley is disproportionately dependent upon farming employment compared to the state as a whole. In addition, the Lower Valley is older, poorer, and has more Latino residents than Colorado overall.

	Pueblo	Otero	Crowley	Bent	Prowers	Colorado
Population	141,172	20,311	5,518	5,998	14,483	4,301,261
Median Age	36.7	37.7	36.6	37.3	32.4	34.3
Farmers %	0.6	2.4	3.9	4.4	3.7	0.7
Latino %	38.0	37.6	22.5	30.2	32.9	17.1
Median Income	$32,775	$29,738	$28,803	$28,125	$34,202	$47,203
Unemployment	5.9					4.4
Poverty %	14.9	14.2	15.2	16.6	14.5	6.2

Source: Census; 2002 Census of Agriculture (USDA); Bureau of Labor Statistics

	Pueblo	Otero	Crowley	Bent	Prowers	Colorado
Ag acres	19,786	32,776	5,437	33,185	166,754	3,867,422
Total acres	152,8832	808,256	504,960	968,060	1,0499,20	66,385,432
Pct Ag	1.3	4.1	1.1	3.4	15.9	5.8

3. Description of the Alternative Water Transfer Method

Please describe the type(s) of water transfers that will be examined/utilized (i.e., conceived transfer methods include, but are not limited to: 1) interruptible water supply agreements; 2) long-term agricultural land fallowing; 3) water banks; 4) reduced consumptive use through efficiency or cropping changes while maintaining historic return flows; and 5) purchase by end users with leaseback under defined conditions). In addition, please describe how the transferable consumptive use will be calculated and quantified, and how return flow patterns will be addressed/maintained.

The water leasing program of the Super Ditch will include interruptible water supply agreements to serve short term needs (up to 10 years), land fallowing and water leasing to serve longer-term needs, and possibly a water bank for needs of less than one year.

Interruptible supply agreements are authorized by CRS § 37-92-309. To the extent that the Super Ditch has stored water in priority that remains after meeting its delivery obligations under various water leases, it may sell that water to others who need it, a sort of water bank. The Super Ditch Company does not intend to operate a formal water bank under CRS § 37-80.5-102 to 106. Long-term water leases may involve adjudicating changes of water rights pursuant to CRS § 37-92-305(3) and/or substitute water supply plans pursuant to CRS § 37-92-308.

The transferable consumptive use of any water right is limited to historical consumptive use under Colorado law. In addition, a change of water right cannot injure other appropriators on the stream, which normally means that historical return flows must be maintained to prevent injury. The Super Ditch will commission the usual engineering studies to determine the historical consumptive

use, historical return flows, and transferable consumptive use when preparing applications for changes of water rights to be filed in water court. It is likely that separate change cases will be filed for each lease in order to comply with the anti-speculation doctrine by identifying the specific changed types of use and places of use. Adjudication of the change cases will require that return flow patterns are addressed and maintained as necessary to prevent injury to other water rights owners. CRS § 37-92-305(3) and (4).

While a change case is pending, the Super Ditch Company will seek administrative approval to operate under substitute water supply plans pursuant to CRS § 37-92-308(4). The State Engineer must find that operation of the plan "will replace all out-of-priority depletions in time, location and amount and will otherwise prevent injury to other water rights and decreed conditional water rights." CRS § 37-92-308(4)(a)(IV).

4. Program/Project Eligibility

Please describe how the proposed program/project meets each of the following eligibility requirements (please see Criteria and Guidelines for additional information regarding the alternative water transfer methods/strategies that qualify for funding). Note: If these requirements are addressed in other parts of the application you may simply reference the applicable section(s).

a) A description of how, if implemented, the proposed program/project will protect property and water rights.

Water Leasing is an entirely voluntary program linking irrigators with municipal and other water users. Since water leasing is voluntary, the current protections provided by Colorado law for property and water rights will apply. Moreover, the Super Ditch will operate within existing Colorado law, and not supersede, abrogate or otherwise impair the current system of water allocation within Colorado.

b) Identified group(s) of agricultural users that are or may be willing to transfer a portion of their water and identified entity(s), group(s) or area(s) where the transferred water could or would be put to the new use and a description of the new use.

Shareholders on the Bessemer Ditch, Rocky Ford High Line Canal, Oxford Farmers Ditch, Otero Canal, Catlin Canal, Holbrook Canal, and the Fort Lyon Canal may be willing to lease the use of their irrigation water rights for M&I uses anywhere along the Front Range. The Super Ditch is formally surveying these shareholders (November, 2010) regarding their interest in entering into individual leases with PPRWA and Aurora, and adopt necessary changes to ditch company articles of incorporation and bylaws at their annual meetings in December 2010 through February 2011.

Pikes Peak Regional Water Authority and Aurora have signed agreements to lease water from the Super Ditch. PPRWA members would use the leased water as a sbustitute for and/or recharge Denver Basin aquifers, which provide most of their supplies now. Either approach would extend the aquifer life, and support aquifer water levels.

Aurora's agreement is for drought, drought recovery and Colorado River calls.

Colorado Springs, Fountain and Security have also expressed interest in leasing water for drought, drought recovery and Colorado River calls.

The Colorado Division of Wildlife, and the Colorado Division of Parks have expressed interest in leasing water from the Super Ditch Company to support wildlife and recreation in John Martin Reservoir. The Super Ditch has also discussed leases with the State Engineer and DNR for the purpose of a reserve supply to meet the State's delivery obligations to Kansas under the Arkansas River Compact.

c) The program/project must at a minimum conceptually describe the technical, institutional, and legal elements of the water transfer. Grant monies may be used to address one or more of these elements. If grant monies are not requested for all three elements, the grant applicant must describe how the applicant has or intends to address the elements, which are not included in the grant request, through other efforts.

To the extent that the current grant request does not address comprehensively these elements, the Lower Ark District has already addressed them. See section on "Previous Studies" under 1 above.

d) If grant monies are proposed for use for legal assistance then the use of those funds shall be oriented toward advancing the knowledge of alternative agricultural water transfer methods and techniques; not for preparation of a specific water court case. The total requested funds for legal assistance shall not exceed 40 percent of the total grant request. In addition, grant monies proposed for use for legal assistance must be used to collaboratively address issues and concerns related to agricultural water transfer. Funds shall not be used to solely advance the cause of the project proponents.

The Lower Ark District is not requesting any funds for legal assistance.

e) A minimum of a 10 percent cash match of total project cost (past expenditures and "in kind" can not be counted toward the 10 percent match).

Applicant Lower District will contribute a 10 percent cash match toward the total cost of the project.

5. Program/Project Evaluation Criteria

The following grant evaluation criteria will be used by the CWCB to evaluate and make recommendations to fund, partially fund or not fund a grant application. The criteria are aimed at advancing alternative transfer methods from the literature and studies to actual on the ground projects/programs that provide reliable water supply and sustain key elements of the agricultural area from which the water is transferred. The applicant should fully address and explain in detail in the application how, and the extent to which, the proposed project/program meets each of the criteria. However, it should be noted that the project does not have to meet all of the criteria to be eligible to

receive funding and the criteria below are not listed in any order of important or priority.

a) The proposed project/program builds upon the work of former alternative water transfer methods efforts and addresses key areas that have been identified (e.g. reduced transaction costs, presumptive consumptive use, and verification/administration issues). For more detailed information on this work, please refer to the draft technical memorandum, "*Alternative Agricultural Transfer Methods Grant Program Summary of Key Issues Evaluation," July 16, 2010.*

The Lower Ark District is completing various technical, engineering, economic and legal analyses funded by the first round of the CWCB's Alternative Agricultural Transfer Methods Grant Program and an Arkansas River Basin Roundtable Grant. Among the issues identified in those studies, the *Grant Program Summary* noted with regard to "Infrastructure Requirements Compared to Traditional Agricultural Transfers:"

> the Super Ditch team finds that infrastructure to move water from agricultural areas to areas of municipal need is limited and/or lacking, a problem that will have to be resolved before alternative transfers can realize their potential. Municipalities are reluctant to fund infrastructure for water they lease rather than own, and infrastructure is cost-prohibitive for the irrigators. More specifically, according to the documentation supplied by the Super Ditch project team, river diversion and storage is needed near the Arkansas River to provide for cost-effective design of the conveyance facilities. Without storage, the pump stations and pipeline(s) would have to be designed for more widely varying flow rates requiring larger diameter pipe and either (1) more pumps, (2) combinations of smaller and larger capacity pumps, or (3) more variable frequency drives for the pumps. Storage is also needed near the water users systems to provide water to their treatment plants as their production rates vary seasonally and day-to-day. At least nine storage options were identified that could be readily incorporated into the Super Ditch system infrastructure.

Id., at 10-11. Limited infrastructure is a major factor contributing to high transaction costs to transport leased water from the Lower Arkansas Valley to new places of municipal use in El Paso County and Aurora.

The current grant request will build on previous engineering and economic analyses through additional engineering analysis and modeling of reservoir operations, water storage operations, recovery of non-exchangeable supplies, and calibration and optimization of the use of existing and permitted facilities and infrastructure to deliver leased water from the Lower Arkansas Valley to new places of municipal use in El Paso County and Aurora.

b) Preference will be given to projects that provide additional matching resources in the form of cash, past expenditures and in-kind contributions that are in addition to the required 10% cash match.

Applicant Lower Ark District has spent more than $2 million developing the Super Ditch leasing

program. The District will also will contribute a 10 percent cash match toward the total cost of the project. In addition, the District will absorb the costs of managing the grant (overhead), which could be as much as an additional 10 percent in-kind match.

c) The proposed project/program has the ability/potential to produce a reliable water supply that can be administered by the State of Colorado, Division of Water Resources.

Historical buy-and-dry demonstrates that taking land out of irrigation and using the water for other uses in other places pursuant to water court decrees or substitute water supply plans can be administered by the State Engineer. The water leasing program is based on the same concept, except that different lands may be taken out of irrigation each year. There is at least one existing augmentation plan in Division 1, the South Platte, that provides for this. Case Nos. 03CW84 (2009) and 119 (2010).

In order to be able to prove to the water court that water leasing will not injure other water rights owners, the Super Ditch will have to prove that the change can be administered. Notice and accounting requirements in the decree can require that the Company notify the Division of Water Resources of the lands that will not be irrigated in any year by some date certain, and provide appropriate and timely accounting for the dry-up and transferred use of such water rights. The Super Ditch will work with the Division Engineer to anticipate administration issues as it prepares the detailed engineering for each water lease, water court applications and substitute water supply plan applications. The Company may also propose terms and conditions in its applications that would address administration.

d) The proposed project/program produces information that is transferable and transparent to other users and other areas of the state (i.e., would provide an example "template" or roadmap to others wishing to explore alternate transfer methods).

The critical questions for large scale water leasing either have been, are being, or will be answered by the Super Ditch Project. Much of this information, particularly the legal work, is generic and applicable anywhere in Colorado. The technical, engineering and economic work is applicable to any traditional or alternate transfer in the Arkansas River basin between Pueblo and John Martin Reservoirs. The technical, engineering and economic analyses also provide a roadmap that other areas of the state wishing to explore alternate transfer methods can replicate. All of the information has been prepared with public funds and is available to others who wish to examine and use it.

e) The proposed project/program addresses key water needs identified in SWSI or as identified in a basin's needs assessment.

See response to 1 above, "The Problem," which reviews SWSI findings relevant to the proposed program.

f) The proposed project/program advances the preservation of high value agricultural lands. Value can be viewed as: the value of crops produced, the value the agriculture provides to the local community, and the value the agricultural area provides for open space and wildlife habitat.

The Lower Arkansas Valley depends on irrigated agriculture for its economic base. Preservation of irrigation in the Lower Valley thus qualifies as "high value agricultural lands." Water leasing is intended to preserve such agriculture. See also response to # 2 e above which contains socioeconomic information showing that the Lower Valley is disproportionately dependant upon farm employment, poor, unemployed, and minority as compared to the rest of the state.

g) The proposed project/program addresses water quality, or provides other environmental benefits to rivers, streams and wetlands.

The Lower Ark District's first Alternative Agricultural Transfer Methods Grant Program application included a task that would have specifically addressed the water quality effects of water leasing, which are expected to be positive. The proposed investigators were Dr. Tim Gates, the leader in this field of investigation, and his team, who proposed to quantify the expected impacts of water leasing. The CWCB did not fund this task, and while the Lower Ark District may resubmit it for future funding, the District feels there are more immediate issues to address to advance water leasing.

h) The proposed project/program increases our understanding of and quantifies program/project costs. This could include: institutional, legal, technical costs, and third party impacts.

These costs have been or are being addressed in the Lower Ark District's first Alternative Agricultural Transfer Methods Grant, as follows:

Projected institutional costs of operating the Super Ditch Company will be part of the Financial Plan prepared under Task A.

Third party impacts have been addressed by prior studies, specifically HDR's Final Engineering and Economic Feasibility Analysis (Nov. 2007), as well as the "Tipping Point" Task added by the CWCB.

Technical issues have been addressed in prior studies by HDR and Boyle, and are further addressed in Tasks C, D, E, F and G.

Front-end legal costs have largely been incurred, and will be quantified in Task G.

Task G will integrate the various studies into one comprehensive report that can serve as a roadmap or template for other areas of the state interested in water leasing as an alternative to continued buy-and-dry of irrigated agriculture.

i) The proposed project/program does not adversely affect access to other sources of water (not subject to/participating in the program) where owners of these water rights may wish to pursue traditional transfer of their rights to other users.

Water leasing is entirely voluntary so it cannot impact anyone who does not want to participate and who wants to sell or otherwise dispose of their water rights.

j) The proposed project/program provides a perpetual water supply for the new and/or alternate use and preserves agricultural production and/or helps sustain the area's economy from which the transfer is occurring.

Water leasing can provide as perpetual of a supply of water to M&I users as they are willing to contract for. For example, at least some irrigators would be willing to enter into so-called "evergreen" leases under the right terms and conditions, including terms concerning lease price escalations that would keep pace with the market value of their water rights.

Water leasing preserves ownership of the water rights in the hands of the irrigators, who will continue to use such water for agricultural production when it is not delivered pursuant to a lease. Continued agricultural production will also sustain local communities and economies. This is evident simply by driving through Sugar City, a community which served land dried up under the Colorado Canal, and Lamar, another community which has not been impacted to any great extent by the transfer of irrigation water rights to M&I use.

k) The quantity of water produced by the proposed project/program. Preference will be given to programs that can address larger water supply needs.

HDR and Honey Creek Resources ran a number of scenarios as part of the detailed engineering study of water leasing. They concluded that the following amounts of water would be available for lease under very conservative assumptions:

Wet Year	42,215 ac-ft
Average Year	28,629
Dry Year	14,020

These amounts might provide all of the water that SWSI projected would be provided by irrigated agriculture in the Lower Arkansas River basin for M&I use by 2030. For further information, see response to # 2 above.

6. Statement of Work

Provide the proposed statement of work. On the following page there is an example format for the statement of work. You can use the example format or your own format, provided that comparable information is included. The statement of work should outline by task how the proposed program/project will be accomplished. It is important that the statement of work detail the specific steps, activities/procedures that will be followed to accomplish each individual task and the overall

program/project and the specific products/deliverables that will be accomplished. The statement of work must include but not be limited to: task description, key personnel, budget, schedule and deliverables and the final report/project documentation upon completion of the water activity.

The statement of work will form the basis for the contract between the Applicant and the State of Colorado. In short, the Applicant is agreeing to undertake the work for the compensation outlined in the statement of work and budget, and in return, the State of Colorado is receiving the deliverables/products specified. Please note that costs incurred prior to execution of a contract or purchase order are not subject to reimbursement.

Please provide a detailed statement of work using the following template. Additional sections or modifications may be included as necessary. Please define all acronyms. If a grant is awarded an independent statement of work document will be required with correct page numbers.

Statement of Work

WATER ACTIVITY NAME -

GRANT RECIPIENT –

FUNDING SOURCE -

INTRODUCTION AND BACKGROUND

Provide a brief description of the project. (Please limit to no more than 200 words; this will be used to inform reviewers and the public about your proposal)

Recent efforts by Colorado State University, University of Nebraska, the USDA Agricultural Research Service (ARS), the private firm Regenesis, and others have focused on farm economics in a static environment, meaning results are for a single time period only, with future conditions extrapolated from the snapshot result. They use expected farm yields, prices, and production costs to determine:

- At what point is it more profitable to sell or lease water than use it for irrigation, establishing a theoretical floor on the price of transferable irrigation supplies.

- What adjustments an irrigator can make to their irrigated acreage levels, crop mix, crop water application rates, and irrigation technology to mitigate reduced water supplies. The degree of these adjustments is typically estimated using optimization methods, primarily profit maximization using linear programming.

Collectively, these efforts have developed valuable decision-making tools for irrigators considering selling or leasing some portion of their operation's water supply. However, these tools may only account for a portion of the farm economics picture as viewed by irrigators. Two important, related aspects not yet fully considered include:

1. In the case of water leases, how the transfer terms impact the long-term financial picture of the remaining farm operation over a number of wet and dry hydrologic cycles. In effect, what is the impact on the operation's cash flow over time? On a parcel basis under assumed conditions, it has been shown that an operator may be better off financially by leasing a portion of their supply compared to continuing their current practices, but little has been offered to show how this affects the whole-farm financial structure. One piece of evidence that it may improve the larger operation would be increasing net income over time compared to the no-action option, with less variability. A second piece might be the operation's ability to meet minimum revenue levels needed to repay debt or meet other major financial obligations. Ability to meet year-in and year-out debt obligations was a major factor for irrigators in the Palo Verde Irrigation District when structuring their rotational fallow program with MWD.

2. The ever-present uncertainties of agricultural production, such as uncertain prices, yields, and input costs. In light of these, analyses have tended to use either expected values or have used low and high ranges to place bounds on their possible outcomes. From a planning perspective, these are reasonable responses to reign-in the analysis. However, from an operator perspective, there are potential opportunity costs that need to be highlighted in order to assess the full upside and downside of a potential transfer. For instance, operators selling their water 10 years ago faced far lower future crop price expectations than they would have 5 years ago, and different than they would today. Additionally, it cannot be taken for granted that water's future marginal value will always be higher for municipal water supply than for irrigation.

OBJECTIVES

List the objectives of the project

This effort's objective is to develop a whole-farm financial planning analysis that considers irrigation water transfers over an extended period of time and also the inherent uncertainties underlying irrigators' decisions to lease, sell, or keep all or a portion of their water supply. To accomplish this objective, a farm financial planning model will be developed. The underlying components of the proposed model are discussed below.

Cash Flow Model

A cash flow model will be the basis for the analysis, with each line item in the analysis drawing from a component of the model. This analysis would consist of four components to account for (1) nature of the contract, water demand, and lease revenues; (2) sources of funds; (3) uses of funds; and (4) carryover balances. The model will cover the time period 2010-2050, which is estimated to be the approximate life of a water lease contract and is sufficiently long as to experience a wide range of hydrologic conditions.

A number of case studies from the Lower Arkansas Valley are recommended for initially testing the model and for subsequent analysis, with each case study representing a different type of operation. Types of operations might include:

- Medium to large-sized irrigated cash grain and/or alfalfa operation, representative of a well-established owner-operator with minimal debt load.

- Smaller, heavily-leveraged cash grain/alfalfa operation, representative of a younger operator with a mix of owned and rented cropland.

- Medium-sized grain and forage operation supporting a cattle feeding operation, with relatively high debt load.

Crop rotations typical of these types of operations in the Lower Arkansas Valley would be developed for baseline revenue and cost projections.

Water Component

The Water component defines the proposed lease type, its terms, the frequency of water deliveries taking place, and other information needed to determine lease proceeds in a given year of the analysis. For example, the lease could require fallowing a proportion of their irrigated acreage at a given frequency, say 1 in every 4 years. The lease terms may require some compensation to the operator every year, with additional compensation in years when water is delivered. The price received for water, either on a per acre basis or per acre-foot basis, would be initially specified but price escalators would be used to adjust prices over time.

Based on the terms of the proposed hypothetical lease contract, Leonard Rice Engineering (LRE) will use historic data to develop one or more hydrologic sequences to determine which years during the period 2010-50 the lease might be exercised and how much water the farm would be giving up in those years and how much remaining supplies are available for irrigation. The output from the water component would be a schedule of lease revenues and acres to be fallowed for each year of each hydrologic sequence developed.

Sources of Funds

Annual sources of funds include lease proceeds, revenues from crop production and/or livestock production, and interest income. Carryover cash balances from the previous year are also a source of funds.

Annual lease proceeds are estimated in the Water component. Revenues from crop production for each year of the analysis would be estimated based on irrigated acreage (also estimated in the Water component) and expected crop yields and prices. For the baseline analysis expected crop yields and prices would be developed from historical data indexed to the current period. Uncertainty associated with these variables is addressed later in this proposal. Similarly, baseline fed cattle prices can be indexed from historical data.

Uses of Funds

Uses of funds consist of crop and livestock production expenses, land costs, taxes, hired labor, and depending on the organizational structure of the operation, either the operator's wages or a family living allowance.

Crop expenses will be categorized as seed, fertilizer, chemicals, fuel, repairs, hired labor, custom work, and interest expenses. Existing enterprise crop budgets available through CSU and other sources will be used to develop baseline estimates of total crop expenses for the entire operation. Further, based on assumptions regarding the debt structure of the case study, the operation's fixed cost outlays will be estimated.

Livestock expenses will include feeder cattle purchase, feed, supplements, veterinary supplies, hired labor, and interest expenses. Similarly, payments towards fixed costs will depend on the operator's assumed existing debt.

Contribution to Reserves

For a given year the difference in sources of funds and uses of funds is the contribution to cash reserves. In this cash flow analysis, the annual contribution to reserves can be equivalently considered the operation's annual profit. The reserves themselves could be considered savings or accumulated wealth.

Results of the Baseline Analysis

The results of the analysis are the comparative cash flow impacts of water transfer options for various types of operations with differing financial situations. These options would include rotational fallow leases, outright sales, and no-action. Important financial components would be the annual contribution to annual reserves, its variability over time, and the ability to maintain a positive balance in cash reserves over the entire period of analysis.

In addition, and possibly as important, will be the model's ability to work backwards in the analysis to see what conditions must be met for the various transfer options to work for the various types of farm operations under a range of financial conditions. The model's spreadsheet-based framework will allow for a wide range of "what if" scenarios.

Dealing with the Uncertainty of Future Commodity Prices, Yields, and Costs

Overall, farm commodity prices have increased significantly during the latter half of this decade, about 50 to 75 percent higher than their relatively stationary levels during the 1980's to the early 2000s. For instance, Corn Belt corn prices have appeared to reach a new plateau of about $3.50 per bushel, up from the $2.00 per bushel range experienced during the previous 20 years. However, there is greater variability around this new level than around the old price levels, driven by increased market speculation and greater exposure to international weather events and politics. To an Arkansas Valley irrigator, this means that higher crop prices may be expected in the future, but it's a big risk getting there. However, it introduces a seed of doubt about whether selling or leasing water is always the most profitable decision over time and forces one to re-examine the risk and returns of continuing irrigating.

Adding to this uncertainty in the opposite direction are widespread rumors that new drought-resistant crop hybrids will soon be available that have the ability to achieve high yields under substantial water stress, making deficit irrigation cost effective. On the cost side, it is well-known that fuel and fertilizer costs have varied tremendously over the last 3 years.

Methods of Dealing with Uncertainty and Recommendation

Overall, it's clear that farmers deal in a highly uncertain environment that weighs heavily upon them. Accounting for this uncertainty in the context of deciding whether to sell water, lease water, or continue irrigating is essential. Previous analyses have dealt with uncertainties in various ways, including:

- Considering worst case and best case scenarios to bracket possible outcomes.
- Through sensitivity analysis, identifying key variables and their impact on the outcomes.

- Similar to how water planners deal with average and firm yield concepts, use a probabilistic approach that identifies strategies that meet certain criteria, say for example, 90 percent of the time.

Of these approaches, the latter is most appealing because it uses all of the information available about the future uncertainties in the most efficient manner. In addition, it likely matches-up with the decision process used by irrigators, although they would probably not express the process in such academic terms. The use of a probabilistic approach is recommended here to develop a range of possible future cash flow scenarios for the decision of whether to sell, lease, or continue irrigating.

In addition, it is recommended that Monte Carlo simulation be the method used to generate ranges of possible cash flow paths over time, based on the underlying uncertainty of each critical variable and the correlation between these critical variables. The critical variables are anticipated to be crop yields, crop prices, and input costs, which translate to line items under the Sources of Funds and Uses of Funds cash flow model components. Other than Monte Carlo simulation, there are few other tools available to synthesize these future cash flow paths. In addition, Monte Carlo analysis has a long history in the commodity trading business as a risk management tool and has also been used to examine risk-reducing strategies by Colorado farm operators.[1]

The underlying uncertainty of critical variables would be described by a statistical probability distribution. The characteristics of this distribution would be based on historic variability, with added emphasis of its variability over the last 10 years.

Results of the Uncertainty Analysis

The output of the Monte Carlo-based uncertainty analysis would be cash flow paths over time corresponding to each decision made – whether to sell, lease, or continue farming, that have statistical distributions associated with each. These statistical distributions can be used to develop traditional confidence intervals around these paths, or they can be used to support statements such as the following:

- "If I lease water from with 25% of my operation in one of every 4 four years, there is a 90 percent probability that my accumulated savings will exceed my annual operating costs after 10 years and I can meet all debt obligations in all years. If I don't lease water there is only a 50% probability that I'll accumulate this level of reserves in 10 years and I can only meet debt service obligations 60% percent of the time."

The above statement is intentionally biased towards the leasing option in order to illustrate the ability of the probabilistic-based analysis to use all available information. It is also propped on the assumptions that would have to be made about the uncertain variables, but it realistically recognizes that nothing in the future is certain and placing "odds" on outcomes is the best an analyst can do.

[1] King, Robert P. and George Oamek. "Risk Management by Colorado Dryland Wheat Farmers and the Elimination of the Disaster Assistance Program." American Journal of Agricultural Economics, Vol. 65, No. 2 (May, 1983), pp. 247-255.

TASKS

Provide a detailed description of each task using the following format

Task 1. Cash Flow Model

Description of Task

Develop the Cash Flow Model.

Method/Procedure

Develop the spreadsheet-based cash flow model described above assuming expected values for critical income variables. In addition, develop the model for a single case study, the medium to large-sized cash grain operation, assuming an established farm operator with a relatively small debt load. Seek Quality Control review of the model and revise it as considered necessary.

Deliverables

- Spreadsheet model with documentation provided in an appendix to the Final Report.
- Sections in Final Report discussing the cash flow model and its components.

Task 2. Case Studies

Description of Task

Develop the remaining case studies.

Method/Procedure

Based on the experience gained from the initial case study and the Quality Control review, develop the remaining case studies.

Deliverables

- Spreadsheet models of case studies.
- Sections in Final Report discussing case studies and insights gained from them.

Task 3. Uncertainty Analysis

Description of Task

Develop the uncertainty analysis with respect to most critical variables.

Method/Procedure

Develop the Monte Carlo simulation component of the cash flow model. Base the underlying statistical characteristics of the uncertain variables (prices, yields, and costs) on historical trends and variability. Develop this component in a modular framework, allowing it to be switched on and off at the user's discretion.

It is anticipated that Microsoft Excel add-ins "Crystal Ball" or @Risk" will be used to implement the Monte Carlo approach.

Deliverables

- Spreadsheet model of first case study, with embedded assumptions about variables' uncertainties. This model would be observable in Excel, but only executable with the Excel add-in.
- Section in Final Report discussing risk and uncertainties and assumptions used to make the model operational

Task 4. Irrigator Workshop

Description of Task

Conduct an irrigator workshop.

Method/Procedure

Conduct a small, informal workshop with a number of Lower Arkansas Basin irrigators to "reality check" the model and its assumptions. Focus initially on the cash flow component, making sure some level of buy-in is achieved prior to discussing the uncertainty component. This meeting could be prior to a larger LAVWCD Board meeting or a Super Ditch Board meeting to minimize inconvenience to the participants.

Deliverables

- The workshop is the deliverable
- Summary notes and Action Items from the Workshop will be summarized in the Final Report.

Task 5. Draft and Final Reports.

Description of Task

Develop the Draft Final Report and the Final Report.

Method/Procedure

Develop a Draft final report for electronic distribution to the CWCB and LAVWCD. After a 2-week comment period, develop the Final Report. The Final Report will be electronically distributed as a pdf file, with two bound copies for the CWCB. Although it is not anticipated that software will be developed as part of this effort, the spreadsheet model would be available for distribution post-development. Using the full model, including the uncertainty component, would require specialized Monte Carlo software. However, since this component would be modular, the baseline model remains usable with Excel.

Deliverable

Draft Final Report and Final Report.

REPORTING AND FINAL DELIVERABLE

Reporting: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of the executed contract. The progress report shall describe the completion or partial completion of the tasks identified in the statement of work including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Deliverable: At completion of the project, the applicant shall provide the CWCB a final report that summarizes the project and documents how the project was completed. This report may contain photographs, summaries of meetings and engineering reports/designs.

Development of the final deliverables, the Draft Final Report and the Final Report is included as Task 5 above. The project will be less than 6 months in duration and, as a result, not require a 6-month progress report.

BUDGET

The total estimated cost for the Farm Financial Model is $32,000 (rounded), derived in the following tables.

Total Cost

Task		Labor	Other Direct Costs	Matching Funds	Total Project costs
1	Develop baseline cash flow model	$ 8,100	$ 50	$ -	$ 8,150
2	Develop case studies	$ 7,000	$ 61	$ -	$ 7,061
3	Develop uncertainty component	$ 3,940	$ -	$ -	$ 3,940
4	Irrigator workshop	$ 5,620	$ 682	$ -	$ 6,302
5	Report writing	$ 6,100	$ 80	$ -	$ 6,180
	Cost	$ 30,760	$ 873	$ -	$ 31,633

Labor

Task		Project Manager	Senior Economist	Project Engineer	Economist	Senior Reviewer	Estimated labor cost
		$ 200.00	$ 150.00	$ 165.00	$ 110.00	$ 150.00	
1	Develop baseline cash flow model	4	32	8	8	2	$ 8,100
2	Develop case studies	0	32	8	8		$ 7,000
3	Develop uncertainty component	0	16	4	8		$ 3,940
4	Irrigator workshop	8	16	8		2	$ 5,620
5	Report writing	4	24	4	4	4	$ 6,100
	Total hours	16	120	32	28	8	$ 30,760
	Cost	$ 3,200	$ 18,000	$ 5,280	$ 3,080	$ 1,200	

Other Direct Costs

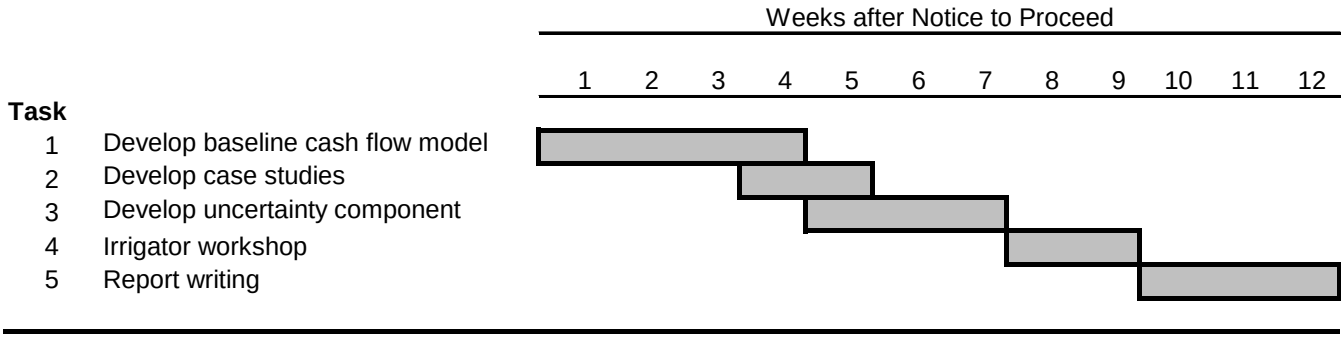
Task		Copies	Materials	Equipment and supplies	Mileage	Lodging and other travel costs	Estimated cost
	Units	No.	$	$	miles	$	
	Unit cost	$ 0.20			$ 0.51		
1	Develop baseline cash flow model			$ 50.00			$ 50.00
2	Develop case studies				120		$ 60.60
3	Develop uncertainty component						$ -
4	Irrigator workshop	400	$ 100.00	$ 100.00	400	$ 200.00	$ 682.00
5	Report writing	400					$ 80.00
	Total	800	$ 100.00	$ 150.00	520	$ 200.00	$ 872.60
	Cost	$ 160.00	$ 100.00	$ 150.00	$ 262.60	$ 200.00	

SCHEDULE

Provide a project schedule including key milestones for each task and the completion dates or time period from the Notice to Proceed (NTP). This dating method allows flexibility in the event of potential delays from the procurement process. Sample schedules are provided below. Please note that these schedules are examples and will need to be adapted to fit each individual application.

The proposed project schedule is shown below. The project is anticipated to be 12 weeks in duration.

Schedule for Farm Financial Planning Analysis



PAYMENT

Payment will be made based on actual expenditures and invoicing by the applicant. Invoices from any other entity (i.e. subcontractors) cannot be processed by the State. The request for payment must include a description of the work accomplished by major task, and estimate of the percent completion for individual tasks and the entire water activity in relation to the percentage of budget spent, identification of any major issues and proposed or implemented corrective actions. The last 5 percent of the entire water activity budget will be withheld until final project/water activity documentation is completed. All products, data and information developed as a result of this grant must be provided to the CWCB in hard copy and electronic format as part of the project documentation. This information will in turn be made widely available to the public and help promote the development of alternative agricultural transfer methods.

Additional Information – If you would like to add any additional pertinent information please feel free to do so here.

The above statements are true to the best of my knowledge:

Signature of Applicant:

Print Applicant's Name:

Project Title:

Return this application to:

Mr. Todd Doherty
Colorado Water Conservation Board
Water Supply Planning Section
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Denver, CO 80203
Todd.Doherty@state.co.us