COLORADO
DEPARTMENT OF NATURAL RESOURCES

COLORADO WATER CONSERVATION BOARD

WATER SUPPLY RESERVE ACCOUNT GRANT APPLICATION FORM

Super Ditch Delivery Engineering	Arkansas River Basin
Name of Water Activity/Project	**Approving Basin Roundtable**

$225,837.00		Amount from Statewide Account	$225,837.00
Total Amount of Funds Requested		Amount from Basin Account	0

Application Content

Attachments

1. Reference Information
2. Insurance Requirements (Projects Over $25,000)
3. WSRA Standard Contract (Projects Over $100,000)
4. W-9 Form (Required for All Projects)

Instructions

To receive funding from the Water Supply Reserve Account (WSRA), a proposed water activity must be approved by the local Basin Roundtable AND the Colorado Water Conservation Board (CWCB). The process for Basin Roundtable consideration/approval is outlined in Attachment 1.

Once approved by the local Basin Roundtable, the applicant should submit this application, a detailed statement of work, detailed project budget, and project schedule to the CWCB staff by the application deadline.

The application deadlines are:

- Basin Account – 60 calendar days prior to the bi-monthly Board meeting
- Statewide Account – 60 calendar days prior to the September Board meeting

Board Meeting Dates	Basin Account Deadlines	Statewide Account Deadlines
July 20-21, 2010	May 21, 2010	n/a
September 21-22	July 23, 2010	July 23, 2010
November 16-17	September 17, 2010	n/a
January 2011	60 days prior	n/a
March 2011	60 days prior	n/a
May 2011	60 days prior	n/a
July 2011	60 days prior	n/a
September 2011	60 days prior	60 days prior

When completing this application, the applicant should refer to the WSRA Criteria and Guidelines available at: http://cwcb.state.co.us/IWMD.

The application, statement of work, budget, and schedule must be submitted in electronic format (Microsoft Word or text-enabled PDF are preferred) and can be emailed or mailed on a disk to:

Mr. Todd Doherty
Colorado Water Conservation Board
Water Supply Planning Section
WSRA Application
1580 Logan Street, Suite 200
Denver, CO 80203
Todd.Doherty@state.co.us

If you have questions or need additional assistance, please contact Todd Doherty of the Water Supply Planning Section at 303-866-3441 x3210 or todd.doherty@state.co.us.

Water Supply Reserve Account – Grant Application Form
Form Revised March 2009

Part A. - Description of the Applicant (Project Sponsor or Owner);

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

Mailing address: 801 Swink Ave.
Rocky Ford, CO 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 St.. Suite 1600. Denver. CO 80203 Tel: 303-339-5825

Position/Title Special Counsel

3. Eligible entities that may apply for grants from the WSRA include the following. What type of entity is the Applicant?

[ ] Public (Government) – municipalities, enterprises, counties, and State of Colorado agencies. Federal agencies are encouraged to work with local entities and the local entity should be the grant recipient. Federal agencies are eligible, but only if they can make a compelling case for why a local partner cannot be the grant recipient.

[X] Public (Districts) – special, water and sanitation, conservancy, conservation, irrigation, or water activity enterprises.

[ ] Private Incorporated – mutual ditch companies, homeowners associations, corporations.

[ ] Private individuals, partnerships, and sole proprietors are eligible for funding from the Basin Accounts but not for funding from the Statewide Account.

[ ] Non-governmental organizations – broadly defined as any organization that is not part of the government.

4. Provide a brief description of your organization

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, CO 81067
719-469-8935
or

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

5. If the Contracting Entity is different then the Applicant (Project Sponsor or Owner) please describe the Contracting Entity here.

Not Applicable.

6. Successful applicants will have to execute a contract with the CWCB prior to beginning work on the portion of the project funded by the WSRA grant. In order to expedite the contracting process the CWCB has established a standard contract with provisions the applicant must adhere to. A copy of this standard contract is included in Attachment 3. Please review this contract and check the appropriate box.

[X] The Applicant will be able to contract with the CWCB using the Standard Contract

[ ] The Applicant has reviewed the standard contract and has some questions/issues/concerns. Please be aware that any deviation from the standard contract could result in a significant delay between grant approval and the funds being available.

7. The Tax Payer Bill of Rights (TABOR) may limit the amount of grant money an entity can receive. Please describe any relevant TABOR issues that may affect the applicant.

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 Lower Ark 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. This approach has been successful for four previous CWCB grants (2 concerning the Super Ditch, including one WSRA grant, and 2 concerning the State Engineer's Irrigation Improvements Rules).

Part B. - Description of the Water Activity

1. Name of the Water Activity/Project:

   Super Ditch Delivery Engineering

2. What is the purpose of this grant application? (Please check all that apply.)

[ ] Environmental compliance and feasibility study

[ ] Technical Assistance regarding permitting, feasibility studies, and environmental compliance

[ ] Studies or analysis of structural, nonstructural, consumptive, nonconsumptive water needs, projects

Study or Analysis of:

- [ ] Structural project or activity
- [ ] Nonstructural project or activity
- [ ] Consumptive project or activity
- [ ] Nonconsumptive project or activity

[X] Structural and/ or nonstructural water project or activity

3. Please provide an overview/summary of the proposed water activity (no more than one page). Include a description of the overall water activity and specifically what the WSRA funding will be used for.

The purpose of the "Super Ditch Company" is to create an alternative to what has been historically "buy-and-dry" of irration 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. This is important to the core mission of the LAVWCD, created by voters in 2002 to preserve agricultural water in the Arkansas River.

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. The Roundtable's update of these estimates are even larger. *See* Projects & Methods to Meet the Needs of the Arkansas Basin (2009).

No one has implemented water leasing on the scale proposed by the Super Ditch anywhere. The most analogous program, involving the Palo Verde Irrigation District and the Metropolitan Water District of Southern California involves just one ditch company, one municipal lessee, and one water right. The Super Ditch involves up to seven ditch companies, hundreds of irrigators, more than a dozen municipal lessees, and dozens and dozens of water rights from Pueblo Reservoir to John Martin Reservoir.

The Super Ditch's ability to deliver leased water to Pueblo Reservoir – from where municipal lessees would transport water to their place of use – is a significant threshold issue for both the irrigators and municipalities. And while the LAVWCD and Super Ditch have made substantial progress resolving this question (with the assistance of the Roundtable and CWCB grants), previous studies identified additional engineering necessary to answer that question.

The LAVWCD expects that additional engineering, which is the subject of this application, will help answer those issues. The request is for $227,837 from the Statewide WSRA, with a 20 percent match by the LAVWCD ($56,460).

Part C. – Threshold and Evaluation Criteria

1. Describe how the water activity meets these **Threshold Criteria.** (Detailed in Part 3 of the Water Supply Reserve Account Criteria and Guidelines.)

a) The water activity is consistent with Section 37-75-102 Colorado Revised Statutes.[1]

Water Leasing is specifically intended to allow M&I water providers to meet their future demands through an alternative -- to historical acquisition and transfer of agricultural water rights -- that will maintain land in irrigation. The activity is an entirely voluntary program to link irrigators with water to lease to municipal and other water users with unmet water demands.

Water Leasing would operate within existing Colorado law, and not supersede, abrogate or otherwise impair the current system of water allocation within Colorado. In addition, Water Leasing also would not supersede, abrogate, or cause injury to vested water rights or decreed conditional water rights.

Water Leasing would not be implemented in any way that would diminish, impair, or cause injury to any property or contractual right created by intergovernmental agreements, contracts, stipulations among parties to water cases, terms and conditions in water decrees, or any other similar document related to the allocation or use of water. Further, Water Leasing would not impair, limit, or otherwise affect the rights of persons or entities to enter into agreements, contracts, or memoranda of understanding with other persons or entities relating to the appropriation, movement, or use of water under other provisions of law

[1] 37-75-102. Water rights - protections. (1) It is the policy of the General Assembly that the current system of allocating water within Colorado shall not be superseded, abrogated, or otherwise impaired by this article. Nothing in this article shall be interpreted to repeal or in any manner amend the existing water rights adjudication system. The General Assembly affirms the state constitution's recognition of water rights as a private usufructuary property right, and this article is not intended to restrict the ability of the holder of a water right to use or to dispose of that water right in any manner permitted under Colorado law. (2) The General Assembly affirms the protections for contractual and property rights recognized by the contract and takings protections under the state constitution and related statutes. This article shall not be implemented in any way that would diminish, impair, or cause injury to any property or contractual right created by intergovernmental agreements, contracts, stipulations among parties to water cases, terms and conditions in water decrees, or any other similar document related to the allocation or use of water. This article shall not be construed to supersede, abrogate, or cause injury to vested water rights or decreed conditional water rights. The General Assembly affirms that this article does not impair, limit, or otherwise affect the rights of persons or entities to enter into agreements, contracts, or memoranda of understanding with other persons or entities relating to the appropriation, movement, or use of water under other provisions of law.

b) The water activity underwent an evaluation and approval process and was approved by the Basin Roundtable (BRT) and the application includes a description of the results of the BRTs evaluation and approval of the activity. At a minimum, the description must include the level of agreement reached by the roundtable, including any minority opinion(s) if there was not general agreement for the activity. The description must also include reasons why general agreement was not reached (if it was not), including who opposed the activity and why they opposed it. Note- If this information is included in the letter from the roundtable chair simply reference that letter.

This information will be addressed in the letter from the roundtable chair.

c) The water activity meets the provisions of Section 37-75-104(2), Colorado Revised Statutes.[2] The Basin Roundtable Chairs shall include in their approval letters for particular WSRA grant applications a description of how the water activity will assist in meeting the water supply needs identified in the basin roundtable's consumptive and/or non-consumptive needs assessments.

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.

Water Leasing is a method to meet consumptive needs identified by SWSI and the roundtables within the Arkansas Basin, including agricultural, municipal, wildlife, and recreational demands. In addition, it builds on the work of the SWSI Technical Review Team on Alternatives to Agricultural Transfers and the IBCC's Subcommittee on Agricultural Transfers by furthering the development of the most promising alternative identified: water leasing. It is specifically intended to allow M&I water providers to meet their future demands through an alternative to historical acquisition and

[2] 37-75-104 (2)(c). Using data and information from the Statewide Water Supply Initiative and other appropriate sources and in cooperation with the on-going Statewide Water Supply Initiative, develop a basin-wide consumptive and nonconsumptive water supply needs assessment, conduct an analysis of available unappropriated waters within the basin, and propose projects or methods, both structural and nonstructural, for meeting those needs and utilizing those unappropriated waters where appropriate. Basin Roundtables shall actively seek the input and advice of affected local governments, water providers, and other interested stakeholders and persons in establishing its needs assessment, and shall propose projects or methods for meeting those needs. Recommendations from this assessment shall be forwarded to the Interbasin Compact Committee and other basin roundtables for analysis and consideration after the General Assembly has approved the Interbasin Compact Charter.

transfer of agricultural water rights that will maintain land in irrigation. Thus, Water leasing will facilitate M&I water providers meeting future needs identified by SWSI and the Roundtable, while fostering the continued irrigation of land in the Arkansas River Basin, along with its associated agricultural productivity and economic activity.

d) Matching Requirement: For requests from the Statewide Fund, the applicants is required to demonstrate a 20 percent (or greater) match of the request from the Statewide Account. Sources of matching funds include but are not limited to Basin Funds, in-kind services, funding from other sources, and/or direct cash match. Past expenditures directly related to the project may be considered as matching funds if the expenditures occurred within 9 months of the date the application was submitted to the CWCB. Please describe the source(s) of matching funds. (NOTE: These matching funds should also be reflected in your Detailed Budget in Part D of this application)

The Lower Arkansas Valley Water Conservancy District has expended over $2,000,000 to date to develop Water Leasing program and Lower Arkansas Valley Super Ditch Company, and will continue to expend funds for that purpose to address the organizational and operational issues of the Super Ditch Company. In addition, the LAVWCD, in cooperation with potential lessors, lessees and ditch companies will provide matching funds and/or in-kind contributions sufficient to complete the Scope of Work included in this Request ($56,460).

2. For Applications that include a request for funds from the Statewide Account, describe how the water activity meets the **Evaluation Criteria.** (Detailed in Part 3 of the Water Supply Reserve Account Criteria and Guidelines.)

Tier 1: Promoting Collaboration/Cooperation and Meeting Water Management Goals and Identified Water Needs.

Agricultural water leasing by the Super Ditch addresses multiple needs, issues and interests. Specifically, agricultural water leasing provides an alternative to historical buy-and-dry of irrigation water rights by municipal providers. Leasing meets the needs of irrigators and agricultural communities for an alternative way for irrigators to realize the value of their most valuable asset – their water – without having to sell their water rights and dry up their irrigated land. Leasing thus meets the needs of rural economies and communities for the economic base provided by on-going irrigated agriculture. *See* Tipping Point, Phase 2. In addition, leasing can meet the needs of municipal providers for additional water supplies without permanent reductions in irrigated agricultural lands. *See* SWSI Major Finding 2. Moreover, leasing addresses public concern about the dry up of irrigated agriculture. *See* IBCC Visioning Process. In sum, leasing serves the multiple needs, issues and interests of irrigated agriculture, rural communities, and thirsty municipalities.

The Lower Arkansas Valley Water Conservancy District in support of the Lower Arkansas Valley Super Ditch Company seeks funding for additional engineering to address the delivery of

leased water to multiple entities, including the Pikes Peak Regional Water Authority (Fountain, Monument, Cherokee Metro District, Donala Water and Sanitation District, Triview Metro District, Woodmoor Water and Sanitation District), Colorado Springs, Aurora, and others. Approximately 2,000 shareholders of the Bessemer, Rocky Ford Highline, Oxford, Otero, Catlin, Holbrook and Fort Lyon canal companies are potential lessors. Water leasing thus promotes cooperation and collaboration among historically competing interests. For example, Aurora and Colorado Springs have previously purchased and permanently dried up tens of thousands of acres of formerly irrigated farmland in the Lower Arkansas Valley to meet their needs. In contrast, water leasing can meet their future needs without permanent dry up. Water leasing is the most significant source of water to meet future intrabasin needs – and can also meet some interbasin needs – while addressing concerns about future agricultural dry up.

SWSI identified a municipal gap in the Arkansas Basin of approximately 17,000 acre-feet per year by 2030. *See* SWSI (2004). The Arkansas Basin Roundtable refined the estimates, which total 28,600 to 28,752 acre feet. *See* Projects & Methods to Meet the Needs of the Arkansas Basin (2009). Water leasing by the Super Ditch can meet the large majority of this intrabasin demand, as well as meet some interbasin needs in the Denver Metro area.

Tier 2: Facilitating Water Activity Implementation

No one has implemented water leasing on the scale proposed by the Super Ditch. The most analogous program, involving Palo Verde Irrigation District and the Metropolitan Water District of Southern California involves just one ditch company, one municipal lessee, and one water right. The Super Ditch involves up to seven ditch companies, hundreds of irrigators, more than a dozen municipal lessees, and dozens and dozens of water rights from Pueblo Reservoir to John Martin Reservoir. The Super Ditch's ability to deliver leased water to Pueblo Reservoir – from where municipal lessees would transport water to their place of use – is a significant threshold issue for both the irrigators and municipalities. And while the LAVWCD and Super Ditch have made substantial progress resolving this question (with the assistance of the Roundtable and CWCB), previous studies identified additional engineering necessary to answer that question. That additional engineering to further investigate and address that issue of deliverability is the subject of this application.

The LAVWCD has invested over $2 million in getting water leasing and the Super Ditch going, and continues to support that effort. For example, the LAVWCD is committing $56,400 in matching to this application, in addition to myriad other commitments to move water leasing and the Super Ditch forward. The District is also helping the Super Ditch solicit expressions of interest from all potential participating irrigators in leasing. Without the requested WSRA funding, it's likely that further progress on this key deliverability issue will slow given limited funds available to the LAVWCD, delaying the implementation of this precedent-setting water leasing activity.

The LAVWCD has a demonstrated record of advancing water leasing and the Super Ditch, including effectively managing both WSRA and Alternative Agricultural Transfers Methods grants. As discussed earlier, the LAVWCD has worked on an alternative to buy and dry almost since its formation, and has done more to advance the promising concept of water leasing than

any other entity anywhere. Invitations to make presentations to and participate on academic, policy and legislative panels across the west are testimony to the District's leadership and capability in this area.

Tier 3: The Water Activity Addresses Issues of Statewide Value and Maximizes Benefits

Water leasing undoubtedly sustains agriculture since it provides an alternative to buy and dry, which effectively curtails productive agricultural activity on irrigated land. Municipal buy and dry has affected approximately 80,000 acres in the Lower Arkansas River basin, while SWSI estimates that without alternatives, another 72,000 acres may be lost by 2030. The IBCC's portfolio tool illustrates the statewide magnitude of the problem. For example, the "Status Quo Portfolio" scenario forecast a loss of 24 percent of all irrigated land statewide by 2030, 42 percent in the Arkansas and 33 percent in the South Platte. *See* Example Portfolios for Discussion. IBCC (Sept. 9, 2009).

The Arkansas River basin is over-appropriated and Colorado faces on-going challenges meeting its Arkansas River Compact obligations. Water leasing will not affect Compact compliance one way or the other, but it will promote the maximum utilization of state waters by allowing irrigators to make water available to meet future municipal needs.

The Super Ditch may potentially lease irrigation water worth more than $350 million to meet municipal needs. The amount of funds requested are comparatively minor, while the return to the state from water leasing is almost immeasurable. That is because water leasing and the Super Ditch are implementing a concept that has state-wide applicability in the future, and addresses one of the key water and social issues facing the CWCB, IBCC and the state: the buy and dry of agriculture.

This grant application compliments the CWCB's program for Alternative Agricultural Water Transfer Methods (ATMs), concerns of the CWCB regarding buy and dry expressed in SWSI, and similar IBCC concerns apparent in its visioning process. Moreover, this application builds directly on work performed under previous CWCB WSRA and ATM grants, and goals of the IBCC.

Part D. – Required Supporting Material

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 Lower Ark 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.

The Lower Ark District commissioned an engineering feasibility study – proof of concept – in 2006. HDR Engineering, Inc. prepared the study, which concluded that the formation of a 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 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 Ark 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 Ark 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 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 and 2011; negotiations continue with Colorado Springs.

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.

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. Information regarding the irrigated lands that may be involved in water is attached as Tables 1 through 3.

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 8,000 acre-feet of water per year.

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 <u>all of the water</u> 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 ac-ft
Dry Year	14,020 ac-ft

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.

Socio-economic characteristics. 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

1. Water Rights, Availability, and Sustainability

This information is needed to assess the viability of the water project or activity. Please provide a description of the water supply source to be utilized, or the water body to be affected by, the water activity. This should include a description of applicable water rights and the name/location of water bodies affected by the water activity.

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.

A complete listing of all of the water rights involved in water leasing by the Super Ditch is set forth in Case No. 10CW4, and exchange application filed by the LAVWCD and the Super Ditch.

2. Please provide a brief narrative of any related or relevant previous studies.

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. (Anthony 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 Ark 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 Facilities. 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., Revised December 30, 2010.

p. Super Ditch Finance Plan. Honey Creek Resources, Preliminary Draft, January 4, 2011.

3. Statement of Work, Detailed Budget, and Project Schedule

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 –Super Ditch Delivery Engineering

GRANT RECIPIENT – Lower Arkansas Valley Water Conservancy District

FUNDING SOURCE – Statewide Account and Matching

INTRODUCTION AND BACKGROUND

The Super Ditch Delivery Engineering is an extension of the existing Lower Arkansas Valley Water Conservancy District Super Ditch program that CWCB previously funded. The Lower Arkansas Valley Water Conservancy District and the Super Ditch Company are seeking to preserve agriculture in the Lower Arkansas Basin with temporary water transfers, and other methods, that can benefit both the municipal interests and those of the local agricultural based economy.

This additional engineering work will enable a better understanding of the water resources in the Lower Arkansas Basin and better modeling of the water resource operations for the Lower Arkansas Valley Water Conservancy District and the Super Ditch Company, as well as for other regional water planners. This modeling information is critical to the Super Ditch program's decision points and efficient use of the State's water resources.

OBJECTIVES

The objectives are as follows:

- Objective 1 – Reservoir Operations: The major reservoirs in the Lower Arkansas basin are keys to efficient and accurate operations for alternative to agricultural transfer scenarios. The major reservoir information will be detailed and the data will be reviewed with recommendations as to how to fill or operate for proper modeling into the future.

- Objective 2 – Pueblo Reservoir: Pueblo Reservoir is very complex and difficult to model without a detailed understanding of its operations and the data. Pueblo Reservoir has been identified as the preferred alternative to the storage and operations of the Super Ditch scenarios from previous CWCB funded studies. During those studies, many stakeholders identified the need to adequately model Pueblo Reservoir operations and spill frequency. This task will meet with the operators of the reservoir and identify data and the operating principals to accurately model the integration of Super Ditch with the reservoir.

- Objective 3 – Winter Water Storage Program (WWSP): This task will seek to account for and model the WWSP for the operational scenarios developed in previous CWCB funded studies. The WWSP is a very large part of the agricultural water rights in the area and needs to have a detailed dataset and operational understanding to properly model for any changes to the operations or external changes that may affect the WWSP.

- Objective 4 – Recovery of Non-Exchangeable Supplies: The results of the first CWCB funded Super Ditch operational scenario demonstrated that there is a large portion of the supplies from the interested canals that may not be available for direct exchange during the entire irrigation season based on the river flow data. During the times that there are non-exchangeable supplies several options to recover these supplies need to be explored. This task will seek to discover feasible means to recover these flows and utilize them by participants or enable them to be exchanged at a later point in time.

- Objective 5 – System Calibration and Optimization: The model constructed from previous CWCB funded efforts needs to be calibrated once the data is refined and the operational scenarios are updated. The calibration will need to match the actual flow data from the river and operate in a manner consistent enough with the actual river operations to realistically model exchanges and return flows in the Arkansas River. Once calibrated, optimization of the existing scenarios is needed to efficiently operate the system.

- Objective 6 – Engineering and Economic Integration: This task seeks to finalize the modeling and integrate the water resources modeling results with the results of the economic modeling to yield a final plan of operations for the Super Ditch scenarios. The models have been operating within similar assumptions but a final update of the water modeling using some of the financial constraints is needed to accurately depict operating scenarios.

TASKS

Provide a detailed description of each task using the following format

TASK 1 – Reservoir Operations

This task will describe the major reservoirs in the Lower Arkansas Basin that contribute to the irrigation of lands and that can be part of an alternative to agricultural transfer program. This task excludes Pueblo Reservoir as it is detailed below in a separate task, but includes the major off-channel reservoirs of Lake Meredith, Great Plains Reservoirs, and John Martin Reservoir. The reservoir operations may need to be modified for Super Ditch deliveries, which could alter the basin operations and return flow patterns over time. This work will be limited to the time period from the 1980 through present day. The time period before the 1980's was before the Winter Water Storage Program and the river dynamics were much different.

Description of Task

Task 1.1 Reservoir Operations: Describe Reservoirs and their Operations

This task outlines each reservoir, their typical operations, their diversion and storage amounts and any restrictions on their systems that may exist.

Method/Procedure
Meeting(s) with Division 2 Engineering personnel will take place to detail each reservoir and its operations. The meeting(s) will review each of the reservoirs, their decrees, typical seasonal operations, diversions and other information pertinent to operations. An attempt will also be made to meet with the various reservoir companies to detail their operations, review and gather their diversion and storage data, and review operations details for later use. The modeled reservoirs will have their respective decrees and the Hydrobase records reviewed to determine the suitability of the information.

Deliverable
This task includes a memo detailing the operations of the reservoirs, their typical diversion pattern, typical release schedule, and a review of their decrees. This will also include modeling parameters that can be used to simulate their operations in future water transfer scenarios.

Description of Task
Task 1.2 Reservoir Operations: Data
This task will seek to review the data within Hydrobase and compare it to the records from the reservoir operations investigation and identify any discrepancies that may exist. This task will also seek to establish basic parameters to estimate the data in error or missing data for each of the identified reservoirs.

Method/Procedure
The individual reservoir information will be queried and compared to the other information to determine suitability for use in the detailed modeling. The information will be compared to the reservoir data collected in Task 1.1. The missing data may be estimated or filled based upon the available data.

Deliverable
This task will be completed with a memo that identifies discrepancies that may exist and recommended methods to fill or alter the data to more accurately model historic conditions on the Lower Arkansas System. This task could, if needed, yield a modified data set for use in the modeling. This may be accomplished with command files or text datasets.

Description of Task
Task 1.3 Reservoir Operations: Modeling
This task will update the StateMOD modeling, which was created to develop scenarios for the Super Ditch operations in previous CWCB funded projects.

Method/Procedure
The modeling will be updated with reservoir data gathered or altered based upon the previous tasks. The modeling may include updated reservoir release and diversion records along with relevant loss information about inlets, evaporation and other information gained through previous tasks.

Deliverable
The modeling of the Super Ditch scenarios will be updated to reflect the new reservoir patterns and their associated availability to store water for delivery to municipal and industrial users during the non-irrigation season.

TASK 2 – Pueblo Reservoir

This task is to model Pueblo Reservoir including spill potential during times when the reservoir fills from native flows in addition to the Fry-Ark project water. The reservoir contains many accounts within its storage allotment and they are operated on a priority system. The junior spill priorities are often full at times when the reservoir approaches spill and therefore are emptied during the filling season and replaced with other water. The task will model a new junior reservoir account to determine its reliability, spill quantity, spill frequency, and the likely timing of a spill from the reservoir. The task will also include changes to the existing reservoir model created in previous Super Ditch tasks to allow for changes in river operations and river conditions to determine its impact on Pueblo Reservoir spills.

Description of Task

Task 2.1 Pueblo Reservoir: Describe Accounts and Operations

This task would be to determine the accounts within the reservoir and how they operate. The accounts could be detailed as to their owners, volumes, and priority in the overall reservoir system. The operations of the system would also be determined to describe the reservoir operations and how the accounts are administered by the various agencies involved.

Method/Procedure

This task requires several meetings to determine the accounts and operations, and will likely include meetings with the Bureau of Reclamation, Southeastern Colorado Water Conservancy District, and Colorado Division of Water Resources Division 2 staff.

Deliverable

This task would be completed with a memo describing the operations of the reservoir and a list of the accounts to be modeled.

Description of Task

Task 2.2 Pueblo Reservoir: Data

This task would be the data collection for the Pueblo Reservoir system. The reservoir is operated and administered daily by several different agencies whose data may not be consistent. As part of the modeling operations of the reservoir model, reservoir data may be compiled and reconciled against one another to determine a dataset that could be used for future modeling efforts. This data would have a study period of 1979 through 2009 of the daily reservoir contents, daily inflows, daily outflows and daily account contents among other pertinent information.

Method/Procedure

This task requires several meetings to determine what data exists with each of the agencies and in what format. The key stakeholders in this task would be the Bureau of Reclamation, Southeastern Colorado Water Conservancy District, and Colorado Division of Water Resources, Division 2 staff.

Deliverable

This task would result in a memo describing the data to model the operations of the reservoir, and the reconciliation process that was performed. The results would also include a modified dataset to update the existing modeling efforts. That information would be available for analysis for the following task.

Description of Task

Task 2.3 Pueblo Reservoir: Modeling

The modeling task will be to integrate the new information from the previous two sub-tasks with the existing modeling of Super Ditch operation scenarios.

Method/Procedure

The modeling will transform the reservoir operations into operating rules for the StateMOD model to be utilized as updated logic of the system operations. In addition, any updated diversion, release, and storage data would also be input into the StateMOD data to further model Pueblo Reservoir and the specific conditions that lead to a spill. The new information would allow the model, when projecting river system changes from Super Ditch, to better determine how and when spills may take place and the reliability of using a junior storage priority in Pueblo Reservoir as a storage location for transferred supplies.

Deliverable

The results of this task would be a memo describing the model procedure and updated Super Ditch operational scenarios results.

TASK 3 – Winter Water Storage Program

A major use of Pueblo Reservoir since the late 1970's has been the Winter Water Storage Program (WWSP). This program stores irrigation water that was historically placed on farm land during the non-growing season to build soil moisture into Pueblo Reservoir, John Martin Reservoir, and other off channel reservoirs around the Lower Arkansas Basin. Changes in river conditions, river administration, and alternatives to agriculture transfer programs may alter the program from its current form of storage for spring irrigation to other uses including municipal and industrial. As a result, the various storage locations of this water may be altered and could affect the historical pattern and reservoir operations throughout the basin.

Description of Task

Task 3.1 Winter Water Storage Program: Operation

This task seeks to understand the key operations of the WWSP and its concepts, components, and administrative constraints. The various decisions that go into each separate company's decision on placement of water and the conditions that cause them to release water will be sought.

Method/Procedure

This task includes understanding the operations of the WWSP from the Division of Water Resources Division 2 Office, Southeastern Colorado Water Conservancy District, and other relevant stakeholders in the WWSP such as the various canal companies that are members. This may include meetings with the major WWSP canals that are interested Super Ditch participants.

Deliverable

The results of this task would be a detailed memo describing the operation of the WWSP program, how the various participants operate the program and their constraints.

Description of Task

Task 3.2 Winter Water Storage Program: Data

The WWSP storage and delivery data is fractured and not well consolidated. This task would seek to consolidate the data and better allow the data to be used in future modeling efforts throughout the basin.

Method/Procedure

Pueblo Reservoir is the primary storage location, however a large portion of the water is contained in other storage locations including off channel irrigation reservoirs and John Martin Reservoir. The additional data not derived from Tasks 1 and 2 may include, for the modeling needs, the amount of supply within each participant's WWSP account in each reservoir during the study period of 1979 through 2009. This data could also include release information and the delivery information to each WWSP participant's canal river headgate during the same study period if the existing data is found to be inaccurate.

Deliverable

The results of this task would be a memo describing the data available for each participant on the available time step at their locations for the modeling. The task will also update data sets for the existing StateMOD model of diversions, storage and release data for the WWSP.

Description of Task

Task 3.3 Winter Water Storage Program: Modeling

The WWSP modeling will be incorporated with an existing StateMOD model of the Super Ditch operation scenarios. The new data will enable StateMOD to more accurately determine affects of the various conditions that may arise.

Method/Procedure

The model will use the WWSP data to incorporate additional information about the amount of exchangeable yield that can be transferred in that portion of the Arkansas River with modifications to the place of storage, the quantity of storage, and changes to the release pattern of the WWSP water from various reservoirs and examine various demand scenarios. The model will be re-run based upon the updated data and a new result set will be generated.

Deliverable

The result of this task would be updated StateMOD model runs including a dataset that would incorporate the updated WWSP operations. This task would also include updated results of the analysis.

TASK 4 – Recovery of non-exchangeable supplies

A result of the existing StateMOD Lower Arkansas exchange model is that during many months of the irrigation season, the exchange potential within the system limits the amount of projected supply available to move water from downstream canals, upstream into Pueblo Reservoir. As a result a large portion of the water is left within the system and is not used for the intended purpose. There are many solutions to recovery of this water that need to be modeled to determine the most appropriate method.

Description of Task

Task 4.1 Recovery of non-exchangeable supplies: Recovery Methods

This task will seek to determine the available recovery methods to use the excess water located in the Lower Arkansas River. Recovery methods can include the use of existing canals and reservoirs located within the area to store the excess water until exchange capacity exists to move the supply upstream to Pueblo Reservoir.

Method/Procedure

This information about the reservoirs' existing capacity and other information will be derived from the previously funded studies and the analysis in Task 1 above. Other recovery methods may include placing the water into artificial recharge ponds to infiltrate the water into the aquifer and then timing those credits so they are exchanged once they appear in the Arkansas River. Other ideas may be explored to determine the options for the system.

Deliverable

The results of this task would be a memo describing the options considered and their application to the recovery of the water that is not exchangeable to Pueblo Reservoir.

Description of Task

Task 4.2 Recovery of non-exchangeable supplies: Analysis of Recovery Methods

An analysis of selected recovery methods could be done to determine information about the particular use of the option in conjunction with the yield recovery that could take place.

Method/Procedure

The option will be explored with Division 2 Staff and other relevant stakeholders to the particular option. The option selected will also include a set of assumptions that will facilitate the modeling of the options. Each option will be considered to it affects, viability, and operational concerns to Super Ditch.

Deliverable

The results of this task would be a memo describing the analysis of the options chosen and the details that would allow for the modeling of the options to determine the recovery amount.

Description of Task

Task 4.3 Recovery of non-exchangeable supplies: Modeling

One or two of the recovery methods will be selected and implemented into the existing Lower Arkansas StateMOD model. This model will correspond to the WWSP model from Task 3 that will contain the data to operate an integrated scenario environment including potential river operation changes from storage, WWSP, and recovery program.

Method/Procedure

The operational command files will be created along with modifications to the model that may be needed to model the selected methods. The StateMOD model will be re-run to account for the changes and demonstrate the effects of the selected methods of recovery. Each scenario may be run individually to demonstrate the effectiveness or may be run in conjunction with other options to achieve the additional recovery.

Deliverable
The result of this task would be an updated StateMOD model including a dataset that would incorporate the recovery operations into the existing Super Ditch model.

Task 5 – System Calibration and Optimization
Once all additional considerations are included in the system model, a detailed calibration and an optimization on the operation of the river, reservoirs, and exchanges needs to be analyzed to conserve the water within the system. Calibration of the model to meet the actual historical conditions will need to take place to create and identify the portions of the data and operation procedures needed to match the existing hydrologic and administration of the Arkansas River. Operational runs and changes will need to be analyzed to incorporate delivery flexibility, reservoir operations, river operations, and to maintain irrigated agriculture in the Lower Arkansas Basin to the highest extent possible.

Description of Task
Task 5.1 System Calibration and Optimization: Opportunities
As each new model module is included in the model, such as WWSP and recovery, additional system opportunities become available to be utilized to conserve the water yield.

Method/Procedure
This task will include several model runs to analyze opportunities that may exist to add additional recovery or storage changes that could increase the system efficiency. The task would utilize the model created in tasks 1 through 4 as its source of results. The updates to the existing StateMOD model would be operated under historical scenarios to create sensitivity to recovery and storage operations to reveal new methods of optimization potentially including changes in reservoir release patterns, altering existing diversions, decreasing length of exchanges to allow most efficient use of exchange water, or changes to recovery itself.

Deliverable
The result of this task would be a memo describing the model results and identified opportunities that could be modeled that may result in gains in water efficiency within the Arkansas River system below Pueblo Reservoir in Colorado.

Description of Task
Task 5.2 System Calibration and Optimization: Modeling
This task would make historical runs of the model and compare to actual data to calibrate the model to replicate the historic river conditions and administration.

Method/Procedure
This task would also modify the model from tasks 1 through 4 to operate the optimization opportunities so that a quantification would be determined if implementation of the operation would take place. The model would be modified in its current form to include the new operations.

Deliverable
The results of this task would be a memo describing the model changes and optimized model results for the Super Ditch of the amount of water that could be exchanged into Pueblo Reservoir from the lower canals.

Task 6 – Engineering and Economic Integration
This task would integrate the water resources considerations with the economic models to create a holistic plan for the system. This would seek to determine what economic and engineering considerations were applicable to the various scenarios. This task would seek to add the output of the engineering results to the economic models and also attempt integrate economic considerations to the engineering tasks to finalize a Super Ditch operational scenario that fits both the water resources goals with the economic considerations.

Description of Task
This task would seek to identify the economic model limitations that need consideration in the scenarios and update the model runs and simulations to account for those changes. This task would incorporate the differences in the models and re-run them with the new limitations to demonstrate a more complete system model of Super Ditch capable of making more accurate decisions on how to best operate the system.

Method/Procedure
The limitations in the economic model will be identified and the corresponding model changes will be created for the StateMOD runs. Once the changes are identified new model runs will be made and updated results set will be created to reflect the economic limitations.

Deliverable
This task would be completed with a memo that would describe the considerations for each model and potential ways to address each in the StateMod and economic models. This task would also result in an updated StateMOD model based on the limitations.

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.

BUDGET

Provide a detailed budget by task including number of hours and rates for labor and unit costs for other direct costs (i.e. mileage, $/unit of material for construction, etc.). A detailed and perfectly balanced budget that shows all costs is required for the State's contracting and purchase order processes. Sample budget tables are provided below. Please note that these budget tables are examples and will need to be adapted to fit each individual application. Tasks should correspond to the tasks described above.

	Labor	Matching Funds (If Applicable)	Total Project Costs
Task 1.1 - Reservoir Operations: Describe Reservoirs and their Operations	$ 49,235		$ 49,235
Task 1.2 - Reservoir Operations: Data	$ 14,664		$ 14,664
Task 1.3 - Reservoir Operations: Modeling	$ 14,551		$ 14,551
Task 2.1 - Pueblo Reservoir: Describe Accounts and Operations	$ 29,309		$ 29,309
Task 2.2 - Pueblo Reservoir: Data	$ 19,509		$ 19,509
Task 2.3 - Pueblo Reservoir: Modeling	$ 14,960		$ 14,960
Task 3.1 - Winter Water Storage Program: Operation	$ 10,050		$ 10,050
Task 3.2 - Winter Water Storage Program: Data	$ 14,754		$ 14,754
Task 3.3 - Winter Water Storage Program: Modeling	$ 14,484		$ 14,484
Task 4.1 - Recovery of non-exchangeable supplies: Recovery Methods	$ 14,550		$ 14,550
Task 4.2 - Recovery of non-exchangeable supplies: Analysis of Recovery Methods	$ 9,964		$ 9,964
Task 4.3 - Recovery of non-exchangeable supplies: Modeling	$ 14,264		$ 14,264
Task 5.1 - System Calibration and Optimization: Opportunities	$ 25,035		$ 25,035
Task 5.2 - System Calibration and Optimization: Modeling	$ 14,784		$ 14,784
Task 6 - Engineering and Economic Integration	$ 20,259		$ 20,259
In-Kind Contributions			
Total Costs:	$280,372	$56,460	$280,372

Example Project Personnel:	Project Manager	Project Engineer	Staff Engineer	Principal	GIS/Database	Clerical		Total Costs
Hourly Rate:	160	130	105	210	90	67		
Task 1.1	110	100	100	20	40	5		$ 49,235
Task 1.2	20	35	50	3	10	2		$ 14,664
Task 1.3	40	30	20	5	10	3		$ 14,551
Task 2.1	60	75	75	5	10	2		$ 29,309
Task 2.2	30	40	45	5	40	2		$ 19,509
Task 2.3	50	24	20	4	10	0		$ 14,960
Task 3.1	40	20	0	5	0	0		$ 10,050
Task 3.2	20	35	10	2	60	2		$ 14,754
Task 3.3	40	45	10	5	0	2		$ 14,484
Task 4.1	60	30	0	5	0	0		$ 14,550
Task 4.2	20	30	20	3	0	2		$ 9,964
Task 4.3	60	30	0	3	0	2		$ 14,264
Task 5.1	90	40	30	5	10	5		$ 25,035
Task 5.2	50	20	20	5	10	2		$ 14,784
Task 6	45	40	45	10	10	2		$ 20,259
Total Hours:	735	594	445	85	210	31		
Cost:	$ 117,600	$ 77,220	$ 46,725	$ 17,850	$ 18,900	$ 2,077	$ 56,460	$ 280,372

Other Direct Costs				
Item:	Mileage	Materials		Total
Task 1.1 - Reservoir Operations: Describe Reservoirs and their Operations	650			$357.50
Task 1.2 - Reservoir Operations: Data	250			$137.50
Task 1.3 - Reservoir Operations: Modeling				
Task 2.1 - Pueblo Reservoir: Describe Accounts and Operations	500			$275.00
Task 2.2 - Pueblo Reservoir: Data	500			$275.00
Task 2.3 - Pueblo Reservoir: Modeling				
Task 3.1 - Winter Water Storage Program: Operation	250			$137.50
Task 3.2 - Winter Water Storage Program: Data	250			$137.50
Task 3.3 - Winter Water Storage Program: Modeling				
Task 4.1 - Recovery of non-exchangeable supplies: Recovery Methods	600			$330.00
Task 4.2 - Recovery of non-exchangeable supplies: Analysis of Recovery Methods				
Task 4.3 - Recovery of non-exchangeable supplies: Modeling				
Task 5.1 - System Calibration and Optimization: Opportunities	250			$137.50
Task 5.2 - System Calibration and Optimization: Modeling				
Task 6 - Engineering and Economic Integration	250			$137.50
In-Kind Contributions				
Total Units:	3,500			
Total Cost:	$1,925		$385	$1,925.00

SCHEDULE

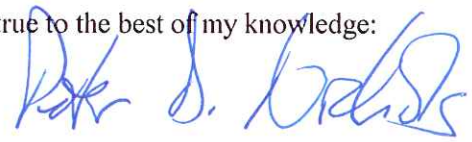
Provide a project schedule including key milestones for each task and the completion dates or time period from the Notice to Proceed (NTP). This dating method allows flexibility in the event of potential delays from the procurement process. Sample schedules are provided below. Please note that these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

Task	First 6 Months						Second 6 Months					
	1	2	3	4	5	6	7	8	9	10	11	12
1 – Reservoir Operations												
2 – Pueblo Reservoir												
3 – WWSP												
4 – Recovery of non-exchangeable supplies												
5 – System Calibration and Optimization												
6 – Engineering and Economic Integration												
Final Reports												

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 Basin Roundtables and the general public and help promote the development of a common technical platform.

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

Signature of Applicant: 

Print Applicant's Name: Peter D. Nichols, for Jay Winner, General Manager

Project Title: Super Ditch Delivery Engineering

Return this application to:

Mr. Todd Doherty
Intrastate Water Management and Development Section
COLORADO WATER CONSERVATION BOARD
1580 Logan Street, Suite 200
Denver, CO 80203

To submit applications by Email, send to: todd.doherty@state.co.us

Attachment 1
Reference Information

The following information is available via the internet. The reference information provides additional detail and background information.

Colorado Water Conservation Board (http://cwcb.state.co.us/)

Loan and Grant policies and information are available at – http://cwcb.state.co.us/Finance/

Interbasin Compact Committee and Basin Roundtables (http://ibcc.state.co.us/)

Interbasin Compact Committee By-laws and Charter (under Helpful Links section) –

http://ibcc.state.co.us/Basins/IBCC/

Legislation

House Bill 05-1177 - Also known as the Water for the 21st Century Act –

http://cwcbweblink.state.co.us/DocView.aspx?id=105662&searchhandle=28318

House Bill 06-1400 – Adopted the Interbasin Compact Committee Charter –

http://cwcbweblink.state.co.us/DocView.aspx?id=21291&searchhandle=12911

Senate Bill 06-179 – Created the Water Supply Reserve Account –

http://cwcbweblink.state.co.us/DocView.aspx?id=21379&searchhandle=12911

Statewide Water Supply Initiative

General Information – http://cwcb.state.co.us/IWMD/

Phase 1 Report – http://cwcb.state.co.us/IWMD/SWSITechnicalResources/SWSIPhaseIReport/

Attachment 2
Insurance Requirements

NOTE: The following insurance requirements taken from the standard contract apply to WSRA projects that exceed $25,000 in accordance with the policies of the State Controller's Office. Proof of insurance as stated below is necessary prior to the execution of a contract.

13. INSURANCE

Grantee and its Sub-grantees shall obtain and maintain insurance as specified in this section at all times during the term of this Grant: All policies evidencing the insurance coverage required hereunder shall be issued by insurance companies satisfactory to Grantee and the State.

A. Grantee

i. Public Entities

If Grantee is a "public entity" within the meaning of the Colorado Governmental Immunity Act, CRS §24-10-101, et seq., as amended (the "GIA"), then Grantee shall maintain at all times during the term of this Grant such liability insurance, by commercial policy or self-insurance, as is necessary to meet its liabilities under the GIA. Grantee shall show proof of such insurance satisfactory to the State, if requested by the State. Grantee shall require each Grant with Sub-grantees that are public entities, providing Goods or Services hereunder, to include the insurance requirements necessary to meet Sub-grantee's liabilities under the GIA.

ii. Non-Public Entities

If Grantee is not a "public entity" within the meaning of the GIA, Grantee shall obtain and maintain during the term of this Grant insurance coverage and policies meeting the same requirements set forth in **§13(B)** with respect to sub-Grantees that are not "public entities".

B. Sub-Grantees

Grantee shall require each Grant with Sub-grantees, other than those that are public entities, providing Goods or Services in connection with this Grant, to include insurance requirements substantially similar to the following:

i. Worker's Compensation

Worker's Compensation Insurance as required by State statute, and Employer's Liability Insurance covering all of Grantee and Sub-grantee employees acting within the course and scope of their employment.

ii. General Liability

Commercial General Liability Insurance written on ISO occurrence form CG 00 01 10/93 or equivalent, covering premises operations, fire damage, independent Grantees, products and completed operations, blanket Grantual liability, personal injury, and advertising liability with minimum limits as follows: **(a)**$1,000,000 each occurrence; **(b)** $1,000,000 general aggregate; **(c)** $1,000,000 products and completed operations aggregate; and **(d)** $50,000 any one fire. If any aggregate limit is reduced below $1,000,000 because of claims made or paid, Sub-grantee shall immediately obtain additional insurance to restore the full aggregate limit and furnish to Grantee a certificate or other document satisfactory to Grantee showing compliance with this provision.

iii. Automobile Liability

Automobile Liability Insurance covering any auto (including owned, hired and non-owned autos) with a minimum limit of $1,000,000 each accident combined single limit.

iv. Additional Insured

Grantee and the State shall be named as additional insured on the Commercial General Liability and Automobile Liability Insurance policies (leases and construction Grants require additional insured coverage for completed operations on endorsements CG 2010 11/85, CG 2037, or equivalent).

v. Primacy of Coverage

Coverage required of Grantee and Sub-grantees shall be primary over any insurance or self-insurance program carried by Grantee or the State.

vi. Cancellation

The above insurance policies shall include provisions preventing cancellation or non-renewal without at least 45 days prior notice to the Grantee and the State by certified mail.

vii. Subrogation Waiver

All insurance policies in any way related to this Grant and secured and maintained by Grantee or its Sub-grantees as required herein shall include clauses stating that each carrier shall waive all rights of recovery, under subrogation or otherwise, against Grantee or the State, its agencies, institutions, organizations, officers, agents, employees, and volunteers.

C. Certificates

Grantee and all Sub-grantees shall provide certificates showing insurance coverage required hereunder to the State within seven business days of the Effective Date of this Grant. No later than 15 days prior to the expiration date of any such coverage, Grantee and each Sub-grantee shall deliver to the State or Grantee certificates of insurance evidencing renewals thereof. In addition, upon request by the State at any other time during the term of this Grant or any sub-grant, Grantee and each Sub-grantee shall, within 10 days of such request, supply to the State evidence satisfactory to the State of compliance with the provisions of this **§13**.

Attachment 3
Water Supply Reserve Account Standard Contract

NOTE: The following contract is required for WSRA projects that exceed $100,000. (Projects under this amount will normally be funded through a purchase order process.) Applicants are encouraged to review the standard contract to understand the terms and conditions required by the State in the event a WSRA grant is awarded. Significant changes to the standard contract require approval of the State Controller's Office and often prolong the contracting process.

It should also be noted that grant funds to be used for the purchase of real property (e.g. water rights, land, conservation easements, etc.) will require additional review and approval. In such cases applicants should expect the grant contracting process to take approximately 3 to 6 months from the date of CWCB approval.

Attachment 4
W-9 Form

NOTE: A completed W-9 form is required for all WSRA projects prior execution of a contract or purchase order. Please submit this form with the completed application.

Form **W-9** Substitute Form State of Colorado 8-2007	**Request for Taxpayer Identification Number and Certification**	Give form to the requester. Do not send to the IRS.

Print or Type
See Specific Instructions on page 3.

Name: **Lower Arkansas Valley Water Conservancy District**

Business name, if different from above

Check appropriate box:

☐ Individual/ Sole Proprietor ☐ Corporation ☐ Partnership ☐ Other ▶ ☐ Exempt from backup withholding

Address (number, street, and apt. or suite no.) **801 Swink Ave**	Requester:
City, state, and ZIP code. **Rocky Ford, CO 81067**	
List Account number(s) here (optional)	Phone Number: **(719) 254-5115**

Part I **Taxpayer Identification Number (TIN)**

Enter your TIN in the appropriate box. For individuals, this is your social security number (SSN) **However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3.** For other entities, it is your employer identification number (EIN). If you do not have a number, see **How to get a TIN on page 3.**

Social Security number								

Note: *If the account is in more than one name, see the chart on page 3 for guidelines on whose number to enter.*

Employer identification number								
4	8	1	2	9	8	1	4	4

Part II **Certification**

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), **and**
2. I am not subject to backup withholding because. **(a)** I am exempt from backup withholding, or **(b)** I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or **(c)** the IRS has notified me that I am no longer subject to backup withholding, **and**
3. I am a U.S. person (including a U.S. resident alien).

Certification instructions. You must cross out item **2** above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item **2** does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the Certification, but you must provide your correct TIN. (See the instructions on page 3.)

Sign Here	Signature of U.S. person ▶	Date ▶

Minority and Women-owned Businesses (M/WBEs) Self Certification (Please check all boxes that apply)

In an effort to track levels of participation by women and minorities doing business with the State of Colorado, the following information is requested. Please indicate the appropriate category of ownership for your company. "Owned" in this context means a business that is at least 51 percent owned by an individual(s) who also control(s) and operate(s) it. "Control" in this context means exercising the power to make policy decisions. "Operate" means actively involved in the day-to-day management. If you business is jointly owned by both men and women or is a large publicly held corporation, please check the box labeled "Not Applicable."

Gender Information:

☐ Female-Owned ☐ Male-Owned ☐ Not Applicable

Owner Ethnicity Information

☐ African American ☐ Asian/Pacific American ☐ White (non-Hispanic) ☐ Not Applicable

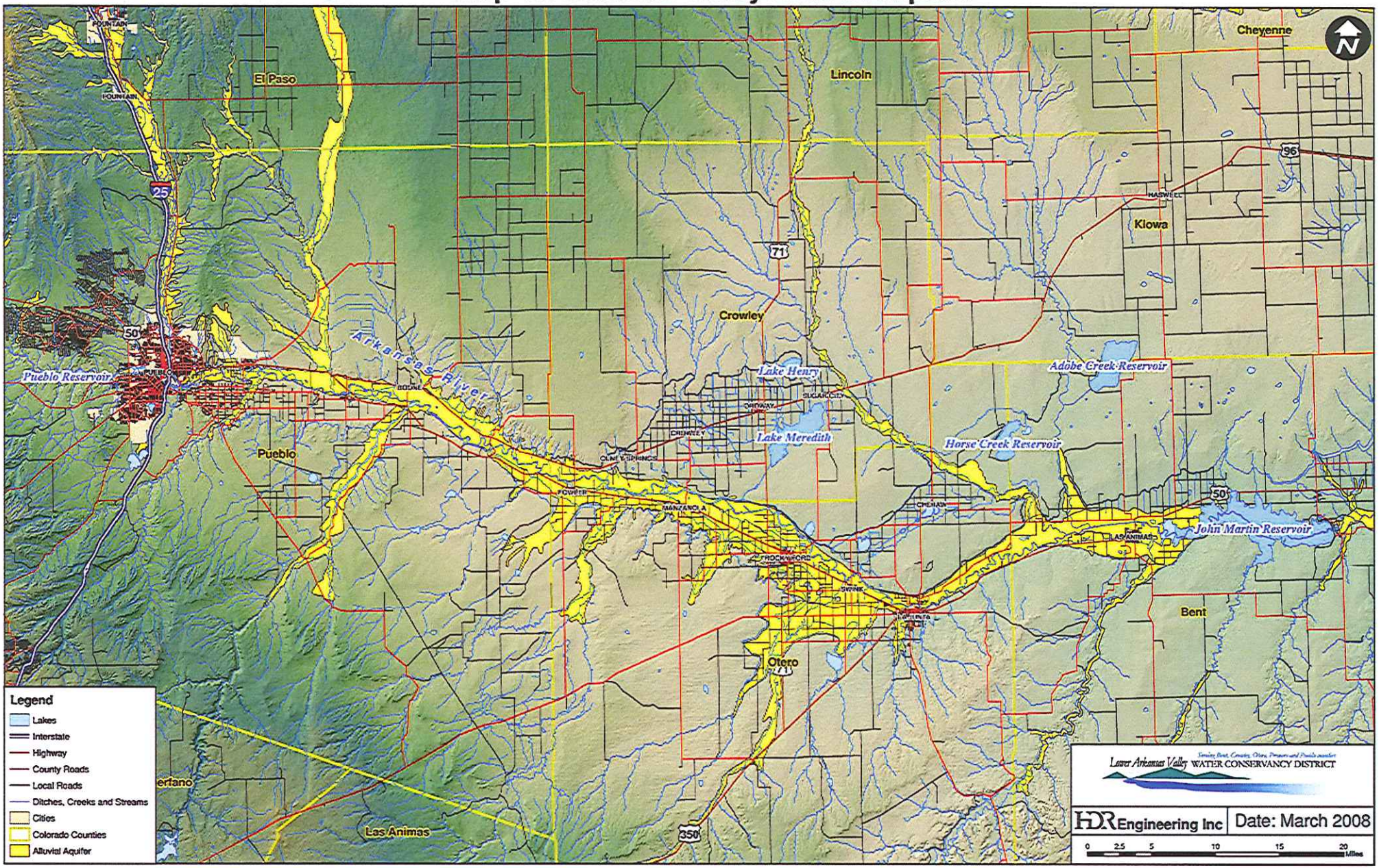
☐ Hispanic American ☐ Native American ☐ Other: _____

Small Business Information

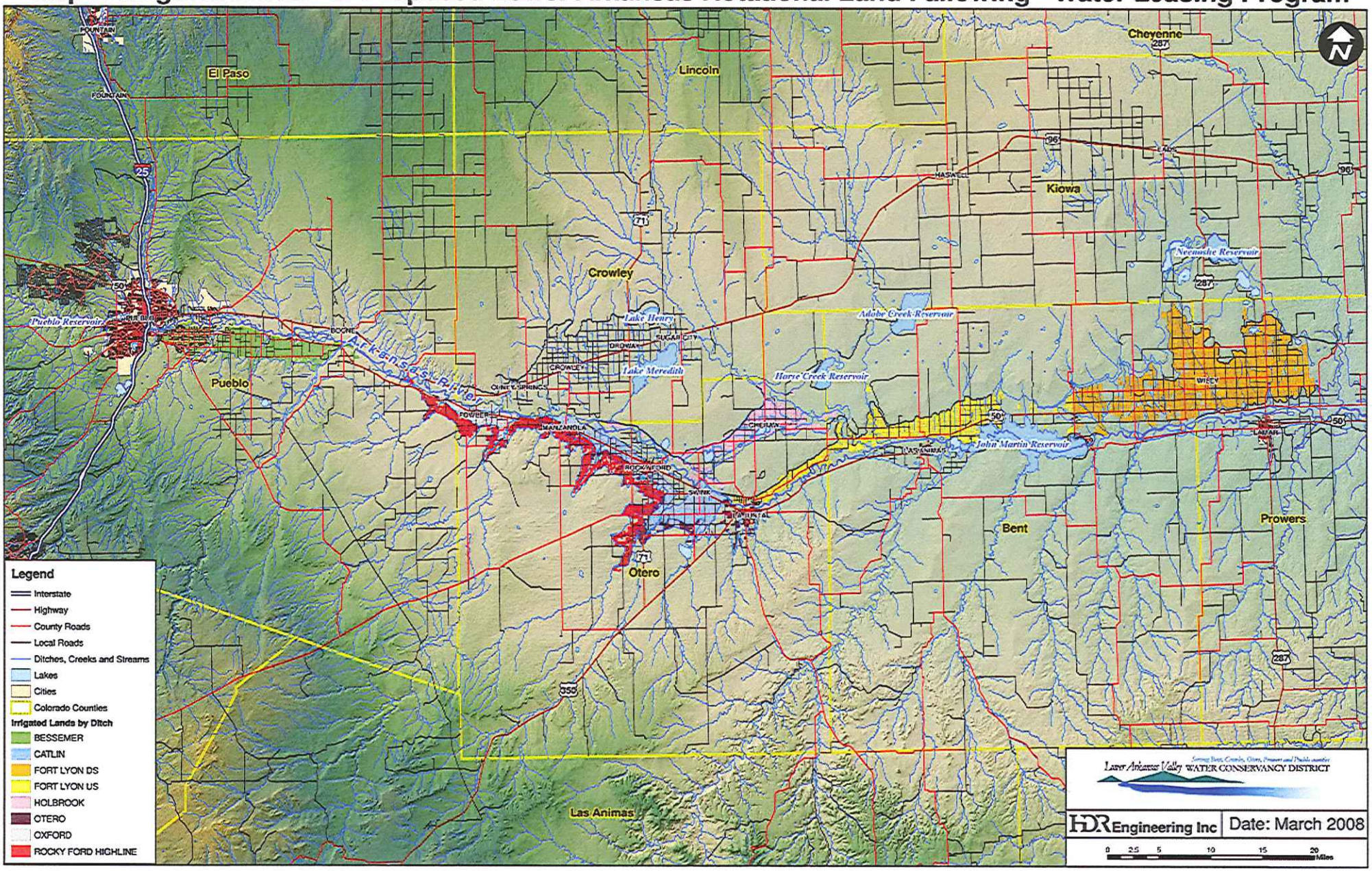
Small Business (a business that is organized for profit, is independently owned and operated, and has 25 or fewer full time equivalent employees.)

☐ Yes ☐ No

Map 1. Arkansas Valley Alluvial Aquifer



Map 2. Irrigated Acres For Proposed Lower Arkansas Rotational Land Fallowing - Water Leasing Program



Lower Arkansas Valley Water Conservancy District

Proposed Rotational Land Fallowing - Water Leasing Program

Table 1. Irrigated acres by crop type, based on 2003 GIS data from CDSS HydroBase records

Canal	Crop Type	Irrigated Acres
Bessemer Ditch		
	Alfalfa	4,078
	Corn (grain)	295
	Corn (silage)	2,052
	Dry beans	2,302
	Grass/pasture	1,585
	Small grains (e.g., sorghum)	1,054
	Vegetables	709
	No crop	5,905
	SUB-TOTAL Bessemer Ditch =	17,980
Rocky Ford Highline		
	Alfalfa	9,676
	Corn (grain)	21
	Corn (silage)	146
	Dry beans	288
	Grass/pasture	1,719
	Small grains (e.g., sorghum)	1,085
	Wheat	132
	Wheat (fall)	50
	No crop	8,998
	SUB-TOTAL Rocky Ford Highline =	22,114
Oxford Farmers Ditch		
	Alfalfa	2,145
	Corn (grain)	11
	Corn (silage)	148
	Dry beans	173
	Grass/pasture	712
	Small grains (e.g., sorghum)	470
	Vegetables	33
	Wheat	61
	Wheat (fall)	61
	No crop	1,530
	SUB-TOTAL Oxford Farmers Ditch =	5,345
Otero Canal		
	Alfalfa	387
	Grass/pasture	145
	Small grains (e.g., sorghum)	116
	No crop	2,824
	SUB-TOTAL Otero Canal =	3,472
Catlin Canal		
	Alfalfa	7,937
	Corn (grain)	26
	Corn (silage)	86
	Dry beans	52
	Grass/pasture	1,536
	Small grains (e.g., sorghum)	1,492
	Vegetables	586
	Wheat	44
	Wheat (fall)	6
	No crop	6,638
	SUB-TOTAL Catlin Canal =	18,403
Holbrook Canal		
	Alfalfa	7,195
	Grass/pasture	701
	Small grains (e.g., sorghum)	148
	Vegetables	86
	Wheat (fall)	12
	No crop	6,955
	SUB-TOTAL Holbrook Canal =	15,097
Fort Lyon Canal (includes both upstream and downstream areas on map)		
	Alfalfa	54,261
	Corn (silage)	658
	Dry beans	11
	Grass/pasture	12,555
	Small grains (e.g., sorghum)	1854.95
	Vegetables	54
	Wheat	1,661
	Wheat (fall)	149
	No crop	20,987
	SUB-TOTAL Fort Lyon Canal =	92,192
	OVERALL TOTAL =	174,604
	OVERALL TOTAL, minus No crop (fallow) lands =	120,768

Table 2. Lower Arkansas Valley Crop Production by County, 2002 or 2007

	County																	
	Bent			**Crowley**			**Otero**			**Prowers**			**Pueblo**			**COMBINED[3]**		
Canals associated with Rotational Fallowing Program, irrigating in County[4]	Fort Lyon Canal			Holbrook Canal			Oxford Farmers Ditch, Rocky Ford Highline, Otero Canal, Catlin Canal, Fort Lyon Canal			Fort Lyon Canal			Bessemer Ditch					
Crop	*Acres Harvested*	*Production*	*Units*	*Acres Harvested*	*Total Production*	*Units*	*Acres Harvested*	*Production*	*Units*	*Acres Harvested*	*Production*	*Units*	*Acres Harvested*	*Production*	*Units*	*Acres Harvested*	*Production*	*Units*
Alfalfa[1]																		
Irrigated	22,080	---	tons, dry	3,848	---	tons, dry	18,161	---	tons, dry	62,641	---	tons, dry	8,734	---	tons, dry	---	---	tons, dry
Total	26,418	49,558	tons, dry	5,027	9,910	tons, dry	18,694	45,715	tons, dry	69,861	186,837	tons, dry	9,674	23,131	tons, dry	---	---	tons, dry
Corn for grain[2]																		
Irrigated	10,500	1,840,000	bushels	---	---	bushels	10,000	1,800,000	bushels	19,600	3,160,000	bushels	3,900	830,000	bushels	---	---	bushels
Total	10,500	1,840,000	bushels	---	---	bushels	10,000	1,800,000	bushels	30,100	3,610,000	bushels	3,900	830,000	bushels	1,000	180,000	bushels
Corn for silage[1]																		
Irrigated	736	---	tons	(D)	---	tons	1,633	---	tons	4,224	---	tons	1,548	---	tons	---	---	tons
Total	909	5,957	tons	(D)	(D)	tons	1,653	21,060	tons	4,376	68,165	tons	1,548	21,383	tons	---	---	tons
Dry beans[1]																		
Irrigated	---	---	CWT	---	---	CWT	235	---	CWT	---	---	CWT	1,879	---	CWT	---	---	CWT
Total	---	---	CWT	---	---	CWT	235	2,898	CWT	---	---	CWT	1,879	41,794	CWT	---	---	CWT
Grass/pasture																		
Irrigated	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Total	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Sorghum for grain[2]																		
Irrigated	(D)	(D)	bushels	(D)	(D)	bushels	(D)	(D)	bushels	8,900	740,000	bushels	(D)	(D)	bushels	6,400	470,000	bushels
Total	4,300	268,000	bushels	3,700	111,000	bushels	1,300	125,000	bushels	22,900	1,250,000	bushels	2,100	56,000	bushels	300	20,000	bushels
Vegetables[1]																		
Irrigated	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Total	(D)	---	---	(D)	---	---	1,977	---	---	1,408	---	---	1,792	---	---	---	---	---
Wheat, all[2]																		
Irrigated	4,700	332,000	bushels	(D)	(D)	bushels	4,300	328,000	bushels	20,300	1,049,000	bushels	(D)	(D)	bushels	1,000	72,000	bushels
Total	8,400	472,000	bushels	600	25,000	bushels	5,500	372,000	bushels	132,300	5,929,000	bushels	1,500	83,000	bushels	---	---	bushels

(D) Data published in combined counties or districts to avoid disclosure of individual operations.

[1]Data from 2002 Census of Agriculture - County Data

[2]Data from 2007 USDA/NASS county estimates.

[3]May also include harvested acres and production from Baca and/or Las Animas County.

[4]Information from Lower Arkansas Valley Water Conservancy District website, www.lavwcd.org.

Table 3. Historical Diversions for Select Lower Arkansas Valley Canals, IY* 1976-2004

Ditch	Average Annual Diversions [AF]
Bessemer Ditch	66,226
Catlin Canal	92,889
Fort Lyon Canal	245,145
Fort Lyon Storage Canal	72,212
Holbrook Canal	49,979
Otero Canal	7,693
Oxford Farmers Ditch	26,700
Rocky Ford Highline	89,037
TOTAL =	649,881

*IY = irrigation year (November 1 through October 31)