

**Water Supply Reserve Account – Grant Application Form**



**COLORADO WATER CONSERVATION BOARD**

**WATER SUPPLY RESERVE ACCOUNT  
GRANT APPLICATION FORM**



Rural Douglas County groundwater-level monitoring network

<b>Name of Water Activity/Project</b>	<b>Approving Basin Roundtable</b>	
\$113,055	<b>Amount from Statewide Account</b>	\$84,792
<b>Total Amount of Funds Requested</b>	<b>Amount from Basin Account</b>	\$28,263

**Application Content**

Application Instructions	page 2
Part A – Description of the Applicant	page 3
Part B – Description of the Water Activity	page 6
Part C – Threshold and Evaluation Criteria	page 8
Part D – Required Supporting Material	
Water Rights, Availability, and Sustainability	page 12
Related Studies	page 12
Statement of Work, Detailed Budget, and Project Schedule	page 13
Signature Page	page 22

**Attachments**

1. Reference Information	page 23
2. Insurance Requirements (Projects Over \$25,000)	page 24
3. WSRA Standard Contract (Projects Over \$100,000)	page 26
4. W-9 Form (Required for All Projects)	page 27
5. Map of Rural Water Authority of Douglas County Director Districts	page 27
6. USGS Well-Monitoring Project Draft Proposal	page 28

# Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

## 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](mailto: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](mailto:todd.doherty@state.co.us).

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

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

1. Applicant Name(s):

Mailing address:

Taxpayer ID#:  Email address:

Phone Numbers: Business:   
 Home:   
 Fax:

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

Name:

Position/Title

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.
- 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.

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

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4. Provide a brief description of your organization

The Rural Water Authority of Douglas County (The Authority) was established on October 8, 2008 by the Board of Douglas County Commissioners, entering into an Intergovernmental Agreement with the Grandview Estates Rural Water Conservation District pursuant to the provisions of Article XIV, Section 18(2)(a) of the Colorado Constitution, and C.R.S. § 29-1-204.

The Authority consists of a nine member Board of Directors (see Attachment 5):

- 5 Director Districts represent individual water providers (owns a water well permitted or operated for domestic or household purpose or services),
- Small Water System Directors (operate a small water system for 500 equivalent residential units or less)
- 1 Douglas County Commissioner

The purpose of The Authority is to assist its participants in developing water resources, systems, in whole or in part, for the benefit of Rural Water users and owners of land within its service area. The Authority's defined functions and services include (a) collaborating and cooperating with other local, regional, and statewide water supply agencies in the development of water supply plans and conservation of water resources, and (b) educating and informing water users as to issues affecting an adequate, sustainable, and reliable water supply.

The Authority represents the owners of approximately 8,000 household and domestic wells and 15 small water system providers in the unincorporated area of Douglas County. The estimated population within the Authority's service area is 26,629.

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

The Applicant will be the contracting entity for the grant, but will enter into a subcontract with the **United States Geological Survey (USGS)**, a scientific agency of the United States government in pursuit of the Work Plan. A bureau of the United States Department of the Interior, the USGS is that department's sole scientific agency, and hydrology is one of their specialties.

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

---

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.

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 Authority is in its first budget year, since it is a new agency. It is commonly-accepted practice for a local government to use its first year of operation as the base for calculating subsequent years' Fiscal Year Spending under TABOR. The Authority is not a TABOR "enterprise," nor does it have any government-owned businesses that qualify as such, therefore accepting a state grant will not jeopardize that status in any way whatsoever.

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

---

**Part B. - Description of the Water Activity**

1. Name of the Water Activity/Project:

Rural Douglas County groundwater-level monitoring network

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

Structural and/ or nonstructural water project or activity

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

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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.

Groundwater from Denver Basin bedrock aquifers provides more than 70 percent of the municipal water supply in the south Denver metropolitan area, and some water providers consider groundwater availability in this area insufficient for long-term demand (South Metro Water Supply Study Board, written commun., 2003; Colorado Water Conservation Board, 2004a). Domestic groundwater use is less than municipal use but is widespread in the basin, and rural areas depend solely on self-supplied groundwater for water supply (Paschke, 2010). Douglas County reports the total number of domestic private wells increased from 1,242 in 1970, to approximately 8,000 by 2010.

In 2010, Douglas County estimated the population would grow from 293,521 residents to 444,784 by 2030. While some water providers in the county have surface-water rights, their allocations do not provide enough water to satisfy the renewable supplies necessary to fulfill the existing water demands of the county. Development of the groundwater resources is necessary to meet the growing needs of the county. The Authority's mission is to assist the estimated 8,000 rural water users and 15 small water system providers by evaluating current and future water supplies and demand.

The primary objective of this study is to establish a county wide groundwater-level monitoring network for the monitoring of the domestic and household water resources of rural Douglas County, Colorado. The network will consist of approximately 30 existing wells throughout the county. Water levels will be measured monthly in all wells and five sites will be equipped with pressure transducers for continuous monitoring. Water levels measured from wells in the network will provide an assessment of the current water resource and provide the basis from which to monitor long-term changes of the hydrologic system.

The Authority is hoping to utilize the proposed assessment of ground water levels in rural areas for planning of an alternate, sustainable water supply. This project will help to identify those areas that may have an imminent need for action by means of scientifically rigorous documentation.

Finally, this project will help document rural areas of the county that should be considered a priority in infrastructure planning effort. The Authority is a party to an Intergovernmental Agreement with Douglas County, the South Metro Water Supply Authority and the Douglas County Water Resource Authority, whereby an application for assistance from the Bureau of Reclamation's new Rural Water Supply Program is being developed. The resulting Feasibility Study will be used to begin planning a water delivery system for all of Douglas County, for which federal loan guarantees may be forthcoming.

This project will expand on a similar effort by The Grandview Estates Rural Water Conservation District which is currently in the second year of their monitoring program under a contract with the USGS.

(See Attachment 6, "Draft proposal by USGS")

**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.)

The project meets the water needs identification activities by the Statewide Water Supply Initiative (SWSI). Eligible Water Activities, as identified in Senate Bill 06-179, include the following:

- Studies or analysis of structural, nonstructural, consumptive, and nonconsumptive water needs, projects, or activities; and
- Structural and nonstructural water projects or activities.

The applicant is an eligible grantee, being a political subdivision of the state, pursuant to 29-1-204(4), C.R.S.

- a) The water activity is consistent with Section 37-75-102 Colorado Revised Statutes.<sup>1</sup>

The measurement of aquifer water levels complies with Section 37-75-102 CRS and will not impair, limit, or otherwise affect existing water rights.

- 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 BRT's 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 application was approved at the Metro Roundtable meeting on July 12. A letter is being submitted by the Roundtable under separate cover.

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<sup>1</sup> 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.

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

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- c) The water activity meets the provisions of Section 37-75-104(2), Colorado Revised Statutes.<sup>2</sup> 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.

**SWSI: Key recommendation #5 “Create a Common Understanding of Future Water Supplies.** To more accurately assess the alternatives available to the state in meeting our future water needs, the analysis of supply availability for each basin will determine developable flows, taking into account factors such as ... hydrologic conditions.”

**SWSI: Key recommendation #6 “Develop Implementation Plans Towards Meeting Future Needs.** While many of the Identified Projects and Processes are already progressing toward implementation, their successful implementation, and the success of any current or future option, for meeting our water needs will have some degree of uncertainty. To better facilitate successful implementation, the following should be addressed in more detail:

- Addressing gaps in rural areas and smaller water providers.

The proposed project supports 37-75-104(2)(c), C.R.S. by contributing to a basin-wide water supply needs assessment, by identifying water availability and those areas at the greatest risk of depletions.

- 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)

Funding from the Basin and State-wide accounts is critical for project implementation. Collective groups of water providers and investors have the resources to move projects forward with coordinated efforts and mechanisms for financial returns to pay off dept. To date, there is a deficiency of similar

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<sup>2</sup> 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.

# Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

opportunities for individual well users to either assess their needs or move forward towards acquiring a sustainable resource. A further understanding of the nature and extent of the existing water conditions in rural areas is important in identifying future needs. Developing water resources is complex and time intensive. It is important if not critical to identify concerns as early as possible.

The newly formed Authority has yet to establish a permanent funding mechanism to sustain its activities and does not yet have the ability to fund the proposed study. Therefore we are requesting 65% of the total project cost from state funds, to be matched by 35% federal funds. Of the state funds, 25% is requested from the Metro Basin account and 75% from the statewide Water Reserve Account.

### Funding Source

Rural Water Authority of Douglas County Grant		
Water Supply Reserve Account	\$84,792	48.7%
Basin Account	<u>\$28,263</u>	<u>16.2%</u>
Total CWCB Grant	\$113,055	65.0%
U.S. Geological Survey- Matching Funds	<u>\$60,880</u>	<u>35.0%</u>
Total Project Cost	\$173,935	100.0%

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.)

The project meets the following Evaluation Criteria -

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

- a. The project addresses the needs and issues of multiple interests by identifying areas with emerging supply needs in rural parts of Douglas County, which includes individual household and domestic wells as well as small water service providers.

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

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- b. There are approximately 8,000 individual wells and 15 small water system providers represented in the application, and the project will promote cooperation and collaboration among these interests. In addition, the United State Geological Survey (USGS) is cooperating and collaborating in this data collection effort. The project assesses a recognized intrabasin need (water needs evaluation).
- c. The project will collect data that will help evaluate the gap between available water supply and anticipated future need in rural Douglas County

### Tier 2: Facilitating Water Activity Implementation

- d. Funding from the Basin and State-wide accounts is critical for project implementation. Collective groups of water providers and investors have the resources to move projects forward with coordinated efforts and mechanisms for financial returns to pay off dept. To date, there is a deficiency of similar opportunities for individual well users to either assess their needs or move forward towards acquiring a sustainable resource. A further understanding of the nature and extent of the existing water conditions in rural areas is important in identifying future needs. Developing water resources is complex and time intensive. It is important if not critical to identify concerns as early as possible.
- e. The USGS will implement the project on behalf of The Authority. The USGS is a well-recognized expert in accomplishing hydrological evaluations.
- f. Matching funds include USGS funds and basin roundtable funds, as identified in 1.d., above.

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

- g. Continuing the sustainable use of Denver basin aquifer groundwater helps relieve the stress on the small local stream systems in rural Douglas County helping to protect the environment to a reasonable degree. Managed groundwater use helps sustain open space and agricultural uses in rural Douglas County which are supported in the County Comprehensive Master Plan.
- h. Use of waters of the Denver basin aquifers in a sustainable manner promotes the utilization of local water resources and waters of the State of Colorado in an manner supported by Colorado law and policy.
- i. Improved sustainability of Denver basin groundwater use help manage depletions in the South Platte River basin and reduce the impacts on endangered species.
- j. The water activity provides a high level of benefit to Colorado in relationship to the amount of funds requested.
- k. The water activity is complimentary to or assists in the implementation of other CWCB programs. The proposed program will assist in the implementation of the Colorado Water Conservation Board (CWCB) supported Colorado Decision Support System (CDSS). The CDSS has data support system for groundwater levels. This project will create data sets that comply with CDSS data dictionary criteria, so they will be searchable.

**Part D. – Required Supporting Material**

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.

Denver Basin Aquifers- existing domestic and household wells. No water rights or bodies of water are expected to be affected by the proposed study.

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

The Douglas County 2030 Comprehensive Master Plan includes the following items

- Goal 8-3, Objective 8.3A:
  - 8-3A.1 Work with municipalities, other counties, water providers and user groups in planning for long-term water supplies
  - 8-3A.2 Encourage local leaders to work together to take a pro-active approach in creating a sustainable water supply

In addition, the following work is cited in the USGS proposal, Attachment 6:

- Colorado Division of Water Resources, 2003, Ground water levels in the Denver Basin bedrock aquifers, 2003 annual report, 132 p.
- Colorado Division of Water Resources, 2004, Ground water levels in the Denver Basin bedrock aquifers, 2004 annual report, 132 p.
- Colorado Water Conservation Board, 2004a, Statewide Water Supply Initiative Report, November 2004, variously paginated, accessed March 19, 2009, at <http://cwcb.state.co.us/IWMD/SWSITechnicalResources/SWSIPhaseIReport/SWSIPhaseIReport.htm>
- Colorado Water Conservation Board, 2004b, South Platte Decision Support System Ground-water Component Phase 1, Task 44.2, Denver Basin region water level technical memorandum, July 30, 2004, 27 p.
- Colorado Water Conservation Board, 2006a, South Platte Decision Support System Ground-water Component Phase 3, Task 44.2, Denver Basin region water level technical memorandum, November 28, 2006, 65 p., accessed February 27, 2008, at [ftp://dwrftp.state.co.us/cdss/gwm/tm/SPDSS44-2\\_20061128.pdf/](ftp://dwrftp.state.co.us/cdss/gwm/tm/SPDSS44-2_20061128.pdf/)

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

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- Fenneman, N.M., 1931, Physiography of the western United States: New York, McGraw Hill, 534 p.
- Graham, Glenn, and VanSlyke, George, 2004, Development of the regulatory framework for Denver Basin aquifers: *The Mountain Geologist*, v. 41, no. 4, p. 153-160.
- Major, T.J., Robson, S.G., Romero, J.C., and Zawistowski, Stanley, 1983, Hydrogeologic Data from Parts of the Denver Basin. Colorado: U.S. Geological Survey Open-File Report 83-274.
- McConaghy, J.A., Chase, G.H., Boettcher, A.J., and Major, T.J., 1964, Hydrogeologic data of the Denver Basin, Colorado: Colorado Water Conservation Board, Basic-Data Report no. 15, 224 p.
- Paschke, S.S., in press, Groundwater Availability in the Denver Basin, Colorado: U.S. Geological Survey Professional Paper 1770.
- Robson, S.G., 1987, Bedrock aquifers in the Denver Basin, Colorado – A quantitative water-resources appraisal: U.S. Geological Survey Professional Paper 1257, 73 p.
- Robson, S.G., and Romero, J.C., 1981a, Geologic Structure, Hydrology, and Water Quality of the Dawson Aquifer in the Denver Basin, Colorado: U.S. Geological Survey Hydrologic Investigations Atlas HA-643.
- Robson, S.G., and Romero, J.C., 1981b, Geologic Structure, Hydrology, and Water Quality of the Denver Aquifer in the Denver Basin, Colorado: U.S. Geological Survey Hydrologic Investigations Atlas HA-643.
- Robson, S.G., Romero, J.C., and Zawistowski, Stanley, 1981, Geologic Structure, Hydrology, and Water Quality of the Arapahoe Aquifer in the Denver Basin, Colorado: U.S. Geological Survey Hydrologic Investigations Atlas HA-647.
- Romero, J.C., 1976, Ground-water resources of the bedrock aquifers of the Denver Basin: Colorado Division of Water Resources Report, 109 p.

### 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** - Rural Douglas County groundwater-level monitoring network

**GRANT RECIPIENT** – Rural Water Authority of Douglas County

**FUNDING SOURCE** – USGS matching funds, CWCB state account and basin account

**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)

This project establishes a county-wide groundwater-level monitoring network for the long-term monitoring of the water resources of rural areas of unincorporated Douglas County, Colorado. A scientific evaluation of groundwater resources in the Authority’s service area has never been accomplished. In 2010, Douglas County estimated the population would grow from 293,521 residents to more than 444,784 by 2030. Some water providers in the county have surface-water rights, but their allocations do not provide enough water to satisfy the renewable supplies necessary to fulfill the existing water demands of the county. Development of the groundwater resources will continue to be necessary to meet the growing needs of the county.

**OBJECTIVES**

The primary objective of this study is to establish a county wide groundwater-level monitoring network for the long-term monitoring of the water resources of Douglas County, Colorado. The network will consist of approximately 30 existing wells throughout the county. Water levels will be measured monthly in all wells and five sites will be equipped with pressure transducers for continuous monitoring. Water levels measured from wells in the network will provide an assessment of the current water resource and provide the basis from which to monitor long-term changes of the hydrologic system.

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

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### TASKS

Provide a detailed description of each task using the following format

#### **TASK – 1 Identifying Target Monitoring Areas and Selecting Water-level Monitoring Sites.**

Description of Task Overlaying existing aquifer maps with well location maps and simulated drawdown maps within each service district will assist in identifying areas of interest for future water-level monitoring. This task will be completed by utilizing the CDWR well-permit web site and retrieving any county resources currently available

Method/Procedure This task will utilize existing State, county, and USGS maps. Potential sites will be identified based on the location, perforated interval, full completion within individual formations, and completeness of the available record.

Deliverable

Identity of possible well sites

#### **TASK – 2 Field Visit and Site Survey.**

Description of Task

This task will involve site visits for identifying wells suitable for water-level monitoring. Final selection will be based on well screened interval, well access, primary use, frequency of use, and well owner cooperation. Wells are considered suitable for water-level monitoring if the screened-interval depth and well-construction materials are known from well-drilling records and if the well can be accessed.

Method/Procedure

Once sites are selected for monitoring, the wells will be fully inventoried. The surrounding area, well head, access port, and measuring point will be photographed for the well record. The well location and elevation of the well head will be measured to within 1 foot using a high precision GPS unit. Field work for this task is estimated to require 164 hours of labor.

Deliverable

Well site selection

**TASK – 3 Monthly Water- Level Measurements and data Management**

Description of Task Water levels in selected wells will be measured on a monthly basis and recorded. This task includes reviewing the field data forms for accuracy, establishing the sites in NWIS, preparing site files, and entering the water level data into the NWIS database.

Method/Procedure

One well within each district will be equipped with a pressure transducer and data recorder for recording daily readings for comparison. Completion of this task is estimated to require 40 hours each month for a total of 632 hours. Data loggers are estimated to cost just under \$6,000 over the 15 month monitoring period. After each round of water-level measurements, hydrographs will be produced and reviewed to ensure that the selected wells are providing reliable data. This task is estimated to require 212 hours.

Deliverable

Data log of water levels in selected wells

**TASK – 4 Report Preparation**

Description of Task

A standard USGS Scientific Investigation Report (SIR) will be prepared to summarize the year of water-level monitoring results, including comparison of the results to other existing data (for example, the CDWR water-level monitoring data). Any GIS data sets generated during the project will be provided to the RWADC as a deliverable

Method/Procedure

Preparation of report. This task is estimated to require 384 hours of labor.

Deliverable

SIR Report and any GIS data sets generated.

A semi-annual report will be provided to the CWCB by the RWADC.

(NOTE: the full USGS proposal is included as Attachment 6.)

**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.

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

### 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.

<b>Total Costs</b>					
	Labor	Other Direct Costs	USGS Matching Funds	CWCB Grant to RWADC	Total Project Costs
Task 1 – Identify target monitoring areas and select sites	\$16,785		\$5875	\$10,910	\$16,785
Task 2 –Field visit and site survey	\$20,250	\$2440	\$7940	\$14,750	\$22,690
Task 3 – FY10 Monthly water-level measurements and data management	\$22,475	\$3765	\$9185	\$17,055	\$26,240
Task 3 – FY11 Monthly water-level monitoring and data management	\$53,870	\$11,645	\$22,930	\$42,580	\$65,515
Task 4 – FY12 Report preparation	\$42,710		\$14,950	\$27,760	\$42,710
In-Kind Contributions					
Total Costs:	\$156,090	\$17,850	\$60,880	\$113,055	\$173,935

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

### Labor costs

Project Personnel: Hourly Rate:	Project Manager (\$126/hr)	GIS Specialist (\$101.65/hr)	Hydrologist (\$91.50/hr)	Database Manager (\$77.25/hr)	Hydrologist (\$77.25/hr)	Total Costs
Task 1 - Identify target monitoring areas and select water-level monitoring sites	\$1,010	\$4,066	\$11,709			\$16,785
Task 2 – Field visit and site survey			\$10,980		\$9,270	\$20,250
Task 3 – FY10 - Monthly water-level measurements and data management			\$15,368	\$7,107		\$22,475
Task 3 – FY11 - Monthly water-level measurements and data management	\$1,070		\$48,870	\$3,930		\$53,870
Task 4 – FY12 Report preparation	\$5,650		\$33,600	\$3,460		\$42,710
<b>Total Hours:</b>	56	40	1,248	180	120	
<b>Cost:</b>	\$7,730	\$4,066	\$120,527	\$14,497	\$9,270	\$156,090

# Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

## Direct costs

Item:	Copies	Materials	Equipment/ Supplies	Mileage		Total
Units: Unit Cost:	No.			Miles		
Task 2 – Field visit and site survey			\$1,425	\$1,015		\$2,440
Task 3 – FY10 - Monthly water-level measurements and data management			\$1,735	\$2,030		\$3,765
Task 3 – FY11 - Monthly water-level measurements and data management			\$5,545	\$6,100		\$11,645
<b>Total Units:</b>						
<b>Total Cost:</b>			\$8,705	\$9,145		\$17,850

**Water Supply Reserve Account – Grant Application Form**

Form Revised March 2009

**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.

\*May be adjusted to reflect change in start date or other delays

Work Plan Element	FY-2010		FY-2011					FY-2012			
Task 1: Identifying Target Monitoring Areas & Review Well Logs		X	X								
Task 2: Field Visit and Site Canvassing		X	X								
Task 3: Measure Water Levels & Data Management			X	X	X	X	X				
Task 4: Report								X			

**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.

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

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

**Signature of Applicant:**

**Print Applicant's Name:** Geoff Withers, Chair: Rural Water Authority of Douglas County

**Project Title:** Rural Douglas County groundwater-level monitoring network

**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](mailto: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 21<sup>st</sup> 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/>

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**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**

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

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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.

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

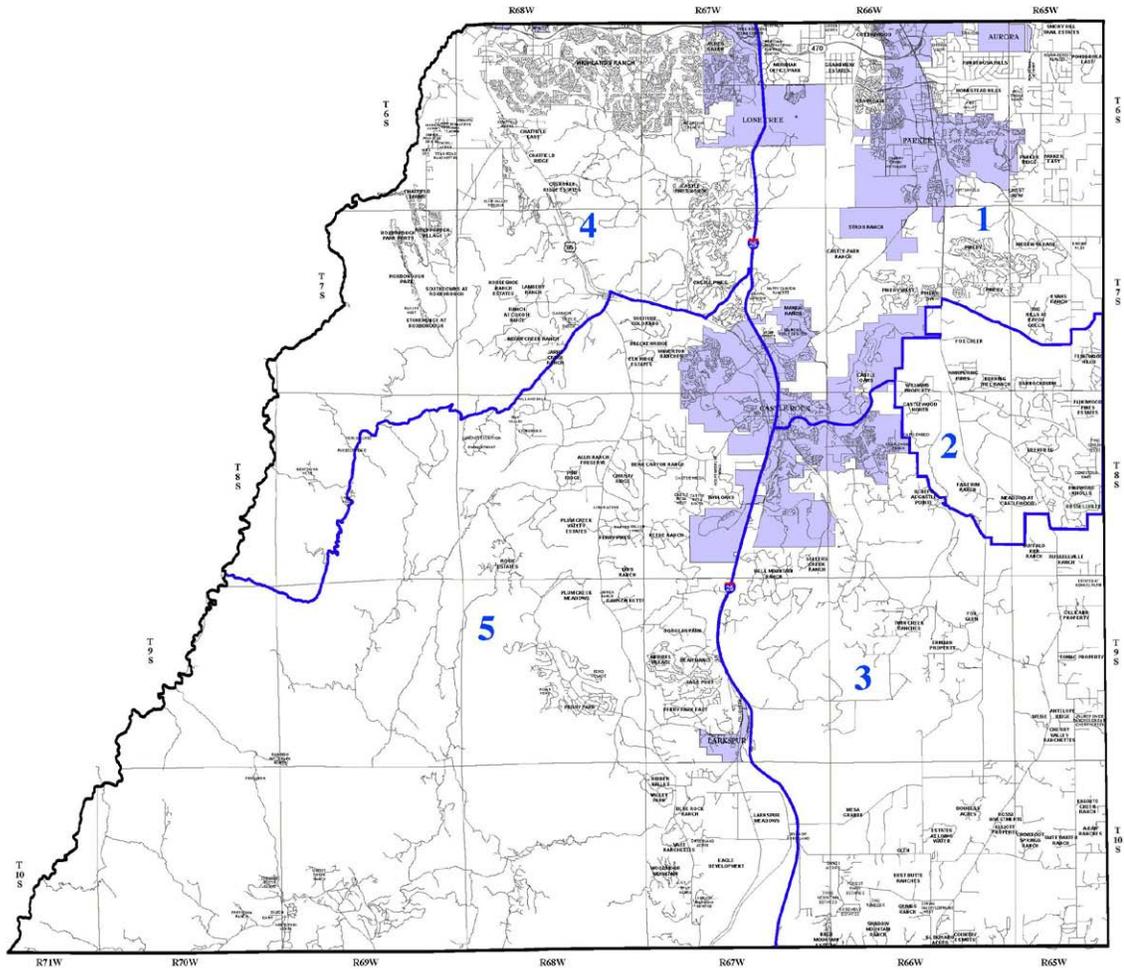
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**Attachment 4**  
**W-9 Form**

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.

Attachment 5

Map of Rural Water Authority of Douglas County Director Districts



WATER RESOURCES DISCIPLINE  
CENTRAL REGION  
COLORADO WATER SCIENCE CENTER  
Full Proposal

A. TITLE

Implementation of a county-wide groundwater-level monitoring network, Douglas County, Colorado, 2010-2012

B. SUMMARY

This project establishes a county-wide groundwater-level monitoring network for the long-term monitoring of the water resources of Douglas County, Colorado. In 2008, the Douglas County planning commission estimated the population would grow from 175,776 residents to more than 450,000 by 2030. While some water providers in the county have surface-water rights, their allocations do not provide enough water to satisfy the renewable supplies necessary to fulfill the existing water demands of the county. Development of the groundwater resources is necessary to meet the growing needs of the county. To assist county residents in developing water resources and systems for the benefit of all water users and landowners the county created the Rural Water Authority of Douglas County (RWADC) in 2008. The RWADC's mission is to assist the more than 8,000 rural water users and 29 water providers by evaluating current and future water supplies and demand. The primary objective of this study is to assist RWADC by establishing a county wide groundwater-level monitoring network for the long-term monitoring of the water resources of Douglas County, Colorado. The network will consist of approximately 30 existing wells throughout the county. Water levels will be measured monthly in all wells and five sites will be equipped with pressure transducers for continuous monitoring. Water levels measured from wells in the network will provide an assessment of the current water resource and provide the basis from which to monitor long-term changes of the hydrologic system.

C. PROBLEM

In 1990, the population of Douglas County, Colorado was just over 60,000 people. Between 2000 and 2008 the population had increased by about 60 percent from 175,766 to 280,621 residents occupying more than 101,000 housing units. The Douglas County planning commission estimates the population will have grown to more than 450,000 by 2030. While some Douglas County municipal water providers have water rights to the South Platte River and its tributaries Cherry Creek and Plum Creek, their allocations do not provide enough water to satisfy the renewable supplies necessary to fulfill the existing water demands of the county. Groundwater from Denver Basin bedrock aquifers provides more than 70 percent of the municipal water supply in the south Denver metropolitan area, and some water providers consider groundwater availability in this area insufficient for long-term demand (South Metro Water Supply Study Board, written commun., 2003; Colorado Water Conservation Board, 2004a). Domestic groundwater use is less than municipal use but is widespread the basin, and rural areas depend solely on self-supplied groundwater for water supply (Paschke, 2010). Douglas County reports the total number of domestic private wells increased from 1,242 in 1970, to 8,264 by 2008.

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

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In October 2008, the Rural Water Authority of Douglas County (RWADC) was created to assist county residents in developing water resources and systems for the benefit of all water users and landowners within the county. The RWADC's mission is to assist the more than 8,000 rural water users and 29 water providers by evaluating current and future water supplies and demand. For operational purposes, the RWADC divided its 840 mi<sup>2</sup> service area into 5 districts; 2 to the west and 3 to the east of Interstate 25.

The Denver Basin aquifer system consists of upper Cretaceous- to Tertiary-age bedrock (sandstone) aquifers and interbedded (claystone) confining units, which underlie about 7,000 square miles (mi<sup>2</sup>) of the Great Plains along the eastern edge of the Rocky Mountain Front Range (Fenneman, 1931; Robson, 1987, Paschke, 2010). The Denver Basin aquifer system is administratively recognized as nonrenewable by State water law because the aquifers are primarily confined and receive little precipitation recharge (Graham and VanSlyke, 2004). About 485 mi<sup>2</sup> of eastern Douglas County are underlain by the Denver Basin aquifer system, and groundwater pumped from the aquifers is the primary source of municipal and domestic water supply in Douglas County.

Systematic hydrogeologic characterization of the Denver Basin aquifers began in the 1970s as part of developing nontributary groundwater rules established by Colorado Senate Bill 213 (Graham and VanSlyke, 2004), and collaborative work between the Colorado Division of Water Resources (CDWR) and the U.S. Geological Survey (USGS) continues to date characterizing the four recognized aquifer units (Romero, 1976; Paschke, 2010). Results of these efforts included hydrologic atlases by Robson and Romero (1981a, 1981b) and Robson and others (1981a, 1981b), which presented the geologic structure, hydrology, and water quality of the Dawson, Denver, Arapahoe, and Laramie-Fox Hills aquifers. The hydrologic atlases and data compiled through the 1980s were then used to construct a groundwater flow model of the Denver Basin aquifers (Robson, 1987). A groundwater flow model of the Denver Basin aquifer system was developed by CDWR in the 1990s (Colorado Division of Water Resources, 1998), and more recently, the USGS, in consultation with the CDWR and the Colorado Water Conservation Board (CWCB), developed a fully three-dimensional groundwater flow model of the Denver Basin aquifer system (Paschke, 2010). Results from the groundwater flow model indicate pumping has lowered the potentiometric surface of the lower Arapahoe aquifer about 400 to 500 feet compared to predevelopment (pre-1880) conditions in northern Douglas County (fig. 1).

Historical water-level data collection for Denver Basin bedrock aquifers has been irregular, and water-level monitoring efforts have decreased since the 1980s (Colorado Water Conservation Board, 2004b, 2006). The first comprehensive measurements of water levels across the basin were made by the USGS from 1956 to 1963 and published by McConaghy and others (1964). A second comprehensive set of water-level data for the bedrock and alluvial aquifers through 1981 was published by Major and others (1983). Routine water-level measurements by the USGS continued through the 1980s, were incorporated into the Robson (1987) groundwater flow model, and are available through the USGS National Water Information System (NWIS) database

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

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(<http://waterdata.usgs.gov/co/nwis/>). The USGS NWIS data were used for model calibration by recent USGS modeling efforts (Paschke, 2010). A water-level monitoring network of approximately 278 wells was established in the 1980s by the CDWR, and data from that network are published in annual data reports (for example, Colorado Division of Water Resources, 2003, 2004). A compilation and bibliography of all available water-level data for bedrock and alluvial aquifers through 2004 was published as part of the South Platte Decision Support System (SPDSS; Colorado Water Conservation Board, 2004b, 2006a). Presently (2010) in Douglas County, the USGS measures water levels in 15 domestic wells in the Grandview subdivision near Parker, Colorado, in the north eastern corner of Douglas County. The CDWR presently measures water levels in 68 municipal and domestic wells within Douglas County on an annual basis (fig. 1). Water-level monitoring is sparse in the southern one-half of Douglas County, and more frequent water-level monitoring is needed in the northern one-half of Douglas County to assess seasonal and long-term water-level changes in response to pumping.

### D. OBJECTIVES AND SCOPE

The primary objective of this study is to establish a county-wide groundwater-level monitoring network for the long-term monitoring of the water resources of Douglas County, Colorado. Approximately 30 existing well sites throughout the county will be identified for the network and monthly water-level measurements will be made through the end of 2011. In addition to the monthly measurements, 5 sites, one within each district, will be equipped with a vented pressure transducer and data logger set to record water levels on a daily basis.

### E. RELEVANCE AND BENEFITS

This project meets the Hydrologic Data Network objective of the USGS Cooperative Water Program Five Year Program Plan. The creation of this network and the data collected from the study will add to the current network of wells currently being used monitor water levels in the Denver Basin. To some extent this project seeds the Hydrologic Hazards objective by providing data that could be used in planning for periods of extreme drought or precipitation. This project also exemplifies part one of the Water Census direction as outlined in Circular 1309 'Facing Tomorrow's Challenges, U.S. Geological Survey Science in the Decade 2007-2017' by assessing the current status of the freshwater resources within Douglas County and by establishing baseline conditions from which to monitor future water level changes.

### F. APPROACH

To accomplish the project objective, the study will be divided into four tasks: (1) the identification of target monitoring area and review of well logs to identify water-level monitoring sites; (2) field visit and site survey; (3) collection of monthly water-level measurements and associated data management, and (4) preparation of a final report.

Task 1: Identify Target Monitoring Areas and Review Well Logs to Select Water-Level Monitoring Sites. Existing aquifer and well location maps will be overlain by simulated drawdown maps within each service district will assist in identifying areas of interest for future water-level monitoring. This task will utilize existing State, county, and USGS maps.

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

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After targeted monitoring areas are identified, the CDWR well-permit web site and available county resources will be used to identify potential water-level monitoring sites. Potential sites will be identified based on the location, perforated interval, full completion within individual formations, and completeness of the available record. To assist in record management and to aid in the field investigation, digital well records will be hyper-linked to the respective well sites in a GIS data set of wells for the county.

Task 2: Field Visit and Site Selection. This task will involve site visits to wells identified as suitable for water-level monitoring. Final selection will be based on well screened interval, well access, primary use, frequency of use, and well owner cooperation. Wells are considered suitable for water-level monitoring if the screened-interval depth and well-construction materials are known from well-drilling records and if the well can be accessed. Once sites are selected for monitoring, the surrounding area, well head, access port, and measuring point will be photographed for the well record, and the well location and elevation of the well head will be measured to within 1 foot using a high precision GPS unit. Field work for this task is estimated to require 164 hours of labor.

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

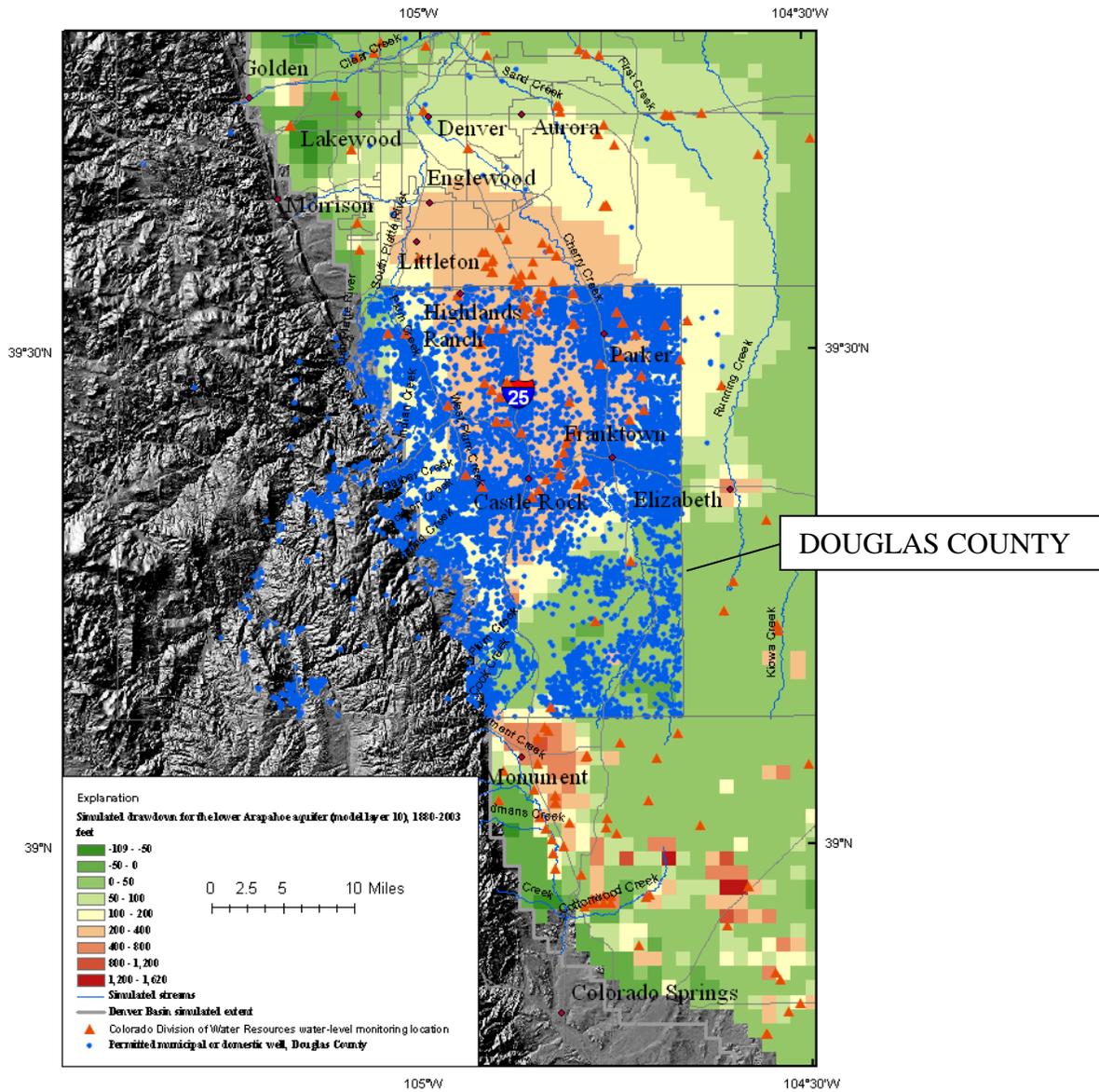


Figure 1. Locations of permitted municipal or domestic wells in Douglas County, Colorado Division of Water Resources water-level monitoring location, and drawdown for the lower Arapahoe aquifer simulated by the USGS Denver Basin model.

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

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Task 3: Monthly Water-Level Measurements and Data Management. Water levels in selected wells will be measured on a monthly basis. One well within each district will be equipped with a pressure transducer and data recorder for recording daily readings for comparison. Wells will be selected for transducer installation on the basis of well-completion interval and water use. If possible, inactive or abandoned wells will be used for pressure-transducer monitoring. Completion of this task is estimated to require 40 hours each month for a total of 632 hours. Data loggers are estimated to cost just under \$6,000 over the 14 month monitoring period from July 2010 through September 2011.

All site information and water-level data will be entered into the USGS NWIS database. This task includes reviewing the field data forms for accuracy, establishing the sites in the NWIS database, preparing site files, and entering the monthly water-level data into the NWIS database. After each round of water-level measurements, hydrographs will be produced and reviewed to ensure that the selected wells are providing reliable data. This task is estimated to require 212 hours.

Task 4: Report. A standard USGS Scientific Investigation Report (SIR) will be prepared to summarize the year of water-level monitoring results, including comparison of the results to other existing data (for example, the CDWR water-level monitoring data). Any GIS data sets generated during the project also will be provided to the RWADC as deliverables. This task is estimated to require 384 hours of labor

### G. QUALITY-ASSURANCE PLAN

All data collected will be in accordance with the OGW Groundwater Technical Procedures Manual as outlined in the USGS Colorado Water Science Center (CWSC) Ground-Water Activities Quality-Assurance Plan. Water levels will be measured using a graduated steel tape. For every measurement a check measurement will be performed until 2 measurements agree to within 0.01 of a foot. Pressure transducers and data loggers used for the project will be checked and calibrated by the U.S. Geological Survey Hydrologic Instrumentation Facility (HIF). Manual water levels will be measured monthly for comparison with the recorded values. The transducer will be inspected if the measurements vary by greater than 0.1 foot.

### H. PRODUCTS

The report will be a standard SIR, including the comparison of the results to other existing data. Any GIS data sets and associated metadata generated during the project will be provided as deliverables to the RWADC and will be accessible to the public through <http://water.usgs.gov/lookup/getgislist>. In addition, a quarterly letter report describing progress will be provided to the RWADC.

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

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### I. REFERENCES

- Colorado Division of Water Resources, 2003, Ground water levels in the Denver Basin bedrock aquifers, 2003 annual report, 132 p.
- Colorado Division of Water Resources, 2004, Ground water levels in the Denver Basin bedrock aquifers, 2004 annual report, 132 p.
- Colorado Water Conservation Board, 2004a, Statewide Water Supply Initiative Report, November 2004, variously paginated, accessed March 19, 2009, at <http://cwcb.state.co.us/IWMD/SWSITechnicalResources/SWSIPhaseIReport/SWSIPhaseIReport.htm>
- Colorado Water Conservation Board, 2004b, South Platte Decision Support System Groundwater Component Phase 1, Task 44.2, Denver Basin region water level technical memorandum, July 30, 2004, 27 p.
- Colorado Water Conservation Board, 2006a, South Platte Decision Support System Groundwater Component Phase 3, Task 44.2, Denver Basin region water level technical memorandum, November 28, 2006, 65 p., accessed February 27, 2008, at [ftp://dwrftp.state.co.us/cdss/gwm/tm/SPDSS44-2\\_20061128.pdf/](ftp://dwrftp.state.co.us/cdss/gwm/tm/SPDSS44-2_20061128.pdf/)
- Fenneman, N.M., 1931, Physiography of the western United States: New York, McGraw Hill, 534 p.
- Graham, Glenn, and VanSlyke, George, 2004, Development of the regulatory framework for Denver Basin aquifers: *The Mountain Geologist*, v. 41, no. 4, p. 153-160.
- Major, T.J., Robson, S.G., Romero, J.C., and Zawistowski, Stanley, 1983, Hydrogeologic Data from Parts of the Denver Basin. Colorado: U.S. Geological Survey Open-File Report 83-274.
- McConaghy, J.A., Chase, G.H., Boettcher, A.J., and Major, T.J., 1964, Hydrogeologic data of the Denver Basin, Colorado: Colorado Water Conservation Board, Basic-Data Report no. 15, 224 p.
- Paschke, S.S., in press, Groundwater Availability in the Denver Basin, Colorado: U.S. Geological Survey Professional Paper 1770.
- Robson, S.G., 1987, Bedrock aquifers in the Denver Basin, Colorado – A quantitative water-resources appraisal: U.S. Geological Survey Professional Paper 1257, 73 p.
- Robson, S.G., and Romero, J.C., 1981a, Geologic Structure, Hydrology, and Water Quality of the Dawson Aquifer in the Denver Basin, Colorado: U.S. Geological Survey Hydrologic Investigations Atlas HA-643.
- Robson, S.G., and Romero, J.C., 1981b, Geologic Structure, Hydrology, and Water Quality of the Denver Aquifer in the Denver Basin, Colorado: U.S. Geological Survey Hydrologic Investigations Atlas HA-643.
- Robson, S.G., Romero, J.C., and Zawistowski, Stanley, 1981, Geologic Structure, Hydrology, and Water Quality of the Arapahoe Aquifer in the Denver Basin, Colorado: U.S. Geological Survey Hydrologic Investigations Atlas HA-647.
- Romero, J.C., 1976, Ground-water resources of the bedrock aquifers of the Denver Basin: Colorado Division of Water Resources Report, 109 p.

# Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

## J. WORK PLAN

Workplan Element	FY-2010			FY-2011				FY-2012			
Task 1: Identify Target Monitoring Areas and Review Well Logs				X							
Task 2: Field Visit and Site Surveys				X							
Task 3: Measure Water Levels and Data Management				X	X	X	X	X			
Task 4: Report									X	X	

## K. FUNDING AND BUDGET.

**Funding shown in this section should agree with funding shown on the Proposal Cover Sheet.**

Funding Source	FY- 2010	FY- 2011	FY- 2012
	(all values in gross dollars)		
Rural Water Authority of Douglas County	\$42,715	\$42,580	\$27,760
U.S. Geological Survey- Matching Funds	\$23,000	\$22,930	\$14,950
<b>Totals</b>	<b>\$65,715</b>	<b>\$65,510</b>	<b>\$42,710</b>

## M. PERSONNEL.

Suzanne Paschke, GS-14 Supervisory Hydrologist, will oversee the project and provide technical guidance.

Rhett Everett, GS-11 Hydrologist, will be the lead hydrologists for the project. Reviewing well logs, selecting potential sites, conducting field visits, and measuring water levels

Jennifer Beck, GS-11 Hydrologist, will work prepare site files, establish sites in NWIS, and enter water levels.

## **Water Supply Reserve Account – Grant Application Form**

Form Revised March 2009

---

Cory Stephens, GS-11 Hydrologist, will create the initial GIS coverage and provide technical assistance in the development of the GIS coverage.

Kyle Davis, GS-09 Hydrologic Technician, will conduct the high-precision GPS survey of the wells.

All of the personnel were been selected based on their expertise or knowledge in a particular field. No additional formal training is required.

N. SAFETY.

**Proposal Job Hazard Analysis – Central Region**

- Check the numbered box(s) for all significant safety concerns this project should address. Significant safety concerns are commonly those that require training, purchase of safety equipment, or specialized preparation to address potentially hazardous conditions.
- Identify any unlisted safety concerns at bottom of the page.
- Provide details on the back of this page.

Proposal Number \_\_\_\_\_

Project Title (Short)\_Ground-water-level monitoring, Douglas County, Colorado, 2009

Project Chief or Proposal Author \_\_\_Suzanne Paschke

**Potential Project Safety Elements**

1.	Wading, bridge, or cableway measurements or sampling (WRD 99.32 & 01.05)
2.	Working on ice covered rivers or lakes (see WRD 00.03)
3.	Measuring or sampling during floods
4.	Well drilling; coring, augers, hydro-punch, borehole logging
5. <input type="checkbox"/>	Electrical hazards in the work area – above and below ground
6.	Construction – including cableways, trenching and demolition
7.	Working in remote areas, communication, office call in procedures (OP94.02)
8. <input type="checkbox"/>	Ergonomics, Office issues, carpal tunnel syndrome
9.	Field Vehicles appropriate for task?- Safety screens, equipment restraints.
10.	All terrain vehicles, snowmobiles, fork lifts,
11.	Helicopter or fixed wing aircraft usage (see OAS at: <a href="http://www.oas.gov/">http://www.oas.gov/</a> )
12. <input type="checkbox"/>	Site access: Federal, State, County and private lands
13.	Hypothermia or Hyperthermia (heat stress)
14.	Hantavirus, Lyme Disease, Histoplasmosis, Pfiesteria, Others?
15.	Contaminated water or soil with sanitary, biological, or chemical concerns
16.	Immunizations - voluntary programs
17.	Laboratory or mobile laboratory. Chemical hygiene plan, HazComm & MSDS's
18.	Hazardous waste disposal – Lab and Field
19.	Hazardous waste site operations (RCRA, CERCLA) HASP, HAZWOPPER
20. <input type="checkbox"/>	Confined space – Stilling Wells, Well Pits, Sample sites
21.	Radioactivity – Borehole logging – Soil Moisture -
22.	Respiratory protection – Dusts, Vapors, Fumes, Biologic (medical monitoring)

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

23. <input type="checkbox"/>	Water levels – wells, well pits, pumps and electrical issues
24.	Electrofishing (see <a href="http://1stop.usgs.gov/safety/Topic/jha/electrofishing.htm">http://1stop.usgs.gov/safety/Topic/jha/electrofishing.htm</a> )
25.	High pressure compressed gas cylinders – handling and transport
26.	Boating – operator training, equipment, requirements, inspections
27.	Special Training
28.	

Box no.	For each numbered box checked on the previous page, briefly: A. Describe the safety concern as it relates to this project. B. Describe how this safety concern will be addressed. Include training, safety Equipment and other actions that will be required. C. Estimate costs.
5.	Electrical hazards in the work area – above and below ground Use caution when opening and closing well head and while measuring water levels to avoid entanglement in electrical lines. No cost
8	Awkward Postures – Break up long sessions of keyboard work with frequent rest breaks or with other tasks that require movements different from those used to type or operate the mouse. No cost.
8	Sitting for long periods of time – Set chair at proper height, set monitor at correct angle, sit with good posture, take frequent breaks, do stretching exercises. No cost.
8	Typing – Take short breaks (3 to 5 minutes). No cost
8	Mouse work – Make sure mouse is at proper height and angle, take frequent breaks, use ergonomic mouse/mouse platform. No cost.
8	Viewing monitor for long periods of time – Look away from screen every few minutes, make sure screen is clean and in focus, make sure screen is angled where there is no glare on screen, have vision checked regularly. Make adjustments to position, and height to obtain optimal vision. No cost.
12	Potentially hostile land owners – Get owner’s permission before entering private property. No cost.
12	Beware of Dogs – Be aware of surroundings before entering property. Communicate with land owners and have dogs restrained as appropriate before entering property. No cost.
20.	Confined space – Stilling Wells, Well Pits, Sample sites. Open well pits and allow space to ventilate before entering. No cost.
20.	Confined space – Stilling Wells, Well Pits, Sample sites. Visually inspect well pits for spiders and snakes before entering. No cost.
20.	Confined space – Stilling Wells, Well Pits, Sample sites. Ensure that the safety evaluation for this site has been completed within the last 12 months. Inspect and document the site: Ladders, Doors, Electrical (GFCI), abate any entrapment

## Water Supply Reserve Account – Grant Application Form

Form Revised March 2009

	hazards. Sample and document the atmosphere: (i.e.) Oxygen, Carbon Monoxide, Hydrogen Sulfide, and Explosive gasses. Follow USGS Safety guidance for confined spaces <a href="http://1stop.usgs.gov/safety/topic/jha/index.shtml">http://1stop.usgs.gov/safety/topic/jha/index.shtml</a> . Estimated cost \$100/week for gas monitoring instruments if needed.
23	Traffic accidents – Stay alert, be aware of other traffic around you, obey traffic laws and reduced speed when weather conditions are bad. All personnel have completed defensive driving training. No cost to project.
23	Personal and vehicle safety when exiting the vehicle in traffic – Use hazard lights, asses road-shoulder conditions, and wear reflective vest when working in or near roadway. No cost.
23	Loading and unloading equipment – Stay alert, be aware of hand placement, use proper lifting techniques, lift with legs. Use caution lifting heavy equipment. No cost.
23	Hand and finger injury – Use care when spooling or unspooling tape or cable. Wear leather work gloves. No cost.
23	Back strain and falling – Ensure well pump is in off position, if applicable. Use care and bend legs when using pipe wrench to loosen caps and breathers. Wear leather gloves. Use care with withdrawing steel tape from well to prevent back strain and tripping over unreeled tape on ground. No cost.
23	Wasp sting. Spider bite. Snake bite – Be alert of wasps and spiders around vegetation and well head. Be alert to snakes in grass and around well head. No cost.
23	Lightening or tornado – Be mindful of weather conditions. Stop work and take cover when peril exists. No cost.
23	Sun and heat exposure – Use sunscreen, wear sun glasses when appropriate, drink liquids. Be knowledgeable of symptoms of heat exhaustion, heat stroke, and dehydration. No cost.
23	Cold exposure – Wear appropriate winter clothing, gloves, hat, and boots for warmth, drink liquids. Be knowledgeable of symptoms of hypothermia. No cost.
23	High Winds – Be aware of flying dust and debris in high winds. Wear safety glasses when appropriate. Be mindful of car doors that may be blown shut in high winds. No cost.

### L. ARCHIVAL PLAN.

All USGS data and information which supports published data (hard copy or publicly available electronic) or published interpretations will be archived according to an established and approved plan.

### M. ATTACHMENTS

- a. **Signed** Proposal JHA checklist