COLORADO
DEPARTMENT OF NATURAL RESOURCES

COLORADO WATER CONSERVATION BOARD

WATER SUPPLY RESERVE ACCOUNT APPLICATION FORM

South Platte River Diurnal Flow Study

Name of Water Activity/Project

Metro Wastewater Reclamation District

Name of Applicant

Metro Roundtable ($50,000)
South Platte Roundtable ($50,000)

Approving Basin Roundtable(s)
(If multiple basins specify amounts in parentheses.)

Amount from Statewide Account: none

Amount from Basin Account(s): $100,000

Total WSRA Funds Requested: $100,000

Application Content

Required Exhibits

A. Statement of Work, Budget, and Schedule
B. Project Map
C. As Needed (i.e. letters of support, photos, maps, etc.)

Appendices – Reference Material

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

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 and approval is outlined in materials in Appendix 1.

Once approved by the local Basin Roundtable, the applicant should submit this application **with a detailed statement of work including budget and schedule as Exhibit A** to CWCB staff by the application deadline.

WSRA applications are due with the roundtable letter of support 60 calendar days prior to the bi-monthly Board meeting at which it will be considered. Board meetings are held in January, March, May, July, September, and November. Meeting details, including scheduled dates, agendas, etc. are posted on the CWCB website at: http://cwcb.state.co.us Applications to the WSRA Basin Account are considered at every board meeting, while applications to the WSRA Statewide Account are only considered at the March and September board meetings.

When completing this application, the applicant should refer to the WSRA Criteria and Guidelines available at: http://cwcb.state.co.us/LoansGrants/water-supply-reserve-account-grants/Documents/WSRACriteriaGuidelines.pdf

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:

Greg Johnson – WSRA Application
Colorado Water Conservation Board
1580 Logan Street, Suite 200
Denver, CO 80203
gregory.johnson@state.co.us

If you have questions or need additional assistance, please contact Greg Johnson at: 303-866-3441 x3249 or gregory.johnson@state.co.us.

Water Supply Reserve Account – Application Form

Revised December 2011

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

1.	Applicant Name(s):	Metro Wastewater Reclamation District		
	Mailing address:	6450 York Street Denver, CO 80229		
	Taxpayer ID#:	84-0524704		
	Primary Contact:	Barbara J. Biggs	Position/Title:	Gov't Afrs Officer
	Email:	bbiggs@mwrd.dst.co.us		
	Phone Numbers:	Cell: 303-947-8046	Office:	303-286-3464
	Alternate Contact:	Mike Shimmin	Position/Title:	Legal Counsel
	Email:	mds@vrlaw.com		
	Phone Numbers:	Cell:	Office:	303-443-6151

2. Eligible entities for WSRA funds 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) – authorities, Title 32/special districts, (conservancy, conservation, and irrigation districts), and 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.

3. Provide a brief description of your organization

The Metro Wastewater Reclamation District (Metro District or Metro) is a Metropolitan Sewage Disposal District created under Part 5 of Article 4 of Title 32 of the Colorado Revised Statutes. The District was created in 1961 to provide wholesale wastewater transmission and treatment for local governments throughout the metropolitan Denver region. Forty-eight cities and special districts, including Arvada, Aurora, Brighton, Denver, Lakewood, Thornton and Westminster, contract directly with Metro for wastewater treatment. Metro has a 750 square mile service area with an estimated population of 1.7 million.

The Metro District operates the Robert W. Hite Treatment Facility (RWHTF) at 6450 York Street in Adams County. The RWHTF has a rated capacity of 220 million gallons per day (mgd) and currently treats approximately 130 mgd. Because upstream senior water rights typically divert 100 percent of the flow in the South Platte River upstream of the Metro District's discharge, reclaimed water from the RWHTF can make up as much as 85 percent of the flow in the South Platte River as much as six months of the year.

Because of the normal pattern of household water use throughout the Metro District's service area, the volume of reclaimed water discharged to the South Platte has a predictable, diurnal pattern, with the lowest daily flows occurring very early in the morning, peak flows around 11 a.m., a second low-flow period in the late afternoon/early evening that is not nearly as low as the early morning period, and a second, less significant peak in the evening.

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

5. 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 link to this standard contract is included in Appendix 3. Please review this contract and check the appropriate box.

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

[x] 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.

6. 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.

Because the Metro District does not rely on tax revenues, but instead funds its operations through charges for service that reflect the actual cost to treat the wastewater collected and treated, it is an enterprise under TABOR and does not anticipate any TABOR issues.

Part II. - Description of the Water Activity/Project

1. What is the primary purpose of this grant application? (Please check only one)

	Nonconsumptive (Environmental or Recreational)
	Agricultural
	Municipal/Industrial
	Needs Assessment
	Education
x	Other Explain: Water rights operation and administration

2. If you feel this project addresses multiple purposes please explain.

The diurnal flow pattern in the South Platte River downstream of the Metro District's discharge can affect the extent to which both agricultural and municipal water rights holders can divert their decreed water rights, and current water rights administration practices may result in unintended impacts to some downstream water rights. The purposes of this study are to identify the water users likely affected by the diurnal flows and to what degree; identify the potential benefits of mitigating or "dampening" the diurnal flows; identify potential administrative or physical actions, including a flow equalization pond, that could provide those benefits; and identify the potential costs of providing administrative and physical changes to address these issues.

3. Is this project primarily a study or implementation of a water activity/project? (Please check only one)

x	Study		Implementation

4. To catalog measurable results achieved with WSRA funds can you provide any of the following numbers?

4. To help us map WSRA projects please include a map (Exhibit B) and provide the general coordinates below:

Latitude:	39° 48′ 46.5″ N	Longitude:	104° 57′ 16″ W

5. 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. A full **Statement of Work** with a detailed budget and schedule is required as **Exhibit A** of this application.

This study will address the following issues:

- Defining the diurnal flow issues; and
- Identifying the water users likely affected by the diurnal flows and to what degree; and
- Identifying the potential benefits of mitigating or "dampening" the diurnal flows; and
- Identifying potential administrative or physical actions, including a flow equalization pond, that could provide those benefits; and
- Identifying the costs of providing potential administrative and physical benefits.

Deere & Ault Consultants, Inc. was retained by the Metro District to develop a scope for the study, and will be kept under contract to complete the study. The scope of the study was cooperatively developed with Opposers' consultants through a stakeholder process. All Opposers in Case No. 11CW74, including the State and Division Engineers, are considered stakeholders in the study process. Other stakeholders may be identified during the study process as well. The scope of work includes the following tasks (a copy of the entire Scope of Work is attached to this application as Exhibit XX):

Task 1 - Review Previous Studies

Deere & Ault Consultants, Inc. (Deere & Ault) will review any previous studies that discuss or relate to the impact of diurnal flows on the South Platte River.

Task 2 - Analysis of Current River Administration

Based on prior discussions with Mr. David Nettles, Division 1 Engineer, and Mr. William Schneider, District No. 2 Water Commissioner, we understand that the diurnal flow of the South Platte River has an effect on administration of water rights in District No. 2. Based on these discussions, we understand that the 1871 priority of the Western Ditch is the primary calling right in this reach of District 2, making the Western Ditch the "swing ditch" (i.e., the ditch that dictates the presence of a call). We understand that the Water Commissioner determines the need for a call in District 2 upstream of the St. Vrain Creek confluence by: 1) discussing the daily water needs of the Western Ditch with the ditch company representative, 2) examining the low flow "trough" of the daily hydrograph at the Henderson stream gage, 3) examining gauged and known inflows within the reach upstream of the Western Ditch and downstream of the Henderson gage to determine their potential contribution to stream flow, and 4) distributing the water to all in-priority water users according to their demand so that the Western 1871 priority and all intervening water rights are satisfied when the trough of the diurnal flow reaches the Western headgate. If the Water Commissioner determines the Western's demand will not be completely satisfied, the Water Commissioner will place a bypass call within District 2. The bypass call allows the Water Commissioner to work with upstream junior water users so that only a partial curtailment may be required to satisfy the Western Ditch's demands. At times, other ditches will be the swing ditch.

Task 3 - Analysis of Impact of Diurnal Flow Fluctuation

The purpose of this task is to identify whether and where the diurnal fluctuation of flow may have adverse impacts on the downstream water users, and the extent of such impacts.

Task 4 - Analysis of Structural Alternatives to Mitigate Any Impacts of the Diurnal Flow Fluctuation

Several possible alternatives have been proposed to address the diurnal flow fluctuation of the South Platte River.

Task 5 - Analysis of Revised Administrative Procedures

In this task, Deere & Ault will analyze whether or not additional or revised administrative procedures could serve to help mitigate any negative impacts as a result of the diurnal fluctuation in the South Platte River. These revised administrative procedures could include the requirement for additional stream gages or other ancillary structures that might be required to facilitate any revised administrative procedures.

Task 6 - Meetings with Stakeholders

At least one stakeholder meeting will be held as the study progresses to report on preliminary results and to receive intermediate input from the stakeholders about the methods being used in the study and preliminary results being obtained. Deere & Ault shall consider the intermediate input obtained from the stakeholders before drafting the study report as allowed within funding constraints.

Task 7 - Progress Reports

If funded through the CWCB Water Supply Reserve Account ("WSRA"), Deere & Ault shall provide the CWCB a progress report every six months, with the first progress report to be submitted six months after notice-to-proceed.

Task 8 - Draft and Final Reports

Draft and final reports issued by Deere & Ault shall address each of the issues and analyses set forth in this Scope of Services, as well as including the identification of the costs and benefits of implementing potential mitigation measures that are deemed to appear feasible and a discussion of potential obstacles to that implementation. Deere & Ault will consult, coordinate, and seek input from the stakeholders' consultants during all phases of the study.

Part III. – 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]

The purpose of this study is to determine how the exercise of existing water rights is affected by the diurnal fluctuation of flow in the South Platte River downstream from the Robert W. Hite Treatment Facility (RWHTF) at 6450 York Street in Adams County and identify administrative and structural approaches that might mitigate or "dampen" the diurnal fluctuation and its impact so that all of the water in the South Platte River downstream of the the RWHTF is efficiently put to beneficial use in accordance with the water rights decrees on the River and Colorado's prior appropriation system.

   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.

Funding for this study is being requested from both the Metro Roundtable and the South Platte Roundtable as a 50/50 split since both BRTs will benefit from the information developed during the study.

[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.

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 purpose of this study is to evaluate the effect of the diurnal flow variations in the South Platte River on the administration of water rights and the ability of water rights holders to put water to beneficial use. The results of this study may allow more efficient use of appropriated water in the basin.

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. Statewide requests must also include a minimum match of **5 percent** of the total grant amount from Basin Funds. 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 **Exhibit A** of this application)

The Metro Wastewater Reclamation District will provide matching funds for the study. To date, the Metro District has expended $27,185 to support the stakeholder process for developing the scope of work for this study, which represents more than 20 percent of the $100,000 study budget.

[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.

2. For Applications that include a request for funds from the **Statewide Account**, describe how the water activity/project meets all applicable **Evaluation Criteria.** (Detailed in Part 3 of the Water Supply Reserve Account Criteria and Guidelines and repeated below.) Projects will be assessed on how well they meet the Evaluation Criteria. **Please attach additional pages as necessary.**

Evaluation Criteria – the following criteria will be utilized to further evaluate the merits of the water activity proposed for funding from the Statewide Account. In evaluation of proposed water activities, preference will be given to projects that meet one or more criteria from each of the three "tiers" or categories. Each "tier" is grouped in level of importance. For instance, projects that meet Tier 1 criteria will outweigh projects that only meet Tier 3 criteria. WSRA grant requests for projects that may qualify for loans through the CWCB loan program will receive preference in the Statewide Evaluation Criteria if the grant request is part of a CWCB loan/WSRA grant package. For these CWCB loan/WSRA grant packages, the applicant must have a CWCB loan/WSRA grant ratio of 1:1 or higher. Preference will be given to those with a higher loan/grant ratio.

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

a. The water activity addresses multiple needs or issues, including consumptive and/or non-consumptive needs, or the needs and issues of multiple interests or multiple basins. This can be demonstrated by obtaining letters of support from other basin roundtables (in addition to an approval letter from the sponsoring basin).
b. The number and types of entities represented in the application and the degree to which the activity will promote cooperation and collaboration among traditional consumptive water interests and/or non-consumptive interests, and if applicable, the degree to which the water activity is effective in addressing intrabasin or interbasin needs or issues.
c. The water activity helps implement projects and processes identified as helping meet Colorado's future water needs, and/or addresses the gap areas between available water supply and future need as identified in SWSI or a roundtable's basin-wide water needs assessment.

Tier 2: Facilitating Water Activity Implementation

d. Funding from this Account will reduce the uncertainty that the water activity will be implemented. For this criterion the applicant should discuss how receiving funding from the Account will make a significant difference in the implementation of the water activity (i.e., how will receiving funding enable the water activity to move forward or the inability obtaining funding elsewhere).
e. The amount of matching funds provided by the applicant via direct contributions, demonstrable in-kind contributions, and/or other sources demonstrates a significant & appropriate commitment to the project.

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

f. The water activity helps sustain agriculture & open space, or meets environmental or recreational needs.
g. The water activity assists in the administration of compact-entitled waters or addresses problems related to compact entitled waters and compact compliance and the degree to which the activity promotes maximum utilization of state waters.
h. The water activity assists in the recovery of threatened and endangered wildlife species or Colorado State species of concern.
i. The water activity provides a high level of benefit to Colorado in relationship to the amount of funds requested.
j. The water activity is complimentary to or assists in the implementation of other CWCB programs.

Continued: Explanation of how the water activity/project meets all applicable **Evaluation Criteria.**
Please attach additional pages as necessary.

Part IV. – 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 water rights issues, and the name/location of water bodies affected by the water activity.

Based on prior discussions with Mr. David Nettles, Division 1 Engineer, and Mr. William Schneider, District No. 2 Water Commissioner, we understand that the diurnal flow of the South Platte River has an effect on administration of water rights in District No. 2. Based on these discussions, we understand that the 1871 priority of the Western Ditch is the primary calling right in this reach of District 2, making the Western Ditch the "swing ditch" (i.e., the ditch that dictates the presence of a call). We understand that the Water Commissioner determines the need for a call in District 2 upstream of the St. Vrain Creek confluence by: 1) discussing the daily water needs of the Western Ditch with the ditch company representative, 2) examining the low flow "trough" of the daily hydrograph at the Henderson stream gage, 3) examining gauged and known inflows within the reach upstream of the Western Ditch and downstream of the Henderson gage to determine their potential contribution to stream flow, and 4) distributing the water to all in-priority water users according to their demand so that the Western 1871 priority and all intervening water rights are satisfied when the trough of the diurnal flow reaches the Western headgate. If the Water Commissioner determines the Western's demand will not be completely satisfied, the Water Commissioner will place a bypass call within District 2. The bypass call allows the Water Commissioner to work with upstream junior water users so that only a partial curtailment may be required to satisfy the Western Ditch's demands. At times, other ditches will be the swing ditch.

Deere & Ault will conduct an analysis of call records for the South Platte River for the study period of 1992 through 2012 to determine which particular water users in District No. 2 were likely impacted by the diurnal flow administration. The analysis will include a tabulation of the various water rights that have placed a call during the study period, as well as the relative frequency of calls that affect each particular structure.

2. Please provide a brief narrative of any related studies or permitting issues.

In 2003 the Metro District completed a study of the feasibility of constructing flow equalization facilities at the RWHTF to protect water quality and aquatic life. That study determined that flow equalization facilities would be operationally complex and much more expensive than originally anticipated (original estimate $7 million; revised estimate $18 - $27 million); when considered in conjunction with the studies described below, it was determined that flow equalization did not provide a benefit to the environment to justify the cost to construct and operate.

Between 1997 and 2004, the Metro District conducted a number of studies to determine if the diurnal fluctuations in the South Platte River had any impact on water quality, especially dissolved oxygen concentrations, or aquatic life, especially spawning success. Those studies determined there was no impact on either water quality or aquatic life as a result of the diurnal flow variations, and the results of the studies were accepted by the Water Quality Control Division of the Colorado Department of Public Health, U.S. Environmental Protection Agency Region VIII, and the Colorado Division of Wildlife (now known as Colorado Parks & Wildlife).

All of these studies will be reviewed as part of Task 1 of this study.

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**. All WSRA funds are disbursed on a reimbursement basis after review invoices and appropriate backup material.

Please provide a detailed statement of work using the template in Exhibit A. Additional sections or modifications may be included as necessary. Please define all acronyms and include page numbers.

South Platte River Diurnal Flow Study
Project Budget

TABLE 1

South Platte River Diurnal Flow Study

Cost Estimate

		$250	$160	$135	$108	$76	$88	$84	$54					
		LABOR BY CATEGORY												
Task	Task Description	Principal	Project Manager	Project Engineer	Water Resources Engineer	Water Resources Analyst	CADD Technician	Technical Writer	Clerical	Total Hours	Labor Costs	Direct Expense	Total by Subtask	Total by Task
1	**Review Previous Studies**													$ 1,270
1a	Review and Analyze previous studies provided to D&A by the Metro District & Others	1	2		2					5	$ 786		$ 786	
1b	Provide Copies of Reports to Stakeholders		1		2				2	5	$ 484		$ 484	
2	**Analysis of Current River Administration**													$ 6,488
2a	Meeting w/ Division Engineer, Water Commissioner(s), and Stakeholders	6	6		8					20	$ 3,324	$ 100	$ 3,424	
2b	Field Trip to Observe Critical Reaches and Infrastructure	8			8					16	$ 2,864	$ 200	$ 3,064	
3	**Analysis of Impact of Diurnal Flow Fluctuation**													$ 27,624
3a	Review and Analysis of District 2 Call Records	4	8		20	16			2	50	$ 5,764		$ 5,764	
3b	Review and Analysis of Hourly South Platte River Gage Records (e.g., Henderson, Fort Lupton, Kersey)	4	8		24	16			2	54	$ 6,196		$ 6,196	
3c	Further Define Diurnal Flow Fluctuation (i.e., time, location, amount, reusable/single use ratio)	8	12		24	16				60	$ 7,728		$ 7,728	
3d	Determine Impact of Diurnal Fluctuation (i.e., location, amount, mechanism)	8	16		20	16				60	$ 7,936		$ 7,936	
4	**Analysis of Structural Alternatives to Mitigate Impacts of Diurnal Flow**													$ 30,322
4a	Conduct Screening of Proposed Alternatives (i.e., on-channel storage, off-channel storage)	8	16	16	16					56	$ 8,448		$ 8,448	
4b	Analysis of Selected Structural Mitigation Alternatives	8	20	24	24					76	$ 11,032		$ 11,032	
4c	Provide Preliminary Drawings of Selected Alternatives	1		24			24			49	$ 5,602		$ 5,602	
4d	Develop Preliminary Cost Estimates for Selected Alternatives	4		16	8	16				44	$ 5,240		$ 5,240	
5	**Analysis of Revised Administrative Procedures**													$ 8,112
5a	Additional Coordination with Division Engineer and Water Commissioners	4	4		8					16	$ 2,504		$ 2,504	
5b	Investigate Potential for Additional Gaging/Instrumentation to Enhance Administration	4	18		16					38	$ 5,608		$ 5,608	
6	**Meetings with Stakeholders**													$ 4,608
6a	Conduct up to two Stakeholder Meetings	12	6		6					24	$ 4,608		$ 4,608	
7	**Progress Report**													$ 2,922
7a	Provide Stakeholders with Progress Report every 6 Months	8	2		2			4		16	$ 2,872	$ 50	$ 2,922	
8	**Draft and Final Reports**													$ 18,916
8a	Prepare and Submit Draft Report for Review by Stakeholders	16	40		32		4	12		104	$ 15,216	$ 50	$ 15,266	
8b	Prepare and Submit Final Report to Stakeholders	4	8		6			8		26	$ 3,600	$ 50	$ 3,650	
	TOTALS	108	167	80	226	80	28	24	6	719	$ 99,812	$ 450	$ 100,262	$ 100,262
													TOTAL (Rounded to Nearest $1,000)	$ 100,000

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. Copies of this report will also be provided to the stakeholders that participated in the study process.

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: Catherine R. Corali, District Manager

Print Applicant's Name: Catherine R. Corali, District Manager

Project Title: South Platte River Diurnal Flow Study

Return an electronic version (hardcopy may also be submitted) of this application to:

Greg Johnson – WSRA Application
Colorado Water Conservation Board
1580 Logan Street, Suite 200
Denver, CO 80203
gregory.johnson@state.co.us

Scope of Study of the Issues, Costs, and Potential Benefits to Agricultural, Municipal and Industrial Water Users from Diurnal Flow Management Options in the South Platte River from Denver to Platteville

INTRODUCTION

Typical diurnal variations in influent flow experienced by municipal wastewater treatment plants are generally characterized by two peaks resulting from morning and early evening water usage and decreasing flows late at night and early in the morning. Effluent discharges from wastewater treatment plants to receiving streams have a very similar diurnal fluctuation that is slightly delayed due to the treatment processes. These peak effluent discharges from the Metro Wastewater District's Robert W. Hite Treatment Facility ("RWHTF") that serves the Denver metropolitan region, occur at approximately 1:00 p.m. and 11:00 p.m., while the low flow discharge occurs at approximately 7:00 a.m. on average.

When wastewater effluent flow rates are large compared to the receiving streams' base flow, the flow rate and pattern of the downstream reach of the receiving stream largely mimic that of the effluent discharge. This is the case with the South Platte River downstream of the RWHTF, which is routinely reflected by the stream flow records for the South Platte River at the Henderson Gage. If the flow rate in the South Platte River is not influenced by a recent storm or spring runoff, the flow rate and hourly flow rate variation is largely influenced by the effluent discharge at the RWHTF.

Analysis of the average hourly effluent discharge at the RWHTF for the year 2011 indicates that on average the discharge from this facility was 195 cfs. However, the discharge from the RWHTF varied on average from a low of about 105 cfs at 7:00 a.m. up to as high as 250 cfs at 1:00 p.m.

The South Platte River at Henderson (PLAHENCO Gage) provides the best data as to the influence of the RWHTF effluent discharge on the South Platte flows. The Henderson Gage is located approximately 10.6 miles downstream of the RWHTF South Platte River Outfall. Average hourly discharge records for the 2011 water year were obtained from the Colorado Division of Water Resources website. Review of the Henderson Gage hourly data for a two-day period during September 5th and 6th of 2011 indicates that the flow at this gage during this period fluctuated between approximately 170 cfs to as high as 330 cfs, and averaged approximately 250 cfs. By comparing this hydrograph to the flow discharge at the RWHTF, it is clear that the diurnal fluctuation at the Henderson gage is strongly influenced by the diurnal fluctuation of discharge of effluent from RWHTF.

On April 20, 2011, the City of Aurora, acting by and through its utility enterprise ("Aurora Water" or "Aurora"), the City of Thornton, and the Metro Wastewater Reclamation District ("Metro") collectively referred to "Co-Applicants" filed an application with the District Court, Water Division No. 1, in Case No. 11CW74. The Co-Applicants in this case applied for a change of water rights to: 1) obtain approval of the relocation of the treatment and discharge of a portion of Thornton's effluent that is generated in Thornton and currently treated at Metro's

RWHTF to Metro's Northern Treatment Plant (NTP) pursuant to the terms of a settlement agreement, dated October 10, 1990, between Thornton, the City of Englewood, and the City of Westminster. During the course of negotiations to settle Case No. 11CW74, several Opposers to the application expressed concerns that the diurnal fluctuation of the South Platte River and the corresponding method of administration of water rights in Water District No. 2, caused a reduction in the amount of water delivered to various water rights located downstream of the effluent discharge point of the RWHTF.

A stipulated settlement in this case was eventually achieved, which led to a Final Decree of the Court in Case No. 11CW74. As part of the stipulation between Co-Applicants and various Opposers, the Co-Applicants agreed to fund and oversee a study (not to exceed $100,000) of the diurnal flows discharged from the RWHTF, including the impacts and potential benefits of dampening those flows on the South Platte River. It was anticipated that funding of the study could be obtained from a grant by the Colorado Water Conservation Board (CWCB). The stipulation between the Opposers and the Co-Applicants specified that the study and the grant application would include:

- Defining the diurnal flow issues; and
- Identifying the water users likely affected by the diurnal flows and to what degree; and
- Identifying the potential benefits of mitigating or "dampening" the diurnal flows; and
- Identifying potential administrative or physical actions, including a flow equalization pond, that could provide those benefits; and
- Identifying the costs of providing potential administrative and physical benefits.

The scope of the study, as presented herein, was cooperatively developed with Opposers' consultants through a stakeholder process. All Opposers in Case No. 11CW74, including the State and Division Engineers, are considered stakeholders in the study process. Other stakeholders may be identified during the study process as well.

SCOPE OF SERVICES

The scope of services for this project is summarized as follows:

Task 1 - Review Previous Studies

Description of Task

Deere & Ault Consultants, Inc. (Deere & Ault) will review any previous studies that discuss or relate to the impact of diurnal flows on the South Platte River.

Method/Procedure

Deere & Ault will review the studies to determine if there is any information that is relevant to the current project.

Deliverables

Consultant will summarize the relevant portions of previous studies in the "Final Report" and provide copies of the reports to the stakeholders upon notice-to-proceed or sooner.

Task 2 - Analysis of Current River Administration

Description of Task

Based on prior discussions with Mr. David Nettles, Division 1 Engineer, and Mr. William Schneider, District No. 2 Water Commissioner, we understand that the diurnal flow of the South Platte River has an effect on administration of water rights in District No. 2. Based on these discussions, we understand that the 1871 priority of the Western Ditch is the primary calling right in this reach of District 2, making the Western Ditch the "swing ditch" (i.e., the ditch that dictates the presence of a call). We understand that the Water Commissioner determines the need for a call in District 2 upstream of the St. Vrain Creek confluence by: 1) discussing the daily water needs of the Western Ditch with the ditch company representative, 2) examining the low flow "trough" of the daily hydrograph at the Henderson stream gage, 3) examining gauged and known inflows within the reach upstream of the Western Ditch and downstream of the Henderson gage to determine their potential contribution to stream flow, and 4) distributing the water to all in-priority water users according to their demand so that the Western 1871 priority and all intervening water rights are satisfied when the trough of the diurnal flow reaches the Western headgate. If the Water Commissioner determines the Western's demand will not be completely satisfied, the Water Commissioner will place a bypass call within District 2. The bypass call allows the Water Commissioner to work with upstream junior water users so that only a partial curtailment may be required to satisfy the Western Ditch's demands. At times, other ditches will be the swing ditch.

Method/Procedure

Task 2a - Meeting with Division Engineer and Water Commissioner

In order to better understand the administrative practices, Deere & Ault will meet with the Division Engineer, current and past Water Commissioners, and representatives of the various stakeholders for this project.

Task 2b - Field Trip to Observe Critical Reaches and Infrastructure

Deere & Ault will also conduct a field trip with the Division Engineer and/or Water Commissioner and other stakeholders to observe various critical reaches of the river, measuring structures, key ditch headgates, check structures, and other facilities that may impact the current administration.

Deliverables

Based on this work, Deere & Ault will provide a written description of the current administrative practices and how the diurnal fluctuation of the South Platte River affects the administration of the South Platte water rights in District No. 2.

Task 3 - Analysis of Impact of Diurnal Flow Fluctuation

Description of Task

The purpose of this task is to identify whether and where the diurnal fluctuation of flow may have adverse impacts on the downstream water users, and the extent of such impacts.

This task will include an analysis of the current nature and extent of the diurnal fluctuation in terms of:

i. By time (daily, seasonal, and annual fluctuations).

ii. By location (determine the downstream location where the diurnal fluctuation is substantially moderated).

iii. If data are available, provide an approximate analysis on an average annual basis of the amount of reusable versus native water that is available for use downstream of the RWHTF. This will be an estimate since Deere & Ault does not have access to all of the data required to determine the amount of reusable versus non-reusable water downstream of RWHTF.

The task will include an analysis of which water rights have been impacted by the diurnal fluctuation and the administration of flow on the South Platte due to the diurnal fluctuation. Deere & Ault shall analyze the mechanism of impact to downstream water users in terms of the location where the impact occurs and the approximate amount of the impact on downstream water users.

Also included in this task will be an analysis of the amount of storage that might be required to store the peaks of diurnal fluctuation so that the water can be released at a more constant rate in order to mitigate the impact of the diurnal fluctuation.

Method/Procedure

Task 3a - Review and Analysis of District 2 Call Records

Deere & Ault shall conduct an analysis of call records for the South Platte River for the study period of 1992 through 2012 to determine which particular water users in District No. 2 were likely impacted by the diurnal flow administration. It is our understanding that the only time that a ditch or water user downstream of RWHTF within District No. 2 would be impacted by the diurnal flow fluctuation would be those times when there is a call or bypass call in District No. 2 at or upstream of the Western Ditch. The analysis will include a tabulation of the various water rights that have placed a call during the study period, as well as the relative frequency of calls that affect each particular structure.

Task 3b - Review and Analysis of Hourly South Platte River Gage Records at the Henderson, Fort Lupton, and Kersey Gages

Preliminary analyses as shown on the attached Figure 1 for September 5 and 6, 2011 indicated that the amplitude of the diurnal fluctuation at the Fort Lupton Gage was significantly reduced from the amplitude of the diurnal fluctuation at the upstream Henderson Gage. Similar results were observed from an analysis of hourly stream flow data for the entire year of 2011. By the time the South Platte reached the Kersey Gage downstream of the confluence of the Cache la Poudre River and the South Platte River, the diurnal fluctuation was all but eliminated due to the impact of irrigation return flows and inflows from various tributaries including St. Vrain Creek, the Big Thompson River, and the Cache la Poudre River located downstream of the of the Western Mutual Ditch Company. However, the preliminary analysis was only conducted for the year 2011, and a more rigorous analysis of the flows at these gages will be conducted in order to determine the point at which the diurnal fluctuation is substantially moderated.

Task 3c - Further Define Diurnal Flow Fluctuation (i.e., time, location, amount, and reusable makeup)

Task 3d - Determine the Impact of the Diurnal Fluctuation in terms of the location, the amount, and the mechanism of Impact

Deliverables

Deere & Ault will provide a written description with supporting graphs and tables explaining the impact of the diurnal fluctuation on water users in District 2 downstream of RWHTF.

Task 4 - Analysis of Structural Alternatives to Mitigate Any Impacts of the Diurnal Flow Fluctuation

Description of Task

Several possible alternatives have been proposed to address the diurnal flow fluctuation of the South Platte River. Possible solutions that have been proposed include:

A. Use of upstream storage at Chatfield Reservoir.

B. Use of an existing gravel pit reservoir between RWHTF and the Western Mutual Ditch headgate to dampen the diurnal fluctuation.

C. Construction of a new gravel pit storage reservoir downstream of RWHTF and upstream of the Western Ditch in order to dampen the diurnal fluctuation.

D. Use of storage at agreed upon locations, including agreed upon timed releases by parties using effluent discharged at RWHTF, to offset the diurnal fluctuation.

E. Construction of a storage reservoir near the headgate of the Western Mutual Ditch at the Gilcrest Reservoir site in order to dampen the impact of the diurnal fluctuation to the Western Ditch, which could benefit other water users that have been historically subject to calls by the Western Ditch. Investigation of a storage location between the RWHTF and the Western Mutual Ditch will not be limited to the Gilcrest Reservoir site. D&A will

investigate storage locations near other ditch headgates on the South Platte River between RWHTF and the Western Mutual Ditch.

F. Use of existing or new river check dams that could be modified in order to regulate the diurnal fluctuation.

G. Utilize groundwater diversions for ditches to offset the diurnal fluctuation.

Deere & Ault shall conduct a preliminary screening of these various alternative solutions, and from that list select up to three alternatives for additional study.

There will likely be both water rights issues and water quality issues associated with each of the selected alternatives. These issues will be identified at a preliminary level to evaluate how they may affect the feasibility of each alternative.

Method/Procedure

Task 4a - Conduct Screening of Proposed Alternatives

Deere & Ault shall conduct a screening analysis of the proposed alternatives to determine which of the proposed alternatives provide the most reasonable alternative to mitigate the impact of the diurnal flow. In conjunction with input from the various stakeholders, Deere & Ault shall select up to three of the proposed alternatives for further analysis. It is understood that certain proposed alternatives may be eliminated from further consideration due to obvious legal, institutional, permitting, or cost issues. One of the factors to be used in the selection process will be whether or not the budget for this project would allow more detailed analysis of the selected alternatives. Detailed analysis of some of the proposed alternatives may be costly and beyond the scope of this study.

Task 4b - Analysis of Selected Structural Mitigation Alternatives

Deere & Ault shall analyze each of the selected alternatives in more detail including the proposed location of the alternative, the current owners of the land or facility, hydraulic issues related to inflow and outflow capacity under gravity flow conditions, property access issues, amount of available storage capacity, and potential impact on the diurnal flow.

Task 4c - Provide Preliminary Level Drawings of Alternatives

The Consultant will develop preliminary drawings of the selected alternatives including the location, inlet structures, outlet structures, and proposed land access.

Task 4d - Develop Preliminary Cost Estimates for Selected Alternatives

Preliminary cost estimates will be developed for each of the selected alternatives and presented in tabular form.

Deliverables

The Consultant will prepare preliminary feasibility level drawings of up to three alternatives. Preliminary cost estimates for these selected alternatives will also be developed. These will be presented in the draft and final reports.

Task 5 - Analysis of Revised Administrative Procedures

Description of Task

In this task, Deere & Ault will analyze whether or not additional or revised administrative procedures could serve to help mitigate any negative impacts as a result of the diurnal fluctuation in the South Platte River. These revised administrative procedures could include the requirement for additional stream gages or other ancillary structures that might be required to facilitate any revised administrative procedures.

Method/Procedure

Task 5a - Additional Coordination with Division Engineer and Water Commissioner

Based on information obtained from the previous tasks, Deere & Ault will meet and coordinate with the Division Engineer, Water Commissioner and other Water Division 1 staff to determine if there are any modifications to the administrative procedures currently employed that could mitigate the impact of the diurnal fluctuation without triggering other negative consequences.

Task 5b - Investigate Potential for Additional Gaging/Instrumentation to Enhance Administration

Deere & Ault shall investigate whether additional gaging and instrumentation could provide the Division Engineer and Water Commissioner with additional stream flow data that could be used to help mitigate the impact of the diurnal fluctuation.

Deliverables

In the reports to be submitted as part of this scope of work, Deere & Ault shall provide a written description of recommended revisions to the administrative procedures that could help mitigate the impact of the diurnal fluctuation without triggering other negative consequences.

Task 6 - Meetings with Stakeholders

Description of Task/Method/Procedures/Deliverables

At least one stakeholder meeting will be held as the study progresses to report on preliminary results and to receive intermediate input from the stakeholders about the methods being used in the study and preliminary results being obtained. Deere & Ault shall consider the intermediate input obtained from the stakeholders before drafting the study report as allowed within funding constraints.

After Deere & Ault prepares a draft of the study report, a copy shall be provided to the stakeholders for review and comment at least 45 days before it must be made final. Stakeholders may provide their comments to Deere & Ault without holding another stakeholder meeting if they wish to do so, but a second stakeholder meeting will be held if needed to provide stakeholder comments on the draft report.

The scope of services and cost estimate presented herein includes time for up to two meetings with stakeholders in addition to the meeting scheduled with the Division Engineer, Water Commissioner, and stakeholders as identified in Task 2a.

Task 7 - Progress Reports

Description of Task

If funded through the CWCB Water Supply Reserve Account ("WSRA"), Deere & Ault shall provide the CWCB a progress report every six months, with the first progress report to be submitted six months after notice-to-proceed. If funded by Metro, progress summaries will be provided with each monthly billing statement.

Method/Procedure/Deliverables

The progress reports shall describe the completion or partial completion of the tasks identified in the scope of work, including a description of any major issues that have occurred and any corrective action taken to address these issues.

Task 8 - Draft and Final Reports

Description of Task/Method/Procedure

Draft and final reports issued by Deere & Ault shall address each of the issues and analyses set forth in this Scope of Services, as well as including the identification of the costs and benefits of implementing potential mitigation measures that are deemed to appear feasible and a discussion of potential obstacles to that implementation. Deere & Ault will consult, coordinate, and seek input from the stakeholders' consultants during all phases of the study.

Deliverables

Deere & Ault shall prepare a draft report for review by the various stakeholders, and after receiving comments on the draft report shall prepare a final report for submittal to the CWCB. The study will be completed within 10 months of the CWCB giving notice-to-proceed under a WSRA grant fund contract or within the same time after notice that the grant application has been denied.

FIGURE 1

48 HOUR DISCHARGE

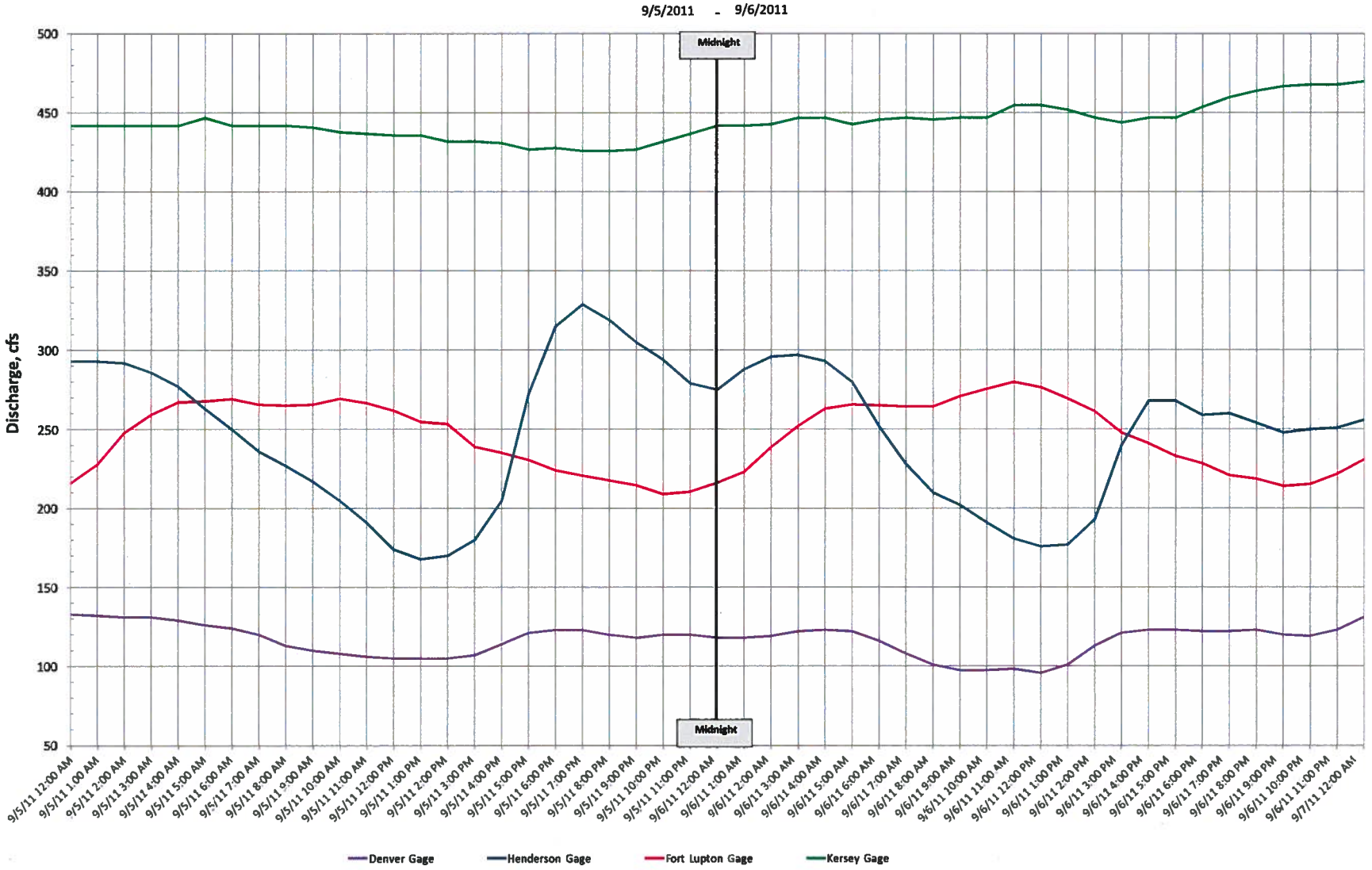


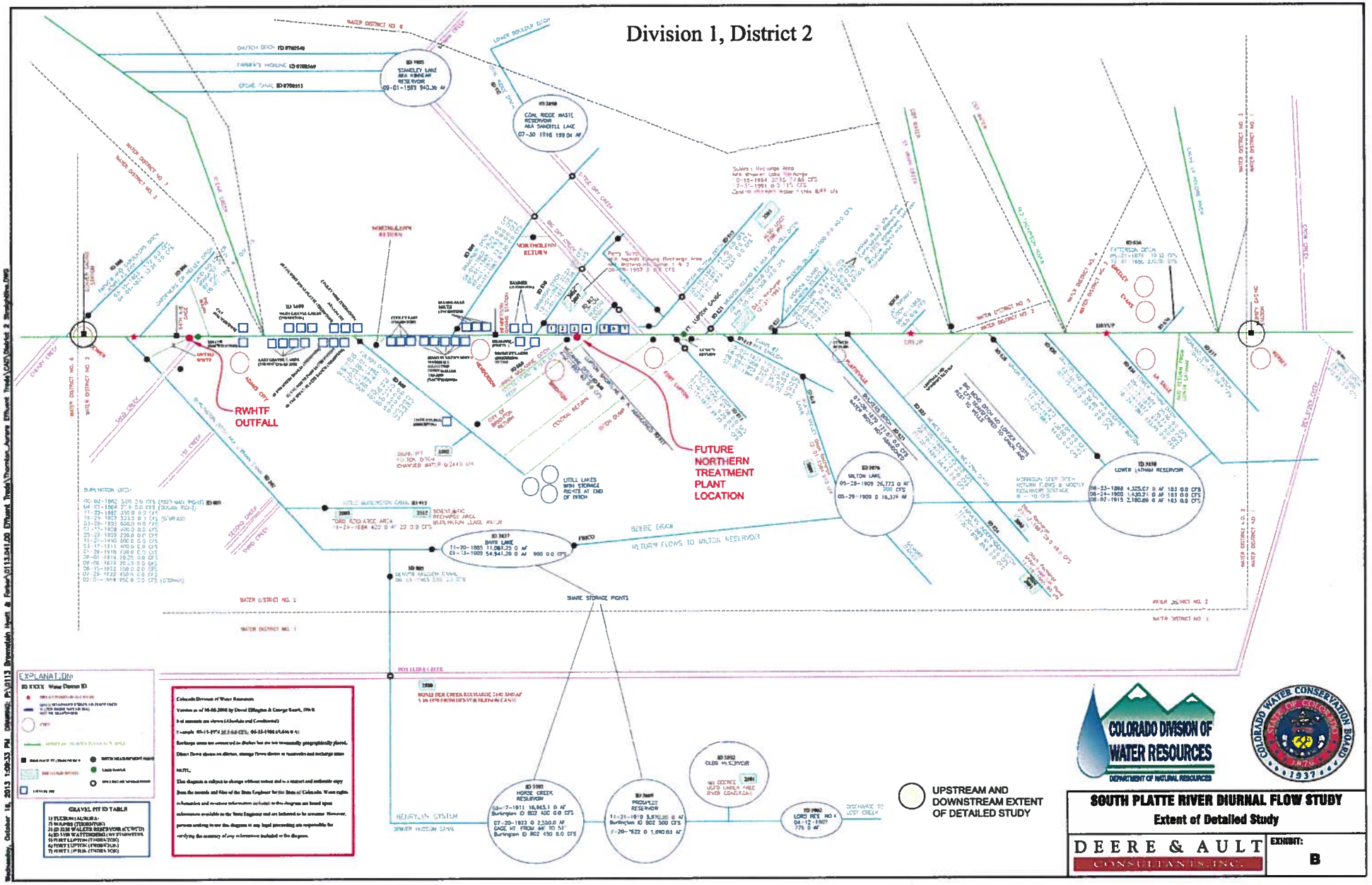
TABLE 1

South Platte River Diurnal Flow Study

Cost Estimate

		$250	$160	$135	$108	$76	$88	$84	$54					
		LABOR BY CATEGORY												
Task	Task Description	Principal	Project Manager	Project Engineer	Water Resources Engineer	Water Resources Analyst	CADD Technician	Technical Writer	Clerical	Total Hours	Labor Costs	Direct Expense	Total by Subtask	Total by Task
1	**Review Previous Studies**													$ 1,270
1a	Review and Analyze previous studies provided to D&A by the Metro District & Others	1	2		2					5	$ 786		$ 786	
1b	Provide Copies of Reports to Stakeholders		1		2				2	5	$ 484		$ 484	
2	**Analysis of Current River Administration**													$ 6,488
2a	Meeting w/ Division Engineer, Water Commissioner(s), and Stakeholders	6	6		8					20	$ 3,324	$ 100	$ 3,424	
2b	Field Trip to Observe Critical Reaches and Infrastructure	8			8					16	$ 2,864	$ 200	$ 3,064	
3	**Analysis of Impact of Diurnal Flow Fluctuation**													$ 27,624
3a	Review and Analysis of District 2 Call Records	4	8		20	16			2	50	$ 5,764		$ 5,764	
3b	Review and Analysis of Hourly South Platte River Gage Records (e.g., Henderson, Fort Lupton, Kersey)	4	8		24	16			2	54	$ 6,196		$ 6,196	
3c	Further Define Diurnal Flow Fluctuation (i.e., time, location, amount, reusable/single use ratio)	8	12		24	16				60	$ 7,728		$ 7,728	
3d	Determine Impact of Diurnal Fluctuation (i.e., location, amount, mechanism)	8	16		20	16				60	$ 7,936		$ 7,936	
4	**Analysis of Structural Alternatives to Mitigate Impacts of Diurnal Flow**													$ 30,322
4a	Conduct Screening of Proposed Alternatives (i.e., on-channel storage, off-channel storage)	8	16	16	16					56	$ 8,448		$ 8,448	
4b	Analysis of Selected Structural Mitigation Alternatives	8	20	24	24					76	$ 11,032		$ 11,032	
4c	Provide Preliminary Drawings of Selected Alternatives	1		24			24			49	$ 5,602		$ 5,602	
4d	Develop Preliminary Cost Estimates for Selected Alternatives	4		16	8	16				44	$ 5,240		$ 5,240	
5	**Analysis of Revised Administrative Procedures**													$ 8,112
5a	Additional Coordination with Division Engineer and Water Commissioners	4	4		8					16	$ 2,504		$ 2,504	
5b	Investigate Potential for Additional Gaging/Instrumentation to Enhance Administration	4	18		16					38	$ 5,608		$ 5,608	
6	**Meetings with Stakeholders**													$ 4,608
6a	Conduct up to two Stakeholder Meetings	12	6		6					24	$ 4,608		$ 4,608	
7	**Progress Report**													$ 2,922
7a	Provide Stakeholders with Progress Report every 6 Months	8	2		2			4		16	$ 2,872	$ 50	$ 2,922	
8	**Draft and Final Reports**													$ 18,916
8a	Prepare and Submit Draft Report for Review by Stakeholders	16	40		32		4	12		104	$ 15,216	$ 50	$ 15,266	
8b	Prepare and Submit Final Report to Stakeholders	4	8		6			8		26	$ 3,600	$ 50	$ 3,650	
	TOTALS	108	167	80	226	80	28	24	6	719	$ 99,812	$ 450	$ 100,262	$ 100,262

TOTAL (Rounded to Nearest $1,000) $ 100,000


Division 1, District 2
RWHTF OUTFALL
FUTURE NORTHERN TREATMENT PLANT LOCATION
UPSTREAM AND DOWNSTREAM EXTENT OF DETAILED STUDY
COLORADO DIVISION OF WATER RESOURCES
DEPARTMENT OF NATURAL RESOURCES
COLORADO WATER CONSERVATION BOARD
SOUTH PLATTE RIVER DIURNAL FLOW STUDY
Extent of Detailed Study
DEERE & AULT CONSULTANTS, INC.
EXHIBIT:
B