Last Updated: July 5, 2017

Colorado Water Conservation Board
Water Plan Grant - Exhibit A

Statement Of Work	
Date:	**8/1/17**
Name of Applicant:	**Denver Botanic Gardens**
Name of Water Project:	**South Platte River Basin Restoration Planning and Feasibility Study**
Funding Source:	**Environmental & Recreation Projects**

Water Project Overview: Please provide a summary of the proposed water project (200 words or less). The same summary can be used from Page 5 of the CWP Grant Application.

The South Platte River Basin accounts for over half of the state's economic activity, contains seven of the top ten agricultural producing counties in Colorado, and includes many areas for recreation. With increasing populations and water demands, the South Platte Basin Implementation Plan (2015) encourages the protection of watershed health for the environmental and recreational economy. In 2015, we successfully initiated a watershed improvement project in the lower portion of the South Platte River Basin at Denver Botanic Gardens Chatfield Farms. Partnering with six other organizations and agencies, using a mix of federal, state, county, and private funds, we installed three in-stream structures along Deer Creek to re-wet historical oxbows, improving hydrology from historical stream channelization. We also planted over 1000 willows, cottonwoods, and other native riparian species and initiated a long-term monitoring program. We have seen increased channel flow and animal use in restored areas. Based on the success of this minimally invasive technique, we aim to expand to other areas in the South Platte River Basin. Partnering with Jefferson County Open Space, we propose to identify appropriate locations for in-stream structures on their properties. We will incorporate undergraduate and graduate students into all components of the project.

Objectives: List the objectives of the project.

1. Identify potential locations for in-stream structure installation on Jefferson County Open Space parcels.
2. Work with Jefferson County Open Space staff to conduct a feasibility study.
3. Establish long-term monitoring plots for vegetation and water quality at each potential installation location to collect baseline data.
4. Report on findings and next steps to seek approval for implementation and construction funding.

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Tasks
Provide a detailed description of each project task using the following format:
Task 1 – Identify potential locations for in-stream structure installation on Jefferson County Open Space parcels
Description of Task:
We will identify suitable locations for in-stream structure locations. Suitable locations will be historical oxbows in areas of the creek that are currently channelized, that have the potential to be reactivated to increase and improve the riparian habitat. This objective will also utilize undergraduate interns from Metropolitan State University of Denver to provide them hands on experience in natural resource management and GIS applications.
Method/Procedure:
To identify suitable locations, we will analyze the topography, hydrology, historical images, and current land use to determine the historical flow of the channel and assess the success of in-stream structures given the current land use. We successfully identified, permitted, and installed three in-stream structures in Deer Creek at Denver Botanic Gardens Chatfield Farms in 2016 using this approach. We will start by identifying locations for in-stream structures upstream of those installed currently in Deer Creek, which would expand our riparian habitat restoration efforts. We will also identify potential installation locations across Jefferson County Open Space for future years. A graduate student at University of Colorado Denver and undergraduate interns at Metropolitan State University of Denver will be actively engaged in this task. The locations will be selected based on the existing floodplain topography, and all locations will be in areas of historic channelization. Placing the in-stream structures at these locations will result in the reactivation of shallow, broad, and well-vegetated relict channels, resulting in the restoration of the natural hydrologic and disturbance regimes present on the floodplain prior to channelization. These natural regimes provide a net increase in aquatic resource functions and services. Reactivation of the historic channels is essential for woody plant regeneration (especially willows and cottonwoods), creating a diversity of herbaceous plant cover, nutrient cycling, groundwater recharge, water quality improvement, and other floodplain functions. Since the main flow path and floodplain of the creeks will remain unchanged, low flows will be kept in the main channel and overbank flows will be relatively infrequent and short in duration. No new wetlands are expected to be created by the placement of the in-stream structures. Additionally, overbank flows will be returned to the main channel through the relict channels which naturally reconnect to the main channel.
Grantee Deliverable: Describe the deliverable the grantee expects from this task
A report with maps identifying suitable locations for in-stream structures to reactivate the floodplain by rewetting historical oxbows.
CWCB Deliverable: Describe the deliverable the grantee will provide CWCB documenting the completion of this task
A report that identifies suitable locations for in-stream structures with the amount of creek (miles) and riparian habitat (acres) that would be restored with the installations.

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Tasks
Provide a detailed description of each task using the following format:
Task 2 – Work with Jefferson County Open Space staff to conduct a feasibility study.
Description of Task:
Review and planning will be necessary to determine which locations are appropriate for in-stream structure installation given land owner management plans. Denver Botanic Gardens will work closely with Jefferson County Open Space to assess real costs that will be associated with the in-stream structures for both installation and long-term maintenance. We will also need to work with Jefferson County Open Space to put together the appropriate documentation to obtain necessary permits for the installation of the in-stream structures. A graduate student at University of Colorado Denver will assist with this task.
Method/Procedure:
To support restoration projects on Jefferson County Open Space, we will assist in their internal decision-making by conducting a feasibility study. We will conduct on-site reviews with natural resource managers of Jefferson County Open Space and develop the necessary documentation to submit permit applications for in-stream structures. This will include developing a preconstruction notification letter to the US Army Corps of Engineers to obtain a nationwide permit (NWP 18). Using information gained from our pilot study at Denver Botanic Gardens Chatfield Farms initiated in 2015, and site-specific information on each proposed installation location, we will develop a construction budget, long-term maintenance costs, and impact assessments to other Open Space activities. We will also include an assessment of the state of the habitat if no restoration is done, and what improvements to habitat quality and stream health will likely be achieved, if the proposed restoration is pursued. This report will allow Jefferson County Open Space to assess the true costs and benefits of the proposed restoration project and have the necessary details to pursue permitting and internal construction funding.
Grantee Deliverable: Describe the deliverable the grantee expects from this task
Specific installation locations,permitting documentation and plans.
CWCB Deliverable: Describe the deliverable the grantee will provide CWCB documenting the completion of this task
A feasibility study for Jefferson County Open Space to use as motivation for pursuing funding and permitting approval for restoration.

Tasks
Provide a detailed description of each task using the following format:
Task 3 - Establish long-term monitoring plots for vegetation and water quality at each potential installation location to collect baseline data.
Description of Task:
In 2016, we established 12 long-term monitoring plots for vegetation and water quality along Deer Creek at Denver Botanic Gardens Chatfield Farms and Jefferson County Open Space properties. These include plots at each of the three in-stream structures that were installed that same year along Deer Creek, and an additional six downstream and three upstream. At each of these plots we measured plant cover and density, canopy cover, and water quality (including TDS, pH, temperature, E. coli, Total Nitrogen, and Nitrate/Nitrite). We plan to extend this long-term monitoring with additional plots located at each of the identified potential locations for in-stream installations to collect baseline data prior to construction.

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Tasks
Baseline data will be provided to Jefferson County Open Space as part of the feasibility study and to assist in permitting and construction efforts. Undergraduate students at Metropolitan State University of Denver and a graduate student at University of Colorado Denver will be incorporated into the monitoring to gain hands-on experience with this aspect of natural resource management and research.
Method/Procedure:
At each identified potential location for an in-stream structure, and at a location upstream and downstream of the potential structure, we will install a long-term monitoring plot. 50-meter transects will be located at each sampling location. An origin and endpoint will be marked with a rebar and metal tag and the GPS coordinates collected (UTM NAD 83). Vegetation cover for the overstory and understory will be documented separately. Percent cover will be assessed along each 50-meter transect using a point-intercept method. These interceptions are tallied at fifty systematically distributed locations along a 50-m transect, i.e., at each meter, one point 50 cm to either side perpendicular of the transect. A total of 100 points are collected along each sample transect. Percent cover values will be assessed for plant species, total vegetation cover, litter, standing dead, rock, bare ground, and total cover (vegetation plus litter plus standing dead, plus rock). At each sample point, after a “First Hit” interception by a plant species, we determine whether there are any further interceptions on other plant species. If so, these are tallied by species as “Other Hits”. Along each sample transect, the presence of less common species not hit during the point-intercept sampling are documented by recording the presence of all plant species occurring within one meter on either side of the sample transect. Thus, from each 50m cover sample transect comes a measure of species “density” that can be expressed as a number of species per 100 square meters. Species density includes species encountered in the cover hits plus the additional species not hit but present in the 100 square meter plot. Stream monitoring roughly follows guidance presented in the Environmental Protection Agency’s document “Volunteer Stream Monitoring: A Methods Manual” (United States 1997). Sampling will be conducted during dry weather, i.e., well after a precipitation or high flow event. For each stream monitoring point, three water samples will be collected and sent to a lab for analysis of E. coli bacteria, phosphate, nitrogen and nitrate. In addition, one (composite) macroinvertebrate sample will be collected at each stream monitoring point. We will also collect standard measurements, including temperature, pH, and TDS. Water samples will be analyzed at Metropolitan State University of Denver and the Colorado Department of Public Health and Environment. Macroinvertebrate samples will be sent to an external lab at GEI consultants for organism counts and lowest practical identification level. Macroinvertebrate samples and plant voucher specimens will be deposited at Denver Botanic Gardens. This task will engage students and volunteers who will assist in preparing locations for plot installation, including some noxious weed management, installing plots, and collecting data. Participants will include youth volunteers with Wildlands Restoration Volunteers, undergraduate students at Metropolitan State University of Denver, and a graduate student at University of Colorado Denver. Denver Botanic Gardens, partnering with Jefferson County Open Space and Metropolitan State University of Denver, plans to continue long-term monitoring of these plots after the completion of this grant.
Grantee Deliverable: Describe the deliverable the grantee expects from this task
Establishment of long-term monitoring plots along with annual data collection and training for the next generation of natural resource managers.
CWCB Deliverable: Describe the deliverable the grantee will provide CWCB documenting the completion of this task

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Tasks
A report with a map of all monitoring plot locations and a summary of baseline data for each potential installation location.

Tasks
Provide a detailed description of each task using the following format:
Task 4 - Report on findings and next steps to seek approval for implementation and construction funding
Description of Task:
Denver Botanic Gardens will work with Jefferson County Open Space to assess results, present summary of preliminary data and feasibility study, and provide a clear plan to move forward with the appropriate construction and permit approvals for the successful implementation of the restoration project.
Method/Procedure:
Staff at Denver Botanic Gardens will put together a final report providing information on specific details of tasks completed and funds spent on the project. This report will include maps, photos, and descriptions of the work completed. In addition, staff (Dr. Hufft is affiliate faculty at UCD) will advise a graduate student at the University of Colorado Denver to complete the analysis of data collected in the monitoring plots. Dr. Hufft will also build on her knowledge from the current project at Denver Botanic Gardens Chatfield Farms to develop the next steps to get approval for the implementation of the restoration project.
Grantee Deliverable: Describe the deliverable the grantee expects from this task
Analyses of annual data collected at monitoring plots and training of a graduate researcher. All documentation necessary for next steps in the permitting and funding process to implement a construction project on Jefferson County Open Space property.
CWCB Deliverable: Describe the deliverable the grantee will provide CWCB documenting the completion of this task
Final report and specific plan for Jefferson County Open Space and Denver Botanic Gardens to seek permitting and construction approval to proceed with restoring portions of the South Platte River Basin

Budget and Schedule
This Statement of Work shall be accompanied by a combined Budget and Schedule that reflects the Tasks identified in the Statement of Work and shall be submitted to CWCB in excel format.

Reporting Requirements
Progress Reports: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of issuance of a purchase order, or the execution of a contract. The progress report shall describe the status 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. The CWCB may withhold reimbursement until satisfactory progress reports have been submitted.

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Reporting Requirements

Final Report: At completion of the project, the applicant shall provide the CWCB a Final Report on the applicant's letterhead that:

- Summarizes the project and how the project was completed.
- Describes any obstacles encountered, and how these obstacles were overcome.
- Confirms that all matching commitments have been fulfilled.
- Includes photographs, summaries of meetings and engineering reports/designs.

The CWCB will withhold disbursement the last 10% of the budget until the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.

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COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Colorado Water Conservation Board

Water Plan Grant - Exhibit A
Budget and Schedule

Date: 8/1/2017

Name of Applicant: Denver Botanic Gardens

Name of Water Project: South Platte River Basin Restoration Planning and Feasibility Study

Task No.	Task Description	Start Date[(1)]	End Date	Water Project Funding Category	Grant Funding Request	Match Funding	Total
1	Identify potential locations for in-stream structure installation on Jefferson County Open Space	1/15/2018	12/31/2018	Environmental/Rec	$ 33,305	$ 32,447	$65,752
2	Work with Jefferson County Open Space staff to conduct a feasibility study.	1/1/2019	12/31/2020	Environmental/Rec	$ 8,483	$ 25,096	$33,579
3	Establish long-term monitoring plots for vegetation and water quality at each potential installation location to collect baseline data.	7/1/2018	10/1/2020	Environmental/Rec	$ 21,645	$ 11,681	$33,326
4	Report on findings and path forward to seek approval for implementation and construction funding	12/1/2018	12/31/2020	Environmental/Rec	$ 6,414	$ 6,414	$12,828
							$0
							$0
							$0
							$0
							$0
							$0
							$0
							$0
							$0
				Total	$69,847	$75,638	$145,485

(1) Start Date for funding under $100K, minimum 45 Days from Board Approval; Start Date for funding over $100K, minimum 90 Days from Board Approval.

·Round values up to the nearest hundred dollars.

·Reimbursement eligibility commences upon the grantee's receipt of a Notice to Proceed (NTP)

·NTP will not be accepted as a start date. Project activities may commence as soon as grantee enters contract and receives formal NTP if prior to the listed "Start Date".

·The applicant shall provide a progress repost every 6 months, beginning from the date of contract execution.

·CWCB will withhold disbursement of the last 10% of the total grant amount until a Final Report is completed to the satisfaction of CWCB staff (2017 CWP Grant Guidelines).