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Colorado Water Conservation Board

Water Plan Grant Application

Instructions

To receive funding for a Water Plan Grant, applicant must demonstrate how the project, activity, or process (collectively referred to as "project") funded by the CWCB will help meet the measurable objectives and critical actions in the Water Plan. Grant guidelines are available on the CWCB website.

If you have questions, please contact CWCB at (303) 866-3441 or email the following staff to assist you with applications in the following areas:

Supply and Demand Gap Projects: Rebecca.Mitchell@state.co.us

Water Storage Projects: Anna.Mauss@state.co.us

Conservation, Land Use Planning: Kevin.Reidy@state.co.us

Education & Innovation Activities: Ben.Wade@state.co.us

Agricultural Projects: Gregory.Johnson@state.co.us

Environmental & Recreation Projects: Linda.Bassi@state.co.us

Applicants interested in submitting an 'Intent to Apply' in the future are encouraged to check here ☐ and fill in all sections with the best information available at the time. Exhibits excluded.

This "Intent to Apply" will help CWCB prioritize Projects that are not ready for fully completed Water Plan Grant Application due to the initial timeframe and deadlines required.

Water Project Summary

Name of Applicant	The Greenway Foundation
Name of Water Project	Clean River Design Challenge

CWP Grant Request Amount	$24,500
Other Funding Sources Anonymous Family Foundation	$16,000.00
Other Funding Sources Riverfront Park Community Foundation	$5,000.00
Applicant Funding Contribution	$3,500.00
Total Project Cost	$49,000.00

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Applicant & Grantee Information	
Name of Grantee(s)	The Greenway Foundation
Mailing Address	1855 S. Pearl St., Suite 40, Denver, CO 80210
FEIN	51-0193575
Organization Contact	Devon Buckels
Position/Title	The Water Connection Director
Email	devon@thewaterconnection.org
Phone	720-837-3289
Grant Management Contact	Rachel Gillette
Position/Title	Education and Grants Director
Email	rachel@greenwayfoundation.rog
Phone	303-743-9720 ext. 920
Name of Applicant (if different than grantee)	
Mailing Address	
Position/Title	
Email	
Phone	

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Description of Grantee/Applicant
Provide a brief description of the grantee's organization (100 words or less).
Since 1974, The Greenway Foundation (TGF) has been a major force behind the transformation of Denver's South Platte River and its tributaries from neglected and polluted eyesores into thriving ecological and recreational resources. By partnering with numerous public, private and philanthropic organizations, TGF has helped substantially improve water quality and recreational opportunities along these urban waterways and has facilitated the creation of 20 riverside parks and a nationally-recognized urban trail system, collectively known as the South Platte River Greenway. The organization recently renewed its focus on water resources through the addition of The Water Connection, TGF's policy and water resource arm.

Type of Eligible Entity (check one)	
	Public (Government): Municipalities, enterprises, counties, and State of Colorado agencies. Federal agencies are encouraged to work with local entities. 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): 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: Private parties may be eligible for funding.
x	**Non-governmental organizations (NGO):** Organization that is not part of the government and is non-profit in nature.
	Covered Entity: As defined in Section 37-60-126 Colorado Revised Statutes.

Type of Water Project (check all that apply)	
	Study
	Construction
	Identified Process or Program
x	Other

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Category of Water Project (check all that apply)		
	Supply and Demand Gap Projects - Multi-beneficial projects and those projects identified in basin implementation plans to address the water supply and demand gap. (Applicable Exhibit A Task(s) _____)	
	Water Storage Projects - Projects that facilitate the development of additional storage, artificial recharge into aquifers, and dredging existing reservoirs to restore the reservoirs' full decreed storage capacity. (Applicable Exhibit A Task(s) _____)	
	Conservation and Land Use Planning Projects - Activities and projects that implement long-term strategies for conservation, land use, and drought planning. (Applicable Exhibit A Task(s) _____)	
X	Engagement & Innovation Projects - Activities and projects that support water education, outreach, and innovation efforts. Please fill out the Supplemental Application available on the website. (Applicable Exhibit A Task(s) CRDC & Implementation of Winning Design)	
	Agricultural Projects - Projects that provide technical assistance and improve agricultural efficiency. (Applicable Exhibit A Task(s) _____)	
	Environmental & Recreation Projects – Projects that promote watershed health, environmental health, and recreation. (Applicable Exhibit A Task(s) _____)	
	Other	Explain:

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Location of Water Project	
Please provide the general county and coordinates of the proposed project below in **decimal degrees**. The Applicant shall also provide, in Exhibit C, a site map if applicable.	
County/Counties	Denver Metropolitan Area
Latitude	NA
Longitude	NA

Water Project Overview
Please provide a summary of the proposed water project (200 words or less). Include a description of the project and what the CWP Grant funding will be used for specifically (e.g., studies, permitting process, construction). Provide a description of the water supply source to be utilized or the water body affected by the project, where applicable. Include details such as acres under irrigation, types of crops irrigated, number of residential and commercial taps, length of ditch improvements, length of pipe installed, and area of habitat improvements, where applicable. If this project addresses multiple purposes or spans multiple basins, please explain. The Applicant shall also provide, in Exhibit A, a detailed Statement of Work, Budget, Other Funding Sources/Amounts and Schedule.
TGF is seeking funding for its Clean River Design Challenge (CRDC), which aims to develop innovative solutions for the problem of trash in Denver's urban waterways. This year, the CRDC engaging approximately forty students from three area universities: Metro State University, Colorado School of Mines, and University of Colorado Denver. Similar participation is anticipated in 2018-2019. The CRDC has two rounds, each culminating with presentations to a panel of expert judges. Round one produces designs, and in the second round, scale models of the devices are built and tested on a custom made flume. To aid in the design process, TGF connects the teams with professionals from a variety of professional disciplines. TGF will also pursue the implementation of a winning trash removal device if it shows significant potential for real-world success. Through connections with local engineers and governmental departments, prototypes will be constructed and tested in the waterway, with the goal of permanent installation. TGF is requesting $28,975 in support of this project in 2018-2019. $21,350 will cover costs to run the 2018-2019 CRDC. $7,625 will cover the staff and engineering time to determine the feasibility of implementing a winning design.

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Measurable Results		
To catalog measurable results achieved with the CWP Grant funds, please provide any of the following values as applicable:		
	New Storage Created (acre-feet)	
	New Annual Water Supplies Developed or Conserved (acre-feet), Consumptive or Nonconsumptive	
	Existing Storage Preserved or Enhanced (acre-feet)	
	Length of Stream Restored or Protected (linear feet)	
	Efficiency Savings (indicate acre-feet/year OR dollars/year)	
	Area of Restored or Preserved Habitat (acres)	
	Quantity of Water Shared through Alternative Transfer Mechanisms	
	Number of Coloradans Impacted by Incorporating Water-Saving Actions into Land Use Planning	
x	Other	Explain: - 6-10 student design teams participating in the 2018-2019 CRDC - 6-10 designs and scale models for in-stream trash removal devices developed through the 2018-2019 CRDC - A feasibility study and cost estimates for a working prototype of a device designed through the 2018-2019 CRDC. - Results from pre- and post-competition surveys taken by participating students measuring awareness and understanding of issue of trash in Denver area waterways - Information on trash in Denver area waterways distributed to 8,000+ Denver area residents through TGF community outreach efforts

Water Project Justification
Provide a description of how this water project supports the goals of Colorado's Water Plan, the most recent Statewide Water Supply Initiative, and the applicable Roundtable Basin Implementation Plan and Education Action Plan. The Applicant is required to reference specific needs, goals, themes, or Identified Projects and Processes (IPPs), including citations (e.g. document, chapters, sections, or page numbers). The proposed water project shall be evaluated based upon how well the proposal conforms to Colorado's Water Plan Framework for State of Colorado Support for a Water Project (CWP, Section 9.4, pp. 9-43 to 9-44;)

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Water Project Justification

This project addresses key themes in the Colorado Water Plan and South Platte / Metro Basin Implementation Plans, including: maximize water resources, protection of watersheds, enhance water quality, protection of recreational and environmental assets, and promote education and innovation. These plans also acknowledge the connection between water supply and water quality. The CRDC supports the State in developing innovative strategies to protect the urban water supply from trash and its many associated pollutants.

A primary goal of the Colorado Water Plan is to address the State's supply and demand challenges while protecting the health of rivers, streams and watersheds. This project supports the State in achieving this goal by facilitating the removal of a visible and pervasive pollutant from the watershed's urban waterways. Watershed health affects water supply – the gap will only grow if our available water is ruined with pollutants.

The CRDC has two key goals: Raising awareness of the importance of protecting our valuable water resources and awareness of the urban waterway trash problem in particular through education and outreach, and 2) facilitating innovation that can lead to solutions to a complex, pervasive water quality problem.

By engaging students from a variety of backgrounds and disciplines in three Universities, TGF is reaching budding professionals who may not have been exposed to water resources as a discipline, and who may not be planning to work in the water field. In addition to reaching students, the CRDC reaches thousands of people through TGF's social media and email newsletter distribution, as well as media coverage of the competition's final demonstration and judging day.

Relevant Colorado Water Plan Sections are listed below:
Education, Outreach and Innovation (bold added)
Colorado's Water Plan sets a **measurable objective to significantly improve the level of public awareness and engagement regarding water issues statewide by 2020**, as determined by water awareness surveys. Colorado's Water Plan also sets a measurable objective to engage Coloradans statewide on at least five key water challenges (identified by CWCB) that should be addressed by 2030. Colorado's Water Plan will expand outreach and education efforts that engage the public to promote well-informed community discourse and decision making regarding balanced water solutions. **This work will be collaborative and include state, local, and federal partners. As one component of this overall strategy, the CWCB will work with Colorado's innovation community, education and outreach experts, research institutions**, and the Governor's Colorado Innovation Network (COIN) **to address Colorado's water challenges with innovation and "outside-the-box" creativity.**
(Colorado Water Plan Executive Summary p. 15)

Watershed Health, Environment and Recreation:
Colorado's Water Plan sets a measurable objective to cover 80 percent of the locally prioritized lists of rivers with stream management plans, and 80 percent of critical watersheds with watershed protection plans, all by 2030. The environment and recreation are too critical to Colorado's brand not to have robust objectives; a strong Colorado environment is critical to the economy and way of life. In addition, the WQCC identified a strategic water quality objective to have fully supported classified uses—which may include drinking water, agriculture, recreation, aquatic life, and wetlands—of all of Colorado's waters by 2050.
(Colorado Water Plan Executive Summary p. 16)

The CRDC also supports the following sections from the South Platte Basin Implementation Plan:
- Appendix E – Water Quality, p. 16, 3.6 Cherry Creek Basin

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Water Project Justification

The Cherry Creek Basin Water Quality Authority (CCBWQA) goals include achieving and maintaining a chlorophyll-a standard (18 ug/L) for Cherry Creek Reservoir, reducing sediment loads from the watershed, and maintaining and enhancing the overall diversity of habitat in the watershed.

The CRDC supports this goal through the development of new ways to remove trash from urban waterways, which enhances the habitat of diverse species.

Executive Summary, p.8, S.3.7 Water Quality Issues
A major challenge in the South Platte Basin relates to adequacy of the water quality for domestic and municipal water uses. … **Major technological innovations are needed** for delivery, treatment, and disposal of the waste streams from currently available complex water treatment systems, which results in significant cost to customers, impacts to the environment, and uncertain regulatory permitting processes. **Relying exclusively on South Platte River supplies in the face of decreasing water quality will be a major challenge in the South Platte Basin**."

The CRDC addresses the challenges highlighted in this section by providing a relatively low cost method for the development of innovative solutions to a water quality issue in the South Platte River.

Appendix E – Water Quality
From a water quality perspective in the South Platte Basin, the following examples demonstrate the diversity of concerns relative to current and future Statewide planning:
"5. The threat of emerging contaminants (including pharmaceuticals and personal care products) being only partially removed by current state-of-the-art wastewater technologies and potentially being introduced into water bodies downstream of wastewater treatment facility discharges and septic systems..." P.2

Waterway trash can contribute to the amount of emerging contaminants found in Denver's urban waterways. The installation of a trash removal device would reduce the amount of such contaminants.

- SWSI Executive Summary
5. Support meeting Colorado's non-consumptive water needs by working with Colorado's water stakeholders to help.
Protect or enhance environmental and recreational values that benefit local and statewide economies. p. 41

The CRDC brings together stakeholders from the business, academic, water management, environmental health, and recreation fields to address the challenges created by in-stream trash.

Related Studies

Please provide a list of any related studies, including if the water project is complementary to or assists in the implementation of other CWCB programs.

A number of studies have been conducted in recent years analyzing both the type and quantity of trash in Denver's urban waterways, as well as public perception of water quality issues in the Metro area:

- 2013 Nonpoint Source Trash Characterization Inventory, Segment 14 of the South Platte River, Denver, Colorado

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Related Studies

- Market Perceptions 2012 Survey of Denver Metropolitan Residents' Attitudes and Behaviors Surrounding Pollution
- Denver Environmental Health 2011 Survey of Confluence Park Users' Knowledge and Attitudes toward Water Quality

Please see Exhibit C for reports related to each of these studies.

The engineering firm Merrick & Company also reviewed the feasibility of installing in-stream trash removal devices in the South Platte River or Cherry Creek. The results of their analysis can be found in the 2016 memorandum also attached in Exhibit C.

The CRDC competition also advances innovative solutions to the issue of trash in Denver's urban waterways "pitched" at a recent CWCB TAP-IN event.

Note: We have not provided a map because there is not a specific location affiliated with this project.

Previous CWCB Grants, Loans or Other Funding

List all previous or current CWCB grants (including WSRF) awarded to both the Applicant and Grantee. Include: 1) Applicant name; 2) Water activity name; 3) Approving RT(s); 4) CWCB board meeting date; 5) Contract number or purchase order; 6) Percentage of other CWCB funding for your overall project.

The following is a list of previous CWCB funding awarded to The Greenway Foundation:
- South Platte River Recreation and Habitat Feasibility Study; Metro Basin RT and Statewide funds; Approved at 9/17/2008 meeting, Contract # C150442, $150,000 total approved amount
- South Platte River Recreation and Habitat Improvement Preliminary Design, Metro Basin RT and Statewide funds. Approved at 9/13/2011 meeting, Contract # C150493, $250,000 total approved amount
- Denver South Platte River Implementation Project, South Platte Basin & Metro RT, Approved at 9/28/2012 meeting, Contract # CTGG1 2015-392, $500,000 total amount approved, $300,000 from Statewide account
- Grant-Frontier Park West Bank Riparian Floodplain Design and Construction Project, Metro Basin RT, Approved at 9/24/2013 meeting, Contract # CTGG1 2015-1721, $350,000 total amount approved, $250,000 from Statewide account
- 8th Ave. to 20th St. In-River Recreation and Environmental Improvements and Floodplain Mitigation, Metro Basin RT and Statewide funds. Approved at 9/12/2014 meeting, Contract # CTGG1 2015, $450,000 total amount approved

Taxpayer Bill of Rights

The Taxpayer Bill of Rights (TABOR) may limit the amount of grant money an entity can receive. Please describe any relevant TABOR issues that may affect your application.

There are no known TABOR issues that would affect this application.

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Submittal Checklist	
x	I acknowledge the Grantee will be able to contract with CWCB using the Standard Contract.
Exhibit A	
	Statement of Work(1)
	Budget & Schedule(1) *(Spreadsheet)*
	Letters of Matching and/or Pending 3rd Party Commitments(1)
Exhibit C	
	Map(1) Note: We have not provided a map because there is not a specific location affiliated with this project.
	Photos/Drawings/Reports
	Letters of Support (Support letter from Basin Roundtable encouraged)
	Certificate of Insurance (General, Auto, & Workers' Comp.)
	Certificate of Good Standing with Colorado Secretary of State(2)
	W-9(2)
	Independent Contractor Form(2) (If applicant is individual, not company/organization)
Engagement & Innovation Grant Applicants ONLY	
	Engagement & Innovation Supplemental Application(1)

(1) Required with application.
(2) Required for contracting. While optional at the time of this application, submission can expedite contracting upon CWCB Board approval.

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Colorado Water Conservation Board
Water Plan Grant - Exhibit A

Statement Of Work	
Date:	**1/31/18**
Name of Applicant:	**The Greenway Foundation (TGF)**
Name of Water Project:	**Clean River Design Challenge**
Funding Source:	**Engagement & Innovation Activities**

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.

TGF is seeking funding for its Clean River Design Challenge (CRDC), which develops innovative solutions to address trash in Denver's urban waterways. This two-part competition invites university students to design trash removal devices for placement in a Denver waterway. The 2017-2018 competition is focused on Cherry Creek, and has nine student teams participating from three area universities: Metro State University, School of Mines, and University of Colorado Denver. Similar participation is anticipated in the following school year.

The CRDC is divided into two rounds, each culminating with design presentations to a panel of expert judges. In the first round, students create detailed plans for their trash removal device, and in the second round, scale models of the devices are built and tested on a flume To aid in the design process, TGF connects the teams with professionals from engineering, public health, environmental, and regulatory agencies that are available for consultation throughout the competition.

TGF will also pursue the implementation of any trash removal device designed through this competition that shows significant potential for real-world success. Through connections with local engineers and governmental departments, prototypes will be constructed and tested in the waterway, with the goal of permanent installation.

Objectives: List the objectives of the project.

- At least 6 teams from local universities will participate in the 2018-2019 Clean River Design Challenge.
- At least 6 in-stream trash removal devices will be designed through the 2018-2019 Clean River Design Challenge.
- At least 6 professionals from local engineering, construction, environmental, or regulatory agencies will participate in the 2018-2019 Clean River Design Challenge as consultants and/or judges.
- At least 8,000 Denver metro residents will receive information on the 2018-2019 Clean River Design Challenge and the issue it addresses.
- TGF will pursue the implementation of the winning trash removal device in a Denver urban waterway.

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Tasks
Provide a detailed description of each project task using the following format:
Task 1 – Clean River Design Challenge
Description of Task:
- The Greenway Foundation will host the 3rd Clean River Design Challenge (CRDC) over the course of the 2018-2019 school year. Student design teams will be tasked with developing in-stream trash removal devices for a Denver urban waterway. Two rounds of judging will be held and winning design teams will receive cash prizes, promotion in the community, and the possibility of having a prototype of their design installed in a Denver waterway.
Method/Procedure:
- In September of 2018, TGF will work with Denver area universities to recruit at least 6 student design teams to participate in the 2018-2019 CRDC. - TGF will provide all student teams with detailed criteria for their designs and the competition itself. - All participating students will take a pre-test assessing their awareness and understanding of the issue of trash in Denver waterways - TGF will also recruit at least 6 professionals from engineering, construction, environmental, regulatory, or other relevant fields to act as consultants for the student design teams and serve on the judging panel - In December of 2018, TGF will host Round 1 judging of the student designs. Each design team will present detailed plans of their designs to the panel of judges and winning teams will be selected. All teams that complete Round 1 of the competition will be invited to participate in Round 2. - TGF will provide each design team with funding to construct a scale model of their device to be tested on a flume - TGF will include information on the CRDC and Round 1 winning designs to the community through its email newsletter. - In April of 2019, Round 2 judging will be held. Each team will test scale models of their trash removal devices and answer questions from the judging panel. Winning devices will be selected based upon their ability to collect and remove trash, durability, feasibility for real-world application, and aesthetics of the design. - In April of 2019, all participating students will take a post-test assessing their awareness and understanding of the issue of trash in Denver waterways - TGF will present cash prizes to the winning design teams and invite them to its 2019 Reception on the River to network with community leaders. - TGF will include information on the winning designs from Round 2 of the CRDC to the community through its email newsletter and provide a press release to local media outlets.
Grantee Deliverable: Describe the deliverable the grantee expects from this task
- At least 6 innovative designs for in-stream trash removal devices - Survey results measuring the change in participating students' awareness and understanding of the issue of trash in Denver waterways over the course of the CRDC. - At least one design for a trash removal device for which implementation can be pursued
CWCB Deliverable: Describe the deliverable the grantee will provide CWCB documenting the completion of this task
- A list of student teams and professionals participating in the 2018-2019 CRDC - Invitations to attend Round 1 and Round 2 judging of student designs - Written and visual documentation of Round 1 and Round 2 judging - Results from the pre- and post-surveys taken by students participating in the 2018-2019 CRDC - Media releases, emails, social media posts, and a list of media contacted will be provided. Any media articles, interviews or coverage will also be sent to the CWCB.

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Tasks
Provide a detailed description of each task using the following format:
Task 2 – Implementation of a Winning Design
Description of Task:
- TGF will pursue the implementation of a winning design from the CRDC in a Denver waterway. This may include additional feasibility studies, cost estimates for prototype construction, fundraising, and coordination with Denver Environmental Health and Urban Drainage and Flood Control District. If installation of the prototype is determined feasible and necessary funding and approvals are obtained, the device will be installed in a Denver waterway for further testing.
Method/Procedure:
- TGF will work with a local engineering firm to further study the implementation of a trash removal device resulting from the CRDC. - If feasible, TGF will work with a local firm to obtain full-scale designs and cost estimates for the construction of the trash removal device prototype - If the results of the feasibility studies and cost-estimates are determined to be reasonable, TGF will pursue funding for the construction of the prototype and obtain necessary permission from the City to install the device in a Denver waterway. - Finally, if installed, further study of the prototype device will occur, including measuring the type and amount of trash removed from the waterway, durability of the device, and amount of maintenance required.
Grantee Deliverable: Describe the deliverable the grantee expects from this task
- An overview of the feasibility of installing a winning CRDC trash removal device with input from a local engineering firm - If a design appears feasible, full-scale designs and cost estimates needed for implementation of a trash removal device that results from the CRDC. - Construction of a full-scale prototype of a winning CRDC trash removal device, contingent upon the results of the feasibility studies and cost estimate.
CWCB Deliverable: Describe the deliverable the grantee will provide CWCB documenting the completion of this task
- Results from any feasibility studies of winning CRDC trash removal devices - Cost estimates for construction and installation of the trash removal device prototype - Pictures of the trash removal device prototype, if constructed

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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.

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, 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.

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Colorado Water Conservation Board

Water Plan Grant - Exhibit B
Budget and Schedule

Date: February 1, 2018

Name of Applicant: The Water Connection / The Greenway Foundation

Name of Water Project: Clean River Design Challenge

Task No.	Task Description	Start Date	End Date	Grant Funding Request	Match Funding	Total
1	Clean River Design Competition - time and expenses	Aug-18	May-19	16,875	16,875	$33,750
2	Implementation of 2019 winning design	May 2019	December 2020	$7,625	$7,625	$15,250
			Total	$24,500	$24,500	$49,000

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

ENGAGEMENT & INNOVATION GRANT FUND SUPPLEMENTAL APPLICATION

Introduction & Purpose

Colorado's Water Plan calls for an outreach, education, public engagement, and innovation grant fund in Chapter 9.5.

The overall goal of the Engagement & Innovation Grant Fund is to enhance Colorado's water communication, outreach, education, and public engagement efforts; advance Colorado's water supply planning process; and support a statewide water innovation ecosystem.

The grant fund aims to engage the public to promote well-informed community discourse regarding balanced water solutions statewide. The grant fund aims to support water innovation in Colorado. The grant fund prioritizes measuring and evaluating the success of programs, projects, and initiatives. The grant fund prioritizes efforts designed using research, data, and best practices. The grant fund prioritizes a commitment to collaboration and community engagement. The grant fund will support local and statewide efforts.

The grant fund is divided into two tracks: engagement and innovation. The Engagement Track supports education, outreach, communication, and public participation efforts related to water. The Innovation Track supports efforts that advance the water innovation ecosystem in Colorado.

Application Questions

*The grant fund request is referred to as "project" in this application.

Overview (answer for both tracks)
In a few sentences, what is the overall goal of this project? How does it achieve the stated purpose of this grant fund (above)?
The goal of this project is to engage university students in a design competition (the Clean River Design Challenge) to develop innovative solutions to the issue of trash in Denver's urban waterways, and to pursue implementation of devices designed through the competition that show significant potential for real-world success. Throughout the competition as well as in the pursuit of device implementation, the project also engages local leaders from the business, academic, environmental, and regulatory sectors to support the development of high quality designs that utilize the latest research, data, and technology available. Not only does the project support water innovation in Colorado, the very core of the competition relies upon collaboration between multiple agencies within the Denver metro community. The CRDC also presents opportunities to raise awareness within the community on the issue of trash and other non-point sources of pollution in Denver's waterways through promotion of the competition and the resulting designs.
Who is/are the target audience(s)? How will you reach them? How will you involve the community?
The target audience for participation in the Clean River Design Challenge (CRDC) is local university students. The Greenway Foundation (TGF) has connections with several professors at Metro State University, School of Mines, and University of Colorado Denver that have helped to recruit student teams for previous iterations of the competition, and who have interest in continuing this partnership. Other local colleges and universities have also expressed interest in participating in the 2018 -2019 CRDC. TGF also seeks to engage professionals from a variety of relevant fields to assist with the design process and judging rounds. Previous competitions have involved professionals from the Littleton/Englewood Wastewater Treatment Plant, Denver Department of Environmental Health, Urban

Overview (answer for both tracks)
Drainage and Flood Control District (UDFCD), ECI Construction, Wright Water Engineers, CDM Smith, DHM Design, Merrick Engineering, and Confluence Kayaks. All of these agencies have long-standing connections with TGF through its various projects along the River and wish to continue supporting the CRDC. Finally, TGF has a database of over 8,000 individuals that receive its weekly email newsletters. Information on the CRDC and the issue it addresses will be included in these email communications several times over the course of the year.
Describe how the project is collaborative or engages a diverse group of stakeholders. Who are the partners in the project? Do you have other funding partners or sources?
As described above, the CRDC involves stakeholders from engineering, design and construction firms, academic institutions, water management and environmental health agencies, and the recreation industry. Pursuing the implementation of a winning design will also involve local design and construction firms to build a prototype, and coordination with Denver Environmental Health and UDFCD to install and test the device. The Riverfront Park Community Foundation is providing funding toward the CRDC. A family foundation that wishes to remain anonymous is providing support the implementation of a winning trash removal device. Participating engineering and construction firms have also contributed funds to the CRDC competition in previous years and TGF anticipates that this support will continue.
Describe how you plan to measure and evaluate the success and impact of the project?
The Greenway Foundation will evaluate the success of the CRDC based upon the number of participants, results of participant pre-post surveys, connections between design teams and professional consultants, and the functionality of the trash removal devices developed. Outcomes of the project will also be assessed through conversations with participants, judges and professors. From these conversations, TGF will further refine the competition. TGF will also evaluate the success of the CRDC by the level of interest in the competition among media outlets, institutions of higher education, engineering firms, and the public. This will be measured through the number of media pieces produced, the participation level of the universities, attendance at events, and funding and participation from engineering firms and other sources. After the competition, success will be measured through the ability to construct a working prototype of a winning trash removal device design and to have it installed in the South Platte River or Cherry Creek. If installation is successful, then the device will be evaluated on the amount and type of trash it removes from the waterway, its durability, and ease of trash collection and other maintenance required.
What research, evidence, and data support your project?
The Greenway Foundation's 2012 inventory of nonpoint source trash in and along segment 14 of the South Platte River reveals the magnitude of the issue. At the most urban and densely populated inventory site, volunteers were able to collect over 25,000 pieces of trash in just three days. Urban Drainage and Flood Control District also reported that they collect between 600 and 900 cubic yards of trash from the South Platte River each year. Surveys of the public also revealed that most residents believe issues of litter and water quality are important to address, but are unaware of a common way that litter enters Denver's waterways. Denver Environmental Health's 2011 survey of Confluence Park users found that they perceive trash in Denver's streams and river as a problem and feel that trash removal is a worthwhile effort for the City to conduct. The users surveyed also felt strong enough about the issue that they expressed a desire to volunteer their own time toward activities that would improve the river. The Market Perceptions survey of Metro Denver residents also found that 71% of respondents perceived water pollution as a problem in the area. Despite this concern, when asked where litter in Denver neighborhoods goes when it is not picked up, only 15% of survey respondents could identify the storm drain as a destination and only 1%

Overview (answer for both tracks)
mentioned it could end up in the water supply or rivers. This disconnect between the concern for water quality and a common source of water pollution is alarming and a likely reason that the issue continues to persist in Denver's waterways. More efforts to raise awareness of these connections, like the CRDC, are clearly needed in the Metro area. As for the feasibility of approaching the removal of waterway trash using an in-stream device, there is precedent for doing so. A Water Wheel Trash Collector is successfully removing trash from Baltimore's Jones Fall River and also serves as a vehicle for public education through the web and social media as well as group visits to see it in operation. Although the device is successful in the Jones Fall River, the Merrick study (see memorandum in Exhibit C) determined the cost of adapting the design to the constraints of the South Platte River would be extremely high and it would be risky to pursue. The study also concluded that a smaller design created with the constraints of Denver's waterways in mind, such as the winning design from the 2016 CRDC, would be promising and effective. Overall, these studies show that the issue of trash in Denver's waterways is significant, the public feels it is important to address, and it would be feasible to address the issue through the installation of a mechanical trash removal device. Moreover, the device could be used to raise public awareness on the issue, its causes, and solutions.
Describe potential short- and long-term challenges with this project.
One factor contributing to the success of this project is the participation level of student teams in the CRDC. TGF will work closely with professors and university staff to ensure that the students are committing the time and effort necessary to develop products that are up to its high standards. There are also inherent risks to any project involving innovation. New approaches and techniques are being designed and tested, each one with a risk of failure, but all ultimately contributing new ideas and knowledge to the end goal. All trash removal devices will undergo thorough analysis and risk assessments by professionals in the engineering and water management fields before being installed in a Denver waterway for further study. This innovation, testing, and modification cycle is fundamental to the innovation cycle, and we believe in failing forward until effective solutions are developed. Finally, there are a couple of long-term considerations with this competition concept: 1) obtaining the funding and necessary City agreements for ongoing maintenance of a trash removal device, once installed in a waterway; and 2) the need to modify the focus of the competition in future years so ideas and solutions remain fresh and not recycled. Future competitions might focus on different geographic areas, or different topics such as designs for storm inlet trash interceptors, or we could shift the focus to other waterway contaminants other than trash.

Please fill out the applicable questions for either the Engagement Track or Innovation Track, unless your project contains elements in both tracks. If a question does not relate to your project, just leave it blank. Please answer each question that relates to your project. Please reference the relevant documents and use chapters and page numbers (Colorado's Water Plan, Basin Implementation Plan, PEPO Education Action Plan, etc.).

Engagement Track
Describe how the project achieves the education, outreach, and public engagement measurable objective set forth in Colorado's Water Plan to "significantly improve the level of public awareness and engagement regarding water issues statewide by 2020, as determined by water awareness surveys."

A primary goal of the CRDC is to raise awareness of the importance of protecting Colorado's valuable water resources, and awareness of the urban waterway trash problem in particular, through education and outreach. By engaging students from three Universities from a variety of backgrounds and disciplines, TGF is reaching budding professionals who may not have been aware of the waterway trash issues facing the Metro area and may not have been exposed to water resources as a discipline. Through participation in the CRDC, students will study Denver waterways and their associated water quality issues in depth and explore new career opportunities in associated fields. Participants will be given pre- and post-tests to determine change in their awareness and understanding of water quality challenges in the South Platte River and its tributaries.

In addition to reaching students, the CRDC reaches thousands of people through The Greenway Foundation's social media, the newsletter distribution, and media coverage of the competition's final demonstration and judging day. Not only will the competition itself be promoted, but also the underlying issues facing Denver's urban waterways. It is TGF's goal that all Denver residents understand the connection between litter in their neighborhood and litter in the waterways.

Describe how the project achieves the other measurable objectives and critical goals and actions laid out in Colorado's Water Plan around the supply and demand gap; conservation; land use; agriculture; storage; watershed health, environment, and recreation; funding; and additional.

This project addresses key themes in the Colorado Water Plan and South Platte / Metro Basin Implementation Plans, including maximizing water resources, protecting watersheds, enhancing water quality, protecting recreational and environmental assets, and promoting education and innovation. These plans also acknowledge the connection between water supply and water quality, and the CRDC supports the State in developing innovative strategies to protect the urban water supply from trash and its many associated pollutants.

The Colorado Water Plan and the South Platte / Metro BIP speak to the importance of protecting our recreational water resources. In many locations in the urban area, those recreational resources are severely impacted by visible, toxic trash littering the waterways that residents and visitors would like to use for boating and fishing. Urban waterway trash functions as a deterrent to the enjoyment of the metro area waterways, creating negative perceptions of the South Platte River and its tributaries. Not only is it an aesthetic issue, but the contaminants and the materials in the trash negatively impact urban waterway ecosystems, impairing the environment and its associated recreational uses.

A primary goal of the Colorado Water Plan is to address the State's supply and demand challenges while protecting the health of rivers, streams and watersheds. This project seeks to support the State in achieving this goal by facilitating the removal of a visible and pervasive pollutant from the watershed's urban waterways. Watershed health affects water supply. If the available water is polluted, it will only widen the supply and demand gap. There are land use connections to this project as well. Land uses adjacent to urban waterways frequently play a role in the amount of trash finding its way into the water, pointing to a need for reevaluation of land use locational decisions, or at a minimum, the establishment of best management practices for trash reduction, containment and disposal.

Describe how the project achieves the education, outreach, and public engagement goals set forth in the applicable Basin Implementation Plan(s).

The CRDC support the Metro Basin Roundtable's Education Action Plan goal to "outreach to metropolitan area institutions of higher education to develop programming specifically targeted to young professionals." The CRDC engages young professionals from metro area universities in improving Colorado's water future. The CRDC also aligns with the Education Action Plan's strategy of expanding on "previous efforts to identify and partner with other groups and/or entities, which are doing water related public education and outreach." TGF has a long history of conducting public education and outreach related to Denver's urban waterways and has a database of over 8,000 area residents that regularly receive its communications. The CRDC is a continuation of these efforts.

Describe how the project achieves the basin roundtable's PEPO Education Action Plans.
The Greenway Foundation is specifically mentioned in the PEPO Education Action Pans as a key outreach and engagement partner. Metro State University is also specifically mentioned. This project is a perfect example of how the Basin's priorities can be implemented through the engagement of partner organizations with extensive outreach potential to the local community.

Innovation Track
Describe how the project enhances water innovation efforts and supports a water innovation ecosystem in Colorado.
The purpose of the project is to spark innovation and to support the development of innovative designs that address the ongoing challenges of trash entering Denver's waterways. Moreover, the project brings together creative minds and current and future leaders with the interest and expertise necessary to find solutions to not only the issue of trash in Denver's waterways, but many other water challenges. By connecting multiple stakeholders together, each bringing their own set of skills and resources, innovative ideas can become real-world solutions.
Describe how the project engages/leverages Colorado's innovation community to help solve our state's water challenges.
Universities are incubators for innovative thought and design. By engaging university students in the CRDC, TGF is tapping into the next generation of thought leaders with new perspectives on current issues and traditional methods. The CRDC connects these young adults with professionals in the design and construction field that are eager to advance new concepts and have the resources to do so.
Describe how the project helps advance or develop a solution to a water need identified through TAP-IN and other water innovation challenges. What is the problem/need/challenge?
The following issue was pitched by TGF's Water Connection Director, Devon Buckels, at the TAP-IN event held in June of 2017: Despite significant improvement in the health of the South Platte River (River) over the past four decades, the reality of trash and other forms of solid waste based pollution continue to be an ongoing challenge to the River and its tributaries. This pollution creates serious health and safety risks for the plants, animals and people that interact with these waterways, can impede the natural flow of creeks and rivers, and is aesthetically displeasing. Trash gets into Denver's urban waterways through a number of different ways. The South Platte River and its tributaries run along many public areas, such as along roads and in public natural spaces. Most of these spaces are open to the public, which makes them frequent destinations for illegal dumping. Park users and regional trail users either intentionally or accidentally leave trash in these public spaces. Additionally, trash along streets, alleys, and sidewalks throughout Metro Denver does not just stay there until it is picked up. During rain events or when snow melts, the water flows into storm drains, and carries with it any trash it picks up along the way. Storm drains lead directly to Denver's urban waterways, and the trash ultimately ends up in the River. Currently, the primary urban waterway trash removal system is the manual removal of debris.

Innovation Track
Employees of two City agencies (along with volunteers from the public) walk through natural areas and waterways and manually pick up trash they encounter. This is a slow, tedious process that is expensive and inefficient, and it is not solving the problem. The challenge presented to teams participating in the CRDC is to design an in-stream mechanical device that will remove trash floating on the surface and in the water column of a Denver waterway, thereby significantly improving its health and appearance.
Describe how this project impacts current or emerging trends; technologies; clusters, sectors, or groups in water innovation.
There is a market need for innovative solutions to the urban waterway trash problem. Currently, Urban Drainage and Flood Control District (UDFCD) spends between $400,000 and $500,000 per year paying clean-up crews to manually remove trash from the water and banks along drainage ways in the Denver metro area, Cherry Creek and the South Platte River. The trash in parks and elsewhere throughout the city frequently ends up in waterways via storm sewer. The City and County of Denver spends $800,000 per year on manual trash pick-up in parks, many of which are along the River. The Greenway Foundation also organizes two River Sweep events per year, engaging volunteers to pick up trash along the River whose cumulative time is valued at $36,000. Alternative solutions and technologies on the market are not meeting the need. The City and County of Denver has looked into the possibility of a “Bandalong” technology currently on the market. The device is expensive and does not have any aesthetic value or educational / awareness-raising benefit. Functionally, it could work in some applications, but is lacking many of the characteristics of an ideal solution. The Baltimore Trash Wheel is a phenomenal success in its particular location and application (Inner Harbor, Baltimore, MD). The inventor of the Trash Wheel is receiving inquiries for his product from cities throughout the U.S. as well as internationally. The device was featured in National Geographic last summer, and Baltimore considers it such a huge success that that raised funding for a second wheel which has now been installed in a different location. In 2016, The Greenway Foundation engaged the inventor of the Baltimore Trash Wheel in a consultation with the City and County of Denver and UDFCD to explore the feasibility of a similar device for Denver. Upon analysis it was determined that the design would need modification in many areas to function well in the urban South Platte River or Cherry Creek, and therefore it is not being pursued at this time. Given the limited number and type of known solutions to the problem currently on the market, and judging from the extensive national and international attention received by the inventor of the Baltimore Trash Wheel, TGF believes there is significant opportunity for winning designs from the CRDC to move forward as resources allow, creating a pipeline for innovative products to better address this growing problem that is global in scale.