Town of Grand Lake

Stormwater Management Plan

03/30/2023

Prepared by: WaterVation

130 West Sackett Avenue, Unit A
Salida, CO 81201

Prepared for: Town of Grand Lake

1026 Park Avenue
Grand Lake, CO 80447

Cover Letter

March 30th, 2023

RE: Grand Lake Stormwater Management Plan

Dear Members of the Selection Committee,

We are excited to share our qualifications, understanding, and approach for the Grand Lake Stormwater Management Plan solicitation for the Town of Grand Lake. WaterVation is a Colorado owned water resources engineering firm with a small business designation headquartered in Salida, CO. We have reviewed Request for Proposal (RFP) and are qualified to execute the required tasks.

At WaterVation we are experienced in working within a variety of environments and with agencies and communities with varying resources. Because of this we recognize the challenges that come with different projects as well as the need to get high value for the investments they make in engineering services. We are excited to team with you and provide:

Superior Customer Service – We understand that when you hire a consultant you are not only hiring us to provide technical services, but you are also hiring us to serve as an extension of your staff. To us this means providing timely communication, thorough documentation, and establishing an organized project file structure that can be easily shared and accessed by all team members. We encourage you to contact our existing and past clients, who can vouch for our commitment to superior customer service.

Technical Expertise – All projects and experience listed in this proposal are directly attributed to individuals employed at WaterVation. Because of this, the Town can take comfort in knowing that the WaterVation staff has direct experience and can immediately provide support or guidance without needing support from a broader range of company expertise.

Guaranteed Availability – We have carefully reviewed our backlog and are committed to providing The Town of Grand Lake with full access to our resources during the contract period. WaterVation has a high standard of care when it comes to estimating our availability. We are a small engineering firm, and we pride ourselves in doing high-quality work. One of the ways we accomplish this is by maintaining a reasonable workload and not overbooking ourselves. Our philosophy is to do an excellent job on a few projects than a mediocre job on several.

Stream Restoration Expertise - WaterVation is regionally recognized stream restoration firm that strives to restore both the natural look and function of impaired stream systems. Our philosophy towards restoring and stabilizing impaired stream systems is to restore the natural characteristics of the stream system using the fundamental principles of natural channel design that incorporates expertise from our team of engineers, biologists, ecologists, and geomorphologists. We believe this experience will be extremely beneficial to the Little Columbine Creek component of the Project.

Sincerely,

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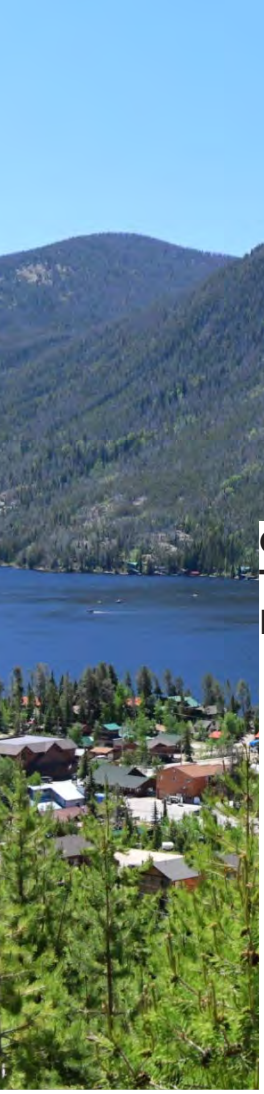

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Project Understanding & Approach

Understanding of the Project

Watersheds to the north of The Town of Grand Lake (Town) have experienced different forms of hydromodification since its founding in 1879. More recently, continued development and climate change has led to further hydromodification. The East Troublesome Fire (2020) burnt land that was previously vegetated and reduced the ability of native soils to infiltrate runoff by creating hydrophobic soil conditions. The combination of these two impacts has resulted in an increased amount of stormwater runoff and sediment being contributed to Little Columbine Creek, and ultimately Shadow Mountain Reservoir. Water quality within the Shadow Mountain Reservoir has been adversely impacted by the excess sediment being delivered from this watershed along with the other contaminates that adsorb to sediment particles.

The Woodpecker Hill area represents a more common form of hydromodification: urban development. Through Development Woodpecker Hill is comprised of impervious surfaces such as roads, houses, driveways, and parking lots. When impervious surfaces are constructed on previously undeveloped land peak flows are increased since the native landscape is no longer able to slow and infiltrate rainfall. This can lead to flooding, increased erosion, and transport of urban contaminates that adsorb to sediment particles (such as hydrocarbons). This can be viewed in Figure 1 from 1990 in comparison to the recent aerial imagery in 2019 (Figure 2).

We understand that The Town of Grand Lake, the Three Lakes Watershed Association, and others have worked to improve the quality of water in Shadow Mountain Reservoir, Granby Reservoir, and Grand Lake - with a focus on water quality, especially clarity issues. Improvements to the quality of stormwater runoff entering the Shadow Mountain Reservoir will be addressed through this Project and will work in tandem with these broader efforts.

The primary goal of this Project is to develop cost-effective stormwater management solutions that integrate natural resource management. It is our understanding that this goal can be achieved by:

1. Designing Low Impact Development (LID) stormwater management techniques that are focused on restoring natural hydrologic processes of the site, and that are incorporated in a contextually-sensitive way within existing conditions.
2. Developing stormwater management practices that establish requirements for maintaining predevelopment hydrology through site, building, and landscape design techniques focused infiltrating, filtering, storing, evaporating, and detaining stormwater close to its source.
3. Enhancing public safety by reducing the quantity of contaminants entering the reservoir through proper implementation of LID and stormwater management practices.
4. Reducing public expenditures by reducing the quantity of sediment and pollutants that are conveyed within stormwater drainage systems and natural resource areas through proper implementation of LID and stormwater management practices.

Figure 1: Grand Lake 1990

Figure 2: Grand Lake 2019

Project Approach

Little Columbine Creek

Increased sediment loading within Little Columbine Creek due to the effects from the East Troublesome Fire could persist for the next few years based on typical watershed responses to fire impacts. Once the sediments deposit into Shadow Mountain Reservoir they become costly and difficult to remove due to costs associated with dredging of materials and costs and efforts to locate the subsurface sediment depositions. Addressing the post-wildfire sedimentation issues at the source or in designated and pre-defined areas is typically the most effective and cost-effective solution for mitigation.

We understand that the Town has a limited footprint to work within to achieve the desired outcome in the Little Columbine Creek corridor. Our approach for improving the water quality within Little Columbine Creek is mainly centered around sediment storage and capture. We have studied the Project area and have identified two potential solutions for capturing excess sediments prior to them entering Shadow Mountain Reservoir:

Option 1: **Constructed Sediment Basins within Town Boundary (Figure 3).**	**Option 2:** **Low-Tech Process-Based Techniques within Wetland Complex (Figure 4).**
Descriptive Details: Capture and store sediments from the fire impacted watershed to prevent impacts to receiving waterbodies.	Descriptive Details: Purpose is to engage multiple flow paths, slow water, encourage infiltration and sediment deposition
Benefits • Stockpiling and maintenance can be conveniently located • Capture sediment before it interacts with the natural environment	**Benefits** • Wetlands naturally filter pollutants and store sediment • Low maintenance, natural solution
Challenges • Ongoing maintenance will be required • Spatial constraints	**Challenges** • Working within wetlands (permitting) • Risk of sediment over filling wetlands and requiring maintenance

We recognize that addressing the impacts of the fire closer to the source for Little Columbine Creek is also an effective way of mitigating the post-wildfire sediment impacts. It is our understanding that broader efforts are being completed within the watershed by Northern Water, USFS, and others and that these mitigation strategies are outside the scope of this project. However, WaterVation is capable of identifying and designing solutions in this manner, if desired.

These solutions would mitigate impacts to the Shadow Mountain Reservoir caused by fire-generated sediments and improve water quality through natural infiltration. The ideal solution will be a result of the inventory and analysis of the stormwater management plan in collaboration with the Team, as identified in the RFP, and public engagement.

Figure 3 (Right):

Constructed Sediment Basins within Town Boundary

Figure 4 (Left):

Low-Tech Process-Based Techniques within Wetland Complex.

Woodpecker Hill

It is our understanding that the Woodpecker Hill area represents a more traditional urban pollutant water quality problem where household and roadside pollutants interact with stormwater runoff and fine sediments and are transported into the receiving waterbodies, affecting water quality downstream.

In these more urban settings techniques generally fall under two approaches: infiltration or treatment. Given the goals of the Project, we will focus our efforts on the natural infiltration methods. Soil and percolation tests will be required to determine the feasibility of infiltration as a technique.

Within the infiltration options they typically fall into two categories:

- Dispersion of flow across an infiltration surface
- Storage and capture of runoff for infiltration

Our plan would be to look at both of these options, and place them within the appropriate landscape location within the study area. A few options for site specific LID approaches are presented below. How these options may work within the study area are conceptually shown in Figure 8.

These options represent a few LID solutions for improving water quality within the Woodpecker Hill area. We expect that these methods and options will be further refined following the inventory and collaboration with The Town of Grand Lake.

Grass Swales

are useful infiltration techniques where ditches may be located, or where ditches should be located. These can slow and infiltrate runoff, improving water quality to the receiving water body.

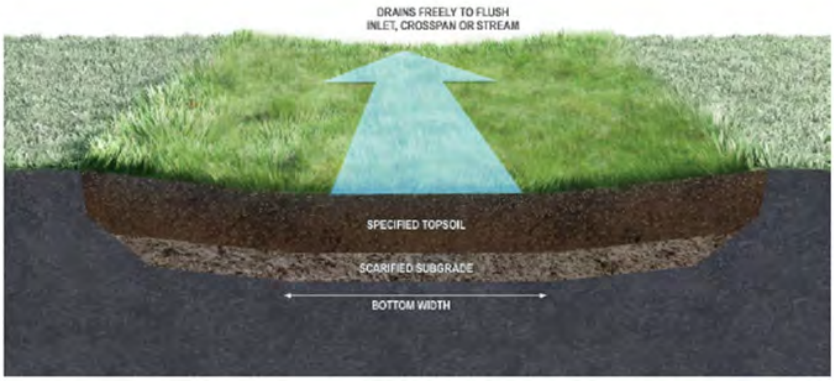


Figure 5: Colorado Springs Green Infrastructure Manual

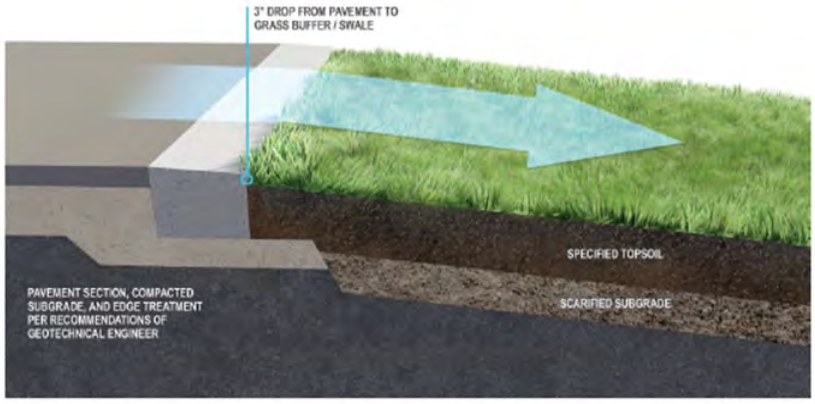


Figure 6: Colorado Springs Green Infrastructure Manual

Vegetated Buffers

should be placed in locations where the natural landscape map slope away from paved areas, or even at the base of steep hillside in the case of this study area. These are flat areas that disperse flow and don't form concentrated flow paths. While overland flow passes through these areas the runoff is slowed and infiltrated.

Bioretention

is very useful in site specific locations. Runoff is directed to these low-lying storage areas where runoff ponds and then infiltrates. These should be placed in areas where pavement can drain to a low spot, such as a parking lot or a larger developed area. These features can range in size and can be flexibly adapted to landscape context.

Figure 7: Mile High Flood District Criteria Manual

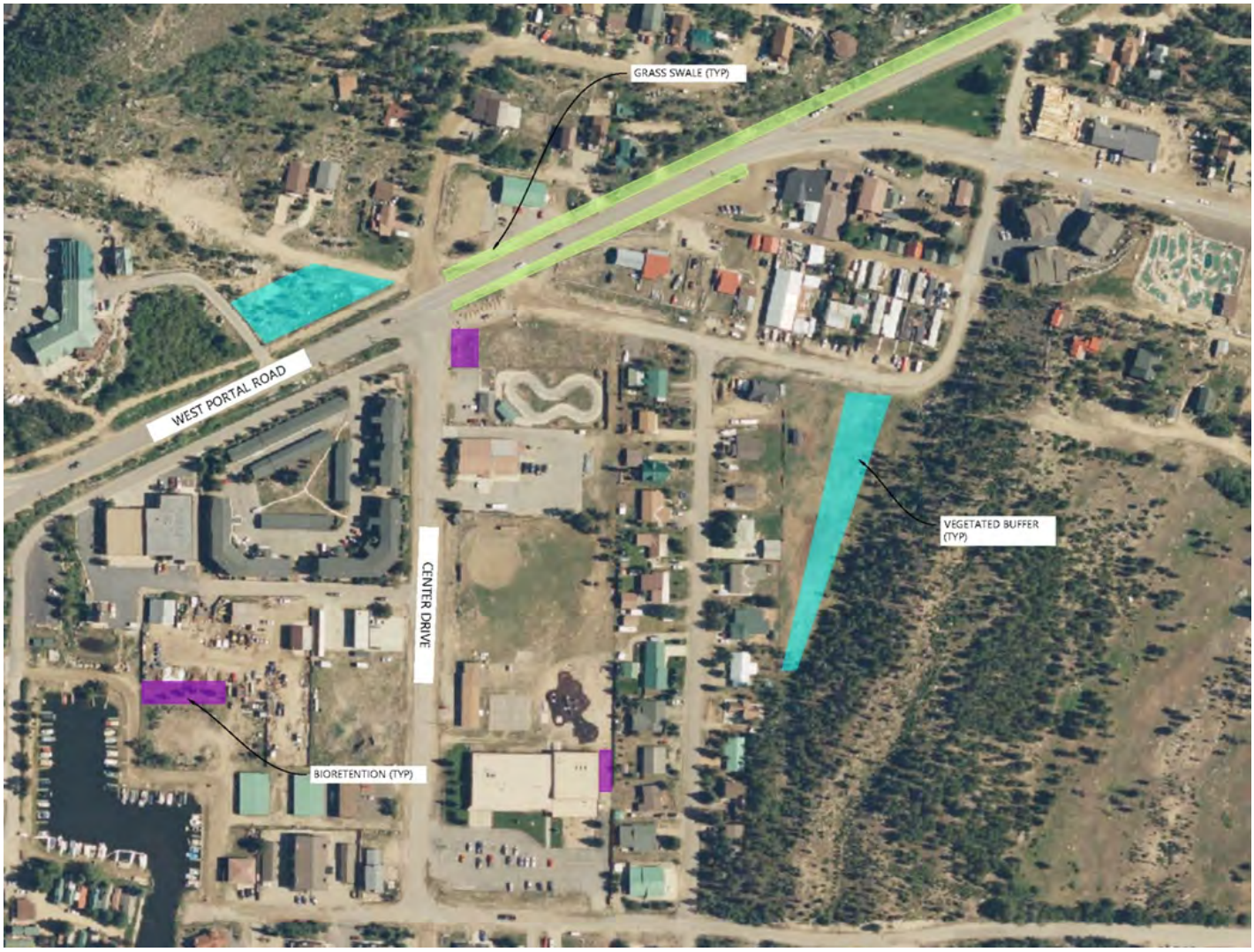
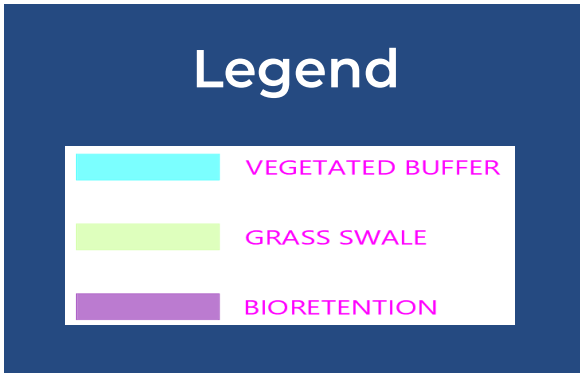


Figure 8 (Above):

Site specific LID approaches within the study area.



Approach to Scope of Services

Our approach to all tasks is founded on solid communication

Communication and collaboration are the foundation for any successful design. The Kickoff Meeting provides an opportunity to discuss critical project elements including definition of goals and objectives, regular project meetings, scheduling, public outreach, etc.

We will also facilitate a discussion with all involved to develop answers to the following question: what defines a successful project? We feel this is an important question to ask and develop responses to prior to beginning a project. This is because public projects typically involve many different stakeholders, with different expertise, interests, and backgrounds. Therefore, one person's definition of success could be significantly different than another's.

Internally, WaterVation schedules progress meetings amongst its team members at intervals established in the work plan. These meetings include an update on progress, review of the schedule and fee, and discussion of any obstacles that may affect the product, schedule, or fee. Designers and engineers are required to immediately discuss any design issues with the Project Manager supervising the work. Notes are taken at the meetings and sent to all attendees via email.

Since we are a small company we routinely and constantly communicate as a team. We have found with a small team that communication lapses are rare, and that schedules and priorities are easily understood by all team members.

Our subconsultants will be required to provide the same level of detail as WaterVation for task scoping, man-hour estimates, and progress reports throughout the contract. WaterVation has extensive experience leading large teams on federal contracts where detailed reporting is required, such as our Fountain Creek Channel Stabilization at Riverside project.

Project coordination meetings will occur at the time and frequency discussed in the Kickoff Meeting. The purpose of these meetings is to provide The Town of Grand Lake with:

- An overview of recent project progress.
- An update on scope, schedule, and budget.
- Information related to design issues, changes, unforeseen circumstances, etc.
- A summary of next steps and action items.
- Some projects could require that Our Team proactively engage stakeholders to understand specific concerns, goals, and ideas for moving forward. This input is needed from a range of stakeholders, including federal, state, and local agency partners, and property owners. The overall goal of the engagement process is to develop broadly supported decisions that are reflected in the project.

Task 1: Inventory

The first task will involve the baseline data collection of the study area to support the plan. We plan on collecting all data during that timeframe as well as meeting with The Town of Grand Lake and Stakeholders to discuss the objectives and goals of the project and important communication items.

Data collection will include:

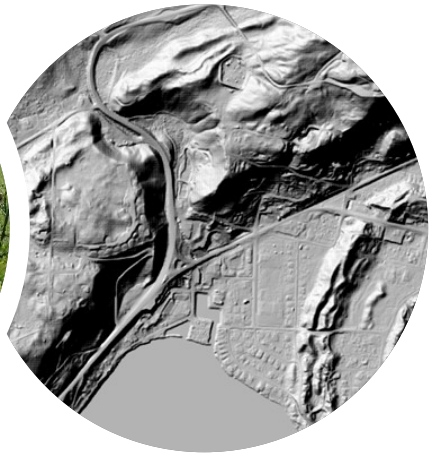
- Topography
- Stormwater Infrastructure (pipes, ponds, other features)
- Soil Analysis
- Water Quality Data
- Drainageways
- Geomorphic Assessment

Following completion of the inventory we will provide the required deliverables in addition to the ongoing Project Management deliverables. Scope items associated with this task are elaborated upon on the following pages.

Mapping

WaterVation Survey Equipment

Field Survey



Grand Lake LiDAR

We perform all topographic survey work in-house for cost and scheduling efficiency. WaterVation owns and operates Trimble R8s/R12 RTK GNSS Survey Equipment that we use for topographic and geomorphic surveys. We have been trained in tying into established control points along with setting our own control points. The benefit of performing our own survey work is the elimination of schedule delays due to surveyor scheduling or the need to re-send a surveyor to the site to capture additional points. As designers and modelers, we know the exact data needs for a given project and stream system.

We also own and operate a DJI Mavic 2 Pro Drone. This allows us to capture recent aerial imagery and photogrammetry for project sites.

The Town of Grand Lake is covered under the 2020 Northwest Colorado LiDAR. This data is relatively recent and accurate and can serve as the baseline mapping. This data will be supplemented by in house survey data to capture items like storm drain inverts that require additional accuracy.

Data Collection

Baseline water quality data will be collected at key locations so that the effectiveness of the stormwater management strategies can be documented. We agree with the baseline parameters the Town has suggested:

- Total Suspended Solids (TSS)
- Bacteria Count
- Dissolved Oxygen
- PH
- Temperature
- Clarity

Samples will be analyzed by a laboratory and provided to The Town of Grand Lake with all information related to time of collection, location, and any other observations.

WaterVation's subconsultant Cesare, Inc who WaterVation partnered with on the City of Salida Stormwater Master Plan will perform soil boring and analysis (soil type, horizons, percolations) to determine feasibility of LID solutions within the Woodpecker Hill area. We anticipate no more than five soil borings will be needed to gain an understanding of soil conditions.

Task 2: Analysis

During the analysis phase of the Project we will assess the existing storm system using the data collected in Task 1. This will include an evaluation of water quality and monitoring plan requirements. We will develop proposed stormwater solutions following the goals and objectives of the plan as presented in the RFP. We will also work with The Town of Grand Lake to develop a public outreach plan.

The deliverables requested in the RFP will be provided as part of this task. Scope items associated with this task are elaborated on below.

Inventory and Analysis of Existing Infrastructure

We will create a comprehensive inventory of all stormwater infrastructure within the study area. A database of all stormwater infrastructure will be collected in a GIS database for ease of sharing and use. We will be able to analyze the existing system for the Woodpecker Hill area using the EPA Storm Water Management Model (SWMM). WaterVation has completed this analysis previously for the City of Salida Stormwater Master Plan and for the City of Colorado Springs within the Pine Creek Watershed.

The SWMM model will include Little Columbine Creek to understand the routing of flows, impacts of storage, and culvert infrastructure. In addition, we believe that a geomorphic assessment of Little Columbine Creek would be beneficial for baselining conditions within the system and understanding the impacts from sediments to water quality. From the EPA:

Disturbances such as floods or forest fires are natural, episodic events that cause a stream to become unbalanced. After such disturbances, the stream will "seek" equilibrium conditions through adjustment of the other components until the stream is once again in a form that allows it to efficiently perform its functions of water and sediment discharge.

These periodic disturbances, of natural intensity and frequency, can increase aquatic biodiversity by creating opportunities for some species and scaling back the prevalence of others. When disturbances are of extreme intensity or frequency, as many human disturbances are, a stream channel will undergo adjustment to a new form. This can result in habitat degradation and threats to public safety and infrastructure.

We will gain a better understanding of how Little Columbine Creek may adjust to the fire impacted watershed conditions and how that will affect water quality and potential risks to infrastructure. The assessment will make sure that any proposed designs would be in-line with Little Columbine Creek's geomorphic trajectory.

Design Solutions / Sustainability

We understand that the Town wishes to implement low cost, natural LID solutions that help decrease the resource allocation of the Town. We will prioritize low maintenance stormwater solutions that work within the natural landscape while providing effective stormwater quality treatment.

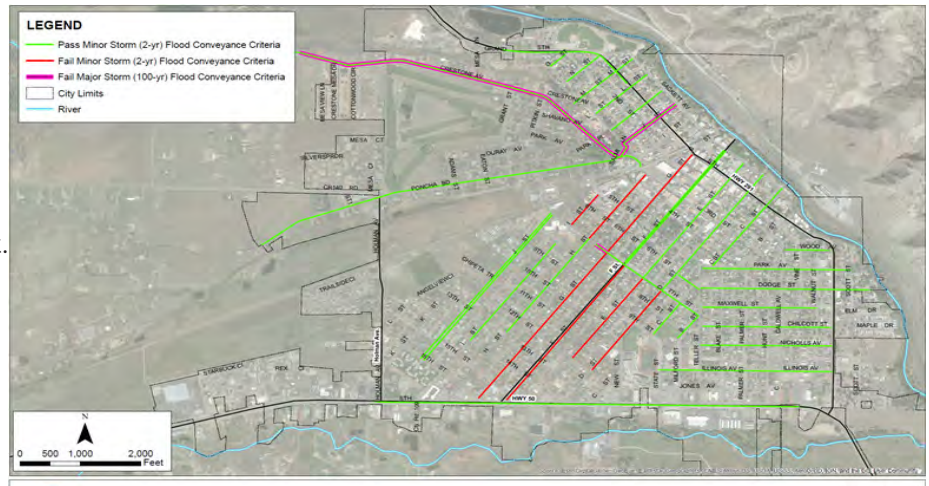


FIGURE 10
Major Curb & Gutter System Capacity
City of Salida Stormwater Master Plan

Sustainability of the solutions will be important when considering how it will perform over time. Choosing native drought-tolerant plants and seed mixes helps minimize irrigation requirements. Considering the watershed and potential future development and how fine sediment can potentially clog infiltration features is another important aspect to consider when assessing the long-term suitability of a feature.

The design solutions will be documented in the stormwater management plan.

Monitoring

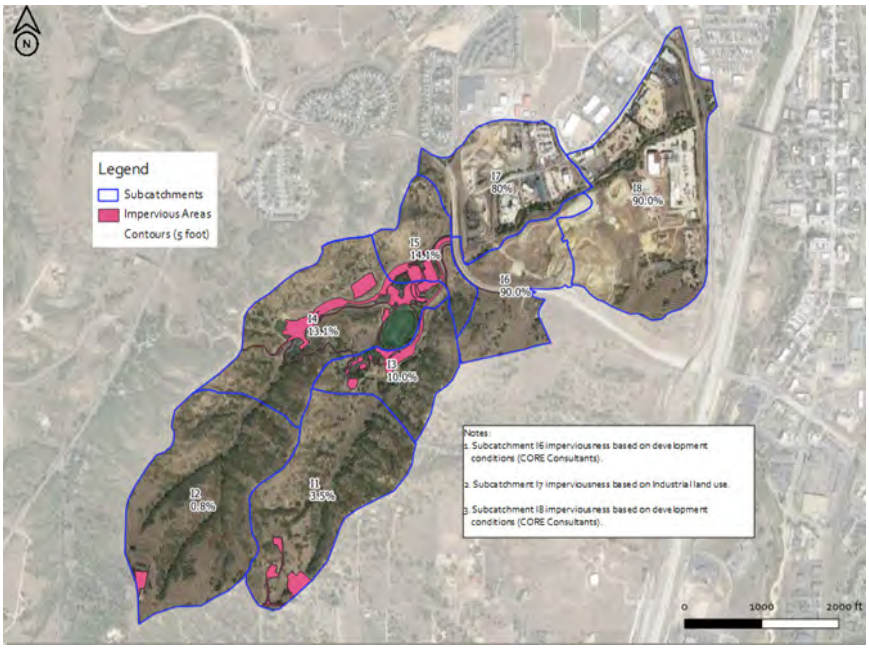
As part of the stormwater management plan, we will provide monitoring recommendations that document all requirements to maintain a successful monitoring program.

Performance of infiltration features as it relates to reduction of stormwater pollutant loading, runoff volume, and peak flows into receiving waters could diminish over time. That is why monitoring plan will be important to long-term success of the solution measures. Monitoring at the receiving waters will be important as well as specific site solutions to understand long-term performance towards achieving the ultimate goal of improving water quality.

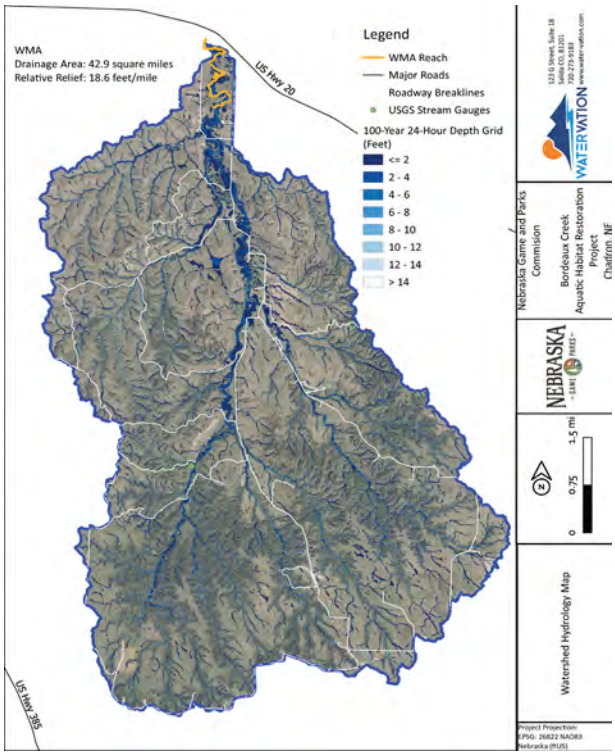
Public Engagement

Our Team's proven performance in managing public involvement processes will ensure that the following expectations will be met. Our Team commits to the following; providing accurate, understandable and accessible information to the public. Respond to questions in an effective manner, providing multiple ways of participating in the project process that are accessible to different stakeholders and constituencies, including vulnerable, underserved and displaced community members, adapting the public involvement approach as needed to be responsive to stakeholders' needs within the scope of the project and resource or time constraints.

Task 3: Stormwater Management Plan Preliminary Design



This task involves development of the preliminary stormwater management plan. This will include construction documents for proposed solutions and development of preliminary plans and reporting. We will prepare a presentation for a public meeting to communicate the plan to the public and additional stakeholders.



Reporting

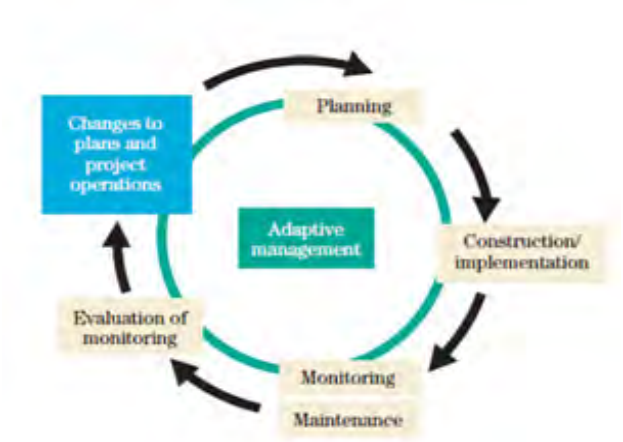
WaterVation will develop a stormwater management plan that documents all investigations, project findings, methodology, and project approach. This plan will support all design decisions towards development of the concept plan and will provided rigorous supporting evidence and rationale for the decision processes.

Task 4: Stormwater Management Plan Final Design

Following input from the public meeting and from The Town of Grand Lake, we will finalize the plan from Task 3. This task also includes the development of an operations and maintenance plan as well as a discussion of available funding sources that may be used to implement the plan.

Maintenance

We will provide a framework for the maintenance plan for the site. We have developed these for a number of our projects. For the maintenance plan we recommend an adaptive management approach. Natural stormwater facilities are part of dynamic systems, and over time the project outcomes will likely change (increase or decline) as project life increases. Revision of project operations, monitoring, and maintenance procedures are identified through adaptive management evaluation. Adaptive management is an approach to natural resource management that incorporates monitoring of project outcomes and uses the monitoring results to make revisions and refinements to ongoing management and operations actions (NRCS NEH Part 654, Chapter 16).



Graphic Courtesy: NRCS NEH Part 654, Chapter16

Funding Options

Our Team has worked on numerous projects with a variety of funding sources, including grant-funded projects. We understand the accounting protocols required for the responsible use of many funding sources and are familiar with project-related eligibility requirements (i.e. material type, schedule, restoration goals, etc.) for these sources. We will help identify all potential construction funding sources and associated requirements, including considerations that need to be made in the design phase.

WaterVation has a breadth of experience helping our clients obtain construction funding from various sources. Matthew Johnson recently wrote a FEMA PDM grant for the City of Colorado Springs, which was awarded in the amount $4M and Lucas Babbitt recently helped prepare a grant for the Fourmile Watershed Coalition that was awarded in the amount of $150k. We just finalized preparation of a FEMA HMGP and BRIC Grant for the City of Creede and are awaiting potential selection.

Ability to Perform all aspects of the Project

WaterVation is able to perform all aspects of the Project. We have provided a project experience chart on the following page highlighting where key project elements have been completed by WaterVation's staff on a number of previous projects.

Key technical tasks will be completed or led by Lucas Babbitt, PE, CFM and/or Matthew Johnson, PE, CFM. Combined, Lucas and Matthew have over 30-years of collective experience performing numerous and varied water resource engineering services to clients. Since WaterVation is a small company, both Lucas and Matthew have a large skill set and direct experiences performing all tasks required for the project

Table 1.

Project Experience Chart

	City of Salida Stormwater Master Plan	Pine Creek Channel Restoration	Turkey Creek Watershed Assessment	North Creede Willow Creek Restoration	Flat Creek FEMA Peak Discharge Revisions	Industrial Tributary Channel Design	Bordeaux Creek Aquatic Habitat Restoration	Mesa View Townhomes Drainage	Sunnyside Subdivision Drainage
Watershed Study	X	X	X	X	X	X	X	X	X
Stormwater Quality	X	X		X					
Sediment Management		X	X	X		X	X		
LID Design	X	X						X	X
Inventory/Assessment	X	X	X	X		X	X	X	X
Public Engagement	X	X		X				X	X

Ability to meet schedules within budget

We develop our budgets by getting input and agreement from all team members that will be involved with a project. This ensures that all team members understand the scope of work and associated effort for the tasks that will be performed. We have found that this process typically results in a project getting completed at or under budget and promotes a more thorough understanding of the goals and objectives amongst all team members.

Project budgets are reviewed on a monthly basis, and we provide monthly invoicing to The Town of Grand Lake that identifies the percentage of the budget that has been used and the amount remaining for each task.

Our approach to managing costs is founded on sound project management and past experience and can be verified by any of the client references provided in this proposal. Managing requires expertise with communication, budgeting, scheduling, and quality control.

Effective project scheduling is critical to cost containment, efficient project completion and mitigating impacts on your operations. This requires a solid process to manage multiple staff and subconsultant resources. Lucas will be directly responsible for ensuring that appropriate staff is committed so that WaterVation consistently meets project schedules.

Project schedules are developed based on input received from the team and then divided into major tasks. Major tasks are then scheduled with key project milestones and man-hour estimates required for the completion of each task. We will monitor actual progress against planned progress through time sheet submittals, internal progress reports, and communication with sub consultants.

WaterVation will promptly report, in writing, situations that impact the project schedule. WaterVation will provide the notifications, including explanation and justification of the situation, immediately after a variance is identified. After discussions regarding the variance and receiving approval to make changes, we can then adjust the schedule as necessary and communicate the new information to the team.

Our process uses the resource planning and monitoring features available in the BigTime software program. We also have scheduling features available in Microsoft Excel to communicate high-level scheduling elements.

Similar Experience

Project References

City of Salida Stormwater Master Plan & Criteria Development

Salida, CO

Relevance

- Stormwater Master Planning
- Inventory Assessment
- Stormwater Quality
- LID Design
- Geotechnical Soil Borings & Analysis

Reference

David Lady
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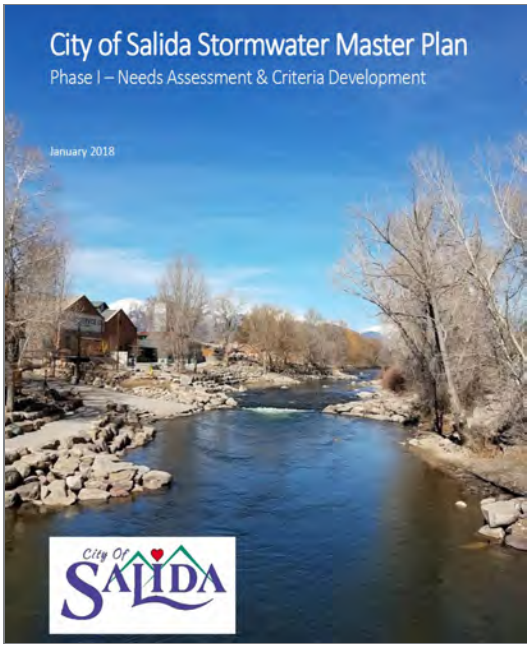


WaterVation was hired by the City of Salida to develop a stormwater master plan and stormwater design criteria. The purpose of the stormwater master plan was to develop a list of recommendations to reduce flooding and improve stormwater quality within the City. The purpose of the stormwater design criteria task was to establish governing criteria to be used for stormwater infrastructure design within the City.

WaterVation performed an inventory analysis of all existing drainage infrastructure within the City to document existing condition, size, and location. Stormwater quality issues were identified by meeting with City and County officials to discuss areas where observed issues such as sedimentation and hydrocarbon buildup was noticed. A watershed model was then developed using EPA SWMM to model hydrologic conditions and evaluation hydraulic function of the existing stormwater infrastructure. Information and data gathered during the inventory analysis, modeling, and stakeholder interviews was used to develop a list of recommended infrastructure improvements to reduce flooding and improve stormwater quality discharge into the Arkansas River.

Until completion of this project, stormwater design criteria did not exist for the City. WaterVation developed the governing stormwater design criteria by referencing national, State, and relevant municipal criteria. Pertinent criteria were modified for use within the City by making programmatic modifications to support local regulatory needs and technical modifications to make the referenced criteria locally-applicable. As an example, WaterVation collected geotechnical soil borings at 4 locations to evaluate percolation rates throughout the City. This data was used to help inform the development of hydrologic modeling criteria, detention pond design criteria, and Low Impact Development (LID) design criteria.

This project provided the City with stormwater design criteria for land use planning; floodplain management; drainage law; MS4 permit compliance; hydrology; hydraulics; infrastructure design of open channels, closed conduits, culverts, detention ponds, and Low Impact Development (LID) techniques; construction; and stormwater Best Management Practices (BMPs).

Turkey Creek Watershed Assessment

Harlan, NE

Relevance

- Watershed Planning
- Sediment Sampling
- Inventory Assessment
- Stormwater Quality
- Sediment Management

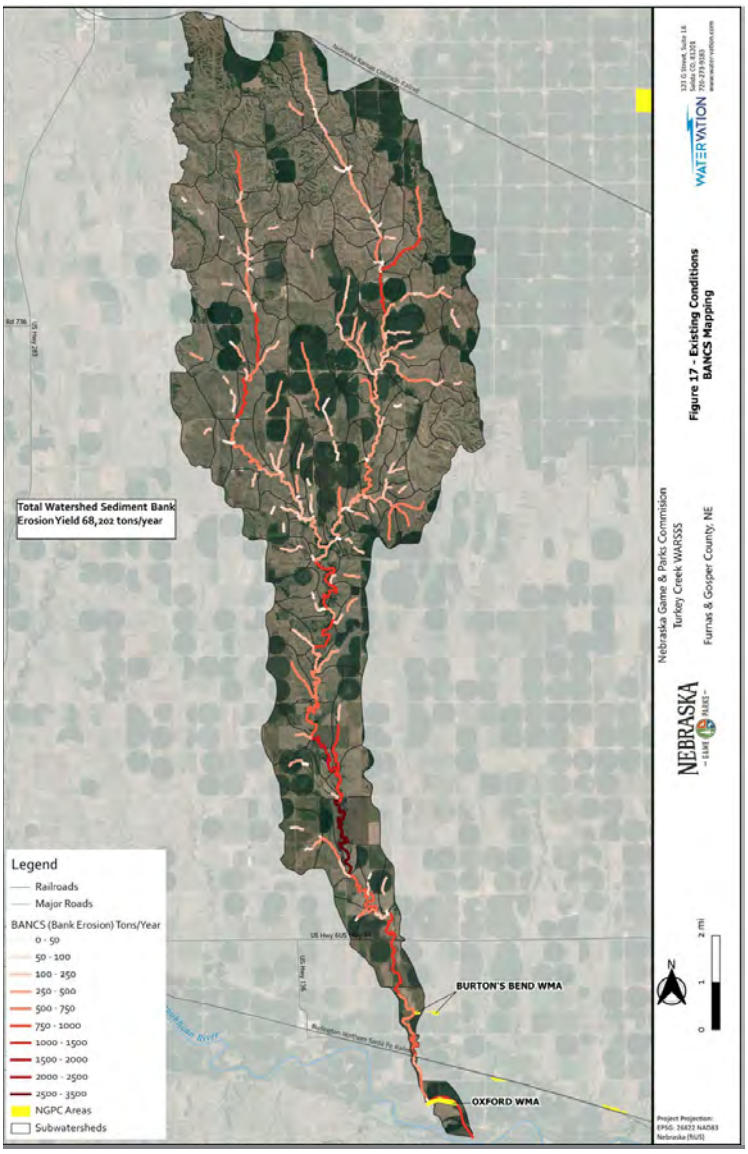
Reference

Brett Roberg

Nebraska Game & Park Commission

308-865-5329

Brett.roberg@nebraska.gov



WaterVation was hired by the Nebraska Game & Park Commission (NGPC) to prepare a Watershed Plan for the Turkey Creek watershed located in Harlan County, Nebraska. The purpose of the project was to evaluate the impacts that a proposed trans-basin diversion would have on the stream morphology, sediment delivery, water quality, and infrastructure.

WaterVation completed a watershed-wide assessment for the 68 square-mile watershed that encompasses 45 miles of Turkey Creek. Assessment tasks consisted of identifying sediment sources and channel stability problems linked to land and river management activities; taking GIS-based inventory of existing infrastructure; geomorphic stream assessments (survey and sediment sampling); and identifying locations within the watershed that are at high risk if sediment loading increases.

WaterVation then developed hydraulic and sediment transport models for existing watershed conditions using data collected in the assessment task and hydrologic data from local stream gages. These models were developed for 45 miles of Turkey Creek and were used to validate the issues and conditions observed during the field assessment task and to quantify existing (baseline) watershed conditions of stream morphology, riparian function, and aquatic habitat. Both models were then modified to include the additional flow proposed by the trans-basin diversion. The results of these models were compared to those for existing conditions to identify areas at risk for flooding, erosion, or sedimentation if the proposed trans-basin diversion becomes active.

Using the assessment and modeling data, planning-level recommendations were developed to help offset the adverse impacts caused by the trans-basin diversion if it becomes active. Recommendations generally consisted of stream and watershed restoration practices focused on reducing flooding, managing sediment loading, and preserving riparian and aquatic habitat.

Pine Creek Channel Restoration

Colorado Springs , CO

Relevance

- Watershed Planning
- Sediment Sampling
- Geotechnical Soil Borings & Analysis
- Inventory Assessment
- Stormwater Quality
- LID Design
- Construction Documents

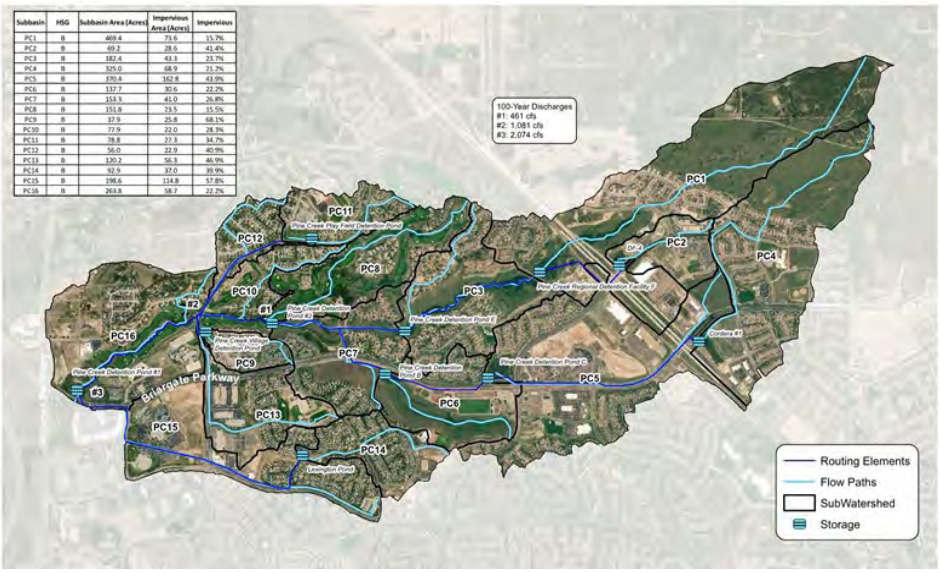
Reference

Adam Copper

City of Colorado Springs

719-385-5436

Adam.Copper@coloradosprings.gov



WaterVation was hired by the City of Colorado Springs to study the Pine Creek Watershed for the purposes of identifying opportunities to reduce peak flows to pre-developed conditions and identifying improvements required for repairing damage caused by watershed hydromodification.

The Pine Creek watershed is located in northern Colorado Springs and experienced rapid development, and corresponding hydromodification, beginning in the late 1990's. During this time period adequate stormwater infrastructure was not constructed in conjunction with the massive amount of urban development. As a result, peak flows that drastically exceeded pre-developed conditions were dumped into Pine Creek and caused severe stream incision and erosion. This process destroyed critical habitat for the Preble's Meadow Jumping Mouse (PMJM), eliminated the riparian corridor, and dumped massive amounts of contaminated sediments that eventually entered Fountain Creek.

WaterVation developed a hydrologic model for the Pine Creek watershed using EPA SWMM to evaluate peak flows being generated by this highly developed watershed. This involved rainfall analysis; inventory and survey of stormwater detention facilities; and preparation of historical, existing, and future hydrological modeling scenarios to assist with problem identification and design decisions. Stream surveys, geomorphic assessments, and ecologic assessments were then performed for approximately two miles of Pine Creek to locate, and characterize, different impairments within the stream corridor.

Using the results generated from the watershed model and data collected during assessment, WaterVation identified an ideal location for a new detention pond within the watershed that would reduce peak flow rates to pre-developed conditions within the area of Pine Creek that had been damaged the most. WaterVation then prepared final design plans for this new detention pond and stream restoration plans for over 7,500 feet of Pine Creek.

The goal of the stream restoration design was to employ a hybrid channel design comprised of a natural channel restoration approach that worked with the natural tendencies of the stream system and preserved existing vegetation while providing adequate stabilization to protect against catastrophic flood events and to limit the excessive sediment contributions to Fountain Creek from this tributary.

Mesa View Townhomes Drainage Analysis & Design

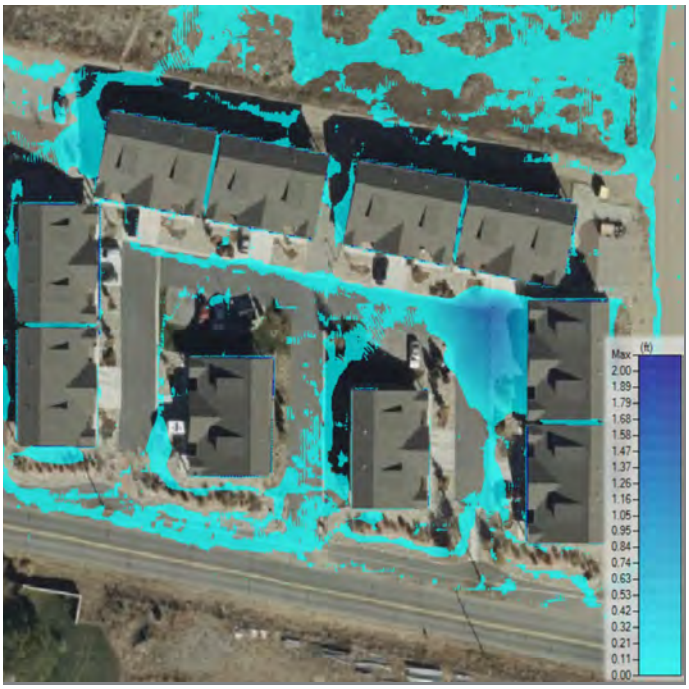
Poncha Springs, CO

Relevance

- Master Planning
- Inventory Assessment
- Stormwater Quality
- Sediment Management

Reference

Jeff Cloutier
Mesa View Town Homes President
303-263-1117
jeff_cloutier@msn.com



The Mesa View Townhomes (MVTH) Homeowners Association (HOA) hired WaterVation to investigate the cause of substantial flooding that occurred on August 4th, 2022, and develop retrofit design solutions to mitigate future flooding.

WaterVation performed an inventory assessment and survey of existing stormwater infrastructure to evaluate the conveyance capacity of the existing system. A rain-on-grid model was then developed using USACE HEC-RAS to evaluate the rainfall and runoff characteristics for several storm events to identify areas at risk of flooding within the development. The results of this analysis were used to prepare retrofit design plans for the existing stormwater system. Additionally, WaterVation designed two bio retention features to help attenuate peak flows, and 2,000 of grass swale to provide infiltration and pollutant filtration prior excess flow being discharged offsite.

Similar Sized Municipalities

WaterVation is located in Salida, Colorado, which is a small rural community with a population of 5,800 people. As such, we understand the "nuances" of working with smaller communities with limited resources. We recognize their need to get high-value for the investments they make in engineering services. Working with smaller communities with limited staff requires all parties to be flexible, wear multiple hats, and constantly communicate. Some of our experience addressing these "nuances" in smaller communities includes:

City of Salida

Working with small communities that don't have established stormwater design criteria, but need state-of-the-practice stormwater quality and LID design criteria to fulfill water quality needs.

City of Creede & Headwaters Alliance

Developing practical, constructable, and affordable sediment management design solutions for the local town engineer (who also drives the snowplow and might also build the sediment basin).

Town of Crestone

Being hired to develop a hydraulic model and prepare flood inundation mapping, but then being asked to write a grant because the only other city staff member resigned.

Qualifications

Qualifications

WaterVation is a small business that was founded in, and is located in, Salida, Colorado. We have been providing water resources consulting services to public and private clients for the past six years. At WaterVation we focus on providing innovative solutions to water resources problems for our service areas of river restoration, watershed planning, hydrologic & hydraulic engineering, stormsystem design, groundwater engineering, water rights, environmental permitting, and surveying.

We are intentionally small with an experienced, flexible, and technical staff. Because of this, the Town can comfort in knowing that the WaterVation staff can immediately provide support or guidance for any challenges the Project may face. Our clients are our partners, and we believe that great collaboration is part of successful project delivery. We care deeply about the unique systems that we work in, and mold our designs towards each individual project's goals. We are constantly striving for excellence in everything we do.

Our Team Members

LB

Principal Water Resources Engineer

Lucas Babbitt will lead our Project team. Lucas has experience in Water Resources Engineering, as well as project management.

18+

Years of experience

MJ

Water Resources Project Manager

Matthew Johnson has experience in hydrologic and hydraulic planning, analysis, and design primarily focused in stream systems.

11+

Years of experience

KB

Water Resources Technician

Kristin Barnett has completed courses for permitting as well as obtaining her FAA Remote Pilot Certificat under part 107.

1

Year of experience

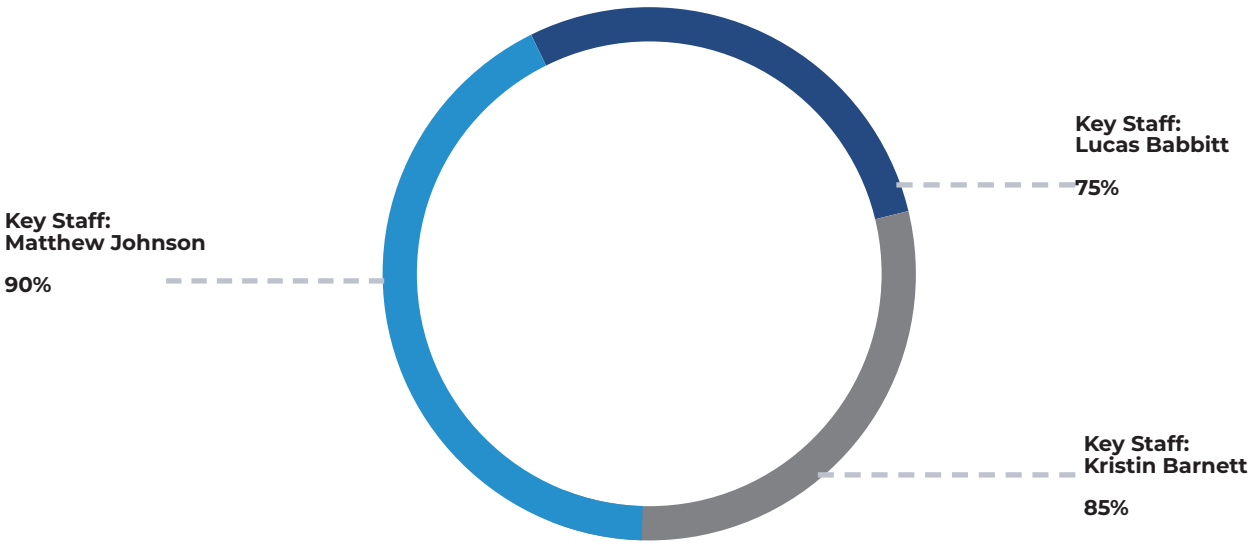
Company Resources

We have found that owning our own equipment eliminates scheduling uncertainties by not having to reserve equipment or trying to use poorly maintained equipment. A list of our survey and assessment equipment is outlined below:

Survey & Imaging

Trimble R8s RTK GNSSS Survey System (base, rover, and TSC3 data collector)	
Trimble R12 RTK GNSSS Survey System (base, rover, and TSC7 data collector)	
Hyside Outfitter 13-foot Raft & Frame Hyside 10-foot Inflatable Kayak	**Ability to Mount with Sonar Mite Echo Sounder**

Our primary resource is our staff and their expertise. As stated in our cover letter we have guaranteed availability to complete this Project for The Town of Grand Lake. For our overall capacity we have allocated our staff towards your Project as shown below.



Key Project Staff Resumes

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EDUCATION

Masters

Water Resources Engineering
Colorado State University

Bachelors

Civil Engineering
Colorado State University

LICENSES

Professional Engineer

Colorado, #42636
Wyoming, #16339
Nebraska, #E-18331

Certified Floodplain Manager

Colorado, #2704

LUCAS BABBITT, PE, CFM

PRINCIPAL WATER RESOURCES ENGINEER

Mr. Babbitt has over 18 years of experience in river and watershed restoration with responsibilities in team management, personnel management, project management, engineering analysis/design, and construction management. He has successfully directed and designed multiple projects including large-scale master plans, dam removal, flood mitigation, and river restoration projects. He has been responsible for managing construction fees up to $7 million dollars and has a proven track record with resource, time, and budget management. He has recently co-authored natural channel design criteria for the Fountain Creek Watershed Flood Control & Greenway District that is being used to implement over $70M in restoration work and is also working as a volunteer with the City of Colorado Springs to develop their stormwater criteria manual.

PROJECT EXPERIENCE

PINE CREEK STREAM RESTORATION

City of Colorado Springs Public Works I Colorado Springs, CO

Project Manager responsible for designing channel restoration improvements for over 7,500 feet of Pine Creek to repair channel erosion and mitigate flooding concerns. Responsibilities included performing stream assessment to quantify existing and reference conditions; hydrologic, hydraulic, and sediment transport modeling; designing 7,500 feet of stream following principles of Natural Channel Design; designing five six-foot tall, grouted boulder drop structures; obtaining Section 404 and floodplain permits; and providing construction oversight.

PINE CREEK DETENTION POND & DROP STRUCTURE

City of Colorado Springs Public Works I Colorado Springs, CO

Project Manager responsible for designing a nine-acre-foot detention pond and a 12-foot tall, grouted boulder drop structure to repair flood damage and prevent future flooding. Responsibilities included hydrologic, hydraulic, and sediment transport modeling; designing a nine-acre-foot detention pond; designing a reinforced concrete box culvert; designing a 12-foot tall, grouted boulder drop structure; obtaining Section 404 and floodplain permits; and providing construction oversight.

TURKEY CREEK WATERSHED WARSSS PLANNING STUDY

Nebraska Game & Park Commission I Kearney, NE

Project Manager for responsible for developing a watershed plan to quantify existing and future hydraulic and sedimentation problems associated with a proposed trans-basin diversion. Work included field assessments to document existing conditions; hydrologic and hydraulic modeling to evaluate changes in hydraulic conditions; sediment transport modeling to evaluate changes in river morphology associated with the diversion; and preparing a summary of recommendations.

FOUNTAIN CREEK CHANNEL STABILIZATION AT RIVERSIDE

El Paso County Department of Public Works I El Paso County, CO

Project Manager responsible for developing stream restoration plans to realign 3,000 feet of Fountain Creek within the City of Fountain to protect adjacent development from being threatened by a 30-foot high, actively eroding, escarpment. Responsibilities included performing stream assessment to quantify existing and reference conditions; hydrologic, hydraulic, and sediment transport modeling; designing 3,000 feet of stream following principles of Natural Channel Design; designing 10 engineered log jam structures; designing aquatic habitat features for the endangered Arkansas darter; obtaining Section 404 and floodplain permits; and providing construction oversight.

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PROJECT EXPERIENCE

GROUNDWATER MODEL & CHEMICAL TRANSPORT

Jackson Hole Airport I Jackson Hole, WY

Project Manager responsible for studying groundwater hydrology for the Snake River Alluvial Aquifer and evaluating chemical transport characteristics for various runway pavement deicing products at the Jackson Hole Airport to determine if site-specific water quality treatment features were necessary. Responsibilities included preparing a groundwater model using USGS MODFLOW USG to establish groundwater elevations; preparing a transient-flow groundwater model to evaluate groundwater flow characteristics for several different snow storage and melting scenarios; developing snow storage and maintenance recommendations to minimize chemical contamination.

CITY OF SALIDA STORMWATER MASTER PLAN

City of Salida I Salida, CO

Project Manager responsible for preparing a stormwater master plan and stormwater design criteria for the City of Salida. Prior to this project, the City of Salida did not have a guiding stormwater master plan or stormwater design criteria in place. The purpose of this project was to develop a comprehensive, and current, stormwater master plan along with stormwater design criteria for use with future design, planning, and construction projects.

A detailed hydrologic model was developed using EPA SWMM to evaluate all of the City's stormwater infrastructure which ranged from large-diameter storm system, inlets, and gutter conveyance and identify areas prone to flooding. This information was used to provide recommendations for further design and evaluation to mitigate flooding issues.

This master plan is currently being used by City of Salida and other stakeholders to implement stormwater improvements, stormwater best management practices, inter-agency coordination, floodplain management, and other land use management practices to reduce stormwater-related impacts to the community.

NORTH CREEDE STREAM STABILITY & FLOOD MITIGATION

Headwaters Alliance I Creede, CO

Project Manager responsible for developing stream restoration and flood mitigation designs for approximately 3,500 feet of Willow Creek in North Creede to repair stream damage caused by flooding and mining activities. Responsibilities included performing a watershed-wide assessment to determine primary sources of sedimentation and flooding; performing stream assessment to quantify existing and reference conditions; hydrologic, hydraulic, and sediment transport modeling; preparing stream restoration designs following the principles of Natural Channel Design; designing embankment protection for the adjacent Bachelor Loop road and hockey rinks; preparing dam removal plans for a historic 10-foot tall dam; designing two sediment basins to reduce downstream sediment delivery; and preparing bridge scour analyses and revetment design at two locations.

MESA VIEW TOWNHOMES DRAINAGE DESIGN

Mesa View HOA I Poncha Springs, CO

Project Manager responsible for preparing a drainage study and design to mitigate flooding within this newly constructed subdivision. Responsibilities included preparing a 2-dimensional hydraulic model to evaluate flood characteristics; designing two bio retention facilities; designing a storm system; designing 1,000 feet of bioswale.

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EDUCATION

Bachelors

Civil Engineering
South Dakota School of Mines & Technology

LICENSES

Professional Engineer

Colorado, #52356
South Dakota, #14500
Washington, #22008488

Certified Floodplain Manager

Colorado, #US-14-07984

Fish Passage and Stream Restoration Design Certification

Washington, #FPT20-49777

MATTHEW JOHNSON, PE, CFM

PE, CFM | WATER RESOURCES PROJECT MANAGER

Mr. Johnson has over 11 years of experience in hydrologic and hydraulic planning, analysis, and design primarily focused in stream systems. He has managed stream restoration projects and served as design lead / assistant project manager on stream restoration projects up to 7 miles in length with construction budgets of $3M. This experience includes construction oversight and implementation of stream restoration/stabilization designs.
Mr. Johnson is experienced in hydrologic modeling, 1D & 2D hydraulic modeling, sediment transport modeling, stream stabilization and restoration design, scour analysis, and erosion countermeasure design. This includes major drainage analysis including FEMA floodplain modeling, mapping, and permitting. His modeling experience includes GIS, HEC-2, HEC-RAS, HEC-HMS, SRH-2D, HY-8, EPASWMM, and XPSWMM.
Mr. Johnson has prepared and lead trainings for SRH-2D and HEC-RAS 2D as well as other hydraulic topics. He has presented his work at ASFPM, EWRI, NHEC, CASFM, and the Rocky Mountain Stream Restoration Conferences.

PROJECT EXPERIENCE

PINE CREEK STREAM RESTORATION

City of Colorado Springs Public Works I Colorado Springs, CO
Lead stream restoration engineer (Reach 1) and responsible for designing channel restoration improvements for over 7,500 feet of Pine Creek. Responsibilities included performing stream assessment to quantify existing and reference conditions; hydrologic, hydraulic, and sediment transport modeling; designing 7,500 feet of stream following principles of Natural Channel Design; designing boulder drop structures; obtaining Section 404 and floodplain permits; and providing construction oversight.

TURKEY CREEK WATERSHED WARSSS PLANNING STUDY

Nebraska Game & Park Commission | Kearney, NE

Project Engineer for the WARSSS study. The overall goal of the study is to determine impacts on the entire watershed to future hydromodification activities. Work includes field assessments, BANCS mapping, geomorphic assessment used to quantify existing baseline watershed conditions. Areas of high risk to were identified. This included a full Predictive Level Assessment of the Oxford WMA, roughly 4,000 feet of full geomorphic channel survey to determine existing impairments and to baseline conditions for future monitoring ahead of potential hydromodification activities.

INDUSTRIAL TRIBUTARY

CORE Consultants | Castle Rock, CO
Matthew Johnson is the WaterVation project manager for this project. His tasks include management of budget and schedule for final design of stream rehabilitation for Industrial Tributary in Castle Rock, Colorado. This project consists of 2,800 feet of channel realignment and design, design of 8 drop structures, and design of 400 LF of boulder wall channel bank protection. This project also required revisions to the Town of Castle Rock FHAD for hydrology and a floodplain modification study. As part of the hydrology revisions the stream stabilization design is streamlined and optimized for cost savings while following stringent Castle Rock criteria. Challenges successfully navigated on this project include shifting priorities due to development changes and rapid changes to project schedule. Permits required for this project include USACE Section 404, Stormwater Management Plan, and Town of Castle Rock floodplain modification study.

MATTHEW JOHNSON

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PROJECT EXPERIENCE

BORDEAUX CREEK AQUATIC HABITAT REHABILITATION PROJECT

Nebraska Game & Park Commission | Chadron, NE

Project Engineer responsible for developing stream restoration designs for approximately 7 miles of Bordeaux Creek in sand hills of Chadron, Nebraska to address streambed incision and a loss of floodplain connection. Responsibilities included performing stream surveys and assessments to quantify impaired and healthy conditions; performing hydrologic, hydraulic, and sediment transport modeling; designing seven miles of stream and aquatic habitat restoration following design philosophies outlined in Process-based Principles for Restoring River Ecosystems (Beechie et al. 2010); designing aquatic habitat improvement features; obtaining Section 404 and floodplain permits; and providing construction oversight.

GUNNISON RIVER RESTORATION

City of Gunnison | Gunnison, CO

Project Manager responsible for developing stream restoration plans for the Gunnison River at Tomichi Park and at the City of Gunnison Park Trail Site. Approximately 1,000 feet of channel geomorphic survey was performed by boat and sonar to characterize the existing conditions, understand stream impairments, and cross-sectional flow conditions. This data was used to bank restoration design and aquatic habitat improvement design. Hydraulic modeling was performed to support the design. Section 404, floodplain permitting, and construction oversight was performed for this Project.

POUDRE LEARNING CENTER RIPARIAN RESTORATION

Poudre Learning Center | Weld County, CO

Project Manager responsible for developing stream restoration plans for 3,200 feet of the Poudre River. For this project WaterVation is the lead stream restoration engineer focused on riverine function and habitat. Work included drone aerial imagery, pond bathymetric survey, and geomorphic survey to characterize the existing stream using the Colorado Stream Quantification Tool. This included a full reference reach geomorphic survey as well. A number of hydrologic, hydraulic, aquatic, and geomorphic parameters were captured and assessed to determine existing impairments and to score potential uplift based on the proposed 60% designs.

FLAT CREEK FEMA PEAK DISCHARGE REVISIONS

Wyoming Game & Fish | Park County, WY

Matthew Johnson is leading a hydrologic study for peak discharge revisions in the Lower Flat Creek Watershed that encompasses all of Jackson, Wyoming. The purpose of this study is to develop a Conditional Letter of Map Revision (CLOMR) based on updated and realistic hydrologic data. This study is also used to support a broader stream restoration project scheduled for construction this fall. Due to construction and grant requirements the study had to be completed in March 2020 to maintain design and construction schedules. Matthew navigated the complex FEMA procedures and tight deadline to deliver the study on time and on budget. The study was accepted by the local floodplain administrator without comment.

CP2 FLOOD MODELING

Kiewit Engineering Group | Santa Clara, CA

WaterVation was hired by Kiewit Engineering Group to support their staff by developing a rain-on-grid two-dimensional hydrologic and hydraulic model to assess flooding conditions at a Project location. Matthew served as the WaterVation Project Manager and completed the modeling for this task. The modeling assesses existing and proposed conditions and determined impacts to flooding patterns and depths at and near the Project site.

CREEDE HAZARD MITIGATION PROGRAM GRANT APPLICATION

City of Creede | Creede, CO

Project Manager responsible for the development of a FEMA HMPG Grant Application for the City of Creede. Three separate projects with multiple stakeholders were combined into a single grant application of around $7 million. This involved data collection, development of all grant materials, and completing a benefit cost analysis (BCA) to support the grant application. Both the HMGP and BRIC Programs were used to submit the grant application.

ORPHAN BOY MINE RESTORATION

Trout Unlimited | Alma, CO

Project Engineer responsible for developing stream and mine restoration plans for the Orphan Boy Mine outside of Alma, CO. This involved topographic data collection to inform the design to provide a natural stream system to convey fresh water flows away from mine tailings into the receiving stream system. Additional ditches, grading, and revegetation plans were developed to preserve water from mine tailings and to restore the Mine site.

KRISTIN BARNETT

WATER RESOURCES TECHNICIAN/
UNMANNED AIRCRAFT PILOT

Kristin has been with WaterVation since May of 2022. She has successfully completed Richard Chinn's Wetland Permitting Training and Wetland Delineation Training. Through this course she is familiar with permitting within the Omaha, Albuquerque, and Sacramento USACE districts. Through that course she is also familiar with the USACE Wetland delineation manual in the Great Plains Region and Western Mountains, Valleys, and Coast Region. She has also successfully completed the Pilot Institue's Part 107 training to obtain her Remote Pilot Certificate from the FAA.
Prior to WaterVation, Kristin spent 13 years as a Certified Athletic Trainer. In addition to being an Athletic Trainer, Kristin was also Metropolitan State University of Denver's Assistant Athletic Director for Sports Medicine, Senior Woman Administrator, and NCAA Health Care Administrator. From that experience she is familiar with managing staff and events, detailed record keeping, maintaining professional standards including OSHA compliance, and timely and effective communication.

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EDUCATION

Masters

Exercise Science
Eastern Washington University

Bachelors

Education
University of Kansas

COURSES & CERTIFICATES

Courses

Richard Chinn's Wetland Permitting Training
Richard Chinn's Wetland Delineation Training
Pilot Institute Part 107

Certificates

FAA Remote Pilot Certificate-Part 107

PROJECT EXPERIENCE

CREEDE HAZARD MITIGATION PROGRAM GRANT APPLICATION

City of Creede | Creede, CO
Assisted the Project Manager with the development of a FEMA HMPG Grant Application for the City of Creede. Three separate projects with multiple stakeholders were combined into a single grant application of around $7 million. This involved data collection, development of all grant materials, and completing a benefit cost analysis (BCA) to support the grant application. Both the HMGP and BRIC Programs were used to submit the grant application.

ABERNATHY RESIDENCE POND RESTORATION

Robert Abernathy | Buena Vista, CO

Water Resources Technician responsible for communicating with USACE to determine correct NWP appropriate for the Project. Completed PCN for permitting purposes and collected data for Wetland Delineation forms.

LION CREEK RESTORATION

Trout Unlimited | Empire, CO

Assisted with survey data collection field work and created an inventory of project area vegetation.

NORTH CREEDE STREAM STABILITY & FLOOD MITIGATION

Headwaters Alliance | Creede, CO
Water Resources Technician responsible for assisting with stream surveys and ssessments for 3,500 feet of Willow Creek in North Creede, Colorado. Responsibilities included performing a watershed-wide assessment following the protocols outlined in Watershed Assessment of River Stability & Sediment Supply (WARSSS) to determine primary sources of sedimentation; performing ecologic assessments; and completing a drone-based aerial and topographic survey for the project corridor.

BORDEAUX CREEK AQUATIC HABITAT REHABILITATION PROJECT

Nebraska Game & Park Commission | Chadron, NE
Water Resources Technician responsible for assisting with stream surveys and assessments for 7 miles of Bordeaux Creek located in Chadron, NE. Responsibilities included performing stream surveys, ecologic assessments, and drone-based aerial and topographic survey for the project corridor.