COMPREHENSIVE WILLOW CREEK WATERSHED PLANNING PROJECT,

FINAL REPORT, DECEMBER 2022

Prepared for:
Colorado Water Conservation Board
Water Plan Grant, awarded May 2020.

Prepared by:
Headwaters Alliance
December 2022

HEADWATERS ALLIANCE
CREEDE, CO

COMPREHENSIVE WILLOW CREEK WATERSHED PLANNING PROJECT

Introduction

The Comprehensive Willow Creek Watershed Planning Project embodies the complex history of anthropogenic impacts to Willow Creek in Creede, CO. Specifically, The Comp Plan focuses on six Objectives with supporting sub-tasks that address issues and needs across the entire Willow Creek Watershed. This approach holistically focuses on integrating community and partner input, infrastructure repair/maintenance needs, data gathering and analysis, engineered designs for several Willow Creek reaches, long-term thinking, and grant administration and management. Past efforts in the watershed have separately focused on projects where individual interests or funding has driven outcomes without an integrated or unified vision. By incorporating various geographical areas and stakeholders into one *comprehensive plan*, Headwaters Alliance has facilitated a collaborative approach to watershed-wide improvements.

Suffice it to say, HWA has led a wildly successful effort, meeting or exceeding all stated Objectives! We have diligently applied CWCB-funds to amplify matched contributions both within The Comp Plan and beyond. We have laid more than just the foundation for next steps, but are engaged in taking the next steps in several project areas.

We have nurtured relationships and collaboration to generate proactive, consensus-based decisions and outcomes. Establishing trust-based partnerships is one of the greatest outcomes of The Comp Plan.

Read on to learn more!

Box 1: Successful Measurable Outcomes

Objective 1:
- Process, process, process!
- The Comprehensive Willow Creek Watershed Planning Project Final Report

Objective 2:
- The Willow Creek Inventory

Objective 3:
- Water Quality Sampling and Summary of Findings
- Willow Creek Water Quality Databank
- Report: Visualizing the Future of the Willow Creek Watershed

Objective 4:
- 30% Conceptual Design for North Creede Stream Stability and Flood Mitigation by WaterVation, PLLC

Objective 5:
- Report: Visualizing the Future of the Willow Creek Watershed

Objective 6:
- Community-vetted, HWA-approved 60% Design for Stream Restoration of Lower Willow Creek Floodplain

Background: Sitting within the heart of the Historic Creede Mining District and flowing through the center of the City of Creede, Willow Creek was used and abused during 95 years of active mining - this included moving the creek multiple times, using the creek as dumping ground and passage for waste materials, and more. When mining ended in 1987, Willow Creek became the focal point for a new range of activities including community-led reclamation work from legacy mining impacts, to the establishment of the Nelson Tunnel Commodore Waste Rock Superfund due to the 300 gpm of acid mine drainage that continually enters the Creek, and more recently as a busy corridor for recreationalists of all types.

1997 brought together a truly phenomenal group of residents at the request of City and County government to provide counsel on how to best respond to the many legacy mining impacts within the watershed. This group became the ad hoc volunteer organization known as the Willow Creek Reclamation Committee. In the words of long-time WCRC president, Zeke Ward:

> "We told CDPHE that we wanted them to give us the opportunity to implement local solutions for Willow Creek. We told them, 'We won't do it the same as you would, we will start from the top of the watershed and work our way down, but we will do it for less money and in good time."

And with that, 25 years of community-led reclamation work was begun. Indeed, the Creede community is no stranger to active community engagement, evident in the body of good works achieved by WCRC. Like the WCRC, HWA has adopted an integrated view of projects within the Willow Creek watershed.

Catalysts for The Comp Plan

The Comprehensive Willow Creek Watershed Planning Project emerged out of three separate, yet connected events. The first is the long-term and ongoing contamination of Willow Creek from the Nelson Tunnel/Commodore Waste Rock Superfund Site. Next, a late Spring high-water runoff event in 2019 that caused significant damage to the very recently completed restoration of the legacy mining site, the lower Willow Creek floodplain. Last and not least, the multi-year partner project with CWCB's Flood Protection Program to submit a Letter of Map Revision to FEMA for Willow Creek; this last project served as a template for the value of process over time to complete important work.

View of Nelson Tunnel/Commodore Waste Rock Superfund Site, Creede, CO

It is both the specifics of each of these events and the ways in which they interact with each other that inspired the framework for the Comprehensive Willow Creek Watershed Planning Project.

Early in 2019, Wood Environment and Infrastructure presented the Draft *CHAMP Phase III, Mineral County, Hydrologic Analysis Report* for community review, resulting in further analysis and data collection to validate the recommended 100-year flow volume for Willow Creek. Simultaneously, HWA - with CWCB support, was working with the City of Creede to complete an investigation of the levee on Willow Creek to be a part of the eventual LOMR application for Willow Creek. The processes by which data was analyzed and revised while the levee investigation was paused to allow completion of the hydrologic analysis provided an excellent example of the importance of "doing steps in order," and in inviting people/groups back to the table over and over again to ensure rigorous and valid outcomes. While the completion of the LOMR was not expressly an Objective of the The Comp Plan, both the process and the data gleaned have deeply informed this project.

Likewise, in placing the Nelson Tunnel/Commodore Waste Rock Superfund Site on the National Priorities List in 2008, Mineral County/Creede entered into a longtime relationship with the EPA. As will be explored in Objective 3, the EPA's question to Creede:"What do we - the community - want for the Willow Creek watershed?" is also be a long-term exploration as new data, technologies and leadership emerge.

The final catalyst was the 2019 late Spring high-water runoff event that significantly impacted both North Creede and the lower floodplain. Given the impacts to the lower floodplain - complete abandonment of the sinuous, single-stream channel, an estimated erosion of 18,000 cubic feet of sediment into the Rio Grande and significant property damages, there were initially all of the questions of "Why?", "How come", "Who's fault?". These are not unreasonable questions. They are, however, the kinds of questions, that when asked to the litigious-minded can arrest identifying and implementing a solution. As a community-based watershed organization, HWA sought a more effective pathway. One that would necessitate transparency among less likely partners, establish formal checks and balances in decision making including an obligation to respond, in full, to community feedback, and if appropriate be willing to revise where feedback, insight and new BCD indicated. More directly, we sought to disrupt the usual power structures by asking Willow Creek stakeholders to abide by the precepts of The Comp Plan.

Central to The Comp Plan is the concept of *comprehensive,* as a deep dedication to both the understanding and the practice that everything is connected in one way or another; that it is our responsibility to make as many connections visible and accessible as possible, to share this information with all possible stakeholders, and to practice what we preach. The Comp Plan embodies the practical and principled objectives that represent comprehensive and collaborative action to benefit Willow Creek.

Gratitude for Partnerships: At the heart of the success of The Comp Plan are the individuals and organizations that shared their skill and expertise, patience and persistence, integrity and humor. Truly, this was a multi-partner, multi-funder project, made stronger by the input, insight and inspiration of many excellent individuals, see Box 1 for a list of all supporting stakeholders. It should be noted, that partnership does not always equal perfect agreement, or result in consensus. Occasionally, it required sitting within differing views, listening and considering. As will be seen, we have left a few conversations on the table to be resolved when the time is right.

While HWA accepts all responsibility for errors, omissions or oversights in The Comp Plan - both project and final report, we must emphasize that we could not have completed this work as well as we have without the aid of several key people.

Jason Willis, P.E., with Trout Unlimited's Abandoned Mine Lands Program offered endless generosity of expertise augmented by a calm, centered approach in solving conflicts. His deep knowledge of abandoned mine lands ensured that we did not miss relevant needs related to the Willow Creek watershed. The partnership between HWA and TU modeled the power of true collaboration - where the results are amplified through a genuinely synergistic process.

We could not have achieved such success without the support of our CWCB Project Manager, Kevin Houck, Watershed and Flood Protection Chief. Kevin's tireless efforts to bring the LOMR to completion, and to work within the realities of the low-resource, rural landscape of Creede were fundamental to our success.

Box 1: The Comp Plan Partners, Collaborators and Invaluable Resources

City of Creede, Administration and Trustees
Mineral County, County Manager and BOCC
American Forest
CDPHE, Hazardous Waste Materials
CDPHE, Water Quality Control Division
CPW, MinCo Hatchery State Wildlife Area
CPW, RiverWatch
Colorado Water Conservation Board
Colorado Watershed Assembly
DNR, Division 3 Water Resources
EPA
EPA Superfund Redevelopment Program
Legacy Willow Creek Reclamation Committee
Lower Willow Creek Restoration Company
Matrix Design Group
Mineral County Fairgrounds Association
Mountain Views RV Resort and Park
National Fish and Wildlife
Skeo Solutions
Rio Grande Headwaters Land Trust
Rio Grande Basin Roundtable
Rio Grande Water Conservation District
Trout Unlimited Abandoned Mine Lands Program
University of Colorado, School of Public Health
WaterVation PLLC

The Comprehensive Willow Creek Watershed Planning Project Final Report.

The Comp Plan Final Report will report on the status of all specified measurable objectives. There is much to celebrate, so hold onto your hats! It is intended that this report be useful, whether in it's entirety or in it's constituent parts; whether for future grant writing, project development, documenting past history, etc. It will reach to reveal the connections between various elements of the project, to tell the story about the complex nature of engaging in a comprehensive processes when undertaking multi-variable projects within a complete watershed.

The Final Report will not rewrite that which can be readily found in other sources, therefore it presumes a certain amount of familiarity with Creede and Willow Creek. One of the primary objectives of The Comp Plan was to reduce duplication of effort by identifying if, and if-so where, other relevant information, data, and or design existed so as to utilize these many existing works rather than rewrite them. As it is, the original grant application to Colorado Water Conservation Board (CWCB) describes The Comp Plan in it's entirety, including the Objectives, Tasks and Deliverables.

There were 7 Objectives within the original scope of project. This report will provide a summary of activities related to each articulated Task, followed by an Appendix listing all the direct measurable outcomes - i.e. reports, engineered design plans, etc. - related to each Task and Objective. The full Appendix is attached as a zipped file to CWCB.

Acronyms

Best Current Practices	BCP
City of Creede	City
Colorado Department of Public Health and Environment	CDPHE
Colorado Water Conservation Board	CWCB
Colorado Watershed Assembly/Healthy Rivers Fund	CWA/CHRF
Comprehensive Willow Creek Watershed Planning Project	The Comp Plan
cubic feet per second	cfs
Division of Water Resources, Division 3	DWR
Federal Emergency Management Agency	FEMA
FEMA Hazard Mitigation Grant Program	FEMA-HMGP
gallons per minute	gpm
Headwaters Alliance	HWA
Letter of Map Revision	LOMR
Lower Willow Creek Floodplain	lower floodplain
Lower Willow Creek Restoration Company	LWCRCo
Matrix Design Group	Matrix
Mineral County Board of Commissioners	MinCo BOCC
Mountain Views RV Resort	MVRV Park
National Fish and Wildlife	NFWF
Nelson Tunnel/Commodore Waste Rock Superfund Site	NTCWR Site
North Creede Stream Stability and Flood Mitigation	North Creede reach
Request for Proposal	RFP
Rio Grande Basin Roundtable	RGBRT
RGBRT-Basin Implementation Plan	RGBRT-BIP
Rio Grande Silver	RGS
United States Environmental Protection Agency	EPA
Trout Unlimited	TU
United States Forest Service	USFS
University of Colorado, Colorado School of Public Health	CU Anschutz
Voluntary Cleanup Plan	VCUP
Wason Ranch Corp.	Wason
WaterVation, PLLC	WaterVation
Water Quality Control Division, CDPHE	WQCD
Willow Creek Reclamation Committee	WCRC
Willow Creek Watershed	Watershed
Wood Environment and Infrastructure Inc.	Wood

COMPREHENSIVE
WILLOW CREEK WATERSHED
PLANNING PROJECT

Objective 1

Partnership, Facilitated Collaboration and Final Report

Objective 1: The central focus of Objective 1 was to facilitate a multi-pathway process of partner and community engagement through both professional and community based facilitation. We operated from the belief that thorough, consistent engagement with the variety of stakeholders would build trust and collaborative relationships and in turn, improve the quality of decision making, and ultimately refine project outcomes.

The tangible deliverable for Objective 1 is this final report. Equally important were the processes whereby we completed this and every other objective within The Comp Plan. Simply stated, the process is both a potent deliverable in-and-of-itself and lays the foundation for future efforts to continue implementing *comprehensive* projects - in practice, ethic and application.

Outcomes

TASKS 1.1, 1.2 & 1.3: Process, Process, Process

An effective process is predicated on active participation by key stakeholders. For the purposes of The Comp Plan, stakeholders include the many individuals, municipalities, organizations, businesses and other regional and state entities with a proactive interest in Willow Creek. Partners are those prominent stakeholders with power, authority, responsibility, claims to ownerships and/or are the direct benefactors of outcomes. Community members, individually and as a unique, collective voice, were also valued as prominent stakeholders

Headwaters Alliance offered many pathways for participation including:

1. Objective-specific work groups for Comp Plan Objectives 2-6. While work groups were open to the public, core membership was solicited from both local and subject-matter experts specific to each objective. In an effort to maximize participation, we thoughtfully scheduled meetings, clearly articulated agendas, goals and expectations for contributions. The efforts of the Creek Criteria Group had practical application across all objectives, while information obtained from the Water Quality Databank/Obj 3, North Creede/Obj 4, Flume/Obj 5 and Floodplain/Obj 6 offered reciprocal context and integration of risk assessment and prioritized mitigation activities to *The Willow Creek Inventory*/Obj 2, see Box 1.1. Work groups enabled completion of all deliverables across all other Objectives.

Objective 1:
Partnership, Facilitated Collaboration and Final Report

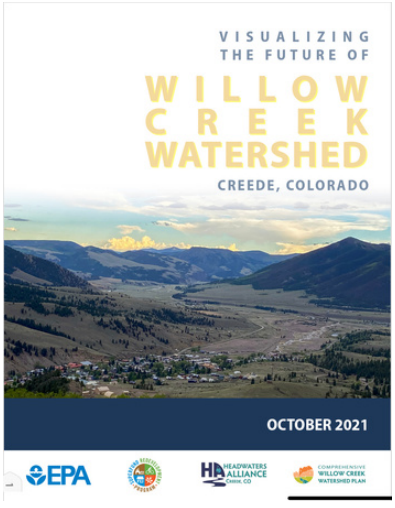
Work Group Engagement / Work Groups	Objectives					
	OBJ 1: Processes to support partnerships, collaboration and projects	OBJ 2: Willow Creek Inventory	OBJ 3: Thinking about Water Quality and Nelson Tunnel Superfund Site	OBJ 4: North Creede Stream Stability and Flood Mitigation	OBJ 5: Conceptual future for the Flume	OBJ 6: Lower Willow Creek Floodplain Stream and Floodplain Restoration
Creek Criteria						
Water Quality						
North Creede						
Flume						
Floodplain						

Box 1.1: Contributions of Work Groups to each Comp Plan Objective

2. The structure and design of The Comp Plan garnered the support by the Nelson Tunnel Superfund Site Project Team Leader, who offered active support to Comp Plan objectives through the EPA Superfund Redevelopment Program. Specifically, EPA-SRP aided in creation of the Annotated Bibliography of key documents in the Willow Creek Library, and in providing professional facilitation to address the Obj 3 question, "What are our most key high level goals for the Willow Creek Watershed downstream from the Nelson Tunnel/Commodore Waste Rock Pile Superfund Site."

This process resulted in a report, *Visualizing the Future of Willow Creek Watershed* (HWA, EPA, EPA Superfund Redevelopment Program, 2022), See Box 1.2. This was a two-year, two-phase focus-group process - 10 zoom gatherings total, facilitated by Skeo Solutions - to generate community-informed maps focused on economic, housing and recreational reuse and redevelopment within the Willow Creek watershed.

The result is a powerful community development document that informs all facets of The Comp Plan and can function as a powerful fundraising tool to support future efforts.



Box 1.1: *Visualizing the Future of Willow Creek Watershed*, by HWA, EPA and EPA Supefund Redevelopment, 2022.

***Visualizing the Future of Willow Creek Watershed* informs every objective in The Comp Plan!**

- Obj 1 - Professionally facilitated community engagement, supports all other Objectives & Tasks.
- Obj 2 - Formal community engagement functioned to both inform and be informed by *The Willow Creek Inventory* process and final report.
- Obj 3 - Seeks to answer the question: "What do we - the Creede community - want for Willow Creek Watershed?"
- Obj 4 - Maps community vision for environmental and recreational uses in North Creede.
- Obj 5 - Maps community vision for reuse and redevelopment of flume.
- Obj 6 - Maps community vision for environmental and recreational uses on lower floodplain

3. The Comp Plan served to further strengthen the habits of collaboration, partnership and leveraging resources between the City of Creede and HWA. Consistent attendance and participation by HWA at City of Creede Board of Trustees bi-monthly meetings enabled makingpublic announcements about upcoming events, making formal presentations and/or seeking formal approval from the Trustees for specific Comp Plan project elements.

   Key presentations to the Ciy included:

   - Frequent updates regarding the process for closing out the LOMR on Willow Creek. While the completion of the LOMR was not a specific objective of The Comp Plan, the process by which it was completed - including the rigorous analysis and by the excellent engineers from Wood, tireless support from the CWCB Watershed and Flood Protection Office and the persistent cheerleading by HWA, have both deeply informed the ensuing processes within The Comp Plan and provided the most singularly applied Best Current Data to inform all other projects. Indeed, flood mitigation is central to every other facet within the Comp Plan and especially the North Creede reach of Willow Creek.
   - Process and content updates, followed by a formal invitation to utilize the *The Willow Creek Inventory*.
   - Review and formal approval for baseline criteria to be included in RFPs for North Creede and Floodplain designs.
   - Multiple presentations by WaterVation and Matrix regarding the North Creede and Floodplain designs, allowing time for questions and discussions, and eventually leading to formal votes of approval by Trustees on both designs.
   - Formal approval of Resolution to Approval of City of Creede Flood Mitigation Infrastructure Plan, prepared by HWA.

4. Monthly participation as the MinCo representative to the Rio Grande Basin Roundtable, including active participation in the Environmental/Recreation subcommittee for the Revised 2022 Basin Implementation Plan for the Rio Grande Basin. The Comp Plan received unanimous support from the RGBRT in 2020, and both the North Creede Stream Stability and Flood Mitigation/Obj 4 and Lower Willow Creek Floodplain Stream and Floodplain Restoration/Obj 6 are identified as priority projects in the 2022 Revised RGBRT 2022 Basin Implementation Plan.
5. Active, ongoing and consistent communication with our community. This included using newspaper, social media, City meetings, posters, etc. to share news of public events, volunteer opportunities, education and other news worthy articles. Please see the Appendix for an overview of articles found in the Mineral County Miner over the funding period.
6. Public Events! Given the enforced solitude of Covid-19, the HWA 4th Annual Picnic in September, 2020 was a welcome event to reconnect and learn about The Comp Plan, see Box 1.2.

Objective 1:
Partnership, Facilitated Collaboration and Final Report

Box 1.2: 4th Annual HWA Annual Picnic, September 2020

It might have been the free beer and brats, or the idea of standing together in a field after the first 6months of Covid lock-down, or that the majority of summer seasonal visitors had departed Creede, but the HWA 4th Annual Community Picnin was a well-attended opportunity. After taking the time for group introductions and Reintroductions, HWA shared news and progress regarding The Comp Plan. Folks were able to learn more at four info stations from HWA Board Memberswhile still social distancing.

TASK 1.4: The Comprehensive Willow Creek Watershed Planning Project Final Report

The Comp Plan Final Report will report on the status of all specified measurable objectives. There is much to celebrate, so hold onto your hats! It is intended that this report be useful, whether in it's entirety or in it's constituent parts; whether for future grant writing, project development, documenting past history, etc. It will reach to reveal the connections between various elements of the project, to tell the story about the complex nature of engaging in a comprehensive processes when undertaking multi-variable projects within a complete watershed.

The Final Report will not rewrite that which can be readily found in other sources. One of the primary objectives of The Comp Plan was to reduce duplication of effort by identifying if, and if-so, where certain other relevant information, data, and or design existed so as to utilize these many existing works rather than rewrite them. As it is, the original grant application to Colorado Water Conservation Board (CWCB) describes The Comp Plan in it's entirety, including the Objectives, Tasks and Deliverables.

Objective 2

Willow Creek Inventory

Project Objective 2: **The three tasks in Objective 2, the Willow Creek Inventory and two others that were initially considered time-sensitive actions, are excellent examples of the dynamic interaction between process and tangible outcome.** *The Inventory* establishes the foundation for the "comprehensive" thinking, planning and implementation that informs the remaining Comp Plan Objectives. In fact, many of the subsequent objectives could only follow upon the completion of the inventory process.

Outcomes

TASK 2.1: *The Willow Creek Inventory*

The Willow Creek Inventory exemplifies the synergy between process and outcome. The final product - report and it's many supporting elements, (Table 2.2), achieve the key goals of this objective, (Box 2.1).

There was the process – we reviewed and evaluated more than 20 plus years of resources, materials and documents related to Willow Creek, as well as engaged with the diverse membership of the Creek Work Group to "inventory" institutional knowledge and oral histories regarding reclamation work in Creede. This was especially relevant given the incredibly effective body of work completed by the local volunteer organization, Willow Creek Reclamation Committee (1997 - 2018) that sought to maintain local authority and leadership in restoring legacy mining impacted sites within the watershed.

The review process was both structured and dynamic. We hosted meetings with the explicit intent of soliciting input and insight from Creek Criteria Work Group partners. We also found that as information came to light that new questions arose necessitating revisiting previously held assumptions (as will be evident in Objectives 2.2 and 2.3), and even adding new materials and revisions Best Current Data.

The final outcome, *The Willow Creek Inventory*, includes many elements, as outlined in Box 2.2. The report itself, provides an overview of the history of the

Box 2.1:
Key Objectives of The Inventory

- Make resources publicly accessible.
- Proactively share resources.
- Establish shared understanding and acceptance of baseline criteria for all projects within the watershed.
- Identify and prioritize future needs.
- Promote holistic thinking, collaboration and long-term solutions.
- Lay the foundation for other efforts within The Comprehensive Willow Creek Watershed Plan.

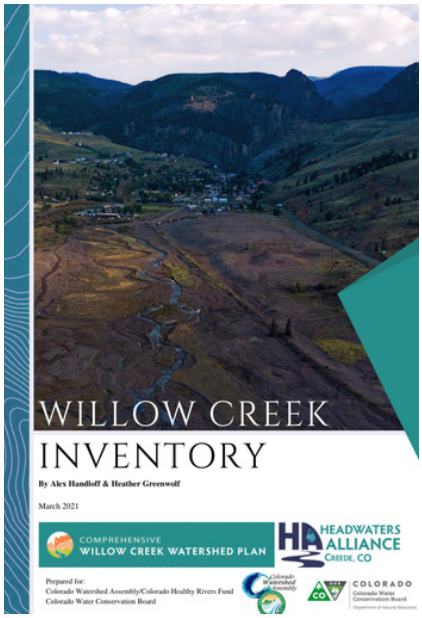
Objective 2

Willow Creek Inventory

Creede Mining District, current conditions and projects, risk assessment, and suggestions for mitigation strategies going forward, as well as additional materials and resources, i.e. Willow Creek Library, etc.

Box 2.2: Components of the *The Willow Creek Inventory*

- Complete report, ***The Willow Creek Inventory***, including summary of conditions, current projects, risk identification and mitigation planning.
- **Willow Creek Library**, including an annotated bibliography and complete PDFs of key documents.
- **Willow Creek Water and Soil Quality Database**, (see Objective 3).
- Story map: History of Mining in Creede
- Interactive systems map: Nelson Tunnel/Commodore Waste Rock Superfund Site.
- Oral histories, in process.
- New materials and resources are added as they become available.
- All materials available at headwatersalliance.com.



Cover Page: ***The Willow Creek Inventory, 2020.***

The final step was to actively inform our partners that a well-organized, user-friendly resource was publicly available in an effort to increase continuity in decision making across all projects. Real-time examples, include:

- Uniformly applying the 2019 CHAMP III hydrologic analysis 100-year flood values to all projects.
- Staged construction of lower floodplain design to meet top-tier risks while continuing to work with landowners on meeting individual needs while still prioritizing ecological approach.
- Civic planning to attend the number one identified risk in *The Inventory* - water security and climate change.

Box 2.3:
Creek Criteria Work Group

City of Creede
Mineral County
WCRC HWA
LWCRCo TU
Wood. CWCB
USFS
Other subject-matter experts

Special Thanks to:
EPA Superfund Redevelopment
Colorado Healthy Rivers Fund

The outcome of *The Inventory* is circular, the Creek Criteria Work Group, Box 2.3, enabled the process of the inventory, while the formal outcome, *The Inventory* is a tool for these same partners and entities. Truly, the hope for the Willow Creek Inventory and Library is to build more than a library, archive and dataset, but to nurture an informed community of wise decision makers able to face the complexities posed by a changing climate.

Task 2.2: Repairs to Grizzly at Amethyst 5 Mine

In working through the inventory process – particularly in discussion with Mineral County Board of Commissioners and Road and Bridge Crew, it was determined that the planned direction for installing a new grizzly within the current configurations of the site would result in a similar outcome overtime and was not the best course of action (See photos 2.1). Rather, HWA, with review by CWCB project manager, decided to including a request for conceptual approach for the Amethyst 5 grizzly into the Request for Proposal for North Creede Stream Stability and Flood Mitigation (Objective 4).

Photos 2.1
Left: WCRC volunteers cleaning out the grizzly at Amethyst 5 Mine on June 5, 2019 - two days before onset of high water.

Above: 2019 Spring runoff caused the grizzly to buckle and fall into creek, decking boards torn away. All debris able to pass downstream.

Given the vulnerability of this site, as a bottle neck below a steep, narrow, densely wooded canyon, and above a deep, walled-canyon with capped waste rock lining the stream bank, it was determined that a new approach could more reasonably result in long-term stability with less maintenance cost, and better address the associated debris and sediment threats identified in The Inventory.

As noted in Objective 4/North Creede Stream Stability and Flood Mitigation, a recommendation was made in the 30% Conceptual Design by WaterVation, LLC to be further refined in the final plans.

TASK 2.3: Operable Stream Gage on Willow Creek

As with the grizzly, the process of working through reports and partner conversations as part of the inventory resulted in including a request for conceptual approach for a stream gage on Willow Creek into the Request for Proposal for North Creede Stream Stability and Flood (Objective 4). There were many key variables that informed the decision to seek a more thorough engineered solution including:

Objective 2

The Willow Creek Inventory

- Updated *CHAMP Phase III*, *Mineral County*, *Hydrologic Analysis Report*, Wood, 2019), revised floodway maps for the City of Creede, and the 2022 FEMA-approved LOMR for Willow Creek.

- Ongoing possibility for the return of active mining to Creede by Rio Grande Silver at the Bulldog Mine. This would significantly alter flow volumes in Willow Creek via several mechanisms, including initially increased flows out of Windy Gulch while the Bulldog is de-watered; resulting in a subsequent drop in water volume out of the Nelson Tunnel. Should RGS resume operations it is anticipated that DWR would be more likely to manage and monitor a stream gage on Willow Creek. The stream gage siting and setup will benefit from accounting for these variables in greater detail.

- The City of Creede is actively developing two additional projects on Willow Creek. The first is Phase 2 resurfacing of the flume which will complete long-overdue maintenance to flume by applying shotcrete to the upper 2/3rds of the flume; expected to be completed in Spring 2023. The second is the installation of a low-flow micro hydro-electric system in the flume. The hydro-electric system is being design by Rentricity, Inc. HWA has actively facilitated team meetings between Rentricity and WaterVation, the engineering team for North Creede Stream Stability and Flood Mitigation, and Matrix Design Group, the engineering team for the Lower Floodplain, to ensure that all these engineers work collaboratively to integrate these various projects where they may overlap.

Again, the process of working through inventory resulted in a more comprehensive approach to the installation of a stream gage on Willow Creek. It has functioned to make each individual entity more aware of the potential overlapping needs and infrastructure complexities, while also mobilizing more expertise in devising the final solution.

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Objective 3:

Creating an Informed Community Vision for the Nelson Tunnel/Commodore Waste Rock Superfund Site

Project Objective 3: The EPA has asked the community in specific terms, "What are our most key high level goals for the Willow Creek Watershed downstream from the Nelson Tunnel/Commodore Waste Rock Pile Superfund Site."

To this end, the four tasks of Objective 3 are intended to empower our community with the necessary data, analysis, and resources to inform the ongoing community dialogue with the EPA to find an acceptable solution to the ongoing contamination by acid mine drainage into Willow Creek. This is a long-term endeavor.

Outcomes

TASK 3.1 & 3.2: Assessment of Benthic invertebrates and Water Quality in Willow Creek, including a report on baseline conditions to determine acceptable water quality standards.

Trout Unlimited conducting two sampling events during low-flow in September 2020, consisting of five water quality samples and five macroinvertebrate samples at five locations. Additionally, HWA maintains a quarterly water quality sampling program at an additional eight sites throughout the watershed. Ongoing sampling of Willow Creek is necessary for the following reasons:

- To function as a check and balance to EPA findings.
- To establish pre-construction water quality conditions in the designated projects areas of North Creede, flume and lower floodplain, and to aid in establishing a monitoring and observation activities post-construction.
- To ensure water quality meets the existing Temporary Modifications for Rio Grande Segment 7, which includes both Willow Creek and the Rio Grande, as defined by WQCD.
- To ensure access to up-to-date current data in relationship with temperature rise, alterations in precipitation and other climate variations.
- To maintain an up-to-date data in the newly developed Willow Creek Water Quality Databank to ensure it remains a relevant and effective tool.

Trout Unlimted generated a summary of findings based on their sampling events to describe current conditions and how future Superfund and/or reclamation activities could

improve these parameters, see the Appendix for full report. While a summary of findings can only describe a point-in-time, there is considerable value to the community in determining if current conditions fall within the current Temporary Modifications to the reach, and concur with the EPA's *Remedial Investigation Addendum, 2019* for the NTCWR Superfund Site.

In summary, results from TU's sampling events in 2020 indicated the following:

- Copper levels fell below the level of detection.
- Cadmium, lead and zinc all fell below the standards for low flow chronic conditions as determined by WQCD.
- Cadmium, lead and zinc all fell at the low end of the ranges identified for each within the EPA's Remedial Investigation Addendum, 2019
- Flows from East Willow Creek notable reduce levels of metals contamination downstream of the confluence of East and West Willow.
- Remedial action at the NTCWR Superfund Site could improve water quality conditions of Willow Creek.

In short, these findings confirm what we know, including the plausibility of a improving water quality conditions.

TASK 3.3: Integration of all water quality data on Willow Creek into a single, accessible data-base.

The creation of the Willow Creek Water and Soil Quality Databank has been one of the most exciting elements of The Comp Plan. While many government entities have been collecting water quality data from Willow Creek in the aftermath of the mining closures in the late 1980s, the local volunteer organization, Willow Creek Reclamation Committee initiated a rigorous water quality sampling program so to inform local solutions to legacy mining sites. Much like the above TU summary, the WCRC revealed site specific contamination, but the data was never collated into a single dataset and/or analyzed more broadly. In establishing the Willow Creek Water Quality Databank, HWA is completing a long-time goal of our predecessor organization, WCRC. It is our hope that the Databank will generate new research and ideas to identify alternative remedies and approaches for resolving heavy metals contamination into Willow Creek.

At the onset of the project, HWA brought together many of the state's experts to provide insight and guidance to the project, see Box 3.1 for Water Quality Work Group.

Box 3.1: Water Quality Criteria Work Group

CDPHE - Water Quality Control Division
CPW - River Watch Director
CU Anschutz
HWA Staff and Board
Lower Willow Creek Restoration Company
Legacy members, WCRC
NTCWR Superfund Site Project Manager
Rio Grande Silver
Trout Unlimited

HWA was fortunate to establish a partnership with Dr. Katherine James, Colorado School of Public Health at the University of Colorado. Dr. James and her team led the effort to consolidate the more than 6000 records - some digital, many on paper - into a four discrete databases within the larger databank, see Box 3.2 for databank overview. This has been a monumental effort, enhanced by rigorous quality control and quality assurance practices that are fully outlines in the associated Databank Report.

Box 3.2: Willow Creek Water and Soil Quality Databank includes:

- More than 6000 records, covering over 50 years.
- Records from surface water, groundwater, sediment, and soil (with geolocation).
- Geographical area includes Willow Creek Watershed and Rio Grande from Marshall Park to South Fork.
- Key sources of data include government agencies, local mining interests, local watershed groups, and several smaller studies.
- Publicly accessible via request to HWA, as a series of excel files.
- Databank will be publicly available on HWA website in early 2023 as a query based system allowing users to generate real-time maps, graphs and charts. This is only made possible by our collaboration with the University of Colorado.
- To be updated with new data semi-annually or annually as indicated.
- Rigorous quality control, quality assurance process, including Willow Creek Water Quality Databank Report and Guide.

HWA was fortunate to establish a partnership with Dr. Katherine James, Colorado School of Public Health at the University of Colorado. HWA engaged Dr. James and her team to lead the effort to consolidate the more than 6000 records - some digital, many on paper - into a four discrete databases within the larger databank, see Box 3.2 for databank overview. This has been a monumental effort of tracking down data, entering it into the databank, then validated by rigorous quality control and quality assurance practices that are fully outlined in the associated Databank Report.

Additionally, Dr. James brought additional resources to support this goal. The databank will be publicly accessible on the HWA website, offering users a query-based system that will generate real-time maps, graphs and charts. This dovetails perfectly with the broader goals for creating the databank. First and foremost, it will be accessible to inform community members as to water quality conditions in relationship to the existing Temporary Modifications and EPA ranges. We hope that this will galvanize informed interest by the community itself.

Additionally, we will invite academics and researchers to more fully utilize the data in our efforts to identify a reasonable remedy for water quality improvements in Willow Creek. By having community ownership of such a powerful data set, we are interested in considering remedies that may exist outside or in addition to the scope of the EPA at the NTCWR Superfund Site.

Objective 3:
Creating an Informed Community Vision for the Nelson Tunnel/Commodore Waste Rock Superfund Site

Task 4: Solicit feedback from community and Town of Creede regarding goals and objectives for the watershed.

As noted in Obj 1, The Comp Plan benefitted from active support from the EPA Superfund Redevelopment Program. This was because the structure of The Comp Plan - seeking to respond to challenges in an integrated manner, particularly related to flood mitigation, aligned with concerns by the NTCWR Site Team. In the aftermath of the Gold King Mine event in Silverton, CO in 2015, the EPA has become more proactive about preventing the sudden release of a large volume of water from happening again.

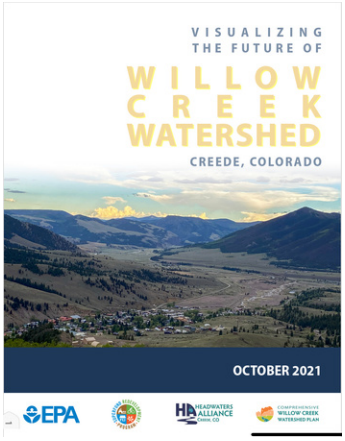
Meanwhile, the NTCWR Site is currently impounding an estimated 20 million gallons of water. A sudden release of this water could have a devastating impact on downstream sites, ranging from a fish-kill event in the Rio Grande to flood damages to homes and businesses in the City of Creede. The Comp Plan's careful attention to applying BCD for 100-yr flow levels across all projects will potentially limit harms from a sudden release of a large volume of water from the Nelson Tunnel. While it is impossible to officially collaborate with the EPA, it is very possible to recognize shared needs and to resolve these issues where one can. The Comp Plan offered such an opportunity, the mindset of being comprehensive allowed us to address very real concerns both within and beyond the official operable boundaries of the Superfund Site. The result of this approach was a professionally facilitated community process resulting in the report, *Visualizing the Future of Willow Creek Watershed* (HWA, EPA, EPA Superfund Redevelopment Program, 2022), See Box 3.4.

This was a two-year, two-phase community-based process that resulted in community-informed maps focused on economic, housing and recreational reuse and redevelopment within the Willow Creek watershed downstream of the Nelson Tunnel. Phase one interviews revealed five themes, see Box 3.3.

Box 3.3: Community-defined themes for Redevelopment and Reuse in Willow Creek

- We want to grow a thriving community, but we don't want to loose our quirky, neighborly, small-town, local character.
- We want healthy tourism without harming the pristine wilderness of our beautiful mountains and the Rio Grande. We don't want Creede to be "loved to death."
- We want to be prepared for the changing climate, despite lacking clear consensus of the anthropogenic catalysts causing climate change.
- We value a healthy quality of life for the people who live and work in Mineral County. We want people to earn a liveable wage, have access to health care, and live in warm, energy efficient housing, but appear politically hamstrung to identify an equitable, inclusive solution.
- We wrestle with the question: "Are there are reasonable limits to development, and if so, what they are?"

The second stage of community interviews - again facilitated by Skeo Solutions focused on refining and locating the more specific ideas identified in round one. There were 5 different time slots for community members to attend to ensure a wide spectrum of participation. Skeo generated large format maps that were hung in prominent locations throughout the community, allowing several weeks for community review. Feedback was integrated into the final report.



Box 1.1: ***Visualizing the Future of Willow Creek Watershed*****, by HWA, EPA and EPA Supefund Redevelopment, 2022.**

Box 3.4: Components of
Visualizing the Future of Willow Creek Watershed

- Re-development and reuse maps of the City of Creede, locating community recommended ideas for recreational, economic and housing development downstream of NTCWR Superfund Site.
- Identifies current development efforts, including The Comp Plan, highlighting potential for project integration.
- Identifies possible funding strategies for objectives.
- Informs the EPA of community intentions as of 2021.
- Will serve as a powerful tool for leveraging project development and funding in the future.

*Visualizing the Future of the Willow Creek Watershed, (*HWA et al, 2022), provides an effective resource and funding tool for the community, and is potent starting point for determining, "What we want for the Willow Creek Watershed."

However, it does not address the specifics of remediating water quality - if, how and when that situation might be resolved. The EPA proposed an Interim Remedy - the installation of a flow-through bulkhead - to the community in 2020. HWA requested a second presentation with the complete EPA Project Team and engineers to answer proactively solicited community questions. Our strategy has always been to provide the Project Team with questions prior to a meeting to ensure they prepare adequately to be able to answer. After a rigorous conversation and a two week public response period, the EPA formally announced their intent to move forward with installation of a flow through bulkhead. While this does not offer a remedy for contamination of acid mine waste from the Nelson Tunnel, it will make the site safer to study, and ideally, prevent the sudden release of a large volume of water. The EPA has community support for this interim remedy.

The NTCWR Superfund Site was listed in 2008. Fourteen years later the EPA has proposed an interim remedy. Perhaps it will be constructed within the next eight years? In the meantime, HWA and community partners will remain informed and engaged with the technically relevant water quality data on Willow Creek so that we may work toward an eventual, yet-to-be-determined remedy for improving water quality in Willow Creek, while also wrestling with larger challenges of climate change.

COMPREHENSIVE
WILLOW CREEK WATERSHED
PLANNING PROJECT

Objective 4:
North Creede Stream Stability and Flood Mitigation

Project Objective 4: Partners will convene to establish criteria for updated Scope of Work and subsequent Request for Proposals (RFP) for a 30% Conceptual Design for Stream Stability and Flood Mitigation of the North Creede reach.

The North Creede reach – the short 0.7mile reach running through a narrow canyon and ending in the levee pond just above the City and Creede and the flume - has experienced extensive degradation since mining started in the 1890's. The creek bed has been moved multiple times to accommodate road and rail within the narrow bottleneck of the canyon, it is absent of all vegetation, and requires consistent maintenance to remove accumulating sediment from both the stream channel and the levee pond. Damages to the reach from the 2019 Spring runoff high-water event further emphasized the need to make improvements to this vulnerable reach that is situated directly north of the City of Creede.

Photo, right: High-water flows during the 2019 spring runoff inundated the North Creede reach, requiring active removal of aggragating sediment from both the stream channel and levee pond to prevent it from over-topping.

While no official flow volume was taken, estimates by paleo-hydrologist, Dr. Robert Jarrett, estimated the flows at 690 cfs, or a 6-year event.

Stream restoration and flood mitigation for North Creede reach is many years in the making; most recently paused to await completion of the CHAMP Phase III, Mineral County, Colorado Hydrologic Analyses Report, 2019 by Wood for CWCB, the levee investigation and revised floodway maps for the City of Creede, all of which were part of the 2022 LOMR for Willow Creek, completed and submitted by Wood in 2021. It was incumbent that design requirements outlined in the RFP for the site reflected the criteria as identified by the LOMR.

The North Creede reach offers another excellent example of a responsive process that prioritized the inclusion of new data, ensured participation by wide range of stakeholders at key decision making moments along the way, and seized opportunities to educated and inform the community regarding flood ways and floodplains along the way.

Objective 4:
North Creede Stream Stability and Flood Mitigation

Outcomes

TASK 4.1: Active flood mitigation work in North Creede in 2019, with ongoing maintenance to reduce flood risks.

While the North Creede reach is located within the boundaries of the City of Creede, it has long been maintained by the MinCo Road and Bridge Crew for the simple reason that they have suitable equipment for the job. Indeed, access to adequate equipment is often a real limiting factor in Creede, as in other small, low-resource communities.

In a formal show of support of the WaterVation design, MinCo BOCC formally renewed their commitment to continue their maintenance of the North Creede reach to the City of Creede Board of Trustees in May 2022.

TASK 4.2: Release of RFP for 30% Conceptual design for Stream Stability and Flood Mitigation of North Creede reach; and select a qualified Engineer through open bidding process.

The RFP for 30% Conceptual Design for North Creede reach was released in Fall 2021, upon near completion of the LOMR on Willow Creek.

The RFP was actively reviewed by key stakeholders and brought before the community at a City of Creede Board of Trustees meeting to ensure that various stakeholder needs had been addressed. It was incumbent that all partners not only agreed to these parameters, but ideally came to understand and advocate for this criteria in other Creek related projects. The City, as landowner of the North Creede reach, approved all criteria and the RFP was completed.

The RFP was released publicly, posted in the local newspaper, several well-known industry sites, as well as sent directly to a list of interested companies. There was a mandatory site visit as part of the bidding process, attended by five engineering firms.

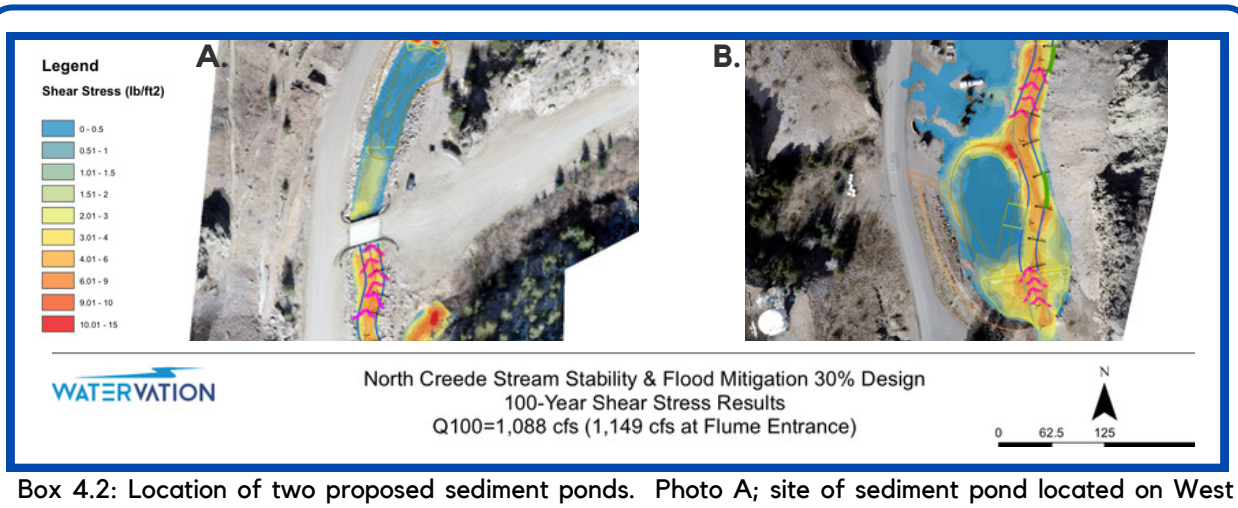
We received five proposal packages. Copies of all RFP's were distributed to the work group for review and to rank applicants in relation to established criteria. The HWA Board of Directors held an open meeting to discuss applicants, and to select candidates for interviews. Three companies were interviewed. In the aftermath of interviews, HWA again met with key stakeholders, primarily City of Creede Board of Trustees and administrative staff, RGS, TU and the MinCo Emergency Preparedness Manager before formally extending an offer to WaterVation, PLLC. Contracting was completed in Fall 2021.

Task 4.3: Community vetted and approved finalized 30% Conceptual design for Stream Stability and Flood Mitigation of North Creede reach to include set of design drawings, cost estimates and material quantities that can be used in future grant applications to bring design to construction.

We engaged in a potent, iterative design process with WaterVation that maximized community and key stakeholder feedback throughout. Please refer to the WaterVation's *Design and Basis of Design Report* in the Appendix. This portion of The Comp Plan report will emphasize key steps in the review process that informed the final conceptual design and enabled the exciting next steps.

After initial data collection and site analysis, WaterVation presented HWA with three initial design concepts from which to select one for further development. WaterVation made public presentations to the HWA Board of Directors, City of Creede Board of Trustees and the MinCo BOCC, allowing time to discuss pros and and cons of each concept, ask questions and offer feedback. There was key interest in the location of the proposed sediment ponds, particularly in relationship to maintenance and operations over time. At the same time, HWA was working diligently with CWCB and Wood to submit further documentation to FEMA in support of the active LOMR application for Willow Creek. This added attention by community members regarding possible alterations to the existing floodway map enhanced the critical attention and evaluation of WaterVation's initial concepts, leading to more rigorous and engaged participation by all.

It was determined that WaterVation would make a public presentation on site. While the site visit was publicly announced, the goal was to ensure attendance by key decision makers and experts across a range of interests and responsibilities thereby eliminating the missed context and crossed concerns that occur when there are multiple conversations. The meeting was attended by MinCo Emergency Preparedness Manager, MinCo Road and Bridge Crew, MinCo Manager, City of Creede Public Works Director, Division 3 Water Commissioner, HWA Board of Directors, HWA Staff, and several community members. Lead engineer, Lucas Babbitt walked the group through the key elements of the design. The resulting conversation enhanced both community understanding, eliminated speculative concerns, and provided a few valuable nuggets of information to the design team. It also provided unified approval in selecting the concept for WaterVation to further development. See Box 4.2 for site of two sediment ponds in community approved concept.



Box 4.2: Location of two proposed sediment ponds. Photo A; site of sediment pond located on West Willow Creek, just above the confluence with East Willow. Site selected for ease in access for maintenance. Photo B; redesign of sediment pond in levee.

Objective 4:
North Creede Stream Stability and Flood Mitigation

There was additional level of cross pollination and collaboration during WaterVation's design process. The City of Creede had contracted with engineering company Rentricity, Inc. to complete a design for a micro hydro-electric system in the flume. In an effort to ensure foresight in planning where the two projects would meet and potentially overlap, HWA actively facilitated several meeting sessions between WaterVation and Rentricity.

WaterVation presented the complete design package for North Creede reach in April 2022. Careful review of the Basis of Design report resulted in further design clarifications, These kinds of changes aid in enhancing the understanding of the scope and depth of the design by the community itself.

Given the community support - especially from the City of Creede, HWA successfully sought grant funding from CWCB Water Plan Grant, Summer 2022 cycle to support taking WaterVation's Conceptual Design to Construction-Ready. Please refer to the Appendix to view WaterVation's complete conceptual design package for North Creede Stream Stability and Flood Mitigation. They are currently under contract with HWA to complete the construction ready design.

Exciting Next Steps

The Comp Plan's dedication to transparent communication and synergistic collaboration served to strengthen many relationships, most notably the relationship between the City of Creede and HWA.

Discussions about the North Creede reach and the LOMR application opened up further conversations with both the City of Creede and MinCo Emergency Preparedness Manager regarding flood risks on Willow Creek, resulting in the City Trustees passing the City of Creede Flood Mitigation Infrastructure Plan as crafted by HWA.

Last, but not least, HWA is working closely with the City of Creede on 3 separate applications to FEMA Hazard Mitigation Grant Program, including construction for North Creede Stream Stability and Flood Mitigation per WaterVation's design. The application has successfully moved through the state level of review and FEMA has the full submission package. While one can never assume a grant award, we have submitted a strong application based on WaterVation's design with clear evidence of cost-benefit of the project. Should these funds be awarded, CWCB's investment of $75,000 to support a design will leverage more than $1.2 million towards construction funding – an excellent investment!

Ultimately, we have worked to maximize our "comprehensive" approach by applying for FEMA-HMGP funds to support flood mitigation of North Creede/Obj 4; repairs to the Flume/Obj 5; and stream restoration of the lower Willow Creek floodplain/Obj 6.

COMPREHENSIVE
WILLOW CREEK WATERSHED
PLANNING PROJECT

Objective 5:

Concept for Flume Repairs and Redevelopment

Project Objective 5: Partners will convene to establish criteria for completing repairs to the Flume through Creede, with the intent of enhancing this utilitarian feature with conceptual planning for development as a usable public space.

The flume was built in 1949 by the US Army Corps of Engineers. It was built in response to flooding that occurred from a large precipitation event which damaged portions of town. Until 2018 it had had no significant repairs or maintenance and large portions of the grouted riprap had come loose and which were the cause of potential problems. In 2018, a project was funded by DOLA to resurface the flume with four inch thick layer of shotcrete on the flume bed, extending up each side 18 inches vertically. This provided a new "wear" surface to the flume and resecured the riprap which had stated to come loose. The next phase of planning will include completing the installation of a new wear surface on the remaining vertical walls of the flume and creating a design that brings the flume into the community as more than a utility, but as a site for education, enhanced public safety and recreational use.

Outcomes

TASK 5.1: Planning with City of Creede for completion of flume repair work.

As noted in Objective 4, HWA has worked side by side with City to apply for construction funding from FEMA-HMGP to complete the long over-due maintenance and repairs on the flume.

If successfully funded, we will continue to collaborate with the City on implementing construction work on North Creede, flume and floodplain, seeking to integrate the design attributes where reaches connect with one another and planning for enhanced redevelopment of flume itself.

Photo 5.1: Watercolor of the flume in Creede, Stephen Quiller, May 2021 at the Community Conversation on the flume

Objective 5:
Concept for Flume Repairs and Redevelopment

Task 5.2: Conceptual design for alternative ways in which the flume can be integrated into the community to benefit safety, water quality and recreational access.

HWA hosted two community forums at two different flume locations in May 2021 as part of the larger community-informed re-development project resulting in the report, *Visualizing the Future of Willow Creek Watershed*, (HWA and EPA Superfund Redevelopment Program, 2022). Both events were scheduled during the lunch hour and provided lunch to all attendees. We had excellent attendance at both events. Discussion was informal allowing people to brainstorm ideas and share concerns regarding alternative uses for the flume. Ideas ranged from building a pedestrian only "trail" over the flume, to developing a disc golf course in the small park south of town, to one private landowner volunteering use of an empty lot as a green space and picnic area proximate to the primary business center of Creede. Ideas were both inspired and loosely captured by world-renowned, local water-color artist Stephen Quiller who was painting the flume and environs during the community events, (See photo 5.1).

The outcomes from these community events were included in the redevelopment mapping project with EPA Superfund Redevelopment Program and can be found in the report, *Visualizing the Future of Willow Creek Watershed* (HWA and EPA Superfund Redevelopment Program, 2022). See image 5.2.

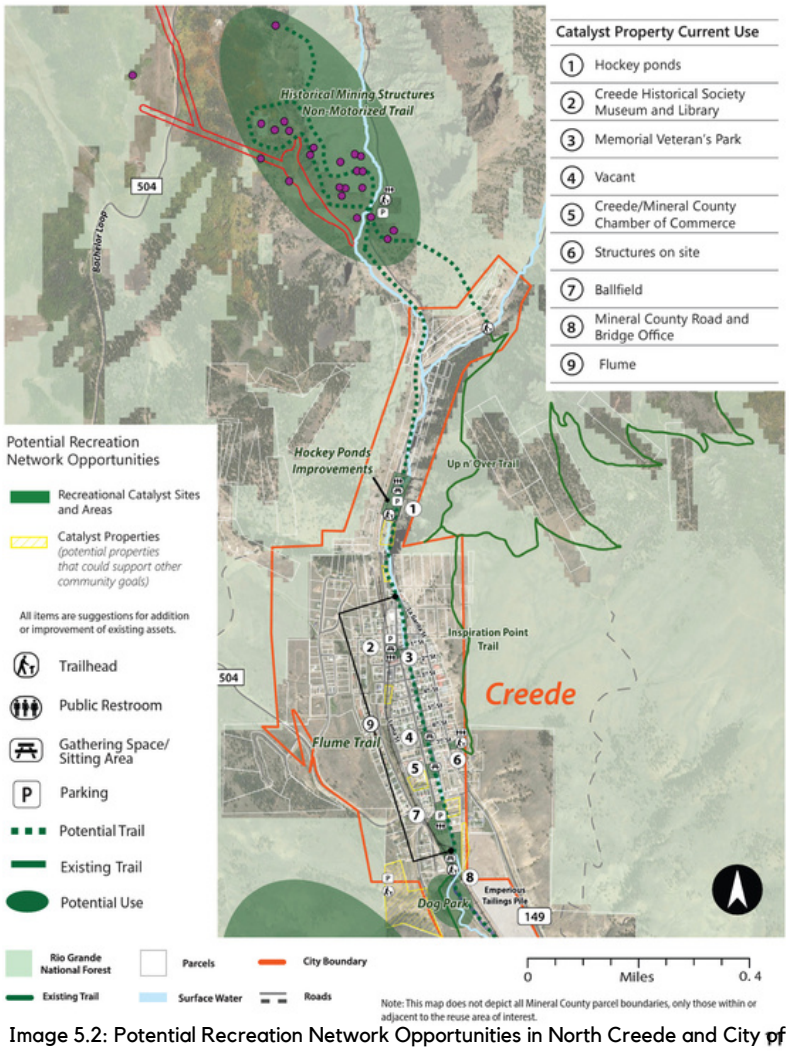


Image 5.2: Potential Recreation Network Opportunities in North Creede and City of Creede, from *Visualizing the Future of Willow Creek Watershed,* (HWA and EPA Superfund Redevelopment Program, 2022.

Objective 6:

Lower Willow Creek Floodplain Stream Restoration

<u>Project Objective 6</u>: Partners and landowners of the lower Willow Creek floodplain will convene to determine design criteria and release an RFP resulting in a 30% Design for the entire reach of the lower Willow Creek floodplain, from the outlet of the flume to the confluence with the Rio Grande River.

The 2019 high-water Spring run-off caused significant damages to both the recently reclaimed LWCRCo-owned parcel, and MVRV Park parcels of the Lower Willow Creek floodplain, see Photo 6.1. On the LWCRCo property, high flows caused the creek to completely abandon the recently constructed sinuous single-channel. In moving out of the stream channel and expanding across the full-width of the floodway, an estimated 18,000 cubic yards of capping dirt was moved downstream and into the Rio Grande. Additionally, high-flows - again estimated at only a 6-year event of 690 cfs - threatened surrounding sites and infrastructure, most notably the Emperius Tailings Pile and the City

Photo 6.1: Aerial photo taken of Lower Willow Creek Floodplain on June 13, 2019; six days after the onset of rising water levels. Photo shows that the primary channel of Willow Creek has moved all the way to the east, abandoning the sinuous single-thread channel. Water has expanded across the floodplain, eroding significant volumes of capped material and moving it downstream.

of Creede sewer line. Adding insult to injury, the LWCRCo parcel was in the final days of closing out a 7-year VCUP on the property, which was directed at limiting lead exposure by creating a single channel and capping all surfaces exceeding the Restoration Action Level of 1500 ppm. The runoff event destroyed the remedy and thus a viable close out of the VCUP. Fortunately, the VCUP has been extended to allow for improved remediation and stream restoration.

Further downstream, high flows caused massive erosion of a steep earthen bank along the last 100 yds of the western side of Willow Creek before the confluence with the Rio Grande on the MVRV Park parcel, threatening to destroy two RV pads and the multi-million dollar rigs parked on them. Flows were so substantial as to warrant MVRV Park to seek permission from neighboring property owner, Wason Ranch, to divert the full flow away from the western outlet of Willow Creek and off the MVRV Park property to the eastern outlet on the Wason property. Willow Creek remains diverted away from MVRV Park at the time of this report.

In the immediate aftermath of the high-water event there was the inevitable barrage of questions, opinions, and most notably grief. There were multiple issues to be resolved, with each landowner seeking the solution specific to their location, without really considering the entire reach of the lower floodplain as a contiguous ecologically functioning system. Thus, HWA decided to approach the problem differently, by working collectively with the five landowners to determine a consensus-based set of criteria for informing an environmentally-sensitive design for stream and floodplain restoration, from flume to Rio Grande - which is to say inclusive of all four properties. The framework for The Comp Plan, with its overt emphasis on process, transparency and collaboration informed every step of the completing Objective 6.

Outcomes:

TASK 6.1: Develop and release an RFP for 30% design for Stream Restoration and Flood Mitigation of Lower Willow Creek floodplain from Flume to Rio Grande; and select a qualified Engineer through open bidding process.

The RFP for 60% Design for Stream and Floodplain Restoration of the Lower Willow Creek Floodplain was released in Fall 2020, after engaging with the Floodplain Work Group to define baseline criteria for the length of the reach. The Floodplain work group was comprised of the five landowners of the five different properties that are situated within the reach, as well as HWA, City of Creede, TU and other local experts. Despite the spectrum of landowners' needs/preferences, consensus was reached in articulating the Key Criteria for the Design, see Box 6.2. It was incumbent that all partners not only agreed to these parameters, but ideally came to understand and advocate for this criteria in other Creek related projects. The City, as a Board Member of the LWCRCo of the North, approved all criteria and the RFP was completed.

It was also decided to request a 60% design, rather than only a 30% conceptual design based on available funding, clarity of RFP and desire by landowners to implement a timely remedy. HWA secured formal approval from CWCB prior to expanding the design.

Box 6.2: Baseline Criteria for 60% Design for Lower Floodplain

- Reconstruction of the Lower Willow Creek channel to establish a connective design between the stream channel, floodplain and Rio Grande.
- Provides reliable hydraulic stability.
- Design will meet or exceed 100-year flow volume as defined in CHAMP Phase III, Mineral County, Colorado Hydrologic Analysis, (Wood, 2019).
- Provides stream flow to the two adjudicated water diversions.
- Provide stabilization so as to protect existing infrastructure.
- Focus on site-specific vegetation plan.
- Complies with existing CDPHE VCUP for the parcel owned by LWCRCo.

The RFP for 60% Design for Stream and Floodplain Restoration of Lower Willow Creek was released in Fall 2020. The RFP was released publicly, posted in the local newspaper, several well-known industry sites, as well as sent directly to a list of interested companies. There was a mandatory site visit as part of the bidding process, attended by twelve engineering firms.

We received six proposal packages. Copies of all RFP's were distributed to the work group for review and to rank applicants in relation to established criteria. The HWA Board of Directors held an open meeting to discuss applicants, and to select candidates for interviews. Two companies were interviewed. In the aftermath of interviews, HWA again met with key stakeholders, primarily City of Creede and LWCRCo, before formally extending an offer to Matrix Design Group. Contracting was completed in Fall 2020.

TASK 6.2: Community vetted and approved finalized 30% design for Stream Restoration and Flood Mitigation of Lower WIllow Creek floodplain from Flume to Rio Grande to include set of design drawings, cost estimates and material quantities that can be used in future grant applications to bring design to construction.

After almost a full-year of working on their design - including bi-monthly meetings with Matrix, TU and HWA; several status updates to LWCRCo; and a variety of site visits from subject-matter experts including Kevin Houck, CWCB Watershed and Flood Protection - Matrix submitted a Draft 60% Design and Technical Memo. Early reviews resulted in some thoughtful revision to the Technical Memo, after which time HWA hosted a series of public events in which Matrix presented their design for rigorous community review, see Box 6.3 for Lower Floodplain Community Review Participants.

Box 6.3: Floodplain Review Participants

City of Creede, Admin & Trustees
CDPHE, Hazardous Materials Program
Creede Residents & Community
CPW
CU Anschutz
CWCB
DWR, Division 3 Water Engineer
HWA, Staff and Board of Directors
Legacy WRCR Member
LWCRCo Board of Directors
MinCo Fairgrounds Association Board
MVRV Park Property Owner
TU
Wason Ranch Board members

Objective 6:
Lower Willow Creek Floodplain Stream Restoration

Several threads emerged from the review, with perhaps the most rigorous coming as a Memo by Chris Sturm, CWCB Watershed Protection Program Director, dated August 30, 2021.

In response to the collective community review, and Sturm in particular, we concluded that the project would benefit from another site visit with the lead Matrix engineer. HWA and TU staked the proposed Matrix design on site prior to the Matrix site-visit to offer real-time visual of design on site. We had four objectives from the site visit:

1. Compare the location of the proposed stream channel with the post-2019 high water stream channel.
2. Observe the natural recovery of the floodplain 2-years after the high-water event, particularly revegetation of grasses and willow recruitment.
3. Determine plan and/or course of action in regards to MVRV Park feedback on design in light of changes to Rio Grande and project criteria.
4. Critically consider reviewer feedback and evaluate the application of the range of stream restoration theories, engineering best practices within the reality (and limits) of the site itself.

The site visit resulted in establishing a three-phase approach to the design for the lower floodplain, with each phase corresponding to a stretch of the creek within the lower floodplain reach, see Box 6.4 for complete description of phases.

Box 6.4 Three Phase approach for
Stream Restoration of Lower Willow Creek Floodplain

Phase 1: From Station 93+43 at the terminus of the flume down to Station 54+00 situated just below the Wason headgate.

Design approach: The Matrix 60% design for this stretch of the lower floodplain addresses all Baseline Criteria - specifically it:

- Significant structural changes to flume - straightening the terminus of the flume followed by a series of drops and pools will facilitate energy dissipation.
- Designed for 100-yr flows, with 50-ft flood-prone zone with stream stabilization to protect surrounding infrastructure.
- Matrix channel mimics the post 2019 high-water event channel, meaning it flows in and down the lowest elevation area.
- Design minimizes threats to areas that will require capping, satisfying VCUP requirements
- Ensures water flow to both adjudicated water diversions.

Next Steps: We have modified the contract with Matrix to bring the existing 60% design for Phase 1 to 100% stamped design. Funding from CWCB Comp Plan funds reallocated from Objective 2/Stream Gage and other - with prior approval from CWCB; plus an additional $27K cash contribution from LWCRCo.

Box 6.4 Three Phase approach for Stream Restoration of Lower Willow Creek Floodplain

Phase 2: From Station 54+00 situated just below the Wason headgate down to Station 27+00 which is just above the emergency diversion channel dug by MVRV Park on Wason property during high-flows in 2019. Station 54+00 is situated below the Wason headgate where the single thread stream channel naturally becomes a multi-thread channel.

Design approach: This section of the reach has demonstrated the natural resiliency of a floodplain. Shifting of the stream-bed and redistribution of seed and sediment resulted in a substantial increase in grasses and willow recruitment. This section has no adjacent infrastructure to protect, and the flood way is contained topographically, transitioning back into a single channel approximately at Station 42+00.

Looking upstream from Station 54+00. Upstream to be stabilized single-channel with 50ft flood-prone zone, while downstream will allow for braiding during high water events.

We will adopt the following actions for this reach:

- Engineered transition from single channel to multi-thread at Station 54+00, as part of Phase 1.
- Field engineering during construction of Phase 1 to stabilize bank at the full-width of flood-prone zone.
- Engineered transition from Station 27+00 downstream as part of Phase 3.
- Continued and ongoing intensive revegetation of the Phase 2 stretch. Funding from NFWF and American Forest allowed us to plant 2500 willow stakes, 100 large clump willows and 35 cottonwoods in the riparian zone in 2021 as part of The Comp Plan.
- Implement rigorous observation and monitoring program of this stretch, to include planting success rate, natural recruitment, stream bed stability, water quality and more.

Next Steps: We will continue to build our relationship with American Forest which will allow us to continue to plant an estimated 100 large clump willows per year in this section, and to seek additional funding to implement intensive revegetation. We imagine this section as a long-term outdoor classroom for students and volunteers of all ages to learn about water, water quality, restoration and get their hands dirty. To this end we will continue to seek funding to support water and river education initiatives.

Fresh, green growth on 4 month old Willow stake, planted Summer 2021.

Objective 6:
Lower Willow Creek Floodplain Stream Restoration

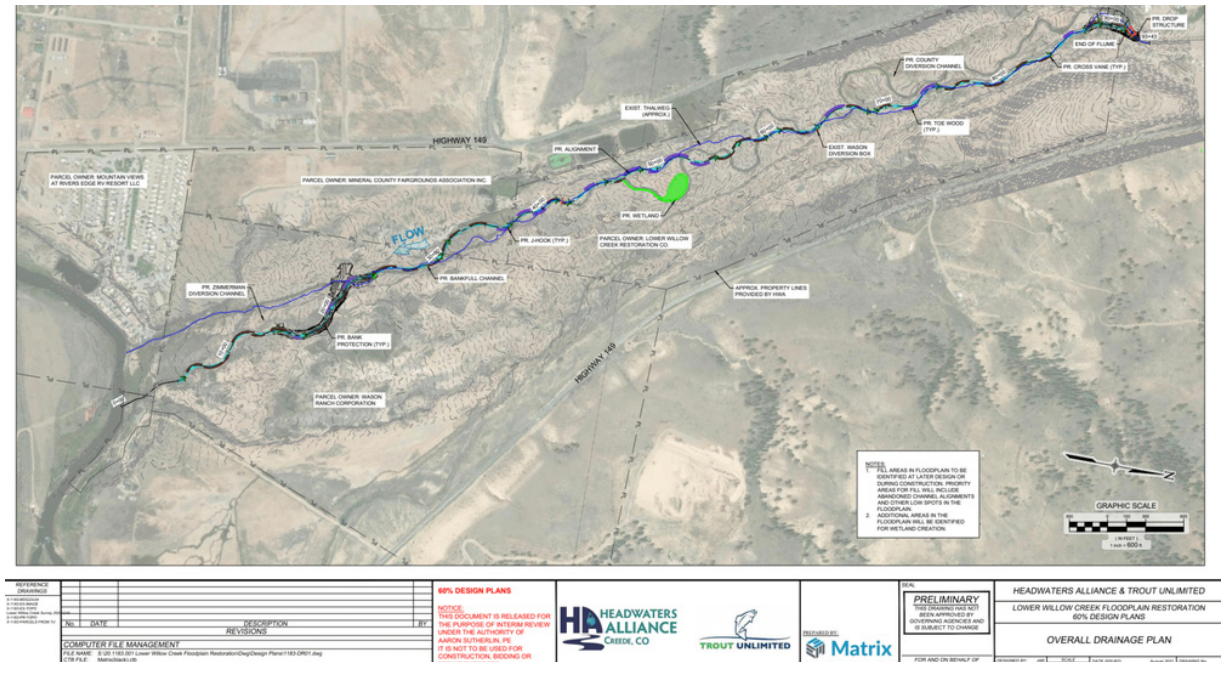
Box 6.4 Three Phase approach for Stream Restoration of Lower Willow Creek Floodplain

Phase 3: From Station 27+00 down to the confluence on the Rio Grande.

Design approach: While the Matrix design satisfies the baseline parameters for a 60% design from flume to Rio Grande, we have not been able to come to an agreement with the landowner at MVRV Park regarding their portion of the reach. There are a number of variables that complicate this situation, including Matrix's identification of the eastern Willow Creek confluence as the reference reach for Willow Creek, while the western confluence is highly degraded, possibly requiring a civil engineering solution. Additionally, MVRV Park made significant changes to river right streambank of the Rio Grande, directly across from the western confluence of Willow Creek that will require another LOMR to update the newly updated Rio Grande floodway maps completed by Wood in 2021. Until the full floodway is newly defined, there is no clear BCD from which to generate a design that satisfies the original Baseline Criteria for Design of the Lower Willow Creek Floodplain.

Next Steps: HWA will continue to work with MinCo and CWCB to see completion of a new LOMR for Rio Grande as it flows through the MVRV Park property, upon which time, we hope to collaborate with the property owner to define an ecologically functioning design that satisfies Baseline Criteria and property owner needs.

Box 6.5: Preliminary 60% Design for Stream Restoration of Lower Willow Creek Floodplain, Matrix Design Group



Exciting Next Steps

The Comp Plan's dedication to transparent communication and synergistic collaboration informed every step of developing, reviewing, revising and finalizing the Matrix design for Stream Restoration of the Lower Willow Creek Floodplain.

We navigated the complexities of multiple owners with their varied needs, opinions and preferences; we embraced guidance where and when it had value; and ultimately we worked proactively with Matrix to revise and refine the design to the reflect BCD, sound ecological principles and collaboration with partners. Objective 6 exceeded the stated outcomes in providing for a community-vetted, HWA-approved 60% Design for Stream Restoration of the Lower Willow Creek Floodplain, and then taking the Phase 1 portion of the reach to 100% Stamped, Construction-ready plans.

Often there is a concern that an involved process will thwart momentum. We have found the opposite to be true in regards to all of The Comp Plan Objectives, and especially the lower floodplain. As noted in Objective 4, we are working closely with City of Creede on on three separate applications to FEMA Hazard Mitigation Grant Program, including construction costs for Phase 1 and a portion of Phase 2 of Matrix's design for the lower floodplain. The application has successfully moved through the state level of review and FEMA has the full submission package. While one can never assume a grant award, we have submitted a strong application based on Matrix's design with clear evidence of cost-benefit of the project. Should these funds be awarded, CWCB's investment of $122,423 to support a design will leverage more than $2.3 million towards floodplain construction funding – an most excellent investment in water for Colorado.

Ultimately, we have worked to maximize our "comprehensive" approach by applying for FEMA-HMGP funds to support flood mitigation of North Creede/Obj 4; repairs to the Flume/Obj 5; and stream restoration of the lower Willow Creek floodplain/Obj 6 for a total infrastructure investment of $6.4 million.

Objective 7:
Administration of The Comp Plan

<u>Project Objective 7</u>: Provide for the administrative responsibilities of initiating, managing and effecting success across Objectives 1-6.

HWA had only a small staff of two, including the Executive Director and Communications & Engagement Coordinator, to move along The Comp Plan. As a small organization, The Comp Plan offered us tremendous opportunity to do more than actual good works (which we did), but to also grow our vision and capacity. And in doing so, we have learned the importance of securing adequate income to support hard-working staff.

Clearly, we were successful in attending to wide spectrum of activities required by such an endeavor, as documented in The Comp Plan Final Report, see box 7.1 for the keywords associated with seeing this project completed.

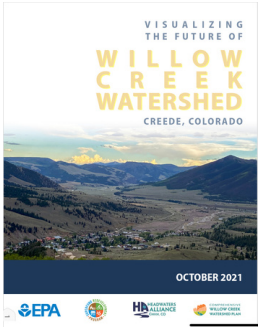
Box 7.1: Keywords for Administrative Success

be a champion for the vision...accept responsibility...say please... express gratitude...learn daily...coordinate...collaborate...schedule... manage...be patient...be insistent...nudge...invite...suggest...include... remind...remind again...ensure invitation is extended generously and frequently... make ample space for others to learn, teach, lead, participate and volunteer...facilitate...participate...be quiet...ensure financial accountability... be invisible...be criticized...show up anyway... review...revise...rewrite...double check...triple check...call...call again... ask for help...ask for guidance...accept good advice...ignore bad manners...stay true to vision...work to completion...finish with the same integrity as started.

COMPREHENSIVE WILLOW CREEK WATERSHED PLANNING PROJECT

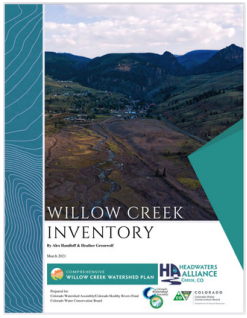
Appendix - Measurable Objectives

The following items can be found in the attached Zip File.



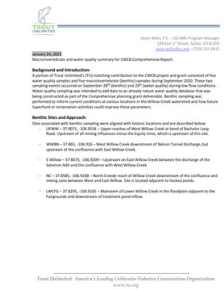
Visualizing the Future of Willow Creek Watershed, Creede Colorado. EPA, EPA Superfund Redevelopment Program and HWA. 2021

Satisfies and Informs Objectives 1, 2, 3, 4, 5 and 6



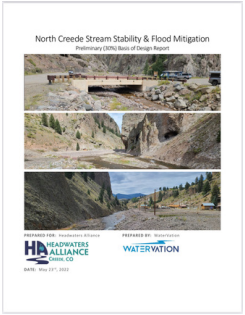
The Willow Creek Inventory. HWA. 2021

Satisfies and Informs Objectives 2, 3, 4, 5 and 6



Macroinvertebrate and Water Quality Summary for CWCB Comprehensive Report. Trout Unlimited. 2023

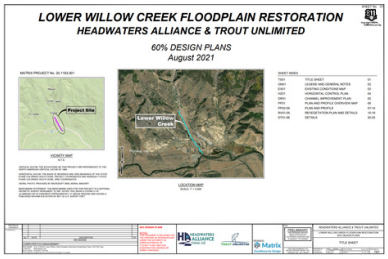
Satisfies Objectives 3



North Creede Stream Stability and Flood Mitigation, 30% Basis of Design Report. WaterVation, PLLC. 2022.

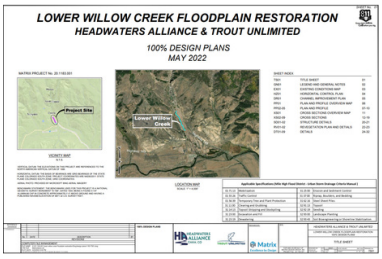
Satisfies Objective 4

Appendix - Measurable Objectives



Lower Willow Creek Floodplain Restoration, 60% Design Plans. Matrix Design Group. 2021

Satisfies Objective 6



Lower Willow Creek Floodplain Restoration, 100% Design Plans. Matrix Design Group. 2021

Satisfies Objective 6