The Lower Willow Creek Restoration Project Final Report

Prepared by the Lower Willow Creek Restoration Company

Executive Summary

Project Title: The Lower Willow Creek Restoration Project-Phase 1
Contract Number: C150467

Water Supply Reserve Account Funds:
$200,000 Statewide Account
$50,000 Rio Grande Basin Account

Total Project Funds

$250,000	CWCB Water Supply Reserve Account
$408,770	CDPHE Non Point Source Grant
$250,000	Colorado Brownfields Foundation
$35,000	Colorado Division of Reclamation Mining and Safety
$943,770	**Total Cash Contribution**
$745,000	Creede Resources, Inc.
$50,000	SLV Earthmovers, Inc.
$39,500	WCRC
$3750	City of Creede
$6,398	Casey Resources, Inc.
$845,148	**Total Match**
$1,788,918	**Total Project Costs**

1.0 Introduction:

The Lower Willow Creek Restoration Company (Company) was formed in 2010 to oversee the Lower Willow Creek Restoration Project. This project, to reclaim the floodplain below the City of Creede, was identified as one of the core goals of the Willow Creek Reclamation Committee (WCRC) when it was founded in 1998 to address the water quality impairments caused by almost one hundred years of mining in the Willow Creek watershed. Because the WCRC is not a 501 c 3, the formation of the Company was vital in order to fund the activities necessary to accomplish the goals of the Lower Willow Creek Restoration Project. These goals include the restoration of the chemical, physical, biological and aesthetic qualities to the lower Willow Creek floodplain, which is an integral part of the Creede community.

Beginning in the early 1900's and ending in 1965, the project site was used to store waste rock in settling ponds from two mills. On two occasions, the berms that contained the ponds were breached and produced fish kills as far downstream as the town of South Fork. In the late 1980's the majority of the pond sediments were consolidated, relocated, and capped just northeast of the project site. This pile is known as the Emperius Tailings Pile. Water samples collected by the WCRC and a tracer study performed in 2003 indicated that despite the cleanup effort, Willow Creek was receiving an additional load of heavy metals as it ran through the floodplain. To address this issue the WCRC, in conjunction with the NRCS, created a planning document to identify known site conditions and provide recommended reclamation activities. The recommendations included the construction of a new channel to avoid 'hot spots' that were potential pollutant sources and re-vegetation of the site. The Company used this document to guide engineered drawings and construction activities to accomplish the Lower Willow Creek Restoration Project.

The completion of these activities will return the ecological services of the floodplain to the Willow Creek watershed, including energy dissipation, storage and delivery of water to the Rio Grande during unusual hydrologic event. In addition, it will, create riparian habitat, and reduce sediment transport to the Rio Grande. The consolidation of the creek from several shallow multi thread channels to a single thread channel will also reduce evaporative loss and deliver more water to downstream users in the Rio Grande.

2.0 Project Goals, Objectives, and Tasks

Project Goal

The overarching goal for the Lower Willow Creek Restoration Project is to restore the lower Willow Creek floodplain to a more natural condition. To accomplish this, three objectives and their measureable outcomes are described below.

1). Improve water quality of Lower Willow Creek and Rio Grande Segment 4a by reducing stream erosion and interaction with contaminated soils, along with the relocation of contaminated soils above the water table. Outcomes associated with this objective include:

- Support of downstream fisheries through improvements to water quality and riparian habitat
- Reduction of direct contact with contaminated soils through capping and revegetation.

2). Restore the ecological function of the lower Willow Creek floodplain by creating a historically based single threaded channel. Outcomes associated with this objective include:

- Reduction of evaporative water loss affecting Rio Grande water users by reducing areas of braided stream channel and wetted soils
- Restoration of stream functions to improve long-term management of stream energy and sediment transport.
- Improvement of riparian habitat, long-term stream stability, and aesthetic conditions through the establishment of appropriate vegetation for riparian and upland areas

3.) Improve aesthetic conditions, recreational values, and educational opportunities with landscaping and trails. Outcomes associated with this objective include:

- Increase in bench and upland zone vegetation cover.
- Completion of objectives in Voluntary Cleanup Plan in order to receive a No Action Determination letter from the CDPHE.
- Installation of recreation infrastructure to support the passive recreation needs of the Creede Community.

The Colorado Water Conservation Board-Water Supply Reserve Account awarded the Lower Willow Creek Restoration Company $250,000 for the Lower Willow Creek Restoration Project. The local Rio Grande Roundtable approved $50,000 from their Basin account and the Colorado Water Conservation Board contributed $200,000 from the Statewide Account for the project. The funding was used to support the following objectives; improve water quality of Lower Willow Creek and Rio Grande Segment 4a by reducing stream erosion and interaction with contaminated soils and relocation of contaminated soils above the water table, and restore the ecological function of the lower Willow Creek floodplain by creating a historically based single threaded channel.

Task 1: Project Administration and Management
Task total cost: $49,350 WSRA total: $5,400
The Company contracted Willow Creek Reclamation Committee staff to execute this task. WCRC staff assisted the Company with the creation and solicitation of the bid documents, contractor review and selection, as well as day-to-day communication.

The property transfer from Creede Resources, Inc. to the Lower Willow Creek Restoration Company was completed in April 2012 and was primarily overseen by the City of Creede, their attorney, and Creede Resources, Inc. and their attorneys. Tasks completed under this activity include filing of records and assistance with any similar tasks.

Two progress reports were submitted to the CWCB on 12/28/12 and 6/13/13 detailing the progress of the project and the expenses paid by CWCB toward the project goals. This document serves as the final report and will be the final deliverable for this task.

WCRC staff submitted reimbursement requests for review to the Lower Willow Creek Restoration Company Board of Directors on a monthly basis during the regular meetings. The reimbursements were then sent to grantors and contractors received payment in the form of a check as soon as the allotted money was posted to the Company's bank account. WCRC staff tracked project expenditures, including in-kind donations, and a final budget is provided below. The remaining $1,000 for administrative time is requested with this final deliverable.

Task No.	Task Description	Budgeted	Actual Spent	Cash Match	In-Kind Match
1	Project Management and Administration	$ 5,400	$ 4,400	$ 5,000	$ 3,750
2	Design and Construction Supervision	$ 83,000	$ 83,000	$ 14,450	$ 5,431
3	Re-construct stream channel/s, bank willow, and wetland areas	$ 161,600	$ 161,600	$ 70,000	$ 13,000
				89,450	$ 22,181
	Total WSRA	$ 250,000	249,000	Total Match	$ 111,631

Figure 1: The Water Supply Reserve Account budget for the Lower Willow Creek Restoration Project.

	CWCB	CDPHE	Colorado Brownfields	CDRMS	Local	In-Kind
Project Administration	$ 5,400	$ 16,200	$ -	$ -	$ 24,000	$ 3,750
Design/Construction supervision	$ 83,000	$ 129,253	$ -	$ -	$ -	$ 6,398
Channel Construction	$ 161,600	$ 214,265	$ 250,000	$ 35,000	$ 745,000	$ 50,000
Revegetation	$ -	$ 25,000	$ -	$ -	$ 5,000	$ 5,000
Education/Outreach	$ -	$ -	$ -	$ -	$ 2,500	$ 2,500
Monitoring	$ -	$ 3,750	$ -	$ -	$ -	$ 1,000
Funding source total	$ 250,000	$ 388,468	$ 250,000	$ 35,000	$ 776,500	$ 68,648
TOTAL PROJECT COSTS for PHASE I:				$ 1,768,616		

Figure 2: The Lower Willow Creek Restoration Project Phase I budget by funding source. The $745,000 figure in local sources is the land donation from Creede Resources, Inc. to the Lower Willow Creek Restoration Company. The donated land is the site where the Lower Willow Creek Restoration Project is being completed.

Task 2: Final Design and Construction Supervision
Task 2 total cost: $218,651 WSRA total: $83,000

The Lower Willow Creek Restoration Company contracted with Casey Resources, Inc. (Casey) to complete six activities to complete the Final Design and Construction Supervision task:

1. Floodplain Delineation and Field Investigations
    - Casey Resources, Inc. reviewed the 2007 NRCS Lower Willow Creek Planning Study to gain an understanding of work completed to date, and identified additional information needed. Casey identified that 1-foot contour intervals were needed to gain a better understanding of the existing topography of the floodplain.
    - Using the field investigations and the updated contour information, Casey modeled the 100-year floodplain using HEC-RAS models. The modeling resulted in the predicted 100-year hydraulic grade line.
2. Preliminary and Final Design Plans
    - To prepare the preliminary design plan Casey integrated the 2007 NRCS study with HEC-RAS models to generate an Alternative Analysis to account for hydrology, hydraulics, existing vegetation, grade control as well as cost/maintenance, flooding and channel stability, property and regulatory issues and trails and open space.
    - A Preliminary Design was presented at the June 2012 regular meeting of the Willow Creek Reclamation Committee. Cost estimates and typical cross sections were included with this presentation. Community input was taken during this presentation and incorporated into the final design.
    - Casey performed Wetland Resources Delineation in conformance with USACE methods and criteria. The limits of the wetland/riparian habitat were flagged and merged into the design. Casey prepared and submitted a report to the USACE for review and approval.
    - Casey also filed a USACE 404 permit and CDPHE Stormwater Management Plan/permit on behalf of the Company to complete the proposed plan for the Lower Willow Creek Restoration Project.
    - In July 2012 Casey presented the Final Design to the Company and the public during another Willow Creek Reclamation Committee meeting. The Company approved the plans and the Final Design Plans were used to draft bid documents and provided in the RFQ.
3. Construction Bid Documents and Bidding Services
    - In August 2012 the Company sent out an RFQ for the Lower Willow Creek Restoration Project. Three responses were returned. Reviewing the qualifications the Company and Casey decided that a design-build approach was necessary to complete the project within the budget.

- Casey reviewed CDOT specifications and standards and supplemented as necessary to control the work. Casey also prepared quantity and cost estimates. Casey also provided bidding services and was on-site during the preconstruction meeting.
- The Company selected SLV Earthmovers, Inc. to complete Phase I of the Lower Willow Creek Restoration Project.

4. Construction Oversight
    - Casey attended a Pre-Construction meeting in September 2012 to meet with the Company, SLV Earthmovers, Inc. and review drawings, and answer questions.
    - A Casey representative was onsite during construction to attend routine project meetings, provide construction observations, and prepare weekly summary reports.
    - Casey also maintained record drawings of civil design portions and prepared certifications of substantial completion.
    - Personnel from Casey Resources, Inc. also provided to the contractor amendments to the plan as necessary.
5. Voluntary Cleanup Plan
    - The Colorado Department of Public Health and Environment (CDPHE) approved the Voluntary Cleanup Plan for Willow Creek Restoration, Creede Colorado prepared and submitted by Casey Resources, Inc. on December 8, 2011. Casey performed a substantial review of all existing information and assessments performed.
    - Casey prepared a Materials Management Plan to manage mining residuals encountered during construction of the restoration project.
6. Prepare Reports
    - Casey prepared and submitted weekly reports to the Company. Further, the firm filed necessary reports to the CDPHE as appropriate.

Casey Resources, Inc. continues to provide technical assistance as the Company moves into Phase II of this project.

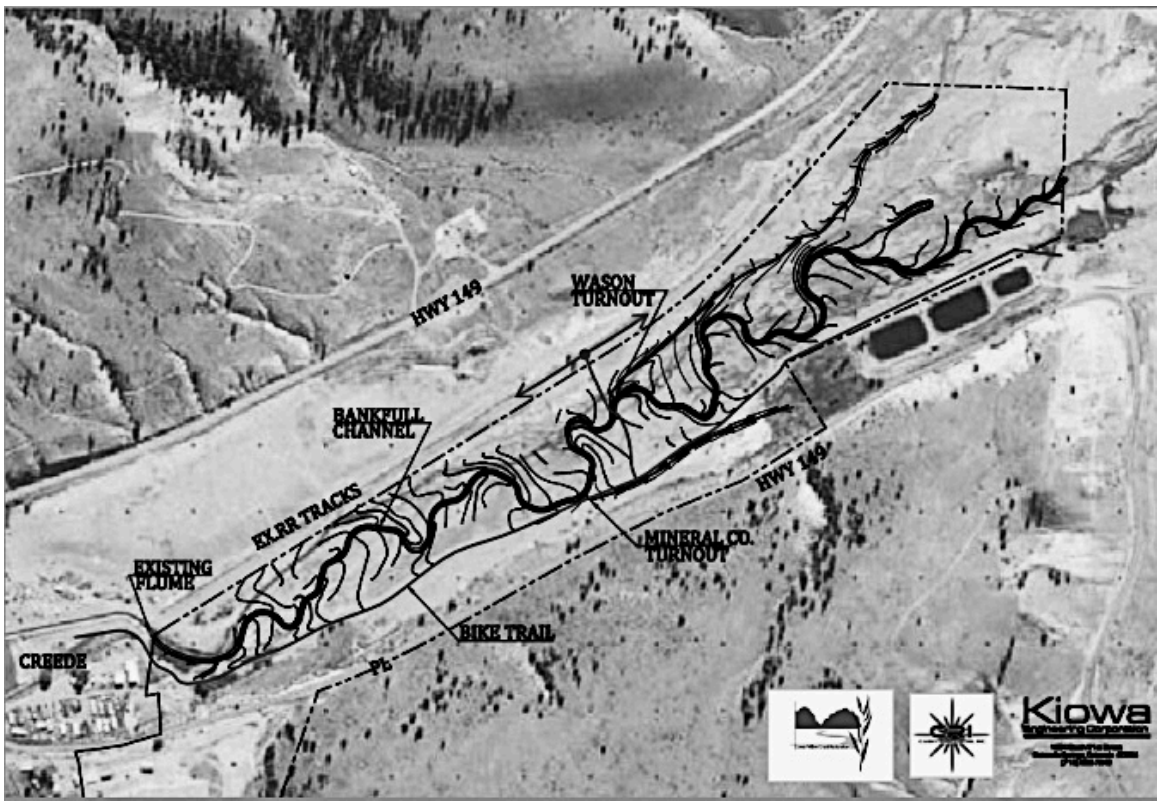

Figure 3. The final design plan, prepared for the Lower Willow Creek Restoration Company by Casey Resources Inc./Kiowa Engineering Team.

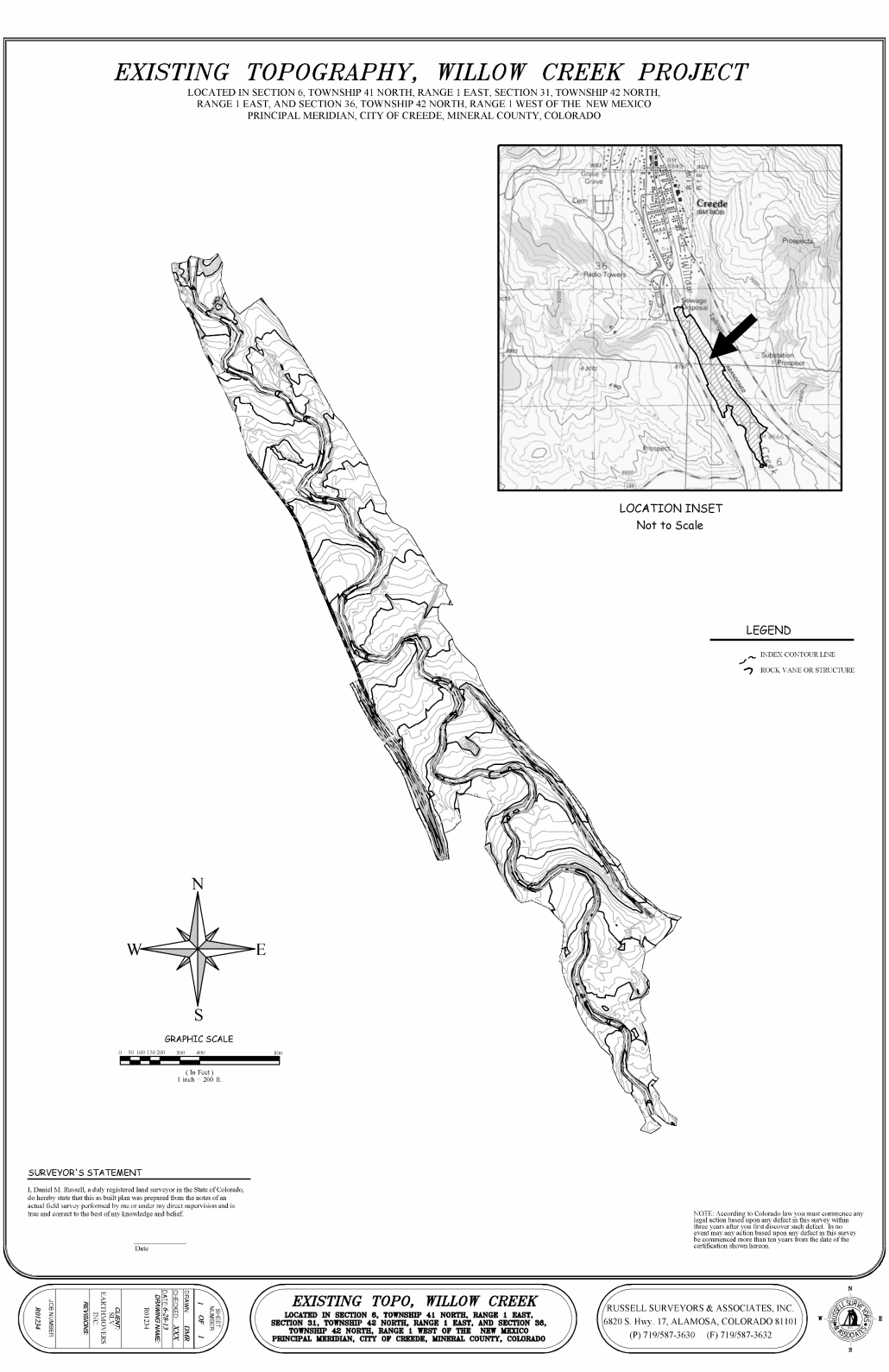

Figure 4: The as-built topographical map taken after channel construction concluded in 2013 for the Lower Willow Creek Restoration Project.

Task 3: Re-construct stable stream channel, bank and wetland areas
Task 3 total cost: $1,455,865 WSRA total: $161,600

The Company hired SLV Earthmovers, Inc. (SLV) to complete the lower Willow Creek channel construction project. In October 2012 the contractor began work on the project. SLV began by implementing BMPs called for in the Stormwater Management Plan, these included installing fencing around the existing vegetation, creating diesel and hydraulic fluid containment area near the fueling station to protect against potential leaks from equipment and storage tanks, and creating a sediment trap at the terminus of the project. SLV purchased water from the City of Creede to control dust during construction, a necessary part of the VCUP requirements.

After site preparations were complete, SLV cleared the construction area of cribbing, trash and other debris that had accumulated on the floodplain. Then SLV mobilized their heavy equipment and began excavating the new creek at the south end of the property. Channel construction included seven activities:

1. Cobble Screening: Cobble was screened from material excavated at the southern end of the project and other onsite locations, as needed. Cobble was screened using a tracked vibratory screen. Originally, the screen was set up to retain 5-inch cobble. This produced a smaller amount of cobble than anticipated. The solution was to set the screen to smaller size to produce more material.
2. Fines Disposition: Fines taken from the screening process were loaded into haul trucks and screened five times with an XRF for metals concentrations. If the material exceeded 1500 mg/kg of lead, the material was placed outside 20 feet of the bankfull channel. If the material was less than 1500 mg/kg, the material was mixed with cobble and placed in the creek channel to line the new creek. 191 of 339 truckloads or 3,820 cubic yards were less than the 1500 mg/kg action level.
3. Channel Lining: 200 feet of the channel was lined with onsite material procured by the screening process. The remainder of the channel was lined with rock imported by SLV from a quarry north of Del Norte, CO.
4. Rock Structures: Fifteen rock cross vanes were installed per the project design. One boulder bank lining was installed at the upper end of the new channel, just downstream from the City of Creede flume. Because these elements were installed during December-January, and not installed to specifications, SLV came back in the spring to make adjustments and meet specifications.
5. Diversion Structure Construction: The Wason concrete diversion box and the Mineral Park diversion box were constructed to design specifications. The outlet culvert to the Wason Diversion ditch was installed and a new diversion channel was excavated.
6. Coir Roll Installation: Coir rolls were installed at five outside bend locations, secured with small cables and duckbill anchors per design specifications. Screened fines less than 1500 mg/kg of lead were placed to backfill between the two coir roll rows.
7. Grading Outside of the Channel: The construction area was graded, but more work needs to be completed to meet specifications. The lower portion of the project is near design grade, but the upper portion requires fill in several areas.

Figure 5: Previous state of the Lower Willow Creek Floodplain.

Figure 6: Previous state of the Lower Willow Creek Floodplain.

Figure 7: Willow Creek Reclamation Committee visits the site during channel construction, November 2012.