

SECTION 319 NONPOINT SOURCE POLLUTION CONTROL
PROGRAM

WATERSHED PROJECT FINAL REPORT

Clear Creek Tributaries Sediment Control and Metal Removal Project

by

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EXECUTIVE SUMMARY

PROJECT TITLE: Clear Creek Tributaries Sediment Control and Metal Removal Project

PROJECT START DATE: July 29, 2013 PROJECT COMPLETION DATE: March 31, 2014

FUNDING: TOTAL BUDGET: \$204,135

TOTAL NPS GRANT: \$122,481

TOTAL EXPENDITURES OF EPA FUNDS: \$115,368

TOTAL SECTION 319 MATCH ACCRUED: \$79,009

BUDGET REVISIONS: Budget amendment of (+)\$24,000 on 10-1-2013

TOTAL EXPENDITURES: (NPS Funds + Cash Match) \$194,377.35

SUMMARY OF FINANCES:

Invoice #1 was submitted in January of 2015. It covered the costs associated with project planning and design and construction of the Hoosac Gl. sediment basin. Invoice #2 was submitted in March 2015. It mainly covered costs associated with construction of the Dumont basin and associated maintenance expenses, along with continuing O&E and reporting efforts.

SUMMARY ACCOMPLISHMENTS:

TASK (number and basic description)	% COMPLETE (estimate)	NEW PRODUCTS (During reporting period)	ON SCHEDULE (Y/N)
Task 1 <u>Project planning and design</u> . Drainage studies for both small watersheds to determine peak flows for various storm event recurrence intervals and determination of required detention times for basins Plans and Specifications for detention basins	100	Design Documents, Plans Drawings; Drainage Studies	Y-
Task 2: Construction of detention basins. Construction of two detention basins- one for Hoosac Gulch and one for the Unnamed Tributary at 1-70 milepost 235.55 near	100 -	Hoosac Basin Is 100% Complete; Dumont Basin Is 100%. : 2 detention basins and associated hydraulic conveyances, energy dissipaters, inlet works and outlet works	Y

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Dumont. Each basin was field-fit to optimize detention volumes and ease of future maintenance operations			
Task 3: Sediment monitoring and data management.	6%	The Hoosac and Dumont Basins have been functioning for 9 months, but they still retain >90% of their retention capacity, therefore no sediment has been collected for analysis.	Y
Task 4: <u>BMP O&M</u> program. Operations, to ensure operability of the detention basins, and maintenance to ensure the design capacity of the.	87%	Both basins were excavated and enlarged during construction. Plugged culverts were cleaned. Minor amounts of accumulated sediments were buried onsite and capped along with the existing mine waste. Both basins have > than 95% of their retention capacity still available after 9 months of continuous operation. CDOT will provide all future maintenance	Y
Task 5: <u>Outreach & Education</u> . Maintain a high degree of public involvement with project cooperators and other interested parties.	100%	Presentations about this project have been provided to County, UCCWA, CWA and CDOT. The project was featured in the Foundation's Clear Creek Watershed Festival booth at each of the 2013, '14 '15 Festival events	Y
Task 6: <u>Project Reporting</u> . Provide efficient reporting for	100%	We conduct several field inspections with NPS	N

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financial accountability and communication of measurable results		Program Staff prior to and during construction. This is the Final Project report	
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1.0 INTRODUCTION

The Tributary Basins Sediment Control and Metal Removal Project was a partnership effort between CDOT and the Clear Creek Watershed Foundation. Hoosac Gulch and the unnamed tributary just east of Mill Creek near Dumont are direct tributaries of Clear Creek, located west of Idaho Springs. Access to the project sites is via the I-70 off ramps serving Fall River Rd and Dumont. The primary goal of this Project was to significantly reduce the loading of particulate metals, including cadmium, copper and zinc, reaching Clear Creek. Important secondary goals of the project include reduction of total phosphorus and sediment loading to Clear Creek. Construction of these sediment control basins has a high priority, as reflected in CDOT's Sediment Control Action Plan for the I-70 corridor between the Eisenhower Tunnel and the bottom of Floyd Hill.

1.1 Project Description

The Clear Creek Tributaries Sediment Control and Metal Removal Project is located alongside Clear Creek (segment COSPCL02c) in Clear Creek County, a short distance upstream of Idaho Springs. Clear Creek crosses the Colorado Mineral Belt from Silver Plume through Idaho Springs. There are a number of small watersheds (ranging in size from ~ 1/8 mi. to >2 mi) draining from the north side of Clear Creek that have experienced significant mining in the past. These are steep side-tributaries with a southern aspect that typically have intermittent flows. Frontal weather systems and intense, short duration thunderstorms can mobilize substantial loads of contaminated sediments from mine waste and mill tailings in the drainage ways. Access to many of these previously mined areas is difficult and even impossible for vehicles in some cases. Therefore, many these areas will not be reclaimed and will be ongoing sources of metals, acidity and nutrients- that is, unless the runoff is captured and detained, so that contaminated solids can be removed and prevented from entering Clear Creek. Hoosac Gulch and the Unnamed Tributary located near Dumont at I-70 milepost 235.5 are examples of such mining impacted tributaries coming into Clear Creek from the North.

Hoosac Gulch is a direct tributary of segment COSPCL02c of Clear Creek, located 1 1/4 mile west of Idaho Springs. It is a prime example of an inaccessible drainage with an abundance of mine waste in the upper (roadless) portion of the watershed and a large mill tailings pile near its mouth. The Unnamed Tributary located at milepost 235.5, about 0.7 miles east of the confluence of Mill Creek with Clear Creek at Dumont Colorado, also has numerous inaccessible mine waste piles in its drainage way.

This project consisted of construction of two sediment basins that will capture metal laden sediments in order to prevent these contaminants from reaching Clear Creek. The detention basins were designed to facilitate very efficient maintenance operations. The Colorado Department of Transportation (CDOT) is responsible for the long-term maintenance of these sediment detention basins. This is an effective form of mine runoff management and control. The source of total metals is particulate mine waste from near the summit of Bellview Mountain located at the headwaters of Hoosac Gulch. This sediment mobilized during runoff events will be captured and detained in sedimentation basins designed to remove such particles from solution before they reach the cross-drain under I-70, which discharges directly into Clear Creek. The contaminated sediment will then be removed from the watershed entirely and deposited in the Church Placer

Mine Waste Depository, located in Gilpin County. The Sediment Management Plan, which describes these maintenance operations in detail, is included in Appendix C- Permitting Documents.

2.0 PROJECT GOALS, OBJECTIVES, AND ACTIVITIES

The primary goal of the Clear Creek Tributaries Sediment Control and Metal Removal Project is to significantly reduce the loading of particulate metals, including cadmium, copper and zinc, reaching Clear Creek. Important secondary goals of the project include reduction of total phosphorus and sediment loading to Clear Creek.

The overarching environmental goal of this project is to: Improve water quality in Clear Creek Segment 2c to fully supporting for Aquatic Life Use. While this project will not achieve that goal on its own, it will contribute to the required loading reductions that have been established to meet that goal.

Programmatic goals are to ensure that: 1) This project is executed in close coordination with our cooperators; 2) The Nonpoint Source contractual requirements are fulfilled in good faith; and 3) This project is fully in accord with the 2012 Nonpoint Source Management Plan for Colorado. We especially hope to learn important lessons about construction and maintenance of detention basins from the project and to be in a position to apply that learning to similar projects in the future.

Environmental Goal 1: Improve water quality in Clear Creek Segment 2c to fully supporting for Aquatic Life Use

Objective 1: Prevent pollution of Clear Creek and reduce metal load from inactive mine waste piles causing and contributing its present degree of impairment from cadmium, copper, lead and zinc

Task 1 Project planning and design. Drainage studies for both small watersheds to determine peak flows for various storm event recurrence intervals and determination of required detention times for basins Plans and Specifications for detention basins.

Products: A Drainage Study (Hydrology Technical Report) for Hoosac Gulch (Drainage Area = 167 acres) and the unnamed tributary near Dumont (Drainage Area = 82.6 acres) along with the final construction plans for the tributary basins are provided in Appendix B.

Task 2: Construction of two detention basins- one for Hoosac Gulch and one for the unnamed Tributary at I-70 milepost 235.55, near Dumont.

Products: Two detention basins and associated hydraulic conveyances, pre-sedimentation basins, energy dissipaters, inlet and outlet works as shown in the preliminary designs in Appendix B. Each basin was sized and configured to optimize detention volumes and ease of future maintenance operations. The ponds are now a permanent part of CDOT's I-

70 drainage infrastructure. Photographs showing the sequence of construction and final configuration are provided in Appendix G and in Section 3 below.



Hoosac Basin Outlet pipe trench



Hoosac outlet pie connection to I-70 cross drain

Task 3: Sediment monitoring and data management. Laboratory analysis of representative sediment samples collected just prior to maintenance operations to determine metal and nutrient components of sediment in storage. Measurement of the volume and mass of sediment removed from each basin during maintenance operations to determine the mass loading of metals and nutrients that the basins prevented from reaching Clear Creek. The sampling results are properly entered into the AWQMS system managed by the Data Sharing Network.

Products: A Mine Waste Monitoring Protocol (composite sampling methodology) was provided by Holly Huyck, PhD, to provide guidance on a standardized approach for sampling mine waste-contaminated sediment in the detention basins. The protocol provides that sampling of detention basins will occur twice during the project period. A will be used. Three composite samples will be analyzed for each basin following each sampling event.

No monitoring data was collected from the ponds since that was intended to occur at the time of sediment removal. The basins still have nearly all of their storage capacity available.

Task 4: BMP O&M program. Operations, to ensure operability of the detention basins, and maintenance to ensure the design capacity of the basins will be conducted by CDOT in accordance with the regular schedules established for sediment control and other hydrologic infrastructure, including culverts in the I-70 corridor as prescribed in the SCAP.

Products: Sediment Management Plan and Interagency Cooperative Agreement are included in Appendix C

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Maintenance will include cleanout of drainage ways within the sediment control project areas, cleaning of debris screens within basins and at culvert inlets, excavation of accumulated sediment in basins and restoration of culvert capacities if needed. CDOT is responsible for maintenance of the sediment basins.

Programmatic Goal 2: Increase public awareness of mining related NPS impacts and appropriate BMPs; Provide efficient reporting for financial accountability and communication of measurable results.

Objective 2: Enhance involvement & awareness, garner local support; demonstrate accountability for meeting goals & objectives.

Task 5: Outreach & Education. Maintain a high degree of public involvement with project cooperators and other interested parties. Present projects at conferences and workshops during the project period, e.g., the Sustaining Watersheds Conference. Conduct periodic environmental education field sessions at the project sites to disseminate lessons-learned and measured results of the project.

Products: Outreach included biannual joint presentations to the Upper Clear Creek Watershed Association by CDOT and CCWF, annual presentations to the Clear Creek County Commissioners by CDOT and CCWF, Presentations by CCWF during the Sustaining Watersheds Conference, the South Platte Forum and the Urban Waters Partnership.



This project was also featured and discussed during the 2013 and 2014 Clear Creek Watershed Festivals.

Task 6: Project Reporting. Provide efficient reporting for financial accountability and communication of measurable results.

Product: Semi Annual reports (2/yr), 1 final report, and invoices/progress reports. Field trips with NPS program staff also involved accountability reporting. This Final Report is the last deliverable under Task 6.

2.1 PLANNED AND ACTUAL MILESTONES, PRODUCTS, AND COMPLETION DATES

This project has a long duration for something as straightforward as building sediment detention basins at the outlets of two small ephemeral drainages. The initial origins of this project date back to the fall of 2012, when CDOT published its Sediment Action Control Plan for the I-70 Corridor through Clear Creek County. At that time CCWF had been approved to

construct a mine drainage control project a Turkey Gulch, located just across I-70 and Clear Creek from Hoosac Gulch. CCWF had an approved NPS project located at Turkey Gulch, just across Clear Creek from Hoosac Gulch. That project became unworkable due to landowner recalcitrance over the issue of maintaining the proposed work as constructed. CCWF applied for a replacement project based upon the recommendations in CDOT's SCAP.

There was a lengthy project design process wherein CDOT employed an out side Engineering Design firm. The designs for the project were completed on October 31, 2013.

Environmental Clearances were required. These were finalized on June 30 2014. A sediment management plan and an approval for use of the Church Placer Mine Waste Repository operated by CDPHE's HMWMD were required. This approval was also received in June of 2014. Special Use Permits were required from CDOT for construction in the I-70 Right of Way. The final approval for the Dumont Basin was received on January 5, 2015.

Construction of the improvements at Hoosac Gulch commenced in December of 2014. Construction of the Dumont basin was completed on March 31, 2015.

2.2 EVALUATION OF GOAL ACHIEVEMENT AND RELATIONSHIP TO THE STATE NPS MANAGEMENT PLAN

This project was very successful in implementing sediment control BMPs on high priority drainages in the I-70 corridor. This type of project is consistent with the state's NPS Management Plan.

3.0 BEST MANAGEMENT PRACTICES DEVELOPED AND/OR REVISED

This project involved installation of Sediment storage basins, armored over flow channels, a roadside sediment collection pan and revegetation

3.1 Sediment Basins



Sediment Basin near outlet of Hoosac Gulch



Basin near Dumont on westbound I-70

The Hoosac Basin was completed in late February 2015. The Dumont basin was completed on March 31, 2015. Neither of the tributary drainages flowed much in 2015. Nearly the full capacity of each basin is still available.

3.2 Armored Emergency Overflow Channel

This armored emergency overflow channel conveys any excess flows from the Hoosac Basin safely around the outlet and into the I-70 cross drain into Clear Creek. The overflow at the



Hoosac emergency overflow channel



Dumont emergency overflow channel

Dumont site conveys water into a slough, approximately 1/3 acre in size with a highway cross drain at the far eastern end of the secondary impoundment area.

3.3 Outlet Structures



Dumont Basin Type C outlet structure



Hoosac Basin Type D inlet structure

3.4 Roadside Sediment Collection Pan



Grading Hoosac the sediment pan



Hoosac Sediment pan concrete pour

3.5 Revegetation

Both, the Hoosac and Dumont sites were final graded and then soil amendments were added. The Hoosac Gulch location was particularly challenging since it was a former mine mill site. The soils contained toxic metals and low pH. Lime was applied at the rate of 20 tons per acre and compost was added to achieve a final soil organic content of approximately 3%. The Hoosac site was also



Erosion control blanket on steep abandoned access road

quite steep necessitating the use of erosion control blankets to stabilize the seedbeds. A DRMS recommended seed mix was applied to both sites. The seed mix was designed especially for western montane ecological zones.

The main challenge regarding revegetation at the Dumont site was a lack of organic material in the soil. Compost was added at a rate of 400 cubic yards per acre.

4.0 MONITORING

As discussed above, monitoring was not conducted during the project period.

5.0 COORDINATION EFFORTS

Our main coordination efforts included: regular (biannual) presentations to the Upper Clear Creek Watershed Association; annual presentations to the Clear Creek County Commissioners, including a field trip and regular update with the NPS program staff at WQCD.

5.1 COORDINATION FROM OTHER STATE AGENCIES

This project required constant and ongoing coordination with four separate organizational units within CDOT Region 1- Planning and Environmental (Holly Huyck), Engineering (Neil Ogden), Inspection and Maintenance (Ken McGhee) and Permits (Irv Mallo and Steve Loeffler). We also met in the field with Paul Winkle from CPW and with Julie Annear and Deb Zack from DRMS.

5.2 OTHER STATE ENVIRONMENTAL PROGRAM COORDINATION

None.

5.3 FEDERAL COORDINATION

Federal agencies with whom we coordinated included the United States Federal Highway Administration FHWA and the Forest Service (USFS).

5.4 USDA PROGRAMS

Trez Skillern participated in a field visit at the Hoosac site on behalf of USFS.

5.5 ACCOMPLISHMENTS OF AGENCY COORDINATION MEETINGS

USFHWA was the most determinative federal agency with which we coordinated. That agency had the ultimate influence on our special use permits, highway lane closures, environmental clearances, and all activities within the right of way. Each approval from USFHWA was the final word allowing us to proceed with the matter at hand.

5.6 RESOURCES/COORDINATION FROM FEDERAL LAND MANAGEMENT AGENCIES

None.

5.7 OTHER SOURCES OF FUNDS

While the only source of cash funding was the NPs grant, CCWF, CDOT, Clear Creek County and the AFS Walstrum Quarry provided significant in-kind match. Documentation of this in-kind support is provided in Appendix F.

6.0 SUMMARY OF PUBLIC PARTICIPATION

Outreach included biannual joint presentations to the Upper Clear Creek Watershed Association by CDOT and CCWF, annual presentations to the Clear Creek County Commissioners by CDOT

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and CCWF, Presentations by CCWF during the Sustaining Watersheds Conference, the South Platte Forum and the Urban Waters Partnership.

Six Field trips to the project site were conducted by CCWF involving: the Clear Creek County Commissioners; staff from the County Lands Department and Site Planning Division; students in the 2014 and 2015 Colorado School of Mines Environmental Field Sessions; as well as state agency representatives for WQCD, HMWMD, CPW and DRMS. Trez Skillern, of the Federal Abandoned Mines Program, represented USFS at the site. In addition, multiple joint inspections were done with CDOT's Region 1 Planning and Environmental Program, the I-70 Engineering group and the Highway Maintenance group. CDOT's project manager (Holly Huyck) conducted educational field trips for CDOT staff as part of the implementation efforts associated with the Sediment Control Action Plan for the Clear Creek Corridor.

This project was also featured and discussed during the 2013 and 2014 Clear Creek Watershed Festivals. These outreach events were educational in nature in that the presentations elucidated the problem of erosion of mine waste during storm events, the challenge of controlling such runoff, the design approach for sediment control and metal removal basins and the ongoing maintenance required for such structures.

7.0 ASPECTS OF THE PROJECT THAT DID NOT WORK WELL

Once the project was fully permitted, it went forward expediently without a hitch. It took from July 2013 to November 2014 to get to that point of departure, however. Work within CDOT's right-of-way on I-70 is fraught with difficulties and delays. Environmental Clearances, Special Use Permitting, USFHWA ongoing oversight and a lengthy approval process for any lane closure requirements, rigorous engineering design procedures, independent construction inspection requirements, intraagency sign-offs from planning and environmental, engineering, maintenance and senior management reviews- all come into play. We didn't receive our Special Use Permit for the Dumont Site until January 5, 2015 (permit 1140583-S is included in Appendix C). We applied for this permit approximately one year earlier. We had grossly misunderstood the nature of the CDOT procedures that would come into play for work on behalf of CDOT in its own right of way. This is not to be understood as criticism of CDOT or USFHWA. It is simply a take-away lesson for anyone attempting to perform work of nearly any kind in the I-70 right of way. There are well considered reasons for CDOT's modis operendi.

There was an additional issue that was very time consuming to address, as well the need to secure permission to utilize the Church Placer Repository for Sediment disposal. This required about eight months of effort between CCWF, CDOT, HMWMD and EPA.

Unfortunately, by the time these procedural issues were handled most of the period of performance for the project had elapsed. We had planned to build the project in 2013 and to operate it for at least 2 years, allowing plenty of time for sediment to accumulate and to execute maintenance and monitoring activities. Construction was completed at the end of March 2015 and the project periods of performance ended on October 31, -2015.

8.0 FUTURE ACTIVITY RECOMMENDATIONS

CDOT's Sediment Control Action Plan has identified several other tributary basins within the Colorado mineral belt along the highway corridor, where past mining contributes metaliferous sediment into the right of way, which is then transported to Clear Creek. These should be addressed in a similar manner as was done for the sites described in this report. Adequate time should be allowed to deal with the procedural requirements and to complete the projects with enough time to gather measurable results. Since any such projects will become part of CDOT's permanent highway drainage infrastructure and receive regular inspection and maintenance, they should be viewed in a positive light. Such projects are subject to accurate monitoring for measurable results, i.e., geostatistical approaches for sampling, analysis of multiple composite samples and determination volumes removed to an offsite repository. But even lacking such documentation, experience has shown that these tributary basins are capable for generating massive quantities of contaminate sediment when storm tracks cross their headwaters areas. The peak flow associated with a 25-year storm event in Hoosac Gulch was calculated using the rational method to be 109 cfs with a volume of 9 ac.ft.