



Cherry Creek Basin Water Quality Authority
8390 East Crescent Parkway, Suite 500
Greenwood Village, Colorado 80111
(P) 303.779.4525 (F) 303.773.2050

January 10, 2013

Ms. Tiffany Clark, PE.
SEMSWA
86 Inverness Drive East, Suite A
Englewood, CO 80112-5106

Subject: CDOT-Arapahoe Road over Cherry Creek – Water Quality Report

Dear Ms. Clark:

The Cherry Creek Basin Water Quality Authority (Authority) has reviewed the subject project for point and non-point source pollutant impacts and water quality considerations in the Cherry Creek watershed. The Authority reviews land disturbance projects for compliance with Control Regulation No. 72¹ and the Authority's CR72.7 Stormwater Guidance Document².

The Authority is a quasi-governmental agency and political subdivision of the State of Colorado whose mission is to improve, protect, and preserve the water quality of Cherry Creek and Cherry Creek Reservoir and to achieve and maintain state water quality standards for the Reservoir and related watershed. Control Regulation No. 72 provides limited direct responsibility to the Authority to implement projects that reduce inflow total phosphorus concentrations to Cherry Creek Reservoir.

Introduction and Purpose

To meet post-construction BMP requirements for construction of the Arapahoe Road Bridge project, Colorado Department of Transportation (CDOT) is proposing³ to participate in the cost of stream reclamation of Cherry Creek. Stream reclamation is an alternative to stormwater quality detention for post-construction⁴ BMPs required under CDOT's and the Southeast Metro Stormwater Authority (SEMSWA) stormwater permit for new development and redevelopment. CDOT's and SEMSWA's stormwater discharge permit also requires each agency to comply with requirements of Control Regulation No. 72.

The purpose of this review is to provide an opinion whether stream reclamation meets the requirements of Control Regulation No. 72 as a post-construction BMP and is consistent with the Authority's mission. CDOT would participate in stream reclamation through a funding agreement with the (SEMSWA), referred to as the "*CDOT and SEMSWA Funding Agreement – Arapahoe Bridge Project*" (BMP Funding Agreement).

The Authority defines⁵ stream reclamation to mean:

¹ Colorado Department of Public Health and Environment, Water Quality Control Commission November 30, 2012. *Cherry Creek Reservoir Control Regulation 5 CCR 1002-72*.

² CCBWQA April 27, 2011. *Control Regulation 5 CCR 1002-72 Stormwater Permit Requirements Guidance Document*.

³ Muller Engineering Company October 17, 2012. *Final Water Quality Treatment Report for Arapahoe Road Bridge Over Cherry Creek CDOT Project No. FBR-088A/18147*.

⁴ The agreement between CDOT and SEMSWA allows CDOT to substitute participation in stream reclamation to meet *post-construction BMPs only*. CDOT must implement construction BMPs as part of the bridge Project.

⁵ CCBWQA June 16, 2011. *Stream Reclamation, Water Quality Benefit Evaluation – Interim Status Report*.

“...additional measures or enhancements to channel or stream stabilization that typically includes riparian and floodplain vegetation planting or enhancements and a channel cross section that results in more frequent connection and flooding of the overbank area. Riparian vegetation promotes filtration of fine particles with attached nutrients, and over-bank flooding promotes additional filtration and to some extent infiltration both which reduce nutrient loads and concentrations. Therefore, the benefits from stream reclamation include the reduction in sediment and nutrients (i.e.: phosphorus and nitrogen) transport from the main channel, but also reduction in nutrient loads from riparian and floodplain vegetation through more frequent floodplain inundation.”

Background

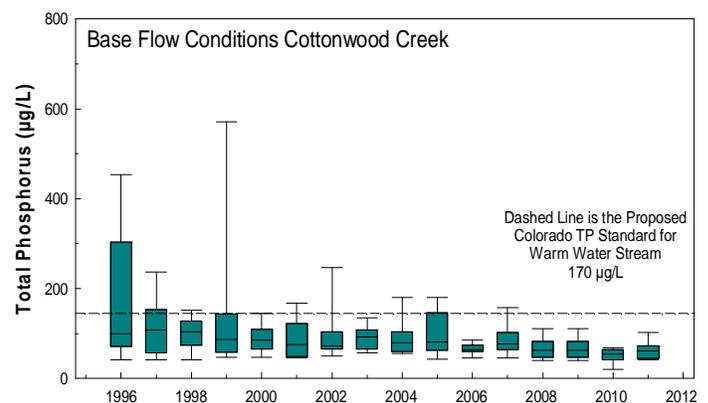
In 2010, the Authority began working with SEMSWA, Urban Drainage & Flood Control District (UDFCD), Arapahoe County, and Aurora (collectively called “Parties”) to plan, design, and implement stream reclamation along Cherry Creek from Cherry Creek State Park southern boundary to the downstream end of Eco Park, a distance of approximately 2.08 miles. The planning effort has resulted in an update to the current Cherry Creek drainage master plan⁶ for the 2.08-miles⁷. The four phases of the project are expected to cost approximately \$11.7M to implement over the next 5-years or so. The complete project is referred to as *Cherry Creek Stream Reclamation – State Park to Eco-Park* or “Stream Reclamation Project”.

During the same time frame, CDOT has been developing plans to construct a replacement bridge and approach roadway over Cherry Creek at Arapahoe Road (Bridge Project). The Bridge Project will include construction BMPs and post-construction BMP (i.e.: channel stabilization, water quality swales) within the roadway prism. Originally at the FIR design level, CDOT proposed to construct two water quality detention ponds (extended detention basins) to meet stormwater permit requirements. The cost of the extended detention basins and related work was estimated by CDOT to be ~ \$384,000. SEMSWA reviewed the cost and believes the estimate is reasonable.

The Parties have been in discussions with CDOT regarding replacement of the Arapahoe Road Bridge at Cherry Creek to coordinate the Parties’ Stream Reclamation Project plans and CDOT’s stormwater management plan for the bridge replacement. In late 2011, the Parties suggested to CDOT that Control Regulation No. 72 allows alternatives for water quality capture volume (WQCV) BMPs where:

“...the permittee may allow alternative BMPs that do not use WQCV approach or are in combination with the WQCV, if they are shown to have comparable or better nutrient concentration reduction characteristics for the given use when properly designed, implemented, and maintained...Specifically, the permittee may allow for the owner to use stream bank stabilization at the development site...to reduce the need for WQCV for the whole site. (@72.7(c)(6)(iii)).

To meet post-construction BMP requirements, CDOT and SEMSWA are proposing to enter into an agreement where CDOT will provide funds to SEMSWA to participate in an undivided interest in the water quality components of the Stream Reclamation Project. SEMSWA would encumber CDOT’s funds into a project account with UDFCD that will be established as part of a separate intergovernmental agreement (IGA) between the Parties for the planning, design, and construction of the Stream Reclamation Project.



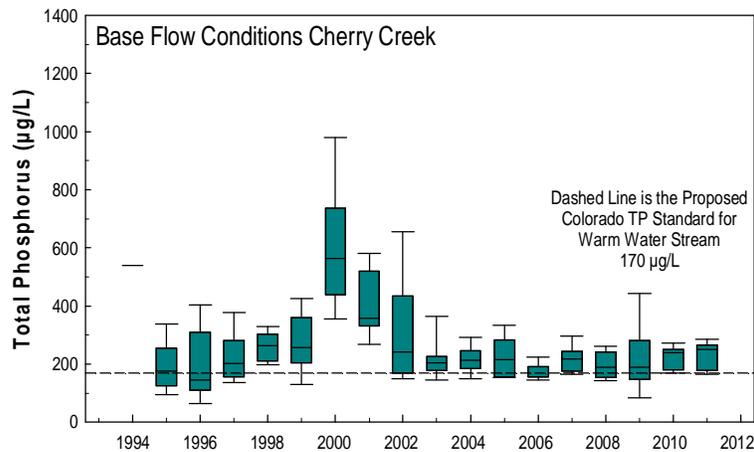
⁶ URS Corporation January 2004. *Cherry Creek Corridor Reservoir to Scott Road Major Drainageway Planning Preliminary Design Report*.

⁷ See Muller Engineering Company Water Quality Report, Appendix C for maps of Stream Reclamation Project.

Water Quality Benefits of Stream Reclamation.

Since the late 1980's the Authority has been constructing and monitoring non-point source pollutant reduction facilities (i.e.: PRF), such as stream reclamation projects, to control nutrient loads and concentrations in Cherry Creek, the Reservoir, and their tributaries. Data collected by the Authority in Cottonwood Creek where stream reclamation has been completed show that these measures have reduced total phosphorus to below concentrations proposed by the Water Quality Control Commission (WQCC) in Control Regulation 85 (i.e.: 170- $\mu\text{g/l}$). Cottonwood Creek data were presented in the Authority's annual report⁸ and the results presented to the WQCC during the triennial review hearing for Control Regulation No. 72 on May 14, 2012. Figure 7-24 from the annual report (previous page) shows the significant reduction in phosphorus concentrations that can occur when stream reclamation and watershed controls are implemented in a comprehensive manner.

Data collected by the Authority for Cherry Creek, where stream reclamation has only been completed in the middle reaches between the Reservoir and the Town of Parker, show that total phosphorus concentrations



during base flows have decreased since 2000 during the period when watershed was experiencing unprecedented growth. Whereas base flow concentrations are still higher than the proposed standard, the median values have been significantly reduced as reflected in the data on Figure 7-26 to the left. Two additional reaches of Cherry Creek were reclaimed in 2012⁹, one reach is under construction¹⁰, and two reaches¹¹ are planned for construction in 2013. Completion of the 3.3-miles of additional stream reclamation is expected to further reduce phosphorus concentrations in Cherry Creek.

Performance of BMPs with WQCV.

The minimum post-construction BMP requirement in Control Regulation No. 72 for new development and redevelopment is extended detention basins, which is a permanent BMP that includes WQCV¹². The International Stormwater BMP Database (<http://www.bmpdatabase.org/>) provides BMP performance information that is updated periodically and summarized in Table 2-2 of the UDFCD manual¹³ volume 3. These data show that the total phosphorus median effluent (discharge) concentration for extended detention basins is 0.20-mg/l (200- $\mu\text{g/l}$). Since Cottonwood Creek data show that phosphorus concentrations are less than 170- $\mu\text{g/l}$ the data demonstrates that stream reclamation can have comparable or better nutrient reduction characteristics as a BMP with WQCV characteristics.

Conclusions

The Authority supports the IGA between CDOT and SEMSWA that allows CDOT to participate financially in an undivided interest in the *Cherry Creek Stream Reclamation – State Park to Eco-Park Project*. The

⁸ Cherry Creek Basin Water Quality Authority March 31, 2012. *2011 Annual Report on Activities Cherry Creek Basin Water Quality Authority*. See Figure 7-24 and 7-26.

⁹ 12-Mile Park Phase I reach (500-ft) and the PJCOS reach (5,100 ft)

¹⁰ Eco Park reach (6,800-ft)

¹¹ 12-Mile Park Phase II reach (2,500 ft), Cherry Creek d/s Hess Road (7,700 lf)

¹² CR72 @ 72.7.2(c)(6)

¹³ UDFCD November 2010. *Urban Storm Drainage Criteria Manual Volume 3 – Best Management Practices*.

Authority believes that stream reclamation provides equal or better water quality protection compared to CDOT providing two water quality detention ponds. The bases for this opinion include:

1. Control Regulation No. 72 allows stream bank stabilization as an alternate to BMPs that use WQCV when shown to have comparable or better nutrient concentration reduction characteristics.
2. The proposed Cherry Creek Stream Reclamation project will include additional measures or enhancements to channel or stream stabilization that include riparian and floodplain vegetation to provide additional filtration and infiltration of stormwater and, therefore, stream reclamation measures are more comprehensive and beneficial than stream bank stabilization alone.
3. The Authority has collected water quality data in Cottonwood Creek and Cherry Creek that shows that stream reclamation can provide equal or better nutrient reduction characteristics than water quality detention ponds.
4. CDOT's alternative plan to construct two water quality detention ponds is not consistent with and would interfere with the proposed Cherry Creek Stream Reclamation plan developed by the Parties. If CDOT were to construct the two water quality detention ponds, the ponds would have to be removed by the Parties in order to implement Cherry Creek Stream Reclamation project.
5. CDOT's alternative plan to construct two water quality detention ponds would require the ponds to be placed on the City of Aurora's property. Since the City of Aurora does not allow detention ponds for development or redevelopment to occur in the floodplain, CDOT's alternate plan would require an exemption from Aurora's requirements under their stormwater discharge permit.
6. Water quality detention ponds require more intensive maintenance activities to preserve the pond functions than stream reclamation projects. Therefore, CDOT's participation in the Cherry Creek Stream reclamation project is a more efficient use of public funds and will further benefit water quality.
7. CDOT proposes additional, on-site post-construction BMPs that will further enhance water quality of Cherry Creek.

Review Comments

The Authority supports the proposed CDOT water quality plan for the Arapahoe Road Bridge project where CDOT would participate in an undivided interest in the water quality components of the Cherry Creek Stream Reclamation Project. Specific comments on the water quality plan are attached.

Respectfully submitted



William P, Ruzzo, PE

For the Cherry Creek Basin Water Quality Authority

Encl: Comments on the Water Quality Report

Cc: Chuck Reid, Manager
Ashley Byerley, SEMSWA
Joe Juergensen, Muller Engineering Company

Enclosure
CCBWQA Comments on the Water Quality Report

1. Page 6 paragraph 1, last sentence: "...from the southern half of the road EAST? of the"
2. Page 6, paragraph 3: In the previous paragraph, you state that the Shoppes at Arapahoe include a WQ pond, which appears to conflict the statement in previous paragraph 2.
3. Page 7, paragraph 3: Regulation 72 does not require WQCV type post-construction BMPs for trails provided other BMPs are included.
4. Page 8 "Recommended Design", paragraph 2: Add the following underlined text "...an undivided interest in the water quality components of the Cherry Creek Stream..."
5. Page 9, paragraph beginning with "A series of pretreatment...". The Authority supports the use of pre-treatment swales. However, if they are part of the Stream Reclamation Plan, then long term maintenance commitments and identification of the responsible party(ies) are needed, as discussed further on in the report but worthy of additional emphasis.
6. Reference #3: Change the date to November 30, 2012, which is now the current adopted WQCC version.
7. Last Reference: Delete this reference since it is simply a citation for Reg 72 and not a separate reference.
8. Figure Page 19 of 29. The map as shown here is not complete and is unclear. I recommend creating another exhibit based on this plan. The figure needs to be updated and perhaps titled "Stream Reclamation Project –Conceptual Plan" which can then become an exhibit that shows all the project components. If agreed, add the following:
 - a. Reach 1 should end at the CCSP boundary and is not part of the "Stream Reclamation Project" but is now a PRF that is the responsibility of the CCBWQA. The actual Stream Reclamation Project begins at Reach 2.
 - b. The map should extend upstream to the downstream tie-in drop of the EcoPark section and should identify the reclamation requirements.
 - c. Show the "pre-treatment swales" on the project map as they are now important components that will help solidify the concept.
9. Suggest including the Authority's Stream Reclamation Evaluation in the appendix since it highlights much of the proposed goal.
10. Suggest including discussion that Stream Reclamation is a unique alternative available in the Cherry Creek Basin, due in large part to the regional emphasis on flood control, water quality, and stream stability.