

**DATE:** February 8, 2023

**TO:** Jane Clary, Wright Water Engineers, CCBWQA Technical Manager

**CC:** Jon Erickson, CCBWQA Technical Advisory Committee Chairman

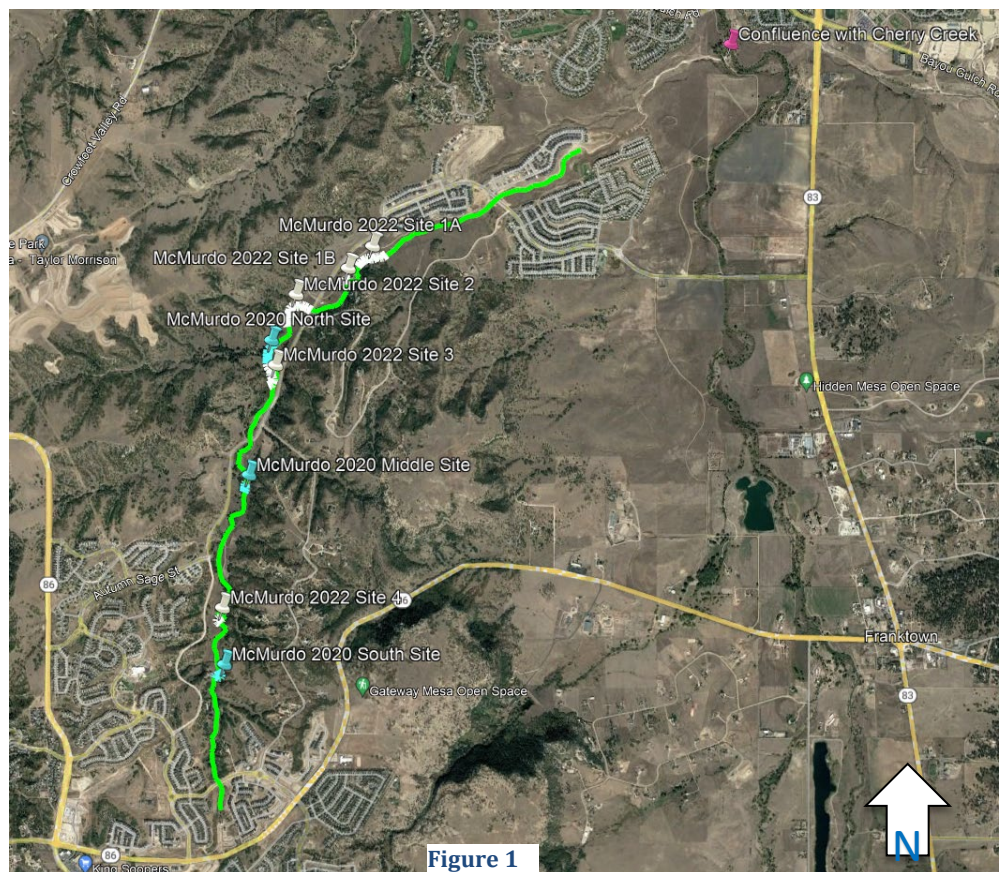
**FROM:** Richard Borchardt, PE & CFM

**SUBJECT:** McMurdo Gulch – 2022 Stream Reclamation Project Summary

**Background and Purpose:**

McMurdo Gulch is a western tributary to Cherry Creek that is 6.7 miles long and has a watershed area of 6.5 square miles. The McMurdo Gulch 2022 Stream Reclamation Project (2022 Project) continues the partnership between the Town of Castle Rock (Castle Rock) and Cherry Creek Basin Water Quality Authority (CCBWQA) on McMurdo Gulch, which began with 2011 Project<sup>1</sup> and the 2020 Project.<sup>2</sup> **Figure 1** shows the location of the 2022 Project (see white sites) and the 2020 Project (see cyan sites).

An Adaptive Management Approach (AMA) is used on McMurdo Gulch: as development occurs, stream changes and degradation are monitored, and the stream is reclaimed as needed. Castle Rock monitors and assesses McMurdo Gulch to determine the scope and schedule of stream reclamation needed to



**Figure 1**

<sup>1</sup> McMurdo Gulch Stream Reclamation – Project Summary; William P. Ruzzo, PE, LLC; November 16, 2011.

<sup>2</sup> McMurdo Gulch - 2020 Stream Reclamation Project Summary; R2R Engineers; February 2, 2022.



Photo 1, Site 2



Photo 2, Site 3



Photo 3, Site 4

improve the stability, natural and beneficial functions, and improve water quality of the stream. In November 2016, Muller Engineering Company (MEC) prepared the 2016 McMurdo Gulch Reach Assessment (MGRA).<sup>3</sup> MEC started their monitoring and assessment at the upstream end of McMurdo Gulch and continued downstream approximately 4.9 miles (see green line in **Figure 1**).

**Existing Conditions:**

From the 2016 MGRA, “The average gradient through the studied reach varies between 1.3% and 2.0%. Evidence of erosion was observed in many locations along the length of the channel. Head cuts, incision, and areas of instability were recorded. In addition, the level of instability and potential for future adverse impacts from the upstream watershed were noted and included in the assessment. Channel reaches in good condition were also noted so that they can be used as reference reaches for restoring stability to degraded reaches.” The MGRA informed the first 3 priorities. The 2020 Project was the first priority and the 2022 Project is the second priority in the MGRA and includes 5 reaches labeled starting at the north end with 1A, 1B, 2, 3, and ending with 4 at the south end. **Photos 1-3** show the existing conditions of the 2022 sites.

**Design Approach:**

McMurdo Gulch is changing with the development of the watershed, as can be seen through the bed and bank erosion in **Photos 1-3**. These changes seem relatively mild; however, through the adaptive management approach provides the right project at the

<sup>3</sup> 2016 McMurdo Gulch Reach Assessment; Muller Engineering Company; November 3, 2016.

right time. MEC designed the 2022 Project using a combination of grade control (boulder cascade and riffle drop structures), bank protection (void filled riprap and vegetation), and grading to create overbanks and reduce erosion potential. The 2022 Project includes stream reclamation of approximately 3,700 Linear Feet of McMurdo Gulch.

**Construction:**

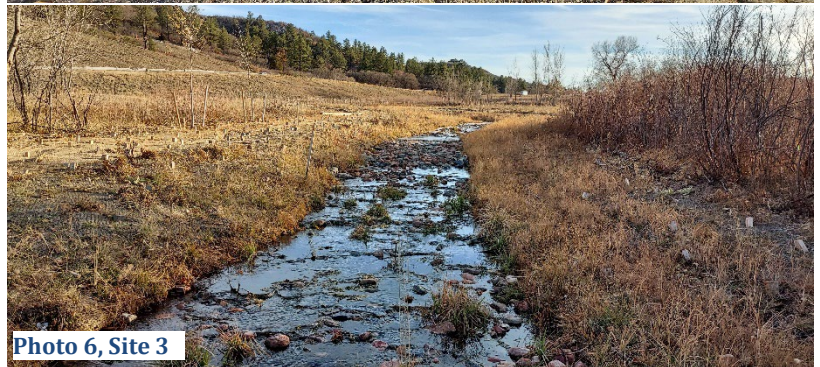
The 2022 Project was constructed from February to November 2022 by Tezak Heavy Equipment. **Photos 4-6** show the constructed improvements for the 2022 Project sites.

**Funding:**

Castle Rock and CCBWQA are partners on the 2022 Project. The cost sharing is 75% Castle Rock and 25% CCBWQA. The project cost is \$1,926,000 with \$482,000 being CCBWQA’s share.

**Water Quality Benefits:**

The 2022 Project includes stream reclamation which provides water quality benefits for the stream and ultimately Cherry Creek Reservoir.<sup>4</sup> Stream reclamation reduces erosion and immobilizes nutrients (including phosphorus and nitrogen) in the soils, reducing nutrient loading to McMurdo Gulch and Cherry Creek Reservoir. Ruzzo states, “Load and concentration reductions during base and storm flow conditions can occur by reducing flow velocities, providing greater areas for filtration and infiltration of stormwater and, to some extent, through increases in dissolved oxygen”.<sup>5</sup> The 2022 Project immobilizes an estimated 63 pounds of phosphorus per year.<sup>6</sup>



<sup>4</sup> CCBWQA Stream Reclamation, Water Quality Benefit Evaluation – Interim Status Report; CCBWQA Technical Advisory Committee; June 16, 2011.

<sup>5</sup> McMurdo Gulch Stream Reclamation – Project Summary; William P. Ruzzo, PE, LLC; November 16, 2011

<sup>6</sup> CCBWQA 2022 Capital Improvement Program Supporting Data, Board Adopted Version November 18, 2021.

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R2R Engineers Memorandum

**Summary:**

**Water Quality Benefit of reduction of ≈ 63 pounds of phosphorus per year**

**Total Project Cost = \$1,926,000**

**Authority's Share = \$482,000**

**Engineer: Muller Engineering Company**

**Contractor: Tezak Heavy Equipment**

Additional information for the McMurdo Gulch – 2022 Stream Reclamation Project can be found at the project sponsor websites below.

Castle Rock website link: <https://crgov.com/1698/Stormwater>

CCBWQA website link: <https://www.cherrycreekbasin.org/library/>