USDA Forest Service
Tonto National Forest
Arizona

September 15, 2020

Process Memorandum to File

Additional Post-DEIS Review of Geomorphology Impacts

This document is deliberative and is prepared by the third-party contractor in compliance with the National Environmental Policy Act and other laws, regulations, and policies to document ongoing process and analysis steps. This document does not take the place of any Line Officer's decision space related to this project.

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Purpose of Process Memorandum

The Draft EIS (DEIS) for the Resolution Copper project was released in August 2019 and included an analysis of the potential impacts to geomorphology in downstream drainages, from either sedimentation or erosion. This analysis was contained in Section 3.7.3 "Surface Water Quantity" of the DEIS.

A public comment was received suggesting that an alternative or supporting technique could be used to bolster the analysis of geomorphology in the FEIS:

> *Impacts to channel geomorphology (slope) from reductions in flood flows and changes in sediment loads can be estimated from Lane's Balance using equation 1.4 in USDA FS RMRS-GTR-226 (2009). This is a quantitative way to describe if you expect the channels to aggrade or degrade.* (Comment #28449-55)

The purpose of this process memo is to document the response to this comment, in support of changes to the FEIS.

Key Process Steps

In order to assist the Tonto National Forest with reviewing public comments, formulating responses to those comments, and revising analysis where appropriate, a Water Resources Workgroup was reconvened in January 2020. This workgroup represented the combination of several workgroups that existed prior to the publication of the DEIS, which were useful to the Tonto National Forest for evaluating groundwater modeling and water quality impacts. The reconvened workgroup included a wide variety of participants including Forest Service specialists, specialists from the NEPA third-party contractors, Resolution Copper and their contractors, cooperating agency specialists including USEPA, the U.S. Army Corps of Engineers, Arizona Department of Water Resources, Arizona Department of Environmental Quality, Arizona Game and Fish Department, and a specialist attending on behalf of the San Carlos Apache Tribe. The possibility of using the proposed analysis technique was explored during the April 2020 meeting of the Water Resources Workgroup (Project Record #0003214).

In response to this comment and others, a new analysis was conducted by Resolution Copper's contractor using the proposed technique, specifically for the Preferred Alternative (JE Fuller 2020; Project Record #0004212).

The new analysis was reviewed by the surface water specialist on the NEPA team, Hamish Weatherly with BGC Engineering. His review is captured in an email dated April 29, 2020 and included as Attachment 1 of this process memo.

Additional Assessment of Geomorphological Impacts

JE Fuller used the Lane Balance approach suggested by the comment, as well as other techniques, to estimate impacts to channels downstream from the Alternative 6 tailings storage facility. The analysis focused on two questions:

- Would the reduction of runoff due to capture of stormwater by the tailings storage facility result in downstream geomorphological changes in the channel of Dripping Springs Wash?
- Would the detention of sediment by stormwater controls result in downstream geomorphological changes in the channel of Dripping Springs Wash?

JE Fuller documented the observed conditions in seven segments of Dripping Springs Wash. Dripping Spring Wash is described as an alluvial river system predominately characterized by a braided channel pattern and sand and gravel bedload sediment. Aerial photograph interpretation and field investigation indicates the wash is in a natural stable condition. The bedload sediment of the wash suggests high sediment transport rates during moderate and large flood events. The availability of sediment from both the main wash and its tributaries is one component that this is contributing to the overall stability of the system.

After applying two different techniques that use discharge and slope to estimate channel characteristics, JE Fuller concluded that the current braided characteristics of the ephemeral system would not fundamentally change due to the change in runoff.

JE Fuller further concluded that changes in sediment load could have an effect:

> *The qualitative sediment analysis indicates Dripping Spring Wash is primarily a sand and gravel alluvial system that is subject to high rates of sediment transport during flood events. The system is presently in a natural balance of sediment supply, transport capacity, and slope. The proposed Skunk Tank TSF design includes multiple surface water diversion dam structures for many of the Dripping Spring Wash tributaries that drain into the TSF. The purpose of the dam structures is to trap and divert stormwater into the proposed TSF diversion channel and pipeline network, which then diverts the flow around the TSF and discharges back to Dripping Spring Wash downstream of the TSF … The diversion dams will also trap and store tributary sediment. The release of "clearwater" flow downstream of the TSF will likely result in channel bed scour and/or bank erosion of Dripping Spring Wash that may propagate upstream and adversely impact the TSF main embankment. It is recommended that engineered erosion countermeasures be implemented in the TSF design to mitigate potential erosion*. (p. 20)

JE Fuller also noted this would only persist during operations:

> *The closure strategy includes removal of the surface water diversion structures and pipeline network, and the establishment of a diversion channel and tailings surface channel network that will divert and transport offsite and onsite stormwater back to Dripping Spring Wash downstream of the TSF, restoring the sediment transport capacity and overall sediment delivery of Dripping Spring Wash to near pre-TSF conditions.* (p. 21)

The NEPA specialist reviewed the report and concurred. Additional discussion will be added to Section 3.7.3 of the FEIS to reflect these conclusions.

References

JE Fuller. 2020. Skunk Camp Tailings Storage Facility, Dripping Spring Wash Geomorphic Impact Assessment. April.

ATTACHMENT 1 – APRIL 29, 2020 EMAIL DOCUMENTING REVIEW OF JE FULLER GEOMORPHOLOGICAL ASSESSMENT OF PREFERRED ALTERNATIVE

Chris Garrett

Subject: FW: RC Action Item Follow-Up - Response to EPA Comment on PN - Sediment Loads

From: Hamish Weatherly <HWeatherly@bgcengineering.ca>
Sent: Wednesday, April 29, 2020 8:27 AM
To: Chris Garrett <cgarrett@swca.com>; Nick Enos <nenos@bgcengineering.ca>; DHrubes@bgcengineering.ca
Cc: Donna Morey <dmorey@swca.com>
Subject: RE: RC Action Item Follow-Up - Response to EPA Comment on PN - Sediment Loads

Chris:

Some comments on the Fuller report:

- Fuller used the Lane equation to determine the channel pattern (see below). They looked at a location just downstream of the TSF (not near the confluence with the Gila River) and using the equation below determined that the channel pattern would remain braided even with a reduced mean annual discharge. Therefore, they concluded that the reduction in downstream discharge would not have substantial downstream impacts to Dripping Spring Wash.

$So > 0.010\ Qm^{-0.25}$ (Braided channels)
$So < 0.001\ Qm^{-0.25}$ (Meandering channels)
So = channel slope (ft/ft), and
Qm = mean annual discharge (cfs)

- They also note that the proposed diversions will trap sediment, so the reach downstream of the proposed TSF would be "clearwater" flows (i.e., a hungry flow that has excess sediment transport capacity). They concluded that this would likely result in channel bed scour and/or bank erosion of Dripping Spring Wash. Engineering countermeasures were recommended to mitigate this potential erosion. So they are saying that the channel will degrade following TSF construction.

Looking at the photos of the channel substrate (sand and fine gravel), I would agree with this conclusion.

Cheers

Hamish