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APPLIED RIVER SCIENCES

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August 27, 2021

Stephanie Moreno
Executive Director
Guadalupe Coyote Resource Conservation District
888 N. 1st Street, Suite 204
San Jose, CA 95112

RE: Recommendations for 2021 Reach 6 Gravel Augmentation

Dear Stephanie:

As you know, I have been working with Valley Water staff to help convey priority objectives of the 2015 Gravel Augmentation Plan (GAP), refine gravel size specifications to meet those objectives at the Reach 6 project site, and brainstorm potential solutions to discrepancies between desired gravel specifications and those proposed by the contractor awarded by Valley Water's Board of Directors. The contractor has had a very difficult time trying to find the gravel material specified in the contract and has reached out to at least six (6) different quarries and landscape suppliers over the last month and a half and all have stated that they cannot meet the gravel specification. However, the contractor is GraniteRock and they have worked with their own quarry to modify their operations to provide two gravel mixes (Course Blend and Fine Blend) that have come the closest out of any other quarries to meet the desired gravel specification. Upon review, the primary issue that still remains is whether the gravel size distribution proposed by the contractor compromises our ability to achieve the desired objectives as described in the GAP.

The gravel size recommended for Reach 6 in the GAP is attempting to achieve two primary objectives: 1) provide larger grain sizes up to 8 inches in diameter to provide vertical channel stability, and 2) provide smaller grain sizes less than 5 inches in diameter to provide substrates suitable for salmonid spawning and rearing habitat (and other ecological benefits). The gravel size distribution proposed by the contractor for the Course Blend comes closest to the gravel specification; however, the gravel deviates from the desired gravel size distribution described in the project specifications in two primary ways:

Deviation #1- The proportion of grains less than 2 inches in diameter is substantially less than the specifications (Table 1)

Deviation #2- The proportion of grains greater than 8 inches in diameter is substantially greater than the specifications (Table 1)

Table 1. Summary of Valley Water grain size specifications (far right column) and contractor-proposed grain size distribution (middle column). Red circles indicate areas of primary deviation.

Gradation : Cumulative Percent Passing

Sieve Sizes	Southside Cobbles	Project Specification
8-inch	78-88	100
7-inch	74-84	84-100
6-inch	73-83	75-84
5-inch	67-77	60-75
4-inch	57-67	45-60
3-inch	43-53	25-45
2-inch	2-11	10-25
1-inch	0-6	4-15
3/8-inch	0-5	0

Discussions with the contractor has indicated that they can supplement the gravel in the proposed Course Blend by adding more gravels that are less than 1.5 inches in diameter to bring the proportion of gravel less than 2 inches to fall within the desired 10-25% range. Therefore, Deviation #1 can be likely be resolved by the adjustment proposed by the contractor.

Addressing Deviation #2 has been more problematic, as the contractor has stated they will try to minimize the greater than 8-inch gravels at the quarry to the extent possible, but is not able to guarantee that grains greater than 8-inches will be precluded from the delivered gravels. I have substantial concern that large grain sizes (boulders) that are much greater than the desired maximum grain size of 8 inches in diameter (Table 1) will be placed in the channel. My review of photos of the materials indicates that we could receive grain sizes in excess of 12 inches in diameter, which give me substantial concern that these very large grains could result in an overly stable channel.

Over the past two weeks, myself, Valley Water, and the contractor has investigated other potential gravel sources that could better meet the specification. The contractor contacted a large number of quarries and landscape suppliers, and none of them could meet the gravel specification on the timeline needed to implement the project this year. My conclusion is that it will be very difficult to impossible to obtain a better gravel particle size distribution from another supplier in the short timeline available for implementation this year. Given that this project is the first to be implemented under the guidance of the GAP, it should be implemented consistent with the objectives and corresponding gravel sizes recommended in the GAP. However, because this project has been delayed over multiple years, I have substantial concern to deferring project implementation for yet another year or more.

Therefore, it is my recommendation that we should proceed with project implementation this year if the following can be conducted:

1. Treat this initial gravel augmentation project as an experiment, where we can deviate modestly from the specification, as long as we have a rigorous monitoring and assessment process (consistent with the May 2021 monitoring plan) to better inform project performance and refinement of future grain size distribution.
2. Have the contractor add materials finer than 1.5 inches in diameter (as they have proposed) that brings the proportion of gravels finer than 2 inches in diameter to between 10% and 25% (Table 1).
3. Request that the contractor take steps to avoid to the greatest degree possible of including grain sizes greater than 8-9 inches in diameter.

4. As part of treating this initial gravel augmentation project as an adaptive management experiment, I recommend the following:
 - a. Develop a concise document that summarizes the proposed adaptive management experiment. I would be happy to prepare this document if desired by the GCRC.
 - b. Collect at least two random samples of gravels delivered to the site to document the grain size distribution of material placed in the channel. These sample sizes should be statistically significant, and sieved/weighed to document the grain size distribution. I would be happy to help develop a cost-effective sampling design for this effort, to be implemented by either the contractor or Valley Water staff.
 - c. Conduct monitoring as defined in the Upper Guadalupe River Project Reach 6 Aquatic Habitat Improvement Project Monitoring Plan for Phases 1 and 2 (May 2021 revision).
 - d. Enhance the Phase 1 monitoring schedule to include Year 2 for topographic surveys and tracer rock monitoring (in addition to Year 3).
 - e. Enhance the Phase 1 monitoring effort to include peak flow water surface profile monitoring through the site (accurate survey of debris lines immediately after peak flow or installation of temporary pressure transducers to record water surface elevations).
 - f. Enhance the Phase 1 assessment effort to include updating the 1-D hydraulic model with post-flood topography, calibrating the model with the peak flow water surface profiles and flow magnitude estimate, and conducting a hydraulic bed mobility analysis to evaluate the mechanics of observed bed mobility. This analysis will enable us to refine bed mobility models and associated future gravel augmentation specifications to better meet bed mobility and stability objectives.
 - g. Discuss potential improvements in future gravel specifications with the 2021 contractor (if willing) or other gravel augmentation contractors to reduce future gravel augmentation costs and increase ability to obtain desired gravels from local quarries.
5. For subsequent gravel augmentation projects, coordinate with regional gravel quarries at least 6 months prior to project commencement to ensure that a gravel source can be procured that will meet project specifications and is cost-effective.

Recommendations 1-3 and 4b should be expedited so implementation can begin immediately; the remainder of the Recommendations can occur after project implementation is completed, and thus is not time sensitive (although should be initiated prior to the high flow season in this coming winter).

I am happy to help on some or all of these recommendations as the GCRC and Valley Water desires. I hope these recommendations will help Valley Water proceed with this important project in 2021 in a way that we can greatly learn from this initial project that will improve subsequent phases of gravel augmentation projects on the Guadalupe River.

Sincerely yours,



Scott McBain