San Francisco Bay Regional Water Quality Control Board

TO: Keith Lichten, Chief
WATERSHED MANAGEMENT DIVISION

FROM: A.L. Riley and Setenay Bozkurt Frucht
PLANNING and TMDL DIVISION

DATE: April 12, 2016

SUBJECT: **GEOMORPHIC INDICATIONS FOR LONG-TERM DEPOSITIONAL ENVIRONMENT ON BERRYESSA CREEK IN THE UPPER BERRYESSA CREEK FLOOD RISK MANAGEMENT PROJECT**

The Santa Clara Valley Water District is the non-federal partner with the U.S. Army Corps of Engineers (Corps) for the Upper Berryessa Creek Flood Risk Management Project (Project), for which the District will be required to sign an agreement with the Corps to accomplish long term maintenance. The Project's downstream boundary is Calaveras Boulevard in Milpitas, and the upstream boundary is Interstate 680 in San Jose, for a 2.2 mile long reach. The district has concluded that there will not be maintenance required on this Project because a hydraulic model indicates that the channel will be in sediment transport equilibrium and more erosional than current conditions, and therefore no sediment deposition is anticipated. Water Board staff does not agree with this conclusion. Moreover, a Corps technical staff member with whom we have communicated about the Project share our concern, even though the Corps does not have a public position on the issue. For these reasons, the Water Board will issue a WDR to condition how future maintenance should proceed on this project given our expectation that sediment will likely continue to deposit along the project reach based on the proposed design and as it has done historically, and that ongoing environmental impacts due to maintenance are inherent in the design.

The history of this issue begins with a third-party review of this project conducted for the Corps to evaluate the proposed project design in which the reviewers criticized the project for not applying standard "stable" – or equilibrium channel design to avoid excessive sedimentation and long term maintenance (technical, independent external peer review report prepared by Battelle Memorial Institute for the Corps on March 6, 2013) (Peer Review Report). (Peer Review Report).The Corps' response to the Peer Review Report is in the Corps' *Revised* Final EIS Report dated March 2014 (received by Water Board staff on August 4, 2015) updated the original Final EIS dated December 2013. However, the Revised Final EIS (March 2014) fails to correct for the sediment modeling assumptions used in the earlier EIS (December 2013) in which the project design resolves the sediment transport issues raised in the Peer Review Report by assuming that another proposed project involving a bypass channel in the so-called Greenbelt Area upstream of I-680, which is neither designed nor permitted at the date of the permit application, would result in reduced project sediment loads and more efficient sediment transport.

Meetings with the Corps and District later clarified that the Upper Berryessa Creek Flood Control project will not be influenced by any upstream changes in maintenance activities or new bypass or other additional project features. The new explanation for the assertion of reduced sediment loading to the Project reach was that the Project will reduce channel bed and bank erosion. According to their modeling assumptions, this is responsible for a sediment load reduction of approximately 50 percent. In an interagency meeting on January 4, 2016, the design consultants and Water Board staff clarified that the HEC-RAS model used in Project design does not model channel bank erosion and therefore does not provide outputs on the stability of channel banks. Therefore this assumption was not based on either empirical or analytical information that is defensible.

Moreover, the Corps' response to the peer reviewer's concerns about sediment maintenance is that the future sediment maintenance needs would be addressed in the Operations, Maintenance, Repair, Rehabilitation, and Replacement Manual (O&M Manual) the Corps would prepare during the preconstruction and project design phase (Revised Final EIS, March 2014). We note, however, that the Corps has stipulated the O&M Manual will not be completed until after the project is constructed (Interagency meeting of January 4, 2016), suggesting that the Corps has not fully addressed sediment maintenance needs in the Project design.

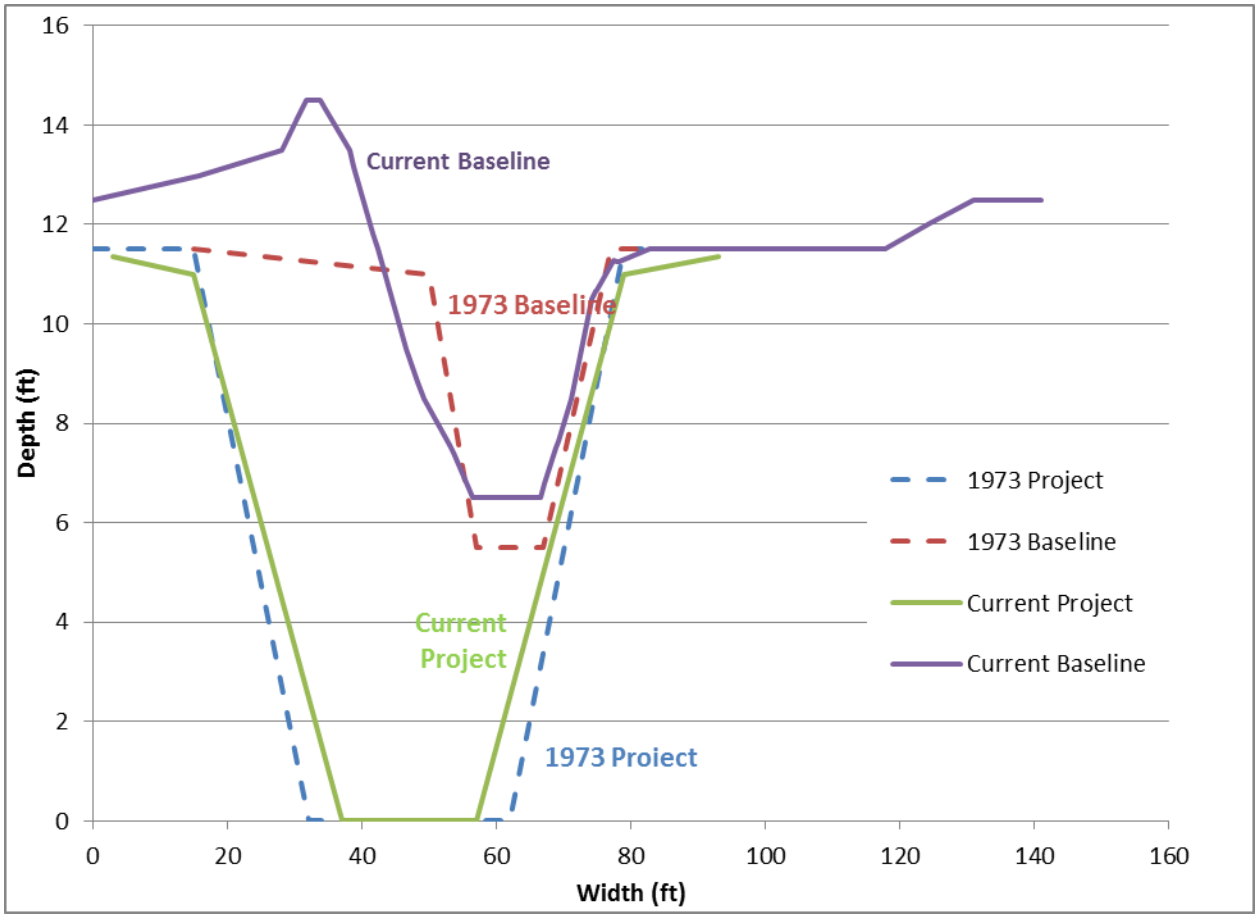
The Corps and District assert that the banks are erosional along the project reach. Water Board staff's observations during a field trip on September 4, 2015, did not indicate significant channel erosion in the proposed project reaches. Recent photos of winter 2015-2016 channel erosion sent to us by the Water District were of a reach in which Piedmont Creek enters the main channel at a right angle. There are three isolated limited bank stabilization sites, one caused by a railroad trestle, and the other two located at creek confluences at Piedmont Creek and Los Coches Creek. Addressing the limited localized erosion at these locations cannot support an assumption for decreasing sediment loading by 50%. Observations during an April 21, 2016, follow-up field trip by Water Board staff indicates stable banks throughout the project reach excepting these isolated spots, and new depositional features in the invert after 2016 flood flows.

It is clear, based on the current and proposed project cross sections and longitudinal profile, that the baseline (i.e., existing) conditions are depositional and that the Project, by increasing channel widths, as well as width-to-depth ratios, will be more depositional. The following is the basis for this finding:

1. Current SCVWD sediment maintenance records indicate that over 20,000 cubic yards of sediment has been removed within the proposed project reach (and not counting upstream or downstream sediment removal) since early 1980s. A September 2015, field trip and recent April 2016 trip observations indicate new point and center bars and the continuing dynamics of a depositional environment.
2. Comparison of cross sections from 1973 as-built surveys with current and proposed project conditions is another line of geomorphic evidence supporting the finding that the project reach will be depositional in the future. Figure 1 below compares baseline and project conditions from 1973 with current baseline and proposed Project conditions at a typical cross section along Reach 17 (i.e., station no.186 +30; approximately 2,300 feet downstream of Interstate 680).

Figure 1

Comparison of 1973 Project and Current Project at a Typical Cross Section[1]
(View Looking Downstream)



[1] Note:
The cross section is “Reach 17” from the HEC-RAS model.

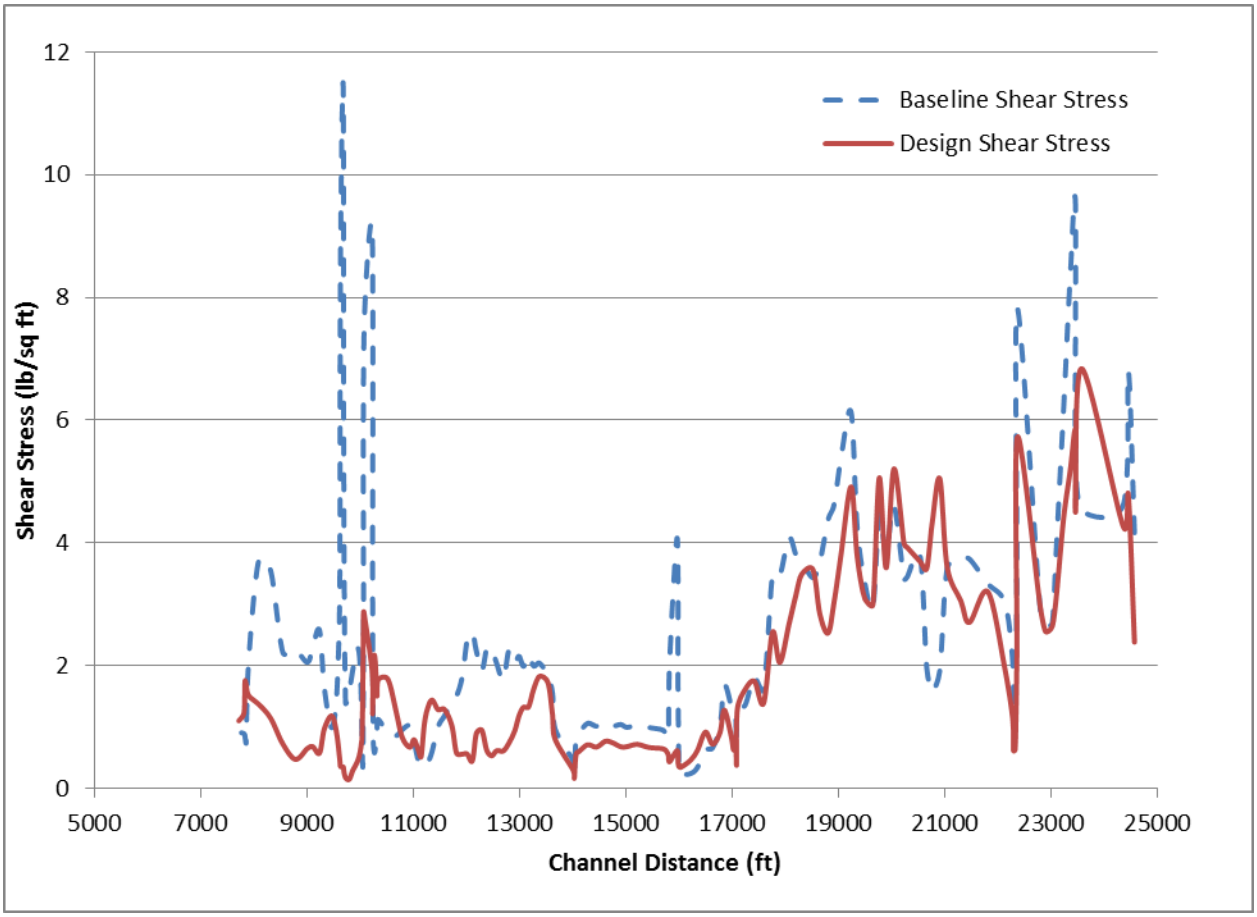
The current active channel in the Project area, and both upstream and downstream channel reaches, averages 10 to 20 feet wide and approximately 4 to 6 feet deep as observed during the September 2015 field survey of Upper Berryessa Creek. These dimensions are within a larger 30 to 40 foot wide, approximately 8 foot deep trapezoid. These active channel dimensions are what would be expected from a watershed of this size in the East Bay of approximately 15 mi^2. In 1973, the mean baseline width of the active channel was 20 to 25 feet, and a depth of about 5 feet; very close to what we are currently observing (Figure 1, red dotted line of 1973 and purple line of current cross sections). The original 1973 project

widened the project channel to 75 to 80 feet, just as the current project is widening this channel to 60 to 80 feet (Figure 1, blue dotted line of 1973 and green line of currently proposed project). Therefore the project proposal is essentially a maintenance project to return to the 1973 project dimensions as clearly illustrated by Figure 1.

The cross sectional areas shown in the Existing Conditions plan were taken from a 2013 LiDAR survey and show a mean trapezoidal width of 29 feet (averaging top and bottom widths); these dimensions were most likely affected by earlier maintenance in 2007-8. The current channel dimensions most likely reflect the impacts of the December 2014 flood and winter 2016 flood flows which have transported significant amounts of sediment.

3. A shear stress comparison between current baseline conditions and proposed project conditions indicates a reduction of channel shear stresses, further leading to the conclusion that project conditions are going to be depositional, and are not going to significantly change channel dynamics toward erosional as suggested by the District.

Figure 2
Shear Stress Along the Project Reach Under Baseline and Project Conditions During the 100-yr Flood



In summary, all four lines of geomorphic evidence — which are field observations, comparison of historic and current cross sections, maintenance records, and sediment transport modeling — indicate that the channel will be depositional and will continually return to its equilibrium dimensions in the same manner it has for the past 40 years.

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