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DELTA STEWARDSHIP COUNCIL

A California State Agency

October 12, 2016

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RE: DLIS Risk Analysis Methodology

Dear Ms. Pappalardo

Thank you for your letter of August 12, 2016, and for participating in a meeting at our offices on August 18th. The Council appreciates the review and input provided by representatives of local levee management agencies for the Delta Levees Investment Strategy (DLIS) project. During the course of project work, we have obtained data from more than 70 sources. As you know, the data vary in age and quality and it has not been possible to ground-truth data reliability. For this reason, comments from the RDs have been very valuable. We have relied heavily on the expertise of agency personnel, local levee managers, and stakeholders with special knowledge and experience with Delta levees.

As you also know, application of these data requires interpretation, use of professional judgment, and, in some cases, simplifying assumptions. From your experience working in the Delta, I am sure that you can appreciate that others using the same data may arrive at different interpretations based on their own professional judgment. Nevertheless, we believe that application of the selected methodology with available data has produced reasonable estimates of relative risk in the Delta.

We acknowledge an error in printing the July version of Appendix A in the DLIS *Risk Analysis Methodology* report. This caused a serious misalignment of data reported for the various islands and tracts. A revised version of Appendix A was posted on the Council website in the revised *Risk Analysis Methodology* report during the week of August 22, 2016. We have cross-checked the information you sent for Brannan, Glanville, Staten, Upper Andrus, and Walnut Grove. There are still, however, a few discrepancies which we will address, but that are not significant enough to materially affect the prioritization based on risk. We are in the process of

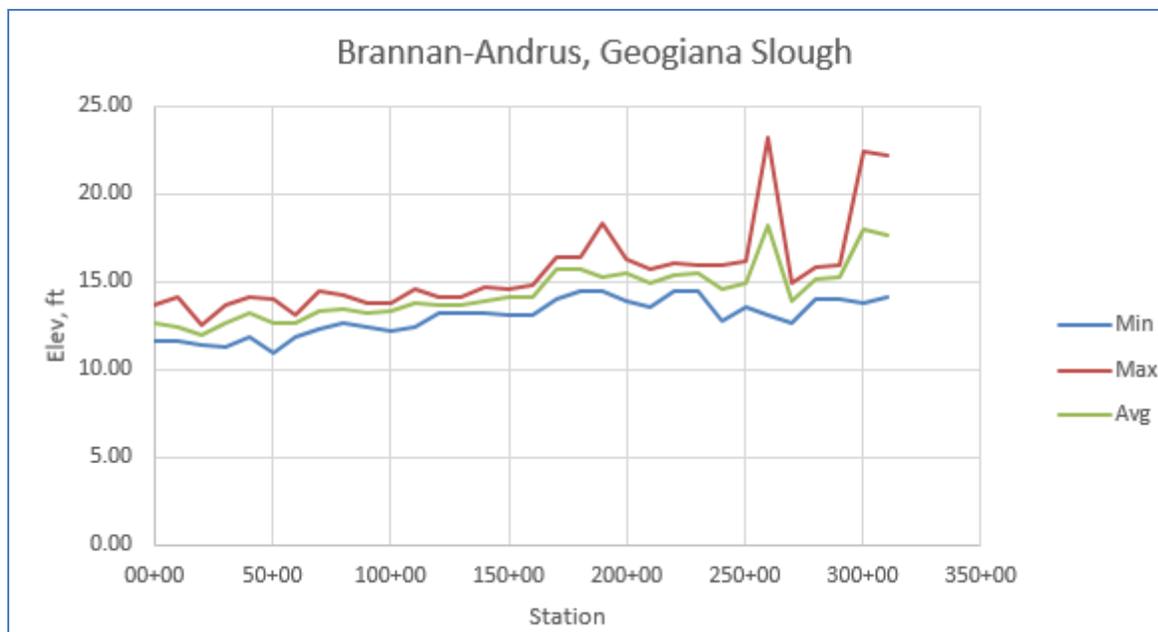
"Coequal goals" means the two goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The coequal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place."

– CA Water Code §85054

collecting other changes and we will post a revised version of the methodology report later this year.

We recognize that there could be some confusion regarding the concept of the weakest link in the methodology report. To clarify, we used an average levee crest elevation because, as pointed out during the peer review process, the lowest elevations reported in the Delta Risk Management Strategy (DRMS) data may be at structures that intersect the levees and may not reflect the true crest elevation at that point. We also used any other evidence we had in hand (soils data, seepage, etc.) to identify weakest link locations.

For Brannan-Andrus, we used the average crest elevation at about Station 100+00 (see graph below), which led to Brannan-Andrus to rank 8th highest in expected annual damage (EAD) and 6th highest in expected annual fatality (EAF). If we were to change the critical location to about Station 50+00, we would also need to adjust the hydrologic and hydraulic (H&H) fragility curve. The likely result of this would be an increase in EAD and EAF. However, such an increase would not change the island ranking for Brannan-Andrus, which is already in the Very High Priority tier.



You estimated a 1.24 percent annual probability of failure at Brannan-Andrus. It appears from your description that is for hydrologic flooding which closely agrees with our estimate of hydrologic flooding of 1.5 percent. We also estimate the probability of failure due to seismic events at Brannan-Andrus to be 2.5 percent for a total probability failure equal to about 4 percent.

The risks to State interests in the Delta are defined by the following metrics: risk to public safety; property and infrastructure; water supply reliability; the Delta ecosystem; and the unique attributes of the Delta as an evolving place (note that we are using the risk of flooding

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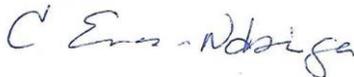
to prime agricultural lands, to legacy towns, and to state and federal highways as a proxy for Delta as a place). The DLIS Decision Support Tool (DST) uses the probability of flooding along with information on assets for each island and tract to calculate risks from flooding.

Although the metrics are in different units of measurement from each other, the DST was developed to enable the Council to better understand the range of possible risks facing the Delta such as which islands are at highest risk for flood damage and, if flooded, which islands most threaten the State's interests. It enables the Council and interested stakeholders to develop their own priorities of: (1) islands based on risk; (2) investments based on the estimated cost effectiveness; and (3) opportunities for habitat restoration. Through evaluation of priorities, the Council and stakeholders can use deliberation-with-analysis to identify common views of Delta risks as well as opportunities for achieving multiple risk reduction benefits. The deliberation-with-analysis process is not intended to provide a single answer but rather to frame and illuminate key policy trade-offs.

As recommended by the National Resource Council, we used direct losses for estimating EAD. Direct losses represent physical damage to items such as structures, vehicles, and crops. We used the best documented information available for estimating direct losses. These data were used consistently across Delta islands and tracts so the relative ranking by EAD should be reliable. As new data become available, the risk analysis can be updated quite readily.

We appreciate your continued participation in our project development and welcome any additional input or questions. Feel free to contact me at Dustin.Jones@deltacouncil.ca.gov or 916-445-5891.

Sincerely,



Cassandra Enos-Nobriga
Deputy Executive Officer
Delta Stewardship Council