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January 17, 2025

Humboldt Bay Municipal Water District Advance Assistance Dam and Spillway Assessment Project Bid Addendum #1

Bidders shall acknowledge receipt of this Addendum in their Statement of Qualifications

This addendum addresses the following:

Performance of a site-specific Seismic Hazard Assessment (SHA) for R.W. Matthews Dam to inform the seismic stability analysis and in anticipation of the upcoming FERC Part 12D Comprehensive Assessment (CA). The SHA should include both a probabilistic seismic hazard analysis (PSHA) and deterministic seismic hazard analysis (DSHA). Please see attached detailed description.

END OF ADDENDUM


Signature

DATE: 1/17/25

#. Site-Specific Seismic Hazard Assessment

Perform a site-specific Seismic Hazard Assessment (SHA) for R.W. Matthews Dam to inform the seismic stability analysis and in anticipation of the upcoming FERC Part 12D Comprehensive Assessment (CA). The SHA should include both a probabilistic seismic hazard analysis (PSHA) and deterministic seismic hazard analysis (DSHA). R.W. Matthews Dam is classified as high hazard by the FERC. Therefore, the SHA should be performed following the 2018 FERC Engineering Guidelines - Chapter 13 "Evaluation of Earthquake Ground Motions". The PSHA is required to complete a Level 2 Risk Analysis (L2RA) that will be performed as part of the upcoming FERC Part 12D CA.

#.1 – Review available documentation to research, compile, and review existing scientific literature, studies, or maps relevant to updating the geologic and seismologic understanding of the region. The data collected should include current and readily available references on nearby fault sources and background seismicity.

#.2 – Conduct a site-specific shear wave velocity study. The time averaged shear wave velocity in the upper 30 meters of a site's profile (V_{s30}) is an important input to the SHA as it is an index to characterize the site.

#.3 – Complete a seismic source characterization of the dam site. Compile and review existing geological, geophysical, and seismicity data within the site region. As part of this evaluation, the seismic source characterization should identify uncertainties, data gaps, and recommendations for sensitivity analyses to be included in the seismic hazard analysis. Uncertainty related to source geometry, fault type, seismogenic depth, style of faulting, activity rates, recurrence models, and magnitude characterizations should be captured through use of a logic tree.

#.4 – Develop the ground motion models (GMMs). The anticipated ground motions at the dam site should be computed using state-of-the-practice ground motion models, including the NGA-West2 GMMs and the NGA-Sub GMMs for subduction regions.

#.5 – Complete a seismic hazard analysis (probabilistic and deterministic). FERC has released risk informed decision-making (RIDM) guidelines for seismic hazard; however, the existing deterministic guidelines will remain in place for the foreseeable future. Therefore, the recommended approach is to perform seismic hazard analysis following latest FERC guidance for the evaluation of seismic hazards, which are the 2018 FERC Engineering Guidelines - Chapter 13 "Evaluation of Earthquake Ground Motions". The probabilistic seismic hazard results can then be used to guide the selection of an appropriate level of ground motion from the deterministic analysis.

Mean hazard curves for peak ground acceleration (PGA) and the available range of spectral accelerations should be developed. Produce a uniform hazard spectra (UHS) for return periods of 150, 475, 975, 2,475, 5,000, 10,000, and 30,000 years. The PSHA results for the dam site should include source contribution hazard plots, deaggregations, and fractiles. The deaggregations should be performed at the following periods - PGA, applicable periods of the dam, 0.2 and 1.0 second spectral acceleration. Results of the seismic hazard analysis should be compared to the published 2023 USGS National Seismic Hazard Mapping Program (NSHMP) and any updated information provided by the USGS.

Based on the deaggregations, deterministic scenario events should be developed and a DSHA be performed. A safety evaluation earthquake (SEE) and associated design spectra are to be selected based on comparison of DSHA resulting spectra to the UHS developed in the PSHA.

#.6 – Prepare a draft and final SHA report for R.W. Matthews Dam including the following:

- Documentation of all fault sources and areal source zones
- Documentation on site characterization – V_{S30} selection
- Logic tree
- Selected GMPEs and weightings
- Inputs required to perform a deterministic analysis
- PSHA and DSHA Results
 1. Mean hazard curves from the PSHA.
 2. UHS for 150; 475; 975; 2,475; 5,000; 10,000; and 30,000 year return periods.
 3. Fractiles to present the uncertainty in the mean hazard results.
 4. Deaggregation tables, plots, and figures for the specified spectral response periods and return periods listed above.
 5. Comparison of PSHA and DSHA Results.
 6. Selected SEE.

The final SHA report shall be completed prior to the FERC Part 12D CA Potential Failure Mode Analysis (PFMA) and L2RA workshops. These workshops are tentatively scheduled for late spring/early summer 2026.

#.7 – Participate in the PFMA and L2RA workshops as the Seismic Subject Matter Expert (SME). The Seismic SME must have sufficient experience and qualifications to be approved by FERC. Prepare a presentation summarizing the results of the SHA to be given at the start of the PFMA workshop. The PFMA and L2RA will be conducted in accordance with the 2021 FERC Engineering Guidelines – Chapter 17 “Potential Failure Mode Analysis” and Chapter 18 “Level 2 Risk Analysis”. The PFMA and L2RA are each expected to last one week.

As the Seismic SME, attend the PFMA virtually to present the findings of the PSHA, contribute to brainstorming potential failure modes for the dam, and participate in the initial screening process. Additionally, provide virtual support during the L2RA, as needed, to assist the Independent Consultants (ICs) and the IC Team in understanding the probabilities of seismic events that could impact the dam site.

The Seismic SME is required to assist the IC Team with the preparation of the CA Pre-Inspection Preparation Report (CA-PIPR), seismic hazard portions of the PFMA/L2RA report, CA Report (CAR), and CAR Review Meeting Slides. The Part 12D CA submittal dates have not been confirmed with FERC. Upon approval by FERC, the IC Team will provide the dates to the Seismic SME.

The anticipated level of effort for each report/meeting is as follows:

- CA-PIPR: Estimate the Seismic SME will provide 20 hours of assistance writing and reviewing applicable portions of the report.
- PFMA/L2RA Workshops: Estimate the Seismic SME will attend 20 hours in the workshops, in addition to the preparation necessary to attend the workshop.

- PFMA/L2RA Report: Estimate the Seismic SME will provide 8 hours of assistance writing and reviewing applicable portions of the report.
- CAR: Estimate the Seismic SME will provide 10 hours of assistance writing and reviewing applicable portions of the report.
- CAR Review Meeting Slides: Estimate the Seismic SME will provide 2 hours of assistance writing and reviewing applicable portions of the presentation slides.