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MEMORANDUM

Date: June 9, 2022

To: All Regional Engineers and Staff

From: Josh Colley, PE – State Dam Safety Engineer

Subject: NC Dam Safety Hydrologic & Hydraulic (H&H) Analysis, Design and Modeling Guidance

Applications submitted to the North Carolina Dam Safety Program (Dam Safety) are received from a diverse set of applicants with varying degrees of experience and education relative to hydrologic and hydraulic (H&H) analysis and design. As a result, a wide spectrum of design reports and modeling efforts are received, some of which require significant additional time and effort to review because they are based on methods that have not been widely adopted, are locale specific, proprietary, or are otherwise antiquated sources that may no longer be supported by their originator and/or that were not updated consistent with current technology trends. Based on the receipt of varying submittals that often require significant additional effort to access, operate, interpret and/or verify, Dam Safety is setting forth general guidance pertaining to recognized industry standard H&H analysis and design, including guidance on modeling sources, in an effort to streamline Dam Safety reviews.

This guidance shall apply to all future Dam Safety submittals.

General Guidance

- To promote streamlining the review process, Dam Safety strongly encourages submittal of H&H modeling by licensed professionals knowledgeable of current North Carolina Dam Safety regulatory requirements.
- Documents and applications should be currently supported by the originating source and should demonstrate compliance with the standard of care for Dam Safety applications by either direct approval by Dam Safety as outlined in the list below, proof of approved application(s) by a Dam Safety regulatory authority similar to North Carolina, or other criteria as may be considered by Dam Safety on a case-by-case basis.
- Modeling software should reflect current industry standard technological trends and results must be readily reproducible with current industry standard technology consistent with the standard of care for providing these services. The standard of care



is based on source information and models promulgated by recognized authorities (e.g. USACE, NRCS, USBR, FEMA, etc.) and institutions (e.g. universities, research venues, etc.) involved in the research, development, issuance and/or maintenance of H&H analysis and design information and products as well as industry-specific users (e.g. technical personnel/consultants, subject matter experts, etc.) routinely involved in the performance of H&H analysis and design applications.

- Current Dam Safety Source List:
 - United States Army Corp of Engineers – USACE (e.g. HEC-HMS, HEC-RAS, etc.)
 - Federal Emergency Management Agency – FEMA
 - United States Environmental Protection Agency – USEPA (e.g. SWMM, etc.)
 - Natural Resources Conservation Service – NRCS (e.g. winTR-20, etc.)
 - United States Bureau of Reclamation – USBR
 - Federal Highway Administration – FHWA
 - North Carolina Department of Transportation – NCDOT
 - National Oceanic and Atmospheric Administration – NOAA
 - Others as approved by Dam Safety

The most widely utilized H&H modeling/methodologies received by Dam Safety in North Carolina are USACE-based models/sources that incorporate NRCS methodologies. Other methodologies may be utilized based on submittal of an appropriate design basis, but may result in increased review times when compared to methodologies on the Current Dam Safety Source List. Desktop methodologies and other specialized applications (e.g. proprietary software, spreadsheets, etc.) may be approved on a case-by-case basis. Evidence of applications (that make use of an alternative approach) that have been approved by North Carolina Dam Safety, or Dam Safety programs in other States, may be submitted in support of your case.

Simple methods/approximations are generally not considered appropriate for most Dam Safety applications, particularly high and intermediate hazard dams. Use of these methods may be considered on small, low hazard dams under limited conditions. However, such approaches should be discussed with Dam Safety prior to submittal and may also result in additional review times.

- Documents and/or applications should not require a subscription, proprietary access or fee to access (i.e. proprietary modeling software, private domain publishing, etc.).

Should there be any questions or comments, please contact me directly at josh.colley@ncdenr.gov or 919-707-9214.

