Frequently Asked Questions Regarding Dam Inundation Maps

The Division of Safety of Dams prepared these FAQs to address questions raised by SB 92 (2017), regarding dam inundation maps, which was signed into law by Governor Brown on June 27, 2017. Although the Department of Water Resources has not yet adopted regulations that will describe specific requirements related to those inundation maps, the Department expects that its regulations will be consistent with nationwide standards, similar to the regulations previously adopted by the Office of Emergency Services (see 19 CCR 2575 et seq.). The recommendations in these FAQs are based on that assumption.

1. What is an inundation map?

   A map showing the area that would be inundated by flooding from an uncontrolled release of a dam's reservoir or portion of the reservoir impounded by a critical appurtenant structure (as defined in Section 6002.5 of the California Water Code).

2. Are all state-jurisdictional dam owners required to submit dam inundation maps?

   No, the requirement does not apply to jurisdictional dams that the Department of Water Resources, Division of Safety of Dams (DSOD) classifies as "low hazard." All other jurisdictional dam owners are subject to this requirement.

3. How is the downstream hazard classification assigned for each dam?

   Reference the hazard classification summary that is posted on this website under … (website format to be determined by web page group)

4. What is driving the mandate for jurisdictional dam owners of dams that are not classified "low" hazard to submit inundation maps to DSOD?

   Water Code section 6161 requires the owners of dams subject to DSOD jurisdiction, except "low" hazard dams, to submit an inundation map to the Department.

   The full text of this new law (SB 92, Committee on Budget and Fiscal Review, Statutes of 2017) can be found at: www.leginfo.legislature.ca.gov

5. How does this new law affect the prior statutes and regulations?

   Regulations concerning dam inundation maps were previously contained in Title 19, Division 2, Chapter 2, Subchapter 4, Sections 2575-2578.3, of the California Code of Regulations and

Government Code Section 8589.5. The underlying statutory authority contained in both of these cited sections has since been repealed.

Government Code Section 8589.5 was updated after being repealed to incorporate a change in regulatory oversight from the Governor's Office of Emergency Services to the Department of Water Resources.

The subject sections within Title 19 will be superseded by new regulations within Title 23, Division 2, of the California Code of Regulations later this year.

6. Can anyone prepare an inundation map on behalf of the dam owner?

   Regulations adopted by the Office of Emergency Services, consistent with standard nation-wide practice, required that inundation maps be prepared by, or under the direction of, a civil engineer registered to practice in California, whose signature and seal should be provided.

7. Will DSOD recommend an engineer or engineering consulting firm to dam owners?

   No - dam owners, however, are encouraged to select engineer(s) with proven expertise preparing dam inundation maps.

8. As a dam owner, are there measures I can take to help ensure high quality inundation maps are prepared?

   We recommend that you ask the engineer to provide a written and signed statement that he/she has evaluated potential hazards downstream of the dam and reservoir, prepared appropriate inundation map(s) that identify these hazards, and that the map(s) meet all applicable federal guidelines for dam inundation maps.

9. Where can I find information regarding applicable federal guidelines for dam inundation maps?

   The Federal Emergency Management Agency (FEMA) has prepared federal guidelines for inundation mapping of flood risks associated with dam incidents and failures that are contained in ***FEMA P-946, dated July 2013****.*

10. What should dam inundation maps show and how are they typically developed?

    Standard best practices for the preparation of inundation maps requires that the map(s) show the entire extent of inundation produced by a potential failure of the dam or its critical appurtenant structure(s). The failure of the dam or its critical appurtenant structure(s) should be simulated by an appropriate dam break computer model assuming various failure scenarios; including, at a minimum, a sunny day failure with the reservoir at the maximum possible water surface elevation (corresponding to the crest of the spillway). The dam breach simulation results should then be entered as input to a flood routing model, which routes the dam breach flood

pulse downstream, modeling the extent of inundation in downstream impacted areas. The Department will adopt specific requirements related to inundation maps by regulation.

11. Are there specific tools or software that must be used to develop the inundation map?

    No - an appropriate flood routing model, however, generally consists of a 2-dimensional model which computes the change in discharge and stage with respect to time. In some cases, 1-dimensional models that incorporate cross sections at appropriate intervals may be accepted.

    Inundation maps may be produced by industry-standard software tools, such as HEC-RAS, GeoDambreach, MIKE-21, FLO-2D, TUFLOW, etc. Some of these software tools couple dam breaching capabilities with 2-dimensional inundation modeling and mapping. Such models not only simulate inundation extents, but also arrival times, depths, and velocities.

    Note: The flow models used are generally based on solution of the St.-Venant equations to compute the changes of discharge and stage with respect to time at various locations along the flood path.

12. Is there any additional information that should be submitted with the inundation map?

    Standard best practices normally require the submission of a digital database containing geospatial or other data used to develop the inundation maps and a supporting technical study prepared by the respective engineer, including all relevant statistical data for the dam, reservoir, and identified critical appurtenant structures. The Department will adopt specific requirements related to inundation maps by regulation.

13. What is an acceptable map scale?

    An appropriate map scale should be easily readable. A typical map scale may be based on a U.S.G.S. quadrangle topographical map with a minimum scale of 1:24,000 (1 inch equals 2,000 feet).

    A larger scale may be used if the inundation area can be reasonably presented on a 24-inch by 30-inch map sheet and sufficient identifiable geographic identification points exist to reference the area in scale to other geographical points.

    The Department will adopt specific requirements related to inundation maps by regulation.

14. What format is generally used for electronic map copies?

    A machine readable format such as PDF or TIF.

    The Department will adopt specific requirements related to inundation maps by regulation.

15. Under Section 2575.1 of Title 19, debris basin dams were previously exempt from inundation map requirements. Will this change?

    Yes, the need for an inundation map and EAP is now based solely on the downstream hazard classification of the dam.