

Analysis

Item 37: Water Resources Department

High-hazard Dams

Analysts: Amanda Beitel and Matt Stayner

Request: Acknowledge receipt of a report on publicly owned high-hazard dams in Oregon that have unsatisfactory or poor condition ratings.

Analysis: The Water Resources Department (WRD) administers the state's dam safety program and is responsible for inspecting, maintaining an inventory, and assigning hazard ratings to state-regulated dams. Dams are assigned one of three hazard ratings: high, significant, and low. Ratings do not represent the probability that a dam will fail, but rather, the consequences of a failure. High-hazard dam failures are anticipated to result in loss of life and significant dam failures are likely to result in major property damage, while failure of low-hazard dams have a limited risk to life and property. WRD evaluates the condition of high-hazard dams and classifies them as either satisfactory, fair, poor, or unsatisfactory, with dams in an unsatisfactory condition having the greatest risk of failure. Given the substantial consequences of a high-hazard dam failure, a budget note (SB 5702) approved in the 2018 session directed WRD to provide a report on publicly owned high-hazard dams in Oregon that have unsatisfactory or poor condition ratings.

WRD reports that of the more than 960 state-regulated dams, there are a total of 74 high-hazard dams. Of the 74 high-hazard dams, nine are in unsatisfactory condition and ten are in poor condition. Of these nineteen, seven are publicly owned, with four that are in unsatisfactory condition and three in poor condition. WRD estimates that rehabilitation or replacement of these dams would cost between \$41.5 and \$108.5 million. Replacement of the Big Creek Dams that supply drinking water to the City of Newport represents approximately half of the total costs at an estimate of \$19 to \$71 million. Newport has independently reported that construction of a new Roller Compacted Concrete dam to replace the existing embankment dams will cost an estimated \$60 million. Funding available to municipalities for dam rehabilitation is limited. A grant program for rehabilitation of nonfederal high-hazard dams was authorized in the 2016 Water Infrastructure Improvements for the Nation (WIIN) Act, but to date, no federal funds have been appropriated. Federal funding is available through the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Watershed Rehabilitation Program, which provides up to 65% of the total rehabilitation cost for dams originally constructed with assistance from USDA Watershed Program funds.

The state does not have a grant or loan program specifically designed to aid in the repair, remediation, or replacement of locally-owned dams. The Special Public Works Fund (SPWF), administered by the Oregon Business Development Department (OBDD), provides funding for municipal infrastructure and would be available for dam rehabilitation projects. SPWF primarily provides loans to municipalities, with limited available grant funding. SPWF has received \$42 million in lottery bond proceeds since the 2013-15 biennium (an average of \$14 million per biennium), excluding proceeds specifically designated for levees, so state capitalization of the program would need to be increased to accommodate the level of funding required to provide loans for dam rehabilitation costs. WRD also provides competitive grants and loans for water development projects that result in economic, environmental, and social/cultural benefits. Dam remediation

projects may qualify for funding, but often don't provide the level of public benefit outcomes to rank well against other projects. In addition to existing state programs, lottery bonds may be authorized to provide grants for specific projects. However, total lottery bond capacity is limited and utilized for a variety of local infrastructure and economic development programs and projects. Article XI-I (1) of the Oregon Constitution authorizes the state to issue general obligation bonds that may be used to finance loans for water development projects to municipalities with populations less than 30,000. Increases in user fees are often the source of revenue to repay loan financing. Financing an entire project with loans may not be feasible for communities with a small rate-payer base or that have projects with considerable costs. Loan financing, supported with local resources, would likely need to be subsidized with grants to keep rates affordable.

WRD is proposing amendments to the dam safety statutes to align with recommendations in its 2017 Integrated Water Resources Strategy (IWRS) and improve dam safety and resiliency. Recommendations do not include a specific proposal for funding dam rehabilitation; however, considering the significant cost to address remediation of dams currently in unsatisfactory or poor condition, funding will likely need to come from a combination of state and local sources.

Legislative Fiscal Office Recommendation: Acknowledge receipt of the report.

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Oregon Water Resources Department
Wittekind

Request: The Oregon Water Resources Department requests acknowledging receipt of its report on High Hazard Dams per a Senate Bill 5702 Budget Note.

Recommendation: Acknowledge receipt of the report.

Discussion: As directed in a Senate Bill 5702 Budget Note adopted during the 2018 Legislative Session, the Oregon Water Resources Department (WRD) is to report, no later than December 2018 to the Emergency Board on publicly owned high hazard dams within Oregon in unsatisfactory or poor condition ratings.

In an effort to comply with the Budget Note, WRD has submitted a report, which includes discussion on existing Dam Safety Program activities. The report includes approximate costs to rehabilitate dam infrastructure with unsatisfactory and poor condition ratings, existing resources available for rehabilitation, and policy and budget recommendations related to the repair, remediation, and replacement of dams with significant risk of failure.

The responsibilities of WRD's Dam Safety Program involve the oversight of existing structures, primarily through inspections. The program takes actions to improve dam safety by: determining hazard ratings; inspecting dams; evaluating proposed designs of new dams; coordinating with owners on development of emergency action plans; and, if necessary, requiring owners to take action to address unsafe dams.

There are currently 74 high hazard dams, 148 significant hazard dams and 731 low hazard dams regulated by the Department. Of the 74 high hazard dams, 10 are in poor condition and nine are in unsatisfactory condition.

The budget note directed the Department to provide estimates on the approximate cost to rehabilitate dam infrastructure with poor and unsatisfactory condition ratings. Dams rated in poor or unsatisfactory condition are normally past the point where repairs alone are insufficient in making the dam safe and rehabilitation or replacement is generally necessary.

The report outlines costs for a few of the dams, which range from \$0.5 million to \$71 million. The specific costs to rehabilitate or replace these dams are difficult to ascertain without a full-scale engineering analysis for each individual dam. The Department does not have resources to conduct more in-depth assessments of dams and inspections are only visual in nature.

In all cases funding is the largest barrier to address dam deficiencies.



REPLACEMENT LETTER

November 20, 2018

The Honorable Senator Peter Courtney, Co-Chair
The Honorable Representative Tina Kotek, Co-Chair
Joint Emergency Board
900 Court Street NE
H-178 State Capitol
Salem, OR 97301-4048

RE: Replacement Letter: SB 5702 (2018) Budget Note on Dam Safety

Dear Co-Chair Courtney and Co-Chair Kotek:

Nature of the Request

During the 2018 Legislative Session, a budget note was adopted directing the Oregon Water Resources Department (Department) to submit a report to the Emergency Board on publicly owned high hazard dams in Oregon that have unsatisfactory or poor condition ratings, no later than December 2018. The report is to include: existing Dam Safety Program activities, such as dam inspection and Emergency Action Plans; the approximate cost to rehabilitate dam infrastructure with unsatisfactory and poor condition ratings; existing federal, state, and local resources currently available for this purpose; and policy and budget recommendations related to the repair, remediation, and replacement of dams with significant risk of failure.

Agency Actions

A. Scope of Dams and Policy Issues Addressed in Report

As directed by the budget note, this report contains information on publicly-owned, high hazard dams that are regulated by the Department. In addition, for reference, the Department has also included information, as available, on privately-owned, high hazard dams that are regulated by the Department. The report does not address the condition of dams or resources for dams that are under the purview of a federal dam safety regulatory program.

B. Overview of Existing Dam Safety Program Activities

Oregon Revised Statutes (ORS) 540.340 to 540.400 and 540.990 authorize actions related to the design, construction, inspection, and general safety of dams. These laws apply to dams that are at least ten-feet high and store three million gallons (9.2 acre feet) of water. Federal agencies like the U.S. Army Corps of Engineers, Bureau of Reclamation, and Federal Energy Regulatory Commission have their own dam safety programs and conduct safety inspections of dams under their jurisdiction.

Currently, there are more than 960 state-regulated dams. The Department's Dam Safety Program includes two full-time, engineering staff. Most of the responsibilities of the program involve oversight of existing structures, primarily through inspections. The program takes actions to improve dam safety by: determining hazard ratings; inspecting dams; evaluating proposed designs of new dams; coordinating with owners on development of emergency action plans; and, if necessary, requiring owners to take action to address unsafe dams.

Hazard Rating

Evaluating hazard and risk are key elements of the Dam Safety Program. Hazard refers to the consequence of a dam failure. Hazard ratings are organized into three categories: high, significant, and low. Failure of a high hazard dam would likely cause fatalities. Failure of a significant hazard dam is unlikely to cause fatalities but major property damage would likely occur. A low hazard dam poses little risk to people and limited risk to property. Determination of hazard rating requires detailed inundation analysis through hydraulic modelling. Hazard ratings for dams require periodic evaluation, as low or significant hazard dams can become high hazard dams over time as populations grow downstream. The Department has limited capacity to re-evaluate the hazard ratings of low and significant hazard dams.

There are currently 74 high hazard dams, 148 significant hazard dams, and 731 low hazard dams that are regulated by the Department.

Dam Safety Inspections

Dam safety inspections evaluate: the condition of the embankment and reservoir; the safety of the spillway; the soundness of the conduit through the dam; the presence of leakage or seepage; and access and security. These inspections are not designed to determine seismic or extreme flood risk. Prior to conducting an inspection, Department staff obtain permission from the landowner. Many dam owners meet with staff during inspections. After the on-site inspection is complete, a letter is sent to the landowner detailing any safety issues. The Department cannot require an owner to take action, unless the Department determines the dam is unsafe. The Department does not have authority to require dam owners to address maintenance and other safety issues that have not rendered the dam unsafe. As a result, these items may go unaddressed. Under current law, even if the dam is demonstrably unsafe, the Department must schedule a contested case hearing before issuing an order directing action to be taken to address the condition of the structure.

The Department seeks to conduct 250 inspections every year on average. This is not possible with the two staff in the Dam Safety Program; therefore, Dam Safety staff emphasize annual inspections of high hazard dams and some significant hazard rated dams. Given limited resources, field staff (watermasters and assistant watermasters) also conduct inspections to assist the Dam Safety Program, primarily focusing on inspections of low and significant hazard dams. In drier years, other demands on field staff may result in fewer inspections.

High hazard dams are evaluated using four classifications (the lower the condition, the higher the potential risk of failure). These conditions are: satisfactory, fair, poor, and unsatisfactory. The condition of each high hazard dam is updated after its formal inspection. Low and significant hazard dams are not normally classified by condition. As discussed in more detail later in this report, of the 74 high hazard dams, ten are in poor condition and nine are in unsatisfactory condition.

Emergency Action Plans (EAP)

A proper EAP allows the owner to identify situations where a dam failure might occur, and spells out actions to save the dam, communicate to emergency officials, and hasten evacuations. Prior to 2017, the Department did not have authority to require EAPs on existing high hazard dams, although many owners did develop an EAP on a voluntary basis. The 2017 Legislature passed a bill (HB 3427) requiring owners or operators of high hazard dams to develop an emergency action plan and file it with the Water Resources Department, Office of Emergency Management, and the local county emergency agency no later than January 1, 2019. Owners have been notified of this change and most have either submitted or are working on EAP's for their dams. The Dam Safety program has no civil penalty authority or enforcement tools to require owners to comply with the new law.

Reviews of Plans and Specifications for New Dams

In addition to administering activities for existing dams, the Department's Dam Safety Program staff also review plans for new dams. On average, these reviews can take approximately three days for a low hazard dam, two weeks for a significant hazard dam, and one month for the in-depth review of a high hazard dam. There currently is no fee associated with this work.

C. Cost to Rehabilitate Dams in Poor and Unsatisfactory Condition

Overview of Dams in Poor or Unsatisfactory Condition

There are currently nine Oregon high hazard dams in unsatisfactory condition, with four of these publically owned. There are an additional 10 dams in poor condition, with three of these publically owned.

Costs to Rehabilitate Dams

A 2012 report by a subcommittee of the Association of State Dam Safety Officials estimated that the cost to rehabilitate non-federally regulated dams in Oregon could cost \$685 million. This includes dams in all hazard rating categories.¹

¹ Task Committee of the Association of State Dam Safety Officials. (2002; last update in 2016). The Cost of Rehabilitation our Nation's Dams: A Methodology, Estimate and Proposed Funding Mechanisms. https://damsafety.s3.amazonaws.com/s3fs-public/Cost%20of%20Rehab%20Report-2016%20Update_1.pdf

The budget note directed the Department to provide estimates on the approximate cost to rehabilitate dam infrastructure with poor and unsatisfactory condition ratings. Dams rated in poor or unsatisfactory condition are normally past the point where repairs alone are sufficient to make the dam safe, and rehabilitation or replacement is generally necessary. The specific costs to rehabilitate or replace these dams are difficult to ascertain without a full-scale engineering analysis for each individual dam. The Department does not have resources to conduct more in-depth assessments of dams, and inspections are only visual in nature. With these caveats, there are methods that can be used to provide a rough estimate.

The Department has provided rough cost estimates below for publicly-owned, high hazard dams in poor or unsatisfactory condition. The Department has more information on publicly-owned dams than privately-owned dams. In general, the Department lacks adequate information to provide estimates for the non-publically owned dams, so they are instead ranked by low, medium, or high cost based on the typical cost to correct the type of deficiency.

Cost Estimates for Publicly Owned Dams				
Dam	Location (County)	Condition	Probable Safety Action	Estimated Cost
Big Creek #1	Lincoln	Unsatisfactory	New Dam	\$19-\$71M
Big Creek #2	Lincoln	Unsatisfactory	New Dam	
Ferry Creek	Curry	Unsatisfactory	New Dam	\$8-\$15M
McMullen Creek	Josephine	Unsatisfactory	Rehabilitate	\$3-\$5M
Bear Creek	Clatsop	Poor	Rehabilitate	\$0.5M
Morgan Lake	Union	Poor	Rehabilitate	\$1M
Wallowa Lake	Wallowa	Poor	New Dam	\$10-\$16M

Cost Estimates for Privately Owned Dams				
Dam	Location (County)	Condition	Probable Safety Action	Estimated Cost
Barnes Butte	Crook	Poor	Rehabilitate	Medium
Duggan	Jackson	Poor	Repair	Low
Johnson Creek	Crook	Poor	Repair	Low
Lake Creek	Jackson	Unsatisfactory	Rehabilitate	Medium
Lonesome Lake	Malheur	Poor	Repair	High
Osborne Creek	Jackson	Unsatisfactory	Rehabilitate	Medium
Pole Creek	Malheur	Poor	Rehabilitate	Medium
Wageman	Douglas	Poor	Rehabilitate	Medium
Woodrat Knob	Jackson	Unsatisfactory	Rehabilitate	Medium
Yankee (Gardener)	Jackson	Poor	Rehabilitate	Medium
Crowley Reservoir	Malheur	Unsatisfactory	Replace	High
Willow Creek 3	Malheur	Unsatisfactory	Rehabilitate	High

D. Existing Funding Resources to Rehabilitate, Repair, or Remove Dams in Poor or Unsatisfactory Condition

The Department has heard from the owners of dams – both public and private – that lack of funding sources to address dam deficiencies is a significant barrier. Oregon is not the only state that faces this challenge; many other states have also identified funding for dam safety as a challenge. Funding sources for private dam owners to repair, rehabilitate, or remove dams are limited. There are a few more options for publicly owned dams; however, even for public entities, the costs may still be prohibitive. Overall, funding for the repair, replacement, rehabilitation, or removal of dams is limited and inadequate to address the need. The Department is continuing to try to identify potential sources of funding for dam rehabilitation, and may provide an update to this report if additional funding opportunities are identified.

Potential Federal Funding Resources²

The Federal Government has had limited funding for rehabilitating nonfederally regulated dams. In recent years, there have been efforts to increase federal involvement; however, funding for new programs in many cases has been authorized but not appropriated.

Below is a list of potential federal funding programs.³ Funding is dependent upon Congressional appropriations and applicants meeting the criteria for the program.

- [FEMA National Dam Rehabilitation Program](#) - Section 5006 of the WIIN Act (P.L. 114-322) authorized a program for rehabilitation of high hazard dams, providing a cost-share of 65 percent federal and 35 percent nonfederal. The Act authorized \$10 million in appropriations for Fiscal Year (FY) 2017 and FY2018; \$25 million for FY2019; \$40 million in FY2020; and \$60 million for FY2021-FY2026. In early 2018, funding had not been appropriated.⁴

² Source for this section: Congressional Research Service. (February 23, 2017). In Focus: Dam Safety Federal Authorities and Programs. <https://fas.org/sgp/crs/homesec/IF10606.pdf>

³ In addition to these two funding sources, the Corps Rehabilitation and Inspection Program (RIP, or P.L. 84-99) may support rehabilitation of dams that are damaged after a flood if they meet certain criteria. Only dams that were primarily built for flood-control purposes are eligible and there must be a public sponsor. See the following link for information about the program:
<https://www.nws.usace.army.mil/Portals/27/docs/Levees/Levee%20Safety/6.%20Rehabilitation%20and%20Inspection%20Program.pdf>

Section 1177 of the WIIN Act, P.L. 114-322 also authorizes the Army Corps of Engineers to provide funding for rehabilitation of high-hazard dams that were constructed for flood control by the Army Corps of Engineers prior to 1940; however, the Department believes that few, if any, dams in Oregon will be eligible for that program.

⁴ Source: Association of State Dam Safety Officials. (n.d). National Dam Rehabilitation Program. <https://damsafety.org/sites/default/files/files/NA%20TIONAL%20DAM%20REHABILITATION%20PROGRAM%20FACT%20SHEET.pdf>

- [USDA Watershed Rehabilitation Program](http://www.nrcs.usda.gov/wps/portal/nrcs/main/or/programs/planning/wr/) can provide assistance for the planning, design, and implementation of dam rehabilitation projects; however, dams are only eligible if they were originally built with certain USDA funds. The program may cover up to 65 percent of the total rehabilitation cost. Current projects benefitting from the program are listed online at:
www.nrcs.usda.gov/wps/portal/nrcs/main/or/programs/planning/wr/.

Potential State Funding Resources

There is no state funding program specific to rehabilitation of dams, and most funding programs are only accessible by public entities. The Department has heard from some owners that even low-interest loans may be cost-prohibitive for entities that have a small rate-payer base. Some other states have state-funded dam rehabilitation and repair programs.

The following state funding source can provide for dam rehabilitation and repairs:

- [Special Public Works Fund](#) – This funding source could potentially fund dam rehabilitation projects; however, resources are limited and there are many other competing needs. Eligibility is currently limited to specified public entities.

There are other funding programs that may be able to fund dam rehabilitation; although none are explicitly targeted for this purpose. Examples of funding programs that may be able to provide funding in some circumstances include, but are not limited to:

- [Water Projects Grants and Loans](#) – This funding source was authorized by the Oregon Legislature in 2013 (SB 839); however, it is generally not an ideal source of funding for dam rehabilitation as it is more targeted at projects that provide new water supplies. Projects are ranked based on public benefits, and projects must provide benefits in three categories: economic, environmental, and social/cultural. In addition, the funding for this program has been around \$10-15 million per biennium.
- [Safe Drinking Water Revolving Loan Fund](#) – The purpose of this fund is to fund drinking water system improvements necessary for compliance with the Federal Safe Drinking Water Act. This funding source may be able to fund dam rehabilitation work in limited instances; however, an EPA waiver is required. Eligible entities are limited to owners of water systems that provide service to at least 25 year-round residents or systems that have 15 or more connections.
- [Clean Water Revolving Loan Fund](#) – In very limited instances, this funding source may be able to provide some funding assistance for dam rehabilitation where it benefits water quality. This funding source currently is limited to specified public entities.

Local Funding Resources

Public entities, such as municipalities or irrigation districts, for example, may be able to utilize revenues from rate payers or patrons to help pay for needed dam repairs or rehabilitation. Some may also be able to raise taxes, or issue bonds. However, for many entities, these sources by themselves are unlikely to be able to pay for the cost of dam rehabilitation or repair.

E. Policy and Budget Recommendations

Recommendations Outlined in Oregon's 2017 Integrated Water Resources Strategy (IWRS)

The [Integrated Water Resources Strategy](#) is a blueprint for understanding and meeting Oregon's water needs now and into the future. As required by ORS 536.220, the IWRS is reviewed and updated every 5 years. The 2017 edition identifies specific recommendations related to dam safety including:

1. Modernize state laws to improve the safety and resiliency of Oregon dams
2. Authorize resources to determine if dams have safety deficiencies; evaluate and retrofit dams to meet new seismic standards
3. Authorize emergency actions and encourage cooperative actions to improve the safety of dams
4. Properly decommission dams at the end of their useful life
5. Coordinate interagency emergency responses regarding dam inspection, communication, and evacuation
6. Define the legal responsibilities of a dam owner
7. Authorize a requirement for remote monitoring on deficient high hazard dams
8. Dam owners should prepare and implement an Emergency Action Plan for all existing dams rated high hazard
9. Authorize a fee for review of plans and specifications
10. Dedicate grant and loan resources for rehabilitation of deficient dams

Potential Department Legislative Concept

The Department is currently working on a Legislative Concept that would address many of the recommendations of the IWRS above, including 1, 3, 4, 6, 7, 8, and 9. See Attachment 1 for more information.

Currently, the Department's potential legislative concept does not address the issues that require staff resources or funding to fix dam safety deficiencies (2, 10). Funding for water infrastructure continues to be a high need; dam safety funding is a particular challenge as most funding programs do not address dam rehabilitation or repairs.

Action Requested

Acknowledge receipt of report.

The Honorable Senator Peter Courtney, Co-Chair
The Honorable Representative Tina Kotek, Co-Chair
Joint Emergency Board
November 20, 2018
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Legislation Affected

None.

Sincerely,



Thomas M. Byler
Director

Attachment: LC 508 - Modernizing Dam Safety Statutes

c: Jason Minor, Governor's Natural Resources Policy Manager
Mike Harryman, State Resilience Officer
Matt Stayner, Legislative Fiscal Office
Linnea Wittekind, Department of Administrative Services

LC 508: Modernizing Dam Safety Statutes

Background

The Oregon Water Resources Department is the state agency charged with overseeing the safety of more than 960 dams across the state that are authorized to store water for agriculture, cities, industry, recreation, fisheries, and other purposes. While dams provide benefits, the consequences of failure of a dam can be significant, potentially resulting in loss of lives and damage to property and infrastructure. As a result, states have adopted dam safety programs. With a few exceptions, Oregon's dam safety statutes have not been updated since 1929, and there is a need to modernize the statutes.

What the bill does

The bill proposes to:

1. Consistent with current and past practice, clarify that the State's focus is on non-federally regulated dams that store water or wastewater. Remove dikes and other hydraulic structures from regulatory oversight to a non-regulatory, technical assistance program.
2. Require plans and specifications for modifications to dams to be approved by the Department and require the Department to receive final engineering documentation that the dam was built as specified before water or wastewater can be impounded for a new or modified structure.
3. Establish a fee for reviews of plans for dams based on actual time spent on the review, but with a cap to provide certainty on the maximum that may be charged.
4. Provide clear guidance for owners that they are responsible for maintaining their dam, and taking specific actions if the structure is at risk of failure and may jeopardize life or property.
5. Clarify the Department's general authorities to implement the statutes, as well as specify actions the Department may take during a dam failure.
6. Establish a process to ensure that removal of high or significant hazard dams are done safely to protect people and property.
7. Improve the process for addressing maintenance and safety issues. Provide additional tools to work with landowners and get compliance, and to address seismic and flood risk. This includes: (a) allowing the Department to work with the owner to develop a plan and timeframe for repair, instead of having to go directly to enforcement; (b) during enforcement, requiring a hearing only if requested by the owner; (c) authorizing the Department to require action on maintenance issues if they are left unaddressed; and (d) in the event that there is an immediate risk to people or property, allowing the Department to obtain a court injunction.
8. Allow the Department to issue civil penalties for failure to address maintenance issues, failure to submit emergency action plans on high-hazard dams, and other violations of the dam safety statutes.
9. In order to improve readability and functionality of the statutes, repeals the current laws; as a result many existing authorities appear as new language.

Contact

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