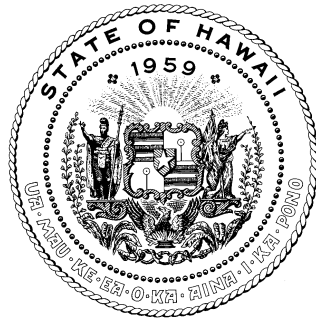


Report to the Thirty-First Legislature
2022 Regular Session

**THE HAWAII DAM AND RESERVOIR SAFETY PROGRAM
STATE FISCAL YEAR 2021**



Prepared by the

Department of Land and Natural Resources
State of Hawaii

In response to
Section 179D-29, Hawaii Revised Statutes

November 2021

THE HAWAII DAM AND RESERVOIR SAFETY PROGRAM STATE FISCAL YEAR 2021

This report is prepared pursuant to Hawaii Revised Statutes (HRS) Section 179D-29 and covers the period from July 1, 2020 through June 30, 2021.

INTRODUCTION

The Department of Land and Natural Resources' (Department) Engineering Division administers the Hawaii Dam and Reservoir Safety Act of 2007 (Act), codified as HRS Chapter 179D (Dam and Reservoir Safety Program). This Act, in conjunction with Hawaii Administrative Rules (HAR) Chapter 13-190.1, "Dams and Reservoirs", governs the design, construction, operation, maintenance, enlargement, alteration, repair, and removal of dams, reservoirs, and their appurtenant works in the State of Hawaii, to protect the health, safety, and welfare of the citizens of the State by reducing the risk of failure of the dams or reservoirs. Pursuant to HRS Section 179D-29, the Department shall submit an annual report to the Governor and the Legislature by January 5 of each year concerning the activities of the department relating to this chapter for the preceding fiscal year. The report shall include but not be limited to information on the following:

- (1) Approvals of plans and specifications for the construction of dams and reservoirs and for alterations, modifications, repairs, removal, and enlargements of any dams and reservoirs;
- (2) A listing of dam and reservoir safety inspections made;
- (3) Use of appropriated funds;
- (4) Rules adopted or amended;
- (5) Enforcement orders and proceedings;
- (6) Dam and reservoir failures and department evaluations of the reasons for the failure, if known; and
- (7) Any other available data regarding the effectiveness of the State's dam and reservoir safety program.

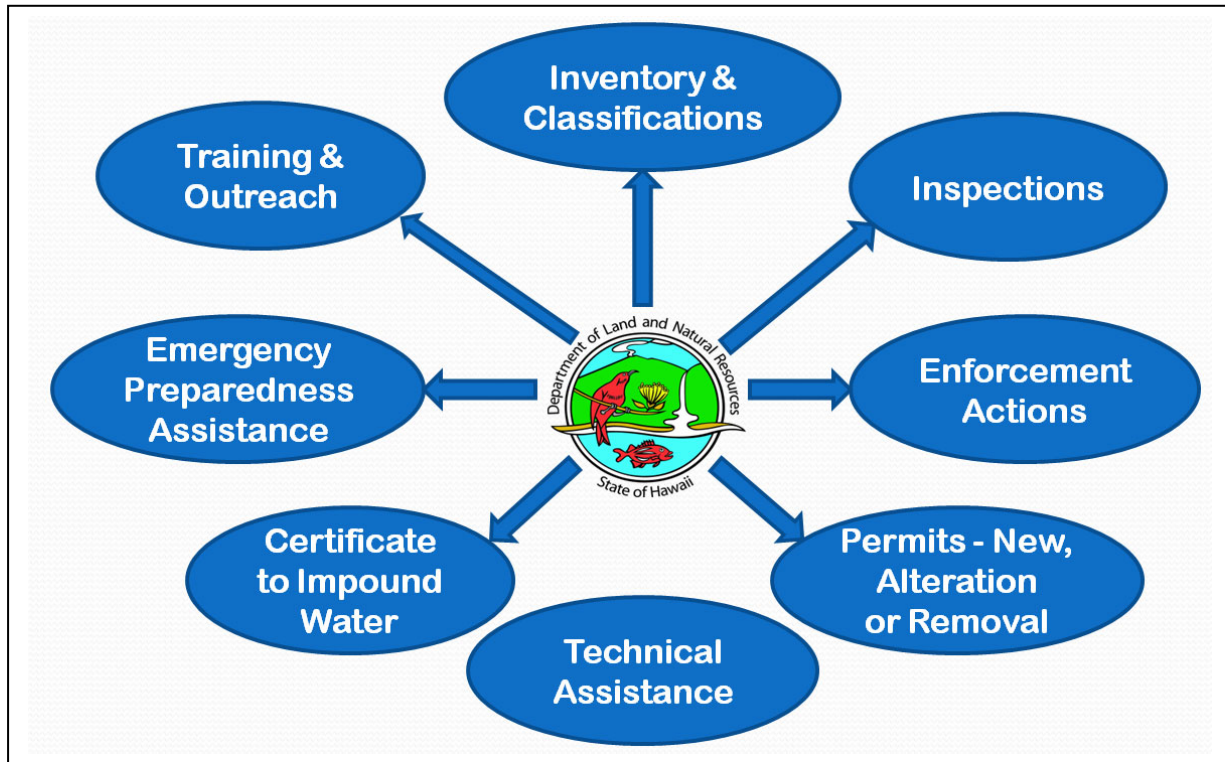
BACKGROUND

Historically, dams and reservoirs in Hawaii were predominately developed by the agriculture industry in the early 1900s. Today, dams and reservoirs continue to be used by the agriculture industry, in addition to providing storage for drinking water, flood control, hydro-electric, recreation and other purposes.

Only dams that meet a certain jurisdictional size criteria (height and volume) are regulated by the Department. Regulated dams are identified as having artificial barriers which are 25-feet or more in height or have an impounding capacity of 50-acre-feet (~17 million gallons) or more. Dams less than 6-feet in height, regardless of storage capacity, or that have a storage capacity less than 15-acre-feet (5 million gallons) regardless of height, do not fall under State of Hawaii jurisdiction, unless otherwise specified by the Dam and Reservoir Safety Program.

THE HAWAII DAM AND RESERVOIR SAFETY PROGRAM

The Dam and Reservoir Safety Program is comprised of several core functions:



Regulated Dam Inventory and Dam Classifications: The Department maintains a database of regulated structures, including classifications of each in regard to size, hazard potential and overall condition. The Department verified and updated their inventory of regulated dams in 2006. Hazard potential classifications were updated and assigned by the department as a product of their statewide dam break modeling analysis conducted between 2007 and 2011. Subsequent updates to the hazard classifications have been made for newly added facilities or those with new data affecting this classification. The overall condition assessment classification is a relatively new field which the Dam and Reservoir Safety Program is working to consistently apply across the state based on the condition assessments conducted on all regulated dams. All regulated dams were assessed and assigned an overall condition assessment classification during phase I inspections conducted statewide in 2007-2009. These condition assessment classifications are being updated based on recently completed Phase I investigations.

Dam Safety Inspections: The Department staff routinely inspects regulated structures statewide and retains consultants as necessary, to confirm or provide additional assessments. The Department presently targets inspecting dams on a two-year frequency, although due to staff vacancies in 2016, 2018 and 2020 has had to stretch the duration out longer. The Department also conducts construction or other informal inspections that are in addition to these visual dam safety inspections. As a result of the COVID 19 pandemic and travel restrictions, the program had to resort to remote video inspections or other remote inspection techniques.

As an alternative to conducting physical inspections, the Department created a remote inspection program in FY 2020 / 2021. Dam safety staff reviewed previous inspections and created a detailed facility map with points of interest and instructions for owners to conduct inspections and transmit photos of these specific locations. These inspections are not the preferred method; however, they do allow the dam owner to take a more active role to provide the Department visual observation of their structures while maintaining COVID 19 safety precautions. Many inspections and construction site visits were postponed in FY 2021. Staff resumed construction inspections as well as dam safety inspections in March 2021 but can still utilize the remote inspection method as an alternative if necessary.

In FY 2018, the Department retained consultants to prepare updated Phase I investigations of regulated dams statewide. The previous complete set of Phase I investigations were completed in 2009-2011 and are approximately 10-12 years old. These Phase I investigations supplement the inhouse Visual Dam Safety Inspections conducted by dam safety staff and provide an objective review and more thorough investigation of the dam's current conditions and deficiencies. The March 2021 statewide emergency from massive rainstorms and flooding, including rainfall up to 16.6 inches in 24 hours on Maui, rain bombs, and the overtopping of Kaupakalua Dam in Haiku, Maui, brought into sharp focus the increasing threats to dam safety from climate change. In response, Department requested and received approval for emergency funding of \$2,040,000 from DLNR withheld general funds, to greatly accelerate the dam safety inspection program to complete the remaining 78 Phase I investigations.

In FY 2019, the Department contracted its first set of Screening Level Risk Assessments (SLRA) for four (4) dams on the island of Kauai. The SLRA identify potential failure mechanisms and then evaluate the probable risk of various failure mechanisms having a negative effect on safety at a dam considering the dam's current physical attributes, operations, and monitoring. These types of analysis allow a more practical view of the deficiencies and failure possibilities at each facility and highlights the highest risk dangers for the owners and regulators to focus on. Once an owner or agency can complete these types of analysis for their portfolio of dams, they can objectively prioritize them by risk and urgency for remedial actions. The Department plans to complete additional SLRAs as part of the Phase I Investigation process to help owners qualify the risks associated with the recommendations identified in the Phase I Investigation reports.

The list of dams inspected during the fiscal year is attached at the end of this report.

Enforcement Actions: The Hawaii Dam and Reservoir Safety Act of 2007 authorized the Department to take enforcement action for both emergencies and any other violations of the Act. The Department has established administrative enforcement action procedures that are initiated by various actions such as the following:

- Failure to timely address unsafe or emergency conditions
- Conducting construction work on a dam without a permit
- Non-compliance with dam safety permit general terms and special conditions
- Failure to furnish requested information or submit required documents or reports
- Failure to submit a required emergency action plan (EAP) or EAP update

- Failure to pay the annual dam owner fee
- Failure to complete corrective actions as ordered by the Board or its agent

The Department has worked with dam owners to set reasonable rehabilitation or compliance schedules for their dam facilities, although this has yielded mixed results with some structures not being able to resolve outstanding deficiencies. In February of 2020 the program took a harder stance on some of these structures which culminated in enforcement fines in the end of FY 2021. Enforcement actions pursued by the Department in Fiscal Year 2021 are described in Section D of this report.

Dam Safety Construction Permits: A permit from the Board of Land and Natural Resources (Board) is required for all dam construction, alteration, enlargement, modification or removal work. Dams are uniquely engineered structures that require knowledge and experience in dam safety, particularly how to safely handle water flows in and out of the structure through appurtenant features, as well as mitigating the hazards of water passing through the dam embankment itself (seepage). Dams sustain high hydrostatic water loads, which can result in failure of the embankment if they are not properly designed and constructed. Dam safety permits allow the Department to review and check proposed improvements for concurrence with current dam safety practices and guidelines. Work that is not considered routine maintenance requires prior approval from the Board. Detailed procedures and requirements for this permitting process are provided in HAR Chapter 190.1. The Department also has developed additional guidance documents for dam owners and designers as well as a standard set of general permit requirements.

Certificate of Approval to Impound: The Certificate of Approval to Impound (CAI) water requirement was included in the Hawaii Dam and Reservoir Safety Act of 2007. Issuance of this certificate will be dependent on dam and reservoir owners ensuring their structures are remedied of critical deficiencies and meet minimum operational criteria. The Department has developed guidelines and procedures for this certificate in coordination with dam owners on the implementation of this new requirement. The Department sent out notices to complete and submit CAI applications, to all owners of regulated dams and reservoirs in the state and received CAI applications for most of the regulated structures. The Department is in the process of reviewing these submissions and reevaluating how to apply current regulations to this requirement.

Understanding that many of these dams are over 80 years old, and almost all were constructed before the development of any modern dam safety standards, the Department is working with owners to establish a reasonable improvement schedule for these facilities to meet current regulations. In the interim period, the department is working with owners to mitigate these deficiencies through operational restrictions or other types of mitigative actions.

Emergency Preparedness: HRS Chapter 179D requires that all dam owners of High and Significant Hazard Potential dams complete and submit an Emergency Action Plan (EAP) to the

Department. The Department developed guidelines and an EAP template for dam owners to utilize in formulating and executing a plan of action should a possible threat or deficiency occur on their dam facilities. The Department provides training and technical assistance to dam owners and emergency management officials to assist them in the completion and execution of the EAPs. Additionally, the Department is identified as a technical advisor during dam safety emergencies when an EAP is activated.

The Department worked with dam owners to have an EAP for every regulated dam in the state in FY 2019. Although in FY 2020 a new dam structure was added to the state dam inventory of regulated dams and that dam does not have an EAP. The Department notified the owner of this requirement. Since then, this dam owner has prepared a dam break analysis for this structure and determined that their structure is a low hazard potential dam and therefore not required to have an EAP. In FY 2021, all high and significant regulated dams in Hawaii have EAPs on file with the Department. All of these EAPs have migrated over to the Department's online EAP tool, which simplifies the creation and routine updates of the EAP process. The tool allows the Department to easily update the statewide template quickly and users can process revisions to EAPs almost instantly.

Training and Outreach: The Department provides technical assistance to the dam owners, operators, and consultants, as well as to the broader community of hazard mitigation partners and agencies. The Department works closely with the Association of State Dam Safety Officials, (ASDSO) to collaborate on public outreach and national awareness of the importance of dam and reservoir safety programs. Past Dam Safety training events include:

- 2008 Dam Safety Failure Mechanisms and Inspections - Statewide
- 2012 Dam Safety Operation and Maintenance Training – Statewide
- 2014 Dam Safety Inspections – Statewide
- 2015 Dam Safety Emergency Actions Workshops – Statewide
- 2017 Dam Evaluation and Rehabilitation Workshops – Statewide
- 2017 Dam Safety Rehabilitation Technical Seminar – Oahu
- 2019 Dam Safety Emergency Intervention Workshops – Kauai, Maui, & Oahu
- 2020 Dam Screening Level Risk Assessment / Failure Modes Analysis Workshop – Oahu

The Department has maintained an online inventory of dams for regulated dams in the state and makes this inventory available to the public at dams.hawaii.gov. The Department coordinated with the Counties to provide their current Dam Evacuation Maps on the Department's dam safety inventory website for the public to download. Residents are also able to quickly identify if their parcels are in a dam evacuation area by entering their address into the Department's Flood Hazard Assessment Tool ([HawaiiNFIP.org](https://hawaiiNFIP.org)) and click on [parcel details](#) for a flood report to learn if the parcel is affected by a dam evacuation area and identifies the dams' State ID number(s).

Dam Safety Program Staffing Challenges: The program has been operating with at least one vacancy since 2016. Midway through FY 2021 the Dam Safety Program hired two additional engineers which enabled the program becoming fully staffed. The second part of FY 2020 brought significant challenges and disruption to the dam safety program due to the Covid-19 Pandemic which continued through FY 2021. Travel restrictions and uncertainties relating to the

pandemic resulted in staff working remotely from home and postponement of neighbor island inspections. Training of new staff members were done remotely through MS Teams meetings and other online training resources. The dam safety team has remained motivated in continuing the mission of the dam safety program.

FUNDING

The Dam and Reservoir Safety Program is funded under the Department’s LNR 810 Program, Prevention of Natural Disasters, and utilizes operational funding from two state special funding sources and typically one federal grant from the United States Department of Homeland Security, Federal Emergency Management Agency (FEMA). The dam and reservoir safety special fund has an annual ceiling spending limit of \$ 1,300,000 but is typically limited based on available funding. In FY 2020 the State was able to secure an additional Federal Grant, the High Hazard Potential Dam Rehabilitation Grant and in FY 2021 the dam safety program was provided with a single General Fund amount to complete the balance of the current set of Phase I Investigations in the State. The following is a breakdown of available funds to the Department for its dam safety activities in FY 2021:

Dam Safety Program Budget

State of Hawaii – Special Land and Development Fund (operating)	\$ 582,880
State of Hawaii – Dam and Reservoir Safety Special Fund (DRSSF balance)	\$ 1,057,000
Revenues (Annual Fees, Permit Fees, Enforcements)	\$ 772,587
State of Hawaii – Emergency Inspection Appropriation (General Funds)	\$ 2,040,000
FEMA – High Hazard Potential Dam Rehabilitation Grant (Fed FY 2020)	\$ 419,546
FEMA – National Dam Safety Program Grant (Fed FY 2021)	\$ 49,463
Total	\$ 4,921,476

<u>Emergency Contingency Reserve</u>	<u>\$ <700,000></u>
Total Available Funding	\$ 4,221,476

FY 2021 expenditures from the various funding sources were made as follows:

	Operating Special Fund	Dam and Reservoir Safety Special Fund	Emergency Funding	Federal Funds	Total
Personnel Services	\$ 423,800	\$ 0		\$ 0	\$ 423,800
Consultant Services*	\$ 0	\$ 491,250	\$2,040,000	\$ 0	\$ 2,531,250
Inspections Costs (including travel)	\$ 0	\$ 4,090		\$ 0	\$ 4,090
Training Expense (including travel)	\$ 0	\$ 0		\$8,625	\$ 8,625
Other Expenses (Supplies, Operating & Equipment)	\$ 6,820	\$ 5,970		\$ 11,840	\$ 24,630
B&F Management Fee	\$ 2,220	\$ 52,620		\$ 0	\$ 54,840
	\$ 432,840	\$ 553,930	\$2,040,000	\$ 20,465	\$ 3,047,235

* Included \$ 850,000 of funds blanketed for consultant contracts in FY21.

Operating funding for the State LNR 810 Program supports multiple sub-programs which include the State oversight of the National Flood Insurance Program, the State General Flood Control Plan and the Dam and Reservoir Safety Program. Some assumptions were taken to separate costs between these programs for this report. The Dam and Reservoir Safety Special Fund was intended to maintain a funding source for ongoing operations as well as a dam safety emergency reserve. HAR Chapter 190.1 enables the Department to collect Dam Safety Annual Fees from regulated dam owners. The collection of these fees has enabled the Department to meet the targeted \$ 700,000 minimum emergency reserve.

DAM SAFETY ACTIVITIES:

A. Approvals of plans and specifications for the construction of dam and reservoirs and for alterations, modifications, repairs, removals, and enlargements of any dams and reservoirs; The following is a listing of active permits and permit reviews in FY 2021 and their status:

Permit No.	State ID	Dam Name	Description of Improvements	Status / Comments
19	MA-0141	Kehalani Retention Basin	New Construction	Under Construction Permit revisions pending
39	KA-0113	Omao Reservoir	Dam removal	Permit Approved, Pending Construction
51	KA-63	Aahoaka Reservoir	Improvement	Approved / Resubmission for project scope change
53	HA-0042	Waimea 60 MG Reservoir (Puukapu)	Dam improvement - lining, outlet slip-line, upstream control, subdrain	In construction; On hold pending design revision
54	HA-0131	Paauilo Reservoir	Dam improvement - upstream control, vegetation	Construction completed, permit pending close-out.
55	HA-0123	Puu Pulehu Reservoir	Dam Spillway/Embankment Rehabilitation	Permit Application under Review. Owner redesigning
59	HA-0040	Waikalua Reservoir No. 1	Major repair.	In construction; On hold pending design revision
66	OA-0001	Nuuanu No. 4 Res.	Repair and improvement	In Construction
68	OA-137	Oahu Reservoir 155	Improvement	Permit Application under Review
71	KA-0061	Lower Kapahi Reservoir	Removal	Permit Application under Review
74	KA-0065	Upper Anahola Reservoir	Rehabilitation	On hold – Owner redesigning
76	KA-0067	Field 1 Kealia Reservoir	Rehabilitation	On hold – Owner redesigning
77	MA-0140	Ukumehame Reservoirs	Removal	Approved; owner obtaining permits for construction.
80	KA-0105	Elima Reservoir	Outlet Work Repair	In Construction
81	KA-0024	Kalihiwai Reservoir	Spillway & Emb. Rehab.	Owner Revising Plan
82	MA-0093	Kaupakalua Reservoir Removal	Removal	In Construction
83	OA-0129	Waimanalo 60 MG - Crest Modifications	Repair and improvement	Permit Application under Review

Permit No.	State ID	Dam Name	Description of Improvements	Status / Comments
	MA-0058	Honokowai Dam	Proposed Reduction	Preliminary Review
	KA-0114	Piwai - Dam Reduction	Proposed Removal	Preliminary Review
	KA-0030	Kaloko - Remediation	Rehabilitation / Reduction	Preliminary Review
	OA-0025	Ku Tree Removal	Removal	Preliminary Review
	MA-0094	Kapalaalaea Reservoir-Breach	Removal	Preliminary Review
	OA-0017	Wahiawa Reservoir	Spillway Improvement	Preliminary Review
	MA-0073	HC&S Reservoir 24 - Removal	Removal / Reduction	Preliminary Review
	MA-0095	Haiku Reservoir Remediation	Remediation	Preliminary Review
	HA-0049	Keaiwa Reservoir	Removal / Reduction	Preliminary Review

Three permits were closed in FY 2021:

Permit No.	State ID	Dam Name	Description of Improvements	Status / Comments
73	KA-0064	Field 2 Kealia Reservoir	Removal	Construction completed / Permit Closed
75	KA-0066	Lower Anahola Reservoir	Removal	Construction completed / Permit Closed
78	KA-0004	Kitano Reservoir	Removal	Construction completed / Permit Closed

B. Listing of dam and reservoir safety inspections;

In FY 2021, Dam and Reservoir Safety Program staff conducted 26 visual and Phase I dam safety inspections on regulated dams. These inspections were a mix of informal dam safety visit, remote inspections, post flood inspections as well as several Phase I inspections. The department did attend some virtual visual dam safety construction visits via cel phone, which are not included below. The inspection numbers for this fiscal year are very low and due to the Covid-19 pandemic and staffing challenges. A listing of the visual dam safety inspections is provided below:

State ID	Dam Name	Inspection Type	Date of Inspection
MA-0080	Maui Reservoir 60	Remote Dam Safety Inspection	7/14/2020
MA-0081	Maui Reservoir 61	Remote Dam Safety Inspection	7/21/2020
MA-0090	Maui Reservoir 92	Remote Dam Safety Inspection	7/27/2020

State ID	Dam Name	Inspection Type	Date of Inspection
MA-0088	Maui Reservoir 84	Remote Dam Safety Inspection	8/7/2020
MA-0071	Maui Reservoir 21	Remote Dam Safety Inspection	8/14/2020
MA-0075	Maui Reservoir 30	Remote Dam Safety Inspection	8/20/2020
MA-0070	Maui Reservoir 20	Remote Dam Safety Inspection	8/26/2020
OA-0025	Ku Tree Reservoir	Visual Dam Safety	11/17/2020
OA-0156	Koolau Reservoir	Visual Dam Safety	11/17/2020
OA-0001	Nuuanu Dam No. 4	Visual Dam Safety	2/4/2021
OA-0154	Nuuanu Reservoir No. 1	Visual Dam Safety	2/4/2021
MA-0127	Napili 4-5 Desilting Basin	Remote Dam Safety Inspection	3/2/2021
MA-0128	Napili 2-3 Desilting Basin	Remote Dam Safety Inspection	3/2/2021
MA-0093	Kaupakalua Reservoir	Post Flood Inspection	3/9/2021
OA-0018	Opaepala No. 1 Reservoir	Post Flood Inspection	3/17/2021
OA-0017	Wahiawa Dam	Post Flood Inspection	3/18/2021
OA-0021	Kemoo 5 Reservoir	Post Flood Inspection	3/22/2021
OA-0022	Upper Helemano Reservoir	Post Flood Inspection	3/22/2021
OA-0023	Helemano 6 Reservoir	Post Flood Inspection	3/22/2021
MA-0150	Wailuku Water Reservoir 6	Informal Visit	3/24/2021
KA-0099	Waita Reservoir	Phase I Investigation	6/29/2021
KA-0118	Manuhonuhonu Reservoir	Phase I Investigation	6/29/2021
KA-0120	Papuaa Reservoir	Phase I Investigation	6/29/2021
KA-0014	Okinawa Reservoir	Phase I Investigation	6/30/2021
KA-0063	Aahoaka Reservoir	Phase I Investigation	6/30/2021
KA-0121	Halenanahu Reservoir	Phase I Investigation	6/30/2021

C. Rules adopted or amended;

No Dam Safety rules were adopted or amended in FY 2021.

D. Enforcement orders and proceedings.

The Department issued penalty fines via enforcement action for delinquent submissions to the dam owner of the following dams in FY 2021:

State ID	Dam Name	Fine Amount	Description
OA-0017	Wahiawa Reservoir	\$ 20,000	Failure to comply with NOD Scheduled Requirements
HA-0049	Keaiwa Reservoir	\$10,000	Failure to comply with NOD Scheduled Requirements
MA-0073	Maui Reservoir 24	\$ 500	Failure to install Monitoring Gage
MA-0093	Kaupakalua Reservoir	\$ 500	Failure to install Monitoring Gage
MA-0094	Kapalaalaea Reservoir	\$ 500	Failure to install Monitoring Gage
MA-0095	Haiku Reservoir	\$ 500	Failure to install Monitoring Gage
MA-0140	Ukumehame Reservoir	\$10,000	Failure to comply with NOD Scheduled Requirements
KA-0010	Waiakalua Reservoir	\$41.06	Delinquent Annual Fee

The Department also maintained the following dam restrictions issued in previous years.

State ID	Dam Name	Deficiency	DLNR Restriction
HA-0049	Keaiwa Reservoir	Earthquake Damage	Keep Empty
HA-0051	Hawi No. 5 Reservoir	Outlet Not Functioning Properly	Keep Empty
KA-0002	Puu Lua Reservoir	No Spillway	Keep Below 59 ft. (Top of Dam = 111 ft.)
KA-0003	Puu Opaie Reservoir	Abandoned Condition	Keep Empty
KA-0005	Mana Reservoir	No Spillway	Keep Empty
KA-0010	Waiakalua Reservoir	Requires Hydraulic and Stability Studies	Keep below 9 ft (Top = 19 ft)
KA-0014	Okinawa Reservoir	Requires Hydraulic and Stability Studies	Keep 10-ft Below Top of Dam

State ID	Dam name	Deficiency	DLNR Restriction
KA-0015	Kaneha Reservoir	Spillway Undersized	Keep Below 22' (Spillway = 42')
KA-0016	Mimino Reservoir	Spillway Undersized	Keep Below 26' (Spillway = 36')
KA-0024	Kalihiwai Reservoir	Requires Hydraulic and Stability Studies	Keep Below 10.2' (Top = 18.6')
KA-0030	Kaloko Reservoir	Partially Breached - No Permanent Repair	Keep Below 21.0' (Spillway = 22.7') (Top >40')
KA-0061	Lower Kapahi Reservoir	No Spillway	Keep Empty
KA-0062	Twin Reservoirs	Spillway Undersized / Abandoned Condition	Keep Empty
KA-0063	Aahoaka Reservoir	No Functioning Outlet / Spillway Undersized	Keep at Outlet Elevation (426.8)
KA-0064	Field 2 Kealia Reservoir	Abandoned Condition	Keep Empty
KA-0065	Upper Anahola Reservoir	Abandoned Condition	Keep Empty
KA-0066	Lower Anahola Reservoir	Abandoned Condition	Keep Empty
KA-0067	Field 1 Kealia Reservoir	Abandoned Condition	Keep Empty
KA-0100	Kapa Reservoir	Requires Hydraulic and Stability Studies	Keep Below 6' (Spillway = 11')
KA-0101	Hukiwai Reservoir	No Spillway	Keep Below 12' (Top =17')
KA-0102	Ioleau Reservoir	Spillway Undersized	Keep Below 25'
KA-0105	Elima Reservoir	Spillway Undersized	Keep Below 7' (Spillway = 22')
KA-0106	Kumano Reservoir	No Spillway	Keep Empty
KA-0107	Puu O Hewa Reservoir	Requires Hydraulic and Stability Studies	Keep Below Lower Spillway Elevation
KA-0108	Kaupale Reservoir	Spillway Undersized	Keep Empty
KA-0109	Ipuolono Reservoir	Spillway Undersized	Keep Below 25' (Spillway = 45')
KA-0111	Aepoekolu Reservoir	Spillway Undersized	Keep Empty
KA-0112	Aepocha Reservoir	Spillway Undersized	Keep Below 27' (Spillway = 37')
KA-0113	Omao Reservoir	Spillway Undersized	Keep Empty

State ID	Dam Name	Deficiency	DLNR Restriction
KA-0114	Piwai Reservoir	Spillway Undersized	Keep Empty
KA-0115	Pia Mill Reservoir	Requires Hydraulic and Stability Studies	Keep 5ft. Below Spillway
KA-0116	Mau Reservoir	Spillway Undersized	Keep Empty
KA-0117	Elua Reservoir	Spillway Undersized	Keep Below 16' (Spillway = 26.6')
KA-0118	Manuhonuhonu Reservoir	No Spillway	Keep Empty
KA-0119	Mauka Reservoir	Requires Hydraulic and Stability Studies	Keep 5 ft. Below Spillway
KA-0121	Halenanahu Reservoir	Requires Hydraulic and Stability Studies	Keep 20 ft. Below Spillway
KA-0146	Halaula Reservoir	Requires Hydraulic and Stability Studies	Keep Below Spillway
MA-0054	Horner Reservoir	Requires Hydraulic and Stability Studies	Keep Below 300" Gage (Spillway = 360" Gage)
MA-0068	Maui Reservoir 14	Reservoir Overtops from Design	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0070	Maui Reservoir 20	Reservoir Overtops from Design Rainstorm event	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0073	HC&S Reservoir 24	Reservoir Overtops from Design Rainstorm event	Keep and maintain empty under normal conditions, alert / coordinate downstream population notification with Maui EMA.
MA-0074	Maui Reservoir 25	Reservoir Overtops from Design Rainstorm event	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0076	Maui Reservoir 33	Requires H&H and stability study	Maintain water level at least 5' below spillway elevation
MA-0078	Maui Reservoir 42	Poor condition, requires H&H and stability study	Maintain water level at least 5' below spillway elevation
MA-0079	Maui Reservoir 52	Reservoir Overtops from Design Rainstorm event	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0080	Maui Reservoir 60	Reservoir Overtops from Design Rainstorm event	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0081	Maui Reservoir 61	Reservoir does not have required safety freeboard	Maintain water level at least 5' below spillway elevation
MA-0082	Maui Reservoir 70	Repairs needed, requires H&H, topo & stability study	Maintain water level at least 5' below spillway elevation
MA-0083	Maui Reservoir 73	Repairs needed, requires H&H and stability study	Maintain Empty, unless water required, coordinate safe level with DLNR

State ID	Dam Name	Deficiency	DLNR Restriction
MA-0084	Maui Reservoir 74	Reservoir Overtops from Design Rainstorm event	Maintain Empty
MA-0085	Maui Reservoir 80	Requires H&H and stability study	Maintain water level at least 5' below spillway elevation
MA-0086	Maui Reservoir 81	Requires H&H and stability study	Maintain water level at least 5' below spillway elevation
MA-0087	Maui Reservoir 82	Poor Condition, require Freeboard Buffer	Maintain water level at least 5' below spillway elevation
MA-0088	Maui Reservoir 84	Reservoir Overtops from Design Rainstorm event	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0089	Maui Reservoir 90	Requires H&H and stability study	Maintain water level at least 5' below spillway elevation
MA-0090	Maui Reservoir 92	Reservoir Overtops from Design Rainstorm event	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0091	Peahi Reservoir	Reservoir Overtops from Design Rainstorm event	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0092	Papaaea Reservoir	Repairs needed, requires H&H, topo & stability study	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0093	Kaupakalua Reservoir	Reservoir Overtops from Design Rainstorm event and seepage at toe	Keep and maintain empty under normal conditions, alert / coordinate downstream population notification with Maui EMA.
MA-0094	Kapalaalaea Reservoir	Reservoir Overtops from Design Rainstorm event and has piping along outlet	Maintain Empty
MA-0095	Haiku Reservoir	Reservoir Overtops from Design Rainstorm event and has piping along outlet	Drain and maintain empty, alert Maui EMA of potential hazard
MA-0096	Pauwela Reservoir	Reservoir Overtops from Design Rainstorm event	Drain and maintain water at outlet works elevation, alert / coordinate downstream population notification with Maui EMA.
MA-0140	Ukumehame Reservoirs	Spillway Undersized	Res 2: Keep Below 2' Res 3: Keep Below 10'
MA-0151	Wailuku Water Reservoir 10	Requires Hydraulic and Stability Studies	Keep Below 9' (Spillway = 11.6')
OA-0017	Wahiawa Dam	Spillway Undersized	Keep Below 65' (Spillway = 80')
OA-0023	Helemano 6 Reservoir	Spillway Erosion	Keep 15' Below Top of Dam
OA-0025	Ku Tree Reservoir	Abandoned Condition	Keep Empty
OA-0154	Nuuanu Reservoir No. 1	No Functioning Outlet / Spillway Undersized	Keep Below 381.5
OA-0156	Koolau Reservoir	Abandoned Condition	Keep Empty

- E. Dam and reservoir failures and department evaluations of the reasons for the failure, if known;

There were no known dam failures in FY 2021.
 There was one dam incident in FY 2021.

March 8, 2021 – MA-0093 Kaupakalua Reservoir on the Northeast side of Maui was overtopped by about 12-18” of water flowing over the mid-section of the crest and sustained moderate erosion on the downstream slope. The dam owner was proactively monitoring this structure and immediately activated the dam’s Emergency Action Plan to coordinate evacuation and road closure measures with Maui County Emergency Management personnel. No lives were lost and no injuries were reported as a result of the overtopping. Additionally, all known property damage were reported upstream of the dam / reservoir. This dam was scheduled to be removed in the summer of 2021, and work has since progressed sufficiently such that the structure no longer poses a dam safety threat to the downstream area.

- F. Other available data regarding the effectiveness of the State’s Dam and Reservoir Safety Program.

The Dam and Reservoir Safety Program has been working with dam owners in the preparation of their Emergency Action Plans (EAP) for their facilities. EAPs are required by Statute for all high and significant hazard potential classifications of dams. Out of the 129 regulated dams in FY 2021, 123 are classified as high or significant hazard potential structures. All regulated dams except one low hazard dam have EAPs on file with the Department, and all EAPs have been migrated and updated on the Department’s new online “Easy EAP” Tool. The following is a summary of EAPs on file with the Department for all classifications.

FY 2004	FY 2007	FY 2010	FY 2015	FY 2020	FY 2021
12	55	121	130	131 of 131	128 of 129