

Report to the Thirtieth Legislature
2019 Regular Session

**REPORT ON
THE HAWAII DAM AND RESERVOIR SAFETY PROGRAM
STATE FISCAL YEAR 2018**



Prepared by the
Department of Land and Natural Resources
State of Hawaii

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

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REPORT ON THE HAWAII DAM AND RESERVOIR SAFETY PROGRAM STATE FISCAL YEAR 2018

This report is prepared pursuant to Section 179D-29, Hawaii Revised Statutes (HRS), and covers the period from July 1, 2017 through June 30, 2018.

INTRODUCTION

The Department of Land and Natural Resources (Department), Engineering Division administers the Hawaii Dam and Reservoir Safety Act of 2007 (Act), codified as Chapter 179D, HRS, (Dam and Reservoir Safety Program). This Act, in conjunction with Chapter 13-190.1, Hawaii Administrative Rules (HAR), “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 Section 179D-29, HRS, 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.

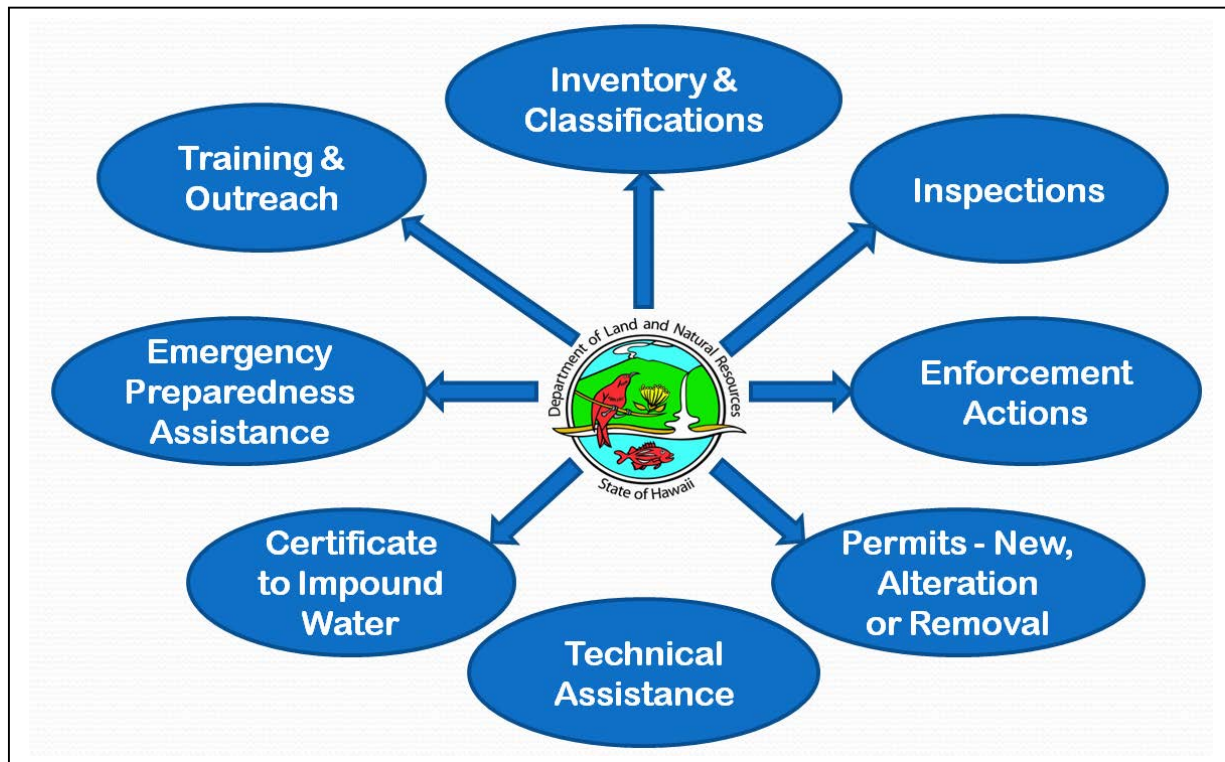
BACKGROUND

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 Hawaii Dam and Reservoir Safety Program.

THE HAWAII DAM AND RESERVOIR SAFETY PROGRAM

The Hawaii 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 Hawaii 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 ongoing inspection findings.

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 and 2018 has had to stretch the duration out a little longer. The Department processed several contracts with consultants to provide Phase I Inspections at various dams throughout the State in Fiscal Year (FY) 2018. The Department plans to retain additional consultants in FY 2019-20 until most of the regulated high and significant hazard dams have an updated Phase I Inspection report, (dependent on available funding).

The Department also conducts construction or other informal inspections that are in addition to these visual dam safety inspections. Listings of the dams inspected this past fiscal year are 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 the following general deficiencies:

- Failure of dam and reservoir owners to comply with general requirements and responsibilities.
- Non-compliance with dam safety permit general terms and special conditions
- Non-compliance with certificate to impound terms and conditions

Enforcement actions pursued by the Department in FY 2018 is described in Section D (Enforcement orders and proceedings) on page 10 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, modifications 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. 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 Chapter 190.1, HAR. 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 in FY 2014. The Department received CAI applications for most of the regulated structures and is in the process of reviewing these submissions.

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: Chapter 179D, HRS, 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 where an EAP is activated.

In April 2015, the Department coordinated EAP training and table top exercises on Oahu and Maui. Over 150 dam owners, operators, emergency managers, first responders and representative from supporting agencies participated in the event. The major objectives for this event was to provide training on basic technical understanding of typical dam failure modes and need of an EAP to mitigate these potential failures, run through several EAP test scenarios, and gain feedback from all participants on revising the current EAP template. Additional training exercises were conducted on Hawaii and Kauai in September 2015, with approximately 130 participants attending those exercises.

At present, the Department has an EAP for every regulated dam in the State. Recently the Department released a new 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. Owners have responded with positive feedback regarding this new tool. As of 2018, 37 dams have EAPs processed by this tool and are available online. This number is unchanged from the previous year, we plan to hold outreach training this year to increase this number. Our goal is to have all owners migrate over to the new online tool and update their EAPs annually.

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. Recent training seminars included Operation and Maintenance Training and Emergency Action Planning Training.

In March and April of 2017, the Department sponsored three overview workshops on Oahu, Maui and Kauai, detailing the rehabilitation improvements for embankment dams and one technical training class. This overview workshop was focused on providing dam owners with insight on how to procure and scope professional services for investigations and rehabilitation

work on their facilities. A two-day advanced technical training class was conducted to provide continuing education for the local dam safety technical community. Almost 200 people attended the various training events and over 20 different consulting firms and partner agencies were present. No additional training sessions were conducted in FY 2018. We plan to conduct an outreach training in the later part of FY 2019 that may be a combination of basic inspection techniques, probable failure mode analysis and EAP tool training.

FUNDING

The Hawaii Dam and Reservoir Safety Program is funded under the Department’s LNR 810 Program, Prevention of Natural Disasters, and receives operational funding from two state special funds and one federal grant from the United States Department of Homeland Security, Federal Emergency Management Agency (FEMA). The following is a breakdown of available funds to the Department for its dam safety activities in FY 2018:

Dam Safety Program Budget

State of Hawaii – Special Land and Development Fund (operating)	\$ 445,000
State of Hawaii – Dam and Reservoir Safety Special Fund	\$ 1,544,055
Revenues (Annual Fees, Permit Fees, Enforcements)	\$ 603,344
Investments	\$ 15,330
FEMA – National Dam Safety Program Grant (Federal FY 2018)	\$ 53,936
Total	\$ 2,661,665
Emergency Contingency Reserve	\$ <700,000>
Total Available Funding	\$ 1,961,665

FY 2018 expenditures from the various funding sources were made as follows:

	Operating Special Fund	Dam and Reservoir Safety Special Fund	Federal Funds	Total
Personnel Services	\$ 409,000	\$ 0	\$ 0	\$ 409,000
Consultant Services*	\$ 0	\$ 1,370,000	\$ 19,800	\$ 1,389,800
Inspections Costs (including travel)	\$ 0	\$ 10,100	\$ 0	\$ 10,100
Training Expense (including travel)	\$ 0	\$ 0	\$ 7,100	\$ 7,100
Other Expenses (Supplies, Operating & Equipment)	\$ 6,100	\$ 8,000	\$ 10,200	\$ 24,300
Special Fund Central Service and Administrative Expenses Assessments	\$ 11,400	\$ 58,200	\$ 0	\$ 69,600
	\$ 426,500	\$ 1,446,300	\$ 37,100	\$ 1,909,900

* Includes \$ 950,000 of contract encumbrances for ongoing consultant contracts.

Operating funding for the LNR 810 Program supports multiple sub-programs which include 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. With the new HARs becoming effective at the end of FY 2012, the Department could start collecting 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.

In FY 2018, the Department retained a consultant to assist in performing Probably Failure Mode Analysis on several dams to aid the Department better managing the risks of the current regulated dam portfolio. The Department also initiated the next set of Phase I investigations on the islands of Hawaii, Oahu, and Kauai and contracted for Phase I inspections of 20 dams on Maui. Several ongoing projects included maintenance and enhancements to the Dam Inventory Management System, Dam break modeling, and remote water level gages installation and software application to monitor these gages.

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;

During FY 2018, one new dam safety alteration permit application was received by the Department:

Permit No.	Dam ID	Dam Name	Status
81	KA-0024	Kalihiwai Reservoir	Submitted / owner revising

The following is a listing of active permits in FY 2018 and their status:

Permit No.	Dam ID	Dam Name	Description of Improvements	Status / Comments
19	MA-0141	Kehalani Retention Basin	New Construction	Under Construction Permit revisions pending
20	KA-0098	Alexander Dam	Spillway Repairs/Veg	Constructed, pending approved close-out documents
39	KA-0113	Omao Reservoir	Dam removal	Permit Approved, Pending Construction
42	KA-0013	Upper Kapahi Reservoir	Gate and Catwalk	Constructed, pending approved close-out documents

One permit was closed in FY 2018:

Permit No.	Dam ID	Dam Name	Description of Improvements	Status/Comments
46	KA-0135	Hanamaulu Field 21	Dam Removal	Constructed, pending approved close-out permit
43	KA-0060	Wailua Reservoir	Gate and Catwalk	Constructed, pending approved close-out documents
44	KA-0013	Upper Kapahi Reservoir	Dam Safety Improvements	Constructed, pending approved close-out documents
46	KA-0135	Hanamaulu Field 21	dam removal	Close-out permit
53	HA-0042	Waimea 60 MG Reservoir (Puukapu)	Dam improvement - lining, outlet slip-line, upstream control, subdrain	Approved, Pending Construction
54	HA-0131	Paauiilo Reservoir	Dam improvement - upstream control, vegetation	In construction
55	HA-0123	Puu Pulehu Reservoir	Dam improvement - buttress w/ subdrain, rehab DS slope, spillway imp	Permit Application under Review
59	HA-0040	Waikaloa Reservoir No. 1	Major repair.	Permit Application under Review
61	OA-0149	Maunaolu Reservoir	Drainage improvements	In construction
66	OA-0001	Nuuanu No. 4 Reservoir	Repair and improvement	Approved, Pending Construction
71	KA-0061	Lower Kapahi Reservoir	Removal	Permit Application under Review
73	KA-0064	Field 2 Kealia Reservoir	Removal	Approved, Pending Construction
74	KA-0065	Upper Anahola Reservoir	Reduction	Permit Application under Review
75	KA-0066	Lower Anahola Reservoir	Removal	Approved, Pending Construction
76	KA-0067	Field 1 Kealia Reservoir	Reduction	Permit Application under Review
77	MA-0140	Ukumehame Reservoirs	Removal	Permit Application under Review
78	KA-0004	Kitano Reservoir	Removal	Permit Application under Review
79	OA-0018	Opaeula Reservoir 1	Outlet Work Repair	Approved, Pending Construction
80	KA-0105	Elima Reservoir	Outlet Work Repair	Board Appr'd Permit April 23, 2018

B. A listing of dam and reservoir safety inspections;

In FY 2018, the Hawaii Dam and Reservoir Safety Program staff conducted 49 visual dam safety inspections on regulated dams. In addition to these inspections, the department also conducted 8 informal dam safety inspection visits (including remote gage siting visits and storm related inspections) and conducted 8 inspections to monitor construction activity. The inspection numbers for this fiscal year are very low and steps are being implemented to bring the program inspection number back on track to at least inspecting every dam on a two-year cycle. The Department has also started contracting with consultants to update the Phase I inspections on several dams statewide. A listing of the visual dam safety inspections is provided below:

State ID	Dam Name	Inspection Type	Date of Inspection
OA-0149	Maunaolu Reservoir	Visual Dam Safety	3-Aug-17
OA-0154	Nuuanu Reservoir No. 1	Visual Dam Safety	8-Aug-17
OA-0018	Opaeula 1 Reservoir	Visual Dam Safety	31-Aug-17
OA-0020	Opaeula 15 Reservoir	Visual Dam Safety	31-Aug-17
KA-0098	Alexander Reservoir	Visual Dam Safety	5-Oct-17
OA-0017	Wahiawa Reservoir	Visual Dam Safety	11-Oct-17
OA-0022	Upper Helemano Reservoir	Visual Dam Safety	11-Oct-17
OA-0023	Helmano 6 Reservoir	Visual Dam Safety	11-Oct-17
OA-0021	Kemoo 5 Reservoir	Visual Dam Safety	11-Oct-17
KA-0002	Puu Lua Reservoir	Visual Dam Safety	12-Oct-17
OA-0001	Nuuanu Reservoir No. 4	Visual Dam Safety	2-Nov-17
KA-0145	Kauai Lagoons	Visual Dam Safety	2-Nov-17
KA-0063	Aahoaka Reservoir	Visual Dam Safety	16-Nov-17
KA-0003	Puu Opae	Visual Dam Safety	21-Nov-17
HA-0040	Waikoloa Reservoir No. 1	Visual Dam Safety	29-Nov-17
HA-0122	Waikoloa Reservoir No. 2	Visual Dam Safety	29-Nov-17
HA-0136	Waikoloa Reservoir No. 3	Visual Dam Safety	29-Nov-17
KA-0004	Kitano Reservoir	Visual Dam Safety	29-Nov-17
KA-0005	Mana Reservoir	Visual Dam Safety	29-Nov-17
OA-0020	Opaeula 15 Reservoir	Visual Dam Safety	19-Dec-17
KA-0006	Waikaia	Visual Dam Safety	28-Feb-18
KA-0007	Kepani	Visual Dam Safety	28-Feb-18
KA-0008	Waikoloa	Visual Dam Safety	28-Feb-18
KA-0009	Kaawawanui	Visual Dam Safety	28-Feb-18
KA-0010	Waiakalua	Visual Dam Safety	7-Mar-18
KA-0062	Twin	Visual Dam Safety	7-Mar-18
KA-0117	Elua	Visual Dam Safety	5-Apr-18
KA-0105	Elima	Visual Dam Safety	5-Apr-18
KA-0116	Mau	Visual Dam Safety	5-Apr-18
KA-0100	Kapa	Visual Dam Safety	10-Jul-18
KA-0109	Ipuolono	Visual Dam Safety	10-Jul-18

State ID	Dam Name	Inspection Type	Date of Inspection
HA-0051	Hawi 5	Phase I	9-Apr-18
HA-0147	Punawai	Phase I	9-Apr-18
HA-0040	Waikoloa 1	Phase I	10-Apr-18
HA-0122	Waikoloa 2	Phase I	10-Apr-18
HA-0136	Waikoloa 3	Phase I	10-Apr-18
HA-0042	Waimea 60 MG	Phase I	11-Apr-18
HA-0123	Puu Pulehu	Phase I	11-Apr-18
HA-0131	Paaui	Phase I	11-Apr-18
HA-0043	Puukapu Watershed Retarding R-1	Phase I	12-Apr-18
HA-0049	Keaiwa Reservoir	Phase I	13-Apr-18
KA-0015	Kaneha	Phase I	16-Apr-18
KA-0012	Kapaia	Phase I	16-Apr-18
KA-0119	Mauka	Phase I	17-Apr-18
KA-0103	Aepo	Phase I	17-Apr-18
OA-0022	Upper Helemano	Phase I	4-May-18
OA-0021	Kemoo 5	Phase I	4-May-18
OA-0018	Opaepa 1	Phase I	18-May-18
OA-0017	Wahiawa	Phase I	18-May-18

Other Inspections Conducted Statewide:

State ID	Dam Name	Inspection Type	Date of Inspection
KA-0119	Mauka Reservoir	Informal – Gage Install Insp.	17-Oct-17
KA-0119	Mauka Reservoir	Informal	16-Nov-17
KA-0107	Puu O Hewa Reservoir	Informal	16-Nov-17
KA-0115	Pia Mill Reservoir	Informal	16-Nov-17
OA-0018	Opaepa 1	Construction	18-May-18

C. Rules adopted or amended;

No Dam Safety rules were adopted or amended in 2018.

The 2016 Legislature authorized the availability of varying amounts of Special Purpose Revenue Bonds (SPRB) to four dam owners/operators to fund improvements and modifications to their facilities. The approval of the SPRB issuance will require further discussion between the dam owner/operator and the Department of Budget and Finance, and satisfactory credit underwriting review of the financing components with respect to the proposed financing. The facilities for which SPRBs are approved by the 2016 Legislature are:

- KA-0030 Kaloko Dam
- MA-0141 Kehalani Offsite Retention Basin
- MA-0140 Ukumehame Reservoirs

MA-0150 Wailuku Reservoir No.6
 Two more dams were approved to be eligible for SPRBs by the 2018 Legislature:

OA-0001 Nuuanu No. 4 Reservoir
 OA-0154 Nuuanu No. 1 Reservoir

D. Enforcement orders and proceedings;

The Department did issue penalty fines via enforcement action for delinquent submissions to the dam owner of the following dams in FY 2018:

OA-0017 Wahiawa Reservoir (Inadequate storm mitigation plan) \$500.00
 KA-0062 Twin Reservoirs (Delinquent Annual Fee) for \$ 450.00

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

There were no known dam failures in FY 2018.

There was a dam incident at the Kalihiwai Reservoir on Kauai which suffered minimal damage due to some flows crossing a small section of the crest during the heavy rainfall event of April 2018 on the Island of Kauai. The owner did contact the Department and the Kauai County Emergency Management Agency and a limited number of families were evacuated due to concerns regarding the dam’s safety to contain the heavy rainfall flows. The rain subsided and the dam did not breach. Subsequently, the owner has made some emergency modifications to allow greater capacity for drawing down the water quicker in the reservoir as well as repairing the section that was damaged by the April storm event. The owner is currently in the process of permitting a permanent fix for this reservoir.

F. Other available data regarding the effectiveness of the Hawaii Dam and Reservoir Safety Program.

The Hawaii Dam and Reservoir Safety Program worked with dam owners to complete EAPs for their facilities. EAPs are required by statute for only high and significant hazard potential classifications of dams. Out of the 132 regulated dams in FY 2018, 127 are classified as high or significant hazard potential structures. All regulated dams have EAPs on file with the Department, 37 of them via the new online EAP Tool. The following is a summary of EAPs on file with the Department for all classifications.

Number of Dams with EAPs							
FY 2004	FY 2007	FY 2010	FY 2012	FY 2013	FY 2014	FY 2015	FY 2018
12	55	121	125	130	127	130	132 of 132