Department of Conservation and Recreation

Design and Engineering Division

Office of Dam Safety

Presentation to WRC December 14, 2023

DCR Manages Dams from Two State-wide Perspectives

1. The Commonwealth's Dam Safety Regulatory Agency
2. Owner of over 300 Dams Located across the Commonwealth

History of Dam Safety in the Commonwealth

- Construction of dams in the Northeast began in the 1700's. Many dams were constructed through the 1800's to provide power and water to mills, industry, population centers and farms.

- Through the 1800's dam designers and constructors were generally those who learned in the field from practical hands-on experience. Following a number of deadly failures in the 1800's some states began establishing standards for dam design and construction including Massachusetts.

Selected Massachusetts Dam Failures

- Mud or Lee Dam, Lee, **Massachusetts**, 1886, 7 deaths.
- Mill River Dam, Williamsburg **Massachusetts**, 1874, 139 deaths
- Lee Dam, Lee, **Massachusetts**, 1968, 2 deaths.

- Sampling of Dam Failures Across the U.S.
  - South Fork Dam, Johnstown, Pennsylvania, 1889, 2209 deaths.
  - St. Francis Dam, San Francisquito Canyon, California, 1928, 420 deaths.
  - Teton Dam, Near Wilford, Idaho, 1977, 11 deaths, greater than $1 billion in damages.

History of Dam Safety continued

- Following a number of deadly dam failures that occurred nationwide in the 1960's and 1970's, in the late 1970's Congress authorized the Army Corps of Engineers to conduct inspection of dams nationwide in an effort to assist states with establishing Dam Safety Inspection standards. Some 1200 Army Corps inspections were conducted throughout Massachusetts from 1979-1981. Reports were sent to state Dam Safety offices where they existed and to state Governor's offices.

History of Dam Safety continued

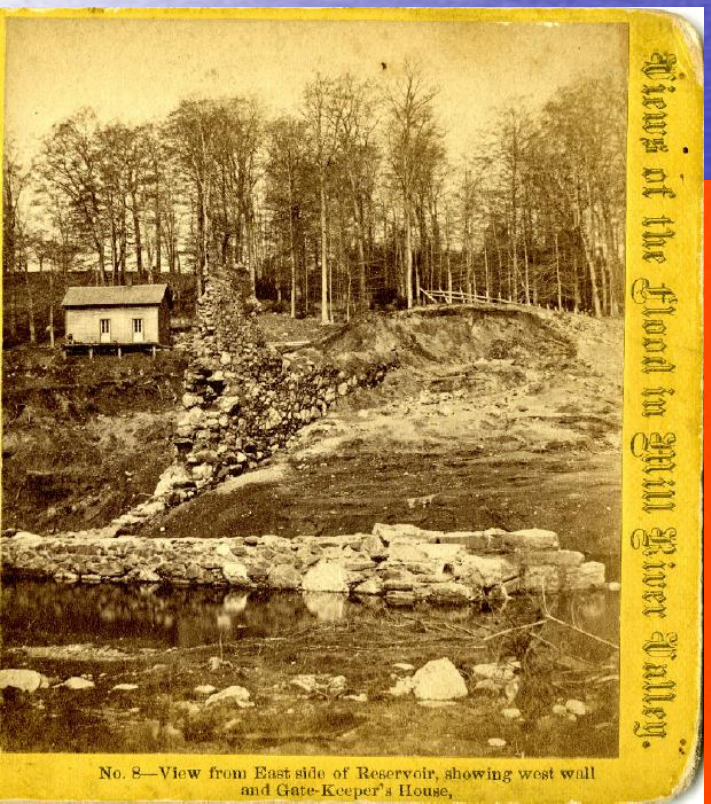
- In the early 1980's the Association of State Dam Safety Officials (ASDSO) was created with the assistance of the Federal Government. ASDSO was and is made up of federal and state dam safety officials along with private professional dam engineers. Initially the association's purpose was to assist states with both creating and improving state Dam Safety Programs with advisement from the Army Corps and other federal agencies.

- The Massachusetts Dam Safety program adopted the inspection and recommended regulatory format developed by ASDSO and federal partners.

Massachusetts Dam Failures

- Williamsburg Massachusetts is the location of one of the earliest and deadly dam failures in the country.
  - Authorized by the state, the Williamsburg Reservoir Company constructed an earthen dam on the Mill River north of downtown Williamsburg in 1866.
  - Due to inadequate engineering design, the dam failed in 1874 reportedly releasing a wall of water 20 to 30 feet high that destroyed everything in its path over 10 miles. Several villages (Williamsburg, Haydenville, Leeds) were washed away along the river, 139 people perished, homes, mills, factories, bridges, farm equipment and much more was lost*.
  - *In the Shadow of the Dam: Aftermath of the Mill River Flood of 1874, by Elizabeth M. Sharpe (Free Press, 2004)

Aftermath photos of Mill River Dam Failure in 1874 in Williamsburg, MA



The New York Times

ANOTHER ACCOUNT.

THE RESERVOIR AND THE DAM—FIRST INDICATIONS OF THE BREAK—THE WATCHMAN VAINLY ATTEMPTS TO GIVE WARNING.

SPRINGFIELD, Mass., May 16.—Never before in New-England, and rarely in the country, has an accident of a similar nature been attended with such sad and fatal consequences as that which, in one half hour this morning, swept out of existence two or three of the most thrifty manufacturing towns in New-England. During the past two days there have been a few mild showers all along the Connecticut Valley, but the aggregate of rain which fell was not sufficient to cause any very perceptible raising in the mountain streams, and therefore the terrible disaster cannot be properly regarded as one of the consequences of an unusual flood or freshet. On the contrary, and lamentable as the fact may be, the calamity is nothing more or less than the fruit of an insecure and probably an ill-constructed reservoir. It was located in the town of Williamsburg, about ten miles north-west of Northampton, and the terminus of the New-Haven and Northampton Railroad. The service of the reservoir was about 125 acres, and the average depth of water at the time it gave way was not less than 30 feet. It was the joint property of the various manufacturing establishments in Williamsburg, Leeds, Haydenville, and Florence, and was used for the storing of water during the Spring and wet seasons.

The water thus gathered was from the eastern and western branches of what is known as Mill River, which empties into the Connecticut River a few miles below Northampton.

The dam itself is about nine years old, has received but few if any repairs since its cor

Hiking Trail to Failed Mill River Dam Williamsburg

- In 2016 the Williamsburg Woodland Trails group established a trail to the site of the failed dam. The trail is on an easement held by the Hilltown Land Trust. Remnants of the failed dam remain in place.
- https://www.hilltownlandtrust.org/hiking-the-historic-dam-trail

- https://www.williamsburgwoodlandtrails.org/trails/historic-dam

Massachusetts Dam Failures

- 2 Deadly dam failures occurred at the same location in Lee Massachusetts killing a total of 9 people.
  - On April 20 1886 Mud Pond dam, which was constructed in 1873, failed resulting in the deaths of 7 people.
  - On March 24, 1968 Lee dam, which was constructed in 1965, at the same site as the 1873 failure, failed resulting in the deaths of 2 people.
  - The second failed dam was not rebuilt. Today remnants of the failed dam can be observed at the site, now named Basin Pond, which is owned by the Berkshire Natural Resources Council. There is a public hiking trail head at Becket Road in Lee that leads hikers to the location of what remains of the failed dam. https://www.bnrc.org/reserves/basin-pond

March 25 1968 Boston Herald Traveler

Aftermath
Lee MA
Lake Lee
Dam Failure

2 Dead in Flash Flood—Large Factory Ruined

Lee Dam Bursts—$10M Damage

Wall of Water Destroys Homes

By EARL MARCHAND and JOE McLEAN

LEE — A flash flood from a bursting dam at a man-made lake killed at least two persons yesterday and caused damage estimated at $10 million.

Believed dead in the devastated area are a 50-year-old Cape street man and his 70-year-old woman neighbor.

Authorities fear several motorists may also have died when their cars were washed off Rte. 20. However, while several cars were found in the wake of the flood, no bodies were found up to a late hour last night.

The rushing five-foot wall of water demolished three homes and swept five off their foundations. Damage to a factory employing 200 people was estimated at $8 million. At least 30 other homes were flooded with mud and water and a two-mile section of Rte. 20 was made impassable.

The Lee exit of the Massachusetts Turnpike was blocked by water and flood debris for several hours.

Motorist 'Never Drove So Fast'

LEE—Donald Fillio, 42, told police he never drove so fast in his life.

And police merely smiled, clapped him on the back and congratulated him.

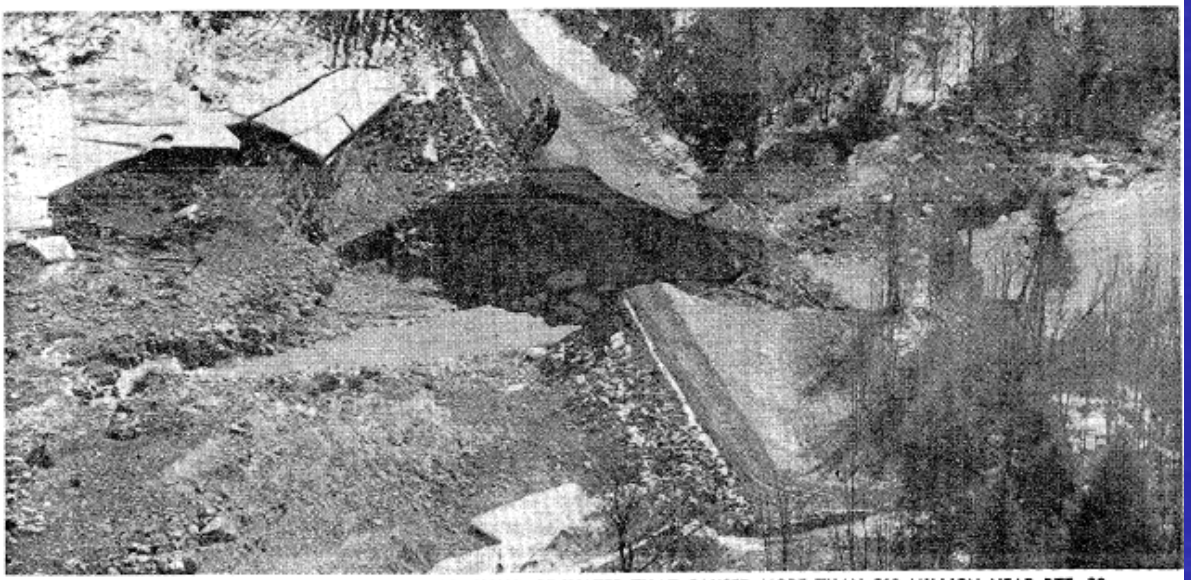
Fillio was one of scores of residents of this town whose home was in the path of the flash flood that broke through the dam at Lake Lee yesterday and cut a two-mile swath of destruction through East Lee.

"I saw the flood waters coming down the hill," he told police later. "I jumped into my car and got away from there fast down Rte. 20."

The flood trailed him for

DAMAGED HOUSES in background and uprooted trees give testimony to force of flood that swept town of Lee yesterday when dam holding back man-made Lake Lee gave way. (AP)

Lee: Sudden Onslaught of Water as Dam Burst



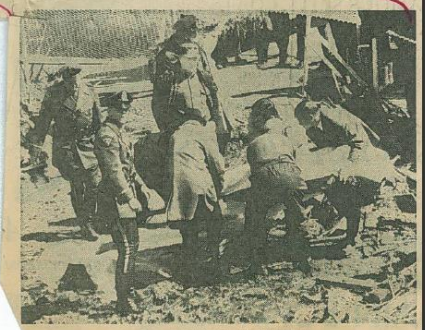
BREACH IN LAKE LEE DAM (CENTER) LOOSED WAVE OF WATER THAT CAUSED MORE THAN $10 MILLION NEAR RTE. 20.

Aftermath: 1968 Lee Dam Failure

(Herald Traveler Staff Photos by Richard J. Bielinski)

AERIAL VIEW shows Lake Lee, top photo, emptied of water but covered by a two-foot thick crust of ice over most of its 16 acres.

The huge swath cut in Lake Lee Dam outlined in top photo and shown in full in bottom photo, measures 40-feet wide by 25 feet, the entire height of the dam.



(Herald Traveler Staff Photo by Richard J. Bielinski)

RESCUE WORKERS und police remove body of Mrs. Olive G. Cordonier, ne of the two Lee flush-flood victims, from debris-strewn East Lee nyground.

TIGHE & BOND
CONSULTING ENGINEERS
HOLYOKE, MASS.

Complete Rpt
11/15/68

Report To

Commissioners of Berkshire County

on

Failure of Lake Lee Dam

Lee, Massachusetts

on

March 24, 1968

RECEIVED
DEC 23 1968
MASS. WATER RESOURCES COMM.
DIV. OF WATER RESOURCES

COMMONWEALTH OF MASSACHUSETTS
GEORGE McDONNELL
No. 852
REGISTERED
PROFESSIONAL ENGINEER

Tighe & Bond, Consulting Engineers
Holyoke, Massachusetts

May thru September, 1968

LEE DAM

24 The Evening Gazette Worcester, Wed., Sept. 18, 1968

Collapse Caused Two Deaths

Engineers Report Dam Poorly Built

PITTSFIELD (AP) — A report to the Berkshire County Commissioners says that "unsatisfactory workmanship and faulty design" caused the collapse of a dam on Lake Lee March 24.

Water released from the 37-acre lake swept two persons to their deaths and caused damage estimated at $10 million.

The 475-foot dam was constructed in 1965 in Lee for East Lee Development Corp., which the report said is owned by Hamilton Wright of New York City and Walter Cromwell of Westport, Conn.

A number of damage suits have been filed against the corporation, including one for $4 million by Clark-Aiken Co., a Lee machine tool manufacturer whose plant was severely damaged.

The dam, built by Whipple Brothers Construction Co., Inc., of Norwalk, Conn., created a pond around which leisure homes were to be erected.

The report, prepared for the county commission by Tighe & Bond Engineering Co. of Holyoke, said the concrete core of the dam was not impervious to water, as called for in the design, and also that the dam was not adequately "keyed" into a soil base.

DAM SAFETY HOST AGENCIES
Administration of Dam Safety

- Following the Williamsburg Mill River Dam failure disaster, in the late 1800s the Massachusetts Legislature established limited requirements for dam construction for the protection of public safety and property. Previous dam related legislation accommodated the needs and interests of mill owners and fish passage.

- Around 1900 County Government was authorized to inspect and set standards for dam construction. Through the early 1900s, Dam Safety Law Chapter 253 developed.

- In the early 1970's Chapter 253 authority was transferred to the Massachusetts Department of Public Works.

- Later in the 1970's Dam Safety authority was transferred to the Department of Environmental Quality Engineering, now DEP.

- In 1983 authority was transferred to the Department of Environmental Management.

- In 2003 authority was transferred to the Department of Conservation and Recreation.

ADMINISTRATION OF DAM SAFETY

- For 40 years administration of the Commonwealth's Dam Safety Program has been with the Commonwealth's State Park Agency.

Review of Dam Safety Law and Regulations

- Mass. General Law Chapter 253, sections 44 to 50 and as amended by Chapter 330 of the ACTS of 2002 and Chapter 448 of the ACTS of 2012

- REGULATIONS 302CMR10.00

Dam Safety Law:
MGL Chapter 253 Sections 44 – 48

- The purpose of DCR's Office of Dam Safety (ODS) is to ensure that owners of the "regulated" public and private dams in the Commonwealth comply with the existing state dam safety statutes and regulations
- Dams that meet the definition of "dam" under 302 CMR 10.03 are subject to DCR oversight.
- The statute and regulations provide guidelines regarding the safety of dams, the creation and maintenance of public records for documenting and reviewing the performance of dams, and statutory and regulatory compliance by owners. Specifically, dam owners are required to inspect their dams on a schedule set forth by regulation, develop emergency action plans, and to undertake construction, material alteration or removal of dams as permitted by DCR.
- When dams are classified as unsafe or inadequate, DCR identifies necessary corrective measures and is empowered to take certain enforcement actions to ensure their implementation. Upon due implementation of the corrective measures, DCR will certify compliance with its regulatory requirements for repair and removal.

Amendments to Dam Safety Law

- **Chapter 448 of the Acts of 2012**
  - **Emergency Action Plans:**
    - **Mandates that the Office of Dam Safety ensure owners of High and Significant Hazard Potential dams prepare and submit an Emergency Action Plan (EAP). It is noted owners of 283 High Hazard Potential dams have prepared and submitted EAPs as required by current regulation. There are 692 Significant Hazard Potential dams, for which there are 50 EAPs on file.**
  - **Review of Hazard Classification:**
    - **Mandates that, on a 10 year frequency, Office of Dam Safety "ensure the accuracy of the dam classification. Requests for review of the hazard classification of a dam shall be made at the expense of the owner of the dam."**

2012 Amendments continued

- Dam and Seawall Repair and Removal Fund:
  - Established a loan and grant fund to be administered by the Executive office of Energy and Environmental Affairs (EEA).
    - 50% of the total fund is to be dedicated to Dam projects and 50% of the fund is to be dedicated to Seawall and Inland Flood Protection projects.
    - EEA administers the Dam and Seawall Repair or Removal Grant and Funds Program.

2002 Amendments

- Chapter 330 of the Acts of 2002
  - Re-defined how dam safety is administered in Massachusetts.
  - Mandated the Office of Dam Safety to order owners to inspect rather than conduct inspections.
  - Mandated the Office of Dam Safety conduct follow-up enforcement actions for certain dams reported to be in structurally deficient condition.
  - Authorized the Office of Dam Safety to collect fees and assess fines for matters of non-compliance.
  - Authorized the Office of Dam Safety to establish a public record of all jurisdictional dams.

Dam Safety Regulations 302 CMR 10.00

Administered by DCR's Dam Safety Regulatory Unit

- The purpose of the Dam Safety Regulations is to provide regulatory guidelines for the safety of dams by establishing and maintaining consistent reasonable standards and to create a public record for reviewing the performance of dams.

- Administration of Dam Safety is transparent. Local and state officials are copied on many dam safety enforcement documents pertaining to poor and unsafe condition dams.

- Freedom of Information requests can be made to the DCR Legal Unit for file information on any dam subject to DCR Office of Dam Safety regulation.

Regulations 302 CMR 10.03
Definition of Dam

- Any artificial barrier which impounds or diverts water and which is 25 feet or more in height; or has an impounding capacity of 50 acre feet or more.

- Any artificial barrier, the breaching of which could endanger property or safety, may be designated a dam subject to the regulations.

Regulations 302 CMR 10.03 Definition Dam continued

- The word dam shall not mean the following, except if it is determined there exists a downstream hazard.
  - Any barrier which is not in excess of six feet in height, or which has a storage capacity not in excess of 15 acre feet, regardless of height.
  - Works which temporarily impound water used on agricultural land.
  - Works which have a size class of small or low hazard potential class in agricultural use.

Regulations 302 CMR 10.04
Exclusions not subject to dam safety regulation

- Dams owned by the United States Government
- Dams regulated and inspected by the Federal Energy Regulatory Commission
- Industrial Storage Tanks.
- Water Supply Storage Tanks.
- Beaver Dams

Regulations 302 CMR 10.05 Registration

- Owners of regulated dams are required to
  - Upon request made by ODS complete a Dam Registration Form.
  - Upon ODS approval of the Dam Registration Form, ODS sends to the owner a Dam Registration Certificate which must be recorded at the Registry of Deeds and reference the deed book and page that describes the parcel upon which the dam is located.

Regulations 302 CMR 10.06 Hazard Classification

- Hazard Class (High, Significant and Low) pertains to the potential loss of human life or property damage in the event of dam failure or appurtenant works

Regulations 302 CMR 10.06
Hazard Classification Continued

- High Hazard Potential:
  - Dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
- Significant Hazard Potential:
  - Dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interuption of use or service of relatively important facilities.
- Low Hazard Potential:
  - Dams located where failure may cause minimal property damage to others. Loss of life not expected.

Regulations 302 CMR 10.07 Inspection Schedule

- Dam owners are required to hire a qualified dam engineer to inspect their dam(s) and report results to ODS on the following frequencies:
  - High Hazard Potential Dams = 2 years
  - Significant Hazard Potential Dams = 5 years
  - Low Hazard Potential Dams = 10 years
  - High and Significant Hazard Dams found to be in Unsafe Condition = 3 month
  - High and Significant Hazard Dams found to be in Poor Condition = 6 month

Regulations 302 CMR 10.08 Compliance with Inspection Results

- High and Significant Hazard Potential Dams found to be in Unsafe or Poor Condition with Structural Deficiencies:
  - Commissioner issues a Certificate of Non-Compliance
    - Identifying inspection findings and issues recognition that current conditions represent a potential threat to public safety.
    - Ordering increased inspection frequency
    - Ordering additional engineering evaluation
    - Ordering preparation of design plans and specifications to be implemented to bring the dam into compliance by repairing, breaching or removing the dam.
    - Time lines for meeting requirements are negotiated with the dam owner.
    - The Commissioner may order immediate action be taken to protect public safety, such as lowering or draining the reservoir water level.

Regulations 302 CMR 10.08
Compliance with Inspection Results Continued

- Low Hazard Potential Dams (for all reported conditions), and
- High and Significant Hazard Potential Dams found to be in Fair, Satisfactory or Good Condition:
  - ODS sends the dam owner a letter acknowledging receipt of the report and recommends the dam owner carry out the inspecting engineer's recommendations for maintenance operation and repair.

Regulations 302 CMR 10.09

Dam Construction, Repair, Alteration, Breach or Removal Permit

- Dam Safety Permits are required for new dam construction, repair projects, alterations, breaching and removal projects.
- Hire a qualified registered professional engineer.
- Prepare and file a Permit Application which must include a Preliminary Site Investigation and Design Report.
- ODS will issue permit within 60 days of submission of final design plan/specs and all necessary application revisions. Owner must record the permit at Registry of Deeds.
- Design Engineer is required to supervise construction. ODS must be invited to construction start, 50% complete and final inspection site visits.

Regulations 302 CMR 10.09
Dam Construction, Repair, Alteration, Breach or Removal Permit continued

- Upon submission of the design engineer's statement that construction has been completed in conformance with the permitted project, and upon review by ODS, a Certificate of Compliance for work completed is issued.
- The Certificate of Compliance can be used by the dam owner to release the recorded Certificate of Non-Compliance in the case of a High or Significant Hazard Potential dam previously found to be in Poor or Unsafe Condition.

Regulations 302 CMR 10.11 Emergency Action Plans (EAP)

- Required for all High and Significant Hazard Potential dams. A written EAP is a well organized emergency response tool to be held by the dam owner, local emergency management officials, MEMA and the Office of Dam Safety. EAPs must be regularly updated and available to be implemented in the event failure of a dam is determined to be imminent or likely.
- Plan Content:
  - Identify equipment, manpower, materials available to implement emergency response plan
  - Notification procedure flow chart for informing first responders and local and state officials.
  - Dam Failure Inundation Map
  - Plan to notify occupants of potential inundation zone to evacuate.

Regulations 302 CMR 10.11 Emergency Action Plans continued

- Upon initial publication and anually thereafter, ODS coordinates EAP review and readiness with the Massachusetts Emergency Management Agency (MEMA) and local Emergency Management Directors.

- ODS works directly with dam owners to develop the initial plan and to prepare the updates at the dam owners expense.

Regulations 302 CMR 10.14 Liability

- (1) The owner shall be responsible and liable for damage to property of others or injury to persons, including but not limited to, loss of life resulting from the operation, failure of or mis-operation of a dam.
- (2)302 CMR 10.00 shall not relieve from or lessen the responsibility of any person owning or operating a dam from any damages to persons or property caused by defects, nor shall the Commissioner be held liable by reason of any inspections, technical documents or permits issued.

Regulations 302 CMR 10.15
Fines for Non-Compliance

- DCR is authorized to assess fines for non-compliance in the amount $500 per day of continuation of non-compliance.

Office of Dam Safety Inventory of Dams

- Total Inventory .....= 3000
- Regulated Inventory.....= 1416
- Unregulated Inventory.....= 1584

Google Earth Link to mapped inventory

Google Earth dam-locations-file.kml

Dam Inventory Summary Statistics

December 31, 2022

Summary of Dam Safety Inventory: Ownership Type and Hazard Classification

Owner Type: Private	1599
Municipal	949
State	365
FERC Regulated	70
US Army Corps	15
US Fish and Wildlife	1
US Govt in Trust	1
Total	3000 (SEE GRAPHS 2. & 4.)

Regulated vs Non-Regulated (Non-Jurisdictional)	
Regulated Dams	1416
Non-Jurisdictional Dams***	1584
Total	3000

*** includes 86 dams owned or regulated by US Govt.

(SEE GRAPH 1.)

Dam Inventory Hazard Classifications	Regulated	NonJurisdiction	Total
High	291	24	315
Significant	624	4	628
Low	501	54	555
Small Non-Jurisdictional Dams		1502	1502
Total	1416	1584	3000

(SEE GRAPHS 3 and 4)

State Owned Dams by Department	Regulated	Non-Jurisdictional	Total
DCAM	3		3
DCR	195	109	304
DFG	19	16	35
DHE	1	3	4
DMH		1	1
DOT	13	2	15
MBTA	2		2
DOC	1		1
	234	131	365

Hazard Class Distribution by Owner Type	Regulated	NonJurisdiction	Total
Privately Owned Dams			
High Hazard*	49		
Significant Hazard*	240		
Low Hazard*	260		
Small Non-Jurisdictional Dams		1050	
Total	**549**	**1050**	**1599**
Municipal Owned			
High Hazard*	186		
Significant Hazard*	286		
Low Hazard*	161		
Small Non-Jurisdictional Dams		316	
Total	**633**	**316**	**949**
State Owned			
High Hazard*	56		
Significant Hazard*	98		
Low Hazard*	80		
Small Non Jurisdictional		131	
Total	**234**	**131**	**365**
FERC Regulated (not subject to State Regulation) **			
High Hazard		12	
Significant Hazard		4	
Low Hazard		54	
Total	**0**	**70**	**70**
US Government Owned (not subject to State Regulation)			
High Hazard		12	
Significant Hazard		0	
Low Hazard		0	
No Hazard Class (small or breached dams)		5	
Total	**0**	**17**	**17**

DCR Owned Dams Detail by Division	
Mass Parks Division	230
Water Supply Protection Division	37
MWRA Operated and Maintained	37
Total	304

DCR-Mass Parks Dams	
High Hazard	36
Significant Hazard	67
Low Hazard	57
Non Jurisdictional	70
Total	230

DCR-Water Supply Protection Division	
High Hazard	2
Significant Hazard	4
Low Hazard	4
Non Jurisdictional	27
Total	37

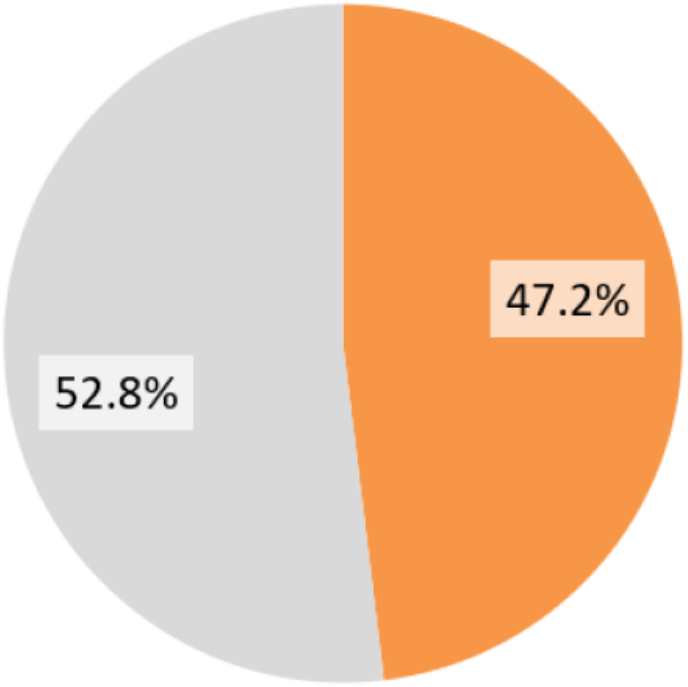
DCR Owned- MWRA Operated and Maintained	
High Hazard	14
Significant Hazard	7
Low Hazard	4
Non Jurisdictional	12
Total	37

Note: Dams owned by or regulated by US Govt and dams under 6 ft high or under 15 acre-feet of storage are not subject to regulation by Dam Safety.

* Regulated Dams

** All FERC regulated dams are Privately owned, except 4 owned by Municipalities and 4 owned by the State.

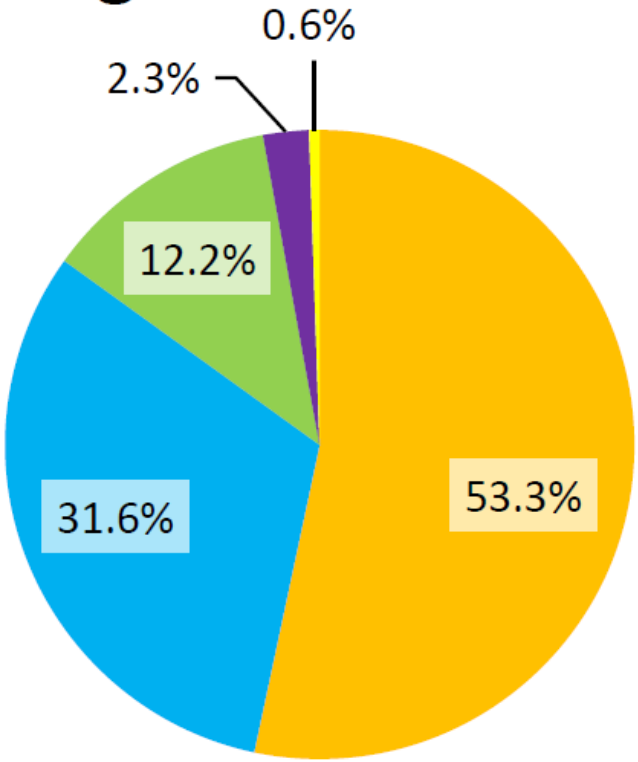
1. Regulated vs *Non-Jurisdictional Dams



ODS Regulated Dams	1416, (47.2%)
Non-Jurisdictional Dams	1584, (52.8%)
Total	3000

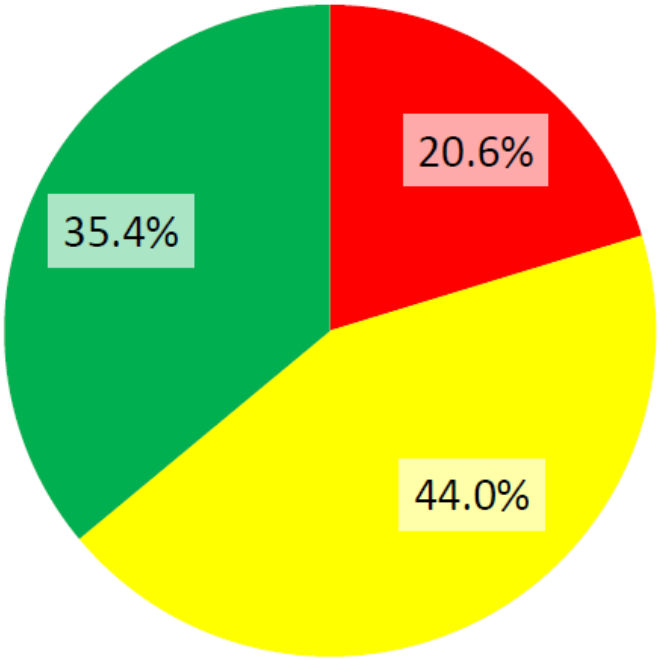
*Non-Jurisdictional dams include small dams less than or equal to 6 feet high or with less than or equal to 15 acre feet of storage; and dams owned or regulated by the federal government and Low Hazard Potential dams used for agriculture.

2. Ownership Type Distribution for both Regulated and Non-Jurisdictional Dams



Private	1599, (53.3%)
Municipal	949, (31.6%)
State	365, (12.2%)
FERC Regulated	70, (2.3%)
Fed. Owned	17, (0.6%)
Total	3000

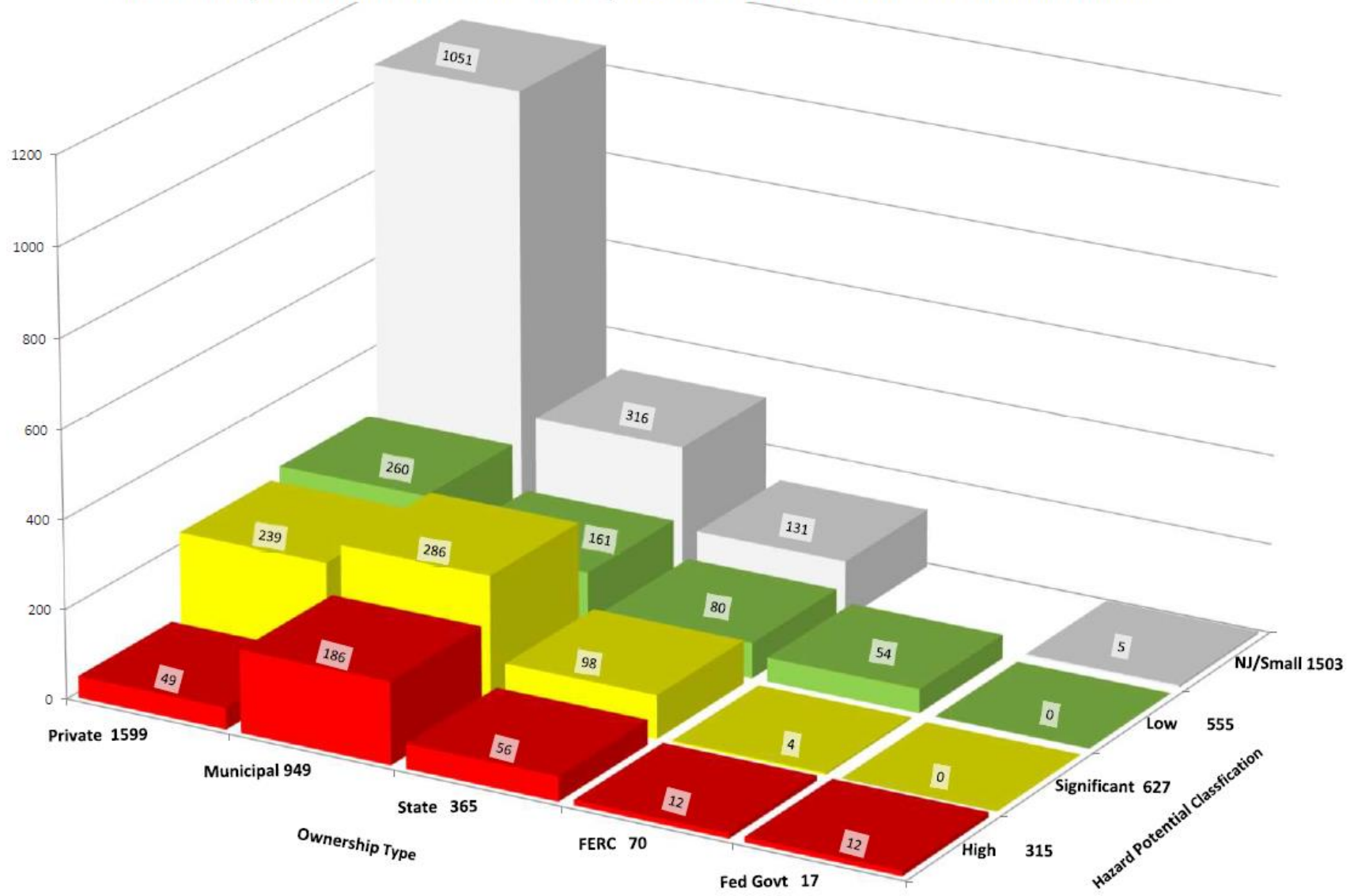
3. Hazard Potential Class Distribution for Regulated Dams



High	291,	(20.6%)
Significant	623,	(44.1%)
Low	501,	(35.4%)
Total	1415	

Hazard Potential is related to the potential for fatalities and damage to downstream interests in the event of dam failure. It is not reflective of dam condition.

4. ENTIRE INVENTORY: HAZARD CLASS DISTRIBUTION AMONG OWNER TYPES INCLUDING REGULATED, NON-JURISDICTIONAL SMALL, FERC REGULATED AND US GOVERNMENT DAMS



Office of Dam Safety Staffing

- Regulatory Unit
  - 5 FTE Civil Engineers
  - 2 FTE Program Coordinators
- Maintenance and Repair Unit
  - 4 FTE Civil Engineers

DCR Dam Maintenance and Repair Unit

- Operation and Maintenance of DCR owned and abandoned dams statewide.
- Contract administration for repair of DCR owned State Park dams and abandoned dams.

Sampling of DCR Owned Dam Repairs FY2006-FY2023

FY	Project	Construction Cost	Town	Description
2006	Rice City Pond Dam	$440,000	Uxbridge	Emergency slope stabilization/repair
2006	Irish Pond Dam	$325,000	Grafton	Structural repairs to spillway & update gate controls
2006-07	Pontoosuc Dam	$550,000	Pittsfield	Complete rehab of spillway & gate works
2006	Unionville Pond Dam	$75,000	Holden	Slip-line and grout double barrel outlets
2006	Windsor jams Dam	$25,000	Windsor	Repair & repoint field stone stop log piers
2007-09	Chicopee Reservoir Dam	$100,000	Chicopee	Spillway & gatehouse repairs, Founation drail, brush removal.
2007	Emergency Action Plans	$300,000	State wide	Program to generate EAPs for High Haz Dams
2007-08	Greenwater Pond Dam	$100,000	Becket	Vegetation Management Slope armoring Spillway & outlet repair Install spillway bridge (Appalachian Trail)
2007-08	Wells State Park	$25,000	Sturbridge	Repair of drainage structure
2007-08	Blackstone Heritage Canal	$675,000	Uxbridge	Replace locks & Rehab operators
2007-08	Cheshire Reservoir Dam	$150,000	Cheshire	Rehab of spillway & gate works
2008 2014	Ruggles Pond Dam	$225,000 $100,000	Wendell	Complete rehab of spillway & outlet works Emergency roadway wall repair
2008	Shoemut Pond Dam	$300,000	Warwick	Spillway & outlet works reconstruction
2008				
2008	Pearl Hill Dam	$175,000	Townsend	Repair of spillway, dam & outlet
2008-09 2010	Lake Cochituate Dam	$300,000 $10,000	Natick	Overtopping protection Pedestrian bridge over lower spillway
2009	Dunn Pond Dam	$125,000	Gardner	Repair of outlet works, drainage & Dam
2009	Forge Pond Dam	$200,000	Freetown	Emergency dam removal & stream restoration
2009-10	Laurel Lake Dam	$200,000	Erving	Repair of spillway & new road bridge
2009-10	Ashmere Lake Dam	$2,450,000	Hinsdale	Complete rehab of dam, spillway & gate works
2010-12	Otis Reservoir Dam	$3,250,000	Otis	Complete rehab of dam, spillway gate works & bridge
2011	Nichols Flood Control dam	$125,000	Westborough	In cooperation w/ NRCS, permitting of project rehabilitated by Federal Govt.
2012	Arch Street Culvert	$75,000	Westborough	Mitigation required culvert replacement
2012	Benedict Pond Dam	$625,000	Gt Barrington	Complete dam spillway & outlet rehab
2012-13	Hemlock Gorge Dam	$875,000	Natick	Complete dam spillway & outlet rehab
2013	Centennial Dam	$100,000	Dedham	Emergency training wall repair
2013-14	Dean Pond Dam	$225,000	Brimfield	Repair of spillway & dam
2013-14	Lost Wilderness Dams	$550,000	Tolland	Repair of 2 newly acquired dams
2013-14	Hopkinton Reservoir Dam	$575,000	Ashland	Complete rehab of outlet works
2014	Echo Lake Dam	$125,000	Princeton	Repair of spillway & dam
2014-15	Aldrich Lake Dam	$750,000	Granby	Complete rehab of dam & outlet works
2015	Paradise Pond Dam	$350,000	Princeton	Complete rehab of dam & outlet works
2015	Upper & Lower Crow Hill Dams	$350,000	Westminster	Complete rehab of dam & outlet works
2015-16	Upper Highland Lake Dam	$2,300,000	Goshen	Complete rehab of dike, dam & outlet works
2016-17	Clam Lake	$200,000	Sandisfield	Complete rehab of outlet works
2016-17	Irish Dam	$700,000	Grafton	Complete rehab of outlet works
2016-17	Lake Cochituate Gate House	$300,000	Natick	Building Repair
2017	Lower Highland Dam	$2,700,000	Goshen	Complete rehab of dike, dam & outlet works
2017	Wetland Replication	$175,000	Hinsdale	Construct Wetland Mitigation Area
2018	Hovey Dam	$1,000,000	Grafton	Complete dam spillway & outlet rehab
2018	Centennial Dam	$1,400,000	Dedham	Complete dam & outlet rehab
2019	Finn Road Culvert in Delaney Flood Pool	$400,000	Stow	Complete replacement of 120 foot long x 8 foot x8 foot culvert
2019	Middle Pond dam	$1,300,000	Taunton	Rehabilitation of dam and outlet works
2019	Lulu Brook dam	$ 293,000	Pittsfield	Repair of dam and spillway
2020	Big Bearhole and Middle Pd dam #4	$ 685,486	Taunton	Rehabilitation of two dams
2020	Mother Brook Diversion Dam	$ 84,409	Dedham	Removal of tree and brush growth
2020	Field Pond Dam&Dike	$2,061,944	Andover	Rehabilitation of dam and dike
2020	Eames Pond dam	$ 96,710	Paxton	Begin rehabilitation of dam
2020	Middle Pd Dams 1, 2 and 3	$ 38,822	Taunton	Complete rehabilitation of dams
2021	Flowering Pd dam, Maudslay	$ 500,000	Newburyport	Rehabilitation
2021	Hopkinton Res Dam	$ 750,000	Ashland	Spillway bridge, universal access, outlet tower
2022	Rawson Hill dam	$3,500,000	Shrewsbury	Complete rehabilitation
2023	Collins Pd dam	$1,400,000	Andover	Complete rehabilitation

DCR Abandoned Dams Program

These 6 are some of the many abandoned dams with no active ownership in the state. These were prioritized because they are the highest risk to the public as all are Significant or High Hazard dams in Unsafe to Poor condition. Currently Dam Safety inspects each dam regularly and hires contractors to perform maintenance as needed at Commonwealth's cost. Currently none comply with Dam Safety Regulations.

- Lowes Pond Dam, Oxford
- Monument Pond Dam, Freetown
- Factory Village Pond Dam, Ashburnham
- Bird Pond Dam, Walpole
- Bel Air Dam, Pittsfield
- Barre Reservoir Dam, Barre

Evaluation Approach

- Initial Municipal Outreach
- Phase II Investigation/Condition Assessment
- Develop Alternative Concepts / Costs to Achieve Dam Safety Compliance
  - Repair
  - Partial Removal to Achieve Non-Jurisdictional Dam
  - Full Removal
- Engage Community to Gain Consensus on Selected Alternative
- Repair Alternative
  - Requires Municipal Commitment to Achieve Property Ownership
  - DCR Implements Repairs Prior to Turnover
- Given no Municipal Interest, Full or Partial Removal is Preferred

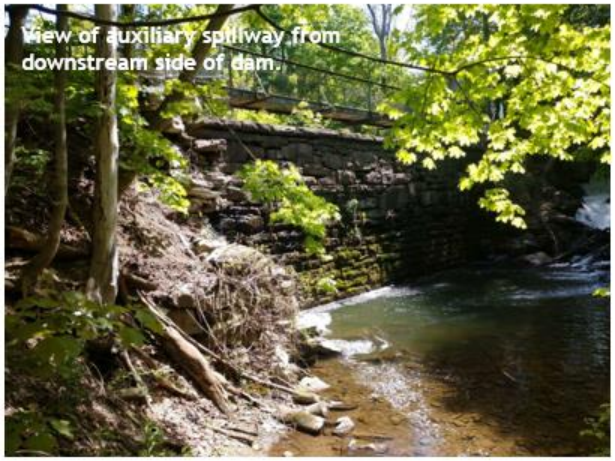
Phase II Investigation and Alternatives Analysis Components

- Condition Assessment
- Topographic / Bathymetric Surveys
- Subsurface Investigation
- Spillway Adequacy Evaluation
- Seepage and Stability Evaluation
- Sediment Sampling and Management Plan
- Develop Alternative Concepts / Costs (Repair, Partial Removal, Full Removal)

Lowes Pond Dam, Oxford, MA

- Dam is a combined earth embankment, stone masonry, and concrete
- 15.6’ height, 170’ long dam with 188 acre-feet impoundment
- Intermediate size, significant hazard dam classification
- Unsafe condition
- Town interested in keeping impoundment and building park for recreation
- Repair requires expansion of spillway and reconstruction of the embankment


View of sluiceway from downstream side of dam.


View of auxiliary spillway from downstream side of dam.

Bel Air Dam, Pittsfield, MA

- Combined earthen embankment, stone masonry, and concrete structure
- Height of 26.5', 200' long with a capacity of 56 acre-feet
- Intermediate size, high hazard dam classification
- Unsafe condition
- City supports removal of the dam and working with DCR to make it happen
- 35,500 CY of impacted sediment requires removal for dam removal or dam repair with full sediment removal
- City does not own the impoundment
- City has provided city solicitor contact for coordination on land ownership issues

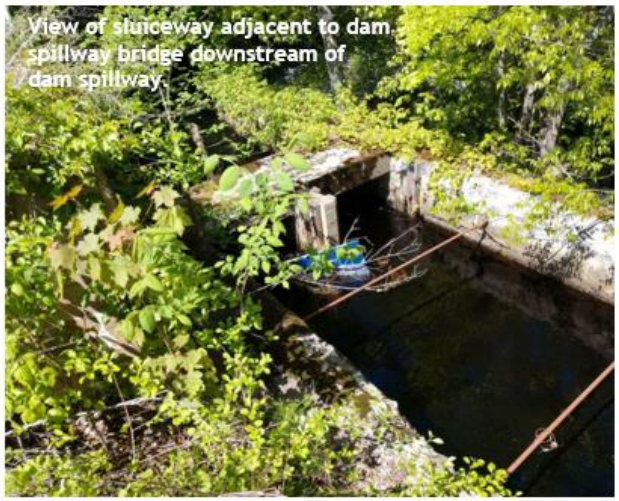
View of right side of center spillway training wall.

View left side of center spillway training wall and pedestrian bridge over spillway.

Bird Pond Dam, Walpole, MA

- Combined earthen embankment, stone masonry, and concrete structure dam
- Height of 18.5', 430' length with an impoundment capacity of 298 acre-feet
- Intermediate size, high hazard dam classification.
- Unsafe condition
- Recent issues with seepage and trespassers
- Businesses immediately downstream impacted by condition of dam
- Spillway discharges to channel that passes under buildings - limits options to repair / remove
- Removal would increase flooding risk to downstream businesses/buildings

Bird Pond Dam
Walpole

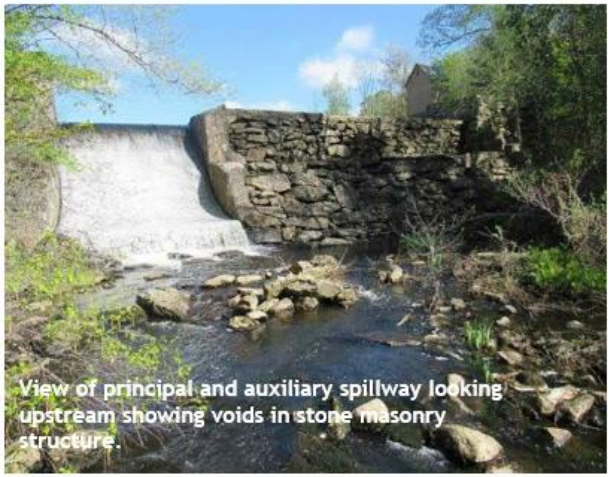


View of sluiceway adjacent to dam, spillway bridge downstream of dam spillway.

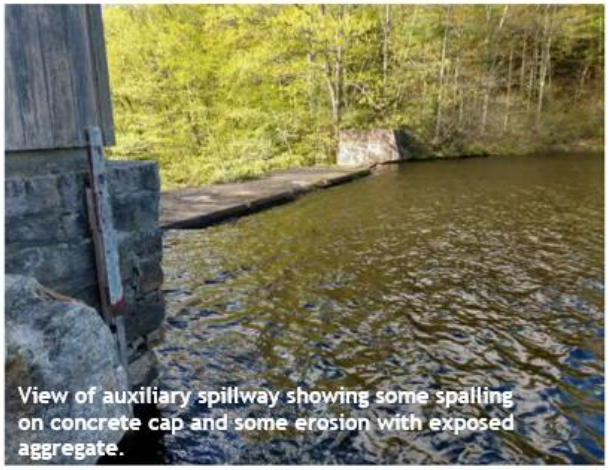
Top of the main spillway on the western side of the dam, facing east.

Monument Pond Dam, Freetown, MA

- Concrete and masonry gravity dam
- 10’ high, 114’ long a 42 acre-feet impoundment capacity
- Small size, high hazard dam classification
- Unsafe condition
- Repair to the Dam would require complete reconstruction.
- Dam is top priority of MVP planning process and Town would like it removed
- Monument Pond supplies fire pumps in adjacent mill building - would be impacted by dam removal



View of principal and auxiliary spillway looking upstream showing voids in stone masonry structure.



View of auxiliary spillway showing some spalling on concrete cap and some erosion with exposed aggregate.

Factory Village Dam, Ashburnham, MA

- Combined earthen embankment, stone masonry, and concrete structure
- Height of 23', 210' length with an impoundment capacity of 82 acre-feet
- Intermediate size, significant hazard dam classification
- Poor condition
- Town supports a dam removal option since there is very little recreational value
- Both partial and full removal are feasible
- Removal requires 1,700 CY of potentially impacted sediment to be removed

Barre Reservoir Dam, Barre, MA

- Combined earth embankment, stone masonry, and concrete structure
- Height of 20’, 690’ long with an impoundment capacity of 590 acre-feet
- Intermediate size, high hazard dam classification
- Poor condition
- Dam partially breached in 1987 (lowered 6’)
- Impoundment may have recreational value to adjacent business
- Access to the dam is over several private properties

Emergency Response

Massachusetts city gets 11 inches of rain, flooding homes, jeopardizing dam

PUBLISHED TUE, SEP 12 2023•3:51 PM EDT UPDATED TUE, SEP 12 2023•3:53 PM EDT

AP

Firefighters use boats and a military truck to evacuate residents and pets as flood water rises in the Meadowbrook Acres neighborhood of Leominster, Massachusetts, September 11, 2023.

Rick Cinclair | Telegram & Gazette | via Reuters

Photo 6 –Overview of embankment crest looking left. Note downstream slope failure due to overtopping

Photo 11 –View of failure looking upstream

Photo 6 – Alternate view of slope failure due to overtopping

Photo 8 –View of slope failure looking upstream from downstream toe

Small Dam Failure, Leominster September 11, 2023

Small Dam Failure, Leominster September 12, 2023

Regulations 302 CMR 10.06 Size Class

Category	Storage Capacity (ac-ft)	Height (feet)
Non-Jurisdictional	Not in excess of 15, regardless of height	Not in excess of 6, regardless of storage.
Small	>or=15 and <or=50	>or=6 and <or=15
Intermediate	>or=50 and <or=1000	>or=15 and <=40
Large	>or=1000	>or=40

Regulations 302 CMR 10.14 Design and Construction Criteria

Spillway Design Flood Design Storm

Hazard Potential	Size	ExistingDams	New Dams
Low	Small	50 year	100 year
	Intermediate	50 year	100 year
	Large	100 year	100 year
Significant	Small	100 year	500 year
	Intermediate	100 year	500 year
	Large	500 year	½ PMF
High	Small	500 year	PMF
	Intermediate	½ PMF	PMF
	Large	½ PMF	PMF