



Connecticut Dam Safety

Owner-Responsible Inspection Information

Connecticut Department of Energy and Environmental Protection
Dam Safety Program
79 Elm Street, Hartford, CT

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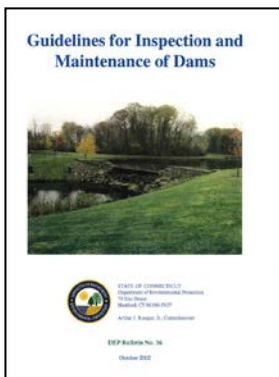
Owner Responsible Inspection Information

This document is designed to assist the dam owner to better understand the state laws, requirements, responsibilities, and duties inherent with dam ownership and to assist the professional engineer by providing a consistent approach to dam inspection and the preparation and submission of reports and related documents to the Department of Energy and Environmental Protection (DEEP).



Quaddick Reservoir Dam, Thompson

This document supplements the required standard regulatory inspection report form and its instructions and includes background information and procedures to use in the submission of dam inspection reports to the Dam Safety Program.



[DEP Bulletin 36](#), *Guidelines for Inspection and Maintenance of Dams*, released in 2002 remains a highly valuable guideline generally applicable to all dams. These guidelines are available on the Dam Safety website. Please consult these guidelines as well.

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1. Background Information

Authorizing Statute and Regulation

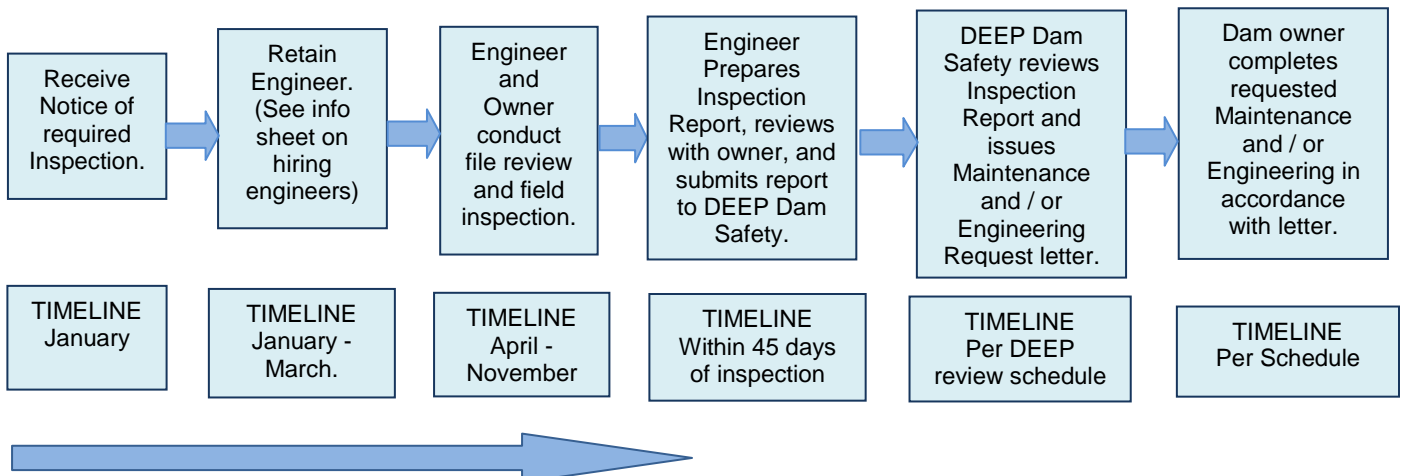
The Connecticut Dam Safety Program is authorized within Sections 22a-401 through 411 of the Connecticut General [Statutes](#). Section 22a-409(c) authorizes the Commissioner of the Connecticut Department of Energy and Environmental Protection (DEEP) to adopt agency regulations relating to dam inspection. The Commissioner is charged with implementation of the requirements of the dam safety statute and regulation. Section 22a-402 provides the Commissioner with the authority to require the owner of a dam to cause an inspection of that dam to be made by a registered engineer at such intervals as are deemed necessary by the commissioner. The Dam Safety [Regulation](#) provides the framework for dam Inspections. These regulations were first adopted on April 30, 1987 and provide definitions, inspection requirements, hazard classification definitions, fees, notification requirements, and outline some of the responsibilities of dam owners. These regulations have been known as the “Inspection Regulation”.

Recent Legislation Public Act 2013-197

[Public Act 2013-197](#), “An Act Concerning the Dam Safety Program and Mosquito Control” became effective October 1, 2013. A modification to the Inspection Program was included in this legislation which now requires the Commissioner to send notices to dam owners regarding required inspections and to ensure that those inspections are conducted by qualified personnel and the reports of the inspections submitted to the Commissioner. Efforts are underway to revise and update the Inspection Regulation to accommodate these and other changes this legislation has brought. Please note that the staff of the Dam Safety Program working on revisions to the Inspection Regulation anticipate adoption of updated regs sometime in 2015. In the interim period, the existing Inspection Regulation remains valid.

Notification of Required Inspection

Public Act 2013-197 requires the Commissioner to notify dam owners of a required inspection by January 15th of the year that inspection is due. When such [notice](#) is received, the dam owner must plan to have their consultant complete that inspection that calendar year and submit the report within 45 days of the date of inspection. **In the event that no inspection report is received by March of the following year, the Commissioner is authorized to impose penalties. These would be significantly greater than the fee currently charged by DEEP for a state inspection or the fee typically charged for a consultant inspection.**



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Recognition of Existing Inspection Programs

Many of the high and significant hazard dams in Connecticut are regularly inspected by professional engineers and qualified personnel. These include hundreds of water supply, state, municipal, and utility dams which are generally considered to be well cared for.

The Dam Safety Program will strive to maintain current and accurate records of submitted inspection reports and will issue the notices of the required inspections each January based on our best available data. Public Act 2013-197 requires that these notices be sent and that inspections are conducted at the intervals specified within the Inspection Regulation and that reports of those inspections be submitted to the DEEP.



Ashland Pond Dam, Griswold

Need For These New Requirements

There are many high and significant hazard dams in private, municipal, state, or corporate ownership which have not been inspected at the required frequencies and the current condition of those dams may be unknown. The intent of the public act is to improve overall dam safety by getting more dams inspected and to get more dam owners involved and educated regarding their dams.

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2. Downstream Hazard Potential Classification and Inspection Frequency

Within section 22a-409-(2)(d) of the Regulation are definitions of the hazard classifications. The reasoning is spelled out and is based on estimates of potential loss of life, damage, and interruption of utilities. The DEEP assigns one of the five classes to each dam in accordance with the descriptions below. The Hazard Classification is important because it provides an indication of the magnitude of the consequences of a dam failure.

Hazard Classifications

- **Class AA: Negligible Hazard Potential.** A dam would be considered to have negligible downstream hazard potential if, were it to fail, it would cause no measurable damage to roadways, land and structures, and negligible economic loss. Examples are a dam located just above a large body of water such as a major river which could easily absorb the entire discharge of the released impoundment or a dam and pond so small that the volume of water if released suddenly would cause no damage. Once the Negligible hazard classification is field verified, **there is no periodic inspection requirement for dams in this hazard classification.**
- **Class A: Low Hazard Potential.** A dam would be considered to have a low downstream hazard potential if, were it to fail, it would cause damage to agricultural land, damage to unimproved roadways, and/or minimal economic loss. **The periodic inspection frequency for low hazard dams is 10 years.**
- **Class BB: Moderate Hazard Potential.** A dam would be considered to have a moderate downstream hazard potential if were it to fail, it would cause damage to normally unoccupied storage structures, damage to low volume roadways, and/or moderate economic loss. **The periodic inspection frequency for moderate hazard dams is 7 years.**
- **Class B: Significant Hazard Potential.** A dam would be considered to have a significant downstream hazard potential if were it to fail, it would cause *possible* loss of life; minor damage to habitable structures, residences, hospitals, convalescent homes, schools, etc.; damage to or interruption of the use or service of utilities; damage to primary roadways and railroads; or significant economic loss. **The periodic inspection frequency for significant hazard dams is 5 years.**
- **Class C: High Hazard Potential.** A dam would be considered to have a high downstream hazard potential if were it to fail, it would cause *probable* loss of life; major damage to habitable structures, residences, hospitals, convalescent homes, schools, etc.; damage to main highways; or great economic loss. **The periodic inspection frequency for high hazard dams is 2 years.**

Reassessment of Hazard Potential

The downstream hazard classification of a dam is reassessed during the regulatory inspections or whenever the Commissioner deems it necessary. The classification can change for a number of reasons,

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including new development within areas downstream of the dam, new information regarding breach inundation estimates, and use of new methodologies for estimating flood flows and inundation areas that occur when a dam fails. The hazard classification is assigned by the Commissioner working through the Dam Safety Program. Dam owners and consultants may submit their recommendation for a revision to the hazard classification for their dam. The submission must include appropriate data to support that recommendation. The Commissioner working through the Dam Safety Program has final authority for the assignment of the hazard classifications.

Risk vs. Downstream Hazard Potential Classification

Communities in Connecticut are looking more closely at dams as they prepare hazard mitigation / risk assessment plans. Insurance companies evaluating dams for policies likewise take a close look at dams. It should be noted that the risk a dam presents to the downstream community is somewhat more comprehensive a concept than the downstream hazard potential classification.

The risk could be thought of as what an insurance actuarial would consider if evaluating the dam for a liability coverage policy. The question is, what liabilities exist? Certainly, they would consider the hazard class and predicted consequences of a failure, but they would also be very interested in the things that increase or decrease the likelihood of a dam failure. This includes the present condition of the dam, its ongoing inspection program, its maintenance programs, its conformance with accepted design standards, the presence or absence of an Emergency Action Plan, how well the dam's owners understand their obligations in the event of large storms or other situations that may arise which threaten the safety of the dam, and whether they are prepared to respond.

For example, a negligent dam owner with a dam in unknown or poor condition, no routine inspection and maintenance program, and no Emergency Action Plan has considerably more risk and exposure than an owner with a comparable dam being maintained and which has those things in place, yet the two dams would have the same hazard classification.

3. Responsibilities of Dam Owners

Minimum Requirements in the Regulation

Owners of dams are legally responsible for the operation and maintenance of their structures. Section 22a-409-(2)(j) of the Regulation outlines owner responsibilities including:

- a. Inspection of the dam to assure no unsafe conditions are developing, e.g., due to weather, animal activity or vandalism.
- b. Notification to DEP (currently DEEP) of any major damage such as overtopping by flood waters, erosion of the spillway discharge channel, new seepage, settling, cracking or movement of the embankment.
- c. Maintenance of structure and adjacent area to remain free of brush and tree growth.
- d. Written records of all inspections and maintenance activities undertaken.

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Planning For a Safe Dam

Long term planning for a safe dam cannot be done without knowing the condition of the dam and identifying what it will need to ensure it is kept in as safe a condition as possible. The professional engineer overseeing the dam's inspection is required to list recommend maintenance in the inspection report and when appropriate, list recommended additional engineering investigations or analysis to evaluate uncertain conditions affecting the dam's safety. Dam Safety program staff will review these recommendations for appropriateness. When substantial repairs or improvements are necessary to make a dam safe, before that construction can begin, State Dam Safety permitting is required. This sets into play a vital need for long term planning to accomplish these more complex tasks. Being able to phase the engineering, permitting, and construction over a period of years may make the process more affordable.

Dam Failures

Failure of a significant or high hazard dam with sudden release of its impoundment creating a flood wave may result in the loss of life, substantial damage to residential homes, property, and public infrastructure such as bridges and culverts, and bring negative financial consequences for many. The flood wave will also carry with it debris it picks up on its way downstream. The failure of a dam can have significant environmental impacts including damage to wetland systems and to the downstream watercourse below the dam. Dam failure often allows for the release and deposition of large volumes of accumulated sediment from the impoundment (or the materials of the dam itself) which can destroy fisheries and aquatic habitat for miles below a dam. There have been numerous dam failures across the United States and several here in Connecticut, one, in 1963 in Norwich resulting in the loss of six lives. Dam failures often result in extensive legal claims against dam owners. There is a considerable wealth of information available on the internet regarding dam failures and the aftermath. Please contact DEEP staff if you wish to learn more. Owners can reduce their liability and the risk of dam failure by implementing a proper inspection and maintenance program which includes proper engineering analysis and permitted repairs and improvements when indicated.

Be a Proactive Dam Owner

Being a dam owner requires constant vigilance. As the owner of a dam, your liabilities and responsibilities exist regardless of any actions or inactions of the state dam safety program. In other words, you should take actions to ensure your dam is kept in a safe condition at all times, and those actions would at a minimum include inspections on a regular basis. If your dam has not been inspected in many years, immediately consider it to be very overdue for inspection and initiate the proper inspection as soon as possible, regardless of whether the DEEP Dam Safety Program has instructed you to do so. We welcome communications from dam owners and will always strive to provide helpful answers to questions regarding the need for inspections or any dam safety topic.

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4. Dam Inspections

We define four types of inspections in this document: Informal, Emergency, Formal, and Regulatory. These are described below along with the minimum qualifications of the inspection personnel. The Regulatory inspection is the most common. The Commissioner may require the owner or operator of any dam to perform an inspection of any type whenever conditions at the dam warrant such.

Qualifications of Inspection Personnel

Informal inspections are conducted by the dam owner and operator. Emergency Inspection parties may include the owner, operator, engineer, local emergency officials and state officials. For the Regulatory and Formal inspections, the dam owner is required to retain a CT licensed Professional Engineer. If you are unfamiliar with retaining a professional engineer, please refer to our fact sheet available on the Dam Safety Website entitled "[Hiring an Engineer](#)".

Owners Participation in Inspections

Once you have retained an engineer for an inspection, you should remain closely involved with each step of the process and attend the inspection and any meetings or conferences that may be scheduled with the staff of the Dam Safety Program. This way you will become more familiar with your dam, will not be surprised by the engineer's findings, and will understand the engineer's recommendations. It is expensive to retain professionals. Therefore, close involvement during hiring and throughout the inspection and beyond is the best way to keep costs in control. In addition, your relationship may not end with the submission of the inspection report. Your dam may need repairs which must be designed by a licensed engineer and for which a DEEP Dam Safety Permit and engineering oversight of the construction is often required. Therefore, staying involved with the process the entire time will ensure that you are not caught unaware of the situation with your dam and can work to plan and schedule things so that they are more affordable.

Types of Inspections

Informal Inspection

This Inspection is the most frequent visual inspection and is conducted by the dam owner and / or operator to assure that no unsafe conditions are developing. This includes but is not limited to looking for weather related damage, animal activity, vandalism, checking and measuring seepage where possible, observing slopes and the crest for settlement, etc. High and Significant Hazard dams must be informally inspected at least quarterly. This is required by the Inspection Regulation in section 22a-409-2(j) Responsibility of the Owner. On larger dams, it is not uncommon for this inspection to be conducted weekly. There is no particular format however; the owner must maintain reports of these inspections in the permanent file for the dam. Unless specifically requested, informal inspection reports are not required to be submitted to the Department.

Owners and Operators of High and Significant hazard dams should consider completing a training program that instructs on what to look for when conducting an inspection of this nature. The Association of State Dam Safety Officials ([ASDSO](#)) working with State Dam Safety programs periodically

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offer one-day dam owner workshops. Check on the DEEP Dam Safety Website for information and links to any available training.

Emergency Inspection

An emergency inspection is an unscheduled inspection of a dam and its appurtenances necessitated by a potentially adverse natural event such as heavy rainfall and large inflows causing the impoundment to rise, noticeable changes in the seepage through the dam, earthquake, landslide or whenever a condition develops that appears to immediately threaten the safety of the dam. The most common condition is a weather related rain event causing high impoundment levels that threaten to overtop an earthen embankment. The Dam's Emergency Action Plan (EAP) should be consulted and if appropriate, implemented by the owner and parties identified in the plan. The Connecticut Dam Safety Program staff should be contacted and kept apprised of the situation, noting however, that staff of the Dam Safety program or the DEEP are not the parties responsible for taking actions in an emergency situation with a non-state owned dam.

Emergency inspections are required by the Inspection Regulation in section 22a-409-2(j) Responsibility of the Owner. An emergency inspection is applicable to any hazard classification and requires immediate attention. Any required emergency repairs resulting from the emergency inspection must be conducted within the permitted conditions of an individual, general or emergency dam safety permit. Daily Reports of emergency inspections must be kept which include Dam Name and number, date and time, weather, rain data, impoundment level during flood or post flood, personnel on site, photographs, conditions observed at the dam such as seepage and discharges below the dam, and all other data collected pertinent to the emergency.

There is no particular format however; the owner must maintain reports of these inspections in the permanent file for the dam. Emergency Inspections are performed by the dam owner, the dam operator, state and local emergency officials, dam safety staff, and the dam owners consulting engineer.

Formal Inspection and Investigation

High and Significant Hazard dams which are lacking valid / current engineering hydrologic, hydraulic, and stability analysis of the current configuration and for which the overall condition and safety status cannot be determined without more in-depth investigation are likely candidates for the Formal Inspection & Investigation. The Commissioner will determine when the Formal Inspection and Investigation is required, however, a dam owner may initiate this at any time it is believed to be necessary. The Formal inspection and Investigation are performed by qualified, Connecticut licensed professional engineers assisted by technical experts and specialists as needed to evaluate unique features or conditions found at the dam.

The report of a formal inspection and investigation should be comprehensive and include evaluation of all deficiencies noted during prior inspections. This would include hydrologic, hydraulic, and structural issues related to the dam which are not addressed by other existing approved reports, and identify all of the needed remedial work necessary to bring the dam up to present day standards for safety. Preliminary design of repairs and improvements are typically included. The report(s) could be

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considered comparable to the Phase I and II inspection and reports which were first initiated by the Army Corps of Engineers in the late 1970's under the National Dam Safety Act.

Regulatory Inspection

The Regulatory Inspection is the primary type of inspection conducted for dam safety in Connecticut. The purpose of this inspection type is to detect any signs of deterioration in material, developing weaknesses or unsafe hydraulic or structural behavior. It is a visual inspection along with a review of file information conducted by either a professional engineer or qualified personnel. If no engineering data is available, the report must identify the lack of existing engineering data. The engineer will recommend and include a description of the appropriate engineering analysis in addition to listing the identified maintenance which the owner can undertake. The report should also include proposed schedules for completing the maintenance and engineering tasks for DEEP review and approval.

5. Regulatory Inspection Procedure

The Regulatory Inspection procedure is based on the requirements of the Regulation sections 22a-409-2(c) and (f) and is to be conducted at the intervals indicated in section 22a-409-2(e). Following is a summary of these requirements taken from the regulation:

Regulatory Inspection requirements From the Inspection Regulation

The periodic inspection procedure in section 22a-409-2(c)(1) of the regulation provides the minimum requirements for Regulatory inspections and which, in brief, should include:

- (A) Visual Inspection of the dam and all appurtenant structures...;
- (B) Review and analysis of available data;
- (C) Observation of downstream development for reassessing the hazard potential;
- (D) Evaluation of the overall condition of the dam considering the visual inspection findings and hydraulic and structural stability data available in the file;
- (E) Evaluation of the operation, maintenance and inspection procedures of the owner;
- (F) Evaluation of any other conditions which could constitute a hazard to the structure;

The minimum required contents of a report for a Regulatory Inspection are listed in section 22a-409-2(c)(3) of the Inspection regulation, and include using the most current version of the Standard DEEP Dam Inspection Checklist, and in brief, the following:

- (A) An assessment of the condition of the dam based on the visual observations, available data on design, construction, operation, maintenance and performance, the hydrologic and hydraulic capacities and the structural stability of the dam;
- (B) Recommendation for any emergency measures needed to assure the immediate safety of the dam;
- (C) Recommendations for remedial measures (engineered repairs);
- (D) Recommendations for additional detailed studies, investigations and analyses, if required;
- (E) Recommendations for time frames for the above recommendations
- (F) Recommendations for routine maintenance (non-engineered) and inspection by the owner.

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File Review

The owner and engineer should review the files of the owner and any parties with information regarding the dam including the DEEP Dam Safety Files prior to conducting the field inspection of the dam. The file review will ensure that the inspection team is aware of all known issues at the dam. It may be required to make an appointment with Dam Safety Program staff to view or copy file data in the State's possession. An appointment request form will be available on the Dam Safety website. In some cases, copies or scans of data for certain dams will not be allowed without the dam owner's permission.

Visual Inspection

The owner / operators and inspecting engineer should conduct the visual inspection of the dam and its environs as a team whenever possible. The Regulatory Inspection Report Form and associated Instructions document should be reviewed to ensure that a complete inspection is performed.

Regulatory Inspection Report Form and Instructions

The report submitted to the Commissioner must use the DEEP provided Inspection Report Form and Instructions which are available for download in the Inspections section of the DEEP [Dam Safety Website](#). Failure to use the DEEP report template may result in a rejection of the submitted report.

Each Dam in a Separate Report

Typically, each dam should have its own separate report. Do not include reports for other dams of other impoundments within the same pdf or hard copy. If an impoundment has multiple dams and / or dikes which have been given individual CT DamID#, they should all be included in a single report. If unsure, contact the Dam Safety Program staff to discuss. When including additional structures with CT DamID#'s within a single report for the impoundment, be sure to include the various CT DamID#'s of those structures in addition to the main dam.

Submitting Inspection Report hard copy by mail.

Submit one signed / stamped bound hard copy of the report to the DEEP Dam Safety Program. The report must be signed by all dam owners and stamped and signed by the licensed engineer.

Mail or deliver the Inspection Report to:

Dam Safety Program
Inland Water Resources Division
Connecticut Department of Energy and Environmental Protection
79 Elm Street
Hartford, CT 06106

Submit Report Electronically

In addition to the single hard copy delivered to the Dam Safety Program, the Inspection Report must be converted to Adobe portable document format (pdf). The completed signature page of the report should be scanned separately and that page inserted into the converted report at the end so that the emailed

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report includes the signature page. The file name for the electronic version of the Inspection Report must be named using the Electronic File Naming convention in the following section.

Electronic File Naming Convention

Reports in Adobe Acrobat portable document format (pdf) for each dam must be named using the following file naming convention:

Name as follows: **##### Inspection Report YYYY-MM-DD DamName Town.pdf**

Where

#####	is the Connecticut DamID# (do not insert leading "0"s).
Inspection Report	is the words "Inspection Report"
YYYY-MM-DD	is the date of the visual inspection with dashes in between as shown.
DamName	is the generally recognized name of the impoundment/dam.
Town	is the name of the municipality (not a borough or village name)
pdf	is the adobe portable document format file extension.

Do **not** use underscores (_) between the dam number or words. Use dashes within the date.

Submitting By Email Attachment

The maximum email attachment size is currently 20 mb. If your report has a lot of un-compressed photographs and graphics, its size may exceed that limit and the email may not get delivered. In that case, you should consider re-sizing or compressing the jpg photographs before inserting them into the report.

A single PDF for each dam which file is named in accordance with the file naming convention above should be emailed to:

DEEP.DamSafety@ct.gov

Please enter the CT DamID# and dam name in the subject line of the e-mail.

Contacting Dam Safety

The Dam Safety Program is located within the Inland Water Resources Division (IWRD). The IWRD is one of four Divisions within the [Bureau of Water Protection and Land Reuse](#) (WPLR). See the Agency overview chart [here](#). We are located on the third floor of DEEP Headquarters at 79 Elm Street in Hartford.

You may contact this office via telephone at **(860)424-3706**. An alternate number for the Inland Water Resources Division is (860) 424-3019.

The email for Dam Safety is DEEP.DamSafety@ct.gov. To email a staff person directly, it is the persons full name with a "." Between first and last @ct.gov.