

The logo is circular with a white top half and a blue bottom half. The text 'connecticut' is in a smaller font at the top, 'DAM SAFETY' is in large bold letters in the middle, and 'PROGRAM' is in a smaller font at the bottom. A stylized wave graphic is on the right side of the circle.

connecticut
**DAM
SAFETY**
PROGRAM

Connecticut Department of Energy and Environmental Protection



Peter Spangenberg
CT DEEP Dam Safety

Great Swamp Flood Control Dam aka
Norwalk River Watershed Dam No. 2

Topics

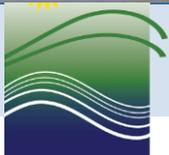


- Introduction to Dam Safety in Connecticut
- Great Swamp Flood Control Dam aka Norwalk River Watershed Dam#2.
- Design Standards for high hazard dams.

Introduction to Dam Safety



The Dam Safety office is located at DEEP Headquarters, 79 Elm Street, Hartford



Connecticut Department of Energy and Environmental Protection

Introduction to Dam Safety

State-Owned Dams Staff

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Environmental Analyst
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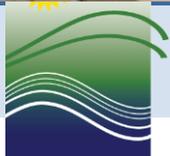
Regulatory Program Staff

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Civil Engineer II
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Environmental Analyst
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Introduction to Dam Safety

DEEP Dam Safety Regulatory Program
is Responsible for:

All dams, dikes, reservoirs and other similar structures, with their appurtenances, without exception and without further definition or enumeration herein, **which, by breaking away** or otherwise, might endanger life or property.



Introduction to Dam Safety

DEEP State Dams Program
is Responsible for the maintenance and repair and
rehabilitation of:

- *Over 250 DEEP Owned dams + work with other State Agencies who own another 50 dams.*
- *Flood Control Projects*
- *Flood Emergency Response.*



Introduction to Dam Safety

DEEP State Dams Program must get permit authorization from DEEP Dam Safety to repair and rehabilitate the state-owned dams.

- *Permits required for substantial repairs to any dam that has downstream hazard.*
- *Permits also require that environmental impacts are minimized, endangered species are protected, etc.*
-



How Many Dams are there?

There are about 5000 dams in Connecticut



Hazard Class

Connecticut has five classes of downstream hazard.

- Class AA
 - Class A
 - Class BB
 - Class B
 - Class C
- | | |
|---|--------------------|
|  | Negligible Hazard |
|  | Low Hazard |
|  | Moderate Hazard |
|  | Significant Hazard |
|  | High Hazard |



Hazard Classification

Hazard Classifications are defined in the regulation.

If the dam were to fail...

What downstream areas get flooded?

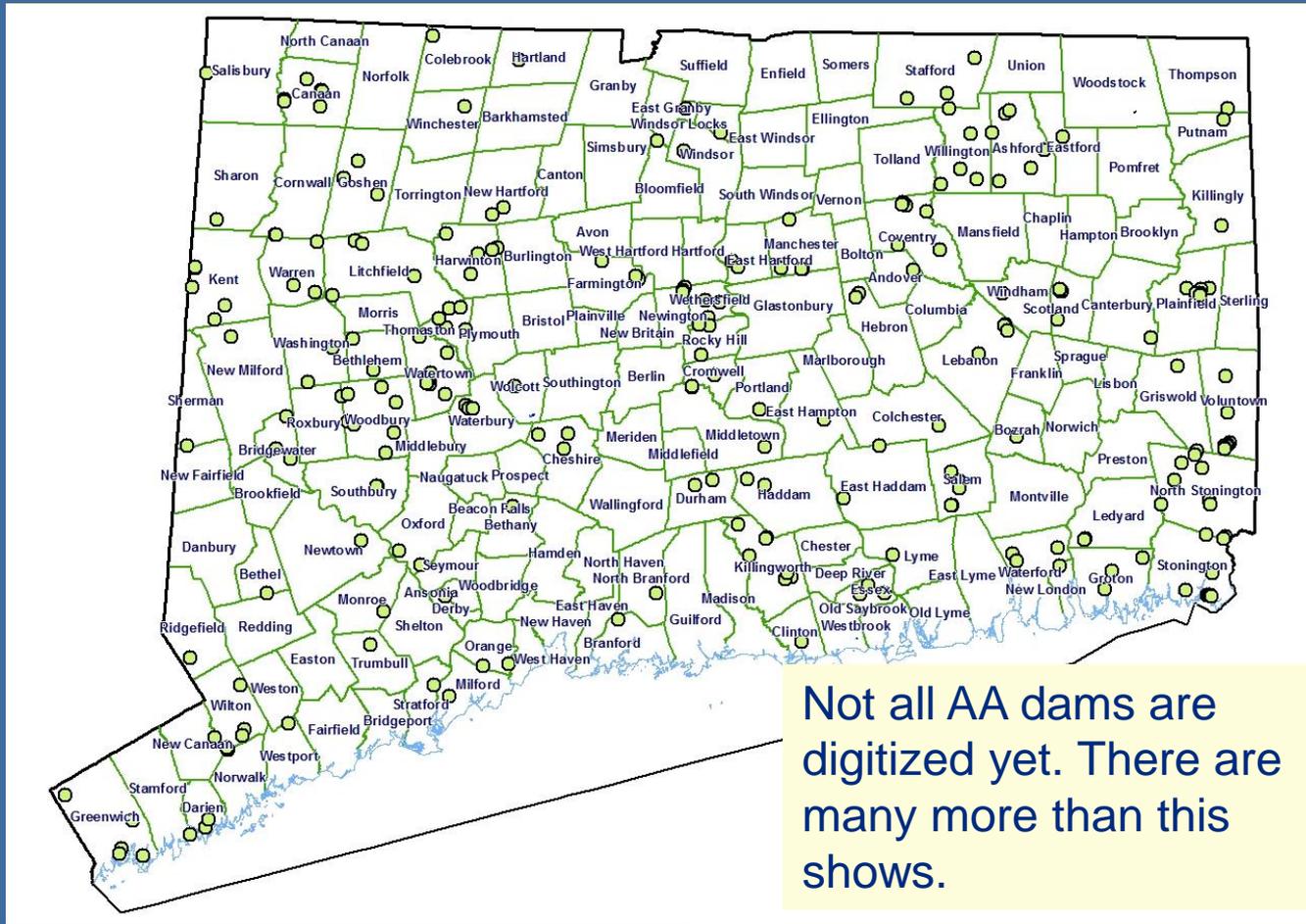
What infrastructure or residences are at risk of being impacted by the flood released from the dam?

?? What is the Worst Case Scenario ??

Heavy Rain? Full & Overtopping Reservoir? Internal leak? saturated embankment?



Introduction to Dam Safety

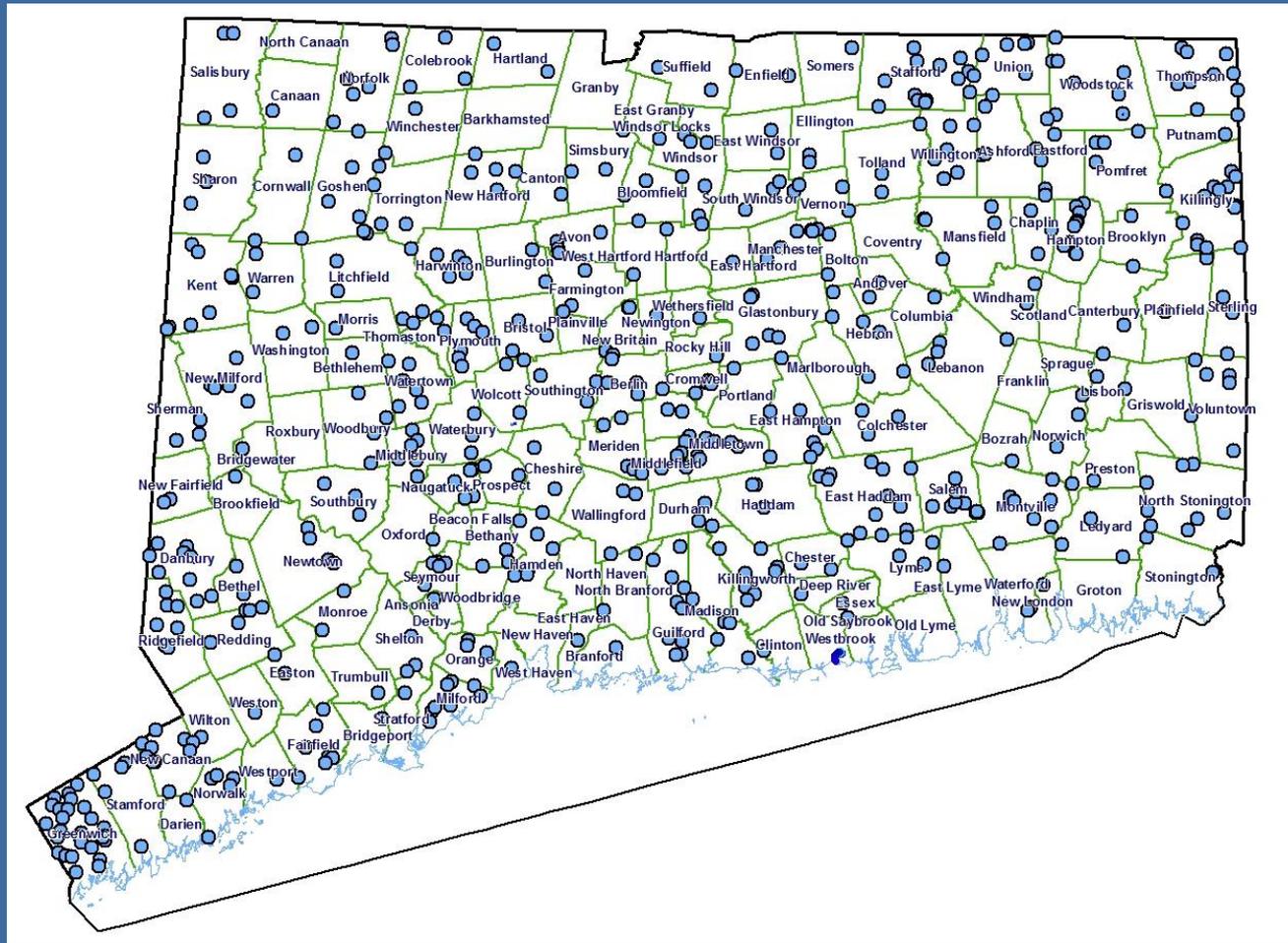


There are about **375** Class AA Negligible Hazard Dams

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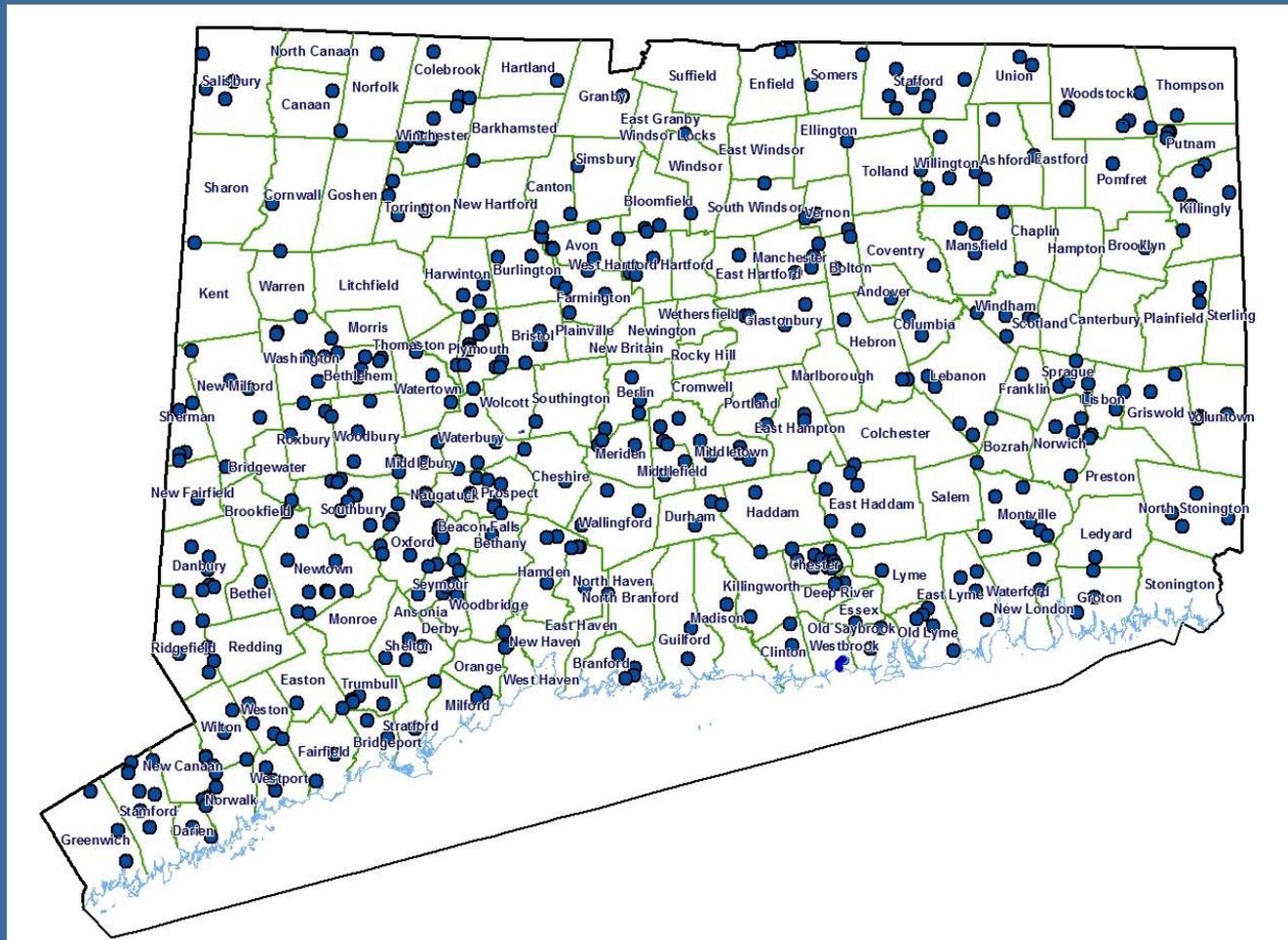


About **725** Class BB Moderate Hazard Dams

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Introduction to Dam Safety

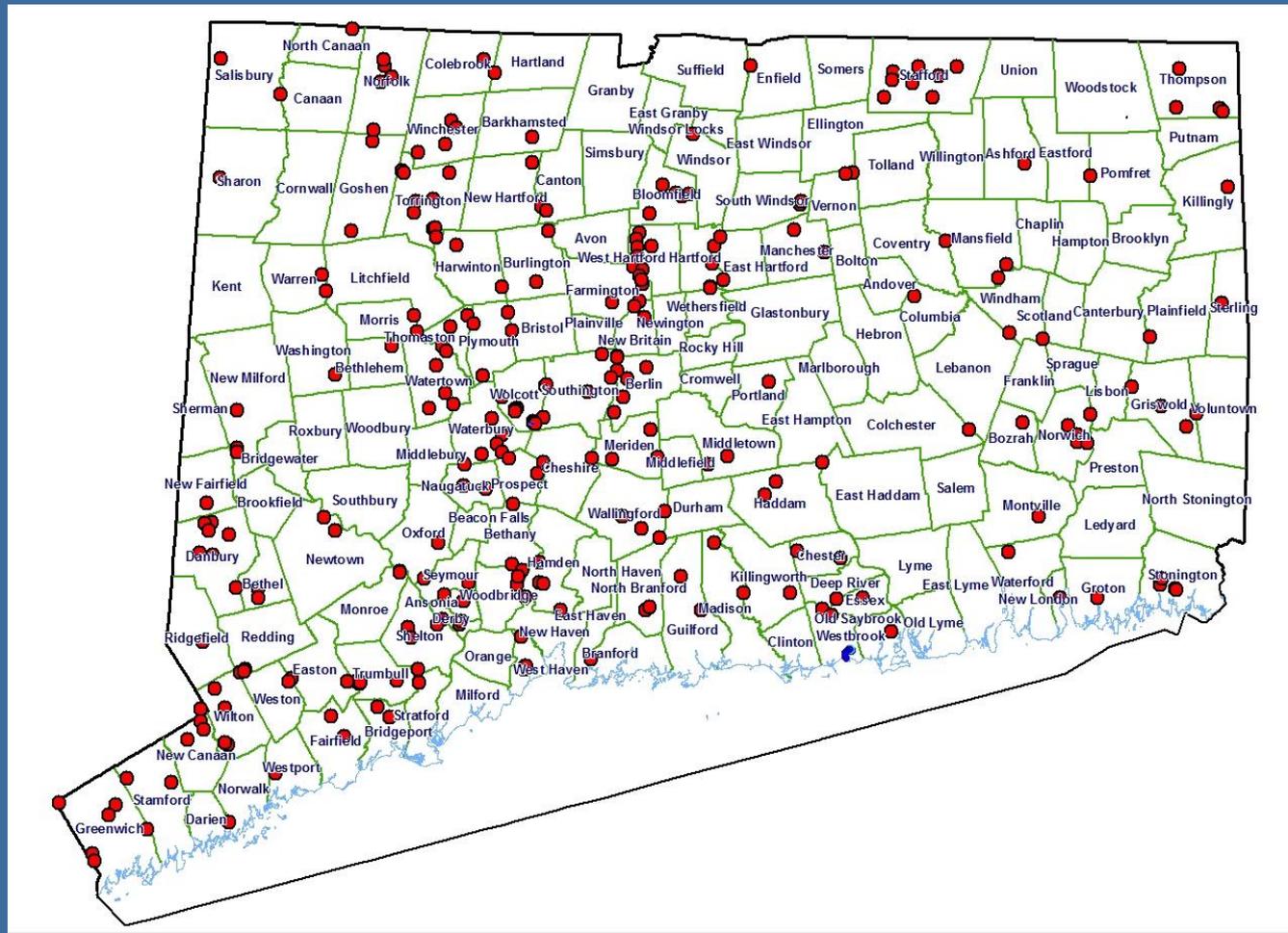


279 Class B Significant Hazard Dams



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Introduction to Dam Safety

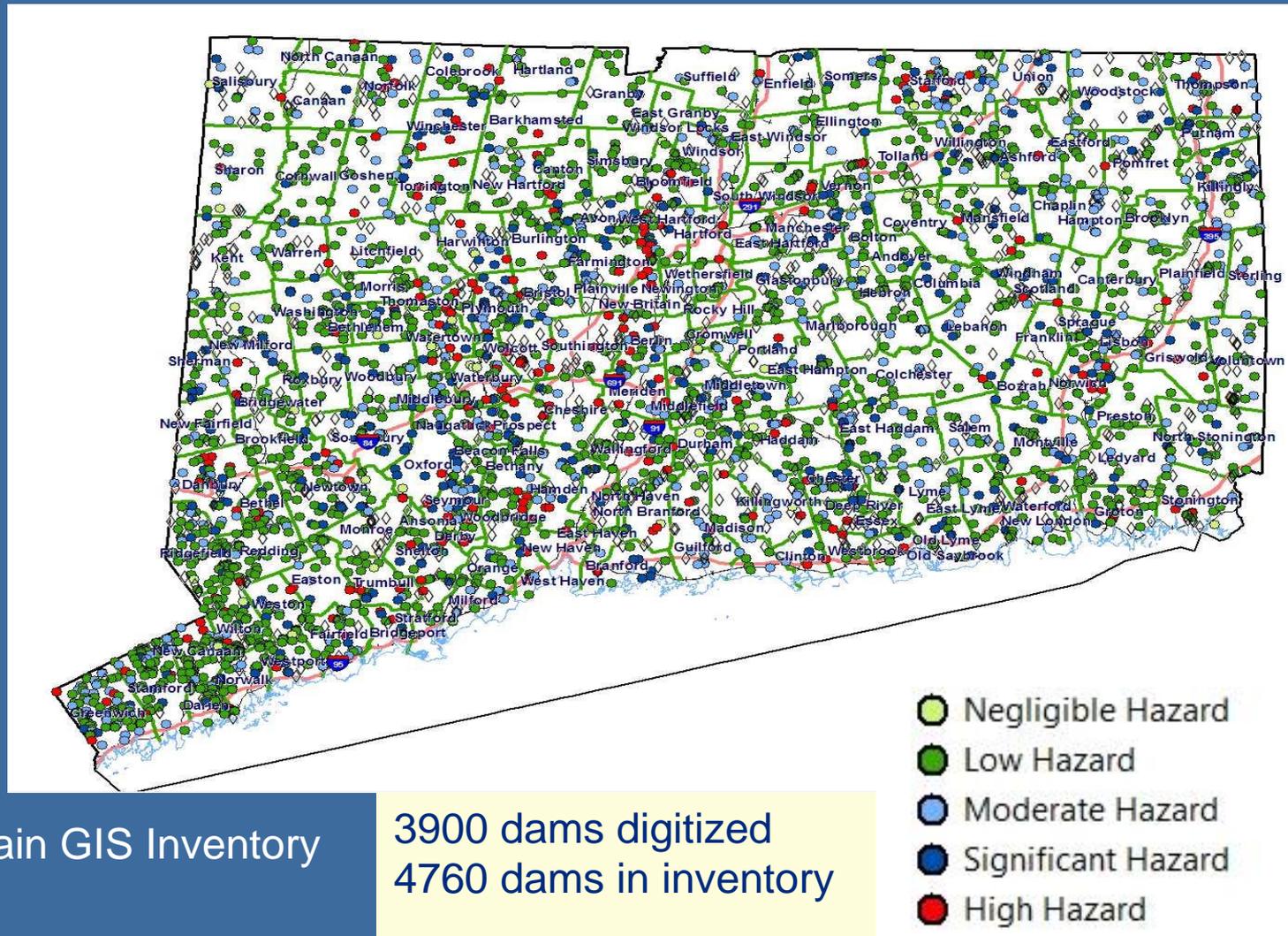


277 Class C High Hazard Dams



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Introduction to Dam Safety



Maintain GIS Inventory

3900 dams digitized
4760 dams in inventory



Connecticut Department of Energy and Environmental Protection

Hazard Class Re-assessment

A dam's Hazard Classification must be reassessed during scheduled regulatory inspections which occur every 2 – 10 years depending on classification.

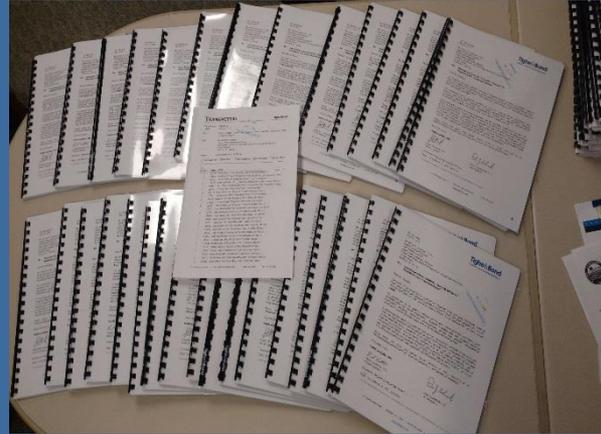
The goal is to have the correct hazard class.

New Development downstream can cause the hazard class to increase.



Introduction to Dam Safety

What does DEEP
Dam Safety
Regulatory Do?



Review Inspection
Reports.

Get Dam Owners to
respond to dam's
needs.

For Official Use Only - Not for Public Distribution 04/12/2015

Emergency Action Plan (EAP)

Great Swamp Flood Control Dam
State of Connecticut Dam ID: 11858
Town of Ridgefield, Fairfield County, Connecticut
Connecticut Department of Energy and Environmental Protection

Dam Hazard Classification is "C"



Reviewed and Updated:

Supervisor, Inland Water Resources Division,
Connecticut Department of Energy and
Environmental Protection

Emergency Management Director,
Ridgefield, CT

Date _____ Date _____
Copy ____ of ____

TH
TATA & HOWARD

Review Emergency
Action Plans.

Participate in EAP
Drills.



Review Permit Applications
& Issue Permits & follow up.



Connecticut Department of Energy and Environmental Protection

Introduction to Dam Safety

What does DEEP Dam Safety Regulatory Do?

- Maintain inventory of dam information - database / GIS / archives.
- Keep track of current owners, all inspections, vital information.
- Communications – emails / phone calls / correspondence.
- Enforcement Actions – NOV's, Orders, AG referrals.
- Emergency Operations during flood events.
- Work with Federal Agencies NRCS, FEMA, USACE, etc.



Introduction to Dam Safety

Resources

Connecticut Dam Safety Website

www.ct.gov/deep/dams



Connecticut Department of Energy and Environmental Protection

The screenshot shows the website for the Connecticut Department of Energy and Environmental Protection (DEEP). The page is titled "Connecticut Dam Safety Program" and features a large photograph of the Collins Company Dam in Canton. The page includes a navigation menu with categories like ENERGY, ENVIRONMENTAL QUALITY, NATURAL RESOURCES, OUTDOOR RECREATION, and PURA. A sidebar on the left contains various links such as "Water Resources", "Water Quality", "Water Quantity", "Watershed Management", "Wetlands", "Regulating Water Usage and Water Discharges", "Environmental Protection Begins With You", "Water Main Page", and "Main Menu". The main content area contains several sections: "Report on ENVIRONMENTAL Concern/Problem", "Calendar of Events", "Laws and Regulations", "Maps and GIS Data", "The Child Left Behind", "the OFFICIAL CT STATE & ROADS GPS MOBILE APP", "energize CONNECTICUT", "DEEP Store", "Sign Up To Receive Updates / Newsletters by E-Mail", "Connecticut still revolutionary", "REGISTER Online to VOTE", "Regulations of CT State Agencies", "access health CT", and "VETERANS CT.gov". The main content area also includes a "State Owned Dams - Engineering Services" section with a link to "DamWatch Monitoring Software Application for DEEP-owned DAMS", an "Emergency Action Plans (EAP)" section with a link to "Emergency Action Plans for High Hazard dams were due on February 3, 2017", and a "Dam Safety Regulation" section with a link to "The Dam Safety regulation was most recently revised with an effective date of February 3, 2016".

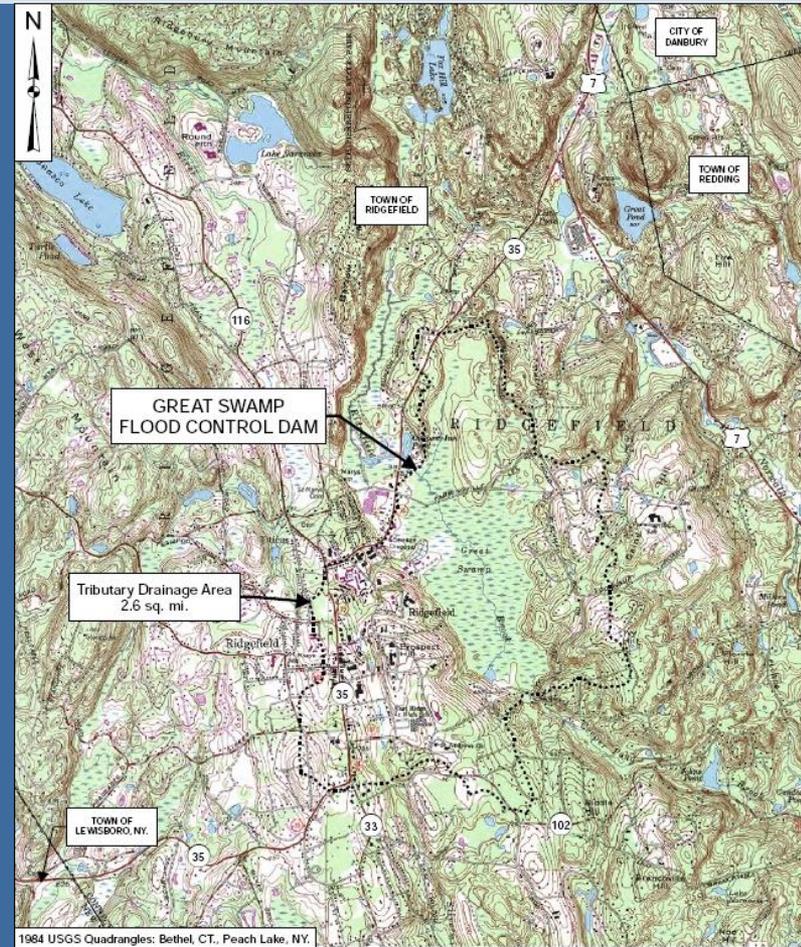
Break



Connecticut Department of Energy and Environmental Protection

Great Swamp Flood Control Dam

What is a Flood Control Dam?



1984 USGS Quadrangles: Bethel, CT, Peach Lake, NY.



Scale: 1" = 3,000' April 2015

Location Map
Great Swamp Flood Control Dam, Ridgefield, CT
CT Dam ID No. 11858
State of Connecticut,
Department of Energy and Environmental Protection

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Great Swamp Flood Control Dam

Flood control dams impound floodwaters and then .. release them under control to the river below the dam..

FEMA 2017 publication,
“Benefits of Dams”



Aerial Photograph
Great Swamp Flood Control Dam, Ridgefield, CT
CT Dam ID No. 11858
State of Connecticut,
Department of Energy and Environmental Protection
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Connecticut Department of Energy and Environmental Protection

Great Swamp Flood Control Dam

- Built in 1979 by the Soil Conservation Service as Norwalk River Watershed Dam #2.
- 276' long & 12' high
- Hazard Class: C HIGH *
- Turned over to the State of Connecticut DEP for ongoing operations.



Hazard Classification

*The Norwalk River Watershed Dam #2 was built and originally assigned Hazard Class B

During subsequent inspections, a reassessment recommended that the Hazard Class be raised to C.

This raises the issue of the need to investigate whether the dam is ok for continued service or should it be rehabilitated.



High Hazard Class

From the Regulation:

- (E) A Class C dam is a **high hazard** potential dam which, if it were to fail, would result in any of the following:
- (i) **probable loss of life;**
 - (ii) **major damage** to habitable structures, residences, including, but not limited to, industrial or commercial buildings, hospitals, convalescent homes, or schools;
 - (iii) **damage to major utility facilities**, including public water supply, sewage treatment plants, fuel storage facilities, power plants, or electrical substations causing **widespread interruption** of these services;
 - (iv) damage to arterial roadways; or
 - (v) **Great economic loss.**



Pertinent Questions

- What is the appropriate design storm for the dam?
- How will the dam fare during the recommended design storm?



Design Storms Guidelines

Connecticut Recommended Design Storms

Hazard Class	Size (USACE size criteria)	CT DEEP Dam Safety Recommended Design Storm
A Low	Small	100 year
A Low	Intermediate	100 year
A Low	Large	100 year – 500 year
BB Moderate	Small	100 year – 500 year
BB Moderate	Intermediate	500 year
BB Moderate	Large	500 year – ½ PMF
B Significant	Small	500 year – ½ PMF
B Significant	Intermediate	½ PMF - PMF
B Significant	Large	PMF
C High	Small	500 year – ½ PMF
C High	Intermediate	PMF
C High	Large	PMF

USACE Size Criteria:

Dam Size	Criteria
Small	Structures that are less than 40 feet high or that impound less than 1,000 acre-feet of water.
Intermediate	Structures that are 40 to 100 feet high or that impound 1,000 to 50,000 acre-feet of water.
Large	Structures that are more than 100 feet high or that impound more than 50,000 acre-feet of water.

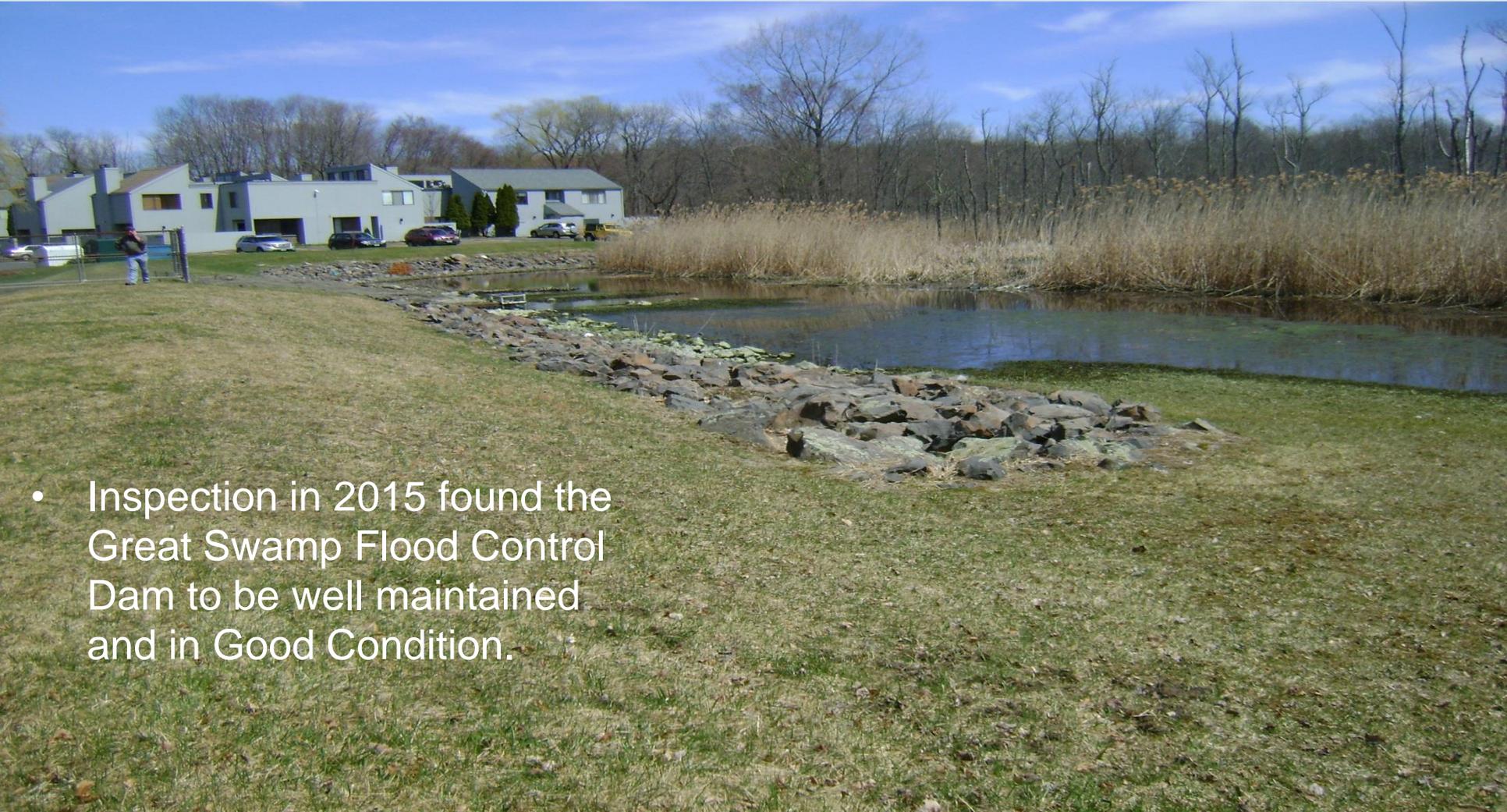


Hazard Class vs RISK

- Hazard Class is a way to assess the possible damage to downstream infrastructure & lives should a dam fail.
- A dam that has not been maintained and is in POOR condition could have the same hazard class as a similar but well maintained dam in GOOD condition.
- The dam in POOR condition presents much Greater Risk & Liability.



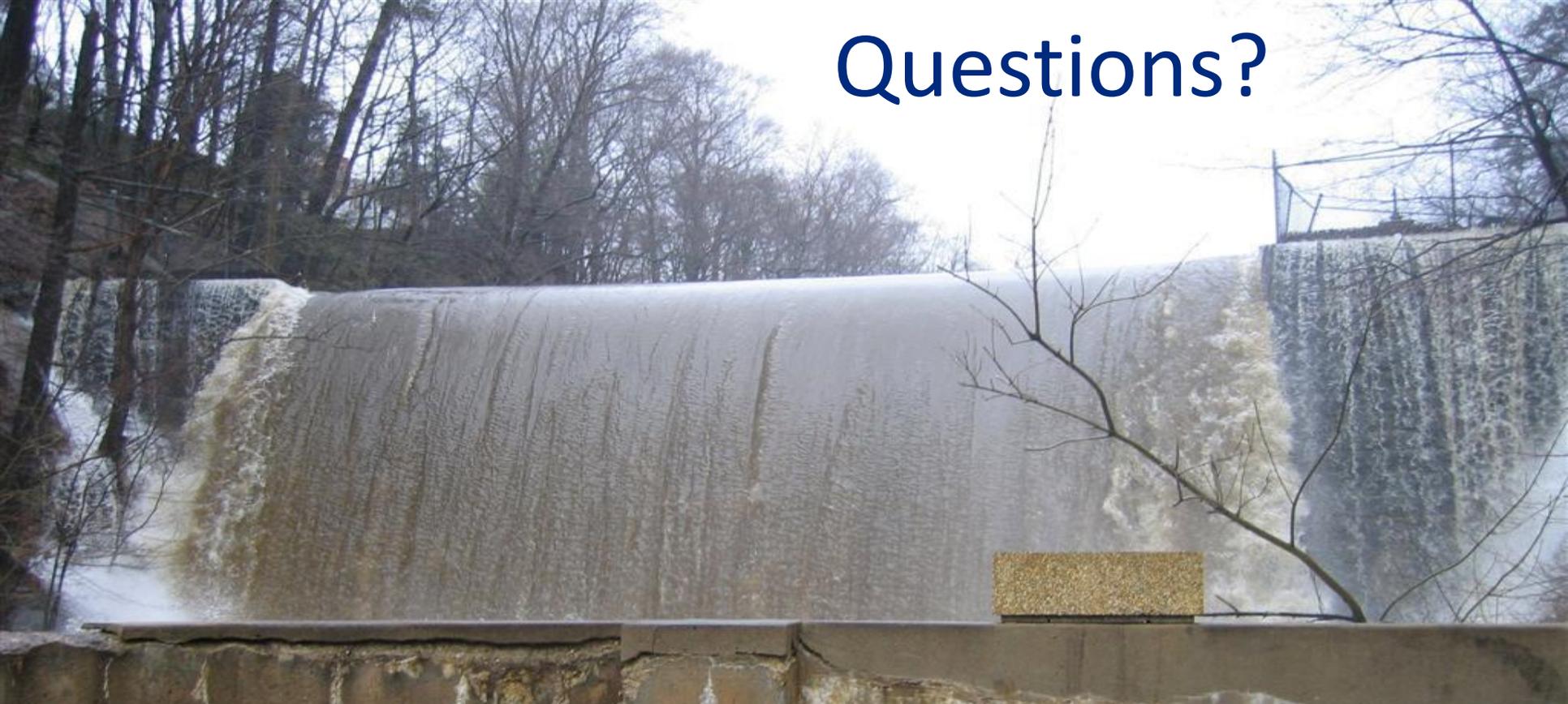
Great Swamp Flood Control Dam



- Inspection in 2015 found the Great Swamp Flood Control Dam to be well maintained and in Good Condition.



Questions?



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Connecticut Department of Energy and Environmental Protection