The North Carolina State Dam Safety Program & BMP's

April, 2013

Today's Discussion

- Brief Introduction to the mission and function of the North Carolina Dam Safety Program
- Brief explanation of the 4 basic Program functions
- What to do to determine if you are under the State Dam Safety Law
- Concentrated look at the Plan Review Process (I of 4 Program functions)
- Discuss the basic components of construction documents for high and intermediate hazard dams?
- Questions

Let’s start with the basics

What is the Mission of the Dam Safety Program?

To prevent property damage, personal injury and loss of life from the failure of dams

Under What Authority Does the Dam Safety Program Operate?

Enabling legislation = North Carolina General Statute 143-215.23 entitled "Dam Safety Law of 1967", and

Accompanying Regulations = Title 15A, Subchapter 2K of the North Carolina Administrative Code entitled "Dam Safety"

Where is the Dam Safety Program Housed?

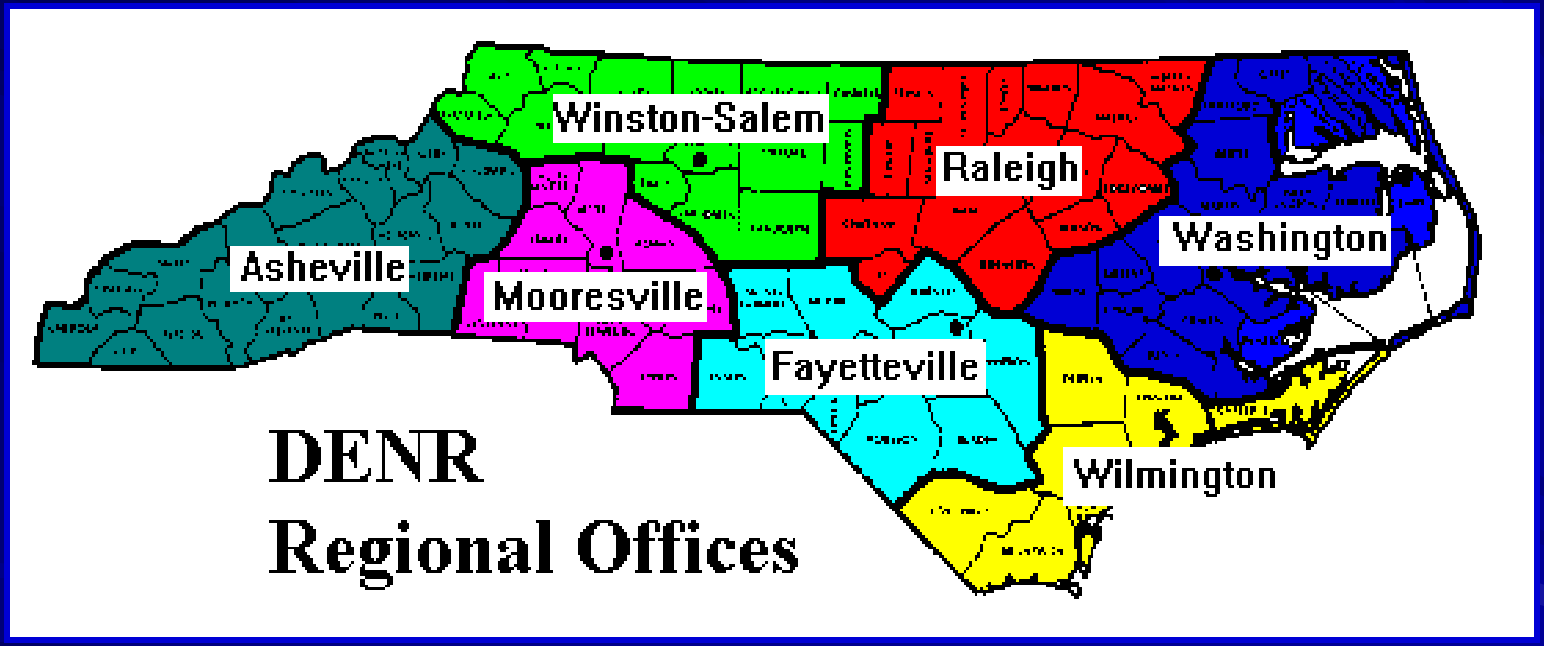
Land Quality Section (LQS)

Division of Energy, Mineral and Land Resources (DEMLR)

Department of Environment and Natural Resources (DENR)

How is the Dam Safety Program Organized?

7 DENR Regional Offices (RO), 1 Raleigh Central Office (RCO)



Staffing: 10 FTE's in the RO's and 9 FTE's in the RCO
42 LQS regional staff are cross trained for Dam Safety, Sediment and Erosion Control, and Mining

The Dam Safety Program carries out its mission through Four Basic Functions designed to ensure Safe Dams (IREE):

- We Perform Dam **Inspections**
- We **Review** and Issue Construction Approvals
- We Carry Out **Enforcement** Actions
- We Assist with **Emergency** Response

Hazard Classification for Dams in North Carolina

- Three hazard classes:
  - **HIGH (Class C)**
  - **INTERMEDIATE (Class B)**
  - **LOW (Class A)**
- Hazard classification refers to damage potential downstream and does not relate to the condition of a dam

High Hazard Classification

- High Hazard Potential (Class C) – Involves dams where failure would:
  - Likely cause loss of life or
  - Serious damage to:
    - Homes
    - Industrial and commercial buildings
    - Important public utilities
    - Heavily traveled roads
- Roads equal to or greater than 250 VPD.
- Economic damage greater than $200,000.

Intermediate Hazard Classification

- Intermediate Hazard Potential (Class B) - Involves dams where failure would:
  - NOT be expected to result in loss of life, but
  - May:
    - Damage moderately traveled roads
    - interrupt use or service of public utilities
    - cause minor damage in backwater areas to:
      - isolated homes
      - commercial or industrial buildings
- Roads greater than 25, less than 250 VPD.
- Economic damage equal to or greater than $30,000, equal to or less than $200,000.

Low Hazard Classification

- Low Hazard Potential (Class A) - Involves dams where failure would:
  - NOT be expected to result in loss of life, but
  - May damage:
    - Uninhabited, low value, non-residential, buildings
    - agricultural land
    - or low volume roads.
- Roads less than 25 VPD.
- Economic damage equal to or less than $30,000.

Waste Treatment/Mine Tailings Hazard Potential Classifications

- Waste treatment and mine tailings dams may be classified low, intermediate or high hazard on the basis of potential environmental damage.

- In this case, hazard is generally determined by equating the results of failure to monetary cost of cleanup.

- 15A NCAC 2K .0211

Size Classification

Size	Total Storage Capacity (Ac-Ft)[1]	Height (Ft)[1]
Small	SC < 750	HT < 35
Medium	750 ≤ SC < 7,500	35 ≤ HT < 50
Large	7,500 ≤ SC < 50,000	50 ≤ HT < 100
Very Large	SC ≥ 50,000	HT ≥ 100

[1] The factor determining the largest size governs.

Recent Legislative Changes

HB 119

HB 119 Changed the Dam Safety Law Effective July 1, 2011

One exemption was revised and one was added

- Existing exemption revised by HB 119:
  - Raised the jurisdictional threshold for dam height from 15 feet to 25 feet,
  - and raised the jurisdictional threshold for impoundment capacity from 10 acre-feet to 50 acre-feet
  - **UNLESS THE DAM IS DETERMINED TO BE OF HIGH HAZARD CLASSIFICATION BY THE DEPARTMENT, THEN THE DAM IS JURISDICTIONAL REGARDLESS OF SIZE**

- Exemption added by HB 119! Dams constructed for the purpose of providing water for agricultural use, provided a Professional Engineer designs and oversees construction and the new dam is registered with the Division of Energy, Mineral and Land Resources, **UNLESS THE DAM IS DETERMINED TO BE OF HIGH HAZARD CLASSIFICATION BY THE DEPARTMENT, THEN THE DAM IS JURISDICTIONAL REGARDLESS OF SIZE**

State-wide Jurisdictional Inventory
12-31-12

- 1,118 (1,118) - High Hazard Dams
- 245 (648) – Intermediate Hazard Dams
- 622 (2,796) – Low Hazard Dams
- Grand Total 1,985 Dams (4,562)

- Red denotes numbers prior to passage of HB 119, effective on July 1, 2011
- These numbers are based on analysis of current data in IBEAM (inventory management database) and must be field substantiated
- Inventory is on our website as an Excel file http://portal.ncdenr.org/web/lr/dams

REVIEW

Plan Review

- Written approval pursuant to plan review is required to construct, repair, modify, or remove a dam, and to impound behind a dam after approved construction (NCGS 143-215.26 & .27)

- During FY 2011-2012, a total of 378 reviews were performed

- Approvals Issued
  - Total: 197
    - Approvals to Construct - 4
    - Approvals to Modify - 8
    - Approvals to Repair - 36
    - Approvals to Breach - 5
    - Approvals to Impound (or Final Approval of Breach) - 36
    - EAP's approved - 25
    - Jurisdictional Determinations - 49
    - Preliminary Reports approved - 23
    - Addendums approved (Construct, Modify, Repair, Breach, Impound) - 11

The Big Question

I have a site plan project that requires a BMP (stormwater pond)

How do I determine if approval under the state Dam Safety Law is required and how do I secure such approval?

First Step

Determine the jurisdictional status and hazard classification of the dam

The Process

- Go the DENR web portal for dams
  - http://portal.ncdenr.org/web/lr/dams
- Go to
  - “Helpful Links”
  - “Forms, checklists, guidelines”
- Download
  - Under “Dam Safety”
  - Form “Determination if a dam is governed by the Dam Safety Act” and
  - “Dam Hazard Classification Data Form”

Print Form

State of North Carolina
Department of Environment and Natural Resources
Division of Land Resources
Land QualitySection
Dam Safety Program

Data Needed to Determine if a Dam is Governed by the Dam Safety Law of 1967 (as Amended)

Overview:

If your wish the Land Quality Section's Dam Safety Programstaff to determine if your dam is governed by the Dam Safety Law of 1967 (as Ameneded) - General Statute 143-215.23-37, please complete this form and return it to:

State Dam Safety Engineer, North Carolina Department of Environment and Natural Resources, Division of Land Resources, 1612 Mail Service Center, Raleigh, NC 27699-1612.

Note: This is a fillable form prepared using Adobe Acrobat 7.0. Acrobat 7.0 users can "save as" the form (including PDF - preferred) for reference as well as printing it locally for mailing (postal and email). Users of earlier versions of Acrobat can only print the file, or elect to print the form to be filled out before mailing.

Name of owner

Owner address

Owner telephone (xxxyyyzzzz)

County in which dam is located

Brief description of dam location

Name of stream

Nearest State Road number (SR)

Drainage areas (in acres)

Impoundment area at Normal Pool (in acres)

Impoundment area at Top of Dam (in acres)

Depth of water at Normal Pool (in feet)

Depth of water at Top of Dam (in feet)

Height of dam form highest point on the top of the dam to the lowest point on the downstream toe of the dam (in feet)

Other information to describe what is located downstream from the dam such as structures, roads, etc. - list in box below.

List other structures, roads, etc., here.

Location map - Attach map showing the location of the dam. A 1:24,000-scale U.S. Geological Survey topographic map is preferred.

Form: Dam Safety-Data needed to determine if a dam is governed by the Dam Safety Law of 1967 (as Amended) - Rev. 09/27/2006

Print Form

Hazard Classification Data Forms for Dams

Dam name		County	
Dam number		River / stream	
USGS 7.5-minute quadrangle			
Dam height		Surface area (acres)	
Storage capacity			
Primary downstream land use			
Downstream improvements			

Downstream improvement data - 1

Type		Elevation above floodplain	
Distance		Breach wave elevation	
Flood plain width		Culvert / bridge dimensions	
Channel slope		Traffic count	

Downstream improvement data - 2

Type		Elevation above floodplain	
Distance		Breach wave elevation	
Flood plain width		Culvert / bridge dimensions	
Channel slope		Traffic count	

Downstream improvement data - 3

Type		Elevation above floodplain	
Distance		Breach wave elevation	
Flood plain width		Culvert / bridge dimensions	
Channel slope		Traffic count	

Downstream improvement data - 4

Type		Elevation above floodplain	
Distance		Breach wave elevation	
Flood plain width		Culvert / bridge dimensions	
Channel slope		Traffic count	

Describe potential for loss of life and structural or environmental damage to existing or potential future downstream improvements	

By		Title		Date	
Concurred by		Title		Date	

Recommended hazard classifiction

Dam Hazard Classification - Hazard classification and quantitative guidelines (summary table for information)

Low

Hazard classification	Quantitative guidelines
Interruption of road service, Low volume roads Economic damage	Less than 25 vehicles per day Less than $30,000

Intermediate

Hazard classification	Quantitative guidelines
Damage to highways, Interruption of service Economic damage	25 to less than 250 vehicles per day $30,000 to less than $200,000

High

Hazard classification	Quantitative guidelines
Loss of human life* Economic damage *Probable loss of human life due to breached roadway or bridge on or below dam.	Probable lost of 1 or more human lives More than $200,000 250 vehicles per day

Note: Cost of dam repair and loss of service should be included in economic loss estimate if the dam is a publically owned utility, such as a municipal water supply dam.

Form: Dam-Safety-Hazard Classification dataform for dams - Rev.09/27/2006

LQS Process for Jurisdictional Determination (JD)

- Submit two copies of the JD form to the Raleigh Central Office (RCO)
- If downstream development is proposed, provide a layout of the proposed development showing location of the stormwater pond(s)
- RCO sends one copy to the Regional Office (RO)
- Staff from the RO visit the site to confirm the current hazard classification and report back to the RCO
- The RCO reviews the RO staff report and the proposed development layout
- The RCO advises the applicant in writing of jurisdictional status and hazard classification

Determination of Jurisdiction
NC Dam Safety Law of 1967

- Hazard Classification
  - What is currently downstream from the dam
  - What is proposed downstream from the dam
  - High, Intermediate, or Low
- Structural height of the dam
  - Is it less than 25 feet
  - Highest point on the crest of the dam to the lowest point at the downstream toe of the dam
  - Applicable only for intermediate and low hazard dams
- Maximum impoundment capacity of the reservoir
  - Is it less than 50 acre-feet
  - Measured at crest of dam elevation
  - Applicable only for intermediate and low hazard dams

I have determined that my project is subject to the Dam Safety Law of 1967, now what?

Prepare the Plans

Question

What are the components of a construction document set for a high or intermediate hazard dam?

Components of a Construction Document Set

- Construction Drawings
- Construction Specifications (Project Manual)
- Engineer's Report (Design Calculations, Special Reports, etc.)

Construction Drawings

- Cover Sheet
- Drawing Index
- Existing Conditions
- S&EC, Demolition (if required), Water Control Plan
- Overall Layout Plan (improvements, grading, armored channel spillways)
- Detailed Segment Layout Plans, Cross Sections, and Profiles
- Specialty Structural/Mechanical Work (may blend with Detail sheets)
- Details

Cover Sheet

- Project Name
- State ID Number
- Vicinity Map
- Owner’s Contact Information
- Engineer’s Contact Information

Drawing Index

- List of Drawing Sheets
- General Symbol Legend
- General Notes

Existing Conditions

- General site survey and topography (two foot contour intervals or less)
- General Notes related to existing conditions

S&EC, Demolition (if required), Water Control Plan

- Scaled Layout
- Sequencing
- Details
- Water control plan must bear a PE seal

Overall Layout Plan (improvements and grading)

- Show general layout and grading (two foot contour intervals or less)
- Show appurtenant works layouts including: spillways, independent bottom drains and conduits, specialty intake structures, etc.
- Special notes
- Scaled drawings
- Use detail indicators in all drawings

Segment Plans, Cross Sections and Profiles

- Show a centerline profile of dam
  - Superimposed boring logs (separate view if preferred)
  - Proposed crest of dam
  - Proposed emergency spillway control section
  - Conduit penetrations, gates, etc.
  - Label all pertinent elevations
- Show cross sections along the centerline profile at 25 foot stations
  - Show embankment material zoning
  - Show embankment keyway
  - Show internal drain systems
- Show spillway plan and profile
  - Principal spillway (plan and profile)
  - Emergency spillway (plan and profile)
  - Any separate bottom drain or other conduit assemblies (plan and profile)
- Show subsurface drain system plan and profile
  - Plan layout
  - System Profile

Specialty Structural/Mechanical Work

- Show intake structures, outlet structures, anti-seepage measures, spillway conduits, conduit bedding, independent bottom drain or conduit assemblies, etc.
- Show structural detailing of components for channel spillway armoring, specialty chambers, etc.
- Show special mechanical / electrical components, gate and valve work assemblies, etc.
- Scaled drawings
- Use detail indicators in all drawings

Details

- Avoid NTS details
- Number all details and use detail indicators
- Ensure detail labeling does not conflict with specifications

Construction Specifications (Project Manual)

- Material Description
  - Suitable / unsuitable
  - Minimum acceptable standards
- Workmanship Requirements
  - Material placement
  - Site preparation
- Quality Control Requirements
  - What to test for
  - How to test
  - How often to test

CSI – Construction Specification Institute

- All construction is categorized by Division
- Currently CSI has a total of 48 Divisions of construction (15 unnamed – reserved)
- In the old days there were only 16 Divisions
- What Divisions should be included in a typical small, high or intermediate hazard earthen dam?

Specification Divisions to Include with a Small, High (Intermediate) Hazard, Earthen Dam

- Division 01 – General (those sections describing general quality control requirements, procedures and responsibilities)
- Division 03 – Concrete (formwork, concrete, grouts, steel reinforcement)
- Division 31 – Earthwork (clearing, grubbing, excavation, backfill, soil and aggregate material, stabilization, rock treatment, shoring and underpinning, foundations)
- Division 32 – Landscaping
- Division 33 – Utilities (piping, valve assemblies, gate assemblies)
- Appendix – include the geotechnical investigation with warranty language (warranty language – Division 01)

Division 01
15A NCAC 2K .0201 (e) (6)

- 011000 - Summary
- 013100 - Project Management and Coordination
- 013200 - Construction Progress Documentation
- 013233 - Photographic Documentation
- 013300 - Submittal Procedures
- 014000 - Quality Requirements
- 015000 - Temporary Facilities and Controls
- 016000 - Product Requirements
- 017300 - Execution
- 017419 - Construction Waste Management and Disposal
- 017700 - Closeout Procedures
- 017823 - Operation and Maintenance Data
- 017839 - Project Record Documents

Engineer's Report

- Design Calculations
  - H&H
  - Structural
  - Flotation
- Geotechnical Investigation
  - Slope stability
  - Subsurface drainage and filters calculations
  - Lab work, recommended compaction
- Specialty Equipment
  - Gate actuators and control assemblies
  - Valve stem extensions, etc.

Application Processing Fees

- Required for plan submittals involving:
  - New dam construction
  - Significant modifications to an existing dam which change the size of the facility
  - Removal of a dam
  - **Exception**: repair plans do not require an application fee

- Fee amount:
  - Minimum $200 application processing fee
  - Additional application fee
    - 2.0 % of actual construction cost from $10,001 to $100,000
    - 1.5% of actual construction cost from $100,001 to $500,000
    - 1.0% of actual construction cost from $500,001 to $1,000,000
    - 0.5% of actual construction cost over $1,000,000

- Total application process fee shall not exceed $50,000 (project cap = $8.4 M)

- Owner is required to submit an affidavit stating actual construction cost with their as-built plan submittal

My plans are ready, now what?

Submit the Plans

Approval Submittal Process

- New Construction
  - 5 sets of construction drawings
  - 2 sets of construction specifications
  - 2 copies of the Engineer's Report
  - Initial application processing fee of $200.00
- Modification of an Existing Dam
  - 2 sets of construction drawings
  - 2 sets of construction specifications
  - 2 copies of the Engineer's Report
  - Initial application processing fee of $200.00
- Repair of an Existing Dam
  - 2 sets of construction drawings
  - 2 sets of construction specifications
  - 2 copies of the Engineer's Report

Send to the Raleigh Central Office of LQS

Standard Stipulations of a Dam Safety Construction Approval

- Requirement for a minimum release if applicable
- Requirement for the design engineer to “supervise” construction to ensure compliance with approved plans
- Requirement for the design engineer to submit record drawings and certification of construction or repairs within 30 days of construction completion
- Requirement for submittal and approval of an Emergency Action Plan (EAP) for high hazard dams prior to issuance of final approval to impound
- Requirement for submittal and approval of an Operation and Maintenance Plan for high hazard dams prior to issuance of final approval to impound
- Requirement for written final approval to impound in order to impound or operate the dam subsequent to construction or repairs (requires LQS staff inspection of completed work)
- Statement that approval does not permit access to the property of others
- Notify the LQS Regional Engineer 10 days before the start of construction

EAP template is available at the website

QUESTIONS?

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