Vermont Department of Environmental Conservation *Agency of Natural Resources*
Dam Safety Program
Water Investment Division
1 National Life Drive, Davis 3
Montpelier, VT 05620-3510

Meeting Notes

SUBJECT:	Act 161 – Regulation of Dams - Phase II Technical Standards Interest Group Meeting 2
DAY/TIME:	April 19, 2023, 10:00 AM to 12:00 PM
LOCATION:	ANR Annex, 190 Junction Road, Berlin, Vermont Teams Meeting (Online and Phone Number) also provided.
PREPARED BY:	Ben Green, VTDEC Dam Safety Program (DSP)
VERSION:	*Updated based on May 5, 2023 comment noted below*

Attendee List*:

In-Person	
Karina Dailey, VNRC	Andy Vallance, Lake Mansfield Trout Club
Mary Perchlik, VNRC	Russ McGinnis, DEC DSP
Charles Johnston, Dubois & King	Andrew Sampsell, DEC DSP
Jake Wimett, GeoDesign	Steve Hanna, DEC DSP
Jason Gaudette, GeoDesign	Ben Green, DEC DSP

Online/Phone	
Ron Rhodes, CT River Conservancy	Abe Collins, Agricultural/Farming interests
Becky Budd, CT River Conservancy	Hannah Smith, DEC Legal
Robert Wildey, VHB	Will Eldridge, VT Fish & Wildlife
Bill Dehler, Barr Engineering	Douglas Osbourne, SLR Consulting
Micah Howe, Public Utility Commission	Joan Haley, Private Dam Owner
Craig Digiammarino, VT Agency of Transportation	Matt Musgrave, Associated General Contractors
Julie Butler, US Fish & Wildlife	Todd Menees, DEC Rivers Program
Mike Sullivan, Hardwick Electric	Neil Kamman, DEC WID
Luis Bango, Private Dam Owner	Scott and Cherry
Jay Kullman, Private Dam Owner	Anonymous Caller – Not identified
Harry Shepard, Town of Stowe	978 Pre-fix Phone Number – Not identified

*Attendee lists are attached.

Attachments:

- Attachment 1: PowerPoint Presentation Slides
- Attachment 2: In-Person Sign-In sheet
- Attachment 3: Online/Phone roster

Notes:

1. Following introductions, a brief overview of the Rulemaking process was presented and discussed. The Interest Group was reminded that the Technical Standard rules currently under development will be appended to the Administrative Rules adopted in 2020. This means that the existing rule will be re-opened to add in the Technical Standards, allowing for updating or editing of the Administrative Rules, as needed. It was reiterated that the objective of the Technical Standards is to provide a clear standard for dams in Vermont to be used to improve the safety of Vermont's dam inventory. Non-compliance with the rules will result in the potential for enforcement actions.

2. The draft rulemaking schedule was presented. There have been no changes to the schedule since Interest Group Meeting 1. The goal is to have the Technical Standards adopted by July 2024. Currently,

one more Interest Group meeting is planned for the summer timeframe. It is planned to have an external/independent, formal peer review of the rules late summer/fall, with a public meeting with the entire regulated base and dam safety community invited to present and take questions and comments on the working draft. The plan is then to file the rules with ICAR and LCAR in late 2023/early 2024 with the goal of adoption by mid-2024.

3. The objectives of the Interest Group were then briefly discussed, followed by an overview and update of the DSP. This was followed by a brief overview of the Administrative Rules.

4. The Interest Group was reminded that the rulemaking process is being documented on the DSP website at the following link: https://dec.vermont.gov/water-investment/dam-safety/dam-safety-statute-and-rules/rulemaking-process . Meeting notes, PowerPoint presentations, and other rulemaking materials will be posted here as developed.

5. A brief overview of the Interest Group Meeting No. 1 topics was performed, including Periodic and Comprehensive Inspection requirements, H&H requirements, and Emergency Action Plan (EAP) requirements.

6. The remainder of the meeting was spent reviewing proposed rule concepts around sub-500 dams, Geotechnical, Operation and Maintenance, and Application requirements:

    a. As noted in Interest Group Meeting No. 1, the rules are being developed using Federal guidance documents from agencies including FEMA, USACE, NRCS, USBR, FERC, etc. The FEMA Model Dam Safety Program, which was recently updated, is being used, as well as dam safety rules from surrounding northeastern States (NH, MA, NY) as well as States that have most recently updated (CO, OR).

    b. Dams that impound less than 500,000 cf:
        i. Rule terminology proposed:
            - Dams that impound less than 500,000 cf are "Sub-500 dams". Sub-500 dams are subject to all rule requirements, except Application/Orders and Annual Registration Fees.
            - Dams that impound more than 500,000 cf are "Plus-500 dams". Plus-500 dams are subject to all requirements with no exceptions.
        ii. Technical standards to be based on Hazard Potential Classification, independent of whether a dam is Sub or Plus-500. For example, a HIGH hazard potential Sub-500 dam will have to have an EAP, Periodic and Comprehensive Inspections, and a prescriptive Inflow Design Flood (IDF) of the Probable Maximum Flood.
        iii. Brief summary of topic questions, answers, and comments during meeting:
            - Q: Could roads that hold back water be considered a Sub-500 dam? A: Transportation infrastructure are not dams per definition of a dam in the rules. As long as the roadway does not have an intake structure that maintains a permanent pool, it is not a dam.
            - Q: Did all Sub-500 dams require reporting in the past? A: No, there are Sub-500 dams in the landscape that have not been inventoried. These dams do not need an Order for construction, repair, or removal, but they will need to follow the Technical Standards. The intent is that dams in Vermont be built and maintained to a minimum safety standard.
            - Q: Is this Sub-500 something neighboring states are doing? A: It varies, some states have dam height and storage parameters that make some small dams non-jurisdictional (such as less than 6 feet tall or less that 15 acre-feet storage). Other states are more inclusive.

- Q: The DSP should consider that upon sale of a dam, it must be registered with the State? A: Dam recording in the land records is a requirement of Phase I rulemaking and the system is in the process of being built.
- Q: Regarding recording dams in the land records, what are you proposing for dams located in Rail or Highway Right-of-Way where there are no Parcels to file a document in land records? A: DSP to consult legal counsel on a case-by-case basis.
- Q: Could a general permit be used for Sub-500 dams? A: Unfortunately, no, our Statute is not set up for that alternative.
- Comment: A Town Official on the Interest Group commended the proposed Sub-500 dam approach. Some Vermont communities have many Sub-500 dams which have been constructed with little or no engineering or regulatory oversight, and have resulted in too many troubling experiences.
- *Updated 5/5/23:* Q: Are rock weirs considered dams? A: Yes, the definition of a dam in statute/rule is broad and in basic terms, includes any structure capable of impounding water/sediment.

c. Geotechnical Requirements:
   i. Subsurface Exploration and Testing Plan: A plan that must be developed, submitted, and reviewed by DSP prior to mobilization. The objective is that investigations minimize risk to the dam.
   ii. Subsurface Investigation and Field-Testing Requirements: Required for new and as needed for existing dams, minimum requirements proposed such as full time Engineer/Geologist monitoring and minimum number and depth of boring as well as testing. The DSP will retain the authority to require more extensive investigations and testing if there are site specific geotechnical challenges.
   iii. Laboratory Testing Requirements: Minimum requirements proposed including Standard Index Tests and Moisture-Density Relationships for all materials to be placed and compacted. The DSP will retain the authority to require more extensive laboratory testing in special cases.
   iv. Geotechnical Analyses: Dependent on hazard potential classification. In cases of MINIMAL, LOW, and SIGNIFICANT hazard potential dams on good foundation conditions with standard, approved geometries and configurations (crest width, slope inclinations, defensive filters), analyses may not be required. Analyses for HIGH hazard potential dams will include slope stability, seepage, settlement, filter compatibility, and seismic.
   v. Brief summary of topic questions, answers, and comments during meeting:
      - Q: Will you be addressing artesian conditions in the requirements, including drilling methods that are considered acceptable versus not acceptable? A: Acceptability of methods will not be included in the rule but likely discussed in guidance documents that will follow best practice and Federal Guidance documents. Unacceptable methods will not be approved when the exploration program is proposed.
      - Q: Will geotechnical requirements apply to dam removals as well? A: It will be addressed on a case-by-case basis depending on the nature of the removal and site conditions.
      - For stability guidance, is the DSP leaning toward US Army Corps Guidance or other Federal guidelines? A: The DSP is still deciding.
      - Q: What triggers the geotechnical analyses? A: A new project or any condition that requires more information to ensure the dam meets minimum geotechnical standards (such as a Comprehensive Inspection on a dam with no available subsurface information or documentation).

- Q: For liquefaction assessment will you require the consideration of potential for static liquefaction? A: It is the intent that all geotechnical risks be identified and considered if applicable.
- Q: For stability and seepage driven instability, will you be specifying Factors of Safety, or will you allow the use of a statistical/risk-based analysis? A: We will likely be either directly specifying Factors of Safety or referencing the use of Federal Guidance documents to dictate. We are working to write the rules with the latitude and flexibility to allow the use of Risk Informed Decision Making where appropriate.

d. O&M Requirements:
   i. General requirements: All dams will be required to have an up-to-date O&M Manual that follows a standard template. Other requirements include items such as brushing and mowing annually, trees and brush maintained clear a minimum of 15 feet from all dam components/footprint, spillways maintained free of debris, annual low-level outlet test operation.
   ii. Monitoring: Annual monitoring and recording requirements, including instrumentation monitoring minimum requirements.
   iii. Instrumentation: Staff gage requirement, monitoring well requirement at HIGH hazard potential dams. The DSP has the authority to require instrumentation to monitor an unusual safety condition.
   iv. Brief summary of topic questions, answers, and comments during meeting:
      - Q: Is the O&M Manual required to be submitted to the DSP? A: Yes, the DSP will review the manual to confirm compliance with minimum requirements. It will be the Owner's responsibility to perform monitoring, fill out applicable logs, etc. The DSP has the authority to request logs during Comprehensive Inspections or in the event of an unusual condition at the dam to confirm if minimum requirements are being met.
      - Q: Would the O&M be a sister-document to the EAP? A: Yes, it would be developed and maintained in a similar way.
      - Q: When will the owner be required to perform storm monitoring, during a minor ½ inch storm, during a 100-year storm, what triggers it? A: The DSP will develop criteria of minimum required conditions for monitoring. It is not the intent to require that every small storm be monitored, it is more focused on unusual events or large storms. This data collection benefits the owner by allowing for early detection of storm related loading issues and can be used to calibrate H&H modeling efforts.
      - Q: Regarding EAP and O&M requirements, how will the DSP enforce all of this? The DSP is planning on taking a risk-based approach to enforcement.
      - Q: Will you require monitoring against a defined set of action levels or expected values? If nothing to compare to, the data is of little value? A: Yes, threshold values will need to be identified in the O&M and instrumentation plan.
      - Q: Permanent and reliable means of measuring and monitoring looks like it could be a costly undertaking for the design, installation, calibration, and maintenance of monitoring equipment. Continuous flow monitoring may require outlet modifications to make accurate monitoring possible and adding electrical service to remote locations. This may be cost prohibitive for many owners. Thoughts on how this would be phased in or how robust this instrumentation would need to be? A: Monitoring of inflow/outflow and reservoir level will not have to be automated or require electronic instrumentation. It can be calculated by using rating curves as well. Continuous monitoring will not be a minimum requirement in the rules.

e. Application Requirements:
    i. Project Determination Form: To be completed by an Owner or Engineer for a project jurisdictional determination prior to the start of work.
    ii. Pre-Design Meeting: Required after the Project Determination Form process determines a Dam Order is needed. Review goals, objectives, and requirements of project before design starts. Confirm envisioned design is an approvable project.
    iii. Application Form: Existing form to be updated and renewed.
    iv. Brief summary of topic questions, answers, and comments during meeting:
        - Q: Would a letter of Understanding be acceptable; this has been done successfully in NH? The proposed approach should be able to accomplish a similar objective.
        - Q: How are you defining "dam footprint" to exclude (or not) entire fill slope associated with impoundment? In the case of a box culvert under rail line is it just the box culvert or all the fill under the rail line? A: The dam footprint is defined as the footprint of the structure that impounds the water. In general, it extends from upstream heel to downstream toe and from right to left abutment.
        - Q: Instead of the word approved in the Engineers statement might you consider “found to be in compliance with the VT requirements”? A: The objective is to find a balance of responsibility and that required due diligence is being performed without placing undue liability on the Engineer.
        - Q: It seems like the proposed rules are being set up to make owners drain their pond, resulting in loss of property value and of a community resource. Owners do not know where to turn, it appears owners who try to get up to date with studies and work are penalized. What are you doing to support dam owners who have inherited these situations and did not know they were going to be financially responsible for the dam and rule compliance at costs that could be more than that of the cost of the home and property? A: The objective of the rules and Dam Safety Program is protection of public safety, property, and the environment downstream from dams. The rules that are being proposed will bring Vermont up to current regulatory and safety standards, for which we are behind compared to Federal Standards and other States. The DSP wants to work with dam owners to help them through these processes and acknowledges that there will be a fiscal impact to owners from these rules, but that the result will be improved public safety. The DSP is interested in pursuing the development of a dam rehabilitation grant/loan program and has started to investigate it.

7. Potential Future Meeting Topics:
    a. Structural Standards
    b. Additional Requirements: Wastewater Ponds and Tailings Dams
    c. Dam Removal Standards

At approximately 12:00 PM, the meeting was adjourned.

<u>To Do:</u>
Dam Safety Program:
- Continue to outline and draft Technical Standard Rule.
- Schedule and plan for the next meeting.

Others:
- Review meeting notes and presentation and provide questions or comments.
- Stay tuned for details of the next meeting.

ACT 161

CHAPTER 43 DAMS - VERMONT DAM SAFETY RULE

Phase II – Standards Rules

Interest Group Meeting 2

VTDEC Dam Safety Program:
Ben Green
Steven Hanna
Andrew Sampsell
Russ McGinnis

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Presentation Overview

- Introductions
- Review Rulemaking phases, requirements, and schedule
- Interest Group Objectives
- Brief Meeting 1 Overview
- Review rule concepts:
  - Dams that impound <500,000cf
  - Geotechnical Requirements
  - O&M Requirements
  - Application Requirements

Lowell Lake Dam

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Act 161
§1110 Rulemaking

<u>Phase I</u>: Rules adopted August 1, 2020

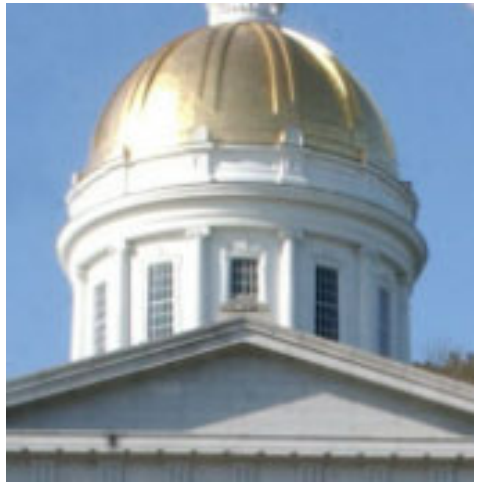
Administrative Rules

<u>Phase II</u>: Rules to be adopted by July 1, 2024

Technical Standards, including:

- Siting, design, construction, alteration
- Operation & Maintenance
- Inspection, monitoring, record keeping, reporting
- Repair, breach or removal
- Application for authorization under 1082
- Emergency Action Plans requirements and guidance

- Re-opening the existing Rule, able to edit/update Administrative Rules



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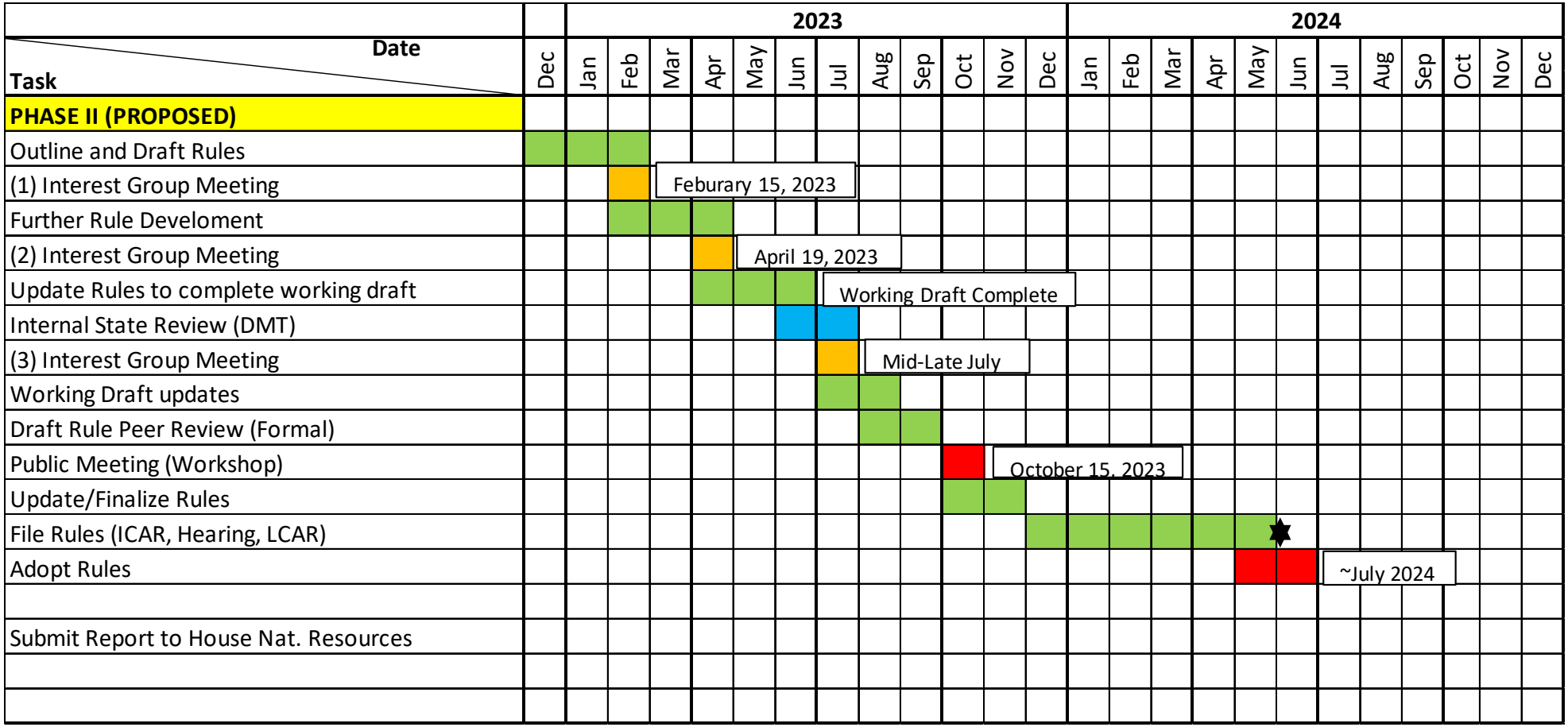
Proposed (Draft) Rulemaking Schedule



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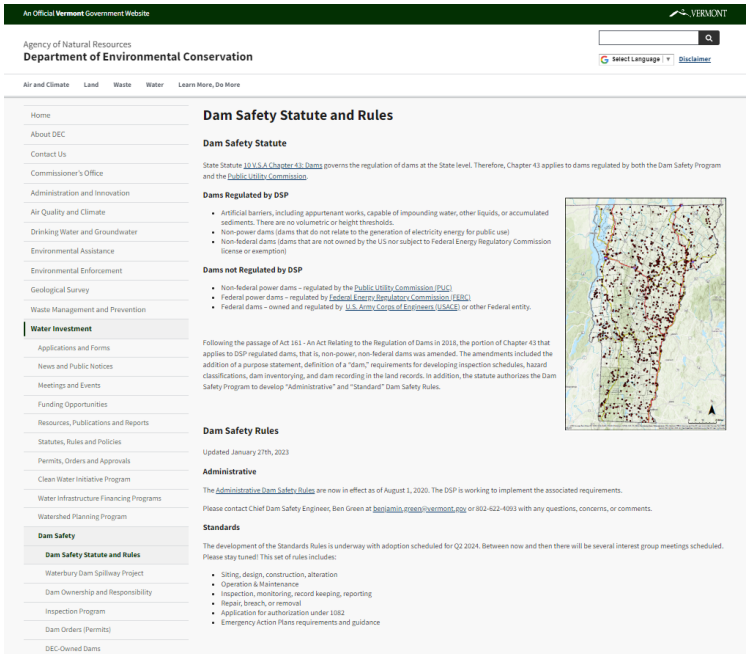
Interest Group Objectives

- **Includes representatives from various groups impacted by Dam Safety Rules:**
  - Dam Owners
  - Consulting Engineers
  - Environmental Groups/Advocates
  - State Officials
  - Other

- **Sounding board during rule development**

- **Review concepts and objects of working draft of rules**

- **Provide questions/comments to help guide process**



- https://dec.vermont.gov/water-investment/dam-safety/dam-safety-statute-and-rules

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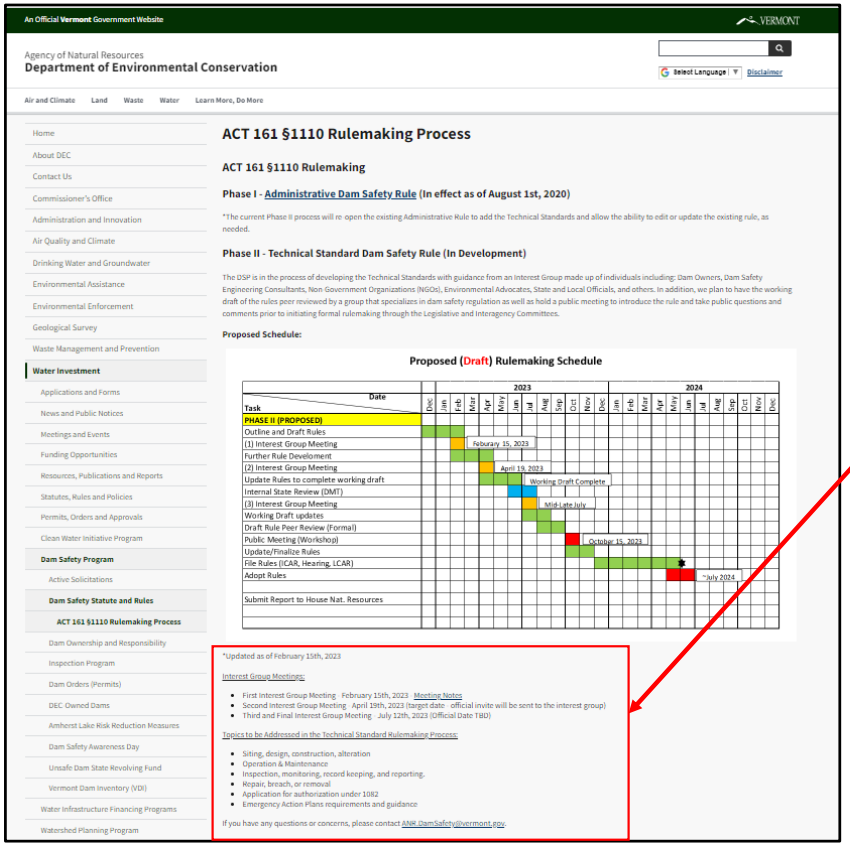
Act 161

Meeting No. 1 Overview

https://dec.vermont.gov/water-investment/dam-safety/dam-safety-statute-and-rules/rulemaking-process



An Official Vermont Government Website

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  - Resources, Publications and Reports
  - Statutes, Rules and Policies
  - Permits, Orders and Approvals
  - Clean Water Initiative Program
  - **Dam Safety Program**
    - Active Solicitations
    - **Dam Safety Statute and Rules**
      - **ACT 161 §1110 Rulemaking Process**
    - Dam Ownership and Responsibility
    - Inspection Program
    - Dam Orders (Permits)
    - DEC Owned Dams
    - Amherst Lake Risk Reduction Measures
    - Dam Safety Awareness Day
    - Unsafe Dam State Revolving Fund
    - Vermont Dam Inventory (VDI)
  - Water Infrastructure Financing Programs
  - Watershed Planning Program

ACT 161 §1110 Rulemaking Process

ACT 161 §1110 Rulemaking

Phase I - Administrative Dam Safety Rule (In effect as of August 1st, 2020)

*The current Phase II process will re-open the existing Administrative Rule to add the Technical Standards and allow the ability to edit or update the existing rule, as needed.

Phase II - Technical Standard Dam Safety Rule (In Development)

The DSP is in the process of developing the Technical Standards with guidance from an Interest Group made up of individuals including: Dam Owners, Dam Safety Engineering Consultants, Non-Government Organizations (NGOs), Environmental Advocates, State and Local Officials, and others. In addition, we plan to have the working draft of the rules peer reviewed by a group that specializes in dam safety regulation as well as hold a public meeting to introduce the rule and take public questions and comments prior to initiating formal rulemaking through the Legislative and Interagency Committees.

Proposed Schedule:

Proposed (Draft) Rulemaking Schedule

Task / Date	2023 Dec	2024 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PHASE II (PROPOSED)																									
Outline and Draft Rules																									
(1) Interest Group Meeting			Feburary 15, 2023																						
Further Rule Development																									
(2) Interest Group Meeting							April 19, 2023																		
Update Rules to complete working draft																									
Internal State Review (DMT)																									
(3) Interest Group Meeting																									
Working Draft updates																									
Draft Rule Peer Review (Formal)																									
Public Meeting (Workshop)																									
Update/Finalize Rules																									
File Rules (ICAR, Hearing, LCAR)																									
Adopt Rules																									
Submit Report to House Nat. Resources																									

Working Draft Complete
Mid-Late July
October 15, 2023
*July 2024

*Updated as of February 15th, 2023

Interest Group Meetings:

- First Interest Group Meeting - February 15th, 2023 - Meeting Notes
- Second Interest Group Meeting - April 19th, 2023 (target date - official invite will be sent to the interest group)
- Third and Final Interest Group Meeting - July 12th, 2023 (Official Date TBD)

Topics to be Addressed in the Technical Standard Rulemaking Process:

- Siting, design, construction, alteration
- Operation & Maintenance
- Inspection, monitoring, record keeping, and reporting.
- Repair, breach, or removal
- Application for authorization under 1082
- Emergency Action Plans requirements and guidance

If you have any questions or concerns, please contact ANR.DamSafety@vermont.gov.

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- Siting, design, construction, alteration
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- Inspection, monitoring, record keeping, and reporting.
- Repair, breach, or removal
- Application for authorization under 1082
- Emergency Action Plans requirements and guidance

If you have any questions or concerns, please contact ANR.DamSafety@vermont.gov.

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Act 161
Meeting No. 1 Overview

- Rules developed using Federal guidance documents from FEMA, USACE, NRCS, USBR, FERC, etc. as well as dam safety rules from nearby States (NH, MA, NY) and States most recently updated (CO, OR).

- Periodic and Comprehensive Inspection requirements.

- Hydrology and Hydraulic Standards, prescriptive Inflow Design Floods (IDFs), allowable techniques to reduce the IDF.

- Emergency Action Plan (EAP) requirements for HIGH and SIGNIFICANT hazard potential dams.

Act 161

Dams that impound <500,000 cubic feet

- Limits of Chapter 43 Jurisdiction related to:
  - Non-Power, Non-Federal Dams
  - No height/volume threshold under which a dam is non-jurisdictional.
  - According to Definition of a Dam, non-power, non-federal dams with few exclusions (wildlife structures, transportation infrastructure, dug ponds, tanks, etc.) are covered by the Statute and Rule.

- Dams that impound less than 500,000 cubic feet (11.48 acre-feet – measured at lowest non-overflow portion of the dam) are not required to:
  - Apply/obtain Order (construct, repair, alter, remove, etc.)
  - Participate in Registration Program

  ALL OTHER RULE REQUIREMENTS APPLY

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Act 161

Dams that Impound <500,000 cubic feet (cont.)

- Proposed terminology in the Rule:
  - Sub-500 Dams are dams that impound less than 500,000 cf, and subject to all rules/requirements except Application/Orders and Annual Registration Fees.
  - Plus-500 Dams are dams that impound more than 500,000 cf and are subject to all rules/requirements.

- Technical Standards to be based on dam Hazard Potential Classification, regardless of whether dam is Sub-500 or Plus-500.

- Sub-500 dams will have to have hazard potential classification assigned, which will dictate requirements.

- Sub-500 dams that are MINIMAL hazard potential will have basic technical standards, no inspection or EAP requirements, IDF = 100-year flood, etc.

- Sub-500 dams that are HIGH hazard potential will have robust technical standards (periodic and comprehensive inspections, compliance with inspection results, IDF = PMF (prescriptive), EAPs, etc.)

Act 161
Geotechnical Requirements

- Planning and Performance of Investigations Requirements
  - For New and Existing Dams
- Testing
  - Field and Laboratory
  - Analysis/Design Phase
  - Construction Phase
- Analyses
  - Requirements tiered by Hazard Potential Classification
- Site characterization, exploration, analyses under supervision of experienced Engineer/Geologist.

Act 161
Geotechnical Requirements

- Subsurface Investigation and Testing Plan
  - Must be developed, submitted and reviewed by DSP prior to mobilization.
  - Required for explorations in footprint and proximity to dam
  - Minimize risk of damage to dam/foundation from investigation
  - Plan to require:
    - Proposed program with objectives/goals of investigation
    - Exploration/testing procedures
    - Identification of risks with contingencies
    - Investigation completion/backfilling/sealing procedures

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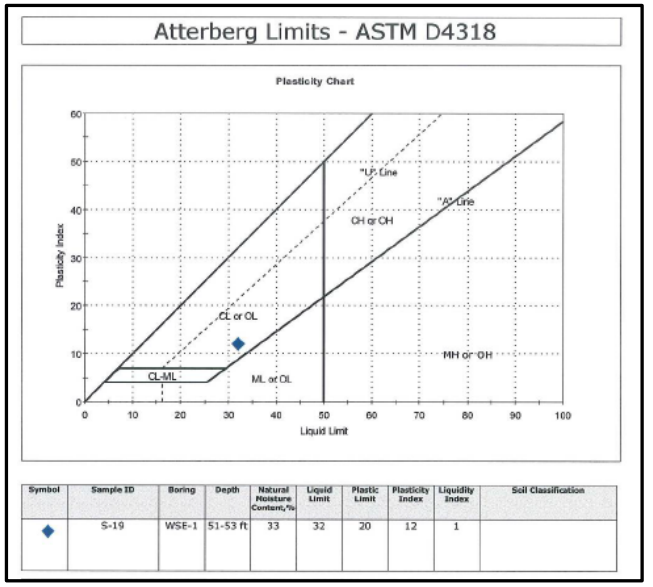
Act 161
Geotechnical Requirements

- Subsurface Investigations
  - Required for new dams and as needed for existing dams.
  - Minimum requirements
    - Full-time monitoring by Engineer/Geologist or representative
    - 2 test borings to appropriate depth
    - Standard Penetration Testing (continuous)
    - Engineers/Geologists logs (consistency, description, water level, observations, etc.)

  - In the case of site specific geotechnical issues or project risk, the DSP retains the authority to require more extensive investigation and testing if not proposed by the Owner/Engineer/Geologist

Act 161
Geotechnical Requirements

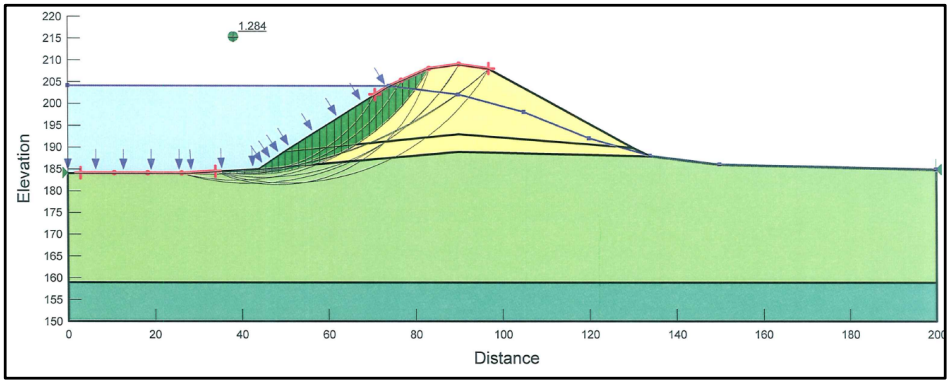


- Laboratory Testing
  - Minimum requirements:
    - Standard Index Tests
    - Moisture Density Relationships for all materials to be placed and compacted.

- Department retains the authority to require more extensive laboratory testing if warranted and proposed by the Owner/Engineer/Geologist

Act 161
Geotechnical Requirements

- Geotechnical Analyses
  - Dependent on Hazard Potential Classification/project risk
  - Standard, approved geometries and configurations
  - Analyses:
    - Slope Stability (various loading conditions)
    - Seepage
    - Settlement (yielding foundations/embankment)
    - Filter Compatibility
    - Seismic
      - ❑ Slope stability
      - ❑ Liquefaction
      - ❑ Structure stability



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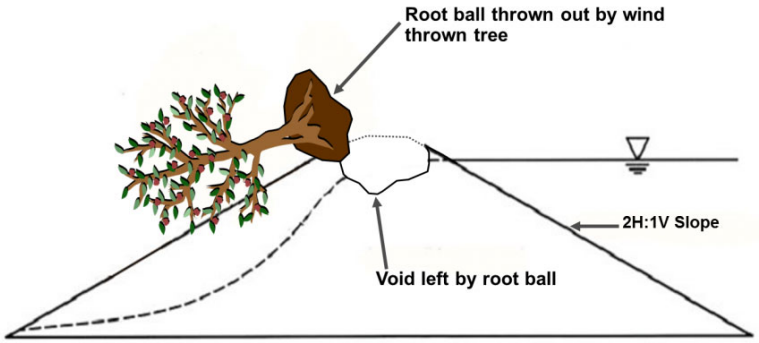
Act 161
O&M Manual

- **Requirement for all hazard classifications (NEW)**
- Sections:
  - Cover Sheet with Basic Dam Information
  - General Description of the Dam
  - Directions to the Facility
  - Dam History
  - Key Design Information
    - Elevations of constructed features
    - Flood and design storm elevations
    - Time to drawdown impoundment and method (LLO, Siphon)
  - Construction and Project History
  - Routine Monitoring Activities & Logs
  - Routine Maintenance Activities & Logs
  - Routine Operation Activities & Logs
  - Flood Performance Log (conceptual idea)
    - Date/Name of Storm
    - Precipitation – Depth/Duration
    - Peak Water Surface Elevation
    - Written Description of Dam Performance
- Appendices:
  - Operating procedures - if required by DSP
  - Design rating curves – High and significant for outlet discharge flow measurement
  - Instrumentation Plan – All dams with instrumentation
  - Special Condition Monitoring Plan – if required by DSP
  - Construction Monitoring Plan – if required by DSP
  - Drawdown Plan (emergency or construction related)
  - First Fill Plan (following construction or repair)
  - All equipment (gates, valves,etc) operating manuals

Act 161
Operation and Maintenance Requirements

- Routine Maintenance Requirements (NEW)
  - Brushing and mowing once annually
  - Trees and underbrush cleared within 15 feet of dam
  - Principal and auxiliary spillway should be free from debris
- Routine Operation Requirements (NEW)
  - Low Level Outlet (LLO) operation once per year
  - Operation of the LLO should be recorded in a log within the O&M manual

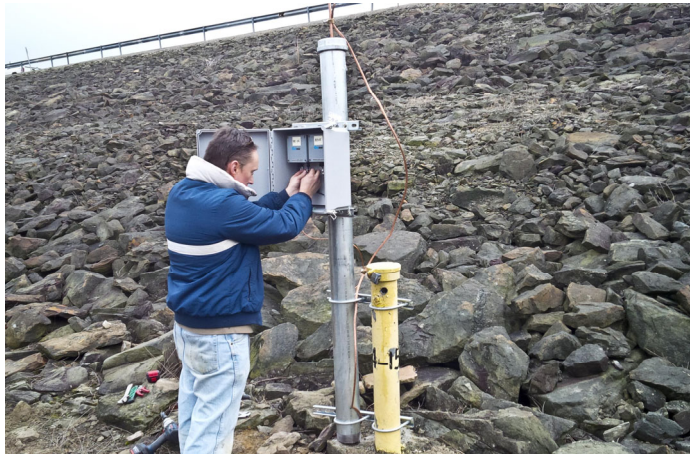


Act 161
Monitoring Requirements

- Owner Observation Frequency
  - Low hazard dams should - once per year
  - High and significant hazard dams – minimum of three (3) times per year.
  - Recorded in a log in the O&M manual
- Example focus for observation site visit
  - Outlet observation for unusual signs of wear or deterioration, including any associated gates, valves, and vaults
  - Observation of the downstream end of the conduit and adjacent embankment for uncontrolled leakage
  - General observation of the dam including the upstream slope, crest, downstream slope, and natural ground around the dam, and outlet
- Monitoring wells
  - Must be measured and recorded in a log at least three (3) times per year
- Seepage collection
  - High and significant hazard dams with the interval to be determined by the DSP
  - A log of recorded readings should be maintained and filed in the O&M manual.
- **Monitoring following seismic and extreme loading conditions should be addressed.**
- **Any unusual condition is to be reported immediately to the DSP.**
- **The DSP is determining whether an individual Monitoring Plan will be required or if this information will simply be contained within the O&M manual.**

Act 161
Instrumentation Requirements

- Staff Gauge Requirement (NEW)
  - All Dams are expected to have a staff gauge to visually estimate the water surface elevation
    - Zero reading aligned vertically and set to the normal pool elevation of the impoundment.
    - Extend to either (1) within 1 foot of the dam crest or (2) PMF Elevation
    - Staggered or multiple gauges for tall dams
- Monitoring Well Requirement (NEW)
  - All earthen embankment high hazard dams should have at least two (2) monitoring wells
  - The frequency of monitoring on following slides.
  - The owner is expected to keep a log of readings in a legible, tabular format.
- All high and significant hazard dams are required to have a permanent and reliable means of measuring and monitoring: (NEW)
  - Reservoir level, seepage collection flows, monitoring wells levels, and outlet flows.
  - The owner is expected keep a log of these readings in a tabular format in the O&M manual.
- The DSP reserves the right to require instrumentation be installed to monitor a discovered and developing unusual condition.



Act 161

When is an instrumentation plan needed?

- Any planned install of instrumentation needs a plan included in the O&M manual
- Applies to all hazard classifications
- The Instrumentation plan should describe proposed instrumentation in sufficient detail for DSP to review.
- Proposed process for adding non-invasive instrumentation:

- If modifying or altering a structure an order will be required to perform the work.

Act 161
Dam Order Application Requirements

- Project Determination Form Requirement (NEW)
- Predesign Meeting Requirement (NEW)
- Application Form (to be revised)
    - Mostly the same application requirements as before

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Act 161
Dam Order Application Requirements Continued

Project Determination Form (NEW)

- Prior contacting the DSP to discuss a project, the applicant shall fill out a project determination form which provides a brief written description of the project and what the project is aiming to address.
- The form will include a series of scoping questions which will help determine if a dam order application will be required.
- The form will also include a list of maintenance items that can be performed without obtaining a dam order, to help owners make an informed decision on weather or not to spend the time filling out and submitting the form. The form will be relatively simple in nature, should not take much effort to fill out.
- It is envisioned that the form will initially be released as word document or PDF which can be downloaded from the DSP website, filled out, and emailed to ANR.DamSafety@vermont.gov, future versions may be incorporated into ANROnline, or some other online application format.

Act 161
Dam Order Application Requirements Continued

Pre-Design Meeting (NEW)

- After it is determined that a dam order application is required for the project. The Owner and the Owner's Engineer shall coordinate a pre-design meeting with the DSP.
- This meeting will provide both the DSP and the Owner/Engineer value and help mitigate the risk of spending a lot of time designing a solution that can not be approved by the DSP.
- Meeting minutes shall be provided by the Engineer to establish a clear understanding of project requirements.
- Depending on the complexity of the project the DSP may recommend additional meetings.

Act 161
Dam Order Application Requirements Continued

Application Form

- Like project determination form PDF format, may transition to ANROnline or other system.
- Drawings & Construction Specifications
- Basis of Design Report, Appendices, & Supporting Files and Calculations
- Dam Failure Analysis Hazard Potential Classification
- Emergency Action Plan
- Temporary Water Diversion or Control of Water Plan
- Construction Monitoring/Observation Plan
- First Fill Plan
- Operations and Maintenance Manual
- Opinion of Probable Construction Cost → Application Filing Fee (1%)

*Not every project will require all listed items, or new versions listed items.

Act 161
Dam Order Application Requirements Continued

Application Form

- Schedule A – Ownership and Flowage Rights
  - Signed statement of ownership and flowage rights
  - **Proof that the dam has been recorded in the land records.**
  - For some dams could be multiple owners, multiple statements, multiple land record submissions.
  - **If property owned by any person or entity not part of the application falls within 300 feet of the project limits the applicant shall submit a legal land survey plat prepared and approved by a licensed land surveyor depicting all property lines within 300 feet of the project limits.**
- Schedule B – Financial Information
  - Total cost of the project excluding land acquisition.
  - Statement of how project will be funded, and how ongoing compliance/operations/maintenance will be funded once the project is completed.

***Bolded** bullet points are new ideas.

Act 161
Dam Order Application Requirements Continued

Application Form

***Bolded** bullet points are new ideas.

- Schedule C – Right of Entry
  - Signed statement providing permission for DSP to enter the property for inspection purposes.
- Schedule D – Public Good
  - Standard series of questions regarding public good.
- **Schedule E – Engineers Statement**
  - **Engineer shall sign a statement indicating that the engineering elements of the application materials have been reviewed and approved by the Engineer who is experienced and competent in dam engineering and licensed to practice in the State of Vermont.**

Thank you!
Questions?

Next meeting target - July 2023

Potential Future Meeting topics:

- Structural Standards
- Additional Standards
  - Wastewater Dams
  - Tailings Dams
- Dam Removal Standards

Wrightsville Reservoir

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Vermont Department of Environmental Conservation
Dam Safety Program
Water Investment Division
1 National Life Drive, Davis 3
Montpelier, VT 05620-3510

Agency of Natural Resources

Sign-in Sheet

SUBJECT: Act 161 – Technical Standards, Interest Group Meeting 2
DAY/TIME: April 19, 2023, 10 AM
LOCATION: ANR Annex, 190 Junction Road, Berlin, Vermont

Name:	Affiliation:	Email/Phone Number:
ANDY VALLENCE	Lake Morgan Boat Club	802 498 4686
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MICROSOFT TEAMS ATTENDANCE LIST: