State of Vermont Department of Environmental Conservation

Instructions for Completing Application for Authorization to Construct or Alter a Dam

10 V.S.A. Chapter 43

Item 1: **Applicant.** Ordinarily, the applicant(s) should be the owner(s) of the dam and land upon which the dam is or will be located. If there is more than one owner, all owners must be listed and become joint applicants. If the dam is on leased land, both the lessor and lessee become co-applicants.

Item 2: **Legal Entity.** Complete only if applicant is not applying as an individual, e.g., corporation, partnership, municipality, etc.

Item 3: **Contact.** Person to contact regarding this application if other than applicant.

Item 4: **Land Ownership and Flowage Rights.** Complete *Schedule A* and provide any required documentation.

Item 5: **Project Description**

a. Check appropriate box.

b. Name of existing dam, if any, or name of applicant or pond as appropriate.

c. Name of town(s) in which the **dam** is located.

d. Name of water course (river, stream, lake or pond) on which the dam is or will be located. If the dam is an offstream structure or on an unnamed watercourse, indicate that it is on an unnamed tributary of the nearest named watercourse.

e. Drainage area in acres at the dam.

f. Indicate type of dam, e.g., earthfill, concrete gravity, earthfill-stonewall, stone masonry, timber A-frame, etc.

g. Surface area of impoundment in acres (A), at Normal Water Level (NWL) and with water level at Top of Dam.

h. Storage in acre-fee (AF). NOTE: One acre-foot is equal to 43,560 cubic feet; 500,000 cubic feet is approximately 11.48 AF. Provide storage values for both NWL and **top of dam**, i.e., top of non-overflow part of dam or top of freeboard, conditions. Storage will be based on one of the following cases.

Case I. Totally artificial (man-made) lakes, ponds, reservoirs, lagoons or other impoundments. Includes man-made dams constructed on beaver ponds. Storage, including accumulated sediments, controlled by the dam **and** any storage created by excavating below the lowest elevation of the dam foundation.

If there is no dam above original ground elevation, e.g., a “dug pond,” lagoon, etc., it is the total storage created by excavation below the lowest ground elevation along the periphery of the pond.

Case II. Dams at the outlets of natural lakes or ponds. Storage is total storage, including any accumulated sediments, controlled by the dam but does not include existing **natural** storage below the lowest foundation elevation of the dam. However, it does include any additional **man-made** storage created by dredging or enlarging a natural pond with a dam on it.

i. The maximum height is the vertical distance from the lowest point along the downstream toe of the dam (usually the original bed of the stream or watercourse) to the top of the non-overflow part of the structure. For impoundments without dams indicate N/A (not applicable).

j. Indicate, for existing lakes, ponds or dams if the existing normal water level will be raised or lowered and by how much. If there is no existing lake or pond or dam, indicate N/A.

k. Provide a brief narrative description of the project and its purpose.

l. Describe the method of operation. Include such things as any proposed manipulation of water levels and any diversions of water into or out of the pond.

Item 6: **Engineer.** List name, address, telephone, and Vermont P.E. license number for engineer providing design and construction supervision services. Sections 1080(4), 1083(b) and 1090 of the statute require that the dam owner retain the services of a professional engineer, registered in Vermont, who has experience in the design and investigation of dams to design and supervise construction or alteration of any dam requiring approval from the department under 1082.

It is desirable, but not necessary, that the design engineer also provide the required construction supervision. **Full time construction supervision and submittal of daily construction status reports is ordinarily required.**

Item 7: **Estimated Construction Cost.** Estimated construction cost – exclusive of cost of land.

Item 8: **Estimated Start and Completion Dates.** Indicate when you would like to begin the project and when it would be completed.

NOTE: For most projects the work should be scheduled to be completed during one construction season (generally April 15 – November 15). For projects that require more than one construction season, a longer construction period may be approved provided there are adequate provisions to safely “winter over” the uncompleted project. If project is to be phased, provide detailed schedule.

Item 9: **Financial Information.** Complete *Schedule B.*

Item 10: Right of Entry. Complete *Schedule C.*

Item 11: Public Good. Complete *Schedule D.*

Item 12: Documents and Schedules Attached.

A. The following items are required for all applications:

1. Location map. Show location of dam on section from U.S. Geological Survey topographic map.

2. Schedules A, B, C, and D.

3. Plans and Specifications. Complete and detailed engineering plans and specifications must accompany the application. Submit two (2) complete sets of 24 inch by 36 inch engineering plans and one (1) complete set of 11 inch by 17 inch engineering plans.

   NOTE: Prior to submitting the application, the department encourages the applicant's engineer to discuss preliminary design concepts and parameters before completing the detailed plans and specifications. Contact with state fish and wildlife, water quality and wetlands personnel is strongly recommended prior to preliminary design.

B. The following items are generally required for all new construction and most reconstruction and alterations.

1. Soils Information. Provide boring and test pit logs, laboratory analyses of soils for foundation, embankment, filters, spillways, etc. Provide filter design and stability analyses as appropriate. Filter gradation requirements should be designed in accordance with NRCS (formerly SCS), *Part 633, National Engineering Handbook, Chapter 26, Gradation Design of Sand and Gravel Filters* (May 1994 or later revisions), or other appropriate standard nationally recognized by the engineering profession as suitable for dams.

2. Hydrology and Hydraulics. Provide detailed H&H study of site and basin hydrology and project hydraulics showing adequate freeboard, spillway capacity and drain capacity to support downstream hazard classification using appropriate and generally accepted methodologies.

3. Storage and Surface Area Data. Provide area-capacity curves or tables for full range of storage controlled by the dam.

4. Breach Analysis. Provide breach analysis and inundation mapping for determination of downstream hazard classification, for sizing spillways and outlet works, and, where appropriate, for use in preparation of Engineering Action Plans (EAP).

The downstream hazard classification used by the department is the same as that used by the U.S. Army Corps of Engineers in *Recommended Guidelines for Safety Inspections of Dams* (ER 1110-2-106: 24 Mar 80, Chg. 1, page D-8). The classification used by the Soil Conservation Service (SCS) as given on page 1-1 of *Technical Release 60* (Revised October 1985) is acceptable, but the classifications should be corrected with the Corps designations.

The breach analysis may be done by generally accepted method such as the National Weather Service (NWS) DAMBRK and FLDWAV models or Corps of Engineers HEC-1 Dam Break computer models. For further guidance, see the Federal Energy Regulatory Commission (FERC), *Engineering Guidelines for the Evaluation of Hydropower Projects, Appendix II-A, Dambreak Studies* October 1993. The NWS models are the preferred methodologies.

5. Spillway Design Flood (SDF)

SDF and outlet works capacities should be consistent with guidelines or service criteria established by Federal agencies such as the Corps of Engineers, Soil Conservation Service and the Bureau of Reclamation for a given size and hazard classification, with the following additional requirements:

- SDF, **as appropriate**, but in no case less than a routed Q100 (one hundred-year frequency) inflow (Ref: FERC *Engineering Guidelines . . .* , October 1993, Paragraph 2-3.3.).

- Freeboard, as appropriate, but not less than 1.5 feet with a routed Q100 inflows, and not less than 3.0 feet from principal spillway crest (usually NWL). Applies to all embankment dams and other dams where appropriate.

6. **Operation and Maintenance (O&M) Manual.** Prepare O&M manual for dam owner/operator. Include, as appropriate, project description, records, photos; operating practices for gates, spillways, etc.; maintenance practices; inspections, frequency for owner/operator and owner's engineer; inspection check lists; recordkeeping, etc.

7. **First Filling Plan.** Provide a plan to be followed by the dam owner and his engineer to monitor dam during first filling following construction or modification.

8. **Emergency Action Plan (EAP).** An EAP is recommended for all dams, particularly Class I (high hazard) structures. An EAP is required for all new Class I and Class II dams. The EAP should be developed in coordination with the affected municipalities and be acceptable to them. Coordination with Vermont Emergency Management is also recommended.

Item 13: **Application Fee Enclosed.** Compute from fee Schedule and submit a check payable to *State of Vermont*.

Item 14: **Certification.** Sign, date and provide typed name and title. If more than one applicant, **all** must sign.

Dam Design

The department expects all dams will be designed in accordance with generally accepted, modern engineering practices by qualified and experienced professional engineers **registered in the State of Vermont**. Although, the department has not formally adopted specific design criteria, the following general standards are used by the department:

1. **Low level outlets.** All new and reconstructed dams must have an adequate low level (bottom) outlet that is operable from the surface and is of sufficient size to drain the reservoir. Slide gates or gate valves are preferred. ”Flap valves” are unacceptable.

2. **Corrugated Galvanized Metal Pipe (CGMP).** CGMP is not acceptable for spillways, low level outlets or drains in new or reconstructed dams.

3. **Seepage Control.** The department places strong emphasis on adequate seepage control to prevent piping (internal erosion) and instability of embankments, structures, foundations and abutments of dams.

   All conduits and structures passing through earth dams must be protected by properly designed mineral filters. In accordance with modern practice, rigid anti-seep collars or diaphragms are no longer to be used on conduits.

   Mineral filter design should be in accordance with NRCS (SCS) Chapter 26, NEH (See Item 12, B-1) or other appropriate standard nationally recognized by the engineering profession as sustainable for dams.

   Filter fabrics should not be used to wrap piezometer screws or as filter material within or on the upstream face of dams, or within any portion of the embankment. (Ref: Corps of Engineers, EM 1110-2-1901, 9/30/86, *Seepage Analysis and Control for Dams*.

Mail completed application to:

Department of Environmental Conservation
Facilities Engineering Division
Dam Safety Section
1 National Life Drive, Main 1
Montpelier, VT 05620-3510

Notes:

(1) The department may request other information from the applicant it considers necessary to properly review the application.

(2) The department will have a notice of the completed application published in an area newspaper, request posting in the town clerk's Office and will seek comments from state, municipal or regional agencies and other individuals or organizations who have requested a notice.

(3) The applicant is requested to provide the department with the names and addresses of any persons the applicant knows to have an interest in the application and would like to receive a notice.

(4) Under 10 V.S.A. Section 1083(a) notice of the application must be given **by the applicant** to governing body of the municipality or municipalities in which the dam or any part of the dam is to be located.

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