The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES

Robert R. Scott, Commissioner

September 20, 2018

Ms. April Talon, Town Engineer
Durham Public Works
100 Stone Quarry Drive
Durham, NH 03824

RE: Mill Pond Dam – D071003, Hazard Classification Assessment

Dear Ms. Talon;

In response to our meeting held at your office on August 6th to discuss the above referenced dam, the New Hampshire Department of Environmental Services, Dam Bureau (NHDES), is providing the following recommendations for assessing the potential effects associated with the failure of the dam so that the appropriate design requirements for the dam can be established.

NHDES assigns hazard classifications, primarily, based upon the potential impacts that dam failure may have on adjacent or downstream properties. In addition, any dam whose height and maximum storage exceed both 6 feet and 50 acre-feet, respectively, is assigned a minimum classification of "Low". For these 6/50 cases, if dam failure is not expected to result in damages to property, lives or structures, then NHDES treats them as Non-Menace dams from an inspection and maintenance standpoint. That is, we still inspect them on a 6-year schedule and require that annual dam registration fees be paid, but no requirements related to performing repairs or maintenance are imposed. There are other factors related to the impoundment of water supply sources or liquid waste that could affect hazard classification, but these do not apply in the case of the Mill Pond Dam.

In the case of the Mill Pond Dam, the current hazard classification of "Low" relates to not only to the 6/50 criteria noted above, but also because of the potential for damages to occur to the property at the dam's right (as looking downstream) abutment. It is obvious that failure of the right abutment area will cause significant erosion damage to this property, as evidenced by previous dam overtopping events that have caused similar damage. Due to the height and configuration of the NH Route 108 crossing located immediately downstream, along with the ample storage provided in the tidal area further downstream, NHDES does not believe that the crossing or any properties downstream of it will be affected. Further, though damages to the wooden pedestrian bridge just downstream of the 108 crossing could occur, because it is municipally owned (like the dam) and its use is transient, NHDES has not considered it in assigning the hazard classification. Therefore, at least at the present time, the sole area of potential damage due to failure or misoperation of the dam relates to the property at the dam's right abutment. As noted, damage to the area immediately adjacent to the abutment as a consequence of dam failure is a given; however, we have not performed any detailed hydrologic and hydraulic modeling to determine what impacts, if any, may occur to the residence on the property.

Previous assessment of the dam's discharge capacity indicates that it will be overtopped by the runoff resulting from storms producing less than the 50 year rainfall; and photos from the April 2007 event provide one example of overtopping. In addition, a photo taken after the May 2006 flood shows a short sandbag wall erected near the residence, but it is not known if the sandbags actually were called upon to divert water or were put in place solely as a precaution. As it is the town's intent to explore options related to retaining the dam, and because the design requirements related to discharge capacity are based upon a dam's hazard classification, it is imperative that the impacts associated with dam failure on the residence be more fully explored so that realistic alternatives and related costs for rehabilitation are better defined.

As we spoke about at or August 6th meeting, the town anticipates engaging an engineering consultant familiar with dams to explore the ramifications and costs associated with both the removal and retention of the dam. As part of that work, the selected consultant should perform detailed hydrologic and hydraulic modeling for the following cases and determine the impact of each on the residence:

- Failure of the dam during the flood at which the water level reaches the top of the dam (water level at point of dam overtopping)
- The 50-year flood without dam failure
- The 50-year flood with dam failure
- The 100-year flood without dam failure
- The 100-year flood with dam failure
- The Threshold flood (the flow rate that causes water to be at the elevation of the first floor sill of the house at the right abutment) with dam failure
- The 50-year flood assuming no dam in place
- The 100-year flood assuming no dam in place

NHDES assumes that the bridge opening beneath the NH Route 108 right of way may act as the flow control (which may cause backwater elevations to increase) for most, if not all, of the cases noted. Further, the last two cases may provide important information to assess the peak flood levels to compare with the other Q50 and Q100 scenarios. This modeling should define the expected incremental effects to the house, if any, both with the dam in place or removed. After assessing the extent of damage that could occur under each of these scenarios, NHDES will be able to determine, with you and your consultant, the appropriate design requirements associated with retaining the dam.

We hope this information is helpful in your discussions with prospective engineering consultants, and we encourage you to make us a part of those discussions to provide whatever information and assistance we can.

Sincerely,

Steve N. Doyon, P.E.
Administrator
Dam Safety & Inspection Section

cc: Mr. Todd Selig, Durham Town Administrator
Mr. Michael Lynch, Durham Public Works Director
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