

**INSPECTION REPORT**

COPY

To: Steve N. Doyon, P.E.  
Administrator Dam Bureau

Subject: Scheduled Inspection of Gould Pond Dam  
Dam# 116.16

From: Grace Levergood, P.E.  
Dam Safety Engineer

Classification: Non-Menace

Date: March 24, 2008

**PERTINENT DATA:**

Date Inspected: June 27, 2007  
Town: Hillsborough  
Waterbody: Sand Brook  
Maximum Height: 5.5 ft  
Overall Length: 28 ft  
Pond Area: 58.5 ac  
Drainage Area: 9.79 sq mi  
Storage: 48 ac-ft norm, 228 ac-ft max  
25-Year Storm: 1283 cfs inflow, 1271 cfs outflow  
Discharge Capacity: 353 cfs top of dam, 190 cfs 1' frbrd, no ops  
850 cfs top of dam, 634 cfs 1' frbrd all boards out  
Type of Construction: concrete  
Construction Date: 1979, reconstructed in 1997  
Outlet Works: 2 - 8.5'w x 5' h stoplog bays  
1 - 3'w x 5.75'h stoplog bay/ pond drain

**OWNER/OPERATOR:**

Emerald Lake Property Owners Assoc  
Mr. Robert Hutchinson  
P.O.Box 1471  
Hillsborough, NH 03244  
Tel: (603)-464-3128

**HYDROLOGY/HYDRAULICS:**

The 9.79 square mile drainage area was modeled using the software, HydroCAD, version 8.0 and the TR-20 curve number method. Upstream of Gould Pond is Farrar Marsh Dam #116.20. The model used the HydroCAD results from the Farrar Marsh drainage area plus 3 additional subbasins and 2 reaches. The inflow from the 25-year storm was determined to be 1283 cfs which routed to 1271 cfs through the outlet. The dam is overtopped by 2.2' during this storm event. The dam can pass 353 cfs with water to the top of the dam and 190 cfs with one foot of freeboard when the pond is operated at normal conditions with 3' freeboard. With all boards removed, winter operations, the dam can pass 850 cfs with water to the top of the dam and 634 cfs with one foot of freeboard.

The dam cannot handle the storm flows as was field verified during the May 2006 and the April 2007 flood events when the entire dam was submerged and damage occurred to the downstream roadway culvert. Both right and left earthen abutments were significantly eroded.

**CLASSIFICATION AND JUSTIFICATION: Non-Menace**

Approximately 50' downstream is Hummingbird Lane, a gravel town road, with a 9' diameter CMP road culvert. Mr. Hutchinson stated that this culvert is to be replaced with a 10' high x 20' wide concrete box culvert during the summer of 2007. A site visit on 3/12/2008 verified that the culvert had not been replaced.

During a flood event this entire area is flooded. A breach of the dam during a storm event does not represent the worst case scenario. A sunny day breach would generate a peak flow of 217 cfs. This flow would pass through the downstream culvert, which has a discharge capacity estimated at 900 cfs. Further downstream, at mile 0.38, the Sand Brook crosses Old Henniker Road, a paved town road, with a 5' diameter CMP culvert and discharge capacity of 220 cfs. At mile 0.57 the brook crosses State Highway Rt 9 which would not sustain damage. The water then flows into the Contoocook River.

**EAP STATUS:**

None required.

**OPERATIONS AND MAINTENANCE PLAN:**

There is an operations and maintenance plan in the file dated 1997. Contacts need to be updated. All boards are removed from the spillways as a fall drawdown.

**INSPECTION RESULT:**

Bob Hutchinson was met at the site for the inspection. The downstream road culvert had been damaged from the April 2007 floods. The spillway had been reconstructed in 1997. Outlet dimensions were checked for conformance with the original design. The following observations were noted:

1. The water level was measured as 37" below the top of the dam.
2. The right earthen abutment had settled by 13" and the left earthen abutment had settled by 26" from past overtopping events.
3. The entire outlet was submerged during the April 2007 flood.
4. A hydrologic/hydraulic analysis was conducted which demonstrated that the outlet is undersized and cannot pass the design storm with one foot of freeboard and not operations.
5. An operation and maintenance plan is not required for a non-menace dam but is recommended.

**RECOMMENDATION:**

I recommend that the DES issue a notice of inspection to the owners that list the following recommendations.

1. Redesign the outlet structure such that it can pass the 25 year storm without overtopping the dam. There should be one foot of freeboard on the dam with no operations during the design storm event.
2. Reconstruct the right and left earthen abutments to match the height of the stoplog bay training walls.
3. Update the 1997 operation and maintenance plan for the dam (refer to the enclosed document).