

MEMORANDUM FOR RECORD: Inspection of Ice Conditions at Peterborough NH,
3 March 2004

Customer: David W. Schafer, CENAE 978-318-8274

Project: FY04 Monitoring Northeast Ice Jams

PM: Kate White 603-646-4187

POC: Gordon Gooch (603-646-4253) and Troy Arnold (603-646-4489)

1. On Wednesday 3 March Troy Arnold and I drove to Peterborough NH. at the request of David Schafer, Emergency Operations Center, New England District. The purpose of this visit was to meet with local officials, discuss their concerns about current ice conditions, and to make ice thickness measurements and observations of the ice conditions along the Contoocook River and the Nubanusit River. The following is a description of the conditions we observed.

2. We met Edwin Betz (Peterborough Director of Public Works), Ron Dubois (Road Agent for the Town of Peterborough), and Jim Holbrook from the Corps' New England District. Jim is in charge of water control from the Edward Mac Dowell Dam located on Nubanusit Brook. Ed brought out a map of the city and pointed out the major flooding area of concern from the 1988 Contoocook River flooding event. (Figure 1) This area was located near the backwater of the most downstream dam at Hunt Street. The Contoocook River is adjacent to Route 202 on the right bank and Summer Street on the left bank. Before going out to the river to make observations and measurements, I gave Ed some information from the CRREL Ice Jam Data Base on the history of ice jam flooding in Peterborough (14 events) and two CRREL technical reports detailing ice control techniques and field data collection methods.

3. We then departed city hall to view past problem areas with Ron Dubois and Jim Holbrook. I asked Jim about the flow control at the Mac Dowell Dam and how it might impact the flooding on the Contoocook. He informed me that when a flood threat is imminent, the flow to the Nubanusit is reduced to approximately 15 CFS, the minimum flow allowed for the fish habitat in the river. The dam then holds back any additional water until the threat of flooding has passed and then begins to discharge their impounded water to Nubanusit Brook in preparation for the next event. He also noted that the emergency spillway sends water to the Contoocook River downstream of Peterborough, thus having no effect on any high water problems that may be occurring in Peterborough. I asked Ron to take us to the most upstream location on the Contoocook River where he gets flooding calls every year from a local resident on Sharon Road.

4. We met with Lorane Strang while we were at the Sharon Road Bridge and she gave us a detailed history of the flooding at this location and relayed her concerns about the water levels that often threaten her home. She has been forced to evacuate during extreme water levels from ice jams at the Sharon Road bridge located just downstream of her home. (Figure 2). High banks characterize the bridge approach, and there is a sharp 90-degree bend in the river approximately 50 feet up stream of the bridge. The clearance to the low steel was less than a couple of feet without any ice jamming and Ron mentioned that ice often hits the low steel. It is not surprising that ice and water conveyance is low at this location. (Figure 3 and 4). The river reach

immediately upstream of this location had open water leads and appeared to be flowing at a moderate flow rate, probably due to snowmelt from the warm temperatures the previous week. Areas maps (Figure 5) indicate that several tributaries exist that could contribute to the ice supply that eventually makes its way to the town of Peterborough. According to Jim Holbrook, the main flow for the Contoocook River flows from the town of Jaffrey where a matchstick factory and a low head hydro dam are located.

5. Our next stop was a hydro dam at the Noon Falls Café approximately half a mile downstream of the Sharon Road Bridge where we made several ice thickness measurements. (Figure 6 and 7). The ice thickness at this location measured 16 inches thick with the top 1-inch soft from the warming temperatures. If the water level could be lowered in the winter months, this impoundment could provide a good storage location for ice discharging from upstream locations and also provide additional area for ice to pass under the Sharon Bridge. Open water was observed for approximately half a mile downstream of this dam. The river then comes to the backwater of the Main Street Dam (Figure 8) where a second ice sheet was observed.

6. We then drove to the location of previous flooding along the Route 202 on the right bank of the Contoocook River and then crossed over the river and drove along Summer Street. Ice jams at this location are likely caused by the change in slope of the river from steep to mild that occurs where the Contoocook meets the backwater caused by the Hunt Road Dam, which is the most downstream dam in the town of Peterborough. (Figure 1) According to Ed Betz the town of Peterborough has hired a consultant to look into the feasibility of lowering this dam by 2 feet. (Figure 11) I asked why this amount was chosen and he said that the town water wells were located in the backwater of this dam and any additional reduction could cause adverse effects on water well levels. He also mentioned that additional benefit would be gained in the creation of more useable land due to the shift in the water surface elevation for flood plain regulations. While we were at this dam site, I observed an old sluiceway (Figure 12) on the left bank of the dam that had been obstructed by a fill area. Ron informed me that they put in a clay barrier to prevent water seepage at this location. He mentioned that this sluiceway had been used during their last ice jam event to aid in the lowering of the water level upstream.

7. We then drove along Summer street and observed the low lying areas on the left bank of the Contoocook River, where two new homes were build according to current 100 year flood level elevations in contrast to the older homes that were several feet lower in elevation. (Figure 13)

8. We then returned to the town office and relayed the ice conditions we had observed to Ed Betz and suggested some possible low cost solutions that the town could investigate further. We thanked Ron and Jim for their help and Troy and I returned to several locations to take additional photos and measure the ice thickness at the Noon Falls Dam.

9. The ice conditions in Peterborough consisted of three intact ice sheets extending to the upstream extent of the backwater reaches of the three dams on the Contoocook River. The river above and below the Main Street Dam ice sheets was open approximately 80-100% of the width of the river reaches observed. (Figure 9 and 10) Ice thickness at the most upstream dam at Old Sharon Road Bridge measured 16 inches. The river upstream of the Sharon Street Bridge was in advanced stages of melting with open water area approximately 30 % of the flow surface. Ice

from the upper Contoocook River reaches between the Sharon Road and the town of Jaffrey is believed to be the starting point of ice movement and jamming, progressing downstream through each of the Peterborough dams depending on the resistance caused by the ice sheets upstream of each of dam. The volume, strength and thickness of the ice and the amount of snowmelt and rain determine the severity of flooding. At the backwater to the Hunt Street Dam there has been flooding of businesses along Route 202 and homes along Summer Street. Nubanusit Brook has three small dams along with the Edward Mac Dowell flood control dam operated by the Army Corp of Engineers, and contributes insignificant flow to the Contoocook River during ice jams events although a jam at the Main Street dam could cause water to back up into the Nubanusit River. (Figure 5) Lowering of the Hunt Street Dam could help the flooding problem upstream and should be considered. Also, the use of the old sluiceway could help reduce upstream water levels during jams. If the pool at the Noon Falls Café could be lowered during the winter, the impoundment could store ice that normally would contribute to downstream flooding.

Respectfully Submitted
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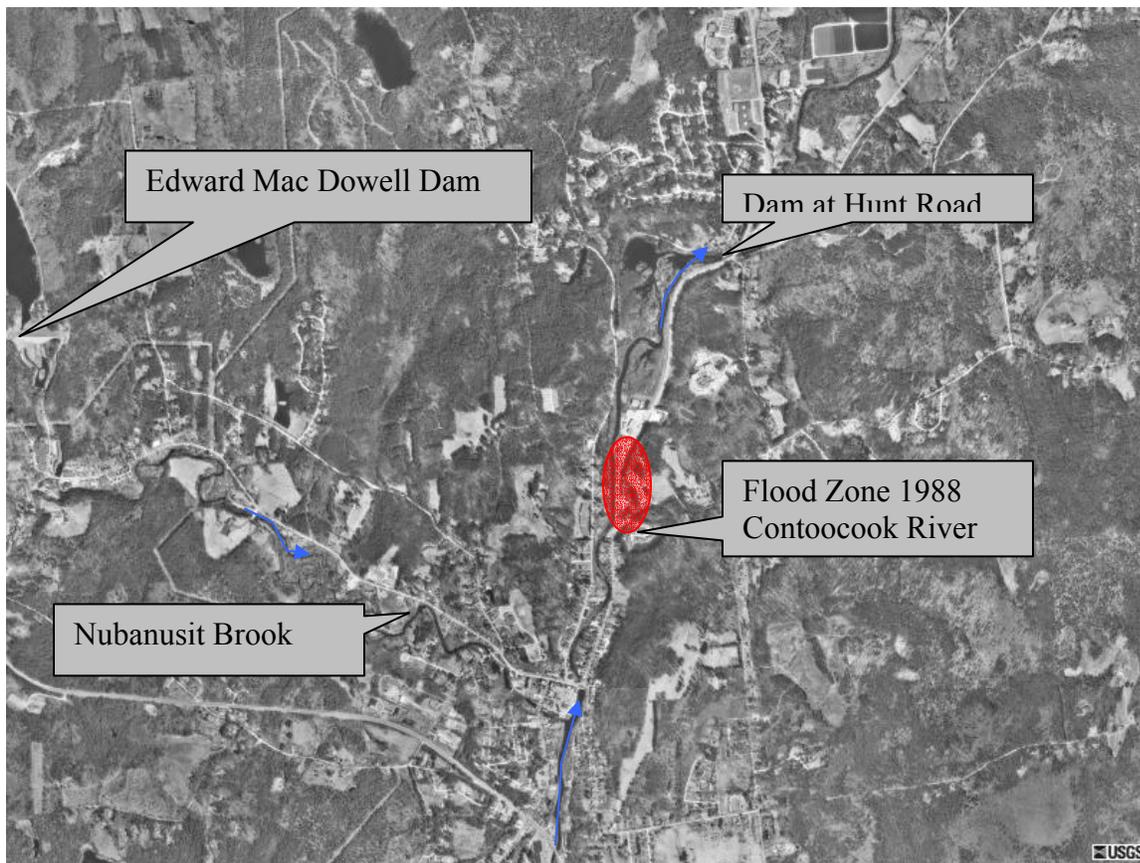


Figure 1. Peterborough NH.USGS Air Photo 12 April 1998

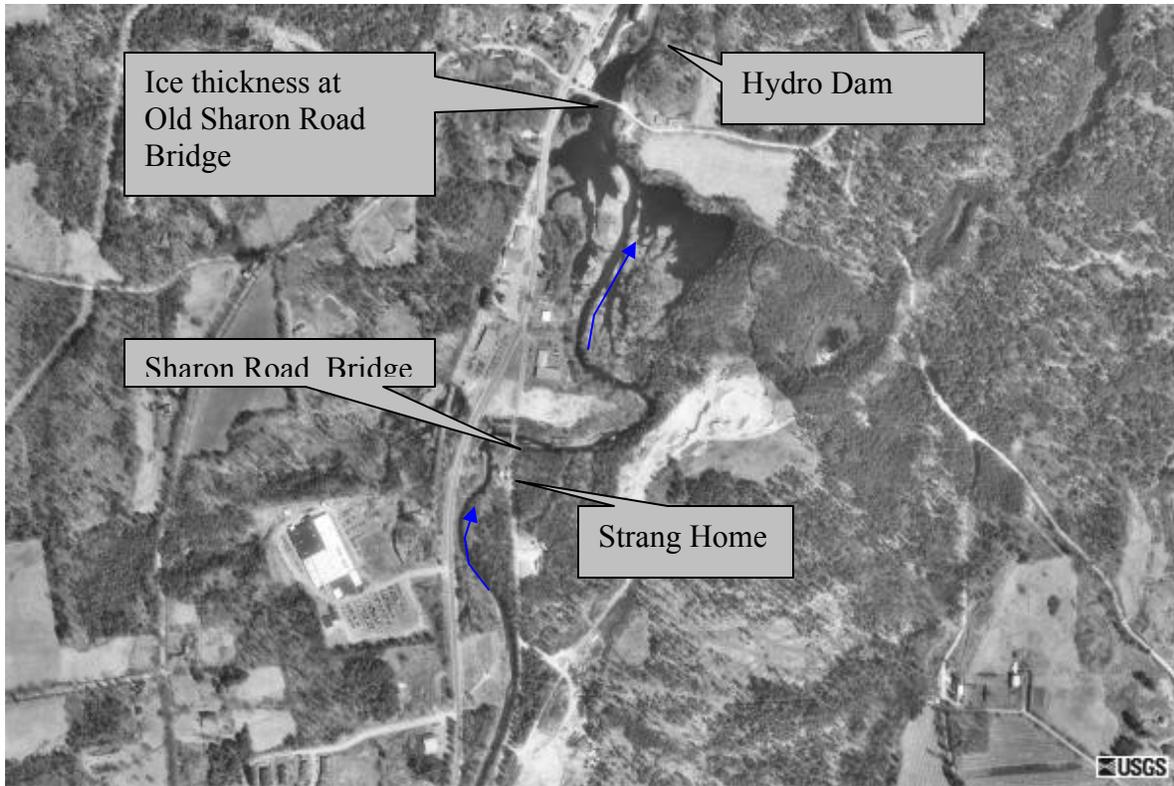


Figure 2. Peterborough NH USGS Air Photo 12 April 1998



Figure 3. Sharon Road Bridge and the Strang home



Figure 4. Looking upstream of the Sharon Road Bridge

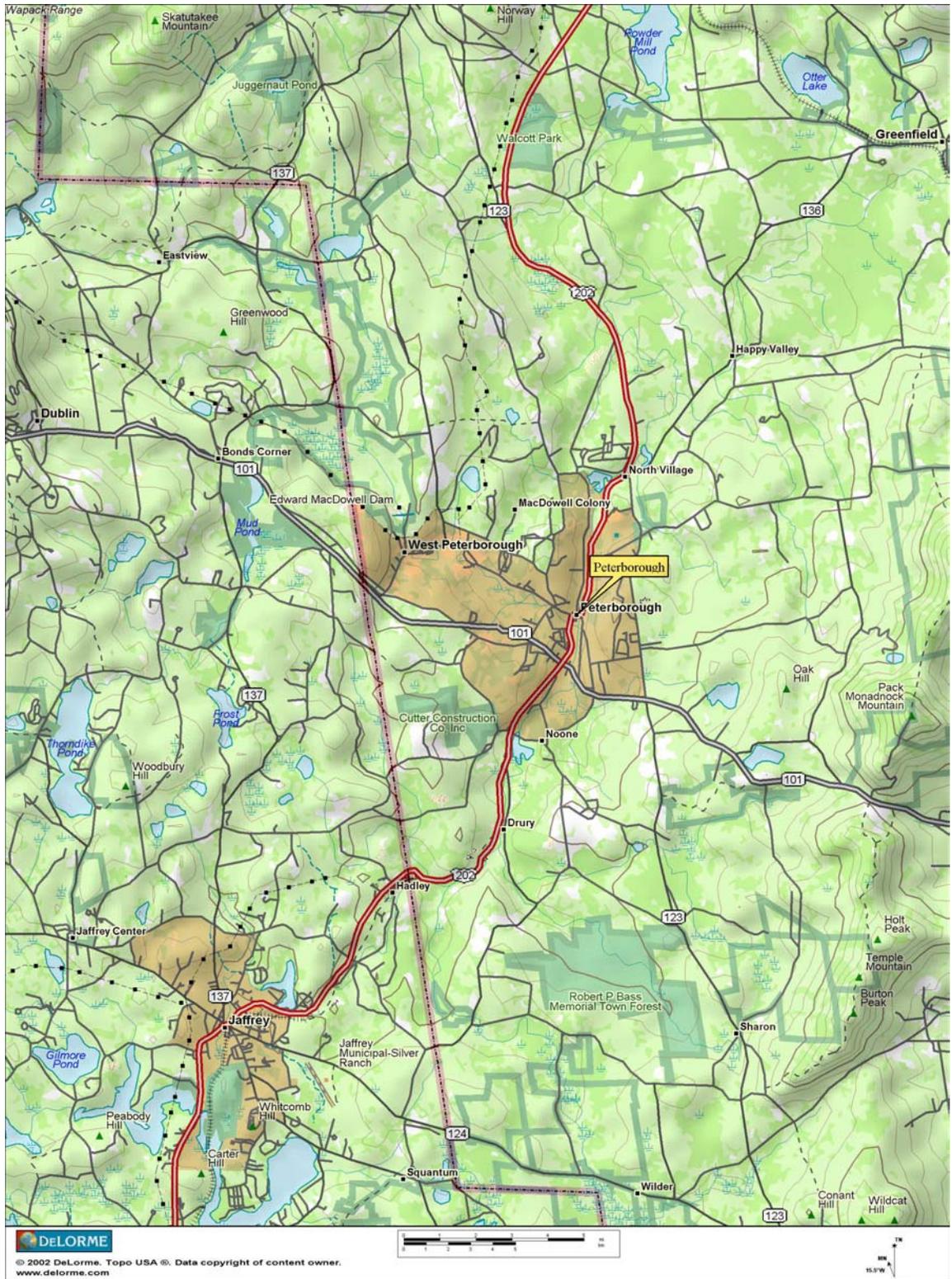


Figure 5. Map of Peterborough NH

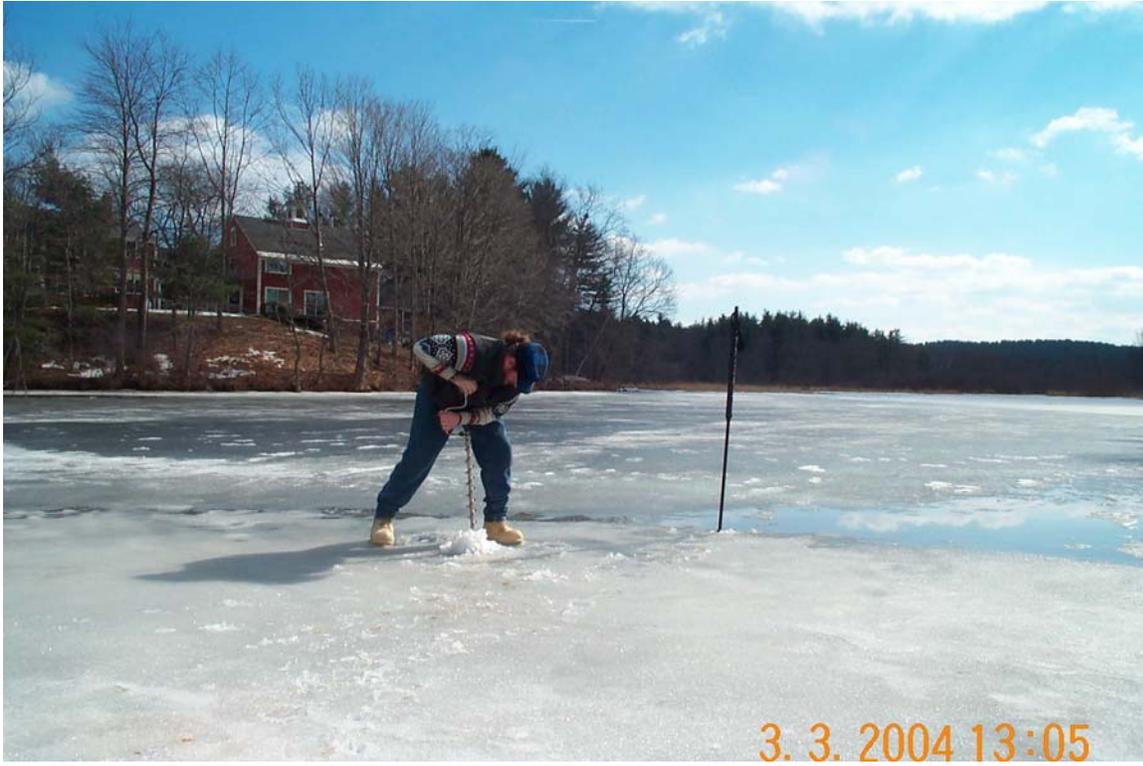


Figure 6. (Hydro Dam Pool) Ice thickness measurement looking upstream of Old Sharon Road Bridge



Figure 7. Looking downstream hydro dam at the Noon Falls Café



Figure 8. Main Street Dam and intact ice sheet



Figure 9. View looking downstream of Main Street Bridge



Figure 10. Downstream of Main Street Dam Looking upstream



Figure 11. Dam at the Hunt Road



Figure 12. Old Sluiceway adjacent to Hunt Road Dam



Figure 13. Summer Street