

A. Were the County Highway NN Culverts a “Substantial Cause” of the High Water Levels in 2002?

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The County Highway NN culverts are one of the three restrictions that caused the high water levels in 2002. Replacing the Little Round Lake Dam and enlarging the man-made channel downstream of this dam would have achieved about 80% of the reduction to the state-designated maximum level: replacing the Highway NN culverts would have brought the level down the remaining 20% to the state-designated maximum level. These percentages are based on hydrologic and hydraulic modeling that simulates the 2002 precipitation, runoff, and water levels, and assumes that the Little Round Lake Dam is replaced and the man-made channel downstream of the dam is enlarged. Replacing the culverts under Highway NN would have been required to keep the high water level in 2002 below the state-designated maximum level.

The existing culverts under County Highway NN have limited capacity because of their opening size^[1] and their invert elevations. A channel survey indicates that the channel bottom is about two feet lower than the culvert elevations both the upstream and downstream of Highway NN, as illustrated in Figure 1. Soil borings taken along the shoulder of Highway NN verify that the natural channel bottom is at about elevation 72, as evidenced by a change in the soil type (the soil borings showed a distinct layer of peat about 2 feet below the existing culvert inverts). Therefore, it appears that the culverts are elevated above the natural channel by about 2 feet. Raising these culverts above the natural channel level and limiting the opening size restricts the outflows and would have caused the 2002 Round Lake water levels to rise above the state-designated maximum levels even if a new dam were constructed.