



Legislation Text

File #: 05695, **Version:** 1

Fiscal Note

N/A

Title

Report of the City Engineer - Determination of Whether to Repair or Replace the Lake Wingra Dam.

Body

Introduction

The Lake Wingra Dam is located at the outlet of Lake Wingra, at the east end of Vilas Park. The dam controls the Lake Wingra water surface elevation and the flow rate from the lake to Wingra Creek. In 2002, staff from the Wisconsin Department of Natural Resources (DNR) inspected the dam. The inspection report noted deterioration of the concrete dam and other violations of state code. Following the inspection, the DNR required that the City repair the dam to bring it up to code. In response to the findings of the DNR, the City hired Strand Associates, Inc. (Strand) to perform a study of the dam, which included investigation of the structural integrity of the dam, hydrologic and hydraulic evaluations of the dam, estimation of the required spillway capacity of the dam, and recommendation of whether to repair or to replace the dam. The Strand report, which was completed in late 2006, recommends replacement of the dam because aesthetic, structural, hydraulic and environmental benefits could be achieved; however, the report indicates that the existing dam could likely be brought into compliance with DNR requirements with relatively minimal repairs. The City Engineer requests direction as to whether to recommend repair or full replacement of the dam. Relevant data are summarized in the sections that follow.

Existing Dam Safety

- If the existing dam were to fail, lake drainage would be directed to a wetland area in the Arboretum, south of Wingra Creek. Wingra Drive and adjacent homes would not be affected.
- The inundated area resulting from dam failure is within the floodplain zone and is not subject to future development; therefore the dam has a "low" hazard rating.
- An underwater inspection was performed on the dam, which indicated that there is cosmetic concrete deterioration of the above-the-water portions of the dam, while concrete below the water line is in good condition. Concrete cores taken from the spillway were found to have acceptable strength, and no undermining of the dam was noted.
- The structure has been stable for over 88 years.

Recommended Repairs if the Dam is Not Replaced

- Removal of the existing observation platform, the lock structure (which was closed in the 1970's), and dam abutment walls, at least to the waterline, and replacement to existing grade.
- Construction of a new stop-log structure (for water level control) at approximately the location of the existing lock structure.
- Either filling an existing void beneath the spillway with grout, or driving a sheet pile cutoff wall at the upstream face of the dam to ensure that the dam has an acceptable factor of safety for sliding and overturning.
- Surface repairs of deteriorated concrete.
- Construction of a stable berm along the south embankment to prevent overflows through this area.

Possible Benefits of Dam Replacement (Refer to Scale Model)

- Wingra Dam is located in a prominent location for public traffic and recreation because of its proximity to Vilas Park, the Zoo, and the Arboretum. A new dam could provide a more aesthetically attractive feature.
- The foundation conditions of the existing dam, which was constructed in 1908, and repaired in 1971, are not documented.
- Currently, the south abutment and McCaffrey Drive act as overflow spillways for the dam. A new dam would provide an engineered spillway to handle this flow in a controlled manner.
- The semicircle design of the proposed concrete dam provides an interesting appearance and allows a greater effective weir length over a shorter actual length.

- A new stop log structure could provide more effective means to drawing down the lake, in the event that draw-down is required or desired at some future time.
- The design should limit injury to muskellunge, which currently jump over the dam. The spring migration of muskies over the dam has become a seasonal public spectacle. The ability of the dam to inhibit carp migration is unknown.

Cost of Repair vs. Cost of Replacement

- The cost to repair the existing dam was estimated by Strand to be \$273,000.
- The cost to construct a new concrete dam was estimated by Strand to be \$694,000. City staff estimate the cost to be closer to \$1,000,000.

City staff calculated the present value for the two options: Repairing the dam now (with assumed total replacement in 30 years), and replacing the dam now (with assumed repair in 100 years). Assuming 4.5% interest and 3.9% inflation, and that for both options the maintenance costs are equal, both options have very similar present values (\$1.1 million).