# STAFF SUMMARY

**TO:** Board of Directors
**FROM:** Frederick A. Laskey, Executive Director
**DATE:** November 14, 2018
**SUBJECT:** Wachusett Dam Lower Gatehouse Pipe Break

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**COMMITTEE**: Water Policy & Oversight

__X__ INFORMATION
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William G. Sullivan, P.E., Sr. Program Manager
Bradley J. Palmer, Manager, Transmission and Treatment
Mark H. Johnson, P.E., Director, Waterworks
Preparer/Title

David W. Coppes, P.E.
Chief Operating Officer

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**RECOMMENDATION:**

For information only.

**DISCUSSION:**

The water transmission system between the Wachusett Reservoir and the John J. Carroll Water Treatment Plant consists of the Cosgrove Tunnel and the Wachusett Aqueduct. The Cosgrove Tunnel provides the primary raw water supply and the Wachusett Aqueduct is an emergency back-up that supplies water to the plant via the new Wachusett Aqueduct Pump Station which is nearing completion. Water is conveyed thru piping in the lower gate house, and flows to the Wachusett Aqueduct. Water also flows thru the lower gatehouse to the Nashua River.

The Wachusett Reservoir and Aqueduct were constructed between 1897 and 1905. The Wachusett Aqueduct pwas rehabilitated in 2002. A substantial portion of the piping in the lower gatehouse was also replaced in 2002 during the construction of the Carroll Water Treatment Plant. The new piping included new control valves to improve the conveyance of water from the reservoir to the aqueduct. Unfortunately, a piece of the piping that was not replaced in 2002 has failed during the testing of the Wachusett Aqueduct Pump Station.

The series of tests before that must be undertaken before final acceptance involves flowing large volumes of water (as much as 240 mgd) through the lower gatehouse and the aqueduct. Some of the piping in the lower gatehouse is original cast iron pipe over 100 years old. This piping has been exposed to a variety of flow rates and volumes to move water down the aqueduct to the pump station. Some tests were run at night while water demand was low, in case the treatment plant was knocked off pline. On October 18, 2018, the day after night-time testing had occurred, staff noted significantly less water flowing through the aqueduct open channel immediately adjacent to the pump station. The lack of water was traced back to the lower gate house where a 48-inch cast iron pipe had failed, with water relieving through the gatehouse to the river.

The photo below was taken when the lower gate house break was discovered. Flow to the lower gatehouse was stopped via remote closure of valves in the upper gatehouse.

There are four pipelines within the lower gatehouse. The break was determined to be on the "tee" and the reducer in Line 2, as shown below.

Pump station testing was suspended to allow investigation of the pipe failure. Site visits by MWRA, Stantec, and Barletta staff occurred during the following days. It was determined that two of the lines could be isolated from the rest and still allow continuation of testing, up to a flow rate of 200 mgd.

The third line has a broken gate valve, which prevents it from being used. The fourth line can be used to send water to the river, if needed.

The feed to the fountain, which is normally used to meet minimum river releases, is inoperable due to a connection to the broken section of pipe. Flow to the river is currently being controlled over the dam with the hydraulically actuated crest gate installed in 2008.

An interim repair plan has been developed in the event the remaining cast iron pipe fails in either line that can currently supply the pump station. The pump station contractor has purchased the blind flanges necessary to make the interim repair if required. A long-term repair plan for the lower gate house piping is being finalized.

Another aspect of testing the new pump station relies on the four existing 2,000kW emergency generators at the treatment plant. All four of these generators are needed to supply full power to the plant and the pump station at maximum flow, and one of the generator bearings has failed. Repeated attempts over the summer under the generator service contract to repair and rebuild the bearings were unsuccessful due to repeated electrical shorts in the windings of the rotor. It has been determined that the generator component of the unit will need to be replaced (the diesel engine unit is in good working condition). The design of the replacement generator is complete and a contract has been advertised for bid. The other three generators are adequate to power the treatment plant and the pump station up to 200 mgd.

**BUDGET/FISCAL IMPACTS:**

The FY2019 CIP includes a budget of $1.6 million for design and $4.0 million for construction to rehabilitate the Wachusett Gatehouse/Bastion Loswer Gatehouse to replace the valves and pipes, repair the leaking roof, and repair/seal the masonry and degraded windows and doors.