

VILLAGE OF LOMBARD
REQUEST FOR BOARD OF TRUSTEES ACTION

For Inclusion on Board Agenda

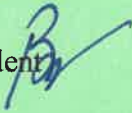
_____ Resolution or Ordinance (Blue) _____ Waiver of First Requested
 X Recommendations of Boards, Commissions & Committees (Green)
_____ Other Business (Pink)

TO: PRESIDENT AND BOARD OF TRUSTEES

FROM: Scott Niehaus, Village Manager

DATE: October 9, 2024 (B of T) **Date:** October 17, 2024

TITLE: Water System Network Analysis

SUBMITTED BY: Brian Jack, Utilities Superintendent 

BACKGROUND/POLICY IMPLICATIONS:

The Public Works Committee submits for your consideration the Water System Network Analysis report. Representatives from Baxter & Woodman Consulting Engineers presented their model, demonstrated its capabilities, discussed their analysis of the water system's condition, and provided some short- and long-term recommendations for system improvements.

FISCAL IMPACT/FUNDING SOURCE:

None

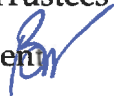
Review (as necessary):

Village Attorney X _____ Date _____
Finance Director X _____ Date _____
Village Manager X _____ Date _____

NOTE: All materials must be submitted to and approved by the Village Manager's Office by 12:00 noon, Wednesday, prior to the Agenda Distribution.

MEMORANDUM



To: Village President and Board of Trustees
From: Brian Jack, Utilities Superintendent 
Through: Carl Goldsmith, Director of Public Works
Date: October 9, 2024
Subject: **Water System Network Analysis – 2023/2024
PWEC Committee Recommendation**

The Department of Public Works submits the Water System Network Analysis to the Village Board of Trustees for inclusion to the October 17, 2024 agenda. Provided in this memo is an executive summary of the report that was presented to the Public Works Environmental Concerns Committee by Baxter & Woodman Consulting Engineers and Village staff. The committee voted unanimously to recommend to the Board of Trustees accept the report and its recommendations for future consideration of system improvement projects.

Background

The Village of Lombard Board of Trustees awarded a contract in May of 2023 to Baxter & Woodman Consulting Engineers for a Water System Network Analysis. This project was a ten-year update from the previous network analysis completed in 2013 by Alfred Benesch & Company.

The objective for the Water System Network Analysis was to complete a thorough review of the Village's water distribution system, facilities, and operations to provide recommendations for capital improvement projects regarding water operations, facilities, and the distribution system with a comprehensive computer model. The model also provides insights to future data collection regarding water main break analysis and predictability, and water quality considerations regarding future unregulated contaminant regulations.

The report provides a systematic approach to decision making for planning both capital improvement projects and operational efficiencies/improvements.

Executive Summary

The Water System Network Analysis utilized an OpenFlow WaterGEMS® hydraulic model of the Village's water distribution system to verify system pressures, fire flow capabilities, and the development of water main improvements with alternative operational schemes and procedures.

The Water System Network Analysis includes the following components:

1. Review of past water use.
2. Review of distribution system data and development of the model based on the Village's Geographic Information System (GIS) database.
3. Analysis of pressure characteristics, fire flows, and existing critical facilities.
4. Use of the new water model and the Village's historical water main break data to analyze and recommend priority ranking for water main replacement.
5. Extended period simulation analysis to evaluate the Village's distribution system for a 96-hour period to identify problem areas in the existing system during a variety of flow conditions, hourly demands, and control settings.
6. Review of the total volume of water storage available in the distribution system and comparison to existing and maximum day peak and hourly water demands.
7. Evaluation of emergency supplies including wells and interconnects and the impact on the system under emergency conditions.
8. Prioritized recommendations for infrastructure needs based on results of water system modeling, including estimated project costs.

Along with the above general components of the network analysis, there were three priority areas of focus:

1. Flow capacity in Lombard Fire District 501.
2. Emergency backup wells needs assessment
3. Water main rehabilitation

Flow Capacity in Lombard Fire District 501

Lombard Fire District 501 bordering Parkside Ave. to the north, Madison St. to the south, Main St. to the west, and Grace St. to the east is subject to low fire flow capabilities due to the age and size of the water mains in that area. This neighborhood is served by four-inch mains that have been in service since the 1940's. Today's standard size of water main in a typical residential neighborhood is eight inches. The network analysis evaluated the current flow capacities under normal and emergency maximum flow conditions and verified the assumptions and field data from Village Staff. The model confirmed that the water mains in this neighborhood are undersized and do not provide sufficient fire flow capabilities.

A three to five year phased approach to replacing and upsizing the water mains is the recommendation from the network analysis. An added benefit to this project would be the replacement of over 400 (or approximately one third) of the lead water service lines in our system to comply with the Lead Service Line Replacement and Notification Act (LSLRNA Public Act 102-0613).

The project would replace the existing four-inch water mains with eight-inch mains, install strategic larger "feeder" mains to add redundancy and increase water quality, replace fire hydrants that have been in service up to 70 years, and replace lead service lines.

Emergency Backup Wells Needs Assessment

Lombard currently has three emergency backup wells that are in place in the event we cannot receive water from the DuPage Water Commission. These wells have been maintained since the Village transitioned to Lake Michigan water in 1992. We have not pumped water from the wells into the distribution system since the change to Lake Michigan water, however, they are exercised and run monthly to test and take water samples.

The well equipment of pumps, electrical panels, contactors, and controls are well beyond their useful life and require great care while operating. As they are for emergency use only, the equipment has only been maintained and not upgraded over the past 30 years. In the past two years, two of the wells have gone out of service due to equipment and well pipe wall failures. Costs estimates for repairs were received and were well out of range to include in existing budgets. The network analysis evaluated scenarios to include rehabilitation, replacement, increase of pumping capacity, and abandonment.

Results of the model demonstrate that in an emergency the three wells would be able to provide sufficient flow capacity under normal conditions. However, if one of the wells would fail or need to go out of service for repair, water restrictions would be necessary. More detailed information regarding these scenarios is on page 34 of the full report.

Although significant work would be needed to bring the well equipment up to today's standards, the cost estimates are considerably less than originally anticipated and would be well worth the investment.

Water Main Rehabilitation

Overall, the network analysis has shown that the water distribution system is in relatively good condition. As a general rule, water main useful life ranges between 50 and 100 years. The average useful weighted life of Lombard's water distribution system is approximately 93 years. Following the American Water Works Association's recommendation of a 1% replacement per year, Lombard would need to replace or rehabilitate approximately 2.1 miles of water main each year. That would equate to \$4.4 - \$6.7 million dollars per year.

The network analysis has identified areas within the system that are in need of improvement. These locations were based upon water main break history and criticalities, fire flows, and water age/connectivity that could effect water quality. The current Capital Improvement Plan does identify funding for continued water main replacement and/or rehabilitation through lining. It is imperative these programs continue to be funded or increased as the system ages.

Recommendation

The Public Works and Environmental Concerns Committee and staff recommend that the Village President and Board of Trustees accept the Water Network Analysis prepared by Baxter & Woodman Consulting Engineers and incorporate water projects into future Village Capital Improvements Plans.