

**Excellence in Engineering Since 1946** 

Strand Associates, Inc.® (

#### Lannon Water System Study

Ben W. Wood, P.E. Village Engineer

#### **Village of Lannon Board Meeting**

September 9, 2019





# Water System Summary

Well and Booster Pumping Facility (2007)

- 250 gpm well
- 160,000 gallon below-ground reservoir
  - ~ 2 maximum days under firm capacity
  - ~ 470 gpm for 2 hours available fire flow
- Two 550 gpm booster pumps
- Pneumatic pressure tank
- Backup generator

#### **Distribution System**

- 3.5 miles of pipe, 6 to 16 inches in diameter
- Static pressure range = 65 to 81 psi













## **Capacity Analysis – Maximum Day Demand**



160,000 Gallon Reservoir

< 2 days of maximum day demand





### **Capacity Analysis – Maximum Day Demand Plus Fire**



160,000 Gallon Reservoir

56,000 gallons = 470 gpm for 2 hours \*Recommended 2,500 gpm for 2 hours\*





#### **Future Growth – Development**







#### **Projected Average Day and Maximum Day Demands**







# **Capacity Analysis – Maximum Day Demand Plus Fire**

- 2019 = Storage deficit of 178,000 gallons
- 2019 = Firm well supply deficit of 50 gpm
- 2024 = Storage deficit of 195,000 gallons
- 2024 = Firm well supply deficit of 188 gpm
- 2035 = Storage deficit of 230,000 gallons
- 2035 = Firm well supply deficit of 490 gpm

Addition of **two wells** (500 gpm) and **one elevated storage tank** (500,000 gallon)

- 2035 = Reserve storage of 33,000 gallons
- 2035 = Reserve firm well supply of 310 gpm



Design Year	Max. Day Demand (gpm)	Fire Flow (gpm)
2019	50	2,500
2024	188	2,500
2035	490	2,500



## **Emergency Response Plan**

- The Waterman delivers tanker trucks of potable water.
- Possible fire-hose connection to Lannon Estates water system.
- Possible fire-hose connection to Menomonee Falls system.
- Fire engines use outside water source for fire fighting.
- Village supplies bottled water.





### Modeling Analysis – Menomonee Falls' Gradient







# Modeling Analysis – Lannon's Individual Gradient







#### **Improvements Needed**

- Distribution
  - Watermain extension to contaminated private wells
  - Fire flow pump at existing station (previous recommendation)
- Supply
  - Second source needed immediately => well siting study required
  - Third source needed before 2035
- Storage
  - Additional storage needed immediately

Project Description	Probable Cost	Anticipated Year of Construction
Water Main Improvements	\$6,400,000	2020-2021
Deep-Aquifer Well with Treatment Facility	\$3,000,000	2021-2022
Elevated Storage Tank	\$2,300,000	2021-2022
Total	\$11,700,000	





# **Anticipated Next Steps to Prepare for 5-Year Growth**

- Finalize Recommended Alternative (October)
  - Conduct Well Siting Study
- Conduct Joint DNR & PSC Meeting (October)
- Submit USDA Rural Development Application (October)
  - Finalize Second Source Option
  - Finalize Scope of Local Water Mains
  - Complete the Environmental Assessment
- Confirm Project Funding Options (Winter)
  - USDA Rural Development Response
  - Quarry Participation
  - TID Sources
- Report Back to Village Board (Winter)







**Excellence in Engineering Since 1946** 

# **Existing Customers and Water Demand**

- Average day demand: 29,000 gallons (20 gpm)
- Maximum day demand: 72,000 gallons (50 gpm)
  - Cause of maximum: bulk water sales to Waterman .

Commercial

2015

2015

Year

Year

107

2020

421

ILLAGE OF

2020





## **Capacity Analysis – Maximum Day Demand Plus Fire**

#### **Demand**

- Maximum Domestic Demand = 50 gpm
- Fire Demand = 2,500 gpm

#### **Supply**

- Firm Supply Capacity = 0 gpm
  - Largest well out of service
- Elevated Storage = 0 gpm
- Reservoir Capacity = 1,067 gpm
  - 128,000 gallons / 120 minutes

Maximum Day Demand	- 50 gpm
Fire Demand	- 2,500 gpm
Firm Supply Capacity	+ 0 gpm
Elevated Storage	+ 0 gpm
Reservoir Capacity*	+ 1,067 gpm
Total	- 1,483 gpm

Additional Supply/Storage Needed



