

# AMPLIFYING WATER DISTRIBUTION

The Passaic Valley Water Commission (PVWC) provides water from the Passaic River and Wanaque supply system to nearly 800,000 residents via 65,000 service connections.

Per New Jersey's Water Quality Accountability Act (WQAA), PVWC was required to submit a Capital Improvement Report outlining both complete and planned capital improvements and the cost of those improvements in the prior year and over the next 10 years.

To facilitate this, PVWC hired the entrant firm to develop a WQAA-compliant Asset Management Plan (AMP) for three of its water distribution systems in northern New Jersey. The AMP prescribes a water main replacement schedule designed to achieve a 150-year planning cycle along with required annual dedicated funding.

The firm developed algorithms and processes to create a prioritized program of water system renewals through analysis of water main characteristics via new and existing Geographic Information System (GIS) data, using that data to create an Asset Risk Exposure Assessment (AREA) rating.

Pipe records in GIS were grouped into replacement projects, which were then ranked by AREA rating to create a prioritized water main replacement program for 650 miles of pipe as well as a transmission main renewal program list.

PoF Classification	PoF Rating	Number of Pipes	Pipes that have Experienced a Failure Since 1988	
			Number	Percent
Improbable	0 - 1	1,430	0	0%
Remote	>1 - 2	6,298	52	<1%
Occasional	>2 - 3	8,835	1,212	14%
Likely	>3 - 4	1,500	1,272	85%
Probable	>4 - 5	58	58	100%

Pipe  
Segment  
Failure

Material  
Break  
History

Soil Type  
Break  
History

Remaining  
Useful  
Service Life

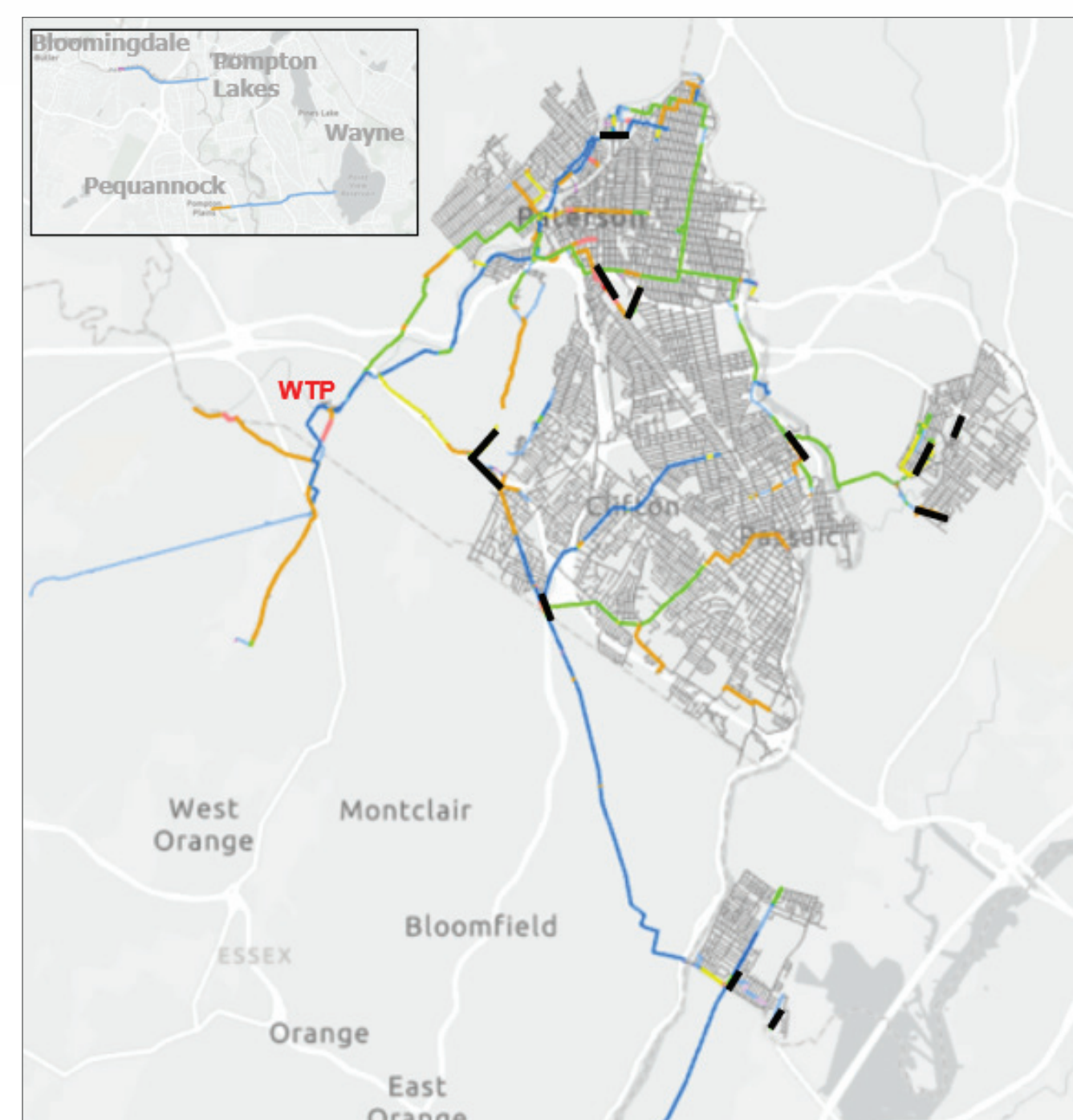
Installation Period	Failure Rate Since 1988 (miles per failure per year)
1890-1899	3.7
1900-1909	7.3
1910-1919	4.5
1920-1929	14.5

See Material Break Slide

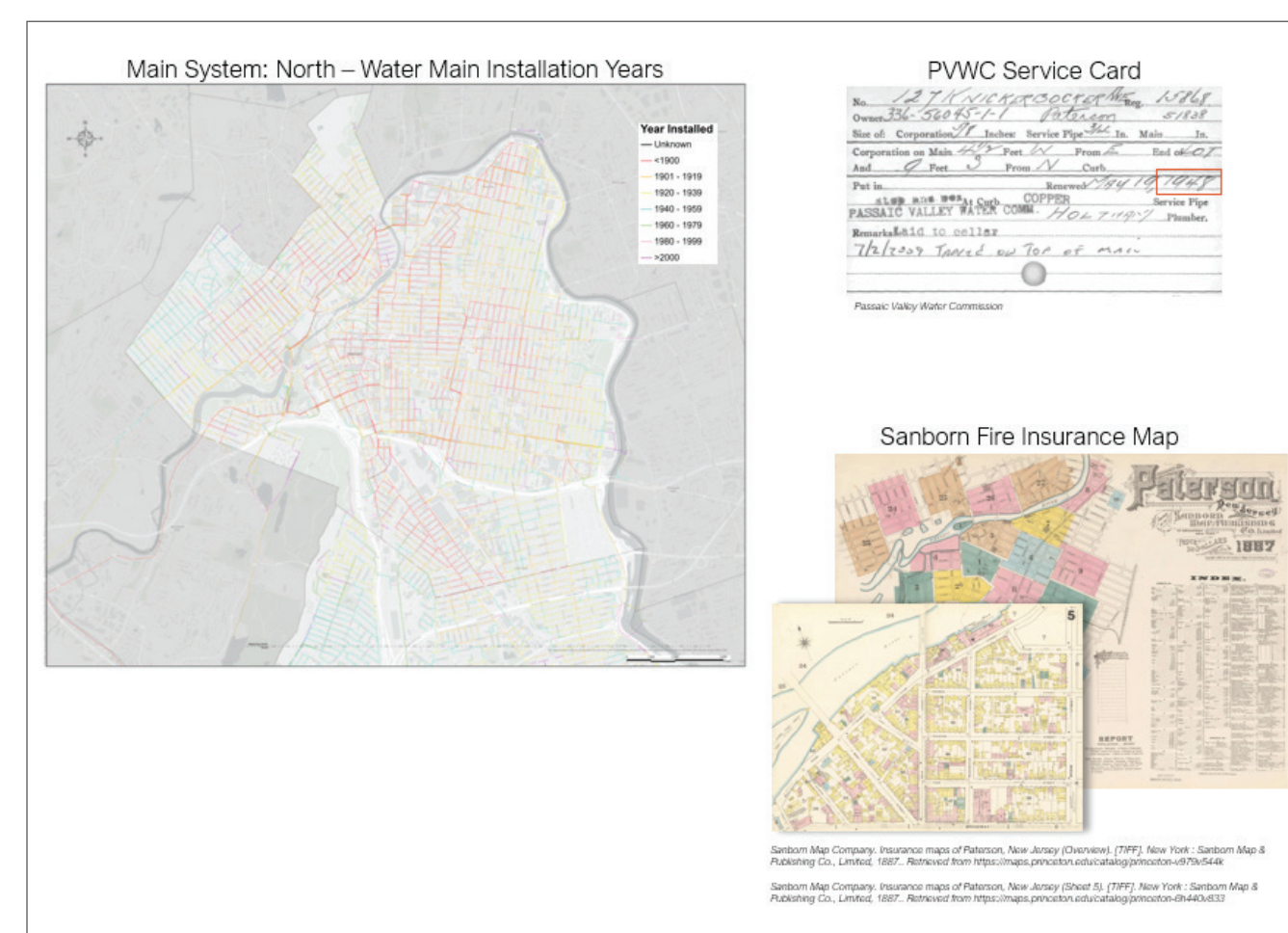
See Soil Type Break History Slide

Remaining Useful Service Life (Yrs)	Rating
150 - 135	0.1
134 - 75	1
74 - 25	1.5
24 - 10	2
9 - 5	3
4 - 1	4
0 - <0	5

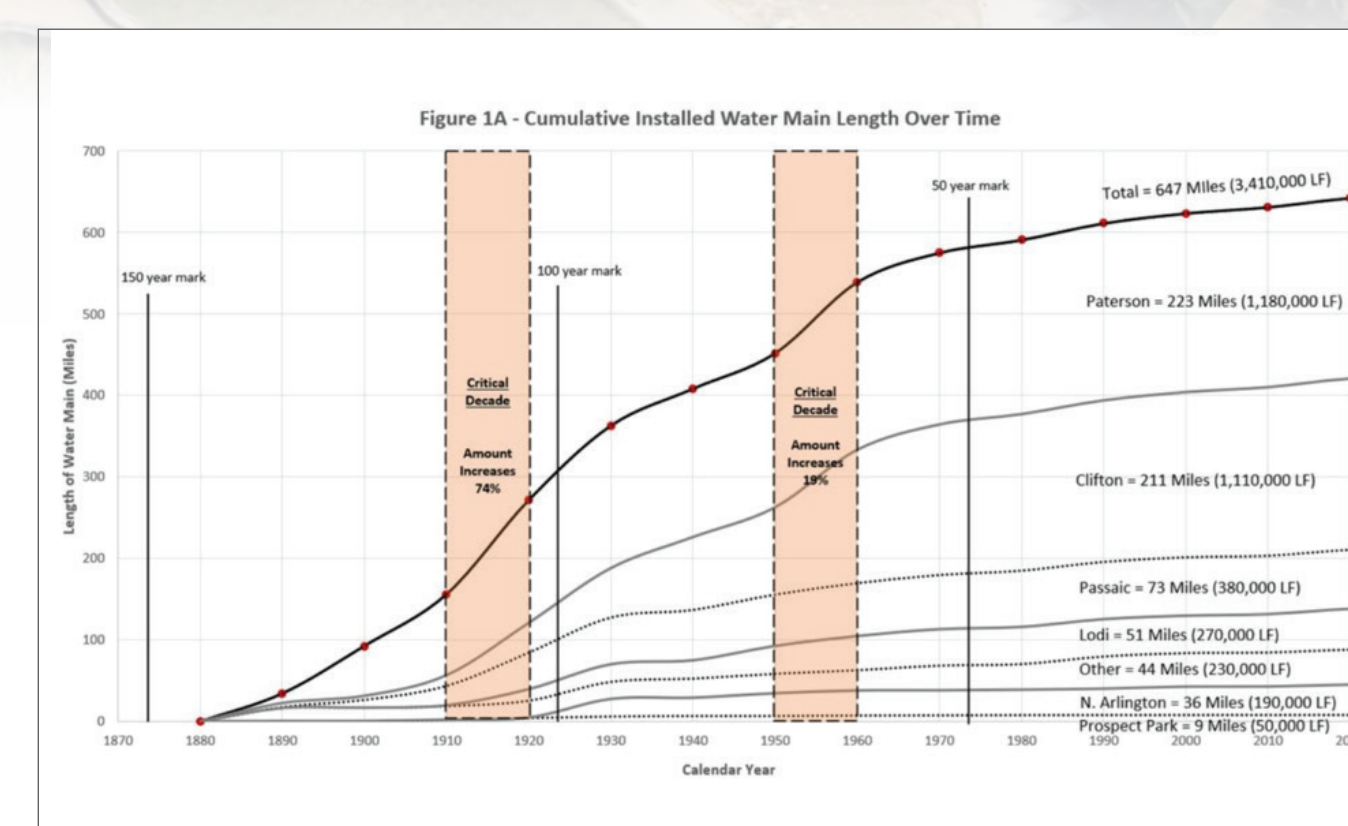
Characteristics such as pipe segment failure, material break history, soil type break history, and remaining useful service life were observed and used to create Asset Risk Exposure Assessment (AREA) ratings for sections of the system.



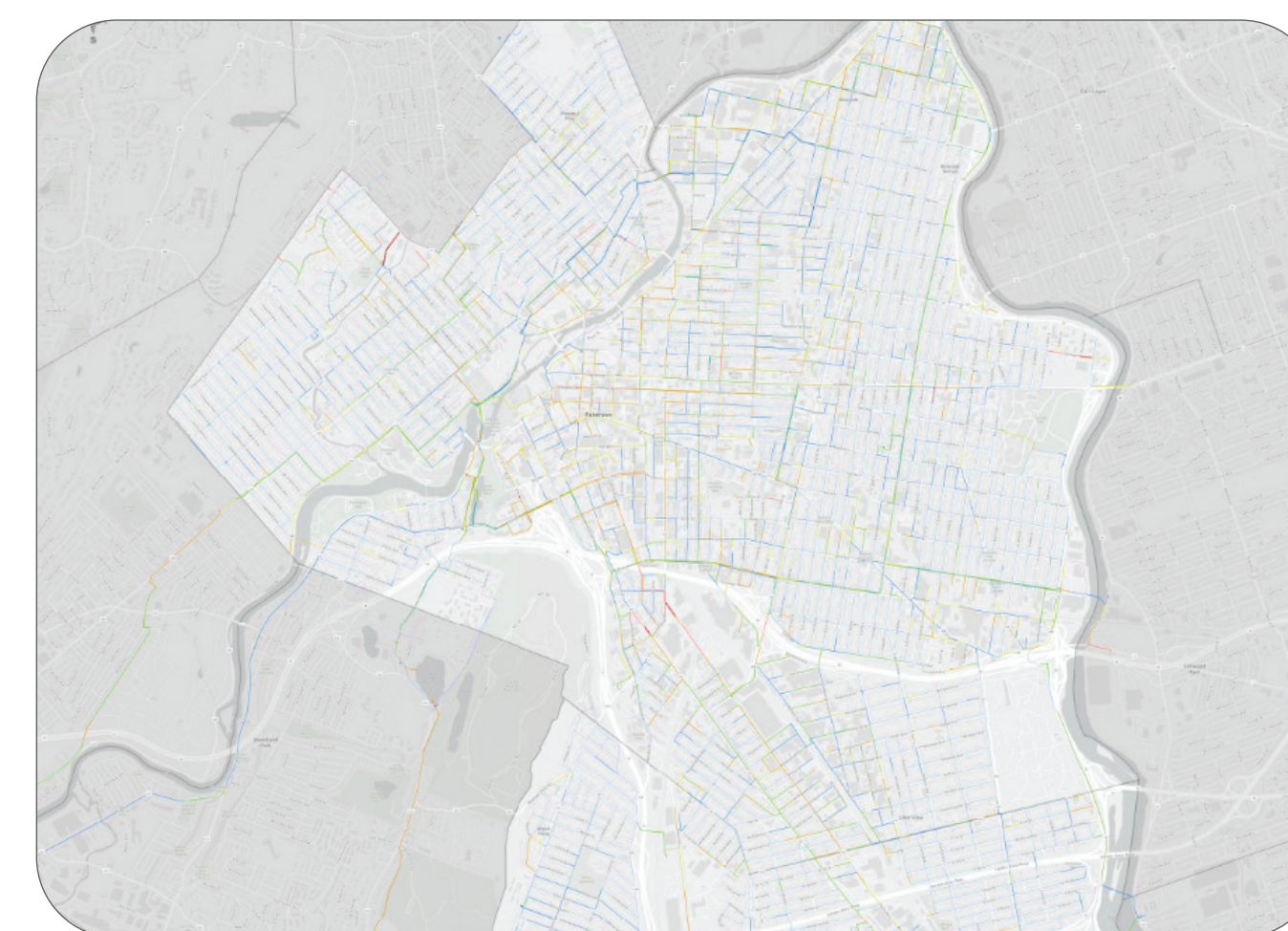
The firm developed prioritized water main replacement and transmission main renewal programs by prioritizing replacement projects based on AREA ratings and other metrics.



Data sources utilized for the AREA ratings include historical flood insurance maps, service cards, and fire insurance maps.



A graph depicting the cumulative installed water main length over time shows the largest periods of growth were from 1910-1920 and 1950-1960. Today, the system comprises nearly 650 miles of pipes.



The entrant firm utilized GIS software to create a map of recommended projects, color-coded based on asset risk exposure.

**PROJECT:** Asset Management Planning  
Location: Passaic County, NJ

**CLIENT:** Passaic Valley Water Commission  
Location: Clifton, NJ

**FIRM:** H2M architects + engineers  
Location: Parsippany, NJ