The Hydrogen Sulfide Beast From Below:

A Reactive, Responsive, and Proactive need for handling H2S before it handles us

NEWEA Annual Conference

January 22, 2024

Agenda

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Background

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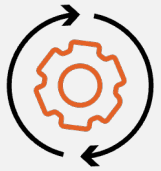
What We Uncovered



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How do We Fix This

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Finding Funding

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Lessons Learned

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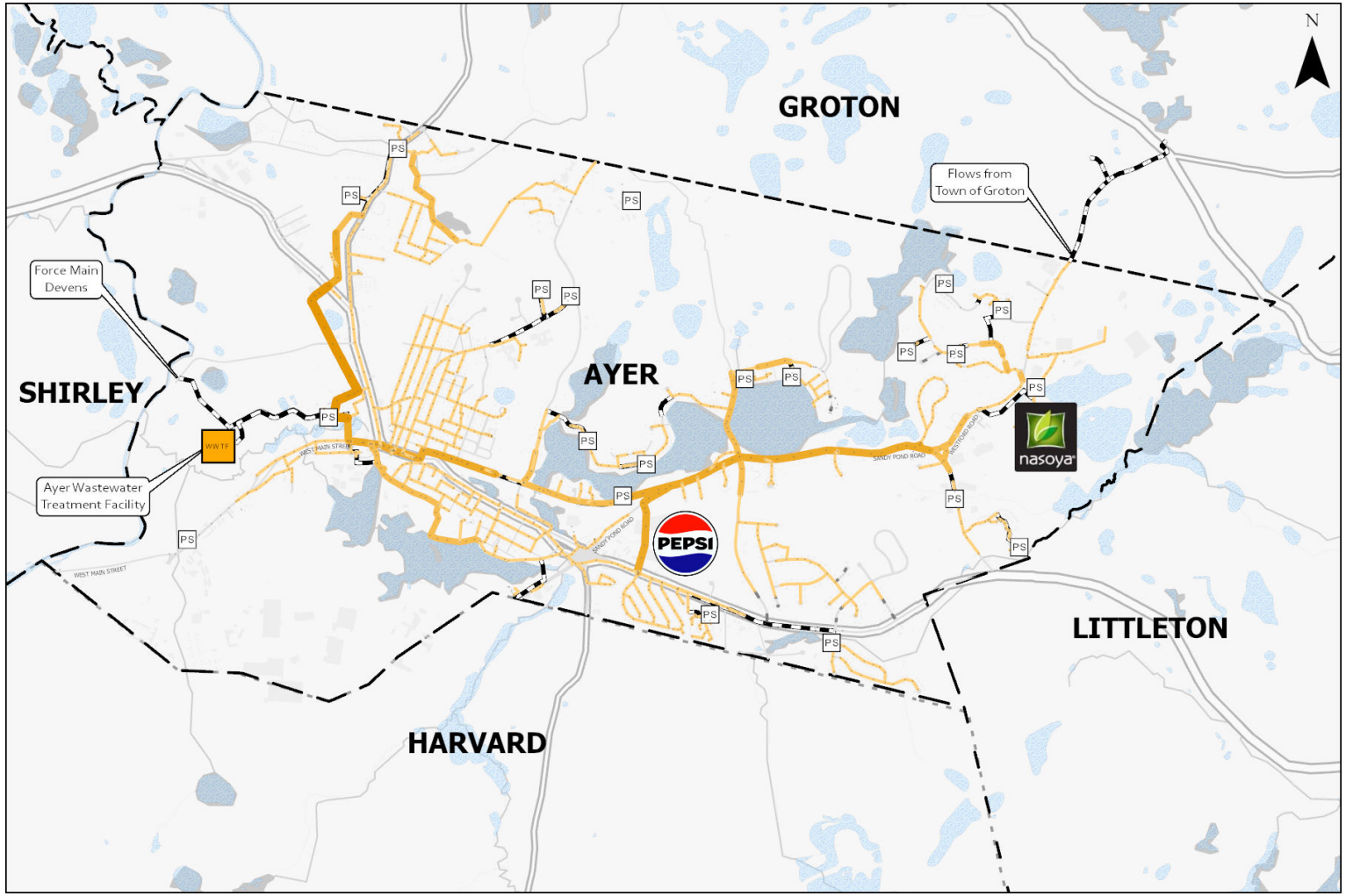
Questions

Background

Get to Know Ayer

- 8,158 Town Population
- 3,340 Customer Accounts
- Large Industrial Presence
- 39 Miles Gravity Mains
  (8 to 36-inch)
- 19 Pump Stations
- 1.79 MGD Average Daily Flow
- 350,000 GPD Reserve
  Capacity at Devens WWTP

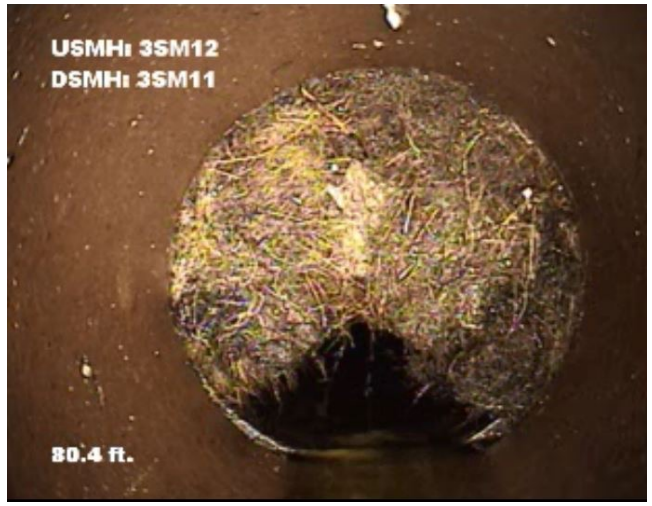


Industrial Presence

- Industrial Pretreatment Program (IPP)
- 316 Businesses, 58 are Goods Producing/Manufacturing
- 3 Significant Industrial Users (SIUs)
  - Nasoya - One of the Largest U.S. Tofu Production Facilities – 170,000 GPD total permitted
  - Two Pepsi Facilities – 280,000 GPD total permitted

Historical Problems

- Operation and Maintenance
  - (FOG, Roots, SSO)
- Infiltration and Inflow
- Peak Seasonal Flows
  - 12-month WWTP peak of 3.05 MGD
- Aged and deteriorating Infrastructure
- Discharges from Industrial processing
- Pump Station Capacity and Deterioration



What We Uncovered

There's H2S in the Ayer!!

Events Timeline

2015-2016, Replace and Upgrade Stony Brook Pump Station	**First Signs of H2S Appear**
2016-2017, I/I Analysis Program	**Isolated areas with groundwater entering defective pipes**
2017-2018, SSES Program	**Identifies heavily deteriorated pipes and manholes from H2S**
2018-2019, Planning	**Developed sewer repair action plan in coordinate with available annual funds**
2021, Emergency Sewer Collapse	**The H2S Beast Draws First Blood!**
2022-2024 Construction Projects	**The Town Strikes Back!**

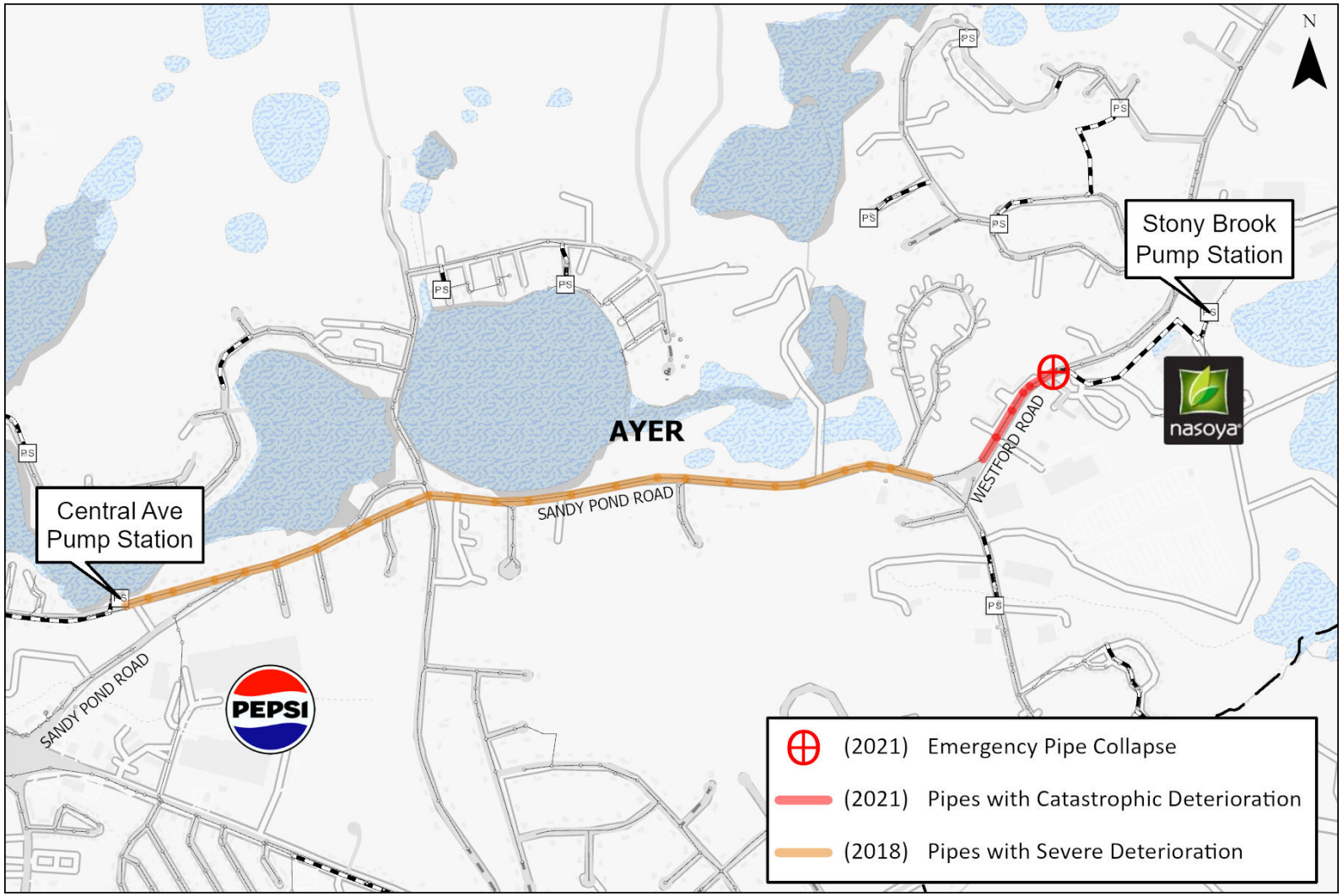
The Picture

2018 - Sandy Pond Road

- Inspected 7,770 LF of 21” and 24” RC Pipe
- Sewer is adjacent Sandy Pond and Flannagan Pond
- Depth of Sewer ranges from 5 ft to 33 ft
- Severe H2S deteriorated

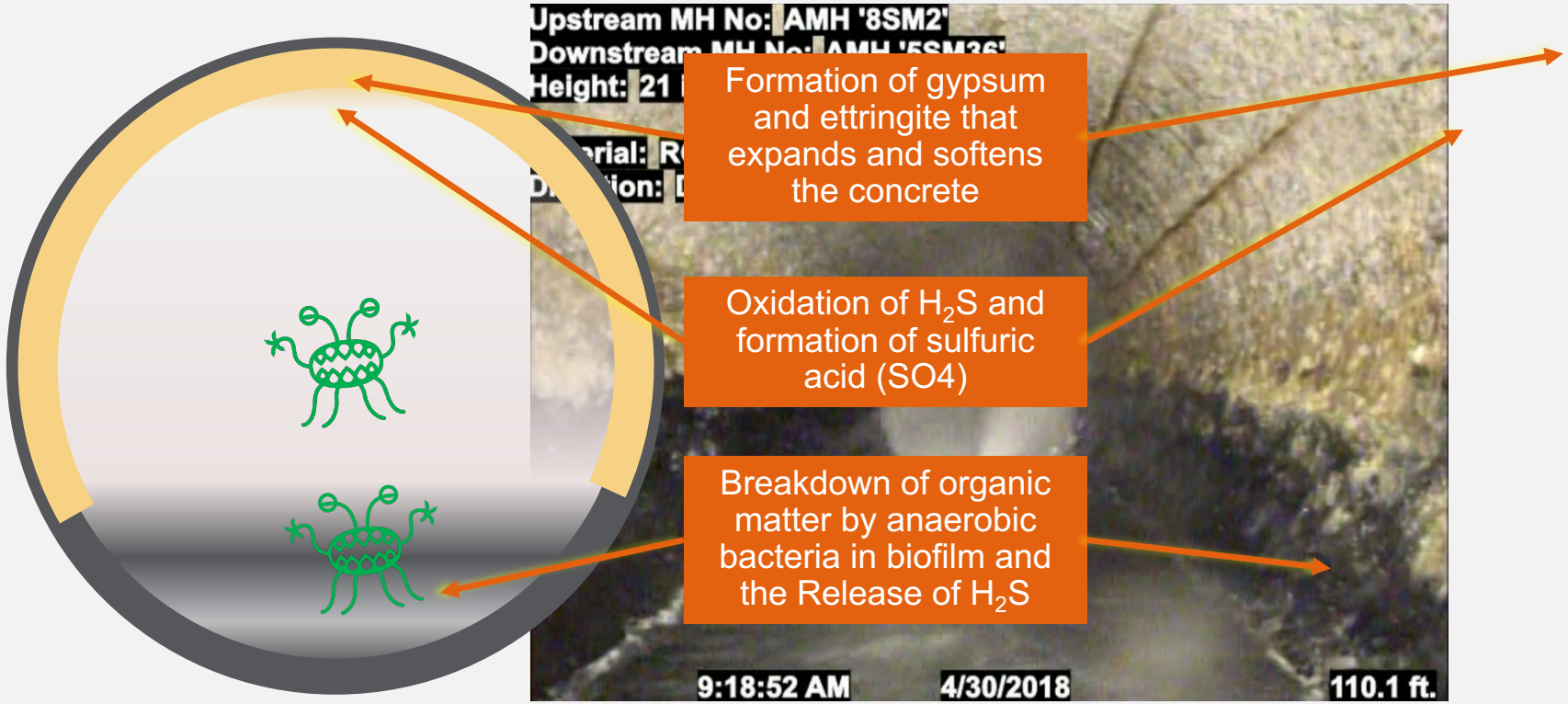
2021 - Westford Rd

- Downstream of discharge from Stony Brook PS
- ~18 LF of 12” AC Sewer Collapsed
- ~1,310 LF of Failed and severely deteriorated 12” and 15” AC pipe
- Unsafe to clean or inspect pipe
- Unsafe to inspect manholes



The Beast from Below:
Hydrogen Sulfide and The Corrosion Mechanism on Concrete

How does H_2S effect infrastructure?

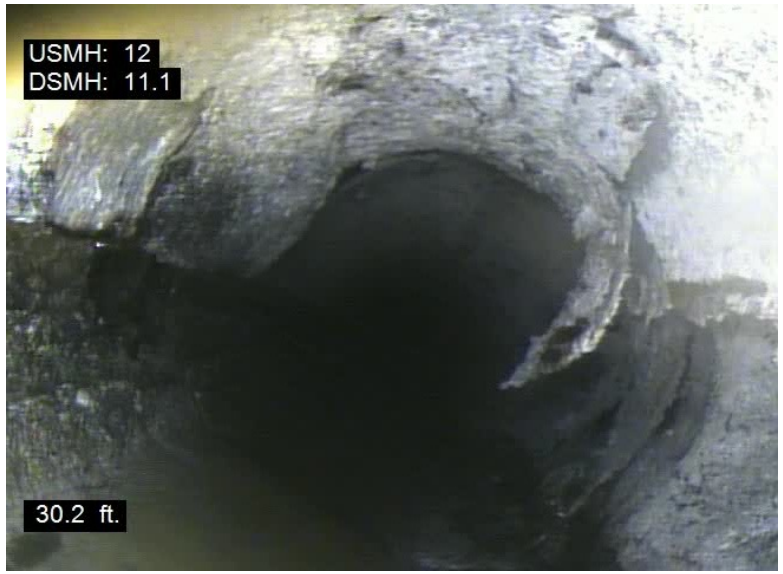


How Do We Fix This?

Different Stages of Deterioration Required Different Solutions

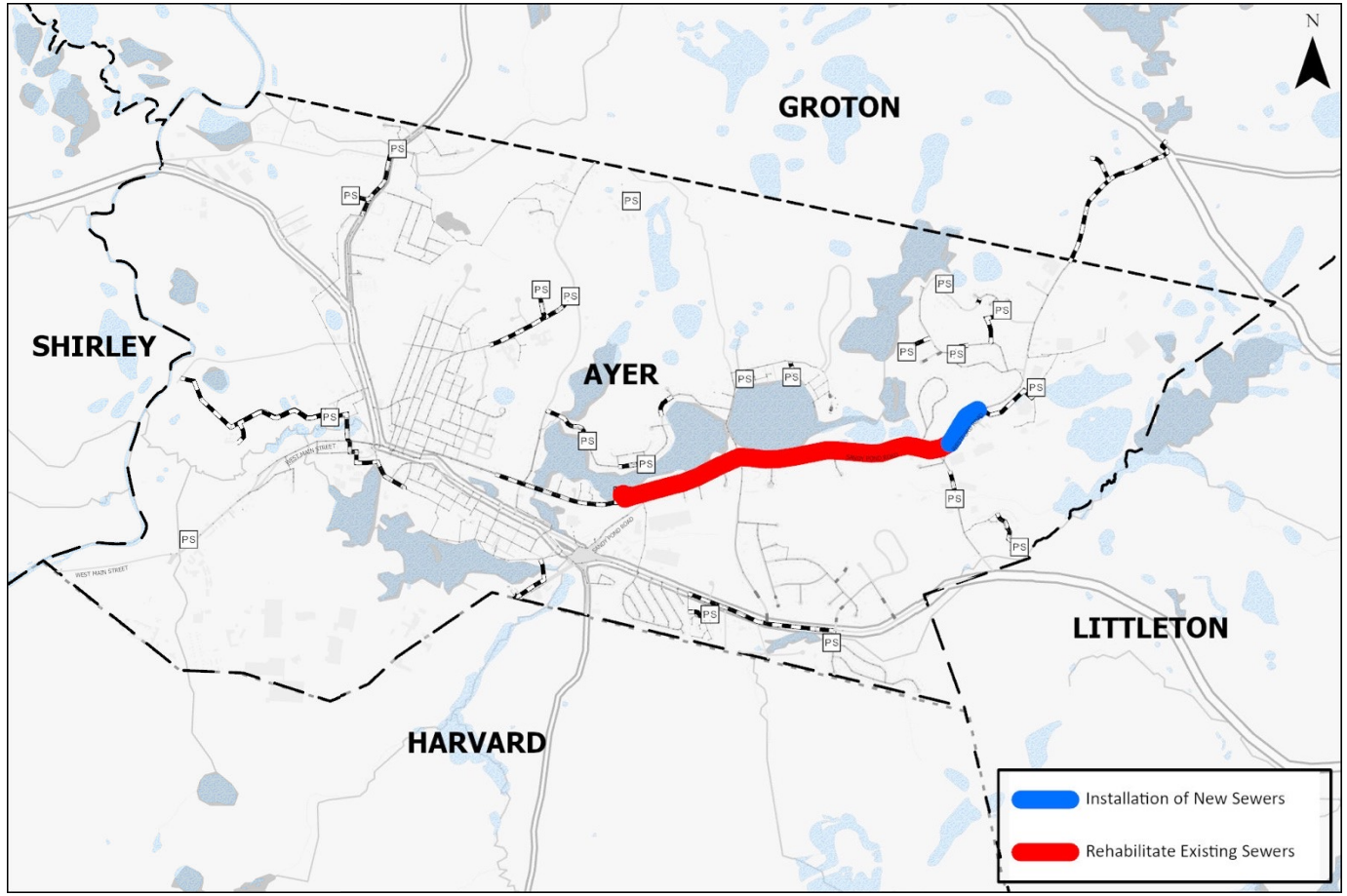
Severely deteriorated pipes on the verge of collapse had to be replaced or abandoned

Pipes retaining structural integrity while still transporting wastewater can be rehabilitated



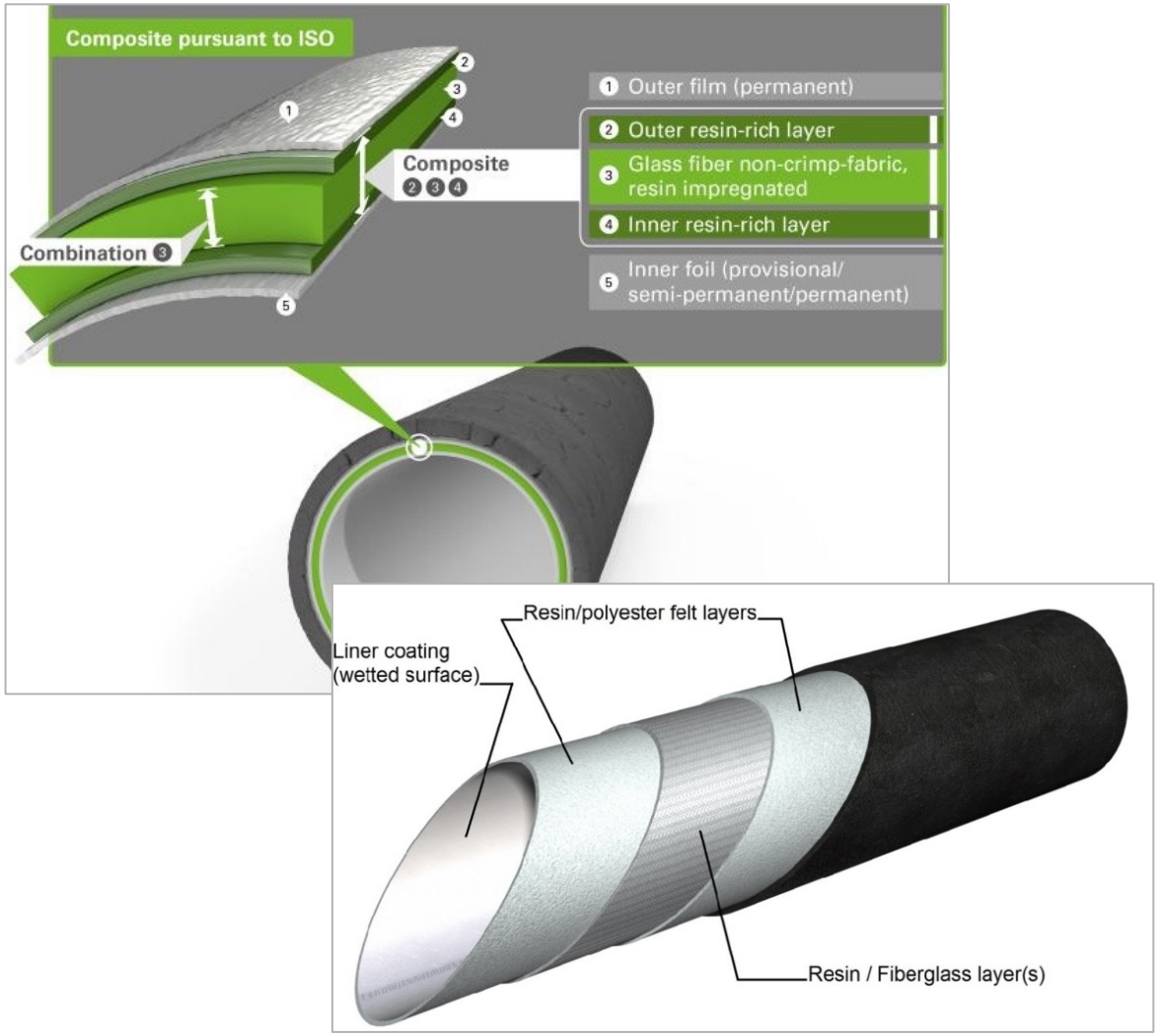
Project Planning

1. Westford Road Sewer Replacement
   - Abandon/Remove failed AC sewer pipes and manholes
   - Install new PVC sewer pipes
   - Install new precast sewer manholes
2. Sandy Pond Road Rehabilitation
   - Rehabilitate sewer pipes with Cured-in-Place Pipe Liners
   - Rehabilitate service connections with Cured-in-Place Lateral Connection Liners
   - Rehabilitate sewer manholes with chemically resistant epoxy lining



Cured-in-Place Pipe, UV or Steam

Liner Type	UV CIPPL	Steam CIPPL
Lifespan	80+	50
Quality Controls	High	Moderate
Air Quality Impact	None	Moderate
Infiltration Removal	High	High
Structural Reinforcement	High	Moderate
Chemical Resistance	High	High
Cost	$$	$



Finding Funding

Funding Sewer Improvements

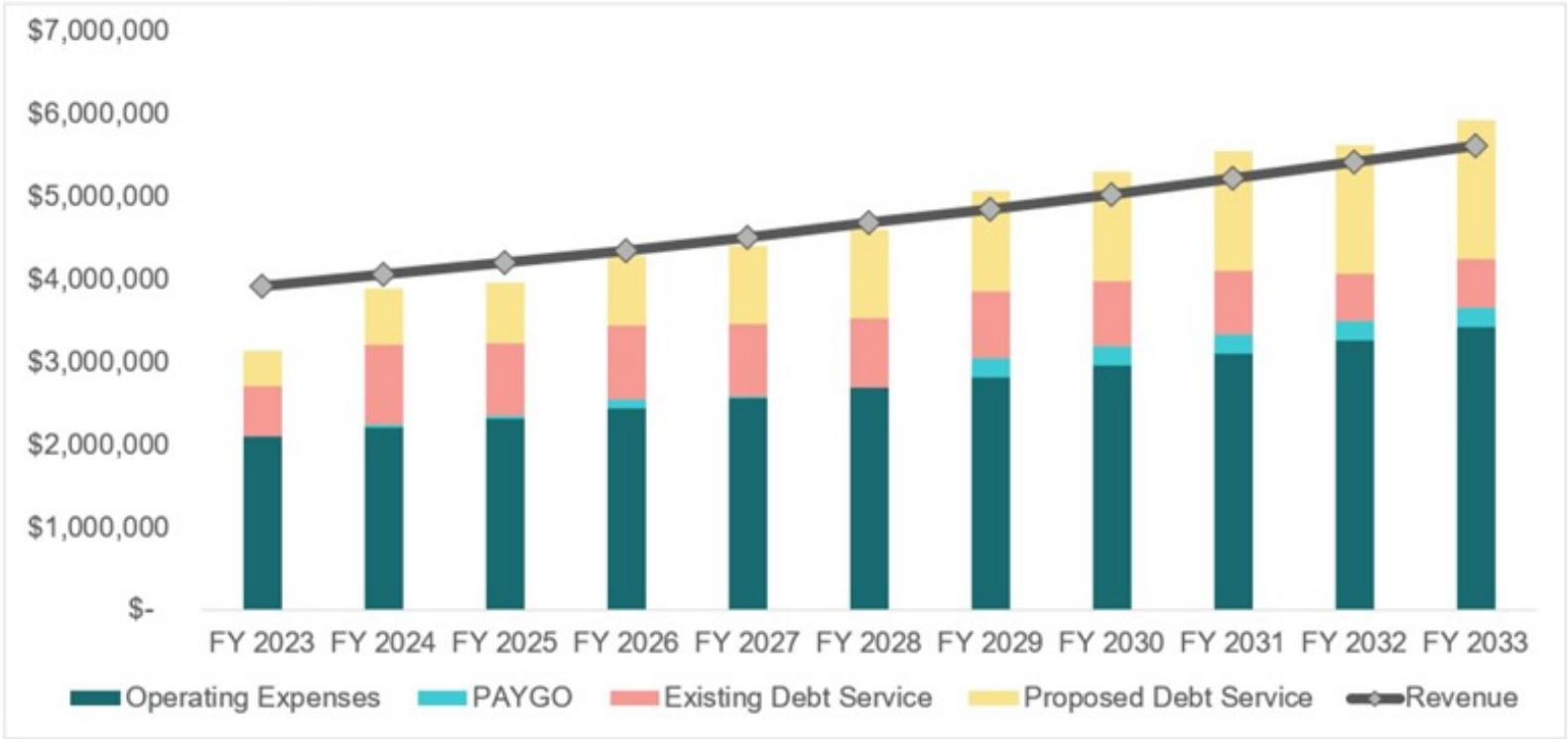
Wastewater is an Enterprise Fund

- i.e., rate based, not tax based)

Rate Review Committee

- Annual rate model update and evaluation, recommend sewer rates to Select Board
- Capital Improvements included in rate setting

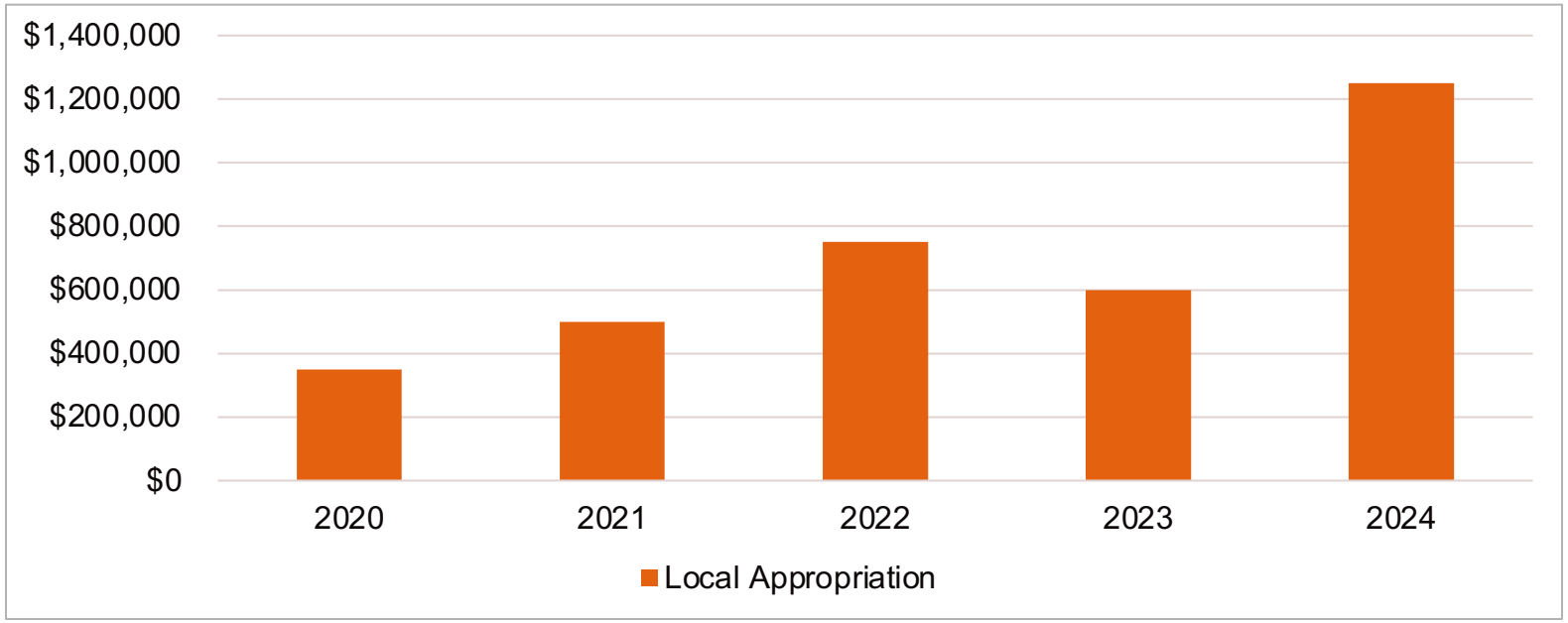
Figure 7 – Sewer Cashflow Under Recommended Rate Increases



Funding Sewer Improvements

General Considerations
- Local
- SRF
- Other/Grant

Low interest rates for borrowing in recent years, predominantly locally funded



Year	Local Appropriation
2020	$350,000
2021	$500,000
2022	$750,000
2023	$600,000
2024	$1,250,000

Funding Sewer Improvements

Town supplementing funding with American Rescue Plan Act (ARPA)

Town ARPA Appropriation from Federal Govt: $2,449,840

ARPA Authorized for Wastewater Projects:

- Up to $700,000 Westford Road Sewer Replacement (Only used $250,000)
- Up to $600,000 Sandy Pond Road Rehabilitation I/I and West Main Street Segment (Current Project)

Where We Are Now

Westford Road Sewer Replacement

100% Complete

- Installed 870 LF of New PVC Sewer
- Abandoned/Removed existing AC gravity sewer pipe
- Installed 6 new precast manholes

Emergency Collapse on West Main St (2023)

Sandy Pond Road Sewer Rehabilitation

28% Complete

- Installed 1,700 LF of UV CIP Liner
- All AC pipe has been lined
- 6,300 LF of 21” and 24” RCP remaining to be lined, including repaired pipe on West Main Street

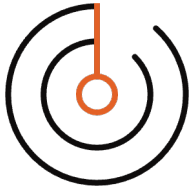
What's Next

- Epoxy Line Manholes along Westford Rd and Sandy Pond Rd
- Inspect and review sewer pipes and structures downstream of Sandy Pond Road and the Central Ave Pump Station
- Evaluate and assess remaining ACP, RCP, and other H2S susceptible infrastructure within the collection system
- Develop a plan to responsively and proactively prevent damage to susceptible sewer pipes and manholes from H2S corrosion

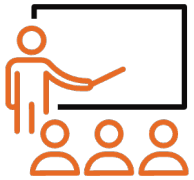
Lessons Learned

Key Takeaways

Keep up with routine sewer inspection and maintenance of pipes and manholes



Tracking issues upstream and downstream where applicable



Maintain training and preparedness for reactive measures

Annual planning and prioritization for responsive and proactive rehabilitation programs

Continual evaluation and project planning for proactive system care

Questions?

Contact Us

Daniel Van Schalkwyk, P.E.
Director of Public Works

978-772-8240

dVanSchalkwyk@ayer.ma.us

Cameron Jenkins
Project Water Resources Specialist

781-213-4926

Cameron.Jenkins@Arcadis.com

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