

Littleton, MA

Comprehensive Wastewater Planning to Address Environmental and Economic Objectives

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January 25, 2023



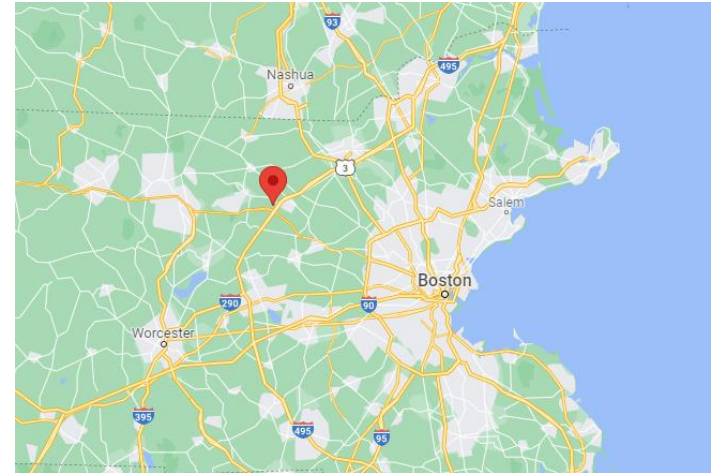
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2023 Annual Conference & Exhibit
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Today's Topics

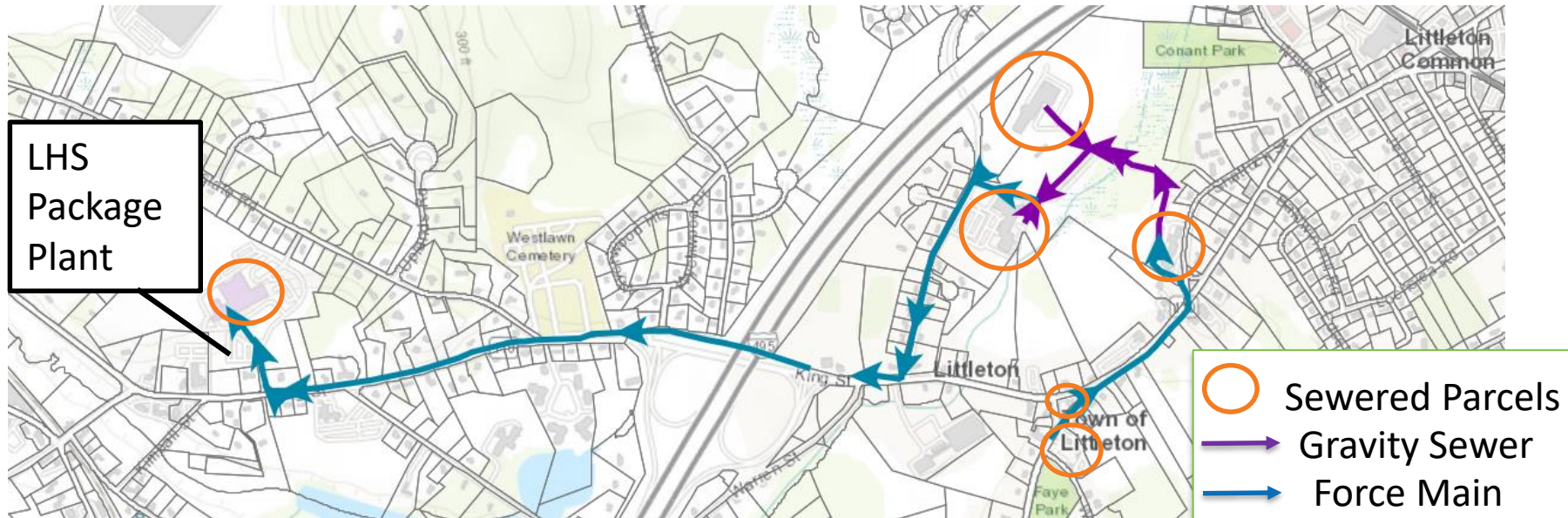
- Overview of Community & Project Drivers
- Comprehensive Wastewater Planning Efforts
- Design Projects
 - Design packages
 - Pre-selection of treatment technology
- Permitting
- Lessons Learned



Littleton Overview

- Population: 10,150
- Median Household Income: ~\$140,000
- Typical House Value: ~\$670,000
- Water System: 75 miles of water main, 2,800+ customers
- Existing Sewer System: ~4,000 gpd

Main Project Driver:
Economic Growth



Evaluation of Existing Package WWTP

- Location at High School
- System uses a Fixed Activated Sludge Tanks (FAST) system with methanol addition
- Limited capacity ~ 17,600 GPD
- Upgrades and repairs identified

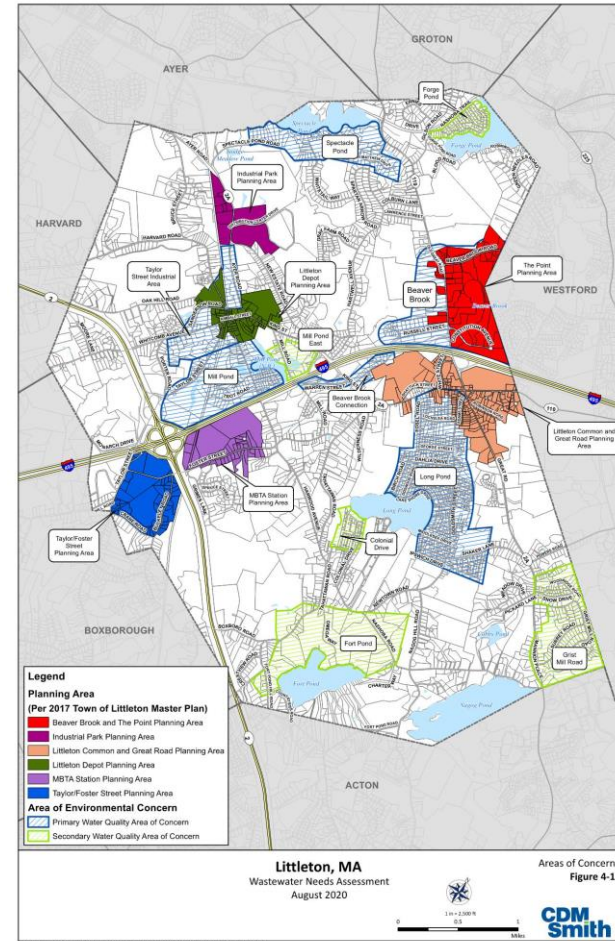


Where to go next?

- 2020 Littleton Wastewater Needs Assessment
- 2021 Sewer Use Regulations
- 2021-2023 Design Packages
 - Effluent Recharge Site Design
 - Water Resource Recovery Facility
 - Collection System
- 2023-2025 Construction

Needs Assessment Evaluations

- Water Quality & Environmental Evaluation
- Town Zoning & Economic Needs Evaluation
- Ranking of Areas of Concern
- Estimated Wastewater Flow
- Collection, Treatment, and Effluent Recharge System Technologies
- Site Screening to find treatment location
- Phasing and Scenario Assessment



Ranking of Areas of Concern

Table 2-9
Summary of Water Quality Areas of Concern

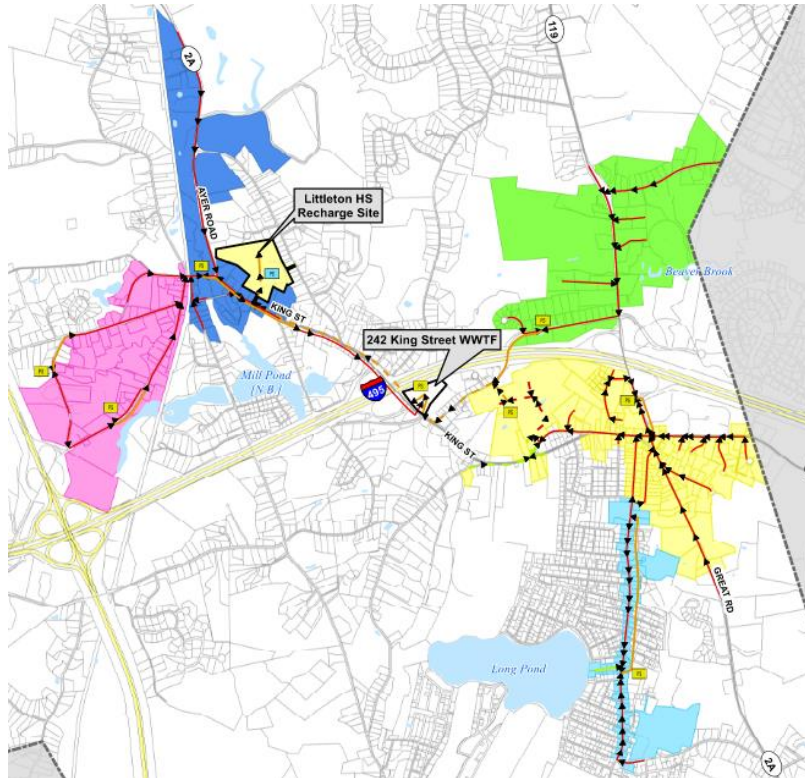
Water Quality Areas of Concern (AOC)	Reasons for Inclusion								
	Zone IIs	Nitrate in Wells	Impaired Water Body	Poor Soils	Small Lots	High Groundwater	Flood Zone	Wetlands	Septic Failures
Primary Areas									
Beaver Brook	✓	✓	✓	✓		✓	✓	✓	✓
Beaver Brook Connection	✓						✓	✓	
Long Pond			✓		✓				✓
Mill Pond	✓		✓	✓	✓	✓	✓	✓	✓
Taylor Street Industrial	✓			✓		✓	✓	✓	✓
Spectacle Pond	✓	✓	✓						✓
Secondary Areas									
Colonial Drive			✓	✓		✓	✓		✓
Forge Pond					✓				✓
Fort Pond						✓			✓
Grist Mill Road						✓			
Mill Pond East	✓		✓			✓			✓

Table 4-3
Weighting Factors

Criteria	Secondary Weighting Factors
Zone II	10
Nitrate in Wells	3
Impaired Water Body	10
Density/Lot Size	8
Soils	3
High Groundwater	10
Flood Zone	3
Wetlands	3
Economic Planning	50
Total	100



Recommended Plan from Needs Assessment (175,000 gpd)



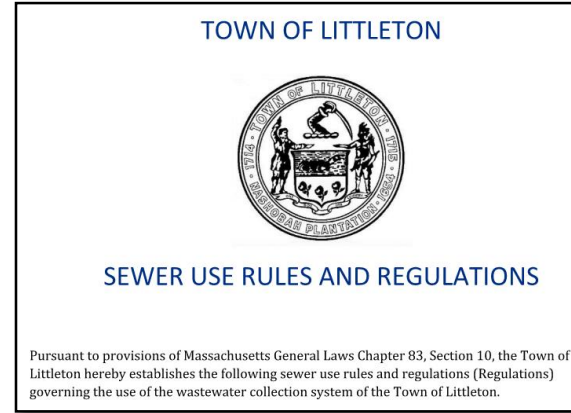
- Community-wide Input
 - LELWD Staff
 - Sewer Working Group (Water Commissioners, Town Administrator, Finance Committee, Town Accountant, Highway Director, residents)
 - Interview with Board of Health
 - Interview with Conservation Commission



Proposed Water Resource Recovery Facility (WRRF) Technology: Membrane Bioreactor (MBR)

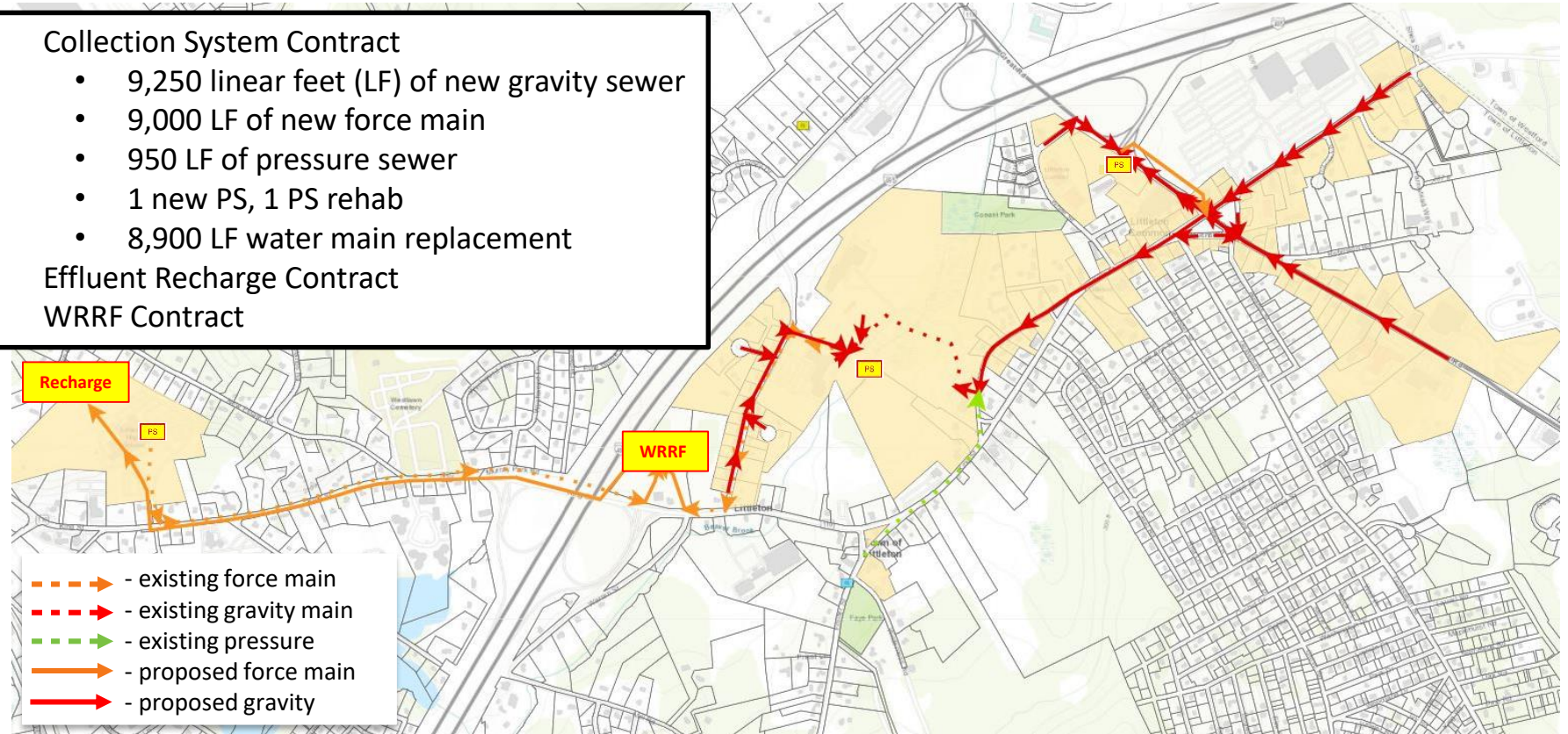
Sewer Use Regulations

- Article 1: General Provisions
- Article 2: Use of Public Sewers
- Article 3: Regulation of Wastewater Discharges
- Article 4: Building Sewers & Connections
- Article 5: Protection from Damage
- Article 6: Permits
- Article 7: Power & Authority of Inspection
- Article 8: Penalties & Enforcement
- Article 9: Validity
- Article 10: Grievance & Variance Procedures
- Article 11: Sewer Collection Fees
- Article 12: Regulations in Force
- Appendices: Schedule of Fees, Acts, Applications for Sewer Connection for various users, Drain Layer License Application, Industrial Waste Survey, Escrow Agreement Template, Design Standards, Public Outreach Flyers

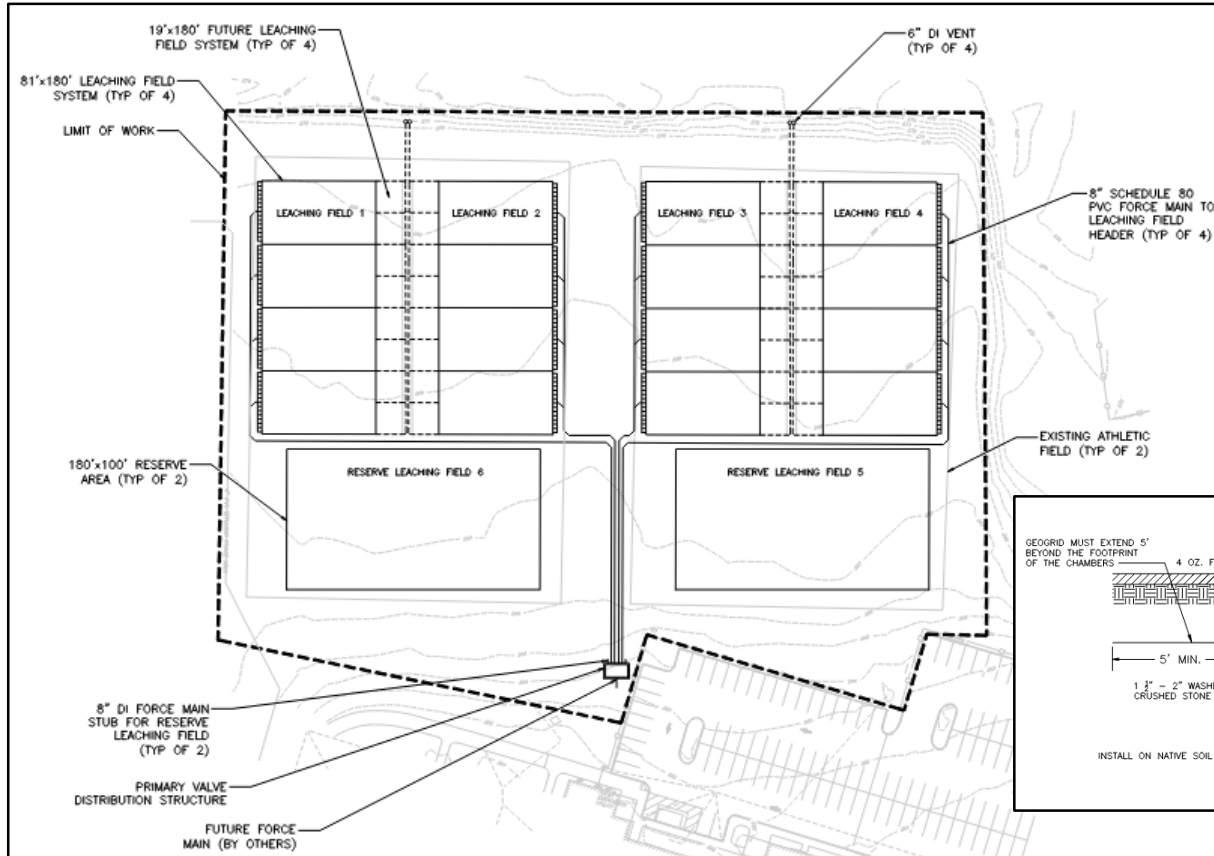


Design Packages

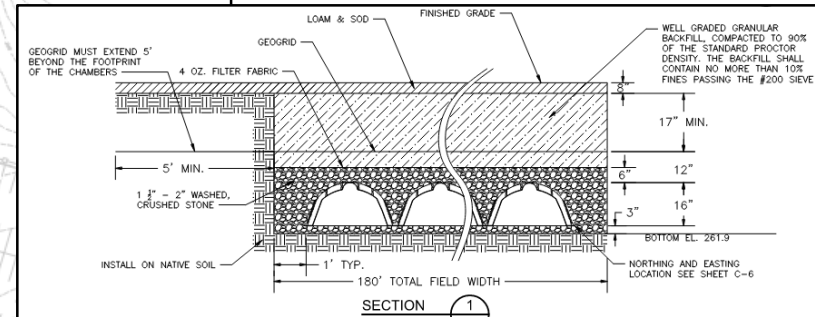
- Collection System Contract
 - 9,250 linear feet (LF) of new gravity sewer
 - 9,000 LF of new force main
 - 950 LF of pressure sewer
 - 1 new PS, 1 PS rehab
 - 8,900 LF water main replacement
- Effluent Recharge Contract
- WRRF Contract



Effluent Recharge Design

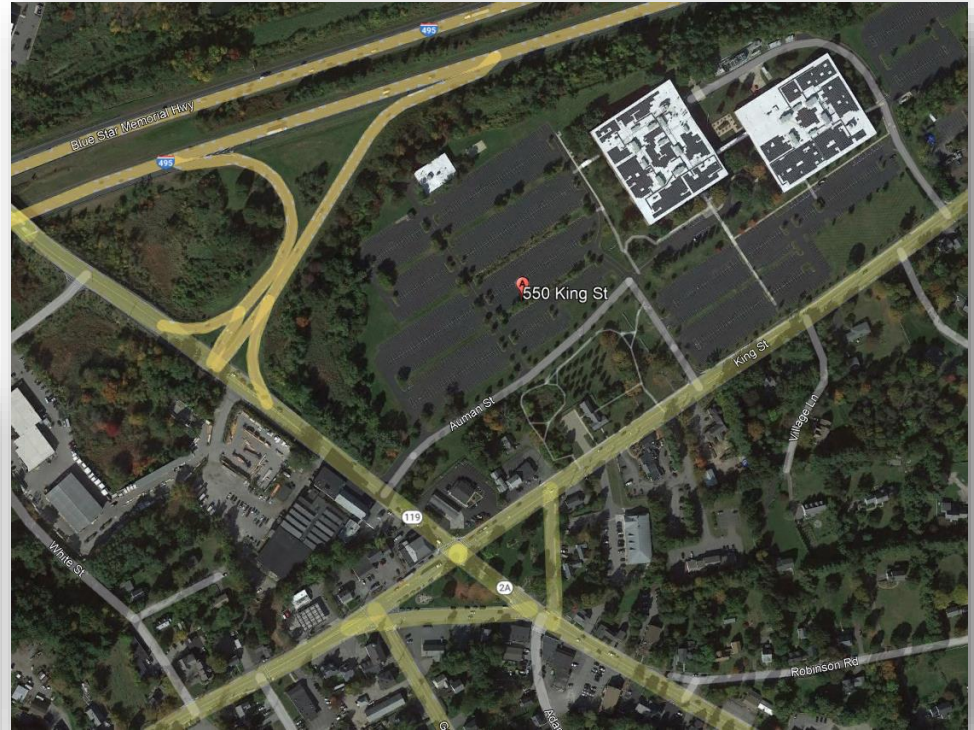


LOCATION PLAN
NTS



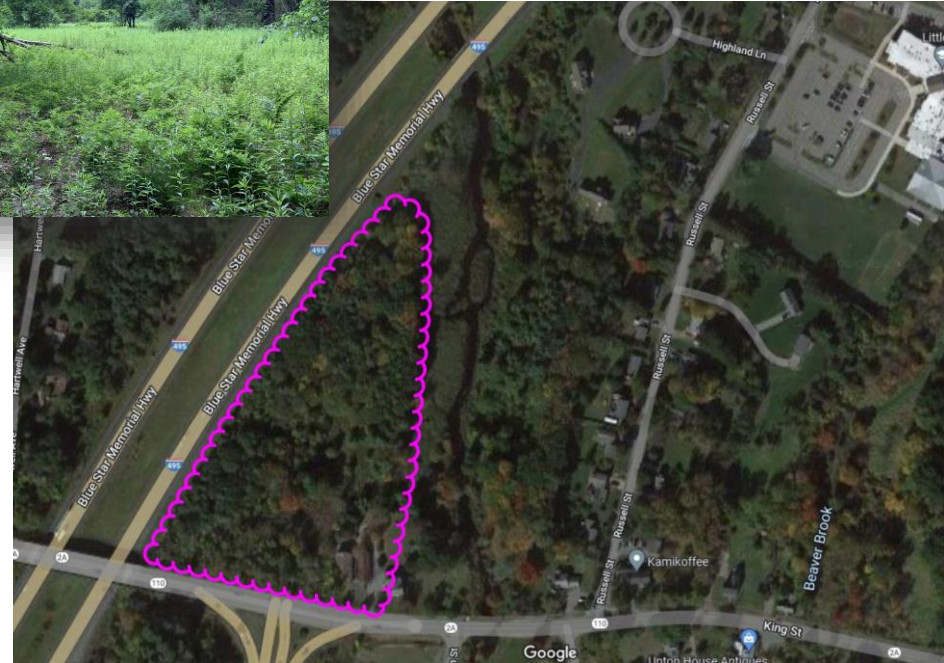
Community Flow Changes during Design

- Private Development Requests
 - Littleton Common Revitalization
- Increased average design flow from Needs Assessment by ~20%
 - Initial: 208,000 gpd
 - Future expansion to 290,000 gpd



Water Resource Recovery Facility (WRRF) Design

- Site purchased by LWD
- Primarily undeveloped site
- Site constraints/permitting
- Future expansion
 - Initial buildout / full buildout
- “Package” plant
- Pre-select MBR vendor



WRRF: Membrane Bioreactor (MBR) Selection Request For Proposals (RFP)

- Follow Chapter 30B Procurement Model
- Publicly advertised RFQ/P (2 envelopes)
 - Technical Evaluation Criteria
 - Price Proposal (capital, O&M)
 - Determine most advantageous proposal
- Equipment to be purchased by Contractor
 - Bid price carried in project bid form
- Design, startup, commissioning services
- Selected: Veolia (Suez) ZeeWeed 500 MBR System

- Min. 15 installations in U.S. over 100,000 gpd
- 5+ installs in New England
- System Expandability
- Customer Support
- Membrane Product History/Durability
- References



WRRF: Site Layout

Influent Equalization Tanks

Odor Control and Influent Pumping Station

Bioreactor Tanks

Flood Storage & Stormwater Basins

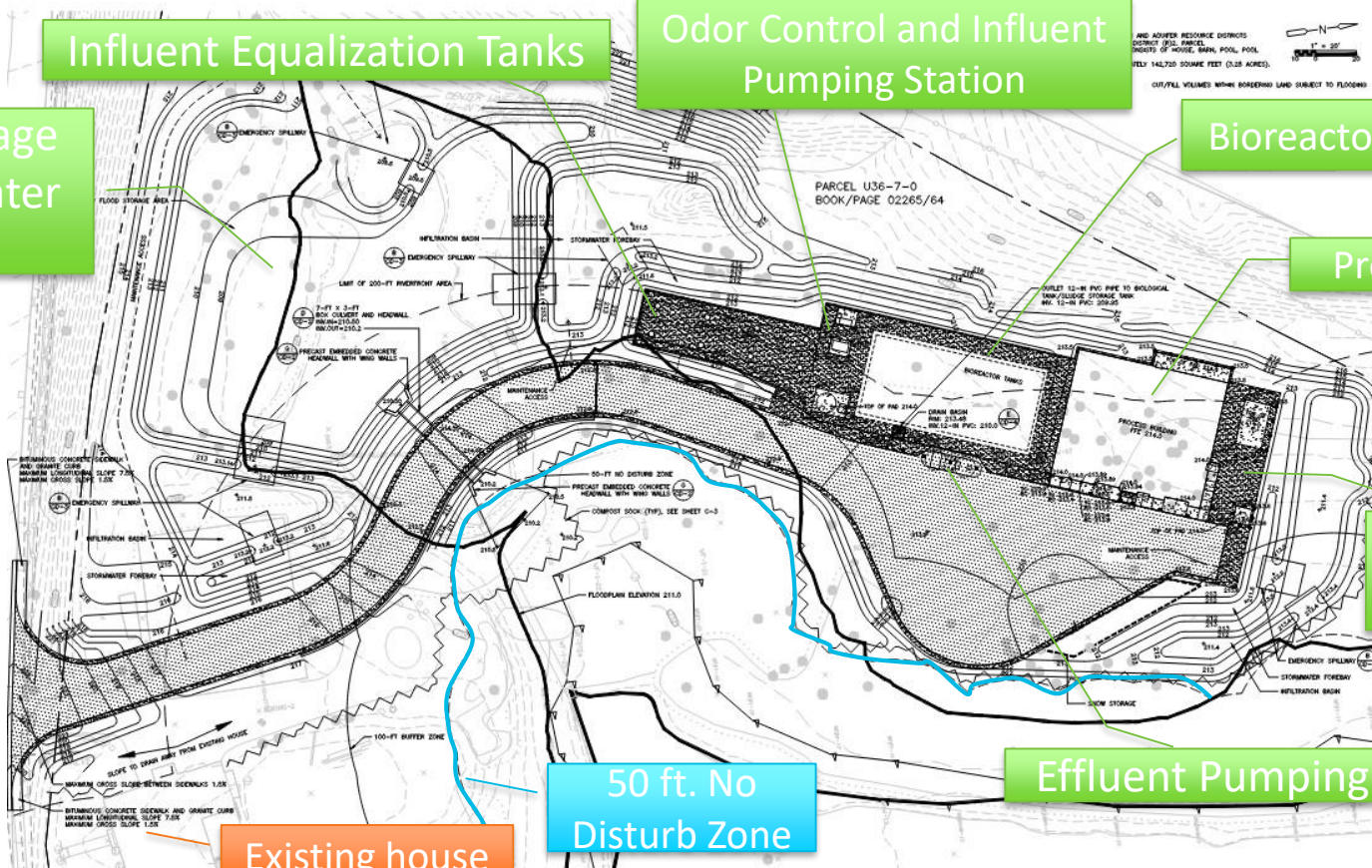
Process Bldg.

Generator & Transformer

50 ft. No Disturb Zone

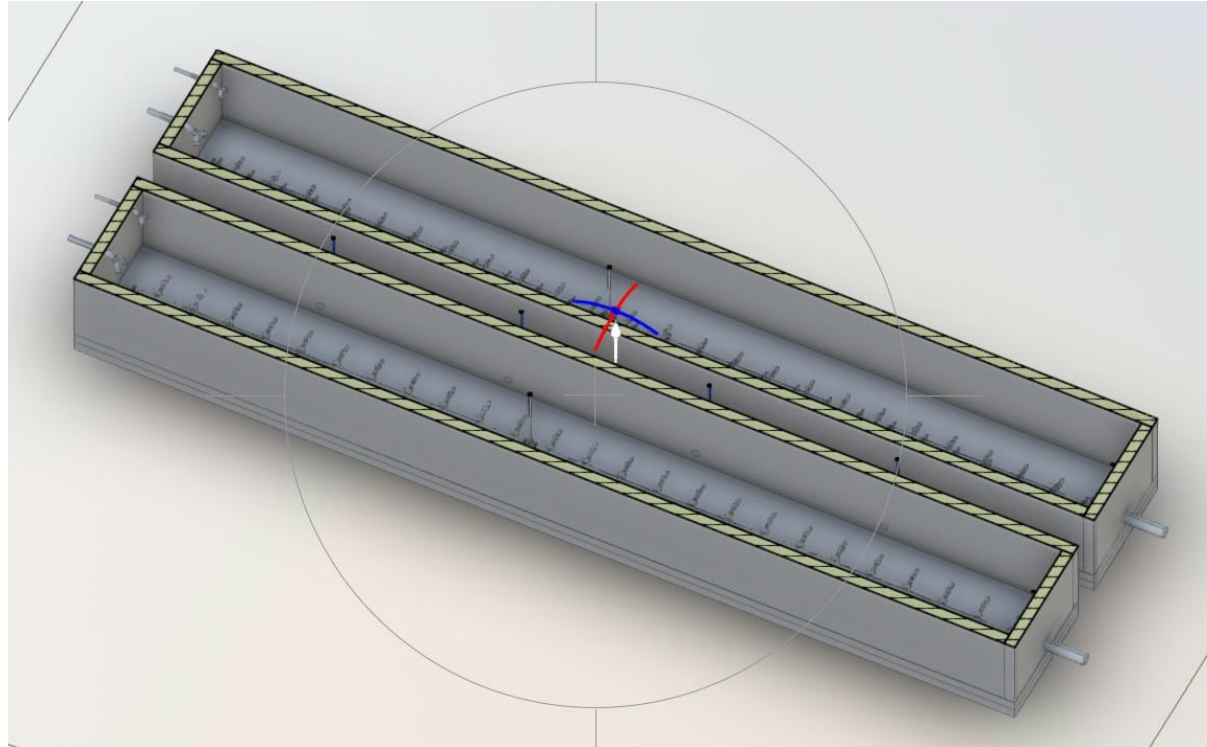
Effluent Pumping Station

Existing house



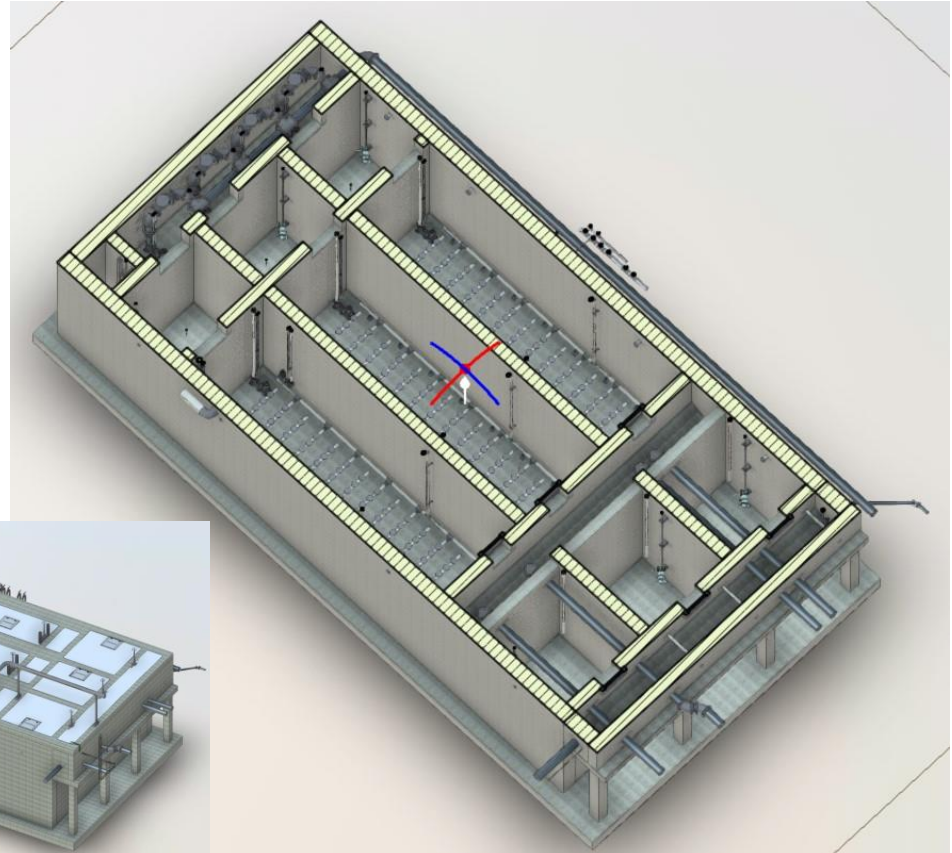
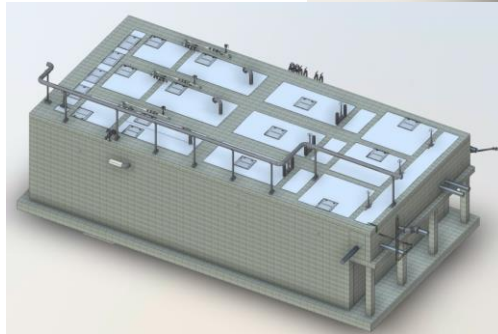
WRRF: Influent EQ

- Peak flows above max day flow
- Buffer flow
- 2 parallel tanks
- Mixing air



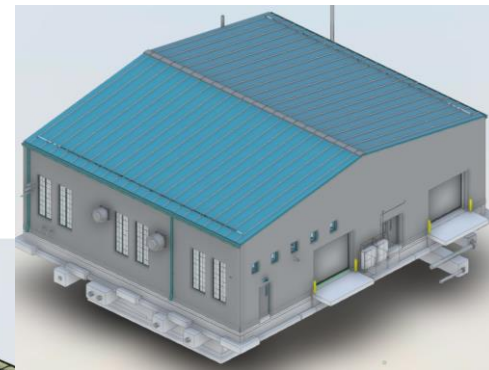
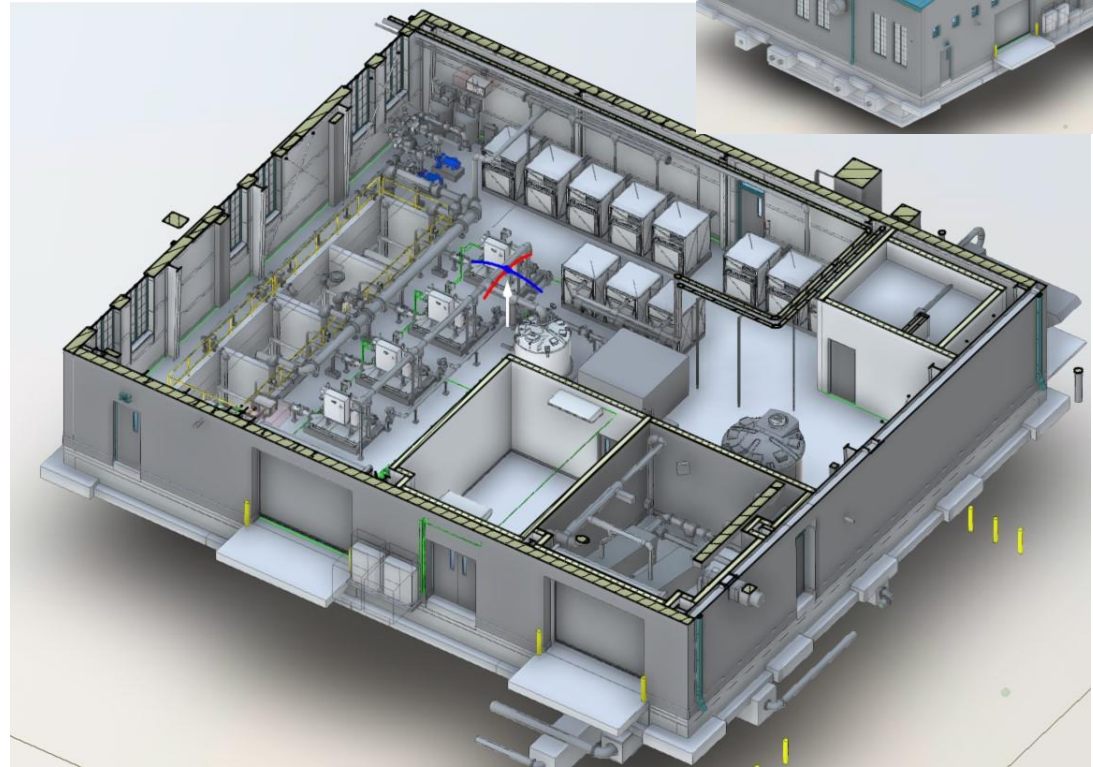
WRRF: Process Tanks

- 3 parallel trains
- BNR removal – pre/post/anoxic zones
- Internal recycle
- RAS distribution channel
- Membrane feed pumps
- Initial buildout – utilize 3rd train for sludge storage



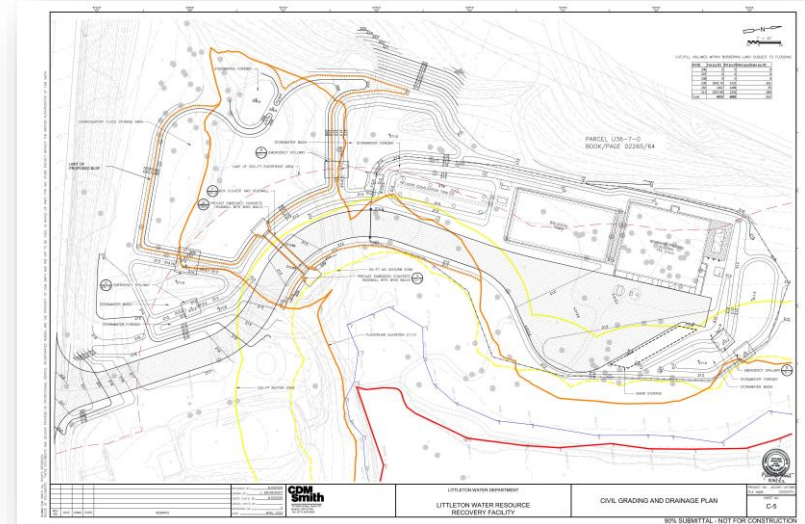
WRRF: Process Building

- Single process/support building
- Membrane tanks & permeate pumps
- Membrane/process blowers
- Electrical room
- Influent screening room
- Chemical storage/feed



Project Permitting

- MEPA (ENF, SEIR, FEIR)
- MassDOT Access Permits (2)
- Littleton Conservation Commission ANRAD and Notice of Intent
- Littleton Special Permit /Peer Review
- Plumbing Variance
- Mass Historical Commission Approval
- SRF Approval
- MassDEP Groundwater Discharge Permit



How to pay for it?

- Effluent Recharge ~\$ 3.0 Million
- Collection System ~\$10.3 Million
- Water Main ~\$ 6.1 Million
- WRRF ~ \$20.3 Million
- Betterments
- Sewer Connection Fees
- Taxes
- SRF Loans
- Grants
- Public/Private Partnership
- State Legislation

Owner Challenges

- LWD is separate entity from Town / working on School Dept. Property
- Previous Legislation establishing Littleton Common Sewer District (opt-in/opt-out)
- Customers
- Mass Historical
- Easement for Pumping Station
- Starting a Wastewater Department from scratch

Lessons Learned

- Starting from scratch...planning is KEY.
- Depending on your treatment technology, pre-selection can be key and needs to be done EARLY.
- Finding groundwater discharge locations is DIFFICULT.
- Starting permitting EARLY avoids late design changes.
- Wastewater design is still complicated in a “small” community.

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