Water System Master Plan
Town Council Meeting

Town of Derry

April 19th, 2022

Underwood Engineers

UNDERWOOD
engineers

Introductions

- Keith Pratt, P.E. – President
- Devon Smith, P.E. – Project Manager
- Eugene Forbes, P.E. – Sr. Technical Leader

UNDERWOOD
engineers

Presentation Purpose

1. Background & Status Update
2. Regional Considerations
3. Capital Improvements Plan (CIP)
4. Rates
5. Future Conditions
6. Next Steps

UNDERWOOD engineers

Background and Status Update

UNDERWOOD engineers

Previous Master Plan

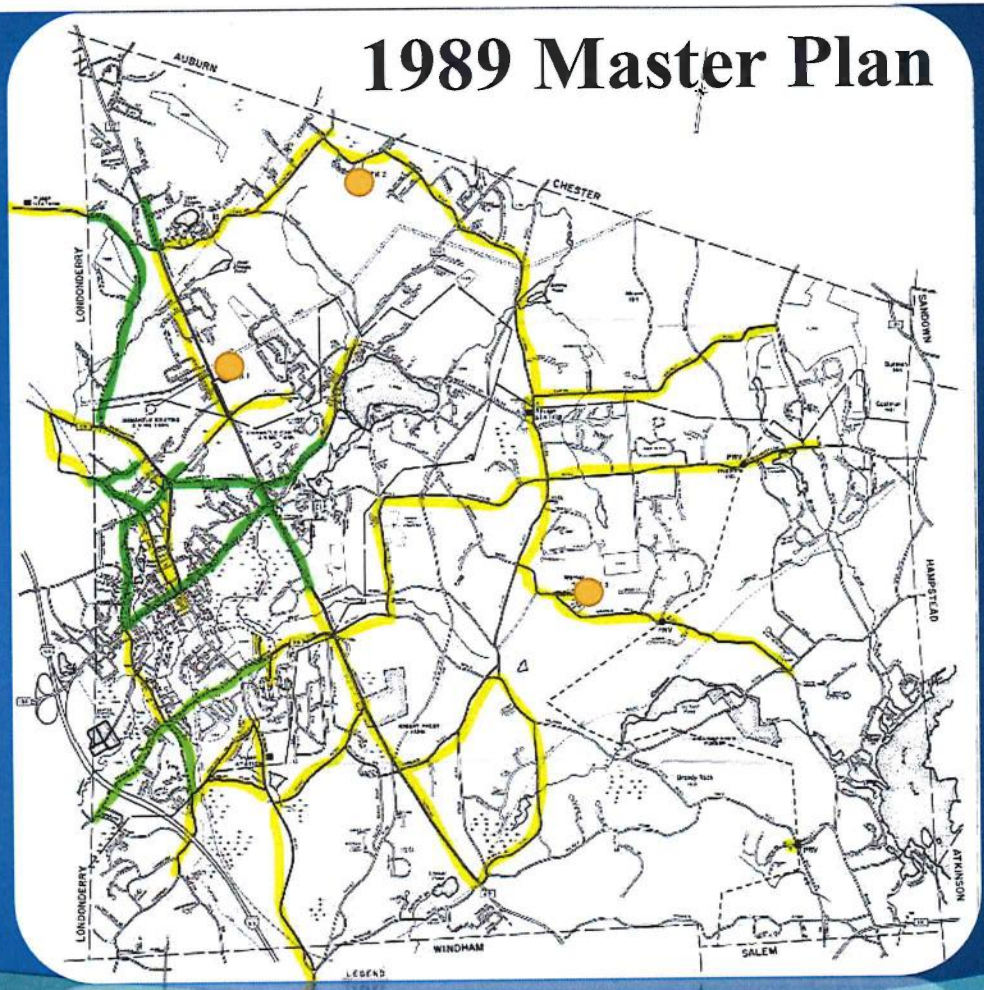
- Last Updated in 1989
- Goal and Vision
  - Bring public water to all of Derry

Legend:

Green = Existing System

Yellow = Proposed Expansion

● = Proposed Water Storage Tanks



UNDERWOOD engineers

Proposed Future Conditions

Minimal Targeted Expansion

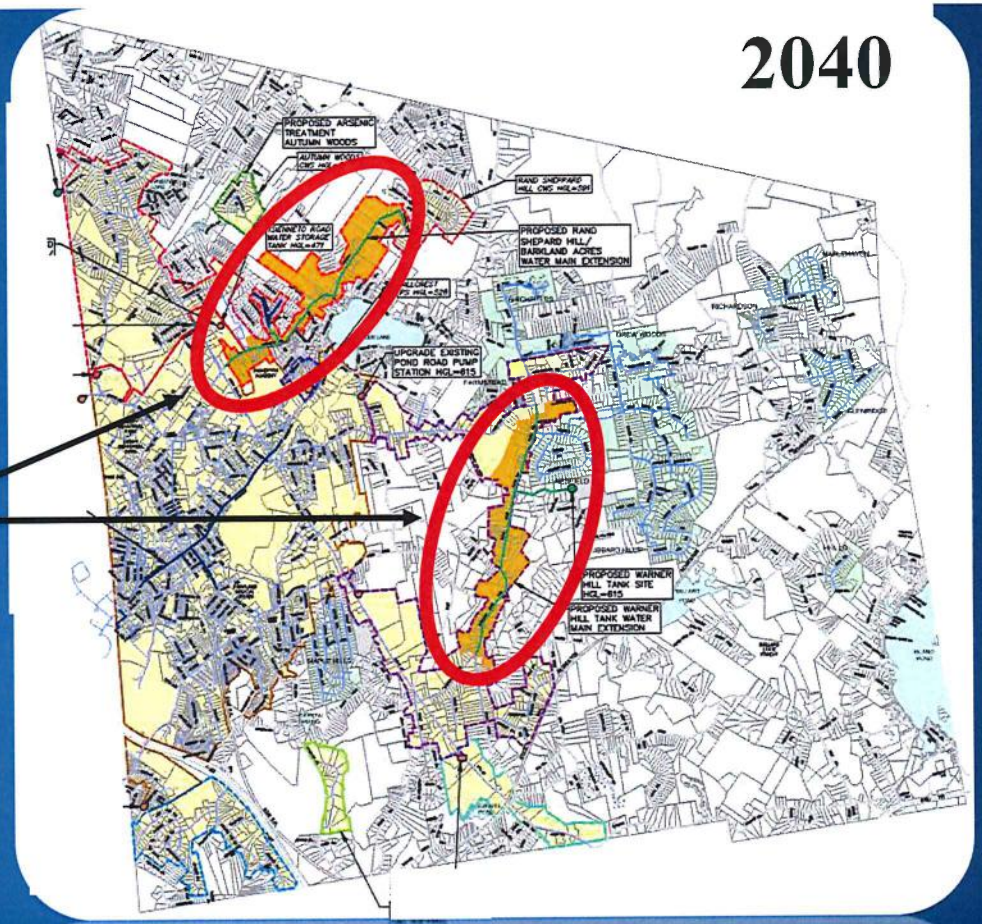
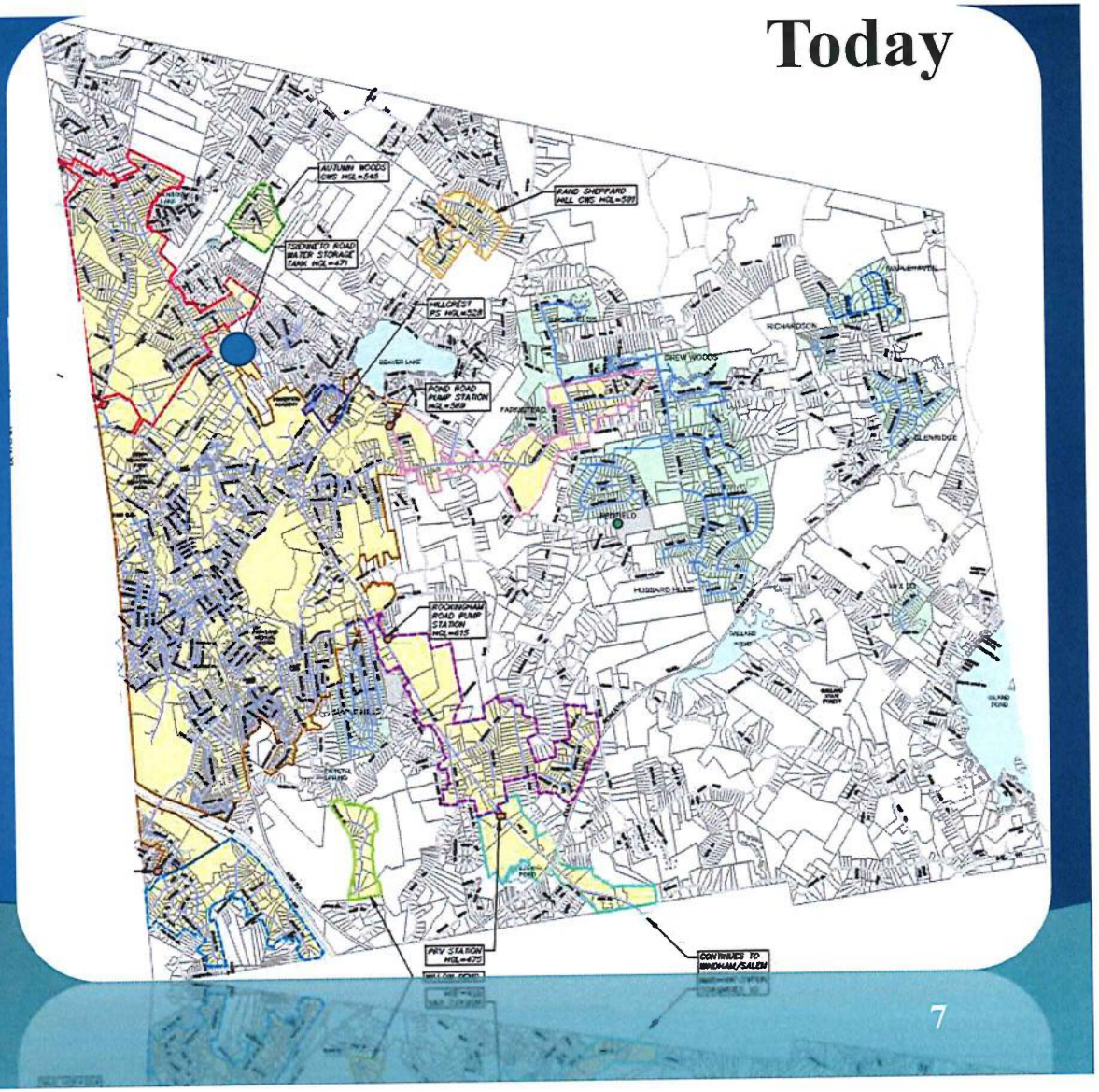


Figure: Proposed future 2040 service area

UNDERWOOD engineers

Current Conditions

- Water supplied by MWW
- 89.4 miles of water main
- 7 pressure zones
- 6 pump stations
- A 4 MG storage tank
- 3 community water systems



UNDERWOOD engineers

Historical Water Demands

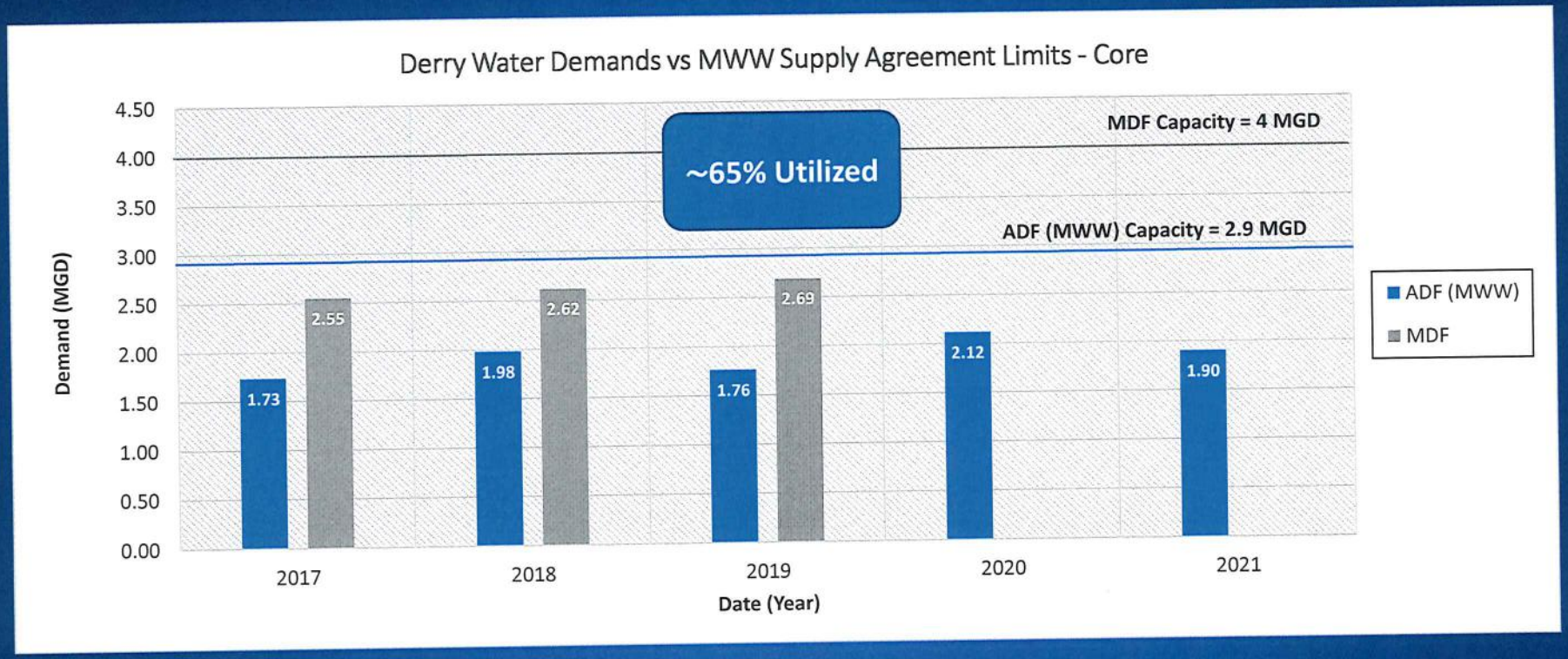
MINIMAL GROWTH

Year	Annual Average Daily Flow (ADF), MGD	Annual Average Daily Flow (ADF) MWW, MGD	Summer Average Daily Flow, MGD	Maximum Daily Flow (MDF), MGD
2017	1.51	1.73	1.71	2.55
2018	1.45	1.98	1.86	2.62
2019	1.47	1.76	1.75	2.69
2020	1.55	2.12	2.10	N/A[4]
2021	1.49	1.90	1.80	N/A[4]

Notes:

1. Flows do not include community water systems.
2. MWW supply agreement defines ADF as the maximum average flow of any two consecutive months.
3. Summer Average Daily Flow is calculated from usage for June, July, August
4. Derry max day flow could not be calculated for 2020 and 2021 because daily Salem flow was not available.

UNDERWOOD engineers



Notes:

1. Derry max day flow not calculated for 2020 and 2021 because daily Salem flow not available.
2. MWW supply agreement defines ADF as the maximum average flow of any two consecutive months.

UNDERWOOD engineers

Regional Considerations

UNDERWOOD engineers

Regional Context

- SIA Agreement
- Regional efforts:
  - Phase 1 – Complete
  - Phase 2 - Underway
  - South Central
  - Londonderry PFAS
  - East Derry Connection
- Coordinate to maximize benefits
- Impacts future conditions and decision making

Picture: Governor Sununu at the Manchester Road Pump Station

UNDERWOOD engineers

SNHRW Project - 8 Towns

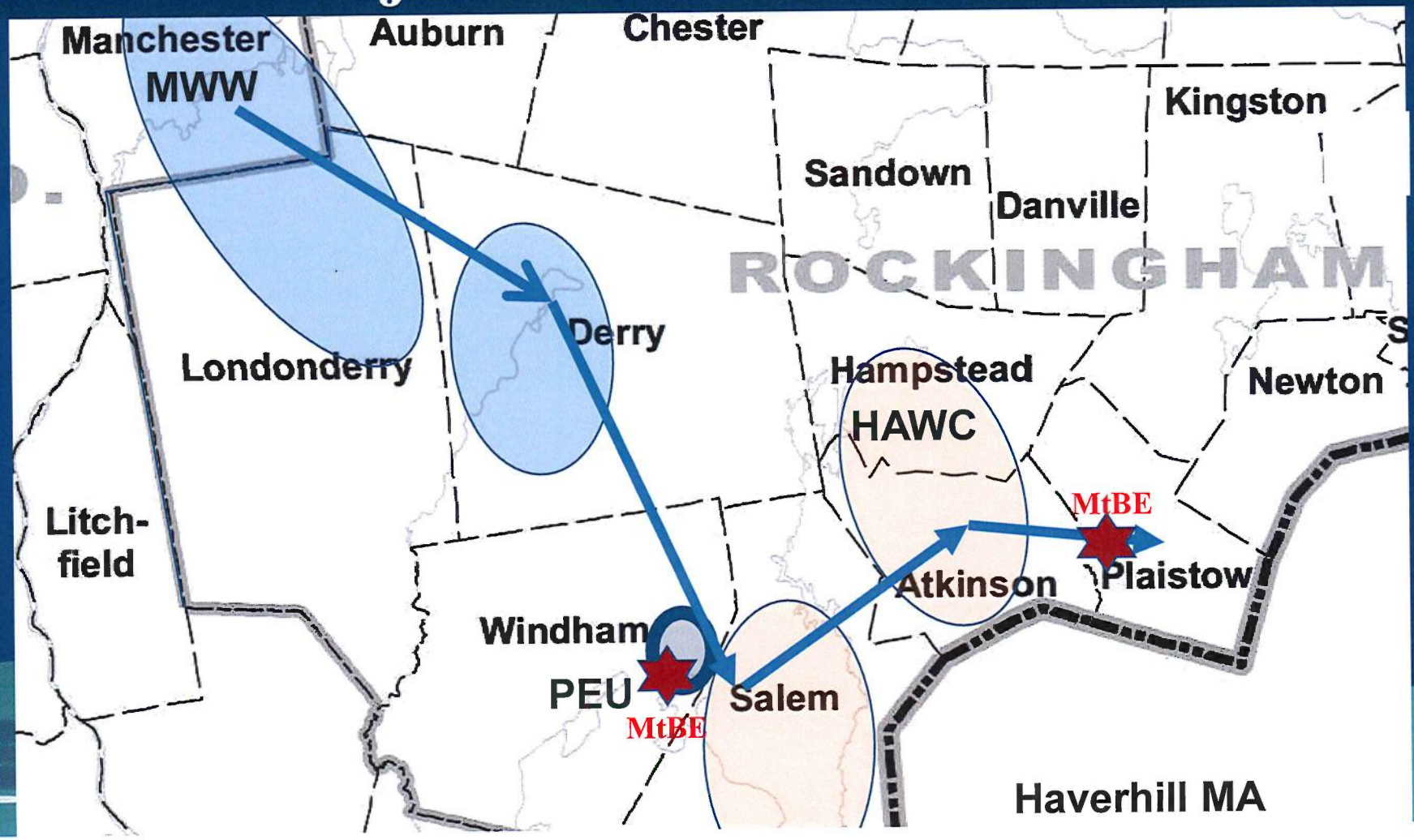


TABLE 2
REVISED ESTIMATED MAXIMUM DAY WATER DEMAND APPROPRIATIONS – PHASE I & II

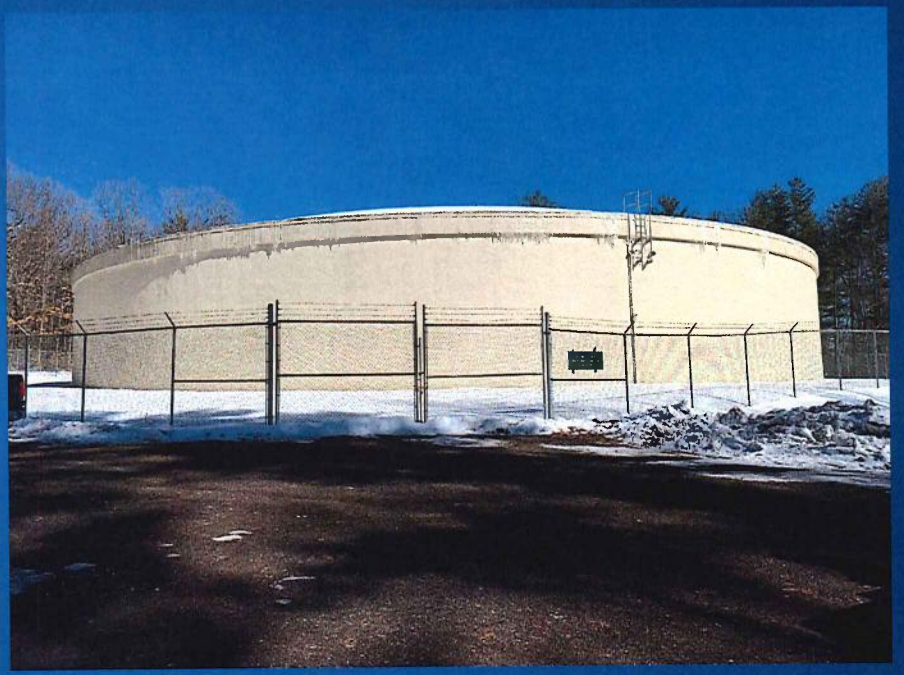
Water System	Estimated Maximum Day Demand (Phase I) (MGD)	Estimated Maximum Day Demand (Phase II) (MGD)	Estimated Maximum Day Demand (Total) (MGD)
Windham – Exit 3 Area	0.2	0.11	0.31
Salem Public Water System	0.3	1.2	1.5
HAWC Water System	0.25	0.5	0.75
Plaistow	0.25	0.32	0.57
Total	**1.0**	**2.13**	**3.13**

CIP and Rates

UNDERWOOD engineers

Master Plan Goals & Vision

- Renew Aged Infrastructure
- Resilient, Robust & Reliable
- Financially Realistic
- Targeted Expansion
  - Promote economic growth (RT-28)
  - Address CWS issues



Picture: 4 MG Tsienneto Rd Tank

UNDERWOOD engineers

CIP- Existing Needs

Capital Project[1]	Possible Funding Source	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028
Rand Shepard Hill Water Interconnection Project	Bond	$6,110,000					
Autumn Woods Arsenic Absorption System[2]	Fund Balance						
Pipe Replacement Projects[3]	Budget	$350,000	$600,000	$600,000	$600,000	$600,000	$600,000
Manchester Road Booster Pump Station Pressure Strategy	MTBE Grant (full)	$60,000					
Chem Feed and Valve Building at Tsienneto Tank	Bond			$1,250,000			
Vehicle Replacement[4]	Operating Budget/Lease	$265,000	$23,972	$33,904	$46,808	$53,600	$53,600
Bedrock Well	Operating Budget		$100,000				
Warner Hill Tank and Loop[5]	TBD		TBD				
Phase 2 Capital Improvements	TBD						
Pingree Hill Tank	TBD						
TOTAL CIP	**$10,693,283**	**$6,785,000**	**$723,972**	**$1,883,904**	**$646,808**	**$653,600**	**$653,600**

UNDERWOOD engineers

Rand Shepard Hill

UNDERWOOD
engineers

Rand Shepard Hill CWS

- Water quality and supply issues
  - Trucking in water to meet demand
  - Well #1 taken offline due to iron
  - Decline in supply capacity
  - Exceeds future manganese notification limit
- Service connections = 63
- Population served = 158
- ADF = 13,000 gpd

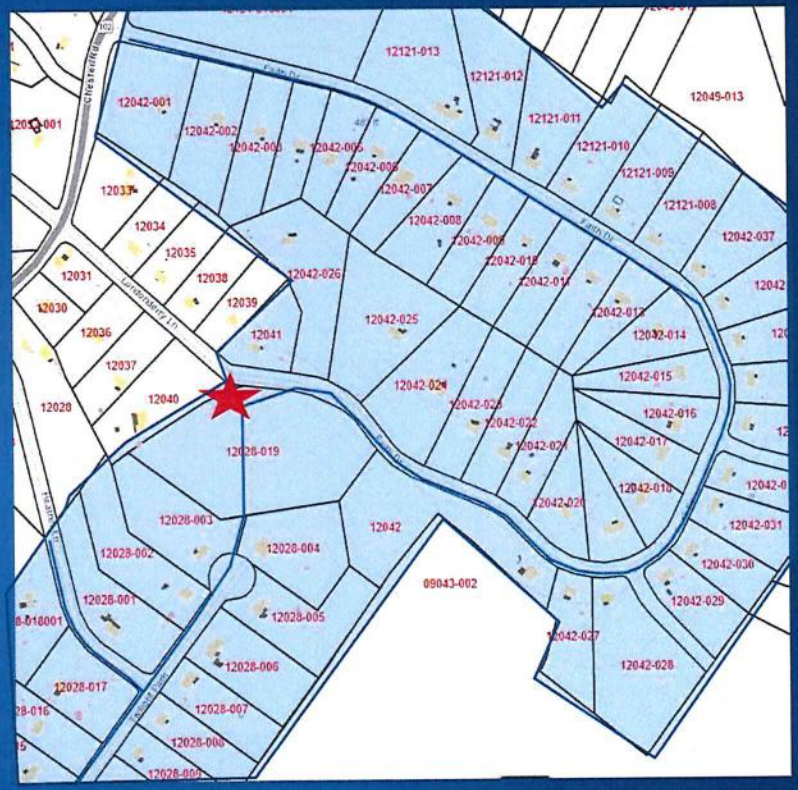
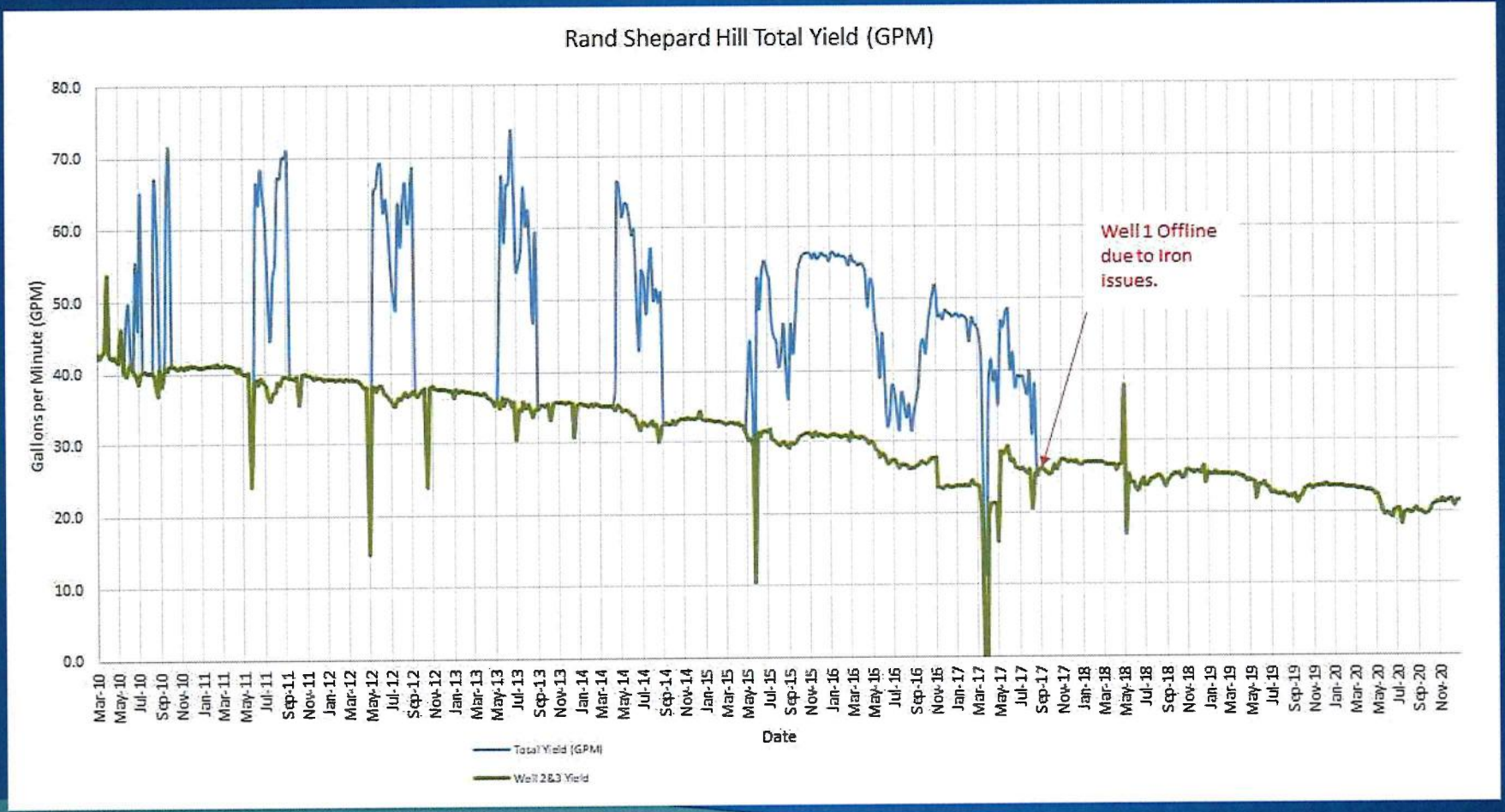


Image: Rand-Shepard Hill Service Area

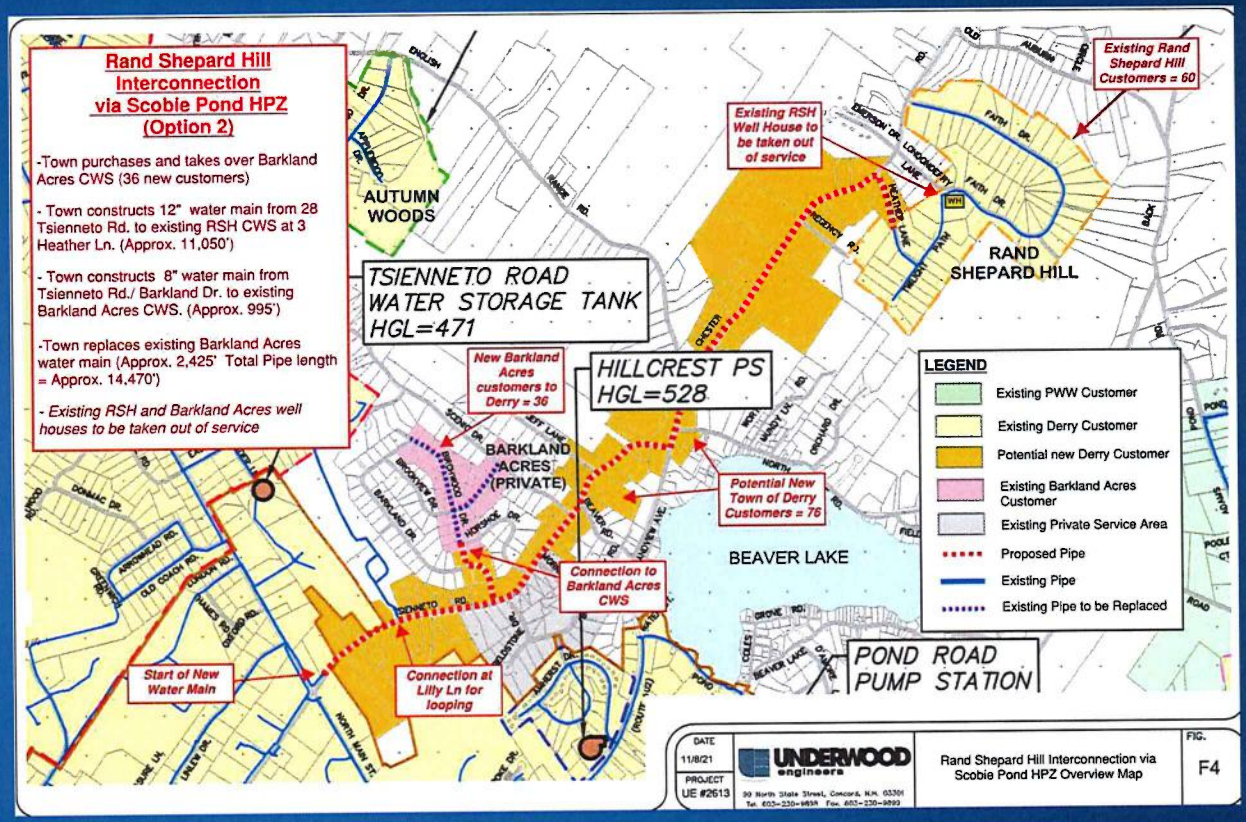
UNDERWOOD engineers



UNDERWOOD engineers

Alternatives

1. Onsite Improvements
   - New well may not be feasible
   - Labor and O&M intensive
2. Adams Pond Interconnect
   - Acquire PWW service area
   - Conservation easement
   - RSH well house remains online
3. Scobie Pond Interconnect
   - Higher density zoning
   - Barkland Acers
   - Minimal labor and O&M



Picture: Rand Shepard Hill Interconnect via Scobie Pond HPA

UNDERWOOD engineers

Pipe Replacement Projects

UNDERWOOD engineers

Pipe Replacement Projects

- Pipe exceeding useful life in service
  - Sections of system date back to 1890's
  - Approx. 20% pipe is greater than 50 years old
- Pressures exceed 100 psi
  - NHDES recommends 80 psi max
- Prioritized:
  - Probability of failure
  - Consequence of failure

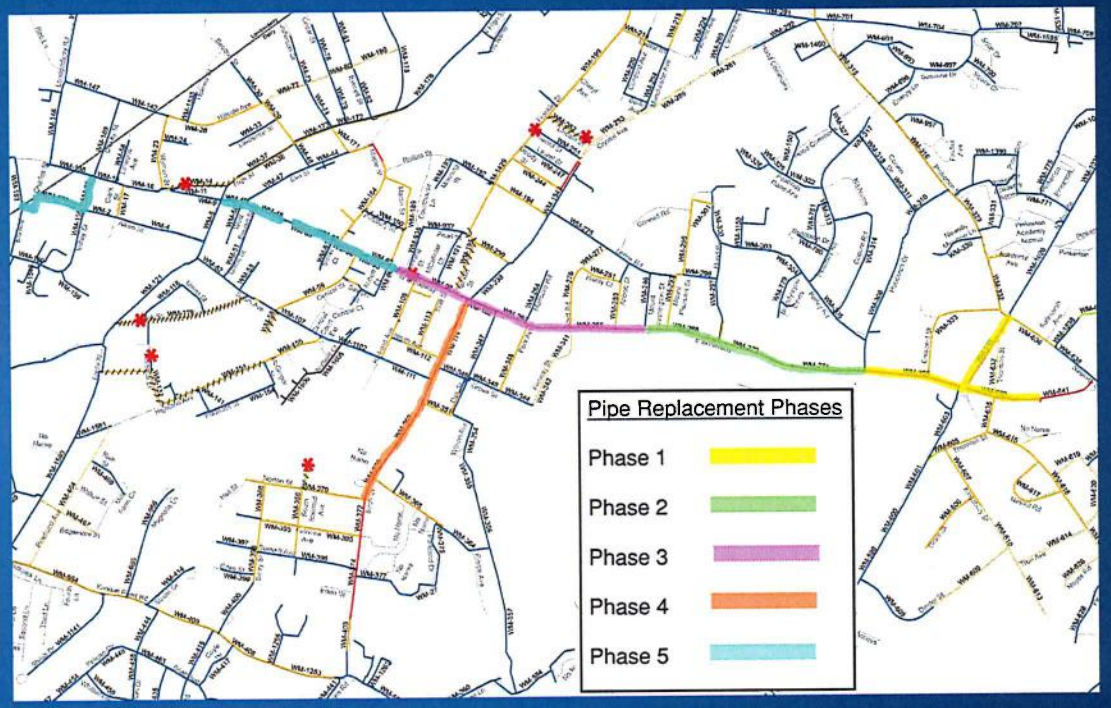


Image: Pipe Replacement Projects

UNDERWOOD engineers

Chemical Feed/Valve Building

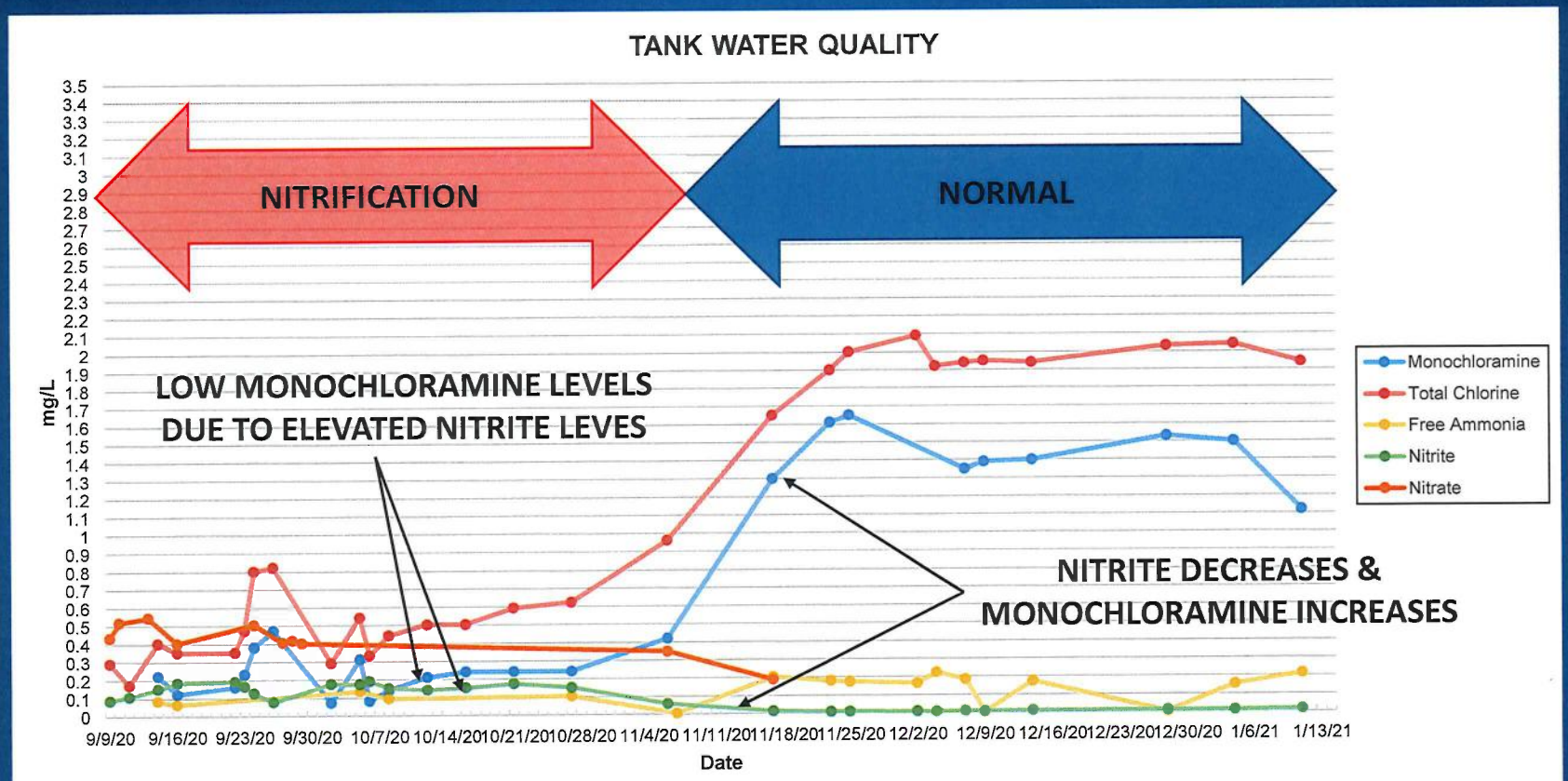
UNDERWOOD
engineers

Tsienneto Rd. Tank Building

- Water Quality
  - Minimal "tools" to control water quality
  - Tank water quality is representative of the systems water quality
  - Tank is a problem spot for nitrification
    - Nitrification can lead to lead and copper issues and violation of total coliform regulation
- Access/Safety Concerns
  - Not OSHA compliant
  - Confined space entry

Image: Tank Vault

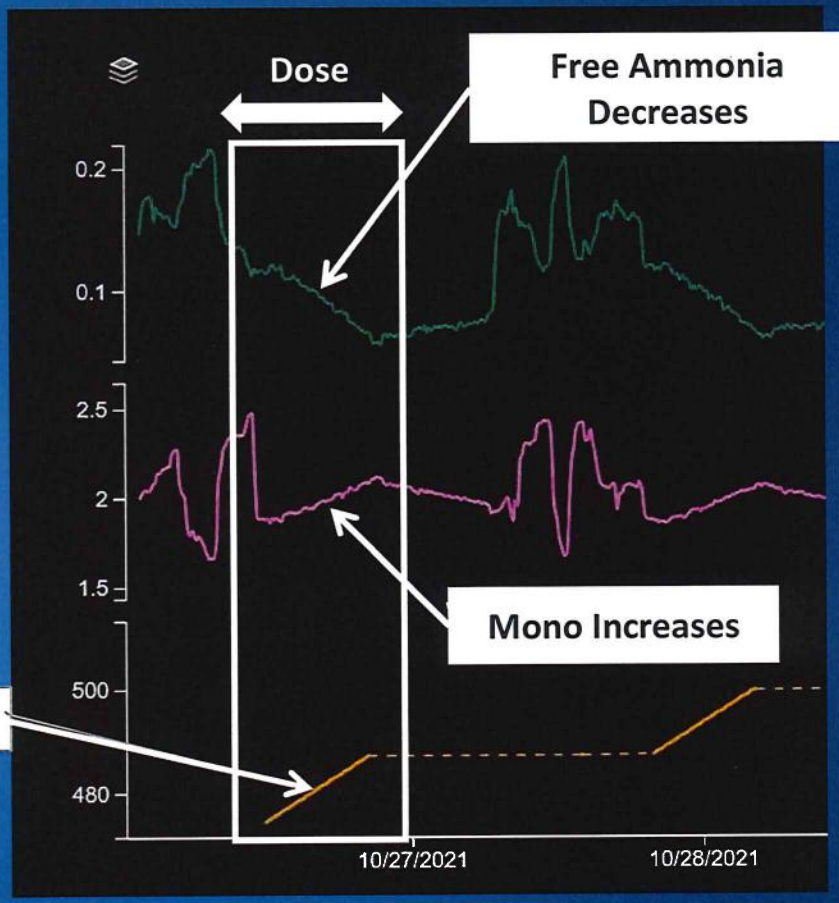
UNDERWOOD engineers



UNDERWOOD engineers

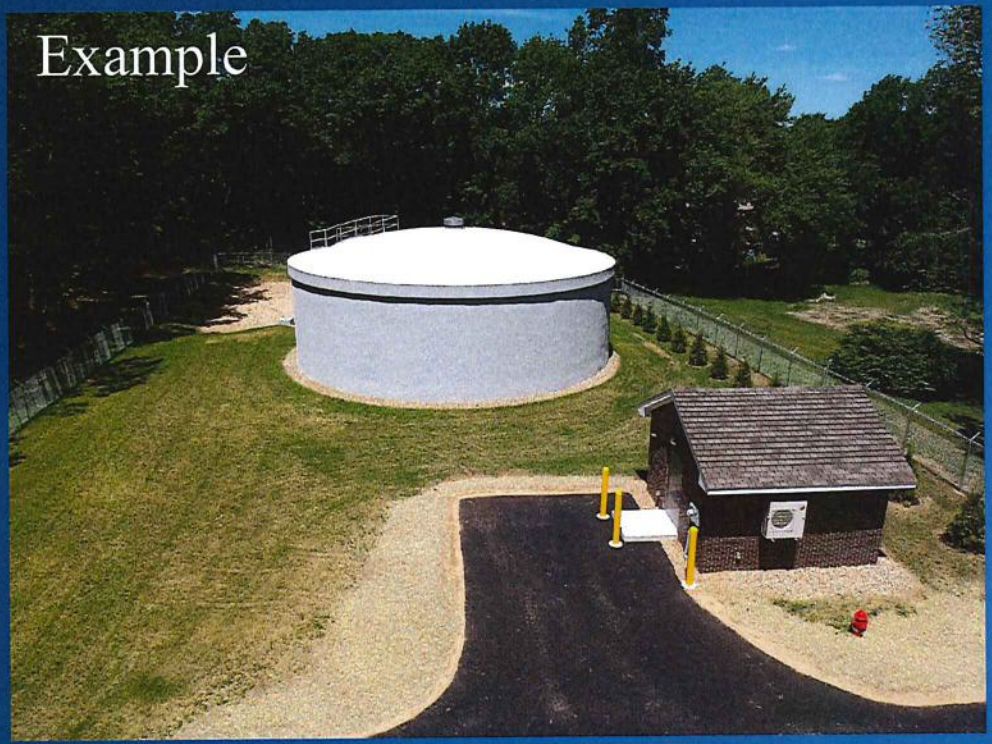
Chemical Feed Pilot

Adding Chlorine



UNDERWOOD engineers

Example



Images: Plaistow Valve Building (No Chem Feed)

Proposed Building: 40'x15'

UNDERWOOD engineers

Rate Study

The proposed rates support the CIP

UNDERWOOD engineers

Comparison of Annual Water Bills at 197 GPD (State Average Consumption)

UNDERWOOD engineers

Rate Setting Needs

Fiscal Year	Qtrly Fixed Charge	Consumption Rate ($/100CF)	Annual Bill	Annual Bill Increase	Qtrly Bill Increase
2022	$26	$2.79	$368		
2023	$27	$2.89	$386	$18	$4.50
2024	$30	$3.18	$424	$38	$9.50
2025	$33	$3.50	$467	$43	$10.75
2026	$36	$3.85	$514	$47	$11.75
2027	$40	$4.23	$565	$51	$12.75

Current Rates

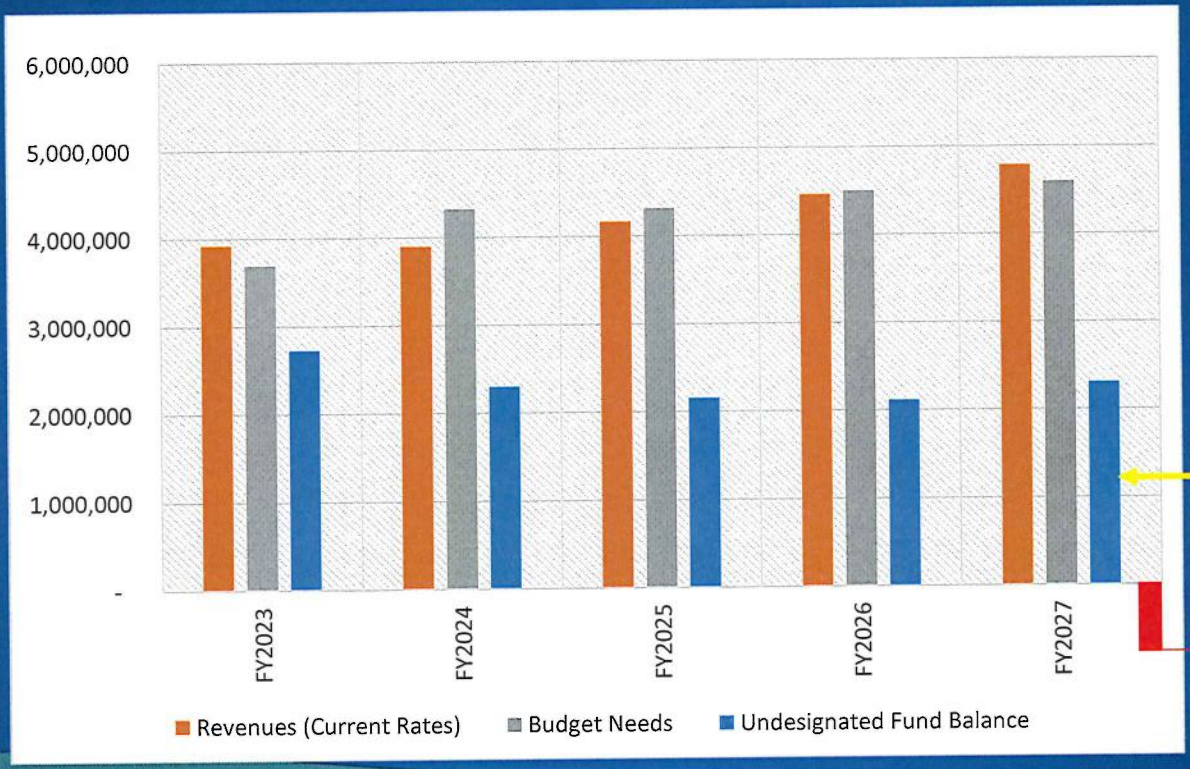
Scheduled Inc.

Annual Bill based on State average consumption of 197 gpd.

Less than current state average annual bill of $587

UNDERWOOD engineers

Revenues, Expenditures & Fund Balance



Recommended Capital Reserves: minimum of 3-6 months expenditures plus additional for CIP

$2.3M = 6 months expenditures

Reserves -$390k if no rate increases

UNDERWOOD engineers

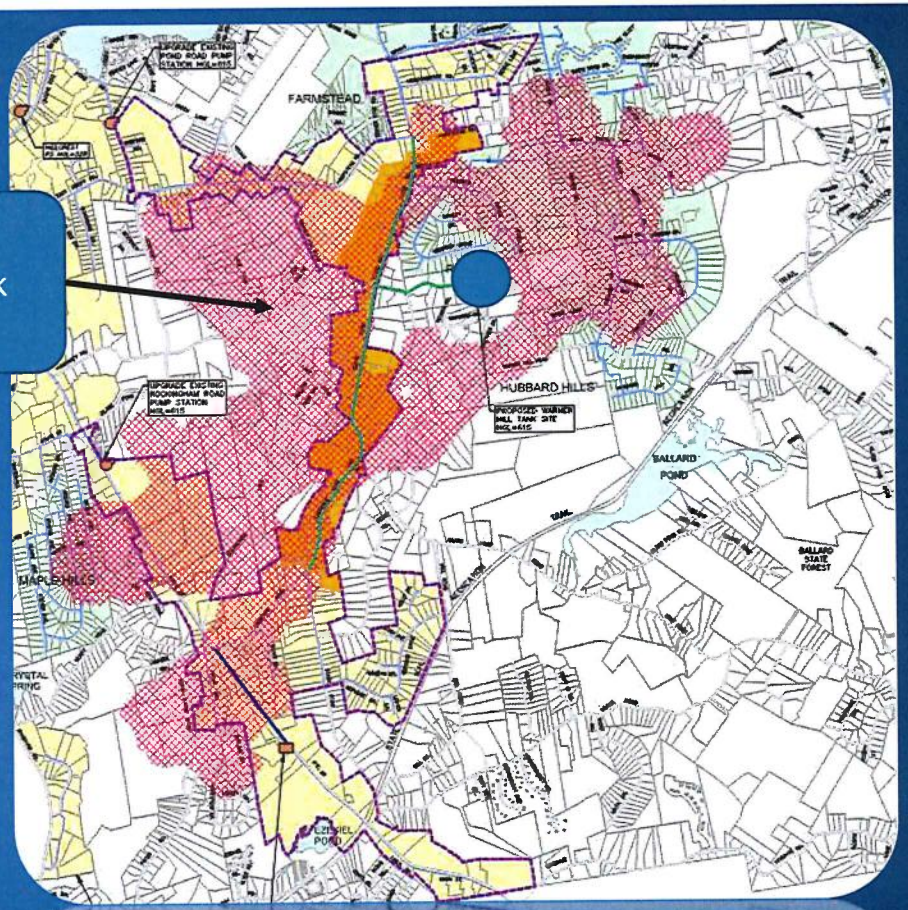
Future Conditions

UNDERWOOD
engineers

Warner Hill Tank & Loop

- Emergency storage
- Fire protection
  - Promotes Commercial Growth on RT-28
- East Derry expansion
- Improves Water Quality & Operations
- Coordinated with Phase 2

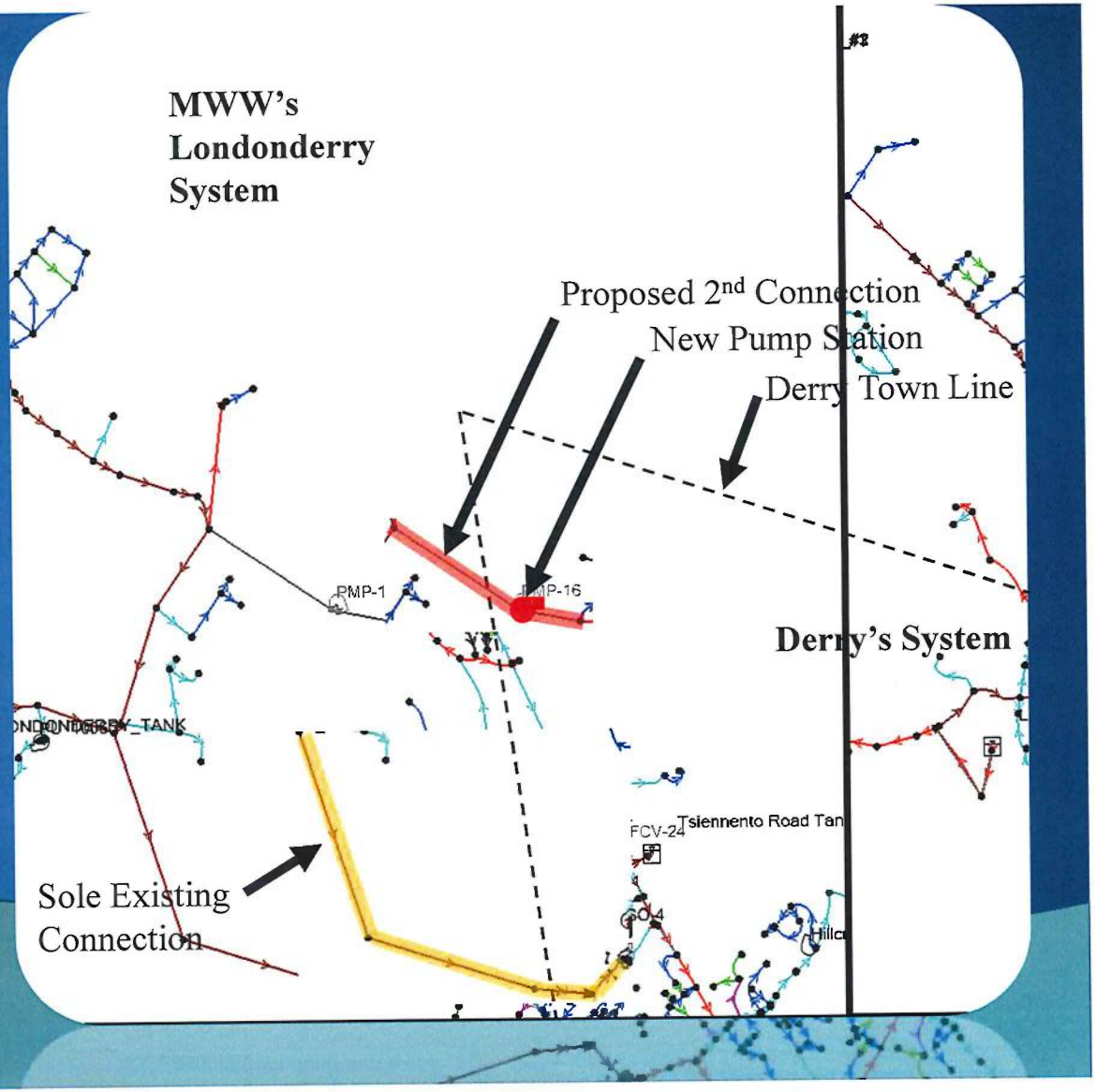
Red shaded area serviceable by tank (35-80 psi)



UNDERWOOD engineers

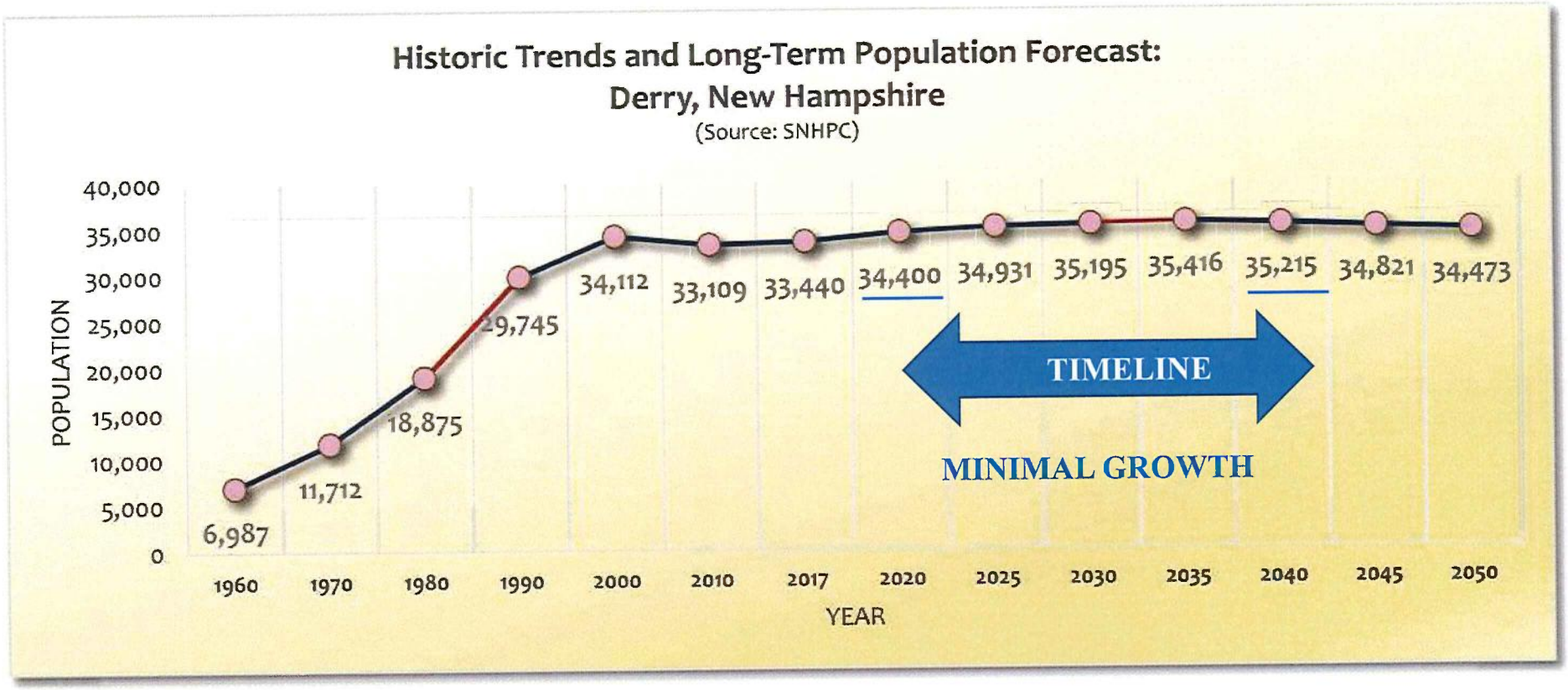
Second Connection

- Supply redundancy
- Improved fire protection in Scobie Pond pressure zone
- Coordinated with Phase 2



UNDERWOOD
engineers

POPULATION & HOUSEHOLD CHARACTERISTICS



Proposed Future Conditions

Increases in future demands based on service area expansion

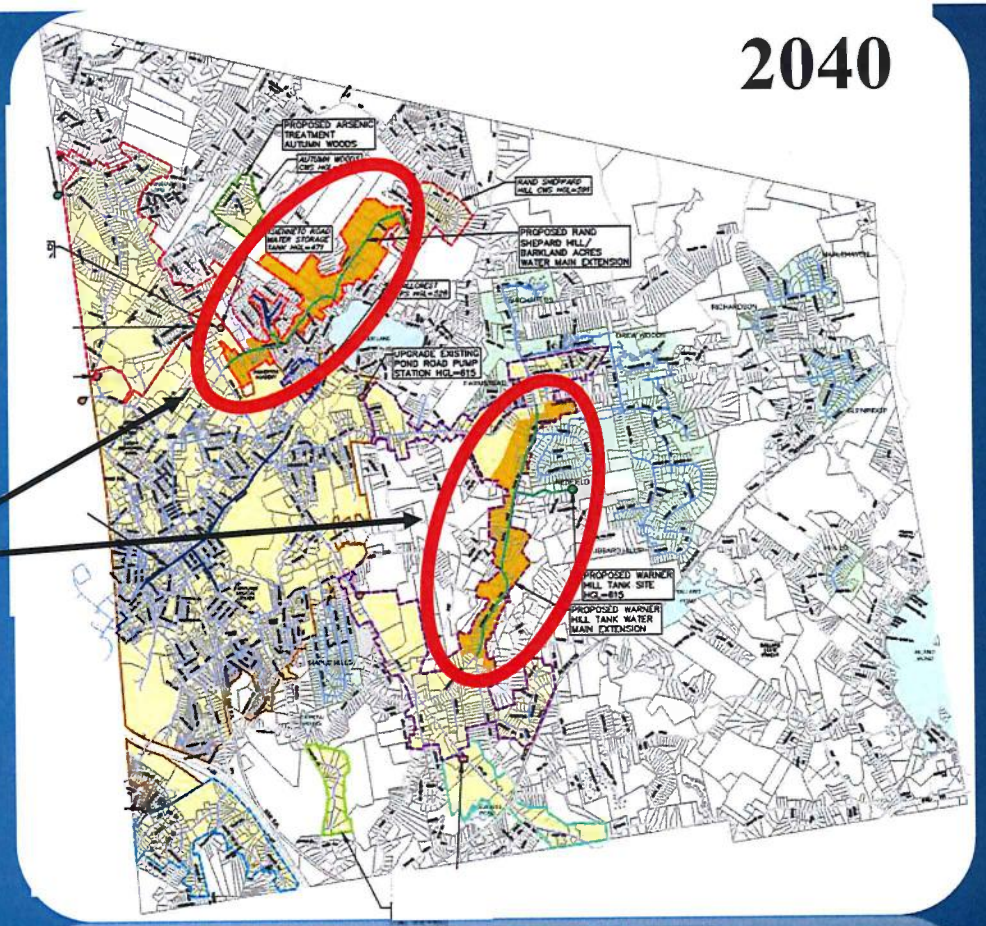
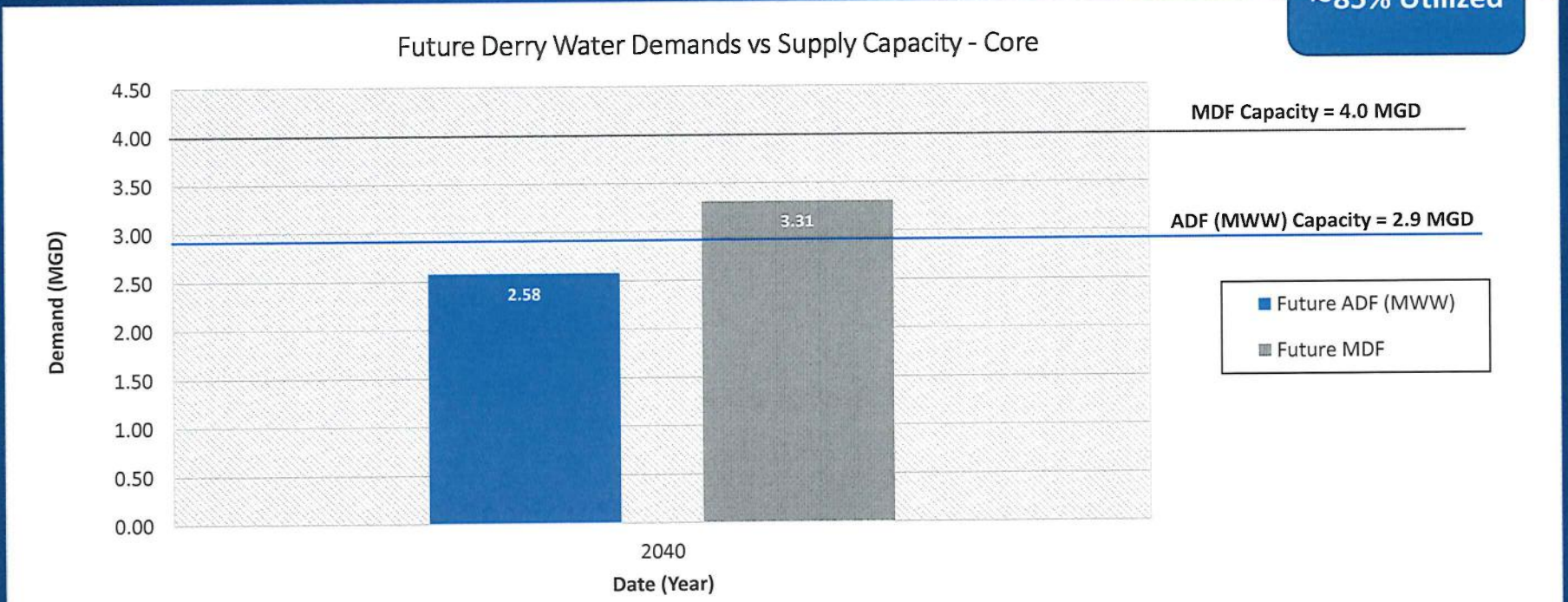


Figure: Proposed future 2040 service area

UNDERWOOD engineers

Future Demands vs Supply Capacity

~85% Utilized



UNDERWOOD engineers

Recommendations

Immediate Needs:

- Rand Shepard Hill supply and water quality issues
- Renew aged infrastructure
- Chemical feed at tank

Future Needs:

- Supply redundancy
  - Second Connection
- Promote commercial growth on RT-28 and allow for East Derry expansion
  - Warner Hill tank and loop

Picture: Manchester Road Booster Pump Station

UNDERWOOD engineers

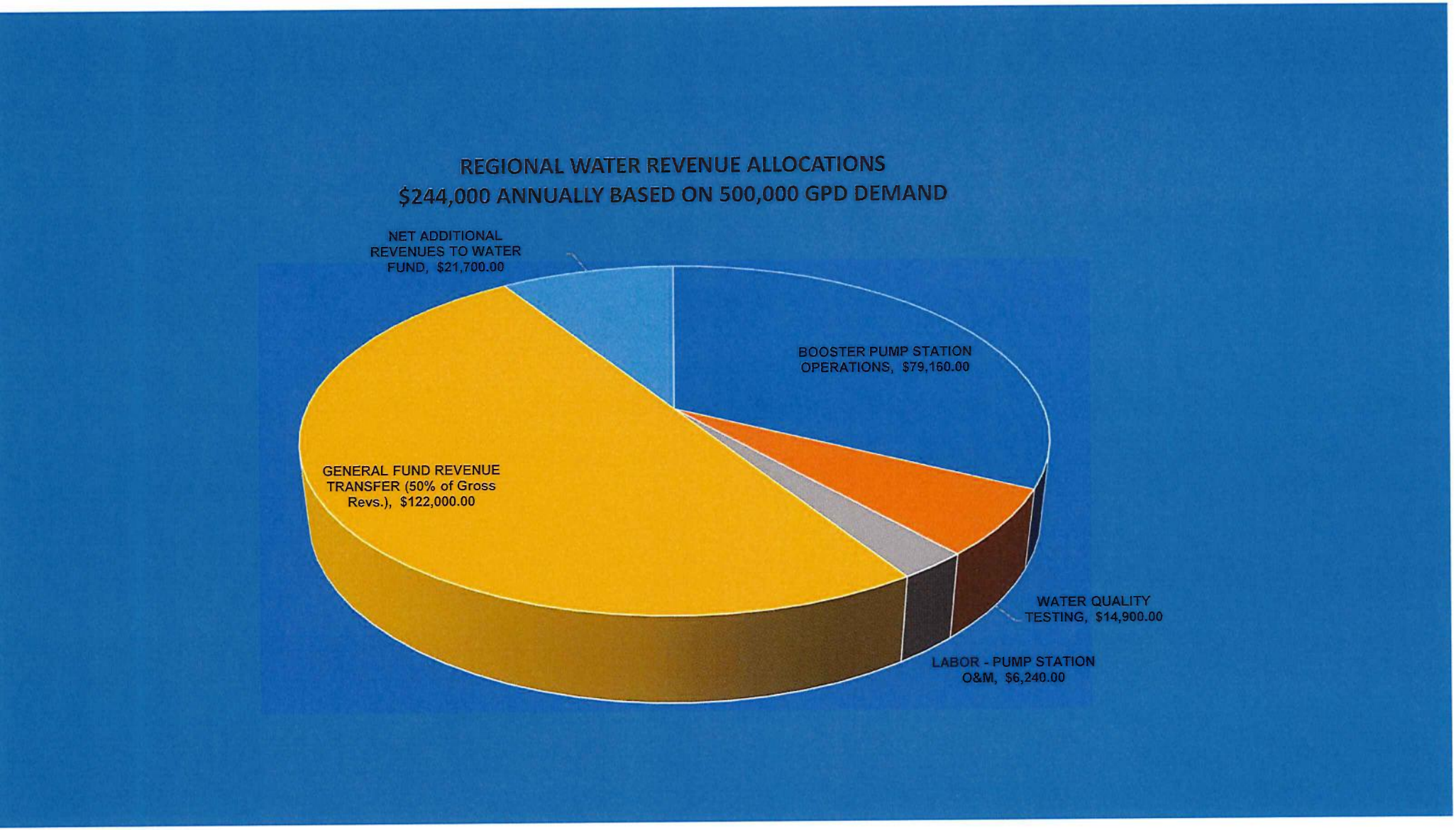
Next Steps:

- Implement rate adjustments and CIP
- Deliver Master Plan - May 2022
- Start Phase 2 evaluation - July 2022

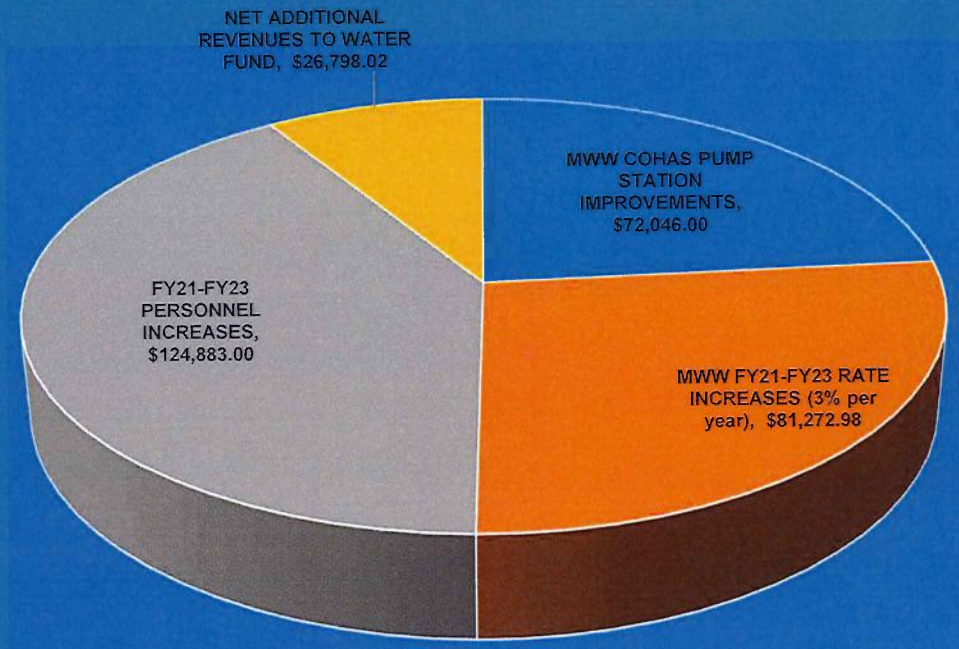
UNDERWOOD engineers

Questions?

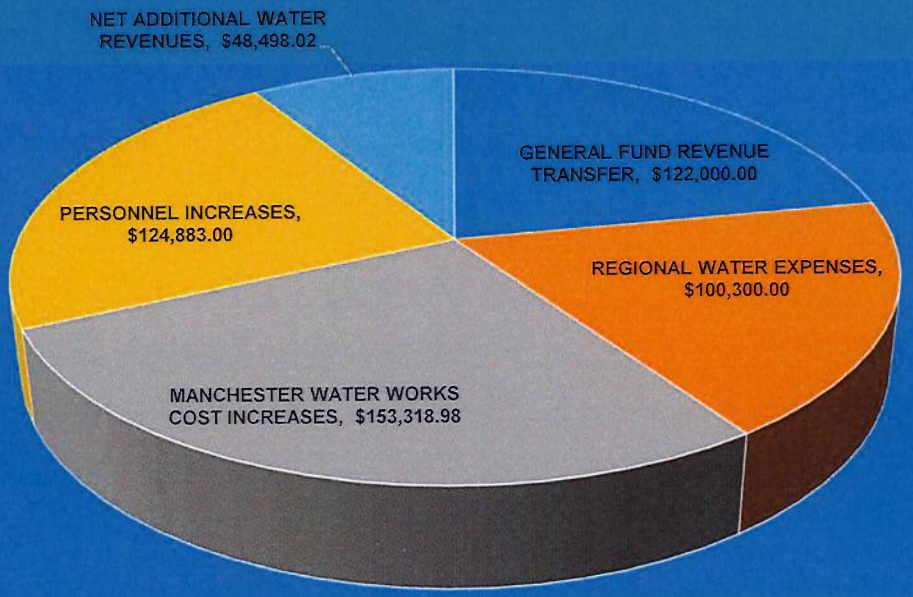
UNDERWOOD
engineers


REGIONAL WATER REVENUE ALLOCATIONS
$244,000 ANNUALLY BASED ON 500,000 GPD DEMAND
NET ADDITIONAL REVENUES TO WATER FUND, $21,700.00
BOOSTER PUMP STATION OPERATIONS, $79,160.00
GENERAL FUND REVENUE TRANSFER (50% of Gross Revs.), $122,000.00
WATER QUALITY TESTING, $14,900.00
LABOR - PUMP STATION O&M, $6,240.00

FY21 RATE INCREASE REVENUE ALLOCATIONS
$305,000 ANNUALLY
$3.40 PER MONTH INCREASE TO AVERAGE BILL ($72/QTR to $82/QTR)



TOTAL REGIONAL WATER & RATE INCREASE REVENUE ALLOCATIONS
$549,000 ANNUALLY BASED ON 500,000 GPD



FY 2023 Water and Wastewater BUDGETS

Michael A. Fowler, P. E.
Director of Public Works

Water – Page 475

- 4,307 service connections
- 90 miles of water main (up from 72 in 2017)
- 3 community water systems, 6 booster pump stations
- 693 hydrants (up from 614 in 2014)
- **Revenues - $3,726,094**
- **Expenses - $3,726,094**
- Water Usage Rate $2.89 per 100 cf – approved increase
- Base Charge $27.00 per qtr. for ¾" service
- $444,492 in revenue from Fire hydrant rental fees
- $243,984 in revenue from SNH Water

Water – Page 475

- $962,389 for purchased water from MWW
- $145,834 for debt service, P & I
- $350,000 capital improvement for water main replacement
- $130,000 to replace F550 Truck w/Mechanics Body
- $85,000 to replace F350 Truck w/Utility Body
- $50,000 to replace Colorado with Cargo Van
- **NOTE: FY 23 BUDGET AS PRESENTED DOES NOT INCLUDE RECOMMENDED RATE INCREASES FROM MASTER PLAN AND ASSOCIATED PROJECTS**

Truck 517A - 2011

Truck 603 - 2012

Truck 678 - 2019

Wastewater – Page 442

- 66 miles of sewer mains
- 3,303 service connections
- 10 lift stations
- **Revenues - $2,819,152**
- **Expenditures - $2,819,152**
- Sewer Usage Rate $3.70 per 100 cf
- Base Charges $41.00 per qtr.
- Revenues primarily from usage and base charges.
- $482k debt service, P & I – last payments on 2003 Force Main ($185k) and Brady sewer ($106k) in FY 23
- WWTP Generator Replacement - $150k
- Replace F350 Truck with Utility Body - $75k

Truck 611 - 2012