City of Huntsville

Palm Street Water Plant

Condition Assessment

November 10, 2015

Presentation Outline

- Palm Street Water Plant Overview
- Risk Assessment Methodology
- Filters Assessment
- Pump Station Alternatives
  - Alternative 1 – Rehab Existing Pump Station
  - Alternative 2 – New Pump Station
- Recommendations

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Water Plant Overview

Old Pump Station

2 – 2,000 gpm pumps

2 – 1,000 gpm pumps

6,000 gpm capacity

New Pump Station

4 – 1,750 gpm pumps

7,000 gpm capacity

Palm St. Water Plant

Total Capacity – 13,000 gpm

Firm Capacity – 11,000 gpm

11,000 gpm = 15.8 MGD

Max Day = 12.5 MGD

Approx. 26% extra capacity

Spring Lake WP

2 – 500 gpm pumps

1 – 1,000 gpm pump

Firm Capacity – 1,000 gpm

City of Huntsville

Total Firm Capacity – 12,000 gpm (17.3 MGD)

2040 Max Day = 16.0 MGD

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Water Plant Overview

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Old Pump Station Overview

- **Built in 1960**
- **Four vertical turbine pumps**
  - **2 - 1,000 gpm pumps**
  - **2 - 2,000 gpm pumps**
- **Original pumps, 3 original motors**
- **Space for 5th pump**
- **Access Issues**
- **Small footprint**

Old Pump Station
Pump Assessment

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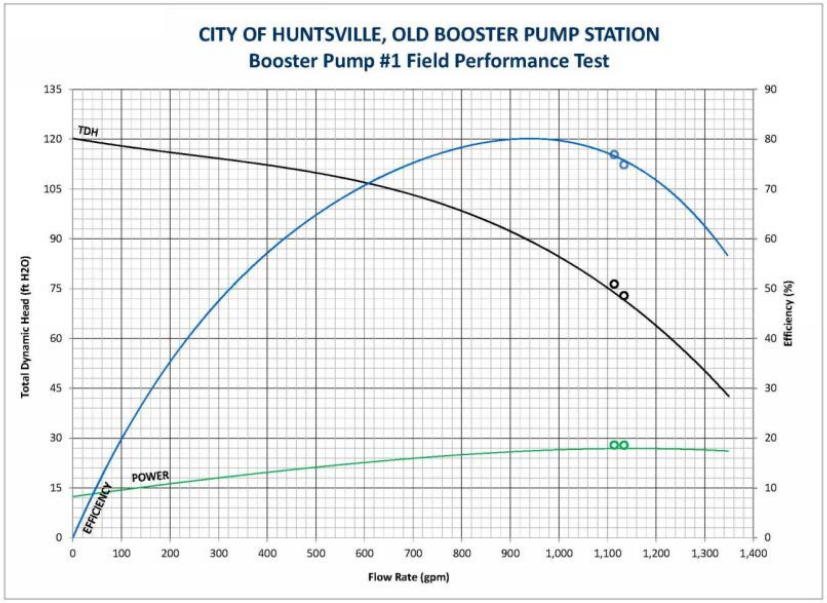
Old Pump Station
Pump Analysis

- High vibration, above HI standards
- Coupling guards difficult to remove
- Corroded stuffing box
- Packing gland studs gone on pumps 3 & 4
- Operating on the right side of the curve



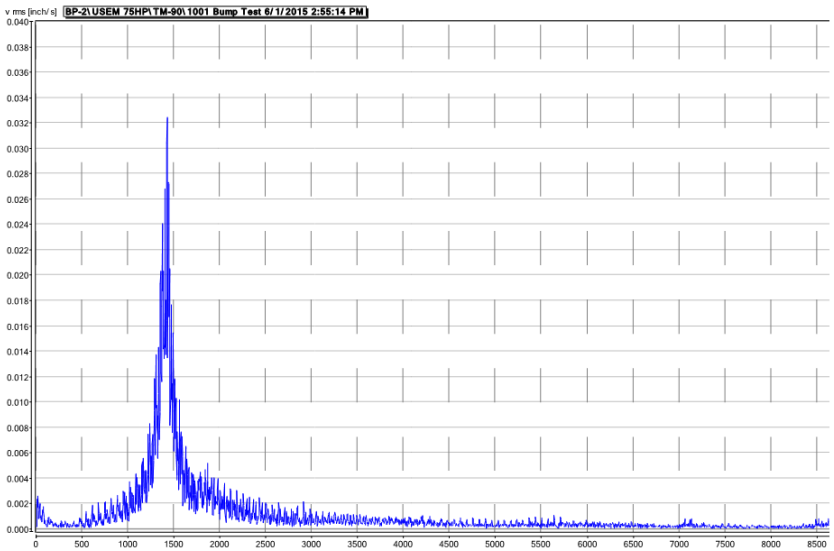


Figure 5: MT-90 Bump Test, Reed Frequency at 1,424 cpm, Motor Speed is 1,785 rpm

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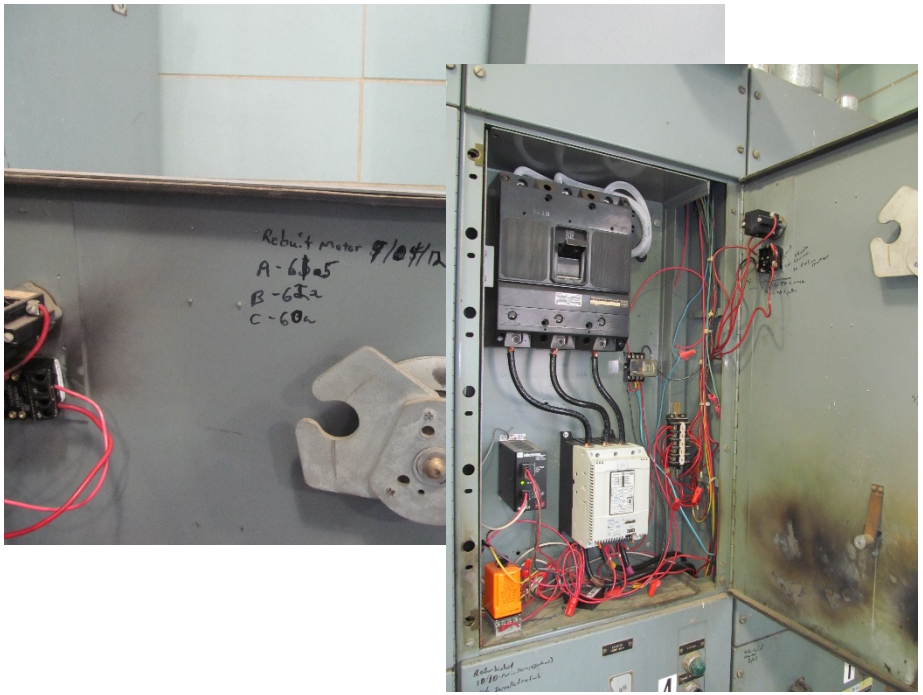
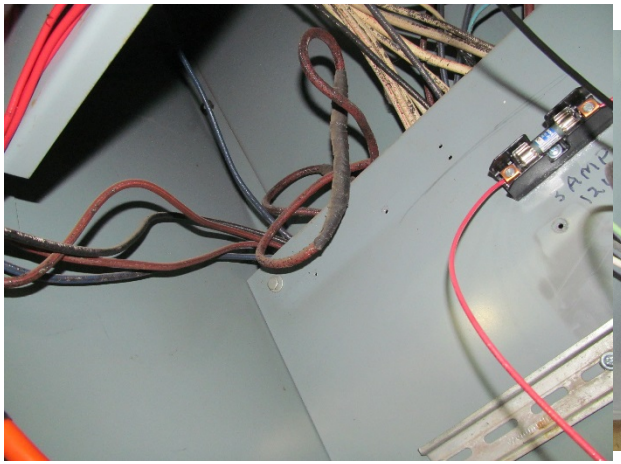
Old Pump Station
Electrical Assessment

- MCC
  - Original from 1960's
  - Parts no longer available
  - Cloth covered wiring
  - Pump controller obsolete
  - Indications of multiple faults
  - Water piping in MCC
  - Protective characteristics change
- Motors
  - Manufactured in 1960. One has been replaced, others are originals
  - Nameplate indicates asbestos in motors





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Old Pump Station
Mechanical Assessment

Observations

- No permanent mechanical ventilation installed.

Recommendations

- Recommend removing a section of windows on each side of the pump station to install wall-mounted fan and louver.
- Recommend installing another unit heater for redundancy.

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Old Pump Station
Structural Assessment

New Pump Station

- Built in 1983
- Four horizontal split case pumps
  - 4 – 1,750 gpm pumps
- Generally requires more maintenance
- Three pumps have been replaced

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New Pump Station

Pumps, Piping, and Valves

- Signs of corrosion on some of the pumps
- No longer manufacturing this pump.
  - Cast parts unlikely to be available
- BFVs utilized instead of GVs
- Old BFV showed signs of cavitation and was very corroded
- Corrosion at taps
- Tape coating peeling in some locations

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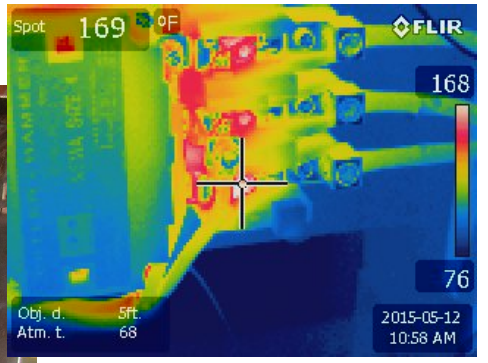
New Pump Station
Electrical Assessment

- MCC & Equipment
  - Installed mid 1980s, past the life expectancy
  - MCC components becoming hard to find
  - Protection characteristics of equipment changes as it ages
  - Disconnect on pump 1 corroding inside
- Automatic Transfer Switch (ATS)
  - Replacement parts will become hard to find
- Motors
  - Some have been replaced.
  - Infrared reading have been done
- Motor Operated Valve (actuators) are not longer supported. Parts are not available.



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New Pump Station
Mechanical Assessment

- Unit heater does not work and should be replaced, redundancy is recommended.
- Louvers let water through, recommend combination louver-damper.
- Exhaust fan is nearing end of useful life. Recommend replacing and including wall collar, hood and OSHA guards.

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New Pump Station
Structural Assessment

Other Site Items

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Risk Assessment Methodology

Condition Rating	Scoring Guidelines
1	**Very Good** condition; no improvements recommended to maintain function
2	**Good** condition; minor improvements recommended to maintain function
3	**Fair** condition; improvements recommended to improve performance or efficiency
4	**Poor** condition; improvements recommended to maintain reliability
5	**Very Poor** condition; rehabilitation or replacement required

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Risk Assessment Methodology

Rating	Scoring Guidelines
Capacity Lost Due to Failure (50%)	
1	No Loss
3	Partial Loss
5	Complete Loss
Redundancy (20%)	
1	Full Redundancy
3	Partial Redundancy
5	No Redundancy
Outage Duration (30%)	
1	< 2 Days
3	3-14 Days
5	> 15 Days

Weighted Criticality Rating	Scoring Guidelines
1	**Very Low Impact**
2	**Low Impact**
3	**Moderate Impact**
4	**High Impact**
5	**Very High Impact**

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Risk Assessment Methodology

		Condition				
		Very Good	Good	Fair	Poor	Very Poor
Criticality	Very Low Impact	LOW RISK	LOW RISK	MODERATE RISK	MODERATE RISK	MODERATE RISK
	Low Impact	LOW RISK	MODERATE RISK	MODERATE RISK	MODERATE RISK	HIGH RISK
	Moderate Impact	MODERATE RISK	MODERATE RISK	MODERATE RISK	HIGH RISK	HIGH RISK
	High Impact	MODERATE RISK	MODERATE RISK	HIGH RISK	HIGH RISK	HIGH RISK
	Very High Impact	MODERATE RISK	HIGH RISK	HIGH RISK	HIGH RISK	HIGH RISK

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Risk Assessment Results

Facility	Component	Condition Rating	Criticality Rating	Risk
Old PS	MCC	Poor	Very High	High Risk
New PS	MCC	Poor	Very High	High Risk
Old PS	Pumps	Poor	High	High Risk
New PS	Roof	Poor	Moderate	Moderate Risk
New PS	Instrumentation	Poor	Moderate	Moderate Risk
Old PS	Roof	Poor	Moderate	Moderate Risk
Old PS	Motors	Fair	High	Moderate Risk
New PS	Pumps	Fair	High	Moderate Risk
New PS	Motors	Fair	High	Moderate Risk
Old PS	Alternate Power	Good	Very High	Moderate Risk
Old PS	HVAC	Poor	Low	Moderate Risk
Old PS	Valves	Poor	Low	Moderate Risk
New PS	HVAC	Poor	Moderate	Moderate Risk
New PS	Valves	Poor	Low	Moderate Risk
Old PS	Walls	Fair	Moderate	Moderate Risk
Other	Yard Piping	Fair	Moderate	Moderate Risk
New PS	Alternate Power	Very Good	Very High	Moderate Risk
Old PS	Piping	Fair	Low	Moderate Risk
New PS	Piping	Fair	Low	Moderate Risk
Other	Tank Overflows	Fair	Low	Moderate Risk
New PS	Walls	Fair	Moderate	Moderate Risk
New PS	Foundation	Fair	Moderate	Moderate Risk
New PS	SCADA	Good	Moderate	Moderate Risk
Old PS	Instrumentation	Fair	Low	Moderate Risk
Other	Site Drainage	Fair	Very Low	Low Risk
Other	Entrance Gate	Fair	Very Low	Low Risk
Other	Video Surveillance	Fair	Very Low	Low Risk
Other	New PS Discharge Meter	Fair	Very Low	Low Risk
Old PS	Crane	Good	Low	Low Risk
New PS	Crane	Good	Low	Low Risk
New PS	Chlorine Analyzer	Good	Low	Low Risk
Other	Fencing	Good	Low	Low Risk
Old PS	SCADA	Very Good	Moderate	Low Risk
Old PS	Foundation	Very Good	Moderate	Low Risk

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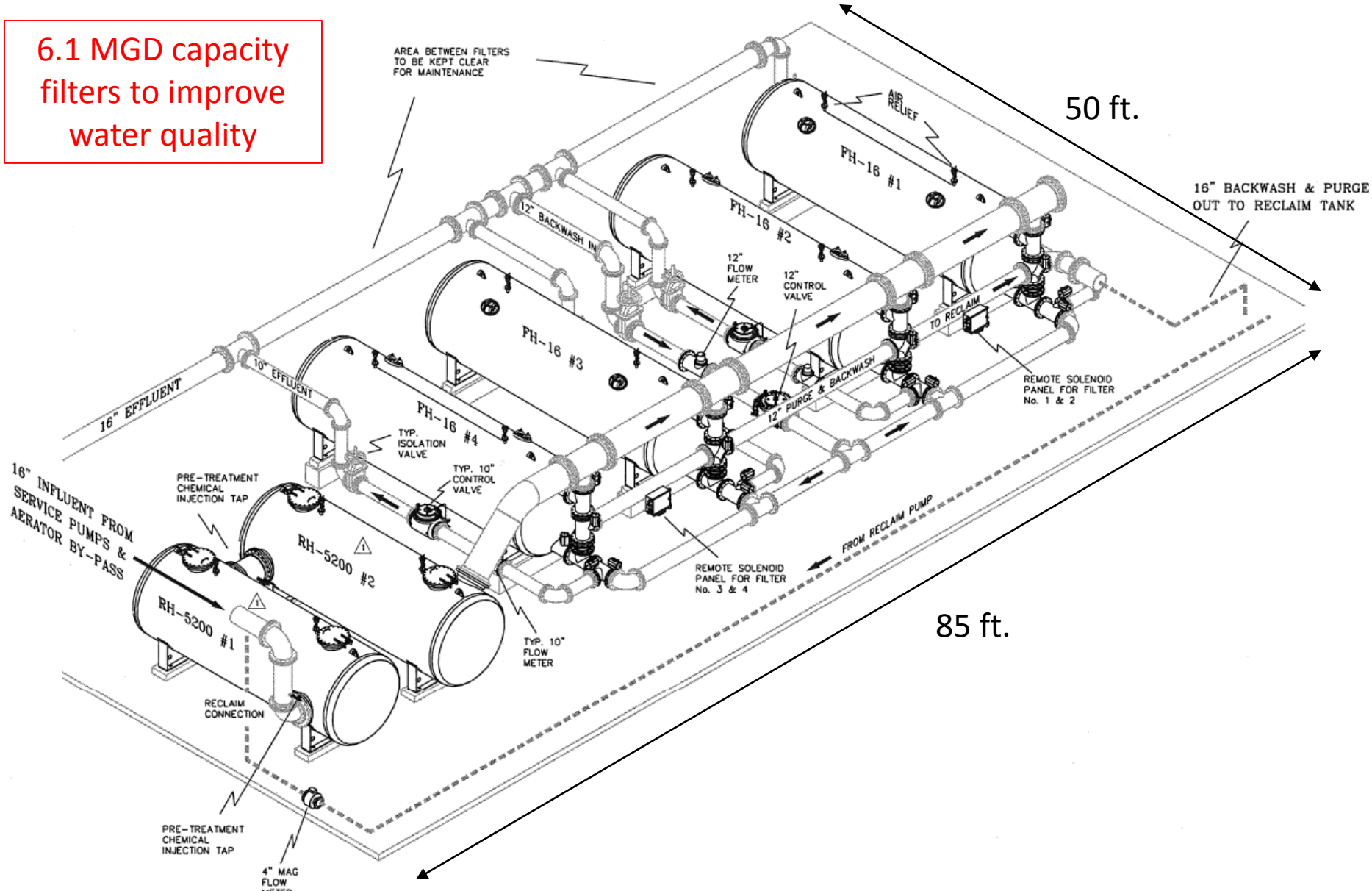
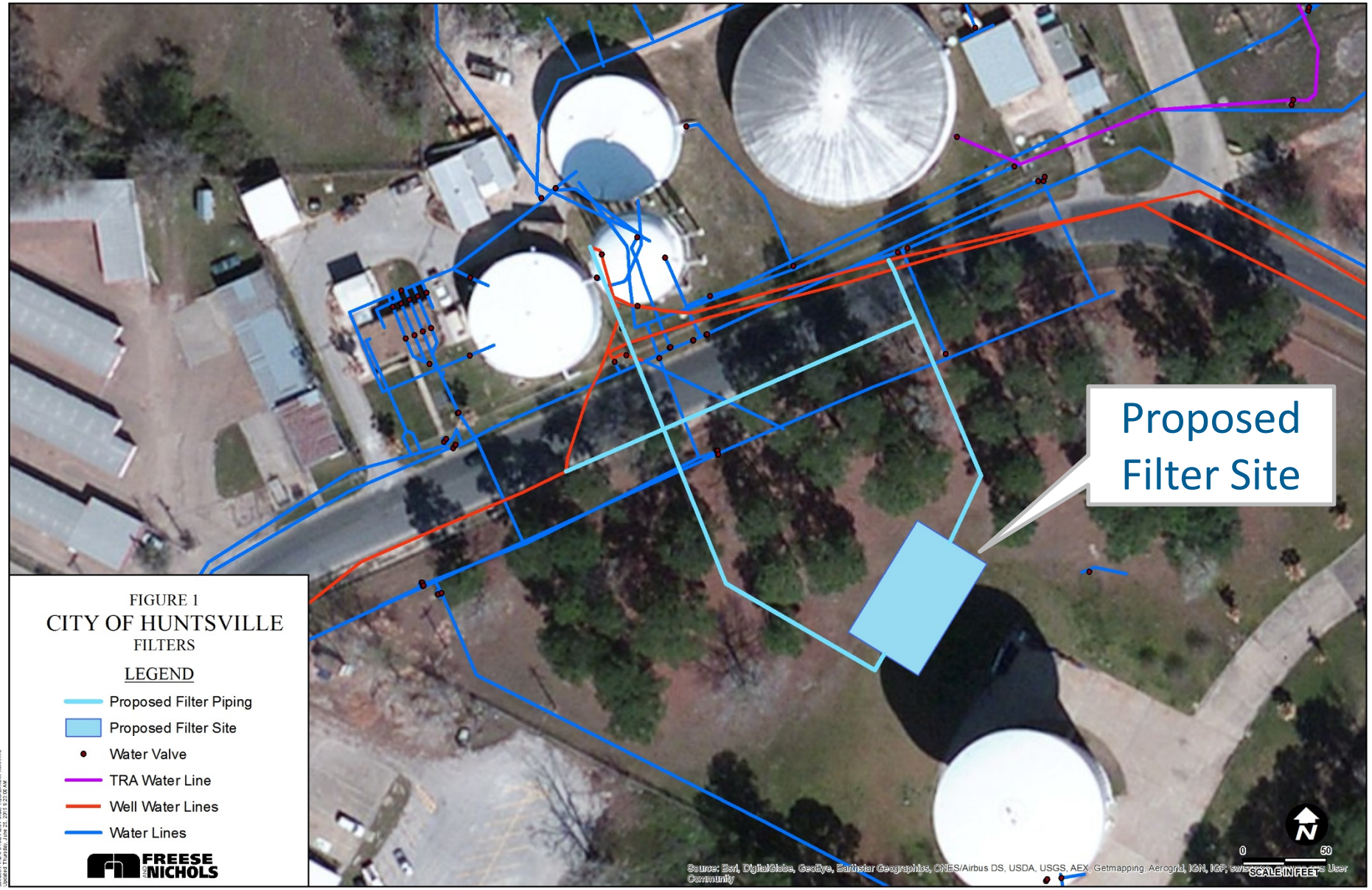
Filters Assessment

6.1 MGD capacity filters to improve water quality



Palm Street Water Plant
Filters Assessment



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Pump Station Alternatives

- Alternative 1 – Rehabilitation of the existing pump stations on the Palm St. Water Plant site, including electrical and other miscellaneous site improvements

- Alternative 2 – A new 16.0 firm capacity pump station on the adjacent city property from the Palm St. Water Plant

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Alternative 1 – Rehab Existing PS

Electrical Package	
Replace MCCs at both Pump Stations	$667,000
Reroute Alternate Power conduits at Old Pump Station	$23,000
Instrumentation/SCADA improvements	$92,000
Total	**$782,000**
Old Pump Station Package	
Replace Pumps and Motors	$247,000
Repair/Replace Piping and Valves	$54,000
Structural/HVAC/Miscellaneous Improvements	$155,000
Total	**$456,000**
New Pump Station Package	
Replace Pumps and Motors	$113,000
Repair/Replace Piping and Valves	$48,000
Structural/HVAC/Miscellaneous Improvements	$447,000
Total	**$608,000**
Rehab Existing Pump Station Total	***$1,846,000***

Alternative 2 – New Pump Station

- 16 MGD pump station
- Located on adjacent property
- Higher efficiencies and lower O&M

Description	Cost
Construction	$2,551,000
Mobilization (5%)	$127,000
OH&P (15%)	$383,000
Contingency (25%)	$765,000
Engineering (15%)	$574,000
Project Total:	***$4,400,000***

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Palm Street Water Plant Alternatives Assessment

Pump Station Alternative	Capital Cost	Power Costs	O&M	Capacity
Alternative 1 Rehab	$1,846,000	Reduced from current condition	Tight working spaces	Possible but limited by building space and piping
Alternative 2 New PS	$4,400,000	Greater reduction in power costs	Reduced O&M with new facility, more working room	Greater potential for increased capacity

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Recommendation

- ✓ Alternative 1
  - This alternative has the lowest capital costs while still maintaining reliable service to the City
  - Additional capacity can be added with larger pumps
  - No additional City property required

- ✕ Alterative 2 was not selected because it was cost prohibitive

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