Elizabeth City
Summary of Findings

January 10, 2022

Presented by

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PRESENTATION

TOPICS

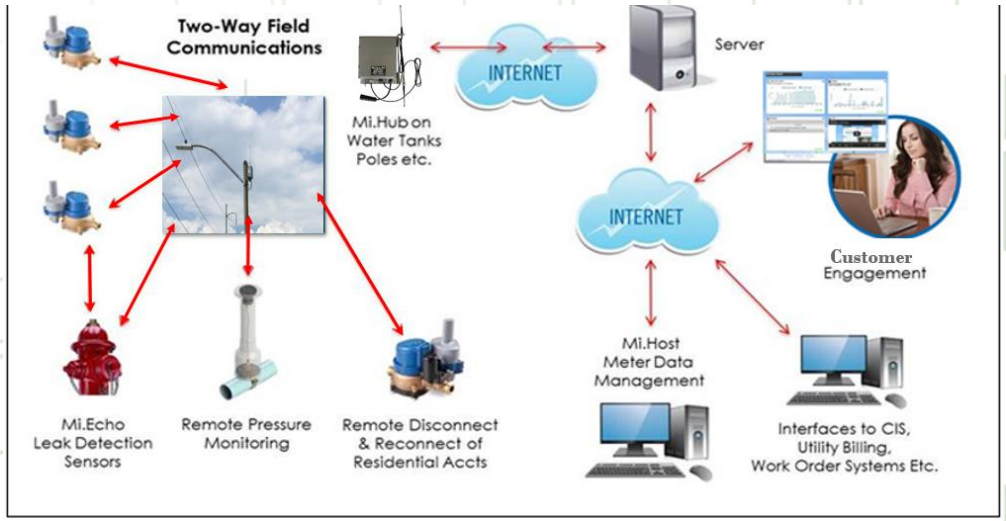
- Background
- Available Data
- Condition Assessment
- Land Use Planning
- Hydraulic Model
- Conclusions

Background

- **In early August of 2021, the City employed WithersRavenel to provide Preliminary Engineering Reports (PER) to identify the best way to improve the City's collection system capacity along with serving future growth with gravity sewer as part of the City's long-term Capital Improvement Plan (CIP), and Timmons Group to provide a detailed analysis of the City's current 4.5 million gallons per day (MGD) Wastewater Treatment Plant capacity serving approximately 6,350 residential properties and 950 commercial properties.**

Background

- **Develop priority list that answers:**
  1. How is my system performing?
  2. Where is growth expected?
  3. What is impact of growth on existing pump stations and plant capacity?
  4. What is impact of inflow and infiltration on growth and plant capacity?
  5. How to address inflow and infiltration to allow for growth?
  6. What is my best long-term funding strategy?



Available data

- Review of Sewer GIS Data
  - Missing inverts
  - Missing connectivity
  - Missing wet well elevations/dimensions
  - Missing geo-referenced customer data
  - Had diameters
  - Had portion of materials
- Review of data for building model
  - No flow data from pump stations
  - Limited pump station run time
  - Limited pump station drawdown testing
  - Large time intervals

Condition Assessment

Sewershed Definition

- Define areas that drain to major pump stations

Pipe Material for Rehabilitation Prioritization

- PVC Indicates Newer Pipe (Replaced previously)
- Vitrified Clay (older sections of City)
- Diameter (larger is more critical)

Pump Station Evaluation

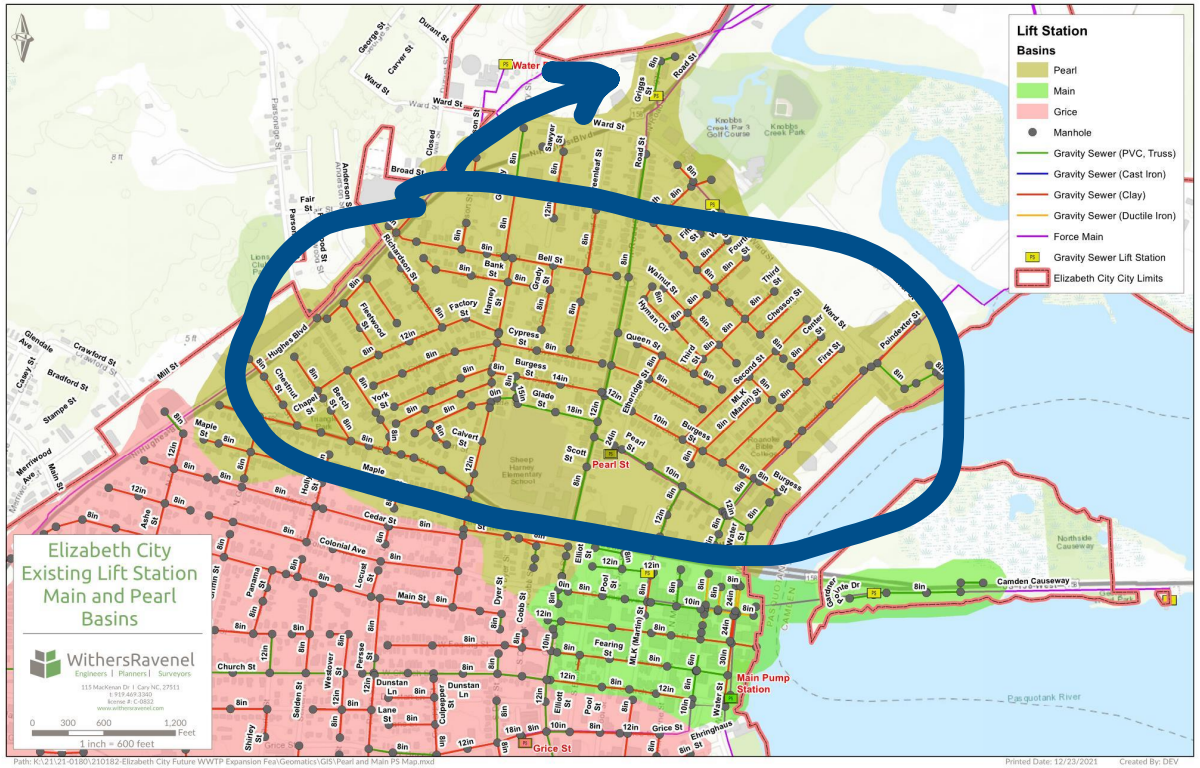
- Evaluated pump stations greater than 100,000 gallons
- Original capacity vs. current

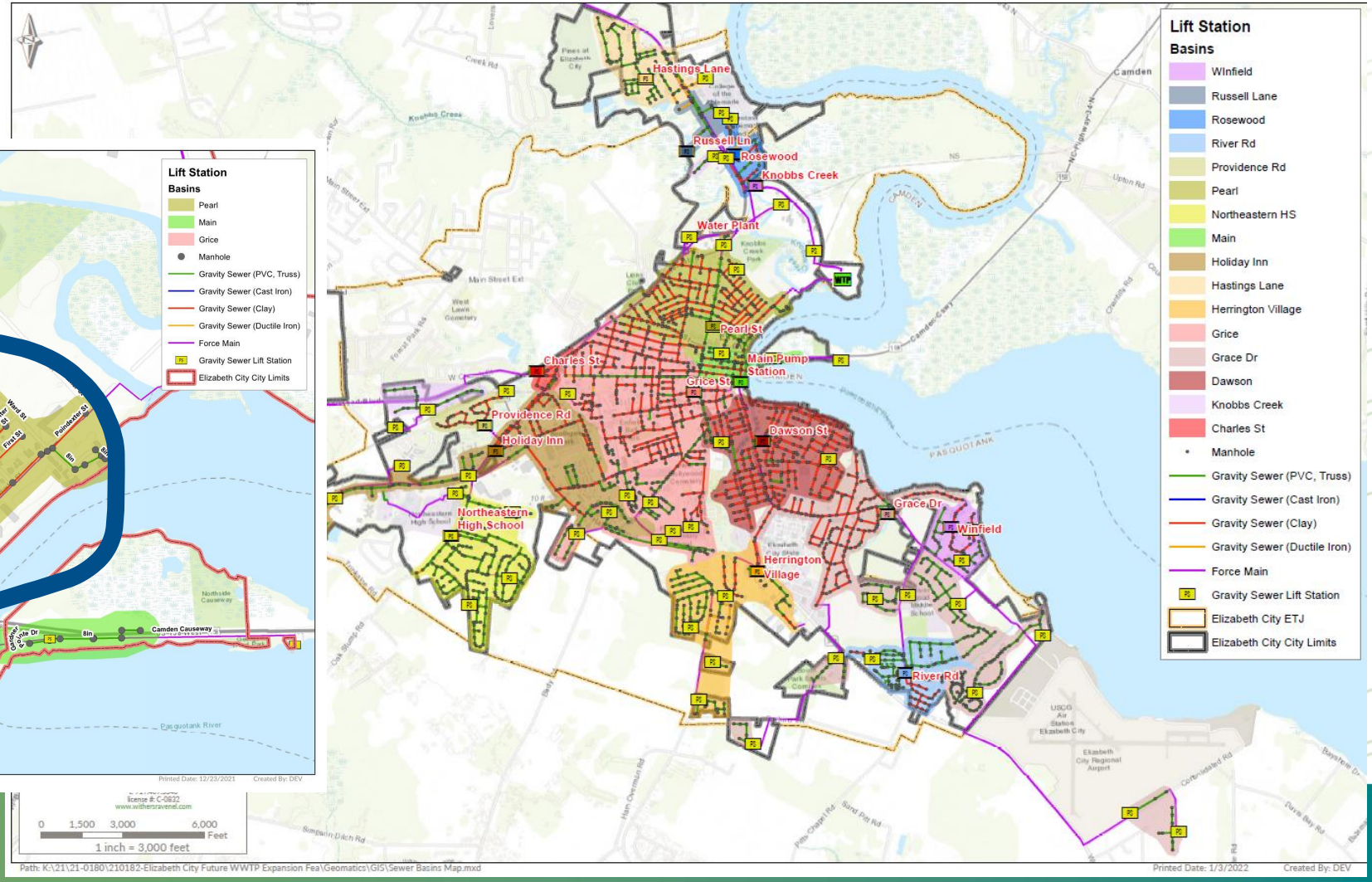
Pump Run Times for I/I Prioritization

- Dry Weather
- Wet Weather

Sewershed Definition

- Areas that drain to major pump stations
- 73 Total pump stations in GIS





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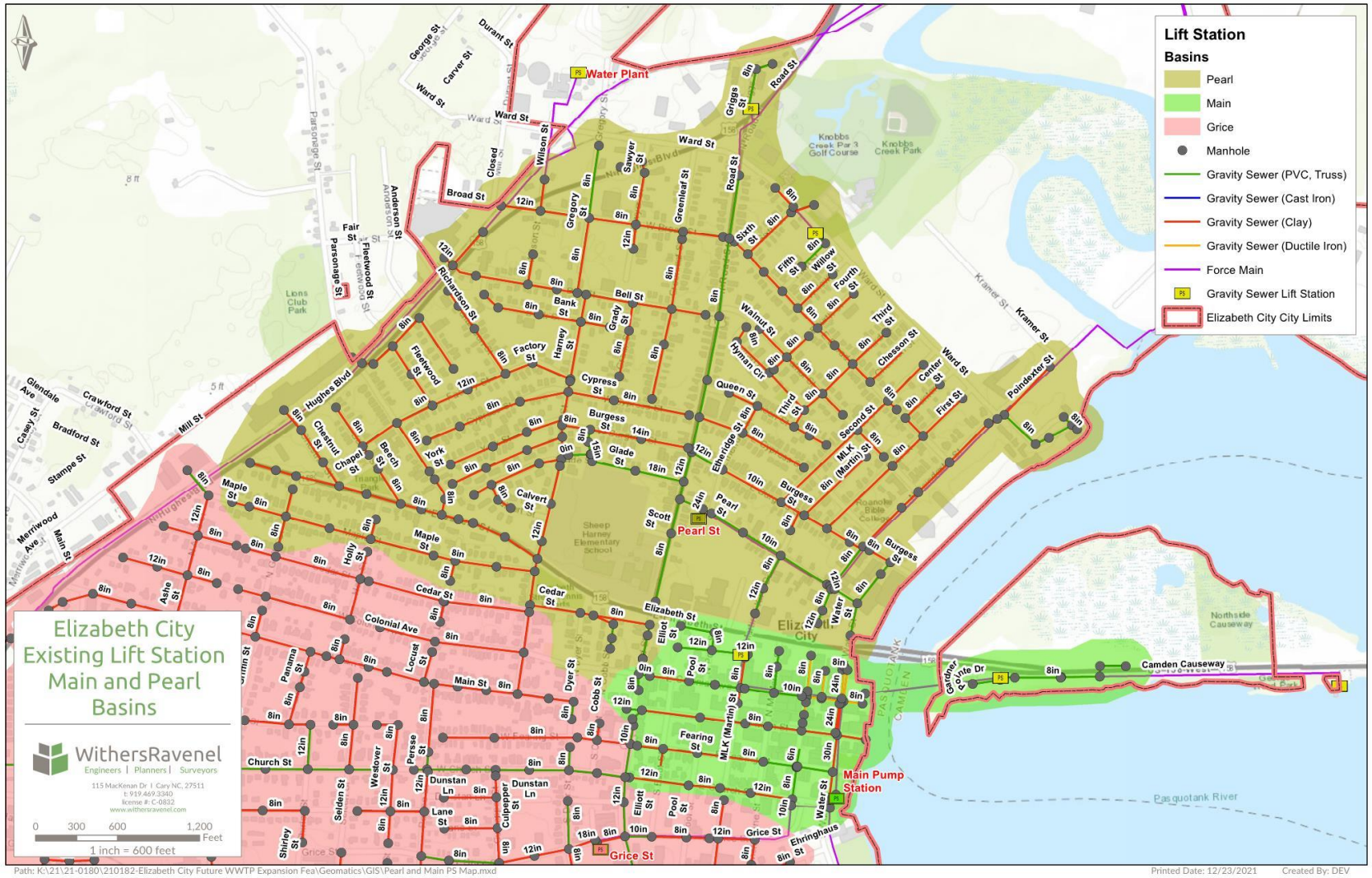
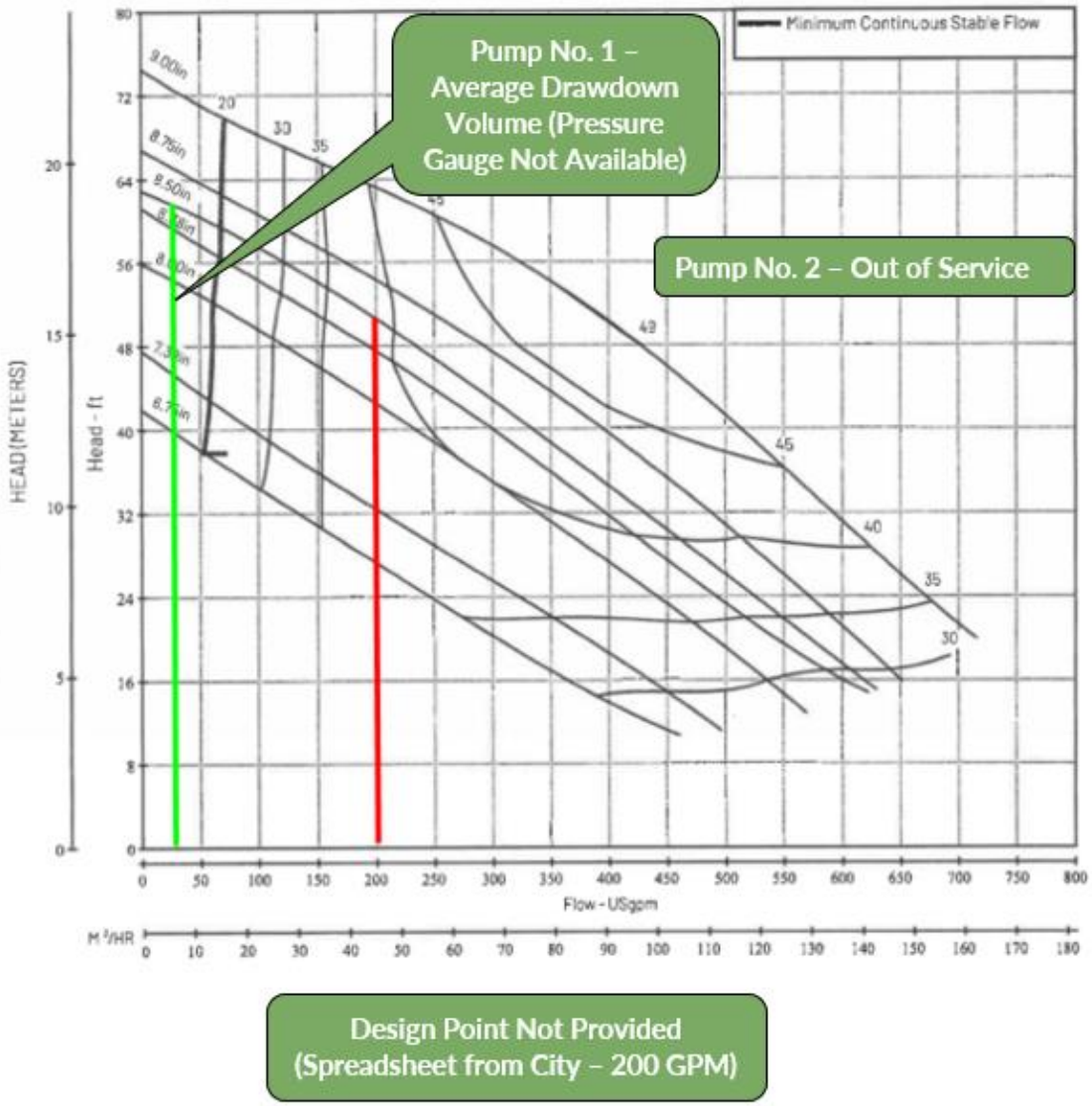
Pipe Material

- PVC, Vitrified Clay, Cast, Ductile Iron
- Material type is a good indicator of age and replacement history

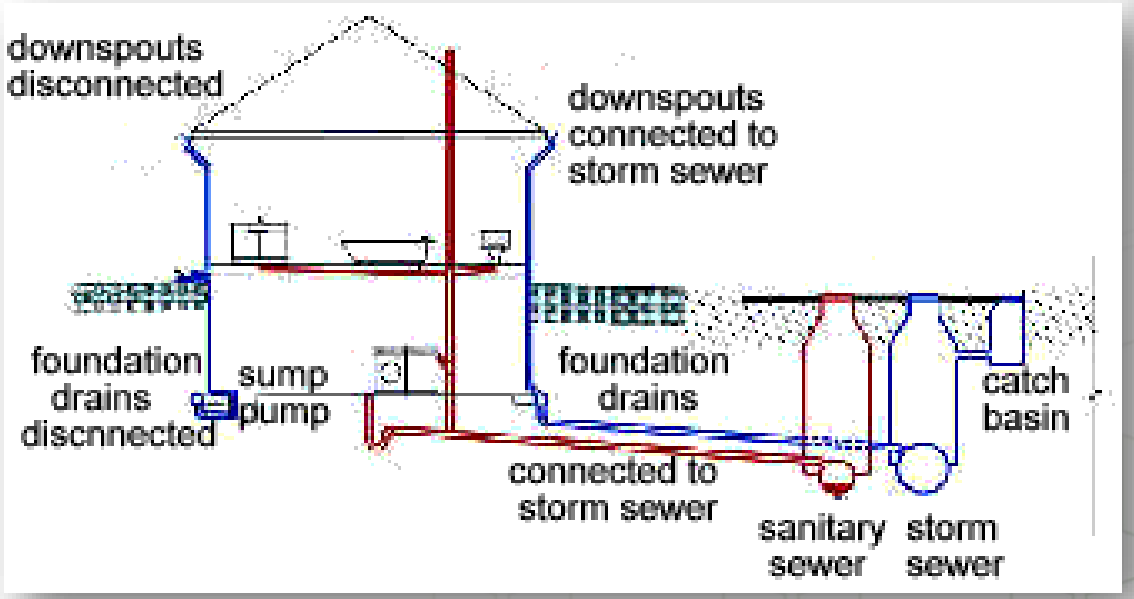


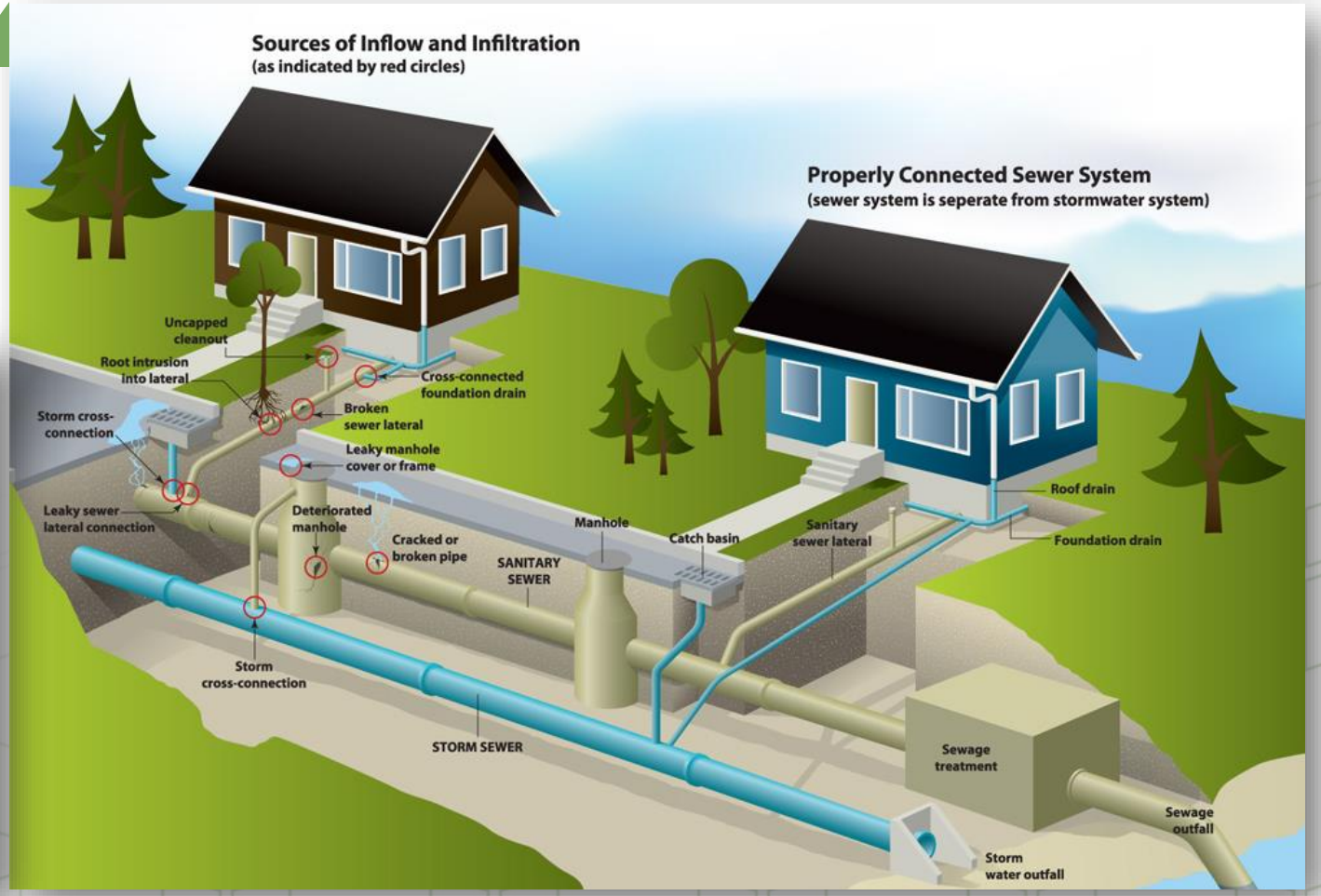
Pump Station Evaluation

- **Performed testing of pumps and concluded that the pumps are not performing to their intended capacities**



Rainfall Dependent Inflow and Infiltration (RDII)





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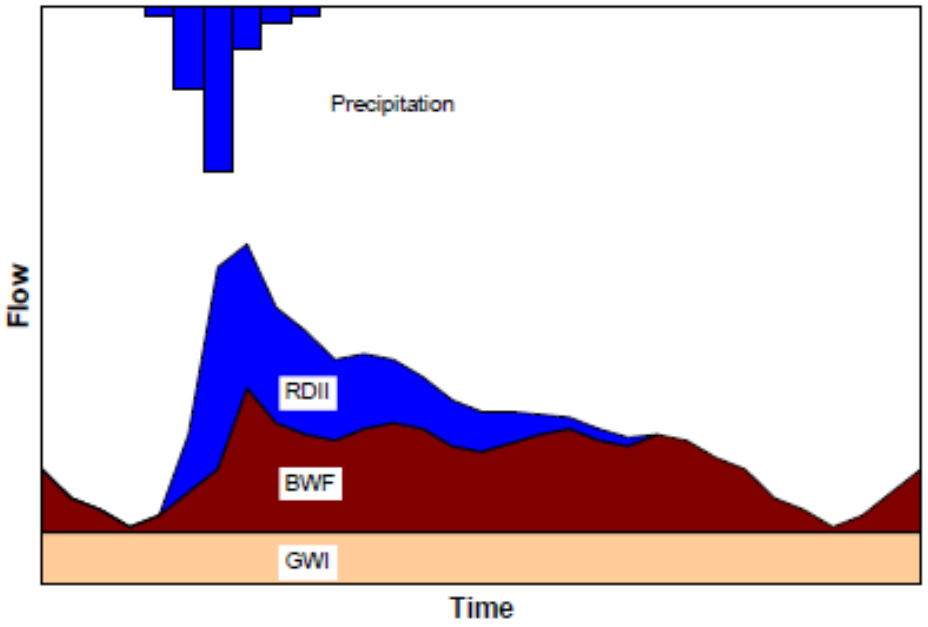
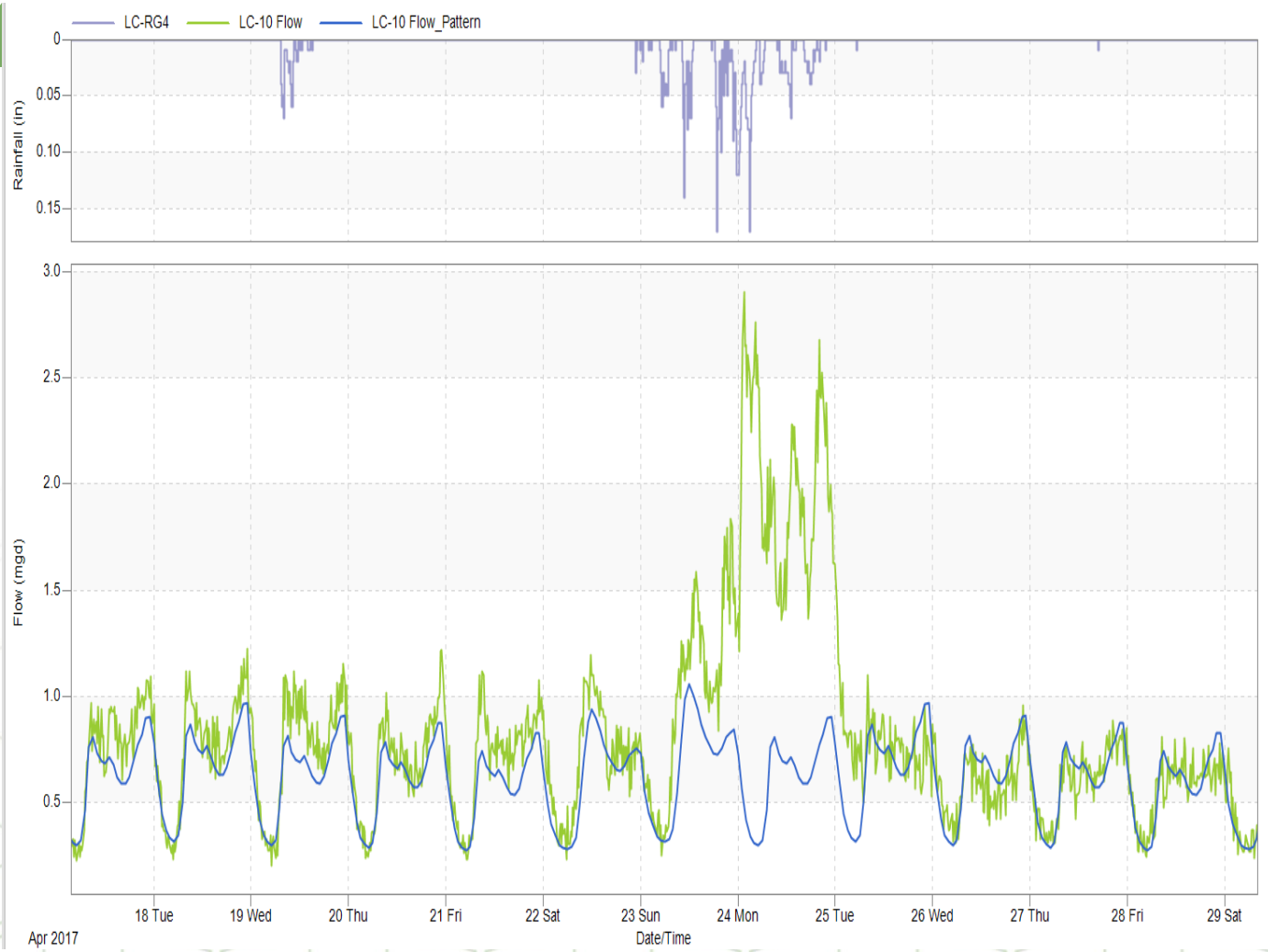
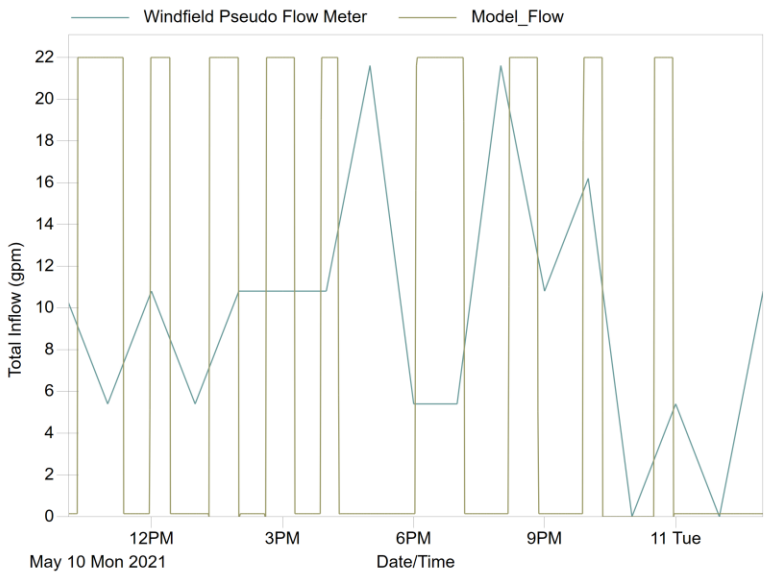
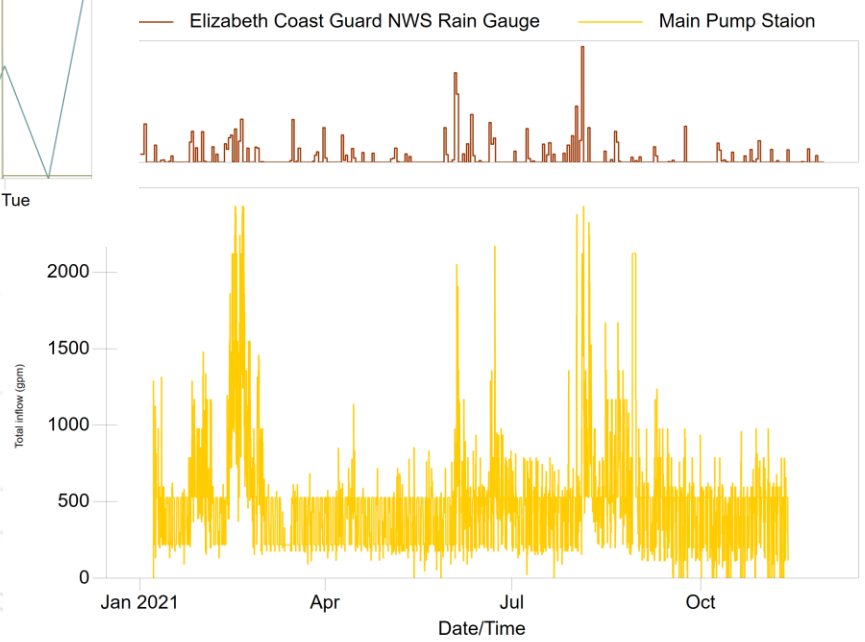




Inflow and Infiltration Prioritization

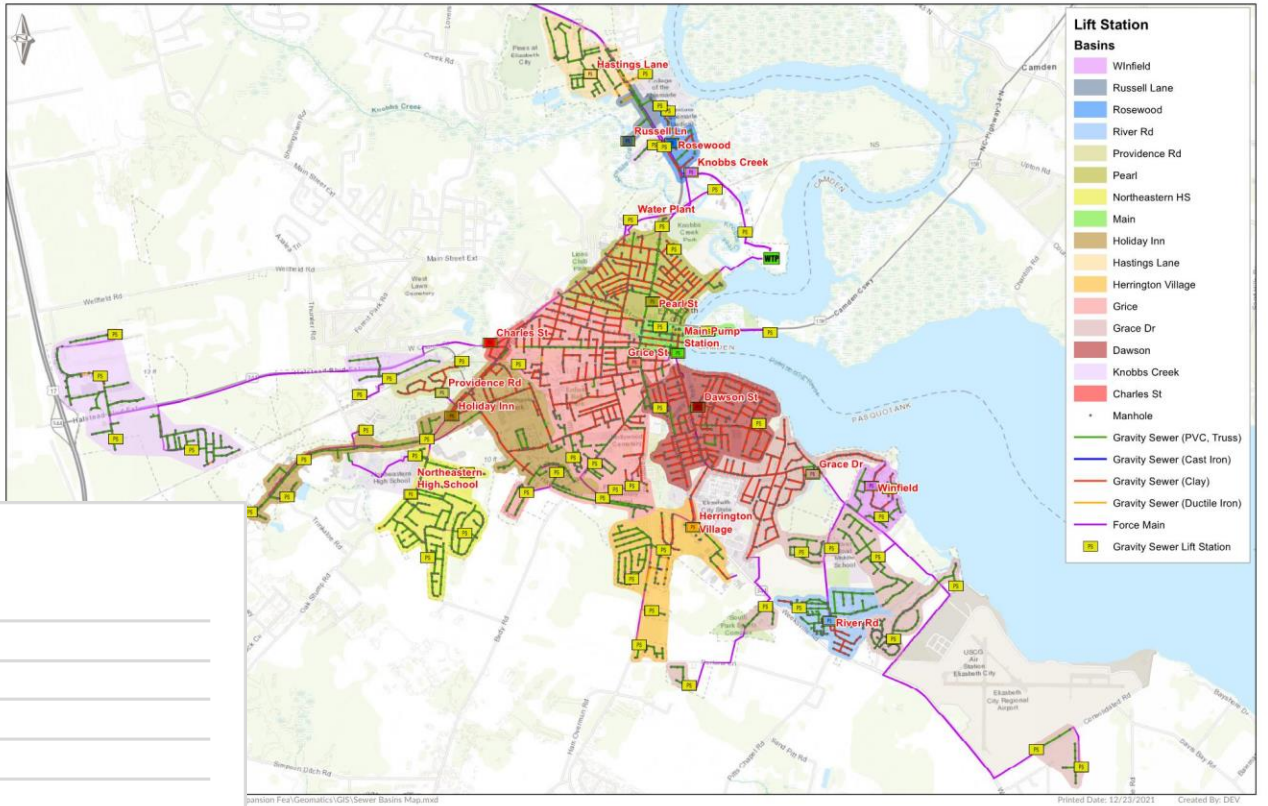


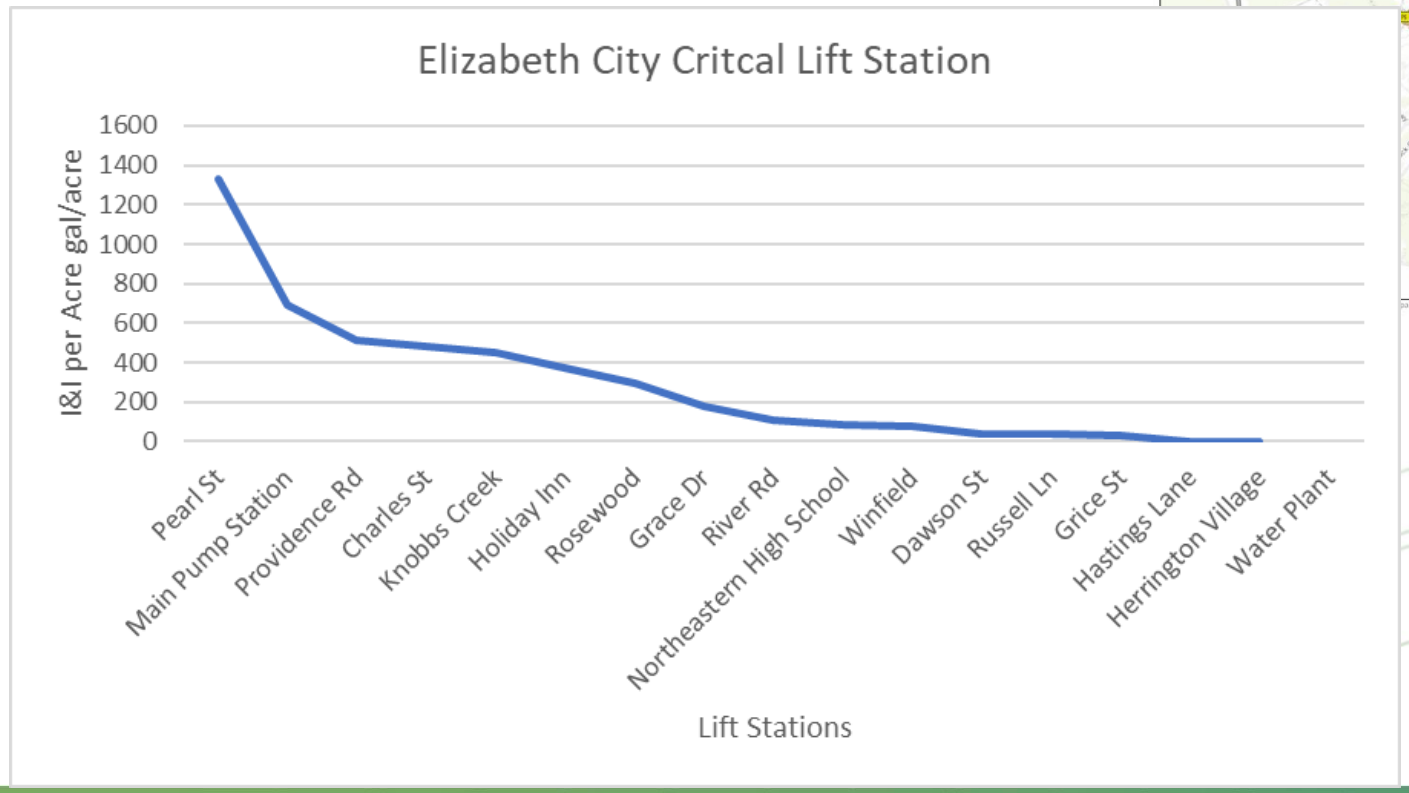


Assessment Results

Prioritized Sewersheds

Pipe Material/Rehab Priority





Financial Planning for Assessment Results

+/- $2M Increments

Recommended Sewer Capital Improvement Plan - Sewer Basins								
Sewer Basins	2022	2023	2024	2025	2026	2027	2028	2029
Main Gravity Sewer	$ 1,561,000.00							
Pearl Gravity Sewer (PH 1)	$ 439,000.00							
Pearl Gravity Sewer (PH 2)		$ 2,000,000.00						
Pearl Gravity Sewer (PH 3)			$ 2,000,000.00					
Pearl Gravity Sewer (PH 4)				$ 2,000,000.00				
Pearl Gravity Sewer (PH 5)					$ 1,108,000.00			
Holiday Gravity Sewer (PH 1)					$ 892,000.00			
Holiday Gravity Sewer (PH 2)						$ 2,000,000.00		
Holiday Gravity Sewer (PH 3)							$ 736,000.00	
Charles Gravity Sewer							$ 708,000.00	
Providence Gravity Sewer								$ 1,018,000.00
Total	**$ 2,000,000.00**	**$ 2,000,000.00**	**$ 2,000,000.00**	**$ 2,000,000.00**	**$ 2,000,000.00**	**$ 2,000,000.00**	**$ 1,444,000.00**	**$ 1,018,000.00**
Fical Year Total	$ 4,582,000.00	$ 3,743,000.00	$ 3,837,000.00	$ 2,000,000.00	$ 2,000,000.00	$ 2,000,000.00	$ 1,444,000.00	$ 1,018,000.00

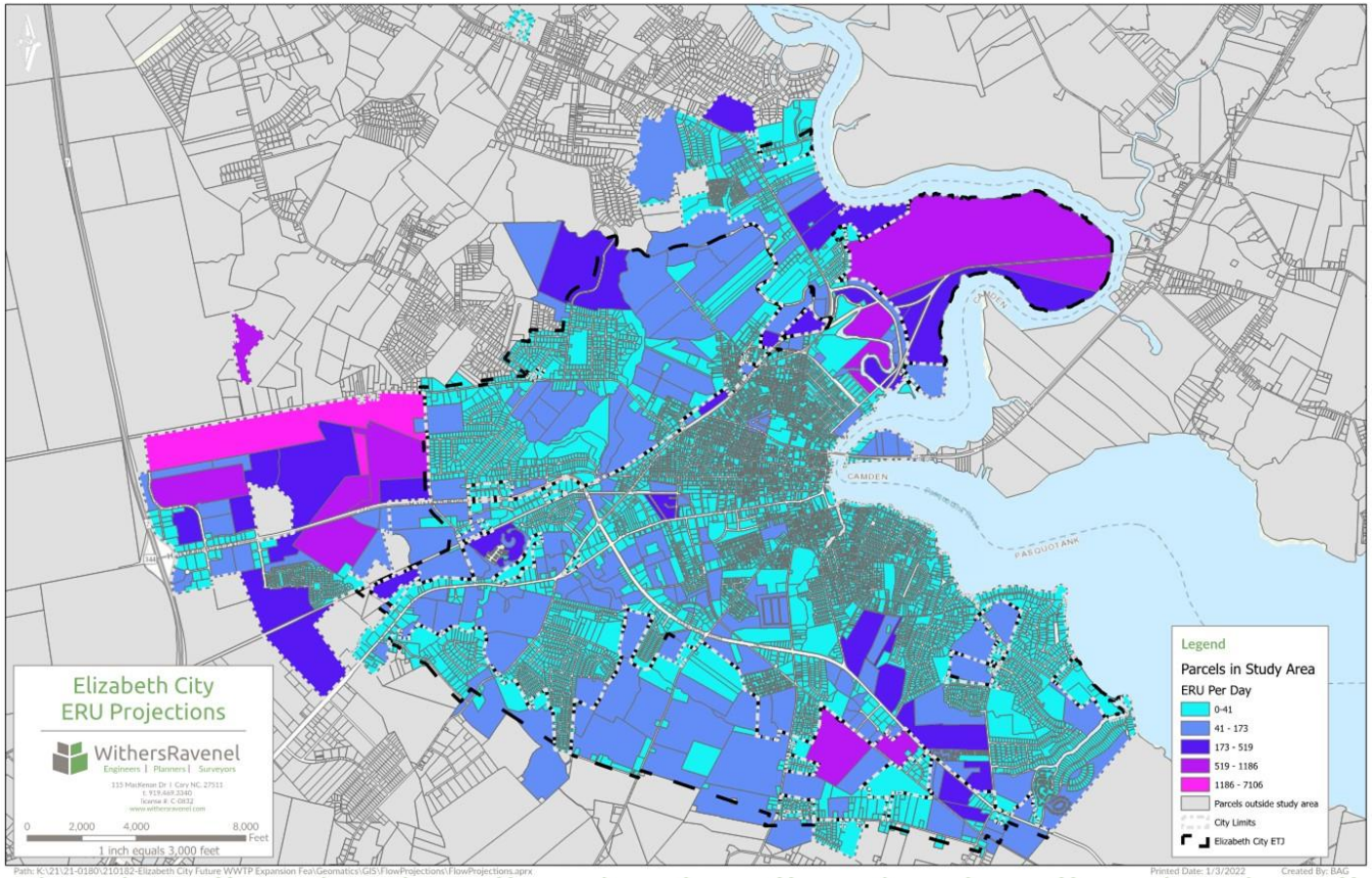
* Pumps to be replaced by Elizabeth City Public Works

Recommended Sewer Capital Improvement Plan - Sewer Basins					
Sewer Basins	Est. Total Rehabilitation and Replacement Cost	Total Est. I/I Flow (Gal/48 Hours)	Est. Reduction in I/I Flow after R/R	Reduced I/I Flow Into System (Gal/48 Hours)	Cost/Gal for Reduced Flow
Main	$ 1,561,000.00	2,973,660	40%	1,189,464	$ 1.31
Pearl	$ 7,547,000.00	1,823,700	60%	1,094,220	$ 6.90
Holiday	$ 3,628,000.00	654,050	20%	130,810	$ 27.73
Charles	$ 708,000.00	53,190	30%	15,957	$ 44.37
Providence	$ 1,018,000.00	74,350	40%	29,740	$ 34.23

Land Use Planning

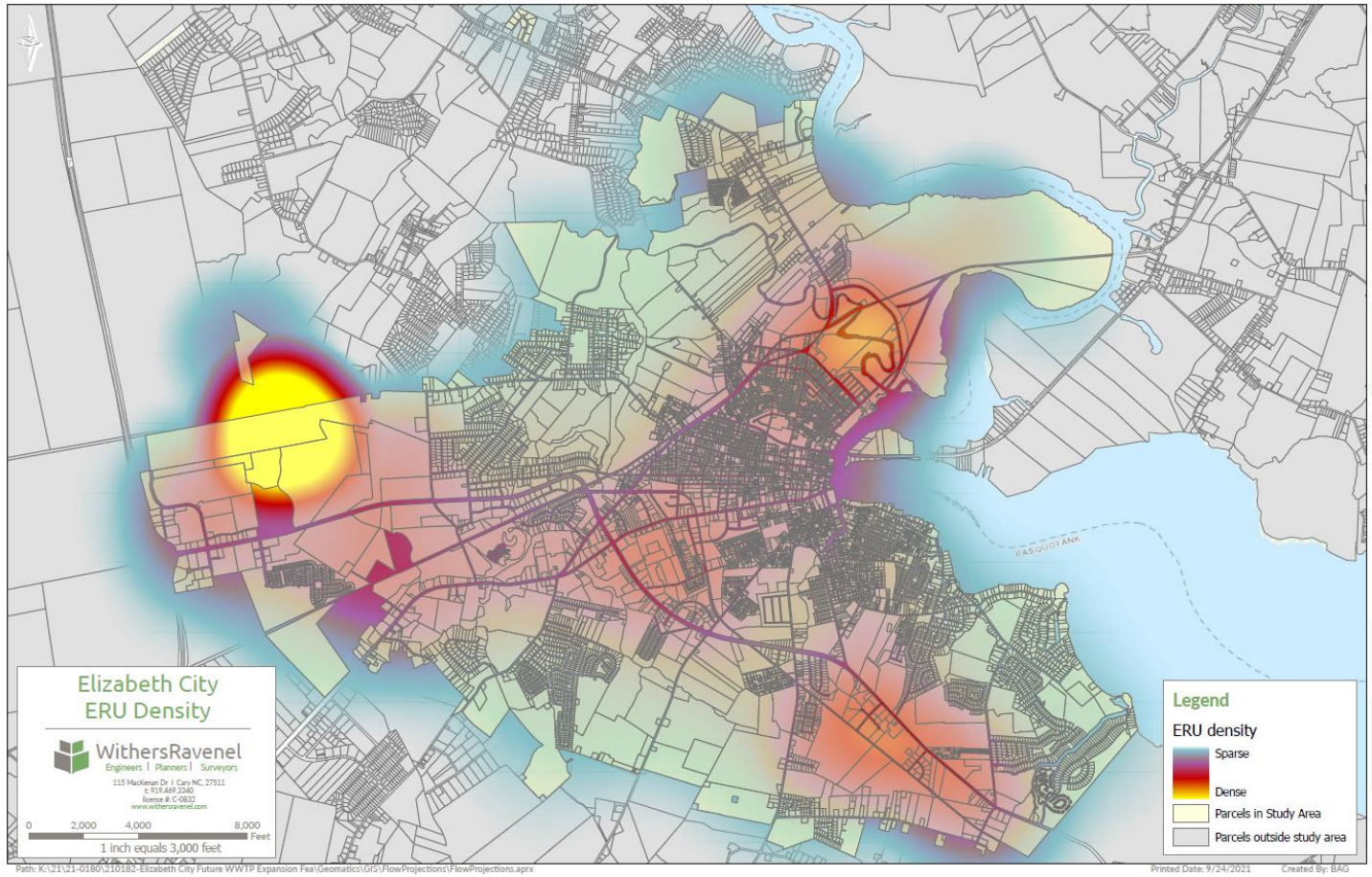
Growth Projections Based on Zoning Classification

Zone Class	Zone ID	ERU (per AC)
Residential	R-6	6
Residential	R-8	3.5
Residential	R-8 - CZ	3.5
Residential	R-10	2
Residential	R-15	1.5
Apartment	AD	11
Residential Manufactured Home	RMH	4.5
Residential Manufactured Home	RMH - CZ	4.5
Office and Institutional	O&I	6
Office and Institutional	O&I – CZ	6
Central Business	CB	9
Neighborhood Business	NB	5.5
General Business	GB	8
General Business	GB – CZ	8
Highway Business	HB	9
Causeway Mixed Use District	CMU	9
Light Industrial	I – 1	14
General Industrial	I – 2	23
General Industrial	I – 2 - CZ	23
Planned Unit Development	PUD – PDR	By project
Planned Unit Development	PUD – PDM	By project



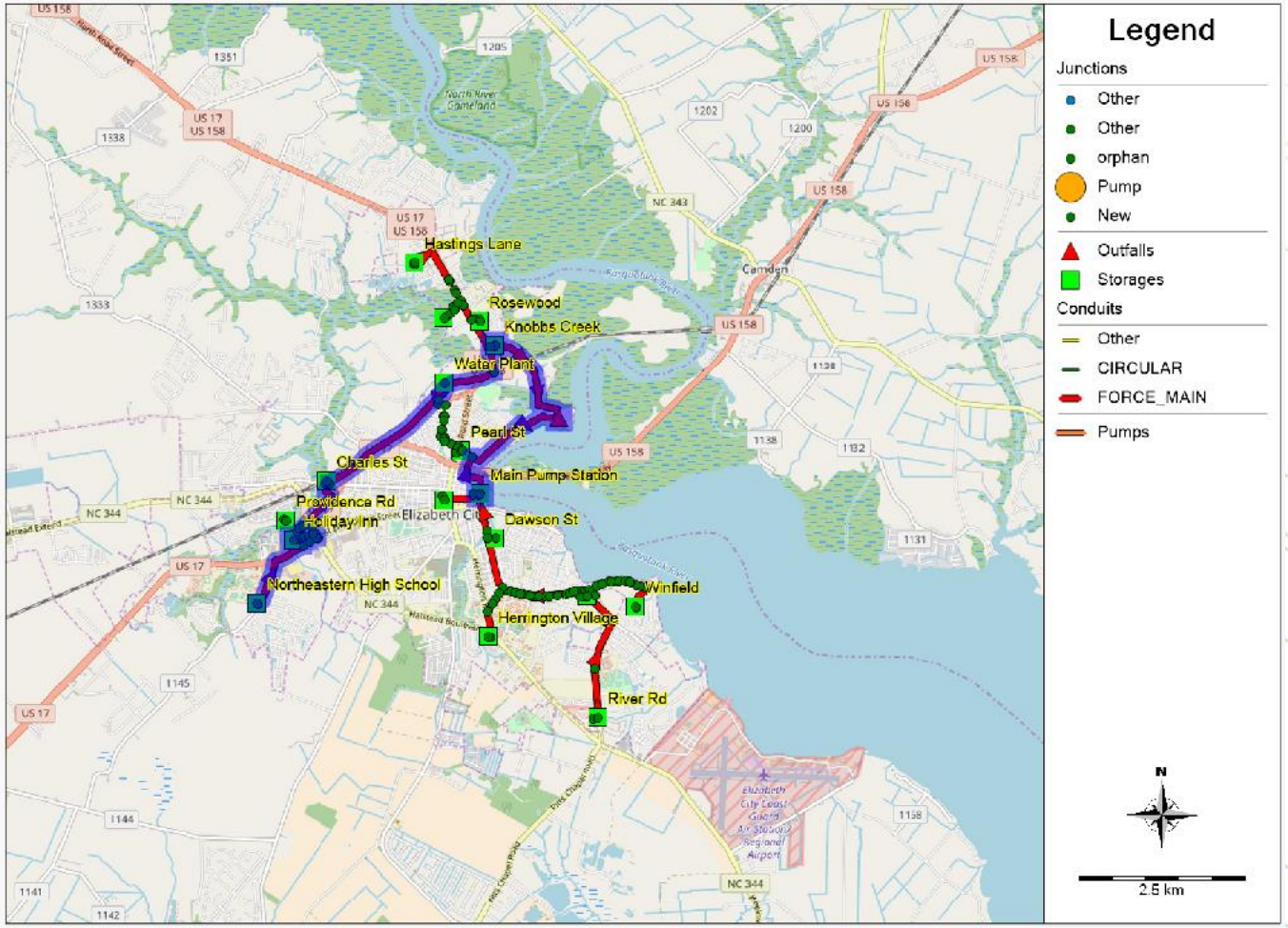
Land Use Planning

- **Flow at Total Buildout is 13.3 MGD**
- **Projected flow is 10.5 MGD**
- **Existing Flow is 2.8 MGD**



Hydraulic Modeling

- **Pump Run Times Merged with Growth Projections**



Conclusions

- **Therefore – Recommended Strategy:**
  - Improved Mapping with Field Verification (inverts/connectivity)
  - Pump Station Capacity Improvements & Improve SCADA
  - Sewershed Inflow and Infiltration Reduction
  - Developer Funded Pump Station Expansion in Targeted Corridors (as needed)
  - Plant Improvements to Accommodate Growth/Inflow and Infiltration
  - Evaluate Regional Plant if Existing Plant Hits 80% of Capacity

Financial Considerations – Pump Stations

Recommended Sanitary Sewer Capital Improvement Plan - GIS								
	2022	2023	2024	2025	2026	2027	2028	2029
GIS Field Verification and Data Inventory	$ 849,000.00							
Recommended Sanitary Sewer Capital Improvement Plan - Sewer Model								
	2022	2023	2024	2025	2026	2027	2028	2029
Update and Calibrate Model	$ 60,000.00							
Recommended Sanitary Sewer Capital Improvement Plan - Lift Stations								
Lift Stations	2022	2023	2024	2025	2026	2027	2028	2029
Main Lift Station	$ 1,029,000.00							
Dawson Lift Station	$ 644,000.00							
Grice Lift Station		$ 495,000.00						
Grace Lift Station		$ 466,000.00						
Herrington Lift Station*		$ 192,000.00						
Rosewood Lift Station*		$ 205,000.00						
River Road Lift Station*		$ 218,000.00						
Charles Lift Station*		$ 167,000.00						
Providence Lift Station*			$ 153,000.00					
Russell Lift Station			$ 163,000.00					
Winfield Lift Station			$ 176,000.00					
Pearl Lift Station			$ 308,000.00					
Holiday Inn Lift Station*			$ 260,000.00					
Water Plant Lift Station*			$ 146,000.00					
Northeastern Lift Station			$ 215,000.00					
Knobbs Creek Lift Station			$ 276,000.00					
Hastings Lift Station			$ 140,000.00					
Total	**$ 1,673,000.00**	**$ 1,743,000.00**	**$ 1,837,000.00**					

Future/Next Steps

- Outline funding strategy with respect to available money
- Perform rate analysis to review affordability of CIP
- Improved Entire System Mapping (field verification/ MH inspection)
- CCTV/Flow Metering of Sewersheds
- Perform more in-depth analysis of project costs based on CCTV/Mapping due to market instability
- Continue to work on planning and budgeting annually

Funding

- State Revolving Fund
- Community Development Block Grant
- Others

Sewer Funding Options					
Funding Source	**Types of Funding**	**Eligible Applicants**	**Eligible Projects**	**Key Program Requirements**	**Applications**
Clean Water State Revolving Fund	Low-interest loans (1/2 of market interest rates)	Local Government Units (counties, cities, towns, sanitary districts, etc.)	Wastewater treatment	Loan maximum is $30 million.	The CWSRF Program has two funding cycles per year, typically in March and September.
	Limited amount of principal forgiveness loans		Wastewater collection	Construction must start within 24 months of Letter of Intent to Fund.	
	0% interest loans available for Green Projects and for rehabilitation projects for certain local government units		Reclaimed water	Closing fee of 2% (which cannot be financed).	
				Local Government Commission (LGC) must approve all loans.	
Community Development Block Grant-Infrastructure	Grants	Non-entitlement units of General Local Government, excluding water/sewer districts and other single purpose government units	Drinking water and wastewater infrastructure projects in areas that meet the HUD Low and Moderate income (LMI) threshold.	Maximum award is $2 million over a 3-year period.	The CDBG-Infrastructure Program has one funding cycle per year, typically in September.
				Local governments may submit multiple applications but will only	

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				Local governments may submit multiple applications but will only be awarded funding for one project in each funding round.	

ANY QUESTIONS?

THANK YOU.