

Lakevale Estates Collection Improvements Community Meeting

March 1, 2022

Department of Public Works and Environmental Services
Working for You!



A Fairfax County, VA, publication
March 1, 2022

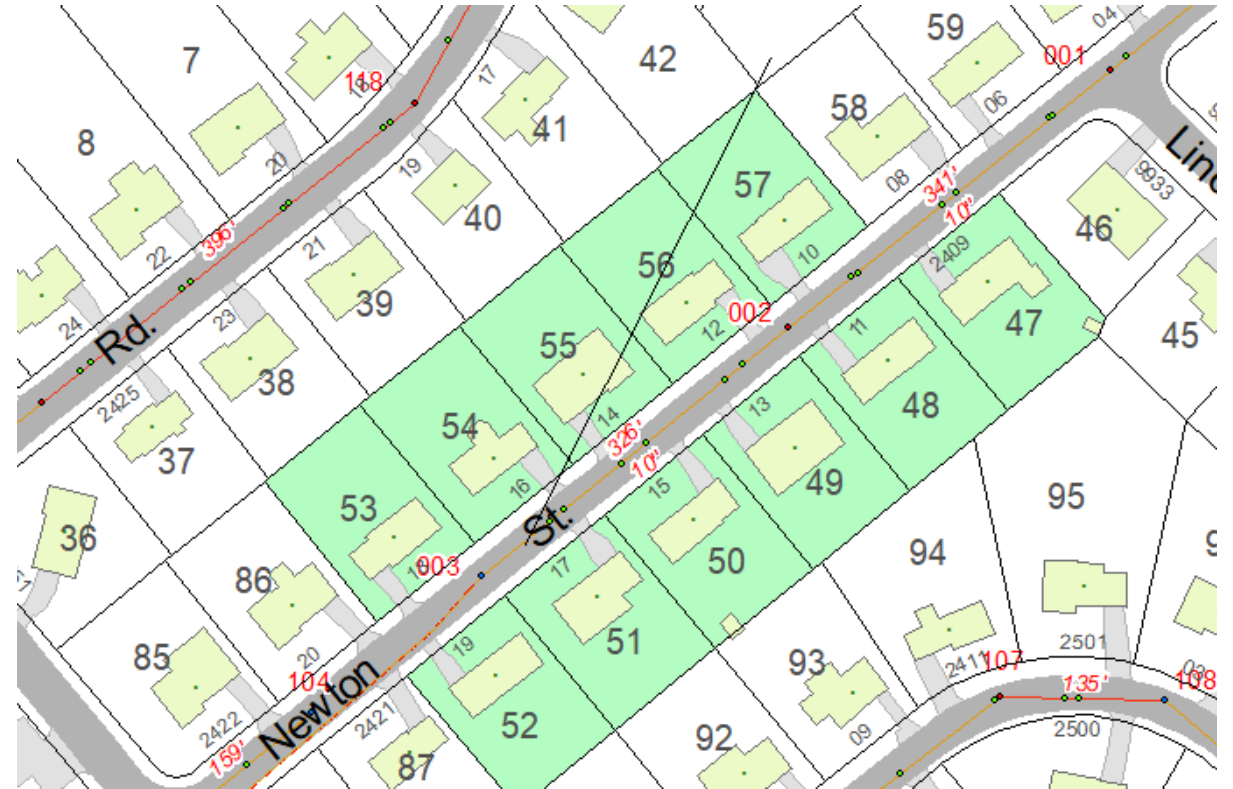
Introductions/ Logistics

- Introductions
 - Wastewater Design and Construction Division
 - Lizzy Merin, Engineer II
 - Project Manager for the long-term solution for Fairfax County
 - Jacobs (Consultant)
 - Water/Wastewater Engineering Firm
 - Ali Nemati, PE
- *To make sure we can answer all your questions, please type them in the chat throughout the presentation!*



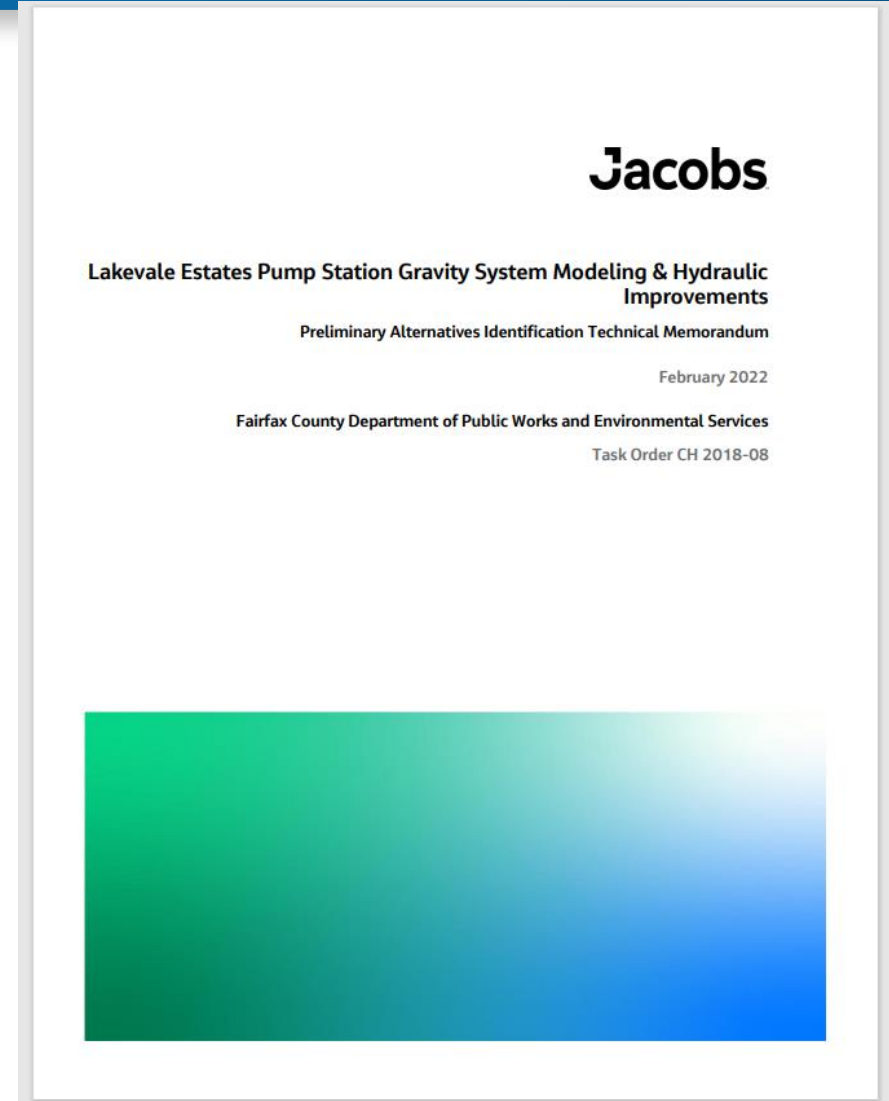
Short-term and Mid-term Updates Performed by WCD

- Short-term: Install Backflow Devices
 - Devices installed
 - Regular system maintenance is ongoing
- Mid-term: Temporary modifications to the Lakevale Pump Station
 - Updated pump operating strategy
 - Replaced pump impeller to reduce pump station capacity

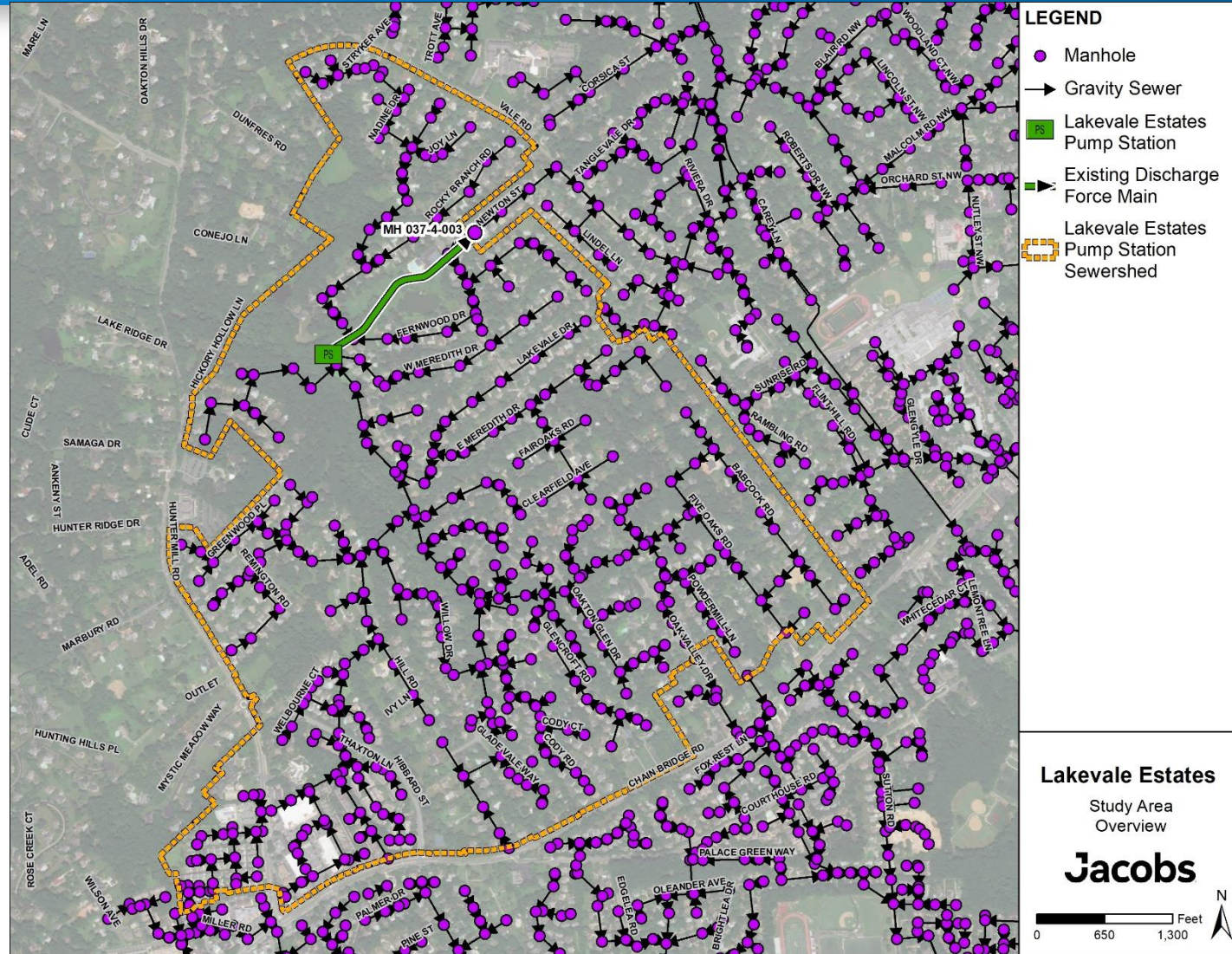


Purpose of Meeting- Present Final Technical Memo

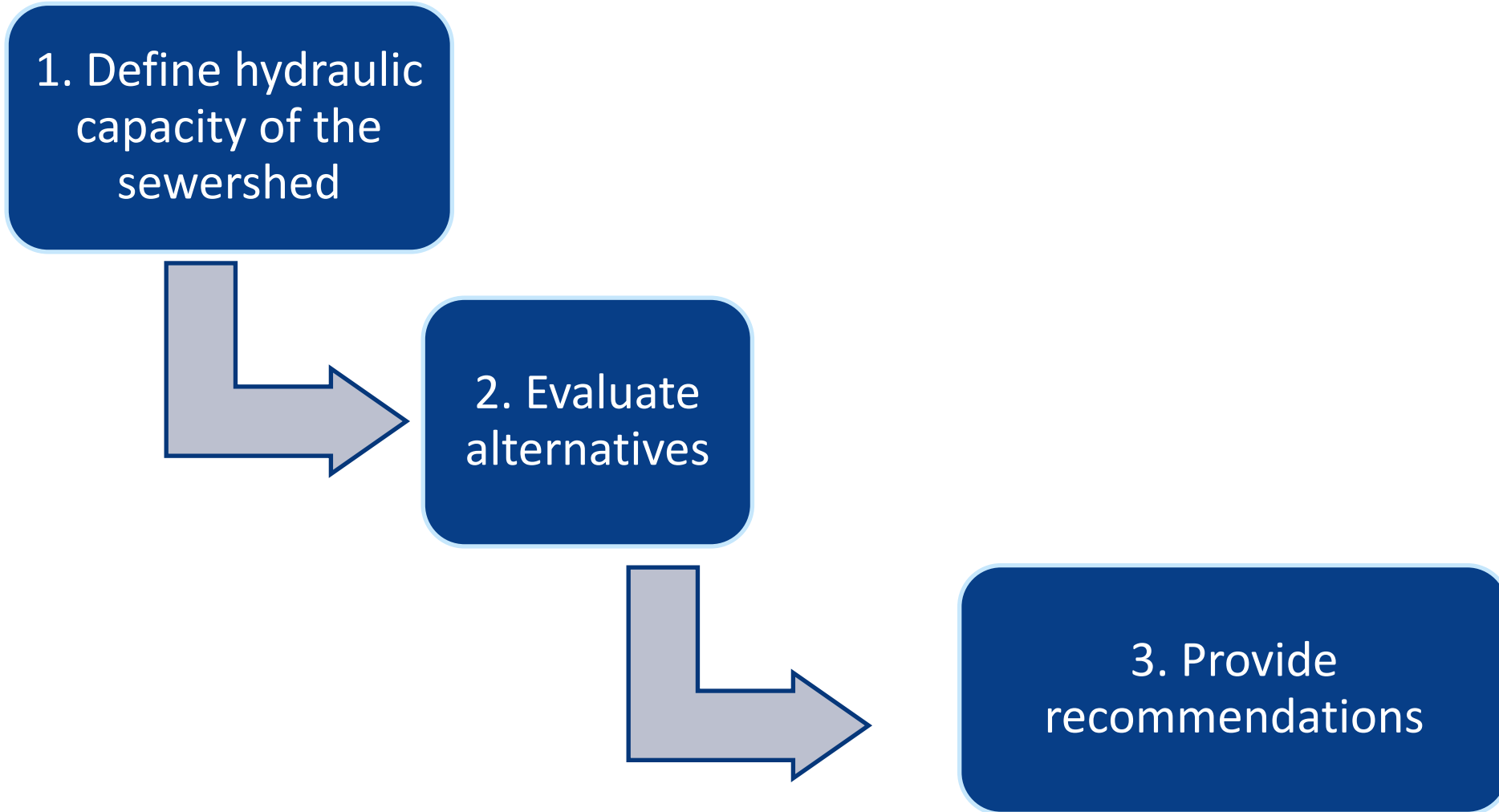
- Inform the community about the upcoming project
- Solicit community input starting at the beginning of the long-term solution
- Show the community the results of the Technical Memo and the alternatives explored



Existing Sewer Service Area

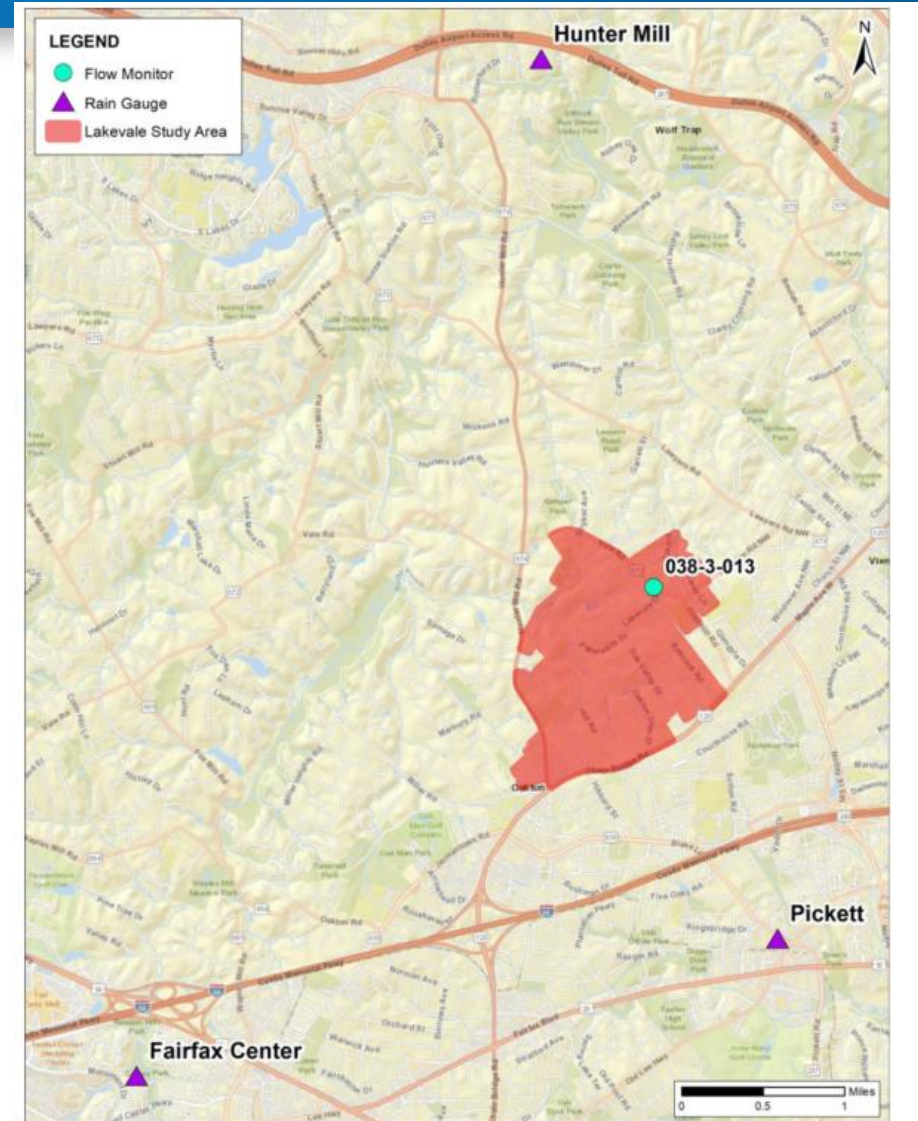


Scope of Technical Memo



1. Defining hydraulic capacity

- Flow meter was installed, data was gathered
- Data that was collected was evaluated to build a model
- Model was calibrated to existing data
- Model was used to evaluate the alternatives



2. Evaluate Alternatives

- Alternatives Considered:
 - Parallel Force Main
 - Parallel Gravity Sewer
 - Pipeline Replacement

- Alternatives Eliminated:
 - Match Downstream Capacity
 - Downstream Equalization
 - Extend Force Main across Vale Road
 - Upstream Equalization
 - Upstream Storage Tank

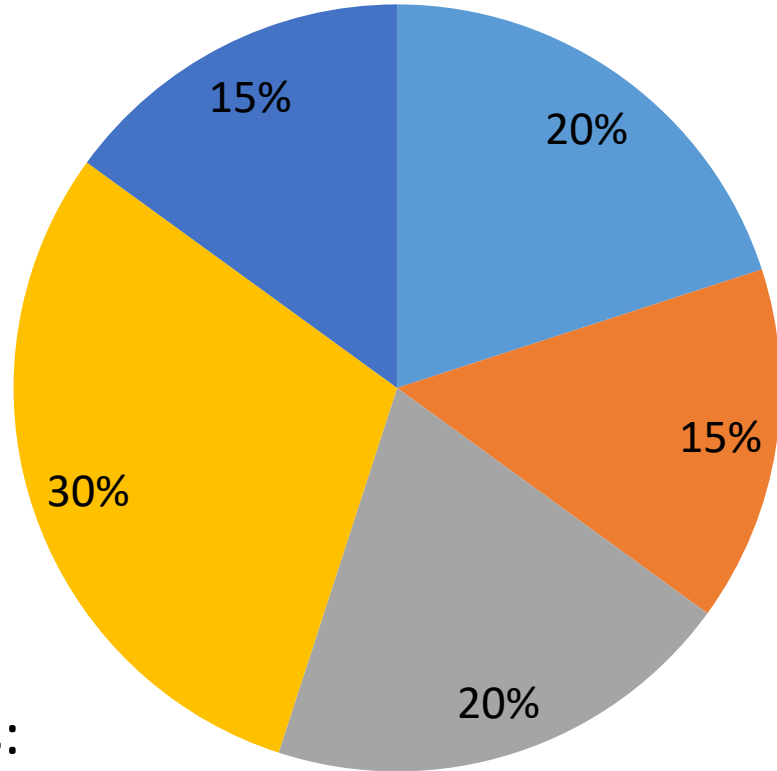
Table 18 - Lakevale Estates P5 Alternatives Evaluation

Alternative	Name	Description	Overall Ranking	Recommendation
DS-1	Pipeline Replacement	Upsize downstream system; install new 12-inch gravity pipe and demolish existing gravity system.	3	Eliminate
DS-2	Parallel Gravity Sewer	Add new gravity pipe parallel to existing sewer to convey pumped flows to location where gravity system has capacity. Leave existing gravity line in place to capture at least some of the local flows.	2	Eliminate
DS-3	Parallel Force Main	Bypass pumped flows in a new force main to a point where gravity system has capacity and leave existing gravity line in place to capture local flows	1	Recommended for further evaluation under the PER
Alternatives Considered and Eliminated				
X-1	Match Downstream Capacity	Downgrade pump station's capacity to match downstream gravity system capacity and maximize utilization of existing infrastructure if conditions allow		Eliminated because alternative would not allow pump station to meet the peak influent flows and limit the pump station's operating strategy to a duty/standby pump configuration
X-2	Downstream Equalization	Install an equalization basin downstream of the force main discharge		Eliminate due to constructability, O&M and site constraints
X-3	Extend Force Main across Vale Road	Offload flows to relieve flooding in downstream system		Eliminated due to insufficient hydraulic capacity in the gravity system on Tanglevale Drive
X-4	Upstream Equalization	Dampen peak pump station influent flows		Eliminated due to insufficient hydraulic data and site constraints
X-5	Upstream Storage Tank	Provide operational response time and protect upstream homes		Eliminated due to constructability and site constraints

Table 18 of the Technical Memo shows the evaluation of alternatives



Scoring Methodology



- Community Impact, 20%
- Constructability, 15%
- Environmental Impact, 20%
- Operations & Maintenance, 30%
- Cost, 15%

Top Priorities:

1. Operations & Maintenance
2. Community Impact & Environmental Impact
3. Constructability & Cost



Lakevale Estates Collection Improvements Community Meeting

DS-1 Pipeline Replacement

- Replace the existing 10 inches AC pipe with 12 inches DIP from Newton St, Southeast on Vale Rd, Northeast to 2424 Riviera Dr
- Replacing ~2,900 ft of pipe
- Provides upgraded capacity of 1,300 gpm



- **Pros:**
 - Pipe capacity increased
 - Eliminates aging infrastructure
- **Cons:**
 - Major utility conflicts and relocations needed
 - Significant public impact from open cut installation and traffic control
 - Requires lateral connections to be re-established for every house connected to gravity sewer
 - Extensive bypass pumping required

4.3.2 DS-1 Alternative Analysis Summary

Table 12 – DS-1 Alternative Advantages and Disadvantages

Advantages	Disadvantages
Eliminate aging infrastructure. New line takes all flows from both pump station and lateral connections (not a relief sewer)	Major utility conflicts and utility relocation delays
Pipe capacity will be increased to allow for both pumps to operate without surcharging downstream system	Significant public impact due to open cut installation and traffic control
	Construction sequencing: requires all lateral connections to be reestablished along the entire length the new sewer line
	Requires extensive bypass pumping downstream of a force main during lateral reconnection.
	Requires installation of new manholes
	Require partial demolition of existing manholes
	Cannot take advantage of remaining useful life the existing pipe

Table 12 of the Technical Memo shows the analysis of DS-1



Lakevale Estates Collection Improvements Community Meeting

DS-2 Parallel Gravity Sewer

- Install parallel gravity sewer adjacent to existing 10 inches AC pipe from Newton St, Southeast on Vale Rd, Northeast to 2424 Riviera Dr
- Adding 2,900 ft of 12 inches pipe in parallel to existing gravity sewer
- Provides upgraded capacity of 1,300 gpm



DS-2 Parallel Gravity Sewer

- Pros:
 - Pump station discharge diverted to new line
 - Existing pipeline stay in service during construction
 - Some trenchless construction methods can be used
- Cons:
 - Requires restoration of ~ 50% of existing lateral connections and will require open cut excavation → significant community impact
 - Requires longer runs for laterals → homeowner impact

Table 13 - DS-2 Alternative Advantages and Disadvantages

Advantages	Disadvantages
Pump station discharge flows will be diverted to the new parallel pipeline	Requires restoration of about 50% of existing lateral connections which will require open cut excavation
Continue to utilize the existing gravity system conveyance capacity	Requires installation of new manholes
Trenchless construction method	Requires longer runs for laterals
Existing pipeline can stay in service during construction	
Pumps can be operated in lead-lag configuration	

Table 13 of the Technical Memo shows the analysis of DS-2



DS-3 Parallel Force Main

- Extend the Force Main from Newton St to Vale Rd, while gravity sewer operates in parallel
- Air release valves at intermediate high points of line
- Pump station able to discharge 593 gpm 2,600 additional ft from current discharge location



DS-3 Parallel Force Main

- Pros:
 - Completely diverts flows from the pump station discharge at Newton St to the proposed Force Main
 - Short bypass duration
 - Trenchless construction technique, safer, less community impact, smaller work footprint than open cut
 - No lateral re-connections needed
 - Avoid asbestos concrete pipe removal
- Cons:
 - Air release valves at intermediate high points require maintenance

Table 14 - DS-3 Alternative Advantages and Disadvantages

Advantages	Disadvantages
Completely divert flows from the pump station to the gravity system in Newton St. to the proposed force main	Air release valve(s) will be required at intermediate high point(s)
Existing line in service during construction (short bypass duration to divert flows to the new force main)	
Trenchless construction technique. Safer and more neighborhood friendly installation method due to the smaller footprint of the work shafts compared to open cut installation method	
No lateral re-connections and shorten construction time	
Avoid asbestos concrete pipe disposal	
Existing pumps equipped with largest impeller can be utilized for this application	
No manhole on force main	
Pump station can be operated in lead-lag configuration	

Table 14 of the Technical Memo shows the analysis of DS-3



All 3 Alternatives

- DS-1 and DS-2 end at 2424 Riviera Dr at MH 038-3-010
- DS-3 ends on Vale Rd



Cost Estimate

Item	Low Range	Estimate	High Range
DS-1 – Pipe Replacement	\$1,885,618	\$3,771,237	\$6,599,664
DS-2 – Parallel Gravity Sewer	\$1,939,114	\$3,878,229	\$6,786,900
DS-3 – Parallel Force Main	\$1,776,809	\$3,553,618	\$6,218,831
	-50%		+75%

- Alternatives DS-1, DS-2, and DS-3 have negligible differences in cost based on Class V rough order of magnitude estimate



3. Provide Recommendations

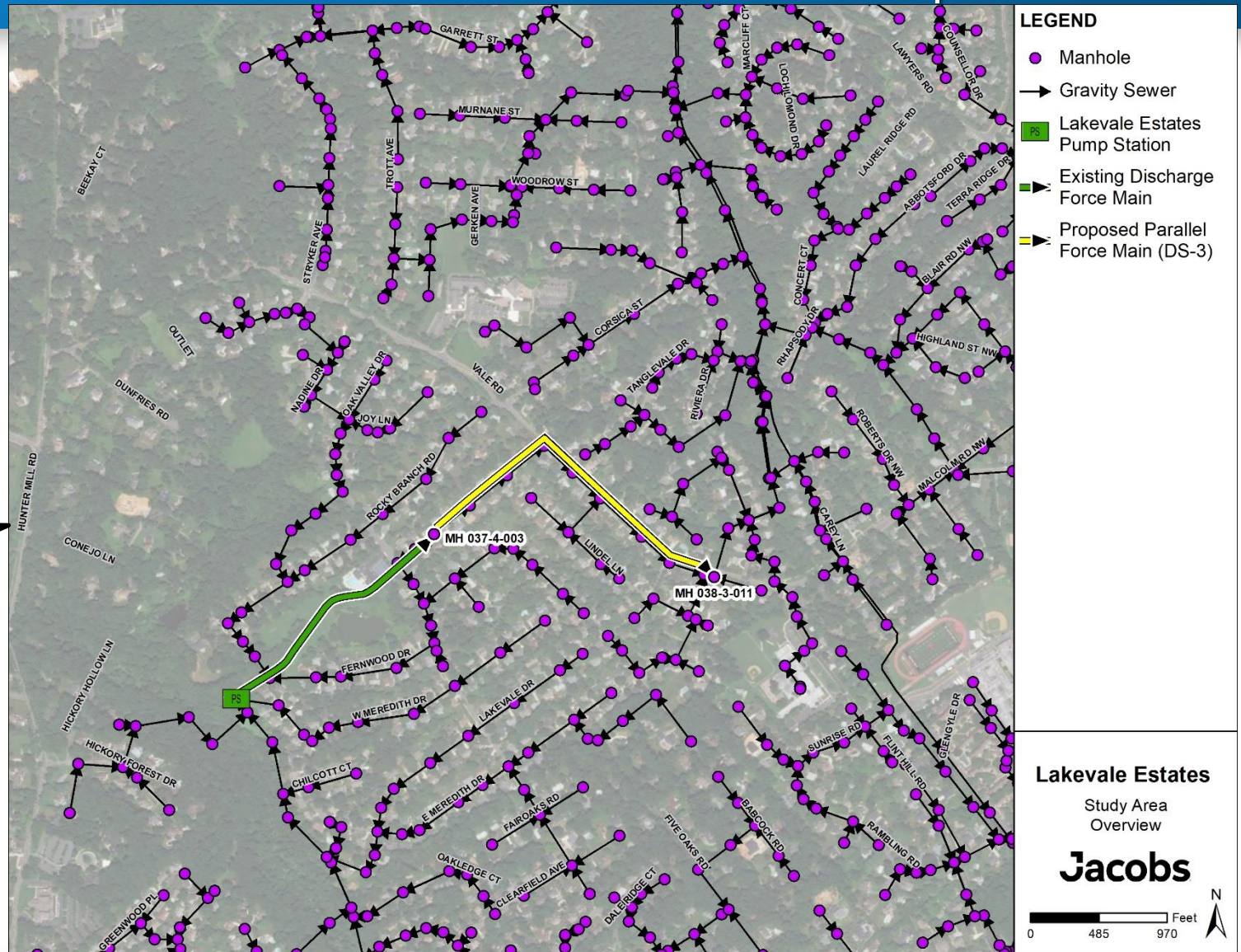
- DS-3 ranked the highest due to:
 1. Its low community impact
 2. The alleviation of operational constraints and lack of reliance on aging infrastructure
 3. Ease of constructability
 4. Low environmental impact
- The only sub-categories where DS-3 was not the best ranked alternative were utility conflicts/site constraints, and asset maintenance.
- Table 16 of the Technical Memo shows alternative ratings

Criteria	Indicator	DS-1	DS-2	DS-3
Community Impact	Community disruption during construction	High	Moderate	Low
	Long-term impact (aesthetics, odor, noise, etc.)	Very Low	Very Low	Low
	Traffic management (during construction)	High	Moderate	Moderate
Constructability	Construction method difficulties/risks	High	Moderate	Low
	Utility conflicts/site constraints	Low	High	Moderate
	Bypass pumping	High	Moderate	Low
Environmental Impact	Excavation Activities and disposal of excavated material	High	Low	Very Low
	Dust, noise, damage to trees, pavement and soil erosion	High	Moderate	Low
	Contaminant disposal (AC pipe)	High	Low	Very Low
Operations & Maintenance	Asset maintenance (cleaning, inspection, assessment, & repair)	Low	Low	Moderate
	Operational constraints (lack of redundancy)	Moderate	Low	Very Low
	Risk of failure due to aging infrastructure	Very Low	Low	Low
Cost	Construction cost	High	High	High
Criteria Points		24	31	37
Weighted Ranking		3	2	1

DS-3 Parallel Force Main recommended for further development

- Extend the Force Main from Newton St to Vale Rd, while gravity sewer operates in parallel
- Air release valves at intermediate high points of line

We want your Input!



Project Timeline

- ✓ Community meeting March 1, 2022, to present the Final Technical Memo.
- ❑ A Preliminary Engineering Report (PER) will follow, on track to be completed in early Summer of 2022.
- ❑ A public meeting will be held to discuss the findings of the PER late Summer 2022.
- ❑ Begin implementing a design and construction project.



Questions & Answers

Thank you for listening !



For additional information, please contact

Elizabeth Merin, Engineer II, Elizabeth.merin@fairfaxcounty.gov

Department of Public Works & Environmental Services
Wastewater Design & Construction Division
703-324-5111



- More information available at: www.fairfaxcounty.gov/publicworks
- www.fairfaxcounty.gov/publicworks/capital-projects/lakevale-estates-collection-improvements-project
- We will post this presentation on the website

