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Paeonian Springs and Waterford Joint Water and Wastewater System Feasibility Study Findings

Finance/Government Operations and
Economic Development Committee
November 12, 2024

Purpose

- Project: (High-Level)
  To Address Public Health and Community Sustainability Concerns by Providing Adequate Quantity and Quality Potable Water Supply to the Villages of Paeonian Springs and Waterford and to Address Long-Standing Wastewater Issues in Paeonian Springs

- Item Purpose:
  To provide the FGOEDC with the findings from the 2024 Paeonian *Springs and Waterford Joint Water and Wastewater System Feasibility Study* and to seek FGOEDC endorsement and further guidance regarding the continued design of water and wastewater interconnected systems between the Villages

Background

- 2019 Paeonian Springs Water and Wastewater Feasibility Study
- 2022 Paeonian Springs Water and Wastewater Boundary and Treatment Alternatives Technical Memorandum

  Historic Waterford Water Feasibility Study

  (April 19th) the Board approved $3.5 million of American Rescue Plan Act funds be applied toward the design of a community water and wastewater system in Paeonian Springs

Background Con't

- 2023 (February 21st) the Board endorsed a communal water system in the Village of Waterford and allocated $1.5 million from the existing Capital Improvement Project (CIP) Water and Wastewater Program funds to conduct preliminary design work for a community system

  Directed staff to continue to evaluate the feasibility of interconnected communal water and wastewater systems between the Villages of Waterford and Paeonian Springs

  Staff initiated the feasibility study with Loudoun Water

Study Scope

- Evaluation of the technical feasibility of an interconnected wastewater system solution
- Evaluation of the technical feasibility of an interconnected water system solution
- Identification of potential constructability challenges associated with the proposed project
- Summarization of the technical feasibility of the water and wastewater systems solution.
- Opinion of probable construction costs for the most feasible solution

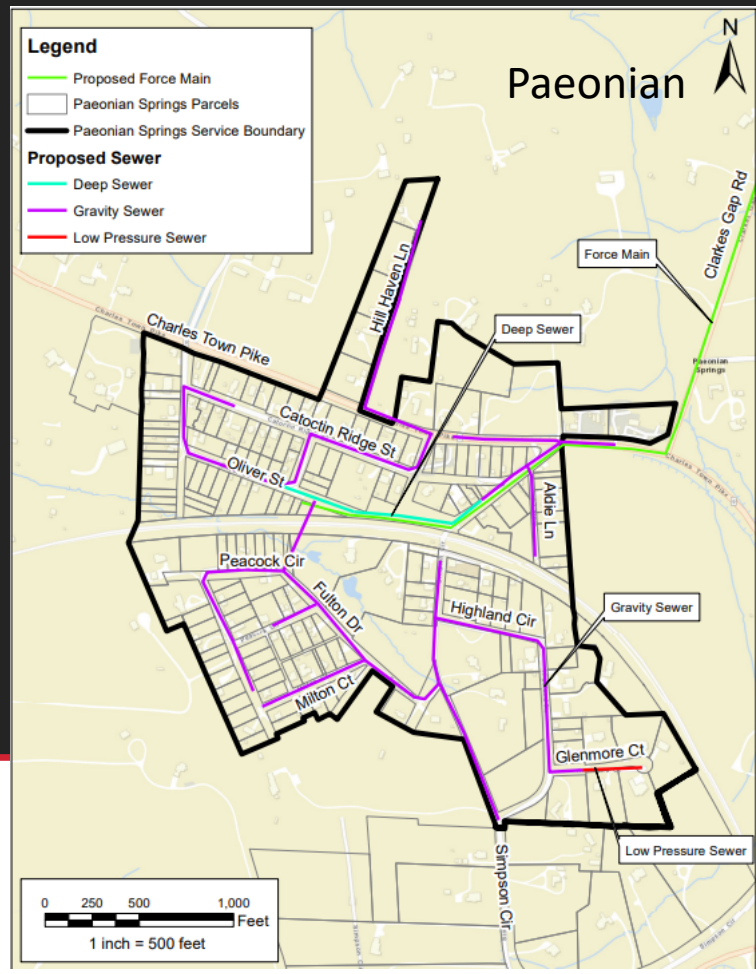
Study Results

- Assuming land acquisition (easements) are completed, and groundwater wells with sufficient yield could be located along the Clarkes Gap Road corridor, the Feasibility Study confirmed it is technically feasible and financially beneficial to design, permit, and construct all components of an interconnected water system and wastewater system

- Development of separate systems would require construction of 3 new treatment plants instead of 1, resulting in increased operation and maintenance and rural viewshed impacts

Wastewater System

- Sanitary sewer collection system serving all connections in the approved Paeonian Springs sewer service area boundary
- Sewage pumping station located in Paeonian Springs
- Sewage force main to convey flows from Paeonian Springs to the Waterford sanitary sewer collection system
- Expansion at the Waterford Wastewater Treatment Plant (WWTP) to meet additional flows from Paeonian Springs



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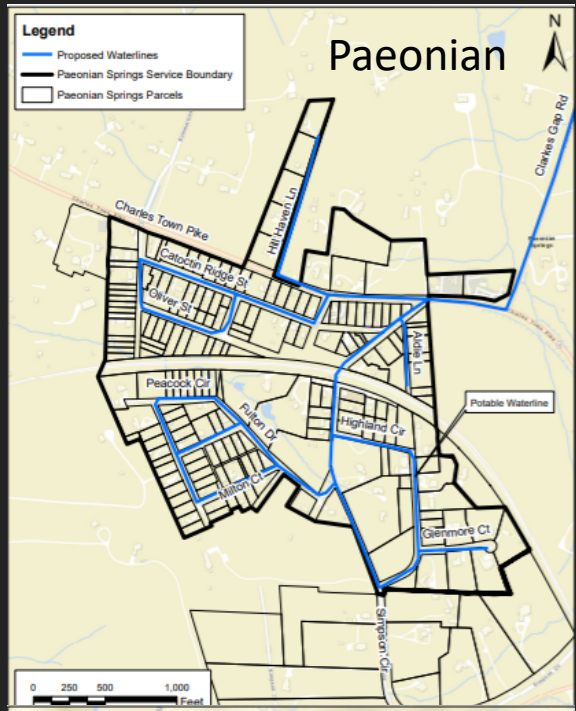
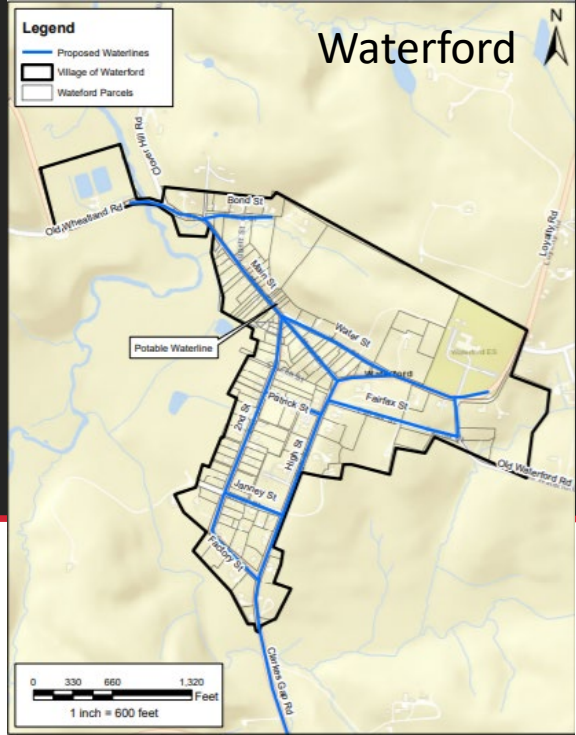
Water System

- Groundwater Wells, Treatment Facility, Storage and Pumping Facility to be sited in the 2.5-mile Clarkes Gap corridor between Paeonian Springs and Waterford
- Watermain conveying treated potable water from the Wells and Treatment Facility to Paeonian Springs and Waterford
- Water distribution system within Paeonian Springs and Waterford to serve all connections within the respective approved water and sewer service areas





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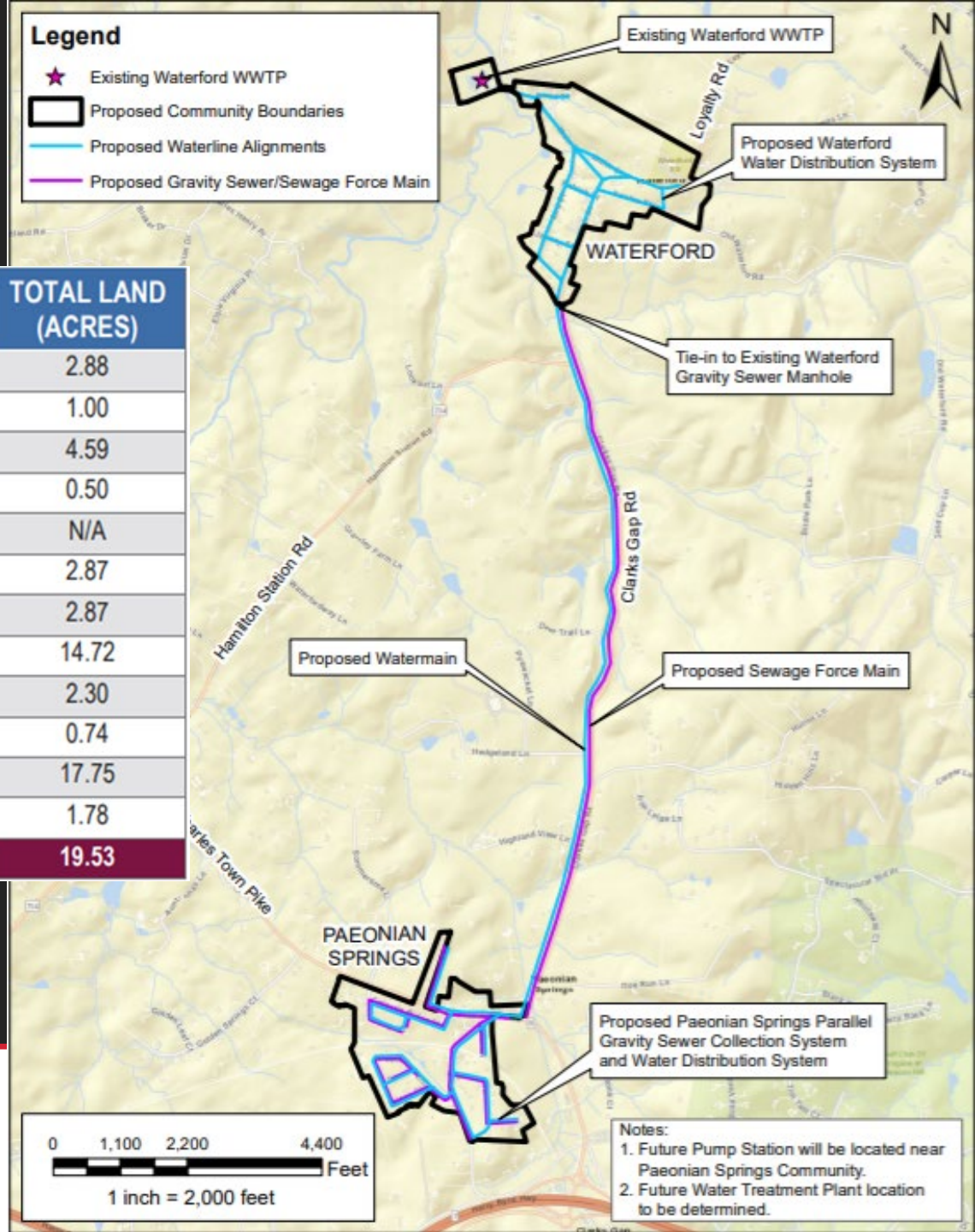
Conceptual Layout

SYSTEM COMPONENT	NUMBER	AREA/UNIT	TOTAL LAND (SF)	TOTAL LAND (ACRES)
Groundwater Wells	4 Wells	200' Ø Circle	125,664	2.88
Water Treatment	1 Facility	1 Acre	43,560	1.00
Groundwater Well Raw Water Piping	10,000 LF	20' Width	200,000	4.59
Sewage Pumping Station	1 Facility	0.5 Acre	21,780	0.50
Wastewater Collection/Water Distribution Systems	11,500 LF	ROW	N/A	N/A
Sewage Force Main	12,500 LF	10' Width Outside ROW	125,000	2.87
Water Transmission Main	12,500 LF	10' Width Outside ROW	125,000	2.87
		SUBTOTAL	641,004	14.72
Contingency 1: Remote Well Locations	5,000 LF	20' Width	100,000	2.30
Contingency 2: Unknown Easements & Property	5% of subtotal		32,050	0.74
		SUBTOTAL	773,054	17.75
Temporary Construction Easement	10% of subtotal		77,305	1.78
		SUBTOTAL	**850,360**	**19.53**



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Construction Challenges

- Roadway Impacts
  - Work along Clarkes Gap Rd is estimated to take 8 months
  - A Detailed Traffic Control Plan will be developed during the design
- Washington and Old Dominion Trail Crossing
  - Approval and coordination with the Northern Virginia Regional Park Authority will be required
  - Installation will require trenchless method under the trail to minimize impacts
- Archaeological and Culture Resources
  - Coordination and approvals from County, State, and Federal agencies
- Easement and Property Acquisition
  - It is estimated that 20 Acres of individual easements will be required
  - Project constructability relies on easement availability

Advantages

- Utilizing the Waterford WWTP site eliminates the need to acquire new land for a “new” WWTP
- The existing Waterford WWTP discharge permit can be modified to accommodate the Paeonian Springs flows without the need to obtain additional nutrient credits
- Maintaining proper treatment and meeting effluent discharge permit requirements at one facility instead of two significantly reduces the risk of environmental impacts and permit violations

Advantages Con't

- The use of a single WWTP and a single Water Treatment Plant (WTP) through the interconnected systems helps to avoid visual impacts on existing viewsheds and minimizes interactions with existing historical sites
- Increasing the evaluation area along the Clarke's Gap corridor significantly increases success for an adequate water supply
- Consolidating systems significantly reduces overall operation and maintenance costs and reduces the lifecycle costs of facilities

Additional Considerations

- Interconnected - Cost Effectiveness
  - 20-30% Overall Life Cycle Cost Savings
  - Highest Savings in Operation and Maintenance
  - Estimate of 6 to 8 Million in Capital Cost Savings
  - Better Estimate Accuracy for an Existing WWTP Expansion
- Essential Project Timing Items
  - ARPA Funds - Deadline of December 31, 2026
  - Loudoun Water Waterford WWTP Upgrade (In Progress)
  - DTCI Waterford Infrastructure Project (In Design Stage)
- Other Potential Services
  - Potential Fire Flow
  - Adaptive Reuse

Estimate of Capital Costs

Design and Indirect Costs	Current Project Phase
Design, Permitting, Surveying	$ 4,500,000 Funded
Land Acquisition, Land Use Approval, Contracted Services	$ 2,700,000 Requesting
Waterford WWTP Upgrades	$ 1,300,000 Requesting
Total Costs	**$ 8,500,000**
Construction Costs	Future Project Phase
Joint Wastewater System Construction Costs	$ 19,700,000
Joint Water System Construction Costs	$ 19,200,000
Contingency for Construction Costs (20%)	$ 8,000,000
Construction Management	$ 4,800,000
Total Costs	**$ 51,700,000**
Current Project Level	-20% to +30%
Total Capital Costs	**$ 60,200,000**

Staff Recommendations

- Endorse Interconnected Water and Wastewater Systems between the Villages of Paeonian Springs and Waterford
- Create a new CIP titled "Villages of Paeonian Springs and Waterford Interconnected Community Water and Wastewater Systems"
- Move available funds from the existing Waterford Communal Water System CIP project to the newly created CIP project

Staff Recommendations Con't

- Close the existing CIP projects, "the Village of Waterford Communal Water System" and "Village of Paeonian Springs Wastewater Modernization"
- Allocate $4 million from the CIP Water/Wastewater Program fund to support easements, land use approvals, and existing upgrades to the Waterford Wastewater Treatment Plant
- Return to the Board with a Construction Funding Strategy

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Questions