Hazen

Jones Falls Sewershed Comprehensive Evaluation

News & Information

Q3 2022 ISSUE
FALL UPDATE

What Area Does the Jones Falls Sewershed Encompass?

The Jones Falls Sewershed includes approximately 1,124,000 linear feet (LF) of gravity sewers ranging from 6- to 42-inches in diameter and approximately 6,200 sewer manholes and structures. The area served by this sewershed is shown in below.

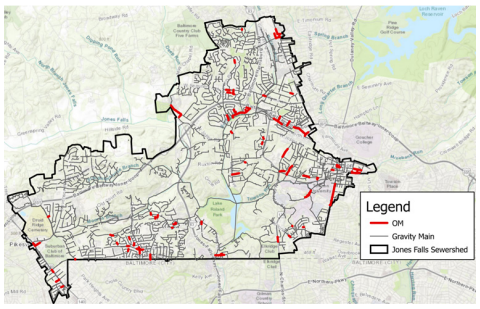

Figure 1: Jones Falls Sewershed

The entire engineering assessment completed will be documented in a comprehensive report that will provide a flexible roadmap enabling Baltimore County to develop informed, asset-based, risk-based, and prioritized Capital Improvement Plan budgets for near-term and long-term system improvements.

Work on the Comprehensive Report has already begun with a Draft anticipated in 2023. Improvements therein will both protect the environment and protect residents/businesses.

INTRODUCTION

Jones Falls Sewershed Comprehensive Evaluation

Slightly more than two years into a three plus year project, Baltimore County and their Engineering Consultant, Hazen and Sawyer, continue to make significant progress in completing a long term comprehensive evaluation of the Jones Falls Sewershed. The following are currently being evaluated with future projects vetted for long term capacity:

- Future capacity needs driven by planned development, potential re-development, and possible future connection of unserved areas of the sewershed, including nearly 1,000 septic facilities spread throughout Jones Falls.
- Strategies needed to further protect the environment from potential sanitary sewer overflows (SSOs) and residents/businesses from potential basement backups.
- Best Management Practices for continued proactive operation and maintenance of the sanitary sewer system.
- Recommended approaches to address sewer system vulnerabilities and improve long-term sustainability and resiliency.
- Development of a Capital Improvement Program (CIP) to address system deficiencies at year 2025, and at 20-year and 50-year planning horizons.

Baltimore County remains firm in meeting the following commitments and achieving the long term planning goals.

Commitments:

- Maintain proper sanitation so communities can continue to thrive and prosper.
- Continue prioritization of clean water access.
- Conduct planning projects that are necessary for the County to meet future utility challenges and build upon past improvements.
- Revitalize utility infrastructure to meet forecasted population and employment growth.

Planning Goals:

1. Enhance resiliency and sustainability through properly planned infrastructure improvements.
2. Preserve and protect the environment through projects that improve water quality.
3. Focus planning efforts on assessment and improvement of the existing sewer system.
4. Track and prioritize needed sewer system improvements and proactively repair/replace infrastructure that impacts the community or the environment.

Project Accomplishments through Q3 2022

A brief update on critical project accomplishments made through Q3 2022, which build upon prior accomplishments, are included below.

Data Review

Comprehensive review of over 17,500 available historical records.

Field Data Gathering/Reconnaissance

Completed a Hot Spot Analysis associated with all SSO, basement backup, and work order data.

Hydraulic Model Expansion

Completed a gap analysis of the existing model to assess ways the model could be improved upon for use as a tool to better estimate the impacts that rainfall has on sewer system operations. The existing model, constructed over ten years ago, was found to not accurately represent current wet weather flow conditions. This is not unusual given the age of the model. The existing model properly predicted wet weather flows at 1 of 39 meters *(Figure 2)*.

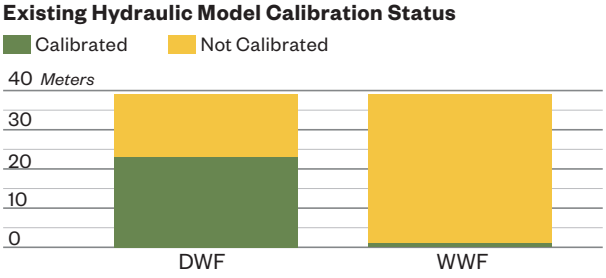

Figure 2

Based upon the model gap analysis, completed field survey of 106 manholes to update the hydraulic model.

Completed a flow, level, and rainfall monitoring data analysis to assess current high rainfall dependent inflow and infiltration (RDII) sewer service areas. These areas respond more dramatically to rainfall *(Red areas shown in Figure 3)*.

Selected additional flow monitor locations to refine the hydraulic model calibration effort.

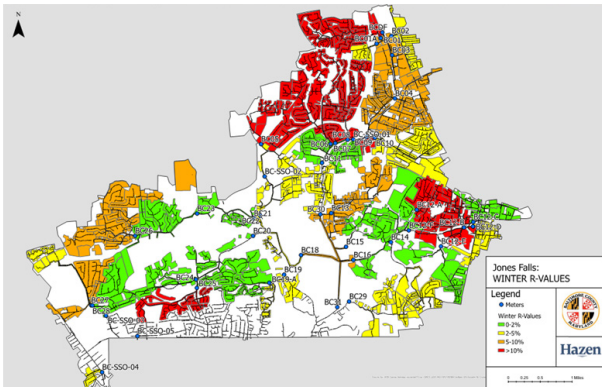

Figure 3 :
Winter High RDII Areas within the Jones Falls Sewershed

Baltimore County deployed 26 additional flow monitors. Monitoring will continue through Summer 2022, such that dry weather, wet weather, and high groundwater flow data is gathered. Expanding the hydraulic model to include all sewers in the sewershed allows for a more detailed sewershed wide analysis. The original model was only required to include pipes 10-inches and larger. The number of manholes in the model increased from 1,513 to 6,715 while the number of pipes increased from 1,342 to 6,919.

Hydraulic Modeling Validation

Expanded model calibration/verification with new flow monitoring data is being completed now with much progress made. Data is anticipated to be collected through Summer 2022.

Stakeholder Engagement

Met with the following stakeholders in the sewershed to better understand potential increases in residential and employment populations: GBMC, St. Joseph Medical Center, Sheppard Pratt, Towson University.

Dashboards

Development of a series of Project Dashboards that are being used to present evaluation findings. These will be expanded once capacity analysis is completed *(Figure 4)*.

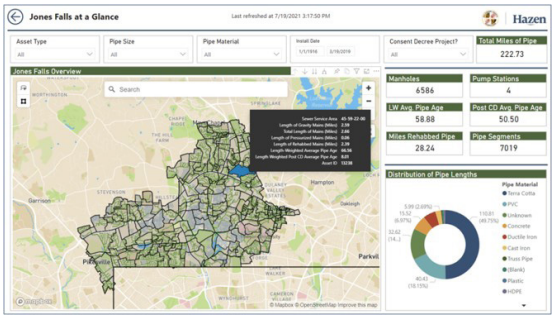

Figure 4

Environmental Investigations

Environmental investigations in and near all large water features within the sewershed (Lake Roland, Jones Falls, etc.) began in Fall 2021 and will continue into 2022.

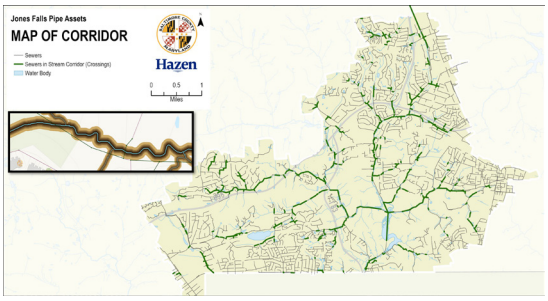

Figure 5

Climate Change

Assessed the potential impacts climate change may have on rainfall within the sewershed, including more frequent and higher intensity storm events.

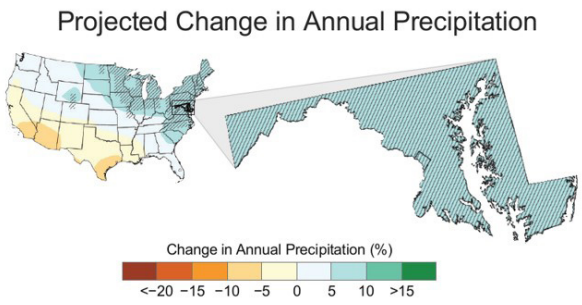

Figure 6

Mobile GIS

Implemented Mobile GIS to streamline data gathering. It replaces maps and redundant data entry, allowing gathered data to be immediately shared within the project team.

Population Estimates

Developed future population estimates, both residential and employment, which will contribute to future flows within the sewershed. All sewer assets must be capable of conveying future flows to protect residents, businesses, and the environment from overflows and backups.

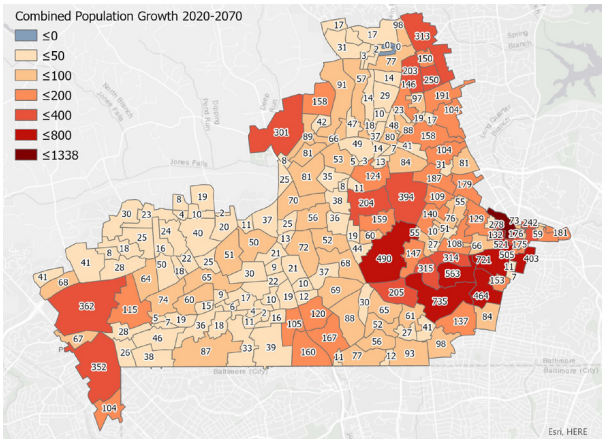

Figure 7

Water Meter Billing

Distributed water meter billing information to the hydraulic model for increased accuracy in sewer modeling.

COF Criteria	Social			Financial	Environment
	Vibrant Communities	Workforce Empowerment	Equitable Decision Making	Government Accountability	Sustainability
Environmental Impact	x		x		x
Transportation Impact	x	x	x	x	
Critical Facilties	x		x		
Diameter		x		x	x
Pipe Accessibility				x	x

Figure 8

Consequence of Failure Criteria

Developed Consequence of Failure Criteria, which are being used to assess and prioritize each recommendation within the sewershed. These criteria account for a Triple Bottom Line evaluation including Social, Financial, and Environmental impacts.

Future Innovation Areas

Identify

Identify innovation options that offer the County the most value.

- Leverage existing data
- Utilize the County's Tools (CityWorks, InfoWorks, etc.)
- Address known concerns within the sewer system (RDII, energy usage, etc.).

Assess

Assess the return on investment for potential use elsewhere in the sewer system.

- Pilot/test and assess results

Position

Position the County as a leading utility in sewer system design & operation.

Baltimore County and Hazen have been having ongoing discussions with respect to future innovations. The goals of these future projects are as shown above.

Flow Monitoring

Flow monitoring data from 32 flow monitors has been analyzed for the data collected from November 2021 through June 2022. Flow data has been imported in the HazenQ software, integrated with previously collected 2018 flow data. Connectivity diagram had been updated to include new locations. Flow data has been reviewed for quality.

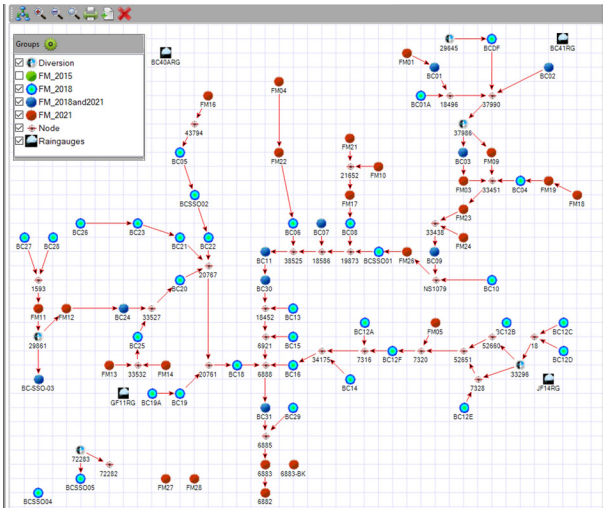

Figure 9

Rainfall

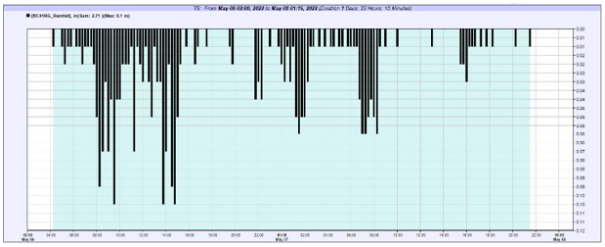

Figure 10

Rainfall data from multiple rain gauges has been analyzed using the data collected from November 2021 through June 2022. Rainfall has been imported in the HazenQ software and return period calculated.

Dry Weather Flow (DWF) Calibration

DWF calculations are under way for each metershed. Normalized DWF patterns are being created and transferred to the modeling subcatchments. GWI component is distributed using subcatchments area and ADSF component is distributed using water consumption.

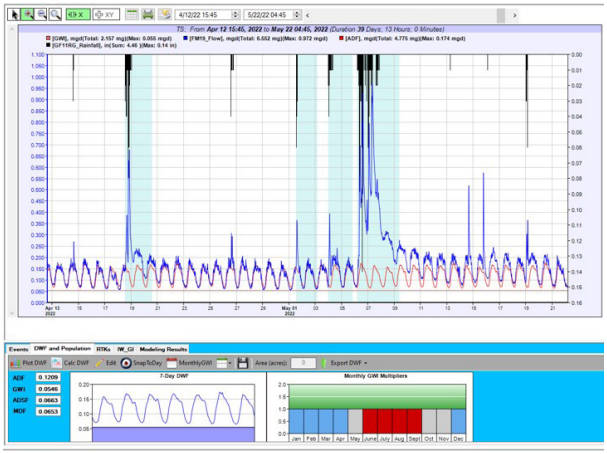

Figure 11

Stream Asset Prioritization

- Developed Framework: Existing approach modified to fit Baltimore County; New COF category introduced - Public Health/ Environmental Impact
- Completed Desktop Analysis: LOF and COF factors decided upon and calculated; Risk scores assigned to all assets; Areas of interest identified with all levels of risk

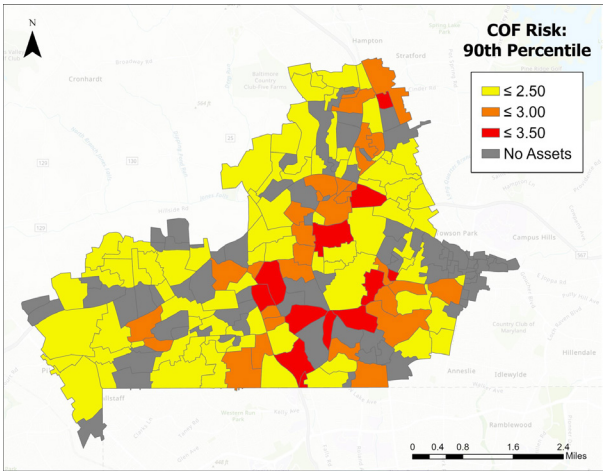

Figure 12

Looking Ahead

Upcoming Project Tasks

Engineering evaluation work continues while flow monitoring efforts reached partial completion in Summer 2022. Planned upcoming project tasks are highlighted below.

Continued stakeholder engagement to fully understand the unique dynamics within the Jones Falls Sewershed, including community interests and potential residential and employment growth over the next 50 years.

Continued sewer and manhole inspections through 2022 and into 2023. Additional system evaluation will occur after hydraulic modeling once Summer 2022 flow data is available, anticipated this Fall.

What to expect going forward?

Given that this project is intended to map out what the sewer system needs to look like over a 50 year period, it is important to cover all possible aspects of what the sewer system could become by the year 2050 (~30 year period) and 2070. The following tasks, planned to occur at a later stage in the evaluation, will be completed as a part of this effort to provide a complete picture of the near and long term sewershed needs.

- Capacity assessment using the calibrated model under future flow conditions. ***Work is underway on this - see the update included in this quarterly issue!***
- Acoustic and Sonar inspection of assets identified during the modeling evaluation effort. Anticipated in late 2022 and continuing into 2023 following hydraulic modeling.
- Development of a recommended CIP.
- Recommendations on Asset Management Program features, which will allow for proactive protection of the environment and the County's residents and businesses. Initial Asset Management framework development has been completed and will be refined when hydraulic modeling results are generated in 2022 based on updated flow monitoring *(see Figure 13)*.

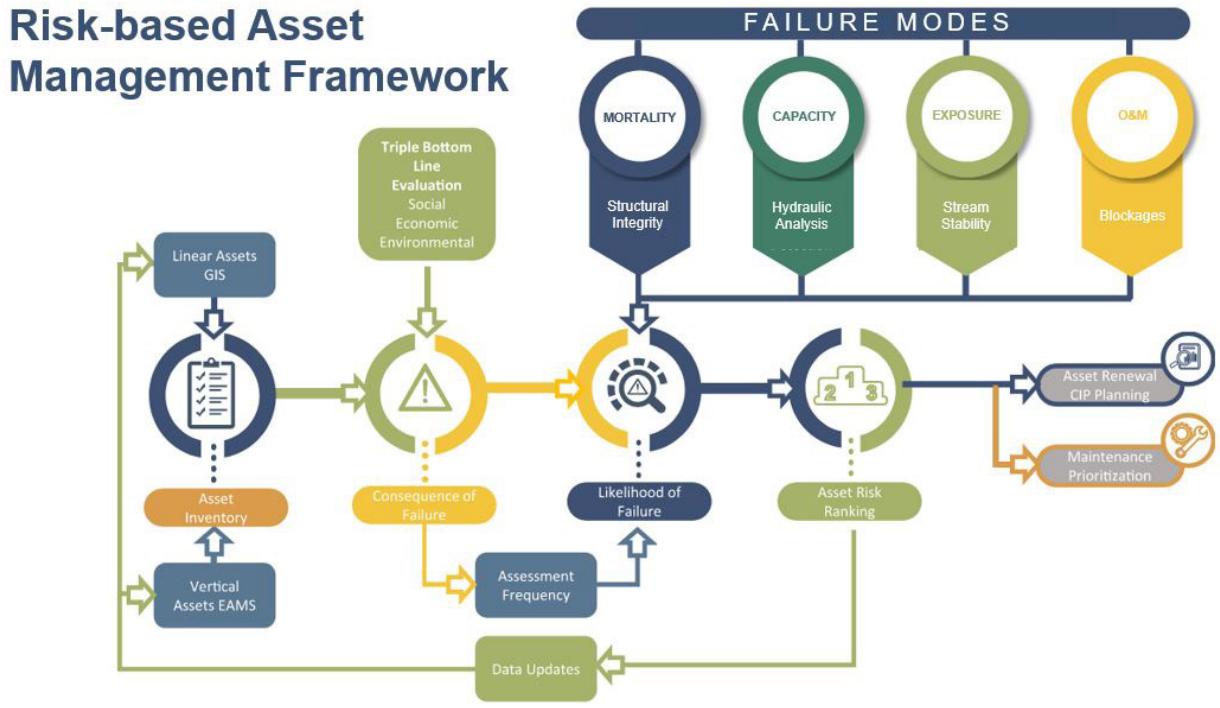

Figure 13

Upcoming Project Tasks (continued)

A concerted effort is being made on this project to expand and refine the hydraulic model so that it can be used as an advanced tool to accurately reflect future wet weather conditions. Potential future flows can also be properly evaluated with the advanced model.

Target Completion Date

The Final Report is anticipated to be completed in late 2023. Baltimore County will continue to provide updates on the project, on a regular basis.

Data continues to be gathered through flow and level monitors located throughout the sewershed. Flow monitoring through May 2022 has been gathered and will continue through Summer and Fall 2022. Hazen and Sawyer continues to use this captured data to improve the County's Jones Falls Sewershed hydraulic model. A concerted effort has been made in Q2 to evaluate the flow data gathered with results anticipated in Q3 and Q4 of 2022. Using the improved hydraulic model will allow for informed decisions to be made on capacity needs throughout the entire sewershed and at the neighborhood level.

Winter 2022 Update to Follow!