Quarter 1 Update: January – March, 2023

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The Springfield Water and Sewer Commission (Commission) is embarking on large-scale upgrades to replace 50- to 100-year-old drinking water infrastructure and to achieve compliance with regulatory limits for disinfection by-products (DBPs). This is a quarterly update on projects related to DBP compliance and water supply capacity.

The following projects to reduce DBPs in the Commission's drinking water and maintain a consistent supply of safe drinking water have progressed over the last quarter:

- **Clearwell & Backwash Pump Station project** - CH Nickerson (contractor) made progress on the backwash pump station, clearwell structure, and site piping this quarter. The contractor completed work on the pump station building envelope and installed electrical conduit, a bridge hoist, and HVAC equipment in the pump station. In the clearwell structure the contractor installed grout, slide gates, and stop log guides. The contractor installed backwash fill piping and made connections to the existing backwash, process water, and domestic water piping systems for future operation. The contractor also installed site drainage infrastructure.
- **New Water Treatment Plant Design** – Hazen submitted 30% design documents in late December. In January, Kleinfelder and Stantec teamed to complete a Value Engineering study of the design, hosting two workshops with the Commission and Hazen. The current total cost estimate for the new plant is $311 million, which is expected to change as design advances. Hazen is scheduled to submit 60% design documents in May and continues to host weekly meetings with the Commission to review aspects of the design. The Commission is planning to complete the project with one contract to reduce risk by placing the responsibility for project schedule and completion on one contractor.
- **42-inch Raw Water Transmission Main** – AECOM is completing the final design for repairs to the existing pipeline and is incorporating comments provided by a peer review from Kleinfelder completed in March.
- **Energy Dissipation Valve and Equalization Tank Facility** – AECOM is working on 90% design documents for the energy dissipating valve to be constructed at the outlet of the 42-inch raw water transmission main to the new WPF and is coordinating design parameters for operation of the future water treatment plant with Hazen.
- **Cobble Mountain Hydroelectric Station Improvements for Primary Raw Water Conveyance** - Stantec and Kleinfelder completed an assessment of the Cobble Mountain Hydrostation and provided a final alternatives analysis for turbine upgrades as part of maintaining the facility as the primary source of raw water to WPF. We are currently reviewing the recommendations made for refurbishing this facility.

We have included additional information for each project on the following project update pages.

Please contact us if you would like more information about these projects. More information is also available at https://waterandsewer.org/projects/.

DBP Compliance

EPA Quarterly Update

Clearwell & Backwash Pump Station

Project Purpose: This facility will replace the existing clearwell and backwash, domestic, and process water pumps.

The existing clearwell is a 1920's slow sand filter that was retrofitted for use as a clearwell and backwash water storage tank for the direct filtration plant in the 1970's. The structural integrity of the clearwell is uncertain and the roof is leaky, allowing rainwater to infiltrate into the filtered water. The roof leaks have been temporarily mitigated by the installation of a geomembrane cover over the clearwell. The clearwell cannot be taken offline for maintenance, presenting a single point of failure for the direct filtration plant. The existing backwash, domestic, and process water pumps are original to the plant and are regularly breaking down and in need of repair.

This project will provide the reliability and redundancy needed to maintain existing operations and will also function as the first component of the new water treatment plant.

Delivery Approach: Design-Build with AECOM (OPM), Tighe & Bond (Engineer), and CH Nickerson (GC). Financed by SRF.

Design Progress: Tighe & Bond finalized the design and submitted the final design documents in November.

Const. Progress: CH Nickerson made progress on the backwash pump station, clearwell structure, and site piping this quarter. The contractor completed work on the pump station building envelope and installed electrical conduit, a bridge hoist, and HVAC equipment in the pump station. In the clearwell structure the contractor installed grout, slide gates, and stop log guides. The contractor installed approximately 250 feet of 48-inch ductile iron backwash fill piping and made connections to the existing backwash, process water, and domestic water piping systems for future operation. The contractor also installed site drainage infrastructure.

Supply Chain: The delivery time for electrical system components (VFDs and MCCs) is the primary concern and may cause an additional schedule delay.

Delivery times for piping and appurtenances continue to be long. Delivery times for ductile iron pipe (both small diameter and large) ordered for this project were upwards of 12 months but have all been delivered at this time. Interior small diameter (4-inch and 6-inch) valves have been delayed multiple times and have not shipped yet but are expected to arrive in time to complete the related work on schedule.

Project Delays: Changes in design scope as requested by the Commission and AECOM during the 60% design review, along with pipe delivery delays, resulted in a four-month delay in project completion. Delays in electrical equipment deliveries may result in an additional delay.

Operational Issues: Construction activity continued to impact water treatment plant operations in Quarter 1. Installation of the clearwell fill piping conflicted with several existing critical pipes and required careful coordination with the contractor. The process water (carrying water for gaseous chlorine) line, chemical feed lines, and domestic water supply were each disrupted by this activity. We worked closely with Nickerson to anticipate periods of high-risk activity and run on auxiliary systems, when possible, as a precaution to minimize the potential adverse impact to our chemical feed systems. Standard operating procedures were developed and followed for the major tie-in work. The connection to the existing backwash piping required careful coordination and a short shutdown of the backwash system.

Schedule: The contractual substantial completion date is currently set for June 2023 (delayed from February 2023), but the project is currently projected to be delayed to September 2023 due electrical equipment lead times.

Backwash Pump Station Structure (over Clearwell)

Installing 48-inch ductile iron backwash fill piping crossing existing piping conflicts

DBP Compliance

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New Water Treatment Plant Design

Project Purpose: This project is for design and construction of a new water treatment plant (WTP) to meet the system demand while providing a higher level of treatment to achieve long-term, consistent compliance with the Disinfection By-Product (DBP) Rule. The new WTP will replace the existing direct filtration and slow sand filtration plants, which were not designed to remove adequate dissolved natural organic matter (NOM) to meet current regulatory limits for HAA5s and THMs.

The Commission has frequently been in non-compliance for HAA5s since 2018. To address this issue, after completing several studies, the Commission identified that modifications to the existing plant processes would not be sufficient to achieve compliance, and that the addition of clarification was needed to reliably remove NOM and maintain compliance. Based on the results of a three-season pilot plant operation, Dissolved Air Flotation (DAF) with a polyaluminum chloride coagulant was selected as the clarification process for the new conventional plant.

Delivery Approach: Design-Bid-Build with Hazen (Engineer). Planned financing by WIFIA and SRF.

Progress: Hazen submitted 30% design documents for the new water treatment plant in late December. In January, Kleinfelder and Stantec teamed to complete a Value Engineering study of the 30% design, hosting two workshops with the Commission and Hazen. . In response to the Value Engineering study, the Commission now plans to complete the project with one contract to reduce cost and reduce risk by giving one contractor ownership over the schedule and procurement.

Hazen is scheduled to submit 60% design documents in May and continues to host weekly meetings with the Commission to review aspects of the design. The current total cost estimate for the new plant is $311 million, which is expected to change as design advances.

Supply Chain: Supply chain impacts on this project are currently unknown but are a concern. Lead times for electrical equipment are currently pushing 18 months.

Project Delays: The Commission changed its approach to this project, and now plans to complete the project with one contract to reduce risk associated with multiple contractors working on the same project by placing the responsibility for project completion on one contractor. This results in an estimated 6-month delay for project completion.

Schedule: The contract is scheduled to be awarded in June of 2024 and be completed by June of 2028. It was previously scheduled to be completed by December of 2027.

DBP Compliance

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Rendering of future water treatment plant by Hazen

DBP Compliance

EPA Quarterly Update

42-inch Raw Water Transmission Main

Project Purpose: This project is for the repair of the 42-inch bypass raw water conveyance PCCP pipeline, which was damaged when a new energy dissipating valve (EDV) failed in 2019. The 42-inch bypass provides an important route for raw water to bypass the Cobble Mountain Hydroelectric Station (CMHS), the Intake Reservoir, and the 72-inch Intake Tunnel. Returning this route to service will allow the Commission to take the CMHS and 72-inch Intake Tunnel offline for maintenance when needed while maintaining raw water supply to the current and future water treatment plants.

With the 42-inch raw water transmission main out of service, the Commission currently relies on the Diversion Gates (the low-level dam outlet) to release water from the Cobble Mountain Reservoir when the CMHS is routinely offline for maintenance. This outlet was not designed to operate as a regular intake and is not operable remotely, requiring staff to regularly perform a complicated confined space entry that, in an emergency, would require assistance from a technical rescue team. With the 42-inch bypass out of service, there is currently no bypass for the 72-inch Tunnel.

Delivery Approach: Design-Bid-Build with AECOM (Engineer).

Progress: AECOM is completing the final design for repairs to the existing pipeline and is incorporating comments provided by a peer review from Kleinfelder completed in March.

Supply Chain: Supply chain impact on this project is uncertain. Current lead times on materials indicate that this may be less of a concern than some of our other projects.

Project Delays: None at this time.

Schedule: Project anticipated to be completed end of 2024.

42-inch Site Map

DBP Compliance

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Energy Dissipating Valve and Equalization Tank Facility

Project Purpose: This project is for construction of a new energy dissipating facility at the outlet of the 42-inch bypass raw water conveyance PCCP pipeline. The original energy dissipating valve (EDV) failed in 2019 and has been offline since then. This facility is necessary to provide energy dissipation for the 42-inch bypass once it is returned to service. The project also includes the design of a new raw water equalization tank that will be used in the future to directly provide raw water to the new water treatment plant. The EQ tank will eventually replace the need to use the sedimentation basin for raw water storage. Completing this work will allow the Commission to take the CMHS and 72-inch Intake Tunnel offline for maintenance when needed.

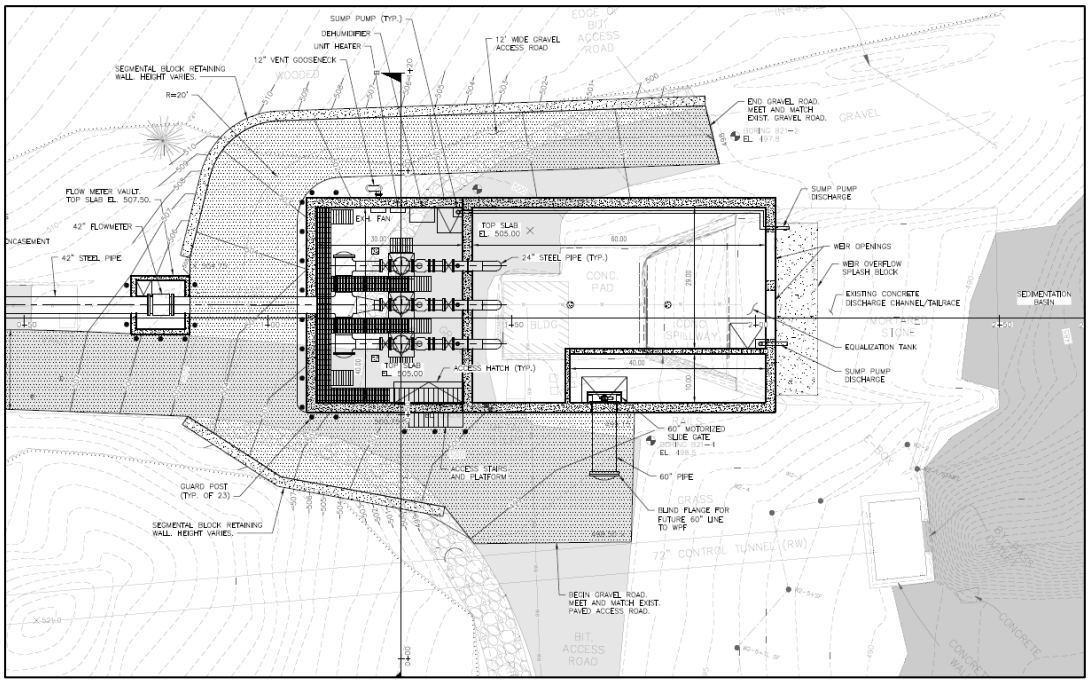
Delivery Approach: Design-Bid-Build with AECOM (Engineer).

Progress: AECOM completed the 30% design in the previous quarter and is working on the 90% design documents for replacement of the existing failed EDV structure with a completely redesigned structure that includes three Mokveld axial flow control valves, an equalization tank, and modifications to the existing outlet. AECOM is coordinating with Hazen regarding design parameters that will impact operation of the future water treatment plant.

Supply Chain: Supply chain impact on this project is uncertain. Possible long lead time items include the energy dissipating valves. Lead times for electrical equipment are currently pushing 18 months.

Project Delays: None at this time.

Schedule: Project anticipated to be completed end of 2024.



Excerpt from the 30% Design Site Plan

DBP Compliance

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Cobble Mountain Hydroelectric Station Improvements for Primary Raw Water Conveyance

Project Purpose: The Cobble Mountain Hydroelectric Station (CMHS) is an essential component of the Commission's raw water conveyance system. As part of the primary raw water conveyance route, the CMHS delivers water from the Broome Gate Intake down to the Intake Reservoir while generating power by using the 450-foot elevation difference between the two reservoirs. This project will identify alternatives for conveyance and hydropower generation in response to failing infrastructure at the facility. The existing turbines have reached the end of their operational lives, and only one out of the original three turbines is currently operational and is on a limited operating schedule to limit wear and reduce the risk of failure.

When the CMHS is offline for maintenance, the remaining routes for raw water conveyance are the 42-inch bypass (currently out of service) and the low-level Diversion Gates, which are not designed for regular operation. Restoring the CMHS conveyance route is vital to establishing reliable raw water conveyance for the Commission.

Delivery Approach: To be determined.

Progress: Stantec and Kleinfelder completed an assessment of the Cobble Mountain Hydrostation in the previous quarter and provided an alternatives analysis for turbine upgrades in this quarter. The Commission evaluated their proposed alternatives and provided comments. Stantec and Kleinfelder submitted an updated deliverable in March and the Commission is reviewing the recommendations in the final document that determine the path forward.

Supply Chain: Lead times for electrical equipment are currently pushing 18 months.

Project Delays: None at this time.

Schedule: Project schedule has not yet been established.

Inside Cobble Mountain Hydroelectric Station during a visit from Congressman Richard Neal in October

Engineering Capital Projects Schedule

EPA Quarterly Update – March 2023

	2022				2023				2024				2025				2026				2027				2028			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
42-inch Transmission Main																												
42-inch EDV Facility																												
Clearwell and Backwash PS Project																												
Direct Filtration Plant Repairs					✓ Project Complete																							
ACH Bulk Chemical Storage					✓ Project Complete																							
New Water Treatment Plant																												
Cobble Hydro/Penstocks (TBD)																												

Planning Design Construction

Note: Schedule is generalized and subject to change