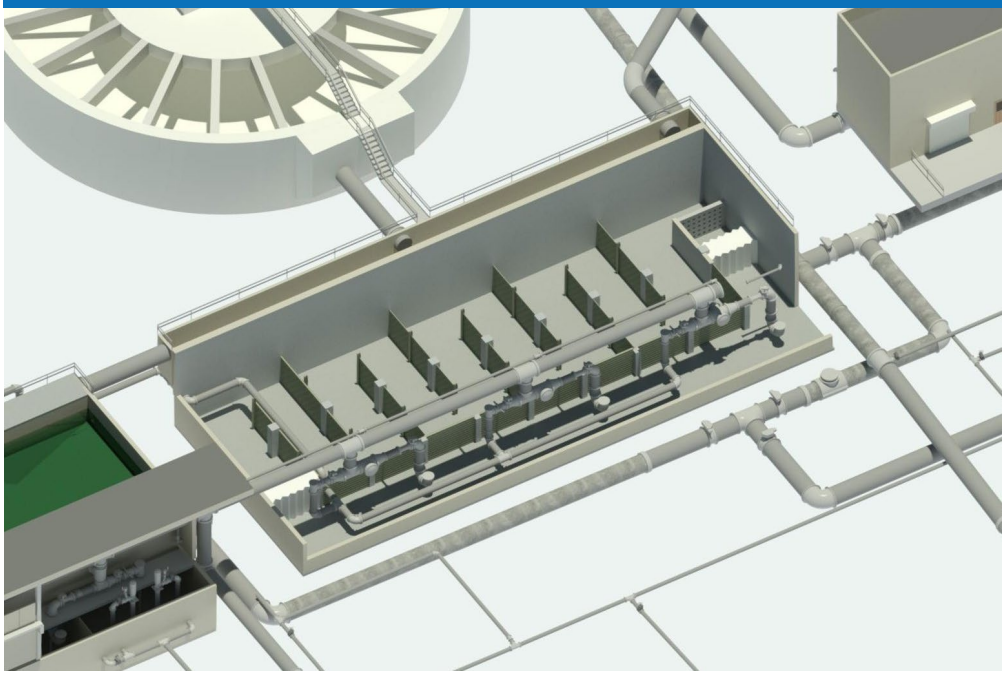
McCafferty Brinson consulting

Water Treatment Plant Four-Log Virus Treatment Upgrades

Boca Raton, Florida



Client
City of Boca Raton

Scope of Services
Professional engineering services for design development, preparation of construction contract documents, permitting, bidding, construction contract administration, and resident project representative services.

Contact
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Start Date
April 2020

Projected Completion Date
May 2026

Construction Cost
$13.60 million

Key MBC Staff
Frank A. Brinson, P.E.
Andrew Barba, P.E.
Mathew Marsh, P.M.P.

Key Features
Installation of intra-basin baffling and relocation of the hypochlorite and ammonia injection points within the clearwells to improve disinfection efficiency and reduce disinfection by-product (DBP) formation. The design also included new filter-to-waste piping and valves to improve filter performance.

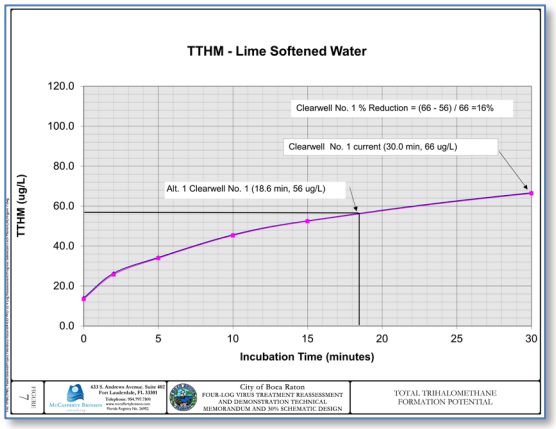
Benefit to the City
Improved operational flexibility and filtered water quality while upgrading 4-log disinfection process by reducing DBPs.

Background

The City of Boca Raton's Glades Road Water Treatment Plant (WTP) utilizes a blend of membrane softening, or nanofiltration (NF) (40-million gallons per day, mgd, capacity), and conventional lime softening (30 mgd capacity), to produce the finished water supply. On December 22, 2009, the City's WTP became the first drinking water facility in South Florida to be certified by the Florida Department of Health in Palm Beach County (FDHPBC) to provide four-log virus treatment of ground water under the Federal Ground Water Rule (GWR). Four-log virus treatment is provided through chemical disinfection with free chlorine in three treated water clearwells operating in parallel (Clearwells 1, 2, and 3), followed by ammonia injection to form a combined chloramine residual in the finished water.

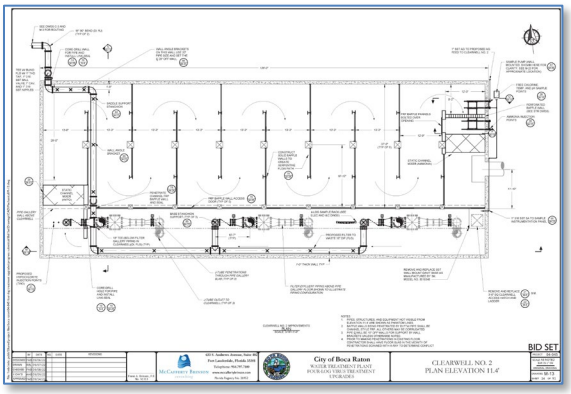
As part of the City's ongoing efforts to continually improve the quality of the drinking water supply, on April 28, 2020 the City retained McCafferty Brinson Consulting, LLC (MBC) to conduct a study evaluating options to reduce the formation of undesirable disinfection by-products (DBPs) such as total trihalomethanes (TTHM) and five haloacetic acids (HAA5) during the disinfection process.

The study, completed on June 15, 2020, concluded that the levels of DBPs in the finished water may be reduced significantly through the installation of baffling in the clearwells and re-locating the sodium hypochlorite and ammonia injection points. The proposed modifications will enable plant operating staff to more precisely control the application of disinfection chemicals to minimize the required contact time for disinfection and therefore better control DBP formation potential. The City received formal approval of the new four-log virus treatment approach from the FDHPBC on July 22, 2020. The recommendations from the study were incorporated in the design of the *Four-Log Virus Treatment Upgrades* project.



The Project

In general, the treatment process improvements included the following:



- Installation of fiberglass reinforced plastic (FRP) baffling within Clearwells 1 and 2 to improve the plug flow characteristics of the clearwells.
- Relocation of the sodium hypochlorite and ammonia injection points and installation of static channel mixers in each clearwell to more precisely control the chemical dosing rates and disinfectant contact times, reducing the formation of DBPs during the disinfection process.
- Addition of filter-to-waste piping to allow the first lower-quality volume of filtered water following a filter backwash to be routed to the washwater recovery basin to be recycled to the head of the plant.
- Yard piping modifications to allow any one of the three treated water clearwells and the transfer pump clearwell to be taken out of service for cleaning, repair, or maintenance without adversely impacting plant production. These modifications provided a substantial improvement in operational flexibility of the lime softening process.

Large-diameter yard piping improvements constructed south of Clearwells 1 and 2 and the Transfer Clearwell to allow each clearwell to be taken out of service, greatly improving operational flexibility.