MOTT MACDONALD

2020 Annual Facilities Inspection Report

Hackettstown Municipal Utilities Authority

November 9, 2020

Hackettstown Municipal Utilities Authority

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Contents

Executive Summary 1

1 Water Supply 2

1.1 Water Allocation Permit 2
1.2 Water Distribution System 2
1.3 Water Filtration Plant 4
1.4 Well Stations 5
1.4.1 Well No. 4 – Seber 5
1.4.2 Well No. 5 – Seber 6
1.4.3 Well No. 6 – Heath 6
1.4.4 Well No. 7 – Seber 7
1.4.5 Well No. 8 – Claremont 1R 7
1.4.6 Well No. 9 – Heath 8
1.5 Water Storage Tanks 8
1.5.1 2.4 MG Water Storage Tank 9
1.5.2 1.0 MG Water Storage Tank 10
1.5.3 Mount Olive Twp. Storage Tank and Booster Station 11
1.5.4 Independence Twp. Water Storage Tanks and Booster Stations 12
1.6 Development of Additional Water Supply 13
1.7 Water Quality 15

2 Sewerage System 17

2.1 Water Pollution Control Plant 17
2.1.1 Inlet Facilities & Raw Sewage Pumping 19
2.1.2 Primary & Secondary Treatment 20
2.1.3 Advanced Treatment 22
2.1.4 Post Aeration & Disinfection 23
2.1.5 Auxiliary & Electrical Systems 24
2.1.6 Solids Handling Systems 26
2.1.7 Plant Laboratory 27
2.1.8 Buildings 27
2.1.9 Site 28
2.2 Sewage Collection System 29
2.2.1 Mt. Olive (formerly Oak Hill) Sewage Pumping Station 29
2.2.2 House of Good Shepard Sewage Pumping Station 30
2.2.3 Diamond Hill (Meadow Lane) Sewage Pumping Station 30
2.2.4 Water Filtration Plant (WFP) Sewage Pumping Station 30
2.3 Wastewater Service Area and Wastewater System Planning 31

3 HMUA HEADQUARTERS COMPLEX & OVERALL FACILITIES 33

3.1 Facility Site Improvements 33

3.2 Energy Audit of HMUA Facilities 33
3.3 Air Permitting 33
3.4 Security Improvements 34
3.5 Electrical Testing Reports 34

4 SUMMARY 35

Executive Summary

The HMUA was formed in 1965 and took over the operation of the Town of Hackettstown Water Supply System and a sewage treatment plant that served a small portion of the Town. Today, the HMUA provides service to portions of five municipalities in the Hackettstown Area. The five municipalities include the Town of Hackettstown, Independence Township and Mansfield Township in Warren County and Mt. Olive Township and Washington Township in Morris County.

Mott MacDonald conducted the Annual Inspection of the operation and maintenance of the Hackettstown Municipal Utilities Authority's (HMUA) water facilities and sanitary sewer facilities on October 6th, 2020 covering the following:

Wastewater Facilities:

- One (1) water pollution control plant; and
- Four (4) sewage pump stations in the collection and transmission system

Water Facilities:

- Six (6) water supply wells;
- Two (2) booster pump stations; and
- Three (3) of Four (4) water storage tanks*

The utilities are well maintained, capably operated and remain in excellent overall operating condition.

* The 1.0 MG Tank site was not visited during the inspection as a site visit is anticipated under the Design Contract for the replacement tank.

1 Water Supply

The Hackettstown Municipal Utilities Authority completed an extensive potable water supply system improvement program between 1975 and 1981. This program included water transmission, water treatment, water supply and water storage projects and was necessary to meet State and Federal standards promulgated at that time and to keep pace with the growth in the Hackettstown area. Following completion of the aforementioned water system improvements, the HMUA undertook a series of individual projects designed to further increase the water supply capacity of the system and to replace the oldest, and in some cases undersized, water mains comprising the distribution system.

The HMUA has been and continues to be proactive in its maintenance of their water system as demonstrated by the HMUA undertaking eleven (11) water distribution and transmission main replacement Contracts since 1993, including the installation of more than 91,650 linear feet (over 17.5 miles) of new replacement water mains. This includes Contract 47W completed in 2018 with installation of 7,650 linear feet of replacement water mains. The investment in new infrastructure allows the HMUA to maintain a high quality of service to its patrons by reducing main breaks, service interruptions and O&M costs.

The water supply system is being competently operated by seven (7) total personnel with five (5) licensed operators, including the water utility superintendent and chief operator. The average daily water production for the period between September 1, 2019 and August 31, 2020 was approximately 2.14 MGD and the maximum monthly rate was 2.61 MGD (July 2020). These figures compare to 2.14 MGD and 2.45 MGD (July 2019), respectively, for the period between September 1, 2018 and August 31, 2019.

Prior to the utilization of 100% ground water well sources, the HMUA Water Filtration Plant had derived its water supply from the Mine Hill Upper and Lower Reservoirs and the Burd Reservoir. These properties have all been sold as the HMUA now solely utilizes groundwater.

1.1 Water Allocation Permit

The HMUA received a modified NJDEP Water Allocation Permit (NJDEP Program Interest ID No. 5145 and Water Allocation Permit No. WAP110002) on June 20, 2012 with an effective date of July 1, 2012. The permit is a 10-year permit with an expiration date of June 30, 2022. The modified Water Allocation Permit combined the HMUA's two (2) Water Allocation Permits into one (1) combined Permit, eliminated surface water reservoirs and the water filtration plant, added Well No. 9 (Heath), increased pumping capacity of Well No. 8 (Claremont Well No. 1R) to 800 gpm and eliminated Well No. 2.

1.2 Water Distribution System

Since 2000, the HMUA has completed five (5) major water transmission main projects to improve the fire flow capacity in the distribution system. During 2010 and 2011, the HMUA undertook the construction of a water main replacement project (Contract No. 38W) to replace undersized water mains located on Fifth Avenue, Reese Avenue, Liberty Street and Cook Street in the Town of Hackettstown. The Claremont Water Transmission Main Project (Contract No. 40W) was completed in April 2013. The project followed the recommendations of a 2011 hydraulic model of the water system for the Diamond Hill area which evaluated the effect on the

water distribution system with an increase in capacity of the Diamond Hill Well No. 8 from 300 gpm to 1,050 gpm.

During 2014, HMUA undertook the construction of a water main replacement project (Contract No. 43W) to replace unlined cast iron water main with cement lined ductile iron pipe within the Arthur Terrace and College View areas of the Town of Hackettstown. Contract No. 43W included the construction of 17,000 LF of water main replacement which included a change order to construct approximately 6,000 LF of water main to replace the remainder of water main in the College View area due to concerns with water main breaks. During 2014, there were several sink holes in the College View area of Hackettstown on College View Drive and Ferris Place related to water main breaks. The HMUA repaired the water main breaks, authorized Mott MacDonald to investigate the extent of sinkholes, and provide recommendations, and remediated the affected areas.

During 2016, under Contract No. 45W HMUA replaced an additional 5,177 LF of water main within areas of Hackettstown and Mount Olive. Contract 47W, replaced 7,650 LF of water main within the Town of Hackettstown in 2018.

The water main projects also included the replacement of almost all of the old non-pumper fire hydrants. In 2007 the ISO upgraded the classification of the Town of Hackettstown from a Class 5 to a Class 4 Public Fire Protection Classification, which is in the top 10% among all communities in the entire country. HMUA has been painting hydrants on an ongoing basis, in October 2020, HMUA said over 300 hydrants had been painted in the past year.

In 2013, HMUA contracted with Mott MacDonald to prepare a hydraulic model of the entire water system. As part of this project the model was used to simulate the hydraulics associated with the replacement of the existing one million gallon (MG) ground storage level tank. The tank has a high water elevation of approximately 830 feet which is approximately 26 feet above the prevailing hydraulic grade line (HGL) of the Main Zone of the system. The HGL of the Main Zone is currently established by a 2.4 MG Tank in the southern portion of the distribution system, in Washington Township. Because of the tank's high elevation, it was unable to "float" on the existing system, and was instead filled via a small booster pumping station. Water within the tank had been stored for fire protection use by the Mars Company with a dedicated 10-inch diameter water main from the tank to the Mars Company (which is approximately 4,000 feet away). One of the main observations from the modeling was that a new tank located in the northern part of the system would have a significant impact on overall hydraulics, pressures, and fire protection in this area. The modeling effort also established a general prioritized ranking for potential tank sites. The 1 MG Tank, which had been out of service since September 2015, was inspected by DN Tanks in August 2016 and underwent repairs to allow it to be placed back into service to facilitate painting of the 2.4 MG Tank in 2017. In September 2020, Mott MacDonald was authorized to proceed with the design of the new 1.0 MG Tank.

Also in September 2013, Mott MacDonald modeled the hydraulics associated with the removal of an existing 12-inch transmission main located within the Harvestone easement.

During 2011, the HMUA undertook a project to install water pressure transmitters at up to seven (7) locations throughout the distribution system to continuously monitor the pressures at these locations within the water system, including any pressure spikes that may be present. Mott MacDonald completed preparation of plans and specifications for the project. The HMUA completed the installation of transmitters at Well 2, the Mount Olive Booster Station, and the Independence Booster Station.

In 2013, HMUA added confined space equipment (hoist mounts) at the Ketcham Road PRV vault, Route 57 vault, Vienna Hills PRV vault, Well 5 & 7 Chlorine vault, Well 7 vault, Mount Olive Tank vault, Independence Tank vault, and Vienna Hill Road PRV vault.

In 2016, Mott MacDonald completed an evaluation of 2,170 LF of 8" and 470 LF of 6" water main located on State Highway 46 between Willow Grove Avenue and Valentine Street. This evaluation provided options for the HMUA regarding this approximately 90-year old asset based on upcoming road improvements in the area. As the main appeared to be in good condition, a full replacement was not required at the time. HMUA is making repairs on an as-needed basis.

During the October 2020 inspection, HMUA reported that new leak detection equipment had been obtained. As of October 2020, HMUA is utilizing both the old and new equipment.

Water Distribution System		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
n/a	Ongoing leak detection to reduce unaccounted for water.	New valve and main installed along Sharp Street. New Tee and hydrant installed off Moore Street. Painting of 300+ hydrants

1.3 Water Filtration Plant

The HMUA surface water treatment plant was constructed at the Seber tract in the Town of Hackettstown in 1981 to treat surface waters derived both from the Mine Hill Reservoir and Burd Reservoir which are now sold off and not part of the HMUA water supply.

The WFP has been permanently out of service since August 2008. HMUA continues to maintain the site and building on an as needed basis. The SCADA RTU is also still actively used.

In 2020, the HMUA completed a spoil disposal project under Contract 49W. HMUA has put some temporary spoils at the site from various water main break repairs throughout the past year.

During the October 2020 inspection, damage to the fence was noted behind the WFP. It was also noted that the lower floor of the WFP was covered in water. HMUA is investigating the source of the water.

Hole in Fence at WFP

Stockpile Area

Water Filtration Plant		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
There is a small hole in the fence behind the WFP. Restoration in stockpile area to be completed	Water on floor of WFP -cause is under investigation.	Spoils Disposal Contract 49W was completed.

1.4 Well Stations

As of July 1, 2012, the HMUA potable water distribution system derives all supply from groundwater sources (wells). The HMUA water system now operates under a single NJDEP Water Allocation Permit. The HMUA Water Allocation Permit (NJDEP Program Interest ID No. 5145 and Water Allocation Permit No. WAP110002) was issued for a ten-year term, effective on July 1, 2012 with an expiration date of June 30, 2022.

Well No. 9 (Heath) was placed into operation in 2015, making the total permitted pumping capacity from the six (6) operational wells 5,100 GPM as shown in the table below.

HMUA Potable Water Wells

Well Designation	Current Production Rate	Permitted Pumping Rate *
Well No. 4 – Seber	0 GPM	300 GPM **
Well No. 5 – Seber	450 GPM	1,000 GPM **
Well No. 6 – Heath	380 GPM	700 GPM **
Well No. 7 – Seber	1,100 GPM	1,500 GPM **
Well No. 8 – Claremont 1R	550 GPM	800 GPM
Well No. 9 – Heath	730 GPM	800 GPM
Totals	3,210 GPM	5,100 GPM

* Maximum Diversion Rate for all groundwater sources is 4,000 gpm.

** Maximum Diversion Rate for Wells 4, 5, 6 &7 is 3,200 gpm. Maximum Diversion for Well 4 is 200 GPM.

The maximum yearly water diversion allowed in the HMUA's current Water Allocation Permit is 1,165 MG (3.19 MGD) and the maximum monthly diversion is 123.7 MG (4.12 MGD). The actual water diversion for the 12-month period ending August 31, 2020 was 782.244 MG (2.14 MGD) and the maximum monthly diversion was 78.427 MG (2.61 MGD) (July 2020), both well within permit limits.

The active HMUA wells are in good operating condition (five are currently active). The static water levels at the well sites remain relatively constant from year to year indicating that these sources are not being over pumped.

1.4.1 Well No. 4 – Seber

Well No. 4 has been out of service since November 2012 and the piping has been cut to prevent suspected leakage back into the well. Options are being reviewed to allow for the well to be used periodically, to avoid the risk of the well being removed from the Water Allocation Permit. Roof repairs were completed at the Well No. 4 building which houses the controls for Wells No. 5 & 7. During October 2020, it was noted that new equipment had been ordered and will be installed within the coming weeks. The well will then be operated and monitored.

Watermark on Ceiling Tile

Well No. 4 – Seber		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
Water mark on ceiling tile to be monitored	New equipment ordered - to be installed and well to be monitored.	New LED Lights installed New Chemical signage on Chlorine Room Door.

1.4.2 Well No. 5 – Seber

The HMUA received bids for Contract 35W in January 2008 to rehabilitate the well pumps for Well No. 5 to restore the pumping capacity to 1,000 GPM. Minor masonry damage at Well No. 5 as noted during previous inspections was repaired in 2016. Controls for Well No. 5 are housed in the Well No. 4 building.

Well No. 5 - Seber		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
n/a	n/a	

1.4.3 Well No. 6 – Heath

The HMUA received bids for Contract 35W in January 2008 to rehabilitate the well pumps for Well No. 6 to restore the pumping capacity to 700 GPM. The well pump and motor were replaced in December 2014. Corrosion on the existing doors and some concrete damage had been previously noted at the Well No. 6 facility. Well No. 6 is currently used infrequently, but

options are being reviewed to allow back-up corrosion control chemical addition should Well No. 9 be out of service. Well No. 6 is currently run once a quarter at a minimum.

During the October 2020 inspection, concrete damage was noted on walls. Concrete was bulging outwards and sounded hollow when hit.

Concrete Wall Bulge and Damage

Well No. 6 - Heath		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
Bulge and damage on concrete wall opposite door	Consider addition of back-up chemical addition system	New LED Lights Installed

1.4.4 Well No. 7 – Seber

The detention main butterfly valve for Well No. 7 remains out of service (in the open position). Controls for Well No. 7 are housed in the Well No. 4 building.

Well No. 7 – Seber		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
n/a	n/a	n/a

1.4.5 Well No. 8 – Claremont 1R

The HMUA acquired three (3) wells as part of the takeover of the Diamond Hill water system. However, the HMUA only operates the Claremont Avenue Diamond Hill Well No. 8 (also known as Claremont Well No. 1R). The Elmwood Drive Well (Diamond Hill Area) was abandoned and sealed by the HMUA. The Brookside Avenue Well (Diamond Hill Area) has been abandoned by the HMUA and will be sealed by the HMUA once it is no longer needed as a monitoring well. M-scope readings are taken monthly for HMUA tracking purposes.

In order to increase the capacity of Well No. 8 (Claremont Avenue – Diamond Hill), in 2013 a new well was drilled on the existing Well No. 8 site and the existing well was abandoned. The NJDEP approved and issued a Construction Permit in 2012, and authorized use of the 800 gpm

permanent pump in 2013 by issuance of the NJDEP Permit to Operate. The permanent submersible well pump and VFD has a maximum pumping capacity of 800 gpm. Well No. 8 is permitted by the NJDEP for 800 gpm and is capable of operating at 800 gpm. However, when the well was operated at 800 gpm, the operation resulted in impacts nearby wells. At the time of inspection, Well No. 8 was operating at 540 GPM. The HMUA has connected the one known property that was adversely affected by Well No. 8 to the HMUA water system. HMUA has continued to monitor impacts to nearby wells and has been able to increase the Well No. 8 pumping rates and operation times accordingly. Under Contract No. 42WS, an emergency generator was installed at Well No. 8. In 2017, HMUA staff added an enclosure above the well pump as a security improvement. A 4-inch diameter surge relief valve leak to the site drain was observed during the 2019 inspection and was resolved prior to the 2020 inspection with the installation of a new surge relief valve.

During the 2020 inspection, it was noted that Well No. 8 was running at 90% speed. During the past year, new chemical signage was added to the building. This well along with the Meadow Lane Pump Station experienced electrical issues in August and were moved to a separate circuit by the utility.

Well No. 8 – Claremont 1R		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
HMUA to review well output at 100% speed.	Consider voltage metering next summer	Surge Valve replaced. New LED Lights installed. New Chemical signage on Chlorine Room Door.

1.4.6 Well No. 9 – Heath

Well No. 9 became operational in 2015 and has been in continuous use since that time. Since being placed into service, HMUA added a radar sensor for monitoring the chemical tank level at Well No. 9 and installed a gate as required by Washington Township.

Well No. 9 - Heath		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
n/a	n/a	Wooden door treated with water seal.

1.5 Water Storage Tanks

The HMUA's Water System includes four (4) Water Storage Tanks as follows:

- 2.4 MG Water Storage Tank (Washington Township)
- 1.0 MG Water Storage Tank (Independence Township) – *Not inspected*
- 0.5 MG Mount Olive Water Storage Tank (Mount Olive Township)
- 0.42 MG Independence Water Storage Tank (Asbury Road, Independence Township)

The two (2) newest water storage tanks were constructed in the HMUA service area in the 1998-1999 time frame to allow the water system to be extended to areas in Independence

Township (0.5 MG) and Mt. Olive Township (0.42 MG) which are situated at elevations above the high water level of the 2.4 and 1.0 million gallon tanks.

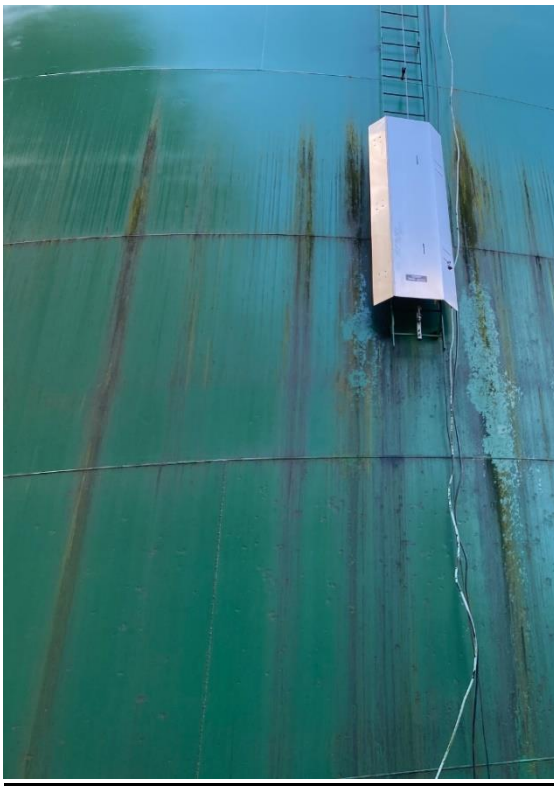
During the October 2020 inspection, it was noted that all sites had new batteries installed for their SCADA systems.

1.5.1 2.4 MG Water Storage Tank

In 1979, the HMUA completed construction of a 2.4 million-gallon (MG) water storage tank which maintains pressure in the distribution system and provides storage capacity for peak demand periods. The 2.4 MG Water Storage Tank is located in the southeasterly section of the HMUA service area in Washington Township off Schooley's Mountain Road.

Over the years, things have been noted and repairs have been done:

- 1998 – The HMUA had replaced the cathodic protection system and completed the repainting of the tank exterior under Contract No. 22W.
- 2012 through 2014 – Areas of corrosion were noted on the tank exterior during the November 2014 inspection as well as during the 2012 and 2013 facilities inspections.
- 2017 – The Tank was repainted under Contract No. 46W. The Tank was taken out of service in April 2017 and returned to service on July 20, 2017. Under this contract, the rectifier for the cathodic protection system was removed (this had not been replaced with the remainder of the system in 1998). A 9' high security fence was also constructed around the tank in 2017.
- 2018 – An anniversary inspection was conducted by MBA prior to the end of the Contract 46W maintenance period. A few minor punch list items were noted by the inspection and addressed by the contractor.
- 2019 – Some growth on the exterior of the tank was noted; however, the tank coating still appears to be in good condition.
- 2020 – Growth on the exterior of the tank was again noted. HMUA has since power washed a portion to confirm coating can be cleaned. New batteries were installed for the SCADA system, and a vent screen was added to panel.



Buildup on Outside of Tank

2.4 MG Water Storage Tank		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
Small buildup on tank was noted, a small area has since been power washed to confirm removal. Coating near ladder to be monitored. Area around tank required maintenance.	n/a	New Batteries were added for the SCADA system and a panel vent screen was added.

1.5.2 1.0 MG Water Storage Tank

The HMUA also owns and operates a 1.0-million-gallon water storage tank located on the western side of its service area in Independence Township. Prior to being taken out of service in September 2015, the tank served primarily as a storage reservoir for fire protection water for the M&M Mars factory located in the northwestern section of the Town of Hackettstown. Fire service for M&M Mars is now provided by the main system in addition to M&M Mars' onsite fire suppression system and storage tank.

The tank is currently operated on "float" based on the water storage elevation in the 2.4 MG storage tank, with approximately 1.5 feet of water typically in the tank.

- 1994 – Inspection of the tank in July 1994 noted a small amount of weepage at the base of the tank sidewall near the valve vault. The HMUA caulked this crack although

- the caulk has held up well for 10 years, the crack appears to have opened slightly since our 2004 facilities inspection.
- 2005 through 2014 – Weepage along the tank wall was noted in varying degrees in the inspections from 2005 – 2014.
- 2015 - In September 2015, it was observed that the booster pump serving the tank was running continuously, indicating leakage at the tank. The tank was taken out of service, but the location of the leak was not identified.
- 2016 – A condition assessment was carried out by DN Tanks in August 2016 and HMUA undertook repairs to allow the tank to be placed back into service while the 2.4 MG Tank was repainted. When the tank was first placed back into service, water main breaks were reported. Review of these breaks found that the tank level was higher than required resulting in increased system pressure. Replacement of the tank level sensor and booster pump pressure gauges addressed the issue. The tank is currently being maintained with 1.5' of water from the system.
- 2016 – The condition assessment notes a build-up of hard dry efflorescence about 6 feet down from the roof slab. HMUA should monitor for vegetation on top of the tank.
- 2017 - As noted previously, the HMUA completed hydraulic modeling as part of continued planning for a new storage tank in the vicinity of the existing 1.0 MG tank. In 2017, Mott MacDonald prepared a conceptual site plan for tank replacement on a site northeast of the existing tank with a lower elevation. Discussions are ongoing with NJDEP, the Highlands Council and Warren County regarding siting.
- 2018 – A site survey was conducted to identify trees and to establish the corners of the new tank site.
- 2019 – Survey Updates noted water main easements and access rights, and the new property acquisition process with Warren County is ongoing.
- 2020 – Mott MacDonald awarded contract for design and permitting of new tank. HMUA has continued with the property agreement.

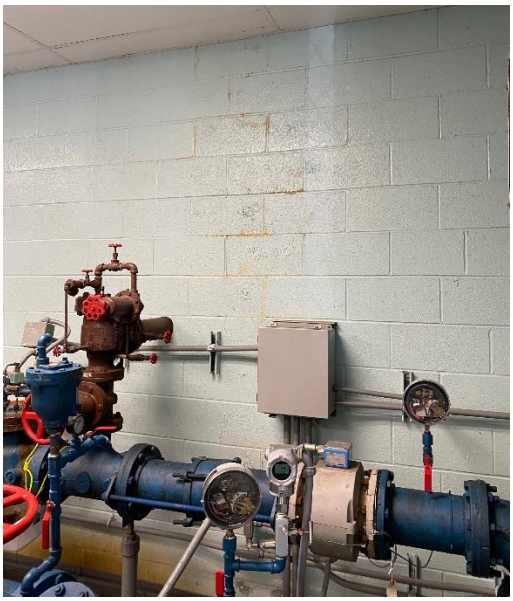
The concrete tank sidewalls of the 1.0 MG Tank have shown minor signs of cracking during past site inspections. During the 2020 inspection there was no visit to the location due to avoid sharing vehicles as a result of COVID-19, and a Mott MacDonald Inspection team that will be returning to the site shortly for the upcoming project.

1.0 MG Water Storage Tank		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
Not Inspected on 10/6/20	n/a	n/a

1.5.3 Mount Olive Twp. Storage Tank and Booster Station

The Mount Olive Township Water Storage Tank appeared to be in excellent physical condition during our October 2020 site inspection. The tank is a bolted, fused glass coated steel type construction. Some minor growth near the tank base was noted. Batteries for the SCADA System were replaced in the past year.

Following 2016 repairs to the altitude valve at the Booster station, HMUA is planning to replace the valve in 2020. Both booster station pumps have been retrofitted with stainless steel impellers following an investigation by Mott MacDonald which found that dezincification of the original Silicon Bronze impellers had occurred. In addition, HMUA has upsized 2" discharge piping to 4" on the pumps. As noted in previous reports, growth was noted on the Booster Station roof and the floor coating has failed.



Impacted Wall Coating from Pipe Leak

Mount Olive Booster Station Roof

Mount Olive Twp. Water Storage Tank		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
n/a	n/a	Batteries were replaced for SCADA System.

Mount Olive Twp. Booster Station		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
Significant growth on roof was noted. Floor coating has failed Wall coating impacted by piping leak.	Altitude valve is expected to be replaced soon.	There was a leak on the water meter piping in 2020. Issue has since been resolved. Pump Control Valve's Solenoid valve rebuilt New LED Lights installed.

1.5.4 Independence Twp. Water Storage Tanks and Booster Stations

The Independence Township Water Storage Tank has been repaired for leaks in 2008, 2012, 2015, 2016 and again in August 2018. No weepage was observed during the October 2020 field inspection and the exterior of the tank appeared to be in satisfactory condition. During the 2019 inspection, at a four way joint connection of the plates, there was a small growth of moss noted, which should be monitored. The moss was still there during the 2020 inspection.

No issues were noted at the booster station during the 2020 inspection.

Independence Water Storage Tank
Growth observed at Joint

Independence Water Storage Tank		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
Continue to monitor moss growth area	n/a	Batteries were replaced for SCADA System.

Independence Water Booster Station		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
n/a	Planned rebuild for Pump # 2	New LED Lighted installed.

1.6 Development of Additional Water Supply

The New Jersey Department of Environmental Protection firm capacity regulations require water utilities to be able to meet their peak water demands with their largest water source out of service. The completion of Well No. 7 in 2007 on the Seber site provides additional firm capacity in the HMUA system and provides additional water quantity on a monthly and annual basis. Well No. 7 has been operating satisfactorily with a peak pumping rate of 1,500 GPM since the end of May 2007.

Aside from the amount of water which the HMUA is allowed to pump from its wells, the Bureau of Water Supply requires that adequate water source capacity be available to meet the peak system demands (as defined by the NJDEP) with the largest water source out of service. Currently, the HMUA water system meets the Bureau of Water Supply's definition of adequate supply capacity with a firm capacity of 3,300 gpm (4.752 MGD) as indicated in the table below. As of 2012, the WFP and Well No. 2 have been removed from the Water Allocation Permit.

Source	Source Capacity	
	(MGD)	(GPM)
Well No. 4	(1)	(1)
Well No. 5	1.440	1,000
Well No. 6	1.008	700
Well No. 7	2.16	1,500
Well No. 4 – Well No. 7 Total	**4.608 MGD**	**3,200 GPM**
DH Well No. 8 (Claremont 1R)	1.152	800
Well No. 9	1.152	800
Total Source Capacity	**6.912 MGD**	**4,800 GPM**
Less Largest Source	2.16	1,500
Firm Capacity	**4.752**	**3,300**

(1) The NJDEP firm capacity calculation has removed Well No. 4, since it has been inactive since 2012.

The issue of firm capacity relates to a water system's source water reliability, and specifically to its ability to continue to meet peak system demands without the use of its largest water supply source. With Well No. 9 commencing operation in 2015, HMUA has added to its production and firm capacities.

In 2013, the HMUA increased the capacity of the Claremont (Diamond Hill) Well No. 8 located in Mansfield Township to 800 gpm (refer to previous comments on current operating level). In 2015, the HMUA increased the system capacity with the construction of the 800 gpm Well No. 9 located in Washington Township on Schooleys Mountain Road.

The HMUA pursues an ongoing leak detection effort within its potable water distribution system. The leak detection program is a continuous long-range maintenance program to ensure that unaccounted for water within the HMUA distribution system is minimized as required by the NJDEP. The HMUA purchased advanced leak detection equipment, ZCorr Correlating Loggers, in 2003 to improve its in-house leak detection efforts. Additional leak detection loggers (SePem 155 noise loggers) were purchased in 2020 to take the place of the ZCorr loggers' daily deployment. ZCorr loggers are still used when correlation of a suspected leak is required. The HMUA has also continued metering water flow to the high pressure zones at the two booster stations. Unaccounted for water was reported to be approximately 22.2% during the 12-month period ending August 31, 2020, which is above the NJDEP goal of 15%. The HMUA is actively taking measures to reduce the amount of unaccounted water. The table below summarizes the reported approximate unaccounted water percentages since 2005.

Calendar Year	Unaccounted for Water (%)
2005	19.5
2006	14.1
2007	15.1
2008	12.7
2009	12.2
2010	13.5
2011	16.8
2012	21.7
2013	22.2
2014	15.6
2015	19.8
2016	18.1
2017	15.4
2018	23
2019	21.7
2020*	22.2

* For 12 months ending August 31, 2020

1.7 Water Quality

The HMUA has complied with the Federal and State regulations requiring analysis of water samples for organic and volatile chemicals, inorganic chemicals, trihalomethanes, disinfection byproducts and secondary drinking water constituents. The routine water analysis results indicate that the finished water is in compliance with the Safe Drinking Water Standards for these parameters.

The United States Environmental Protection Agency (USEPA) is enforcing more stringent standards for lead and copper concentrations in potable water with adoption of the Lead and Copper Rule. Lead and copper in potable water typically originates as a result of corrosion occurring in plumbing systems within private homes rather than existing in the raw water the utility treats and pumps into the distribution system. The Lead and Copper Rule requires water utilities to optimize the treatment of potable water such that any corrosive tendency of the water is minimized.

The HMUA applies a polyphosphate/orthophosphate blended corrosion inhibitor at its Well No. 9 to minimize corrosion within the plumbing systems of its customers. The bi-annual sampling of patron services conducted during 2002 achieved compliance with the EPA Lead Maximum Contaminant Level Goal (MCLG) of 0.015 M/L. It therefore appeared that optimal corrosion control had been achieved through the application of the polyphosphate/orthophosphate blend. However, the results of the first of the two annual sampling events from 2004 slightly exceeded the threshold for compliance with the Lead and Copper Rule. The HMUA met with the NJDEP to review the range of possible alternatives to ensure consistent compliance with the Lead and Copper Rule. The HMUA has replaced customer water meters with units which have almost no lead content, increased its effort in instructing customers on the proper water sampling techniques, and increased its frequency of corrosion inhibitor concentration monitoring within its water distribution system. The results from subsequent customer water sampling conducted in late 2004 and during the summers of 2005 through 2009, inclusive, have conformed to the Lead and Copper Rule. The results of the sampling in the summer of 2010 slightly exceeded the EPA's limits for the Lead and Copper Rule, but 2011, 2012 and 2013 samplings were in conformance. No sampling was required in 2014 and 2015, but standard sampling resumed in

2016. Sampling conducted in August 2017, April 2018, August 2019 and July 2020 was in conformance. An extensive Public Education Program was completed by the HMUA.

Well No. 8 was temporarily taken out of service due to failed water quality tests (positive e-coli in raw water sample) in June 2012. Due to the failed water quality tests, the HMUA and Mott MacDonald prepared a Ground Water Rules/4-Log Virus Inactivation Certification Form, calculations and plans which were submitted to the NJDEP, and in 2012 a 4-log analyzer was installed at Well No. 8. The 2012 forms were resubmitted in December 2017 in response to an NJDEP letter dated October 25, 2017. NJDEP approval was received on March 12, 2018. Since this approval, one notification has been issued to NJDEP when the chlorine residual dropped below the required value of 0.88 ppm. HMUA is considering request to discontinue the certification.

Commencing in 2020, HMUA has sampled for PFNA, 1,2,3-trichloropropane, ethylene dibromide, and 1,2-dibromo-3-chloropropane (DBCP) on a quarterly basis at all wells, and results have been below action levels.

As of October 19, 2017, HMUA is subject to requirements under the New Jersey Water Quality Accountability Act (WQAA). This Act requires purveyors to demonstrate and report upon the planning, operation, maintenance and reinvestment of its water systems. HMUA contracted with Mott MacDonald to assist in developing the Asset Management Plan (AMP) and the Cybersecurity assessment and is taking steps to achieve compliance and review required manpower associated with requirements for:

1. Water System Maintenance
2. Asset Management Plan
    a. Initial Plan prepared as of April 12, 2019. HMUA has updated as necessary.
    b. 2020 Action Items
        i. Valve Exercising – 1470 valves have been exercised with only two requiring repairs. GIS corrections have been done as part of the process.
        ii. Leak Detection – New equipment was purchased in 2020, which is being used in conjunction with existing equipment.
        iii. SCADA Evaluation – An evaluation is underway to identify upgrades for inclusion in the AMP. HMUA received a budgetary proposal from PCS Pump and Process for the upgrade of the SCADA equipment and has the upgrade planned for 2022/2023 fiscal year.
        iv. Meters – Only 27 older meters remain(<1%) HMUA plans to maintain a 20-year replacement schedule.
        v. A new hydrant was installed on Sharp Street via a wet tap on Moore Street.
        vi. Materials have been purchased for the main replacement on Ashley Avenue (between Cook and Franklin).
3. Mitigation Plans for Notice of Violations
4. Cybersecurity Program
    a. An updated form prepared by the NJ Dept. of Homeland Security & Preparedness' New Jersey Cybersecurity and Communications Integration Cell (NJCCIC) was submitted by the November 16, 2018 deadline.
5. Annual Certifications
    a. Annual Certification Form submitted on 10/14/2020

2 Sewerage System

The HMUA Water Pollution Control Plant is being operated by seven (7) personnel under the supervision of four (4) licensed operators. The collection system is operated with five (5) licensed operators.

The Water Pollution Control Plant (WPCP) constructed in 1971 had an original permitted capacity of 1.65 MGD and was designed to provide advanced secondary treatment. Development which occurred within the HMUA service area in the 1970's and early 1980's required that the HMUA undertake a plant expansion. The enactment of more stringent effluent requirements by the U.S. Environmental Protection Agency and the New Jersey DEP also dictated that the treatment process be upgraded. The HMUA embarked upon the planning and design for the upgrade/expansion in 1984. The necessary construction permits and low interest rate financing received from the New Jersey Wastewater Treatment Trust were received in 1991. Construction of the WPCP upgrade/expansion to a capacity of 3.30 MGD was substantially completed in September 1993 and the construction contract was finalized in September 1995 at $10,510,210.

2.1 Water Pollution Control Plant

The amount of treated effluent that can be discharged to the Musconetcong River from the Water Pollution Control Plant (WPCP) is limited by the NJPDES Permit (NJPDES Permit No. NJ0021369) issued to the HMUA for operation of the plant. Currently, the permitted capacity of the plant is rated at 3.30 MGD. The August 2008 NJPDES Permit with an expiration date of July 31, 2013 included provisions to formally increase the plant capacity rating from 3.30 MGD to 3.39 MGD due to additional flow from the Diamond Hill area of Mansfield Township. A renewal NJPDES permit was submitted to NJDEP in January 2013, and a draft permit was received and comments provided to NJDEP in August 2016. The draft permit included proposed arsenic and mercury limits. A final NJPDES permit dated September 18, 2017 was issued. Based on concerns with the mercury limit, a stay request was submitted on October 16, 2017. NJDEP issued the stay for mercury in a letter dated November 17, 2017 and the NJPDES Permit Modification dated December 6, 2017. The final permit also included a limit for arsenic. However, NJDEP simultaneously stayed the limit to allow time to study background arsenic levels and HMUA has been participating in an arsenic treatability study at the WPCP, conducted by NJDEP and Stevens Institute of Technology. A meeting of the Arsenic Study group was held on September 19, 2019 to discuss results of pilot testing to date, and it is anticipated that a waiver program will be developed to relieve utilities of the proposed limits.

As a result of requirements contained in the HMUA's NJPDES Permit, the amount of flow to the treatment plant could have a significant impact on whether the existing WPCP can meet the stringent load-based limitations. The HMUA already removes most of the phosphorus present in its effluent by application of alum. HMUA has determined, based upon findings from a Chemically Enhanced Primary Treatment (CEPT) study, that use of chemicals will be adequate to meet the permit limit.

The Delaware River Basin Commission added a new quarterly color sample requirement in the current permit; with sampling required to be performed between +3.5 & +4.5-years (6/1/2021 –

6/1/2022) from the effective date of the permit (EDP). The results are to be submitted to the DRBC and NJDEP with the permit renewal application.

The WPCP operated at an average daily flow of 2.001 MGD between September 1, 2019 and August 31, 2020, compared to 2.345 MGD for the prior 12-month period. This equates to approximately 61 percent of the permitted plant capacity of 3.30 MGD. The maximum monthly flow during the period between September 1, 2019 and August 31, 2020 was 2.16 MGD (Both April and May 2020). The ratio of the maximum monthly flow to the 12-month average daily flow was 1.08 times. The plant performance results for the major effluent parameters of concern, Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), Ammonia and Phosphorus, averaged 2.9, 5.9, 0.09 and 0.3 mg/l, respectively, over the past year, well within the NJDEP permit values of 20, 25, 1.0 and 0.49 mg/l assigned to the plant in the NJPDES Permit.

The upgraded and expanded WPCP has now been in service for twenty-seven (27) years. The major treatment reactors and equipment were found to be in good physical and mechanical condition during the October 2020 facilities inspection. Routine maintenance and occasional hardware replacement, particularly for equipment which has been installed since the original plant construction completed in 1971, will continue to be required on an as needed basis.

The HMUA has recently completed five (5) construction projects at the WPCP as follows:

Contract No. 37S - 2010

- Site Piping Improvements
- Inlet Facilities Improvements including new Screening/Washer/Compactor unit and “bus stop” Enclosure
- New Motors and variable frequency drives (VFDs) for the two (2) main Raw Sewage Pumps
- Improvements to the existing Anaerobic Digesters

Contract No. 39S - 2012

- Installation of two (2) new Nitrification Tank aeration blowers and associated controls

Contract No. 42WS - 2014

- Installation of equipment to connect the two generators at the site
- Installation of a new power monitor allowing HMUA staff to operate additional equipment on the 660kW generator.

Contract No. 44S - 2015

- Building Architectural Improvements and Interior Painting
- Replacement of non-potable water pumps and site piping
- Elimination of Ponding Issue at lower level of Advanced Treatment Building
- Removal and decommissioning of Equalization Basin

Contract No. 48S - 2019

- Replacement of the Nitrification Tank diffusers
- Revision to Neuros Blower 10” Intake Piping
- Replacement of Anoxic Zone Mixers

The HMUA, under a separate procurement Contract No. 36S, purchased new Digester Mixing and Heating Equipment that was installed by the Contractor under Contract No. 37S in 2010.

A 31.7 kW solar array was installed at the WPCP Site under a Power Purchase Agreement. The installation of the solar array was completed in September 2011, with an official ribbon-cutting ceremony on October 6, 2011. On November 13, 2018, the HMUA Board voted to accept ownership of the solar array and related appurtenances from SSE-NJ001, LLC at no cost as per a bill of sale dated November 16, 2018.

Since approximately 2006, the HMUA has been utilizing a maintenance management program software called “E-Maint” to keep track of the numerous routine maintenance tasks required to keep the equipment throughout the treatment plant operating efficiently and to increase the longevity of the equipment. The Sewer Utility’s Chief Operator indicated that the “E-Maint” software has proven to be very helpful in keeping track and scheduling of the required maintenance tasks throughout the facility.

HMUA continues to accept wastewater from the M&M Mars pretreatment facilities which were constructed in 2015.

2.1.1 Inlet Facilities & Raw Sewage Pumping

The influent flow meter was last calibrated on 12/3/2019. The HMUA plans to calibrate the influent and effluent meters yearly (NJDEP requires a minimum interval of 1/5-years). The Division Box No. 1 flow control cones manufactured in 2013 have begun to exhibit pitting. Grit is removed at the Division Box using the HMUA Jet Truck.

Screening, Washing and Compacting Equipment was replaced in November 2010. The HMUA reported that equipment is working well. One 3 CY dumpster of material is collected during a typical week. In 2020, the washer/compactor motor and VFD was replaced and the drive head and VFD was replaced on the screens. The discharge chute insulation was replaced in 2020 to address some rodent damage from the past couple of years.

Recent Chronology for Raw Sewage Pumps

- HMUA personnel replaced the impeller and shaft sleeve for Raw Sewage Pump No. 3 in April 2011. The pump bearings and suction cover wear ring for this pump were also replaced by the HMUA in August 2011. During 2011, the HMUA investigated pump noise and bearing temperature concerns for Raw Sewage Pump No. 3; however, a report by Rapid Pump and Meter in November 2011 found the pump to be operating within limits and the pump was returned to service.
- Raw Sewage Pump No. 1 was replaced in December 2012.
- In 2016, HMUA personnel replaced the rotating assembly for Pump No. 3.
- Raw Sewage Pump No. 2 was rebuilt in 2017
- Following a 2018 safety inspection, HMUA added shields below the motors where the pump shafts are exposed.
- In 2020, Raw Sewage Pump No. 1 was rebuilt and HMUA is planning to re-pack Pump No. 3.

New motors and VFDs for Raw Sewage Pumps No. 1 and No. 2 were installed under Contract No. 37S, in 2010. During 2013, the HMUA completed the replacement of the existing Raw Sewage Pump Control Panel. HMUA staff also removed recirculation piping associated with future filters and repaired a damaged plug valve on the recirculation system during 2013. In 2020, HMUA reported that a sporadic issue with the use of Pump No. 3 VFD (original) while on generator power is still present.

The pump room floor, raw sewage piping, valves and pumps in the lower level of the WPCP Administration Building were coated under Contract No. 44S, in 2015.

The influent wet well is cleaned out by outside Contractors periodically as required. The refrigerant unit for the influent sampler was replaced in 2017.

Screening, Washing and Compacting Equipment

Inlet Facilities and Raw Sewage Pumping		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
Seal on Raw Sewage Pump No. 2 had slight leak (spray).	HMUA plans to repack Raw Sewage Pump No. 3. Wet well cleaning Replace Inlet Cones for Division Box	New Insulation was added to the chute for the bar screen. VFD for Washer/Compactor was changed. New Drive Head and VFD on the influent screen.

2.1.2 Primary & Secondary Treatment

During the October 2020 inspection of the site, Primary Clarifier No. 2 was in service. Primary Clarifier No. 1 was down for maintenance and had been cleaned and painted. Rags were also removed from the period when the influent screen was down for repairs.

Primary Clarifier No. 1

During the 2020 inspection, Trickling Filter No. 2 was not in use, but has been working well. All three (3) of the Trickling Filter Recirculation Pumps were reported to be operating properly.

At the time of our site inspection, only Intermediate Clarifier No. 1 was in service. Intermediate Clarifier No. 1 was reported to have operated satisfactorily during the past year and appeared to be in sound operating condition. Intermediate Clarifier No. 1 will eventually require sandblasting and painting. Intermediate Clarifier No. 2 had been out of operation since February 2012, but was reactivated during 2019 along with the second trickling filter. Since being taken offline rags were removed. Some minor concrete damage was observed near the center column of Intermediate Clarifier No. 2 during the 2018 inspection and again during the 2020 inspection.

Intermediate Clarifier No. 2

The Intermediate Pumping Station was constructed during the WPCP Upgrade and Expansion in 1993. The Intermediate Pumping Station includes three (3) pumps with 25 HP motors equipped with VFDs. Prior to the April 2019 reactivation, the station had been off-line since February 2012 and was operated occasionally to test the equipment. During the November 2014 inspection, it was noted that the floor coating system has failed. The Pumping Station roof will require replacement at a future date. During the October 2020 inspection, it was noted that the pumping station was turned on briefly for Tropical Storm Isaias. Pump No. 1 can only run at

100% speed. An upgrade of the pump controls is recommended as part of any upgrade to the Intermediate Pumping Station.

The Equalization Basin was abandoned in 2015 as part of Contract No. 44S.

Primary & Secondary Treatment		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
Minor Spalling near center column in Intermediate Clarifier No. 2 was noted.	Several items at Intermediate Pump Station – Floor, Roof and Pump Controls	Primary Clarifier No. 1 Painting

2.1.3 Advanced Treatment

In 2017, Mott MacDonald carried out an evaluation of options for diffuser replacement as the existing swing-arm mechanisms were no longer manufactured, and other diffuser designs offer higher efficiency. HMUA completed Contract 48S which included diffuser and mixer replacement in July 2019. During the October 2020 inspection, large darker bubbles were noted in the Nitrification Tank, the bubbles appear to start midway through the tanks. HMUA will continue to monitor. At the time of the October 2020 inspection, the anoxic zones were being aerated. HMUA noted that the diffuser purge systems are operated weekly.

The three (3) Nitrification Tank Internal Recycle Pumps were reported to be in satisfactory operating condition. During the 2020 inspection, it was noted that upgrades would be required to the Internal Recycle System if regular use was required at a future date.

Nitrification Tanks with Darker Bubbles

The HMUA aerated both of the Nitrification Tanks with a single 125 hp constant speed blower for many years. The 1991 plant upgrade and expansion provided four (4) constant speed centrifugal blowers with 125 hp motors. As recommended by the Energy Audit prepared by CDM, the HMUA completed Contract No. 39S to replace two (2) of the four (4) existing 125 hp constant speed centrifugal blowers with more efficient variable speed turbo blowers and to reduce the air flow capacity of the blowers based on the actual plant operating conditions. Two

(2) new 75 hp turbo blowers with VFDs and controls were installed and have been operational since early 2012. A single turbo blower typically meets plant air demands for both Nitrification Tanks. The installation of the new turbo blowers has resulted in energy costs savings to the HMUA. In 2015, a VFD issue with one of the blowers was reported. Though repairs occurred in 2016, VFD issues persisted and a constant speed blower had been in operation. In 2017, HMUA worked with Neuros to analyze the blower issues. Air sampling suggested that H_2S from thickening operations was resulting in corrosion of the electronic components. Replacement of one VFD (with enhanced coatings) and the PLC was completed in 2017. A second replacement VFD was also installed. HMUA improved the seal on the door leading to the blower room, maintained louvers in the open position and tested a new filter style as part of addressing the corrosion issue. With the diffuser replacement under Contract 48S, the turbo blowers have been operating at reduced speeds while meeting the plant air demands. In 2020 the Master Control Panel PLC was replaced, the programming was updated, and replacement PLCs were installed for both blowers.

Both Final Clarifiers were operating during our site inspection in October 2020. During 2013, a Weir Wolf algae removal brush system was installed in Final Clarifier #2 and appears to be working satisfactorily. In June 2019, the same system was installed on Final Clarifier #1 and brushes have been replaced as needed. In 2013, HMUA installed new 8" WAS valves and replaced the WAS meter. In 2017, a new motor was installed on Final Clarifier #2.

Advanced Treatment		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
n/a	Monitor Large Dark Bubbles forming in the Nitrification Tanks	n/a

2.1.4 Post Aeration & Disinfection

Post aeration of Final Clarifier effluent is provided by a step cascade which is a concrete structure with no mechanical or electrical components. The unit is in sound condition. Effluent disinfection is provided in a two-channel UV disinfection system. The HMUA replaced the UV equipment and installed weather protection housing around the UV channels in 2002. The system has been having issues in automatic operation, and the HMUA staff completed a bulb change operation in 2017. However, as replacement parts are becoming difficult to obtain, design is underway on Contract 51S to upgrade the UV system to a vertical style UV system. In 2018, Mott MacDonald completed an evaluation, including jar testing, comparing use of Peracetic Acid (PAA) in place of an upgrade to the UV system. A pilot study of PAA was conducted in 2019 and a report was prepared in November 2019, and HMUA intends to utilize PAA to provide temporary disinfection while the UV upgrade is under construction.

Additional post aeration equipment is also installed in the UV tank, but is rarely, if ever needed at current flows due to the effectiveness of the step cascade. The blowers are used when the UV tanks are cleaned.

The HMUA installed bar screens just before the UV lamps (in place of the original gates) to help prevent leaves and algae from adversely affecting the performance of the UV disinfection system. HMUA changed out the two (2) aluminum gates during 2020 on Tanks 1 & 2 and repaired the Tank 3 effluent gate bottom gasket.

Two New Aluminum Gates

During the 2018 Inspection, HMUA reported issues with the mud valves in the UV tanks. During the 2020 Inspection, HMUA reported that three new mud valves were installed and the remaining valve in the UV tank will be replaced under Contract 51S.

Mud Valve

Post Aeration & Disinfection		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
n/a	Design of a new UV system is currently ongoing.	new mud valves and 2 new slide gates were installed. Replaced the bottom gasket on Tank 3's effluent slide gate.

2.1.5 Auxiliary & Electrical Systems

In 2007, the HMUA switched from the use of aluminum chloride to aluminum sulfate for phosphorus reduction. The HMUA continues to be very satisfied with the performance and use

of the aluminum sulfate. The HMUA has two (2) Alum Storage Tanks and the Storage Tanks were reported and appeared to be in satisfactory condition. During our site inspection, both Alum Storage Tanks were in service. The seal water pumping systems at both the Administration and Advanced Treatment Buildings are in satisfactory operating condition and the service water pumping equipment in the Administration Building was replaced under Contract No. 44S. HMUA staff installed a stainless steel seal water filter in 2014. HMUA is planning to install a dual basket strainer on the influent of the service water pumps and replacement intake screens will be included in Contract 51S.

The WPCP has two (2) emergency generators. The original 300 Kw emergency generator was installed with the original plant construction in the 1970's. The other generator is a 660 Kw generator that was installed as part of the 1991 WPCP upgrade and expansion project. The emergency generators and automatic transfer switches (ATS) were reported to be in good working order at the time of our inspection. The emergency generators are exercised under load once per month. Maintenance and inspection of the emergency generator is performed quarterly by an outside contractor. With the completion of Contract No. 42WS, HMUA staff can use a new power monitor to operate additional equipment on the 660Kw generator. One of the main breakers was tested in November 2017, and a replacement was installed in April 2018.

During 2011, Mott MacDonald reviewed, investigated and evaluated the existing electrical distribution system at the WPCP to determine the feasibility of providing emergency back-up power to the Digester Building. The evaluation included preparation of Equipment List and Load Calculations for the existing 300 Kw generator. Based on the theoretical load analysis of the generator, the existing Digester Building feeder was connected to the existing 300 Kw generator to provide emergency power to the Digester Building.

The original boiler for the WPCP Administration Building, also constructed in the 1970's, was replaced in 2002 and is reported to be in satisfactory operating condition.

In 2019 Mott MacDonald carried out a review of the USTs and associated equipment. HMUA is planning a three-phase approach to remove the USTs and install one new AST to serve the 660 Kw generator. HMUA is also working with Elizabethtown Gas to extend natural gas service to the plant for use in heating and for the replacement of the existing 300 Kw standby generator.

In 2020, HMUA tested oil in the 500kVA Transformer in both February and June. An inspection was also carried out by Jet Electrical Testing. HMUA staff caulked a gap found in the high side transition cabinet. HMUA is reviewing options for transformer replacement.

Auxiliary & Electrical Systems		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
Issue with Electrical panel near 660 KW generator. Wires inside not held down properly which could eventually damage insulation.	Transformer replacement Install strainer ahead of the non-potable pumps	Transformer inspection and oil testing Cleaning of the transformer cabinet

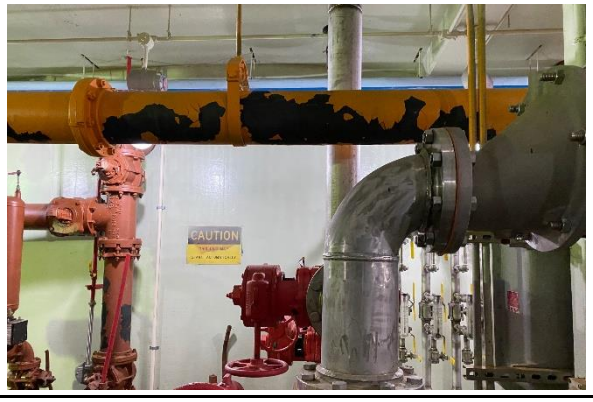
2.1.6 Solids Handling Systems

Sludge collected in the primary and intermediate clarifiers is removed from the treatment process to the Anaerobic Digester System which was part of the original 1971 plant construction.

The HMUA undertook a Digester Repair Contract that included the construction of a new roof on the Digester Building, new waste gas burner, new gas piping and appurtenances. The Contract work for this project was completed during 2007.

As recommended by the WPCP Feasibility Study prepared by CH2M Hill and the Energy Audit prepared by CDM, the HMUA completed construction of Contract No. 37S to improve the gas production and performance of the anaerobic digestion system. The project included the installation of new sludge mixers. Air testing of the upgraded digesters occurred in late October 2011. HMUA staff added anti-slip pads to the digester covers to better facilitate flare maintenance. In 2014, the digester boiler was replaced and the existing oil tank was removed and replaced with a propane tank. In 2015, boiler piping was replaced in stainless steel. In 2015, HMUA staff replaced an 8" digested sludge valve, which required draining the associated tank. The boiler receives quarterly maintenance. Since the 2018 inspection, HMUA has replaced the mixing valve and mixer compressor and has a spare unit available. During the 2020 inspection, it was noted that a new ATB Boiler fuel monitoring system was installed and the gasket was replaced on the Digester boiler's upper door.

HMUA staff noted clarifier issues when the supernatant is recycled, so the flow is typically directed to the pre-thickened sludge wet well. It was noted that the exterior coating on the supernatant piping within the Digester building is failing. A struvite build-up has been identified in the digested sludge line – the pipe clogs over the course of a three-year period. HMUA staff cleaned sections of digester overflow piping in September 2019.



Failing Supernatant Piping in Digester Building

Sludge collected in the final clarifiers is wasted from the treatment system to a pre-thickened sludge holding tank at the Advanced Treatment Building. The waste sludge is thickened using gravity belt thickeners located in the Advanced Treatment Building prior to being trucked off-site (PVSC) for ultimate disposal. The two (2) gravity belt thickeners are now over twenty-five (25) years old, and in 2020, Contract 50S will rebuild one of the units and provide new controls. The gravity belt thickeners are typically operated three (3) days per week. The positive displacement pumps (rotary lobe) used in conjunction with the gravity belts are reported to have operated satisfactorily over the past year. In 2015, HMUA replaced one of the polymer feed control panels and two polymer feed pumps. Spare parts are not readily available for the remaining existing polymer feed equipment. The thickened sludge mixer was replaced in 2016. A new hatch was installed between the belt thickeners. Commencing with the 2018 inspection, it was

noted that some of the newer floor coatings in the Advanced Treatment Building installed in 2015 under Contract 44W are already peeling, particularly in the stairwells. HMUA also completed cleaning the sump pumps and replacing a small section of fire system piping on the lower level. In 2019, Fischer Electric replaced the sump pumps' floats. HMUA is monitoring the operation of the sump pumps and may need to have one or two pumps rebuilt or replaced in the near future.

Solids Handling Systems		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
Supernatant piping protective coating to be addressed RAS Pump No. 1 was out of service	One gravity belt thickener is being fully rebuilt.	New LED Interior lights installed. Fuel monitoring system was installed at the ATB. Digester Boiler – Thermocord gasket installed on the upper door of the digester boiler. Thickened Sludge Pump No.2 – New VFD RAS Pump No. 2 – New VFD

2.1.7 Plant Laboratory

The existing WPCP water quality analysis laboratory, located within the plant Administration Building was modified under Contract No. 44S. The laboratory has been certified by the NJDEP to conduct chemical analyses and had recently been audited by NJDEP at the time of the 2018 inspection. The laboratory is used to monitor select parameters used for routine process control of the treatment process and those for which the NJDEP requires monthly reporting from both the sewer utility and the water utility. Certain testing which is required on a monthly or less frequent basis does not justify the costs associated with purchasing additional laboratory equipment and maintaining a full-time lab technician on staff. These analyses continue to be performed by a private laboratory certified by the NJDEP.

Plant Laboratory		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
n/a	n/a	New LED Interior lights installed.

2.1.8 Buildings

The buildings at the WPCP remain in good, well-maintained condition. A roofing repair project was undertaken in 2006. As the 2006 project didn't include the roofs for the Intermediate Pumping Station or the Advanced Treatment Building, the HMUA should plan for replacement. A new heating unit was installed in the Advanced Treatment Building during 2008 and stairwell radiators were replaced in 2016 due to corrosion. Building lighting improvements recommended by the Energy Audit were completed in August 2011 and a further upgrade to LED was carried out in 2020. In 2015, building fire alarm systems were replaced and replacement emergency lighting was installed.

The HMUA received BPU approval on December 17, 2010 for an Energy Reduction Plan for the WPCP. The ERP provides for up to $361,836 in rebates, including Lighting Retrofits that were

completed in 2011. The ERP also includes many of the improvements constructed under Contract No. 37S such as piping upgrades and VFD's for the Raw Sewage Pumps as well as the Blower upgrades constructed under Contract No. 39S. The HMUA received $250,546 in rebates from the ERP. The final report certified a 33.4% reduction in electricity costs, providing an annual savings of approximately $70,000.

Buildings		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
n/a	n/a	New LED Interior and exterior building lights installed.

2.1.9 Site

The HMUA installed new landscaping throughout most of the plant site during 2009. Since 2017, HMUA has been cutting brush along the existing fence line. Some of the site paving is reaching the end of its life, and the HMUA may consider milling and providing a new topcoat. During the 2020 inspection, a large crack was noted in asphalt on main entrance into the treatment plant.

Large Crack in asphalt near Primary Clarifiers

During the 2020 inspection, it was noted that the lawn hydrant near the UV disinfection system had been upgraded to match the others installed under Contract 44S in 2015.

Site		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
Large crack in asphalt near the Primary Clarifiers along main road.	n/a	New LED Lights installed. Lawn hydrant near UV disinfection system was upgraded.

2.2 Sewage Collection System

The HMUA continued to conduct internal television inspections of its sanitary sewer collection system during the past year in an effort to define areas where infiltration (groundwater leakage) may be entering the sewer system. Mott MacDonald completed a Phase I I/I investigation in the Spring of 2003 which identified which sections of the HMUA collection system warranted further investigation to locate and repair specific leaks. The majority of the system was found to be in sound shape. However, there were a number of areas identified in the Phase I study where the collection system requires further investigation and repair of leakage sources. In 2018, grouting was done in the Kenwood area.

The HMUA purchased new TV Inspection equipment during 2008. TV Inspection equipment owned by the HMUA includes a sewer lateral camera to allow for the inspection of sewer service laterals within the collection system. The HMUA also owns a Jet/Vacuum Truck that is utilized to periodically clean the sanitary sewers within the HMUA's sanitary sewer collection system. Issues with the truck were noted during the 2019 inspection and subsequently corrected. The HMUA has established a Sewer System Cleaning Program as well as a TV Inspection Program. The HMUA performs TV Inspections of the sanitary sewers periodically as time permits. HMUA noted that they continue to monitor grease that collects in the 16" river crossing, which has minimal slope. The wet wells of the pump stations within the collection system are typically cleaned by the HMUA every two (2) months.

The HMUA owns and operates three (3) sewage pumping stations and operates one (1) sewage pumping station, the House of Good Shepherd Pump Station, which is privately owned. The Hills of Independence sewage pumping station is privately owned and operated. The HMUA has one (1) spare pump available for each pumping station.

The HMUA has taken efforts to identify sump pump discharges to the collection system. When identified, homeowners are contacted and follow-up inspections are conducted to confirm that sump pumps were disconnected.

HMUA has installed new confined space signage for the stations since the 2017 inspection.

During September 2020, a portable flow meter was purchased for use in measuring I&I.

Sewage Collection System		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
n/a	n/a	Portable flow meter to measure for I&I was purchased

2.2.1 Mt. Olive (formerly Oak Hill) Sewage Pumping Station

The HMUA owns and operates a small sewage pumping station serving a section of the Oak Hill at Mt. Olive subdivision along Stephens State Park Road. The sewage pumping station is located off Dorset Drive. The facility appeared to be in excellent physical condition and well maintained during our inspection. The discharge piping in the wet well is showing some signs of corrosion. In 2017, HMUA had installed new shock absorbers on the generator enclosure. The Oak Hill sewage pumping station includes two (2) submersible pumps, valve chamber, alarm dialer and emergency generator.

Mt. Olive (formerly Oak Hill) Sewage Pumping Station		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
n/a	n/a	n/a

2.2.2 House of Good Shepherd Sewage Pumping Station

The House of Good Shepherd sewage pumping station located in Hackettstown is privately owned, but is operated by the HMUA. This pumping station was constructed in approximately 1998. The pumping station was reported to be operating satisfactorily.

House of Good Shepherd Sewage Pumping Station		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
n/a	n/a	n/a

2.2.3 Diamond Hill (Meadow Lane) Sewage Pumping Station

The Diamond Hill (Meadow Lane) sewage pumping station located in the Township of Mansfield is owned and operated by the HMUA. This pumping station was constructed in 2004. The pumping station includes two (2) submersible pumps and emergency natural gas generator. The Diamond Hill sewage pumping station appeared to be in good physical condition and well maintained. In 2017, a new pump plate, lead pump float and replacement of controls was required at the facility.

During the 2020 inspection, it was noted that the well and pump station were moved to a new circuit.

Diamond Hill (Meadow Lane) Sewage Pumping Station		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
No pump issues.	Generator repairs are planned Possible voltage monitoring next summer.	Pump motor contactors replaced.

2.2.4 Water Filtration Plant (WFP) Sewage Pumping Station

The HMUA also owns and operates a small sewage pumping station located at the Water Filtration Plant in Hackettstown. In 2010, the existing grinder at the station was removed due to failure, and both pumps were replaced with non-clog pumps. In 2014, one of the two pumps was again replaced with a new version non-clog pump, and the second was replaced in 2018. The station was reported to be operating satisfactorily.

Water Filtration Plant (WFP) Sewage Pumping Station		
2020 Findings by Mott MacDonald	Ongoing Issues / Items to be Addressed	Items addressed / Completed Upgrades in 2019-2020
No issues	n/a	n/a

2.3 Wastewater Service Area and Wastewater System Planning

The HMUA's Future Sewer Service Area and water service areas were significantly reduced through implementation of the Highlands Preservation Act. The Highlands Regional Plan was approved by the Highlands Council on July 17, 2008 and was approved by the Governor. Amendments in the State's Water Quality Management Plan rules including the designation of the Musconetcong River as a "C-1" waterway has further limited the extent of the HMUA's sewer service area. Following a period with few requests, there has been an increase in requests received by the HMUA for centralized sanitary sewer and potable water service from undeveloped or underdeveloped properties situated within its service within the past three years. The HMUA completed a project to update the November 2003 HMUA Wastewater and Water Flow Projections and the updated flow projections are included in a report entitled "Water and Wastewater Flow Projections dated September 2008". As detailed in the September 2008 Water and Wastewater Flow Projections Report, it was projected that the WPCP peak monthly flows would exceed the current permitted plant capacity rating of 3.30 MGD in 2017. However, the actual average plant flows had decreased at several points during the last 10-year period due to efforts by the HMUA to reduce inflow and infiltration (I/I) flows and slowed development within the HMUA Sewer Service Area. The current average flow has reduced back to the values typically experienced over the past 10 years. The average flow in the 2019 report had been reported to be an increase of approximately 12% from the previous 12-month period (average daily flow of 2.345 MGD from September 1, 2018 to August 31, 2019 compared to 2.096 MGD from September 1, 2017 to August 31, 2018). It should be noted that 2018 was the wettest year in the State since record keeping began in 1895. In 2012, HMUA staff made adjustments to the values in the Flow Projections Report (as suggested in previous Annual reports) to reflect properties removed from the sewer service area and connections which have occurred since 2008 and excess capacity was shown for the WPCP. At this time, it is recommended that the HMUA continue to monitor and evaluate the existing and projected flows.

To comply with the recent NJDEP Water Quality Management Plan (WQMP) requirements that became effective in July 2008 requiring updates to the Hackettstown Wastewater Management Plan (WMP), the HMUA and Town of Hackettstown sent initial draft NJDEP Sewer Service Area (SSA) maps to the NJDEP on October 1, 2009. Following the initial submission to the NJDEP, numerous revised SSA Maps, documentation and emails were sent to the NJDEP based on comments received from the NJDEP on the SSA Maps. Agreement was reached with NJDEP on two (2) lots that the NJDEP was excluding from the Sewer Service Area (due to lots being designated as Rank 4 Habitat in the State's database) that the Town of Hackettstown and the HMUA wanted included in the HMUA's Sewer Service Area. The Sewer Service Area, including these two lots, was the subject of an April 6, 2011 Public Hearing by NJDEP. In June 2011, information from the 2008 Flow Projections Report was provided to the Highlands Council, which had become responsible for completing the Hackettstown WMP. In June 2012, April 2013 & December 2013 formal comments were provided to the Highlands Council regarding future flow estimates developed by the Highlands Council. In November 2014, the Town of Hackettstown met with the Highlands Council and was assured that the WMP will be completed and submitted to NJDEP. The proposed amendment covering the Town was adopted on February 12, 2016.

In 2011 and 2012, Mott MacDonald reviewed and prepared comments on the Washington Township WMP Chapter prepared by the Highlands Council, which included future flow estimates for the five (5) contributing municipalities. The HMUA elected to submit no comments on the final document and the Washington Township WMP was adopted by NJDEP in July 2012. In February 2016, HMUA provided comments on a proposed Washington Township Zoning amendment (RO-03-16) impacting the Musconetcong Age-Restricted Housing Overlay

zone. An Amendment related to the Heath Village West development was approved on March 20, 2018.

In 2012, Mott MacDonald reviewed WMP mapping for Mount Olive Township prepared by the Morris County Department of Planning. Comments were submitted on July 12, 2012 stating that only existing served/approved properties should be shown in the Future Sewer Service Area.

In 2016, Mott MacDonald updated the service area mapping from the 2008 Flow Projections Report reflecting the various updated municipal chapters.

3 HMUA HEADQUARTERS COMPLEX & OVERALL FACILITIES

3.1 Facility Site Improvements

In 2016, the HMUA undertook several minor building repair/update projects at the HMUA Headquarters Complex at 424 Hurley Drive which includes the Administration Building, Storage Building, Operations Building and Material Storage Yard.

In 2020, the HMUA Headquarters complex remained in good condition.

3.2 Energy Audit of HMUA Facilities

During 2009, the HMUA completed an Energy Audit of the HMUA's facilities that included the Water Pollution Control Plant, Water Filtration Plant, Administration Building, Operations Building, Storage Building and Well and Booster Stations. The Energy Audit prepared by CDM included recommendations with potential areas to reduce energy usage and to reduce energy costs. The HMUA has undertaken several projects to implement some of the energy saving recommendations made in the Energy Audit report as discussed above.

3.3 Air Permitting

The table below summarizes the air permits for HMUA facilities. In 2018, updates were made to permits at the Water Pollution Control Plant and Water Filtration Plant Site and preparation of a renewal permit for Claremont Well No. 8 was completed with permit issued in November 2018. Renewal permits for the WPCP Boiler and Well #9 were completed during 2020.

HMUA Air Permit Summary

Facility Name and ID	Air Permit Number	Permit Type	Equipment	Effective Date	Expiration Date
Water Pollution Control Plant (25591)	GEN100001	GP-017	Boilers (3)	1/27/2020	1/27/2025
	GEN180001	GP-005A	Emergency Generators (2)	1/10/2018	1/10/2023
	PCP960002	PCP	Primary Digester	4/2/1998	4/2/2023
Water Filtration Plant Site (84575)	GEN180001	GP-005A	Emergency Generator	4/18/2018	4/18/2023
Mount Olive Booster Pump Station (85547)	GEN170001	GP-005A	Emergency Generator	12/8/2017	12/7/2022
Independence Booster Pump Station (85546)	GEN170001	GP-005A	Emergency Generator	12/8/2017	12/7/2022
Claremont Well #8 (85654)	GEN180001	GP-005B	Emergency Generator	11/7/2018	11/7/2023
Well #9 (26976)	GEN150001	GP-005B	Emergency Generator	5/19/2020	5/19/2025

3.4 Security Improvements

As mentioned previously, in 2017, HMUA added a security fence at the 2.4 MG tank and an enclosure around the Well No. 8 pump equipment. During the 2020 Inspection, all facilities appeared to have adequate security measures in place.

3.5 Electrical Testing Reports

In July 2017, three thermographic surveys were completed by CNA and a follow up survey was done in September 2019. The purpose of these reports was to generate an infrared thermographic scan of the building's electrical systems in order to identify points with elevated temperatures within the electrical systems. Points of elevated temperatures can indicate potential wear or deterioration.

If an issue was detected, it was rated on a scale of severity ranging from minor to intermediate to serious to critical. The severity of the issues was determined based on temperature.

In July 2017, the Office building was scanned. There were no issues identified.

In July 2017, the WPCP was scanned. There were seven (7) intermediate issues identified, five (5) serious issues identified, and one (1) critical issue identified. All but two of these identified issues were confirmed as resolved in the 2019 follow-up.

In July 2017, the WFP Building was scanned. There was one (1) serious issue identified. This issue was confirmed as resolved in the 2019 follow-up.

In September 2019, a follow up survey was completed. In this scan, there were two (2) intermediate issues identified at the WPCP. These issues are in the process of being corrected.

It is recommended that these surveys be conducted annually until all critical and serious faults are verified as corrected and thereafter every three (3) years.

4 SUMMARY

The HMUA potable water and sanitary sewer utility infrastructure is in sound condition and updated to comply with current environmental requirements. Potable water production capacity has been increased to meet growth occurring in the service area and this has allowed for the sale of the HMUA's surface water supply properties and the abandonment of the Water Filtration Plant. The HMUA has completed the replacement of its surface water reservoirs with groundwater with the completion of Well No. 9 located in Washington Township and the increased capacity of Diamond Hill (Claremont) Well No. 8. HMUA has commenced the design and permitting for construction of a new water storage tank on the northerly side of its distribution system. Additional capital projects have been identified in the Asset Management Plan and will be reviewed and prioritized on an annual basis.

The WPCP upgrade/expansion was completed in 1993 and the plant is operating at approximately 61 percent of its permitted capacity and complying with its NJDEP effluent limits. Contract 50S will rebuild a gravity belt thickener and 51S will replace the UV disinfection system. Other Capital expenditures for the next five years should include the miscellaneous replacement of mechanical and electrical equipment on an as needed basis which reaches the end of its useful life. As mentioned previously, the HMUA has completed the following projects at the WPCP:

- Sludge Digester Mixer Project to improve gas production and performance of Anaerobic Digestion System (Contract No. 37S, 2010)
- New screening/washing equipment at headworks of plant (Contract No. 37S, 2010)
- Raw Sewage Pump (RSP) motors and VFDs for RSP No. 1 and No. 2 (Contract No. 37S, 2010)
- Site piping modifications (Contract No. 37S, 2010)
- Blower Replacement (Contract No. 39S, 2012)
- Generator Interconnection (Contract No. 42WS, 2014)
- Removal of Equalization Basin and other improvements (Contract No. 44S, 2015)
- Replacement of Nitrification tank Diffuser System (Contract No. 48S, 2019)

The HMUA water and sewer facilities are well maintained and capably operated. In order to continue this level of performance and keep pace with technological advances in the water supply and wastewater treatment field, HMUA personnel are encouraged to continue attending training seminars.