ARCADIS Design & Consultancy for natural and built assets

City of Albany, New York
Water and Sewer System

FIVE YEAR CAPITAL IMPROVEMENT PROGRAM (2022-2026)

Prepared for:
Albany Water Board and Albany Municipal Water Finance Authority

Albany, NY

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EXECUTIVE SUMMARY

The Albany Water Board (AWB) and Albany Municipal Finance Authority (Authority) project a Five-Year Capital Improvement Program (CIP) annually for the water and wastewater system (System), which is comprised of water treatment, transmission, and distribution assets, as well as, wastewater collection, conveyance, and satellite treatment facilities. The Authority is also required to complete an examination of the system every other fiscal year in accordance with the Water and Sewer System General Revenue Bond Resolution, adopted by the Authority on January 22, 1998. This report presents the proposed CIP for the periods 2022-2026.

An assessment of the AWB assets was completed based on visual inspections and interviews with AWB personnel regarding previous maintenance, inspection and/or performance records. The assessment was performed on the following assets:

- Supply Reservoirs (Basic Creek and Alcove)
- Six-mile Reservoir (Rensselaer Lake)
- Feura Bush Filtration Plant
- Loudonville Reservoir
- Treated Water Pump Stations
- Elevated Storage Tanks
- Sewer Pump Stations (Representative sample of the 30 stations)
- Albany Water Department Office - (10 North Enterprise Drive and 35 Erie Boulevard)
- Supply and Distribution System
- Collection System

The intent of this system examination is to provide a planning level evaluation of the system, not to provide a detailed assessment of each asset. The recommendations from this evaluation include the need for more detailed assessment of certain assets that are either buried, are too numerous to evaluate under this assignment, and\or if there is insufficient historic data on the condition of the assets.

Project descriptions and capital cost estimates provided by the AWB are incorporated into the CIP. The amount budgeted for 2022 is 32.9 million, which includes both water and sewer. This work will be undertaken using reserve funds, grant funds, Environmental Facilities Corporation (EFC) financing, and through bond funds.

Water System

The water system for the City of Albany consists of two supply reservoirs with a combined capacity of 13.8 billion gallons; a 48-inch diameter raw water system conduit, 8.3 miles in length; a filtration plant with a design capacity of 32 mgd; a treated water supply conduit, 48 inches in diameter and 11.1 miles long; a distribution system containing approximately 370 miles of pipe of various diameters; and treated water

storage facilities consisting of an open reservoir and two elevated storage tanks and one standpipe charged by pump stations.

Major conclusions with respect to the water system are as follows:

- All major elements of the water system are in generally adequate condition.
- The quality of treated water has consistently complied with regulatory standards.
- The capacity of the water system is projected to exceed the demand of the service area through the year 2026.
- The AWB has historically provided adequate service at staffing levels equivalent to those currently in effect.
- Timely completion of the capital improvement program, along with adequate maintenance, should be sufficient to maintain the present level of service provided by the water system for the next five years.

Recommendations for repairs and upgrades were provided based on observations made by Arcadis and discussions with the Albany Department of Water and Water Supply (AWD) staff. A summary of the condition of assets and recommendations for repairs or upgrades are provided in the text. Appendix A, Five Year Capital Improvement Program (2022-2026) Summary of Costs, lists the anticipated projects and project costs. The scope of work for these projects may not be fully defined so the costs shown may change during the five-year period. In addition, if costs for projects are higher than anticipated, some projects may not be included or completed within the five-year period.

Sewer System

The sewer system consists of a network of sewers and sewage pump stations that receive approximately 25 mgd (2020) of sewage per day from the City for conveyance to two treatment facilities owned and operated by the Albany County Water Purification District (ACWPD).

The sewer system includes approximately 900 miles of sanitary, storm, and combined sewers; 30 sewage pump stations; and 22 overflow regulators which carry excess flow from combined sewers to 11 discharge points. The system is divided into eight districts and lies entirely within City limits.

Major conclusions with respect to the sewer system are as follows:

- All major elements of the sewer system are generally in adequate condition.
- The sewer system should be capable of handling anticipated sanitary sewage flows through the year 2026.
- Timely completion of the capital improvements program, along with adequate maintenance, should be sufficient to maintain the present level of service provided by the sewer system for the next five years.

Recommendations for repairs and upgrades were provided based on observations made by Arcadis and discussions with Albany Department of Water and Water Supply (AWD) staff. A summary of the condition of assets and recommendations for repairs or upgrades are provided in the text. Appendix A, Five Year Capital Improvement Program (2022-2026) Summary of Costs, lists the anticipated projects and project costs. The scope of work for these projects may not be fully defined so the costs shown may change

during the five-year period. In addition, if costs for projects are higher than anticipated, some projects may not be included or completed within the five-year period.

1 BACKGROUND

The Albany Water Board (AWB) and Albany Municipal Finance Authority (Authority) project a Five-Year Capital Improvement Program (CIP) annually for the water and wastewater system (System), which is comprised of water treatment, transmission, and distribution assets, as well as, wastewater collection, conveyance and satellite treatment facilities. This report presents the proposed CIP for the periods 2022-2026. Timely completion of the CIP, in conjunction with adequate system maintenance, should be sufficient to maintain the present level of service for the next five years.

The Authority is also required to complete an examination of the system every other fiscal year in accordance with the Water and Sewer System General Revenue Bond Resolution, adopted by the Authority on January 22, 1998 and subsequent resolutions and amendments, as described below.

In every other Fiscal Year, the Consulting Engineer shall make an examination of and shall report to the Authority, the Board, the City and the Trustee on, the properties and operations of the System. Such reports shall set forth among other findings: the Consulting Engineer's advice and recommendations as to the proper operation, maintenance and repair of the System during the two ensuing Fiscal Years and improvements which should be made during the ensuing five Years, and an estimate of the amounts of money necessary for such purposes, the Consulting Engineers findings as to whether the System has been maintained in good repair and sound operating condition, and its estimate of the amount, if any, required to be expended to place such properties in such condition, and the details of such expenditures and the approximate time required therefor.

An assessment of the AWB assets was completed based on visual inspections and interviews with AWD personnel regarding previous maintenance, inspection and/or performance records. The assessment was performed on the following assets:

- Supply Reservoirs (Basic Creek and Alcove)
- Feura Bush Filtration Plant
- Loudonville Reservoir
- Six-mile Reservoir (Rensselaer Lake)
- Treated Water Pump Stations
- Elevated Storage Tanks
- Sewer Pump Stations (Representative sample of the 30 stations)
- Albany Water Department Office - (10 North Enterprise Drive and 35 Erie Boulevard)
- Supply and Distribution System
- Collection System

The intent of this system examination is to provide a planning level evaluation of the system, not to provide a detailed assessment of each asset. The recommendations from this evaluation includes the need for more detailed assessment of certain assets that are either buried, are too numerous to evaluate under this assignment, and\or if there is insufficient historic data on the condition of the assets.

Project descriptions and capital cost estimates provided by the AWB are incorporated into the CIP. The amount budgeted for 2022 is 32.8 million, which includes both water and sewer. This work will be undertaken using reserve funds, grant funds, funding through the Clean Water State Revolving Fund, the Drinking Water State Revolving Fund, and through bond funds.

Asset Management Plan

In 2015, AWB developed an Asset Management work plan for the water and sewer system, and an Asset Management Plan in 2017. The development of these plans assists the AWB prioritize and implement asset management elements into its operations. Recommendations included the need to inventory assets and perform condition assessments of infrastructure to support the next steps of the asset management program. Elements of the Plan that require funding from the Capital Budget have been included in this CIP and will be updated annually. A status update is provided in a separate section following the CIP.

Summary of Completed Engineering Reports (2021)

This CIP briefly discusses the work completed in 2021, but Appendix C lists the engineering plans, reports, and designs completed so the reader will know where to obtain additional information.

2 ALBANY WATER SYSTEM

The Water System's source of supply is obtained from the waters of the Hannacrois and Basic Creeks, located approximately 20 miles southwest of the City in the Heldeberg Mountains. A retention dam was built across the Hannacrois Creek near the Village of Alcove which stores the water of this creek and forms the Alcove Reservoir. The Alcove Reservoir is the main supply reservoir for the Water System. Located in the Town of Coeymans, the Alcove Reservoir contains 13.5 billion gallons of water, of which approximately 12.1 billion gallons are considered available for use. The safe-yield (i.e., long-term safe withdrawal) of the Alcove-Basic Reservoir System is estimated to be 30.5 million gallons per day ("mgd"), and the Alcove Reservoir alone has a safe yield of 24.2 mgd.

Water is carried from the Alcove Reservoir by a 48-inch diameter cast iron pipe (the "Supply Conduit") to a filtration plant located in the Town of Bethlehem, approximately half-way between the Alcove Reservoir and the City water distribution system. The filtration plant is a conventional treatment plant with aeration, hydraulic flocculation, sedimentation, rapid sand filtration and disinfection. Chemicals currently used in the process include sodium hypochlorite, polyaluminum chloride, sodium permanganate, and hydrated lime. In 2018, gas chlorination was replaced with sodium hypochlorite and sodium permanganate addition was relocated to the Alcove Reservoir. The rated plant capacity is 32 mgd.

The water supplied from the Alcove Reservoir is delivered to the City entirely by gravity through the Supply Conduit. The Supply Conduit, constructed in 1930-1932, is approximately 20 miles long and traverses the Towns of Coeymans and Bethlehem, from the Alcove Reservoir to the Loudonville Reservoir. Water is transmitted by the Supply Conduit to the filtration plant and subsequently, to the City and the Loudonville Reservoir. The Supply Conduit is equipped with air release valves at the highpoints and blow-off valves at the low points, which facilitates draining and filling operations.

The Loudonville Reservoir serves as both distribution, storage and back-up supply. The Loudonville system consists of three concrete lined basins with a total capacity of 211 million gallons, representing approximately 7-days of water supply to the City during an emergency or planned outage, one requiring shutdown of the Feura Bush filtration plant or the shutdown of the Supply Conduit.

The storage basins are uncovered. An ultraviolet disinfection system was installed in 2003 and it can treat a total capacity of 40 mgd. In addition, the finished water is chlorinated prior to entering the distribution system reservoir, in accordance with New York State Department of Health requirements. Viricidal disinfection with chlorine is accomplished prior to ultraviolet treatment.

Interconnections to the Town of Colonie have capacity of approximately 10 MGD. These interconnections, at Loudonville reservoir and New Karner Road, are for emergency use for supply to either municipality under and intermunicipal agreement.

2.1 Service Areas

The majority of the City is served as one pressure zone from the Loudonville Reservoir. The downtown portion, which is at a lower elevation along the Hudson River, is served through pressure reducing valves. The western portion of the City beyond Fuller Road is served by the Pine Bush Pump Station and the

Pine Bush Tank (1,000,000 gallons). Properties in the vicinity of the Loudonville Reservoir are served by the Upper Service Pump Station and Upper Service Tank (150,000 gallons).

Water from the Supply Conduit is distributed to the City through a series of feeder mains. The distribution system carries water from the feeder mains to the consumers. The distribution system consists of approximately 376 miles of pipes which range in size from 4-inch diameter to 36-inch diameter. There are over 8,700 valves in the distribution system to provide flow control during system maintenance. The distribution system includes approximately 3,000 fire hydrants.

Much of the distribution pipe mileage in the System is unlined cast iron, the primary construction material used before 1930. Since 1973, the installed distribution pipe material has been cement-lined ductile iron.

The distribution system is the oldest part of the Water System. The oldest water mains may date back to 1851, the year the water system transitioned from private to public. Greater than 20% of the existing distribution system was placed in service prior to 1900. Pipe is replaced on the basis of frequency of repairs, or in conjunction with street reconstruction projects. The AWB has a crew that is proactively performing leak detection in the system.

The AWB currently has interconnections with the Towns of Bethlehem and Guilderland and supplies water to these communities as-needed under purchase water agreements. There are also two emergency interconnections with the Latham Water District in the Town of Colonie. One near the Loudonville Reservoir has a capacity 7.4 MGD and one on New Karner Road has a capacity 3.5 MGD.

In 2020, a new Upper Washington Pressure Zone was established as an intermediate zone between the Loudonville reservoir zone and the Pine Bush Zone. This zone includes a Colvin Avenue pump station and a 1.1 MG tank. In 2021, the State of New York transferred a 12-inch water main, a 750,000 gallon concrete ground storage reservoir, and a water pump station to the AWD. These assets are located near the Western Avenue entrance to the W. Averell Harriman State Office Campus and will be incorporated into the new Upper Washington Pressure Zone.

2.2 Water System Supply Reservoirs

The upland supply reservoirs, on Basic Creek and at Alcove Dam, were constructed in the late 1920's and early 1930's. These reservoirs continue to serve as the sole source of water supply to the City.

The initial development of the reservoirs used the runoff from the Hannacrois and Basic Creeks. Diversion dams, constructed on the streams, collected the natural flow of the streams into reservoirs. A tunnel constructed a short distance upstream from the Basic Creek Reservoir conveys water in an easterly direction, through a dividing ridge, to Silver Creek, a tributary of the Hannacrois Creek.

The Alcove Dam, constructed in 1928-1930, is a rolled earthen embankment with a reinforced concrete corewall. The Alcove Dam is approximately 2,177 feet long, which includes a 300-foot concrete spillway. The maximum height of the Alcove Dam is 81 feet and the base of the dam is 485 feet wide. The Alcove Reservoir contains an estimated 13.3 billion gallons of water with a surface area of more than 1,392 acres.

The Basic Creek Dam was constructed circa 1928, is a rolled earthen embankment with a reinforced concrete corewall. The Basic Creek Dam is approximately 865 feet long, which includes a 100-foot concrete spillway. The maximum height of the Basic Creek Dam is 21 feet. The Basic Creek Reservoir contains approximately 646 million gallons of water with a surface area of more than 240 acres.

2.2.1 Condition of the Water Supply Reservoirs

The Alcove Reservoir is the primary source of raw water supply for treatment to the Albany Water System. The reservoir is in serviceable condition. The reservoir's low level outlet gate was replaced in 2019 and the gate operators have been serviced and painted.

The office building and furnishings at the reservoir are well worn and in poor condition. Painted surfaces have been weathered to the point of peeling or missing paint completely. Reportedly, samples of the paint have revealed multiple layers of lead-based paint. Wooden surfaces exposed to weathering are continuing to decay. The windows in the building appear to be original and are in poor condition. Reportedly, heavy rains penetrate the roof envelope and are evidenced by discoloration in the ceiling tiles and the support under the ground floor bathroom has been identified as requiring structural support to maintain the current level of utilization.

The four barns adjacent to the office building are also showing signs of age. The paint has not been tested for lead-based paint. Historically, these barns were sprayed to control and/or avoid powderpost beetle infestation, but spraying was discontinued. No recent damage has been observed by the AWD.

The metal chemical storage structure paint is peeling and missing in some small areas and the enclosure has not been evaluated since installed.

The AWB has plans to use bond funds to replace the office and garages. The new facility will include a one-story building (approximately 2,100 to 2500 square feet) and additional garages for workspace and storage. The AWB has been working with architectural consultants regarding the best alternatives for construction of new modern facilities to support operations at the dams and watershed areas. Construction of the new building is planned for 2022. AWB is considering retaining the existing four barns for material and equipment storage.

At Alcove Reservoir, the eve of the intake structure roof shows signs of continued deterioration. The eve should be addressed to prevent damage to the roof system. Additionally, the historic windows are showing signs of deterioration and should be repaired to maintain the weather tightness of the intake structure. Reportedly, the lighting within the intake structure requires frequent replacement and options for upgrading the lighting to provide longer life should be evaluated.

The principal spillway is approaching 100 years of active service without significant repair. The 300-foot concrete spillway discharges to an earthen and rock armoured spillway chute defined by concrete sidewalls. Repairs to the spillway and spillway channel are required to remove vegetation, repair cracking, spalls, and areas where concrete loss is evident in the shotcrete façade and other exposed potions of the mass concrete. This work should include removing vegetation, grouting or sealing smaller cracks, injection grouting of larger cracks, and placement of mesh reinforcement in areas of larger concrete loss. AWB is considering options for repairs, versus a comprehensive evaluation and upgrade of the spillway and sidewalls. A more comprehensive repair of the concrete spillway and spillway

sidewalls is likely necessary to provide another 100 years of serviceability. Work to the spillway is planned after the implementation of the Basic Creek Dam and Rensselaer Lake Improvements.

Seepage discharged at the toe of the right abutment is conveyed away from the toe of the embankment through corrugated metal pipes, which have been halved to create a swale. Deterioration and damage require routine maintenance and replacement when necessary.

The AWB has a Dam Safety consultant and costs have been included in the CIP for initiating detailed inspection and conditions assessments to identify necessary improvements to the spillway and spilling channel. Plans have been advanced by the engineering group of the AWD, and with support of consultants for survey and mechanical, electrical and plumbing portions. The project has been presented to the Town of Coeymans Planning Board and is approved to proceed in 2022.

Photo 2-1. Alcove Reservoir Dam

AWB's Dam Safety consultant has conducted investigations at Basic Reservoir and prepared an Alternatives Analysis which provided recommendations to bring the dam and spillway into NYSDEC compliance. This included drainage improvements and strengthening of the embankment section, increasing spillway capacity, addressing the downstream concrete, and upgrading the access bridge to allow for access by mowing equipment. The rehabilitation work will address the deteriorating concrete of the spillway and the exposed top of the concrete core wall. This work will also address the environmental restrictions which prevent AWB from accessing the embankment by driving equipment through the channel.

A safe yield study was completed in 2021 for both the Alcove and Basic Creek Dam, the study indicated that the Basic Creek normal pool elevation could be significantly lowered, with operational changes, without significant impact to the overall system safe yield. Subsequently, an additional Basic Creek Dam rehabilitation alternative is actively being investigated which would lower the normal pool elevation by up to six feet thereby reducing the volume, height, and hazard designation for the facility with a corresponding reduction in capital cost.

The eves and soffits of the roofs for the gate house and intake have continued to deteriorate, but both structures still appear to be weather tight. Repairs to both structures should be implemented to maintain the integrity of the structures and protect the equipment from the weather. The concrete bridge to the diversion tunnel gate house has areas of missing and spalled concrete which should be repaired to prevent the bridge from becoming unsafe.

The diversion tunnel has sluice gates and stop logs. The sluice gates will be replaced along with dam safety improvements in upcoming years. The configuration of the diversion tunnel is expected to be modified.

Photo 2-2. Basic Creek Reservoir Gate House

The Basic Creek Reservoir has been declared an "impaired water body under Section 303(d) of the Federal Clean Water Act. The impairment from the water quality standards is due to a concentration of Phosphorous, the principal source being from agriculture activities in the drainage basin. The Basic Creek Reservoir was used in the winter of 2016-2017 to augment the Alcove Reservoir. The Basic Creek Reservoir will be used each year when water quality of this source is suitable.

The AWB was awarded a NYSDEC grant for land acquisition for watershed protection. The focus of the grant will be acquisitions to benefit water quality at Basic Creek. They were also awarded a FEMA High Hazard Potential Dam Grant for preconstruction activities associated with the planned dam rehabilitation project.

2.2.2 Recently Completed and Planned Projects

In the 2012 Capital Improvement Budget, money was allocated to bring the Alcove Dam into compliance with NYSDEC Regulations. This work included the addition of the piezometers, stop logs and leak repairs.

In 2015, a consultant was retained for professional services in regard to Dam Safety, and they completed Engineering Assessments (EA) for both the Alcove and Basic Creek Reservoirs. The findings of this evaluation provided recommendations for specific rehabilitation activities to bring the dams into compliance with NYSDEC Dam Safety regulations. The initial EA was completed for Basic Creek Reservoir using conventional parameters, no field exploration. For Alcove Reservoir the EA was completed using limited existing site-specific information.

EA findings for both Alcove and Basic Creek Reservoir were submitted to NYSDEC in 2016. Site specific field explorations, including rock and concrete core sampling, soil borings, the installation of additional

piezometers, and laboratory testing were completed. Amended EA for Alcove Reservoir was submitted to the NYSDEC in January 2018 and Basic Creek Reservoir in December 2017.

Alcove Reservoir Gate Rehabilitation Project was designed in 2017 and construction began in 2018. This project included the replacement of five water supply gates located within the gatehouse, including the two outlet gates and two of the four inlet gates. The main drain gate (low-level outlet) was also replaced. This project was completed in January 2019.

A preliminary design for the Basic Creek reservoir rehabilitation was completed in 2019. In 2021, a safe yield analysis and bathymetric survey was completed at Alcove and Basic Creek Reservoirs. These will guide the AWB in determining which preliminary design alternative to implement for the Basic Creek Reservoir.

In 2017, the AWD entered into a Working Woodlands Program with the Nature Conservancy to serve as the foundation for certification under the Forest Stewardship Council and the establishment of a Conservation Easement to improve forest health, provide options for long-term watershed protection, and new sources of revenue from the sales of carbon credits on the Voluntary Carbon Market. The AWD anticipates receiving over approximately $150,000 in revenue in 2021 from the sale of carbon credits associated with the Working Woodlands Program with The Nature Conservancy. The cumulative amount received to date is approximately $350,000.

A pilot project began in 2017 for the addition of sodium permanganate at the Alcove Reservoir, as a replacement for the use of potassium permanganate at the Feura Bush Filtration plant. This pilot showed to be successful in reducing total organic carbon (TOC), and permanent facilities are currently under construction.

Planning and design for the rehabilitation of Alcove and Basic Creek reservoir buildings was initiated in 2017. Design of a replacement building and associated SHPO consultation is ongoing. The Alcove building project is expected to be advertised in December of 2021. Construction is expected to begin the spring of 2022, and substantial completion by the end the year.

Recent projects are summarized in Table 2-1 below.

Table 2-1. Recent Improvements at the Water Supply Reservoirs

Recent Improvements	Construction Date
Two new piezometers in the Alcove Reservoir	2013
New stop logs and leak repairs in the main drain valve at Alcove Reservoir.	2013
Installation of additional piezometers at Alcove Reservoir	2016
Working Woodlands Program - forest management at the Alcove	Began 2017
Alcove Reservoir gate replacement	2018-2019

For 2022 the following projects have been identified. These projects include both studies and the implementation of repairs.

- Begin construction of new Alcove office and garage buildings
- Complete construction for permanent sodium permanganate facility at the Alcove Reservoir.
- Detailed design of Basic Creek reservoir dam safety improvements.

Tables showing summaries of planned projects for the next five years is provided in Appendix A, Five Year Capital Improvement Program (2022-2026) Summary of Costs.

2.3 Supply Conduit

The transmission system consists of supply conduits that carry raw water from the Alcove Reservoir to the Feura Bush Filtration Plant and treated water from the Feura Bush Filtration Plant to the City's distribution system.

The first supply conduit section carries raw water from the Alcove Reservoir, through the Town of Coeymans and into the Town of Bethlehem. The conduit subsequently enters the water filtration plant located near the hamlet of Feura Bush. This raw water supply conduit consists of 43,965 feet of 48-inch diameter cast iron pipe. At a point approximately 12,000 feet downstream of the Alcove Dam, the supply conduit crosses a ravine in a reinforced concrete box shaped bridge. The three spans crossing the ravine are 25 feet, 28 feet, and 25 feet in length respectively.

Approximately 4,500 feet upstream of the Feura Bush Plant, the conduit crosses the Onesquethaw Creek. At the Onesquethaw crossing, a new single span steel bridge, constructed in 2001, supports the 48-inch supply conduit and the 36-inch filtration plant process wastewater drain. New insulated ductile iron piping, control valves, and waste blowoffs were included in this construction.

From the Feura Bush Filtration Plant, the second supply conduit section traverses the Town of Bethlehem and enters the City through the southerly City limit near Delaware Avenue (N.Y.S. Rte. 443). This treated water supply conduit consists of 34,374 feet of 48-inch cast iron pipe. At the Selkirk Railroad Yard, southeast of Feura Bush, the conduit consists of parallel 42-inch pipes which are located within a 1,156 foot-long reinforced concrete tunnel. There is a brick gate house at one end of the tunnel and a metal hatch at the other end.

The supply conduit is also protected at other railroad crossings between the Feura Bush Filtration Plant and the City. Just below the Feura Bush Filtration Plant, under what was once the West Shore Railroad, the conduit is set in a rectangular reinforced concrete tunnel 61.5 feet in length.

A similar tunnel structure exists at a single track crossing of the former Delaware and Hudson Railroad in Elsmere. This tunnel is 35.5 feet in length. At the Delmar Bypass, the supply conduit crosses the highway in a concrete tunnel.

The third section of the supply conduit continues from the Normans Kill crossing at the southerly City limit just north of Delaware Avenue, through the City, to the Loudonville Reservoir for a distance of approximately 24,000 feet. It consists of 48-inch cast iron pipe throughout its length, with the exception of a 42-inch section between Myrtle and Clinton Avenues, and the CSX crossing noted below.

From the Normans Kill crossing, the supply conduit crosses the New York State Thruway in a reinforced concrete tunnel and continues northerly into the City crossing Whitehall Road, Hackett Boulevard and New Scotland Avenue, and runs along Lake Avenue, between New Scotland and Livingston Avenue. The conduit extends northerly from Livingston Avenue to the Loudonville Reservoir. At Tivoli Hollow, the conduit crosses under CSX railroad tracks within a rectangular reinforced concrete tunnel 91 feet in length. The tunnel encloses two 36-inch water pipes. There are three 36-inch valves in valve pits at each end of the tunnel. From the northerly end of the tunnel, the 48-inch conduit continues to Albany Shaker Road to the Loudonville Reservoir. At the Interstate 90 (Crosstown Arterial) crossing, the conduit passes through a concrete tunnel.

Valves in the first and second sections of the supply conduit are located at the Alcove Dam, the Feura Bush Filtration Plant, the Selkirk Railroad Yard crossing, and the Normans Kill crossing. Within the third section, that which traverses the City proper, the supply conduit has been provided with main line valves at regular intervals. These additional valves permit conduit repair without interrupting the delivery of water to the distribution system, either from the Feura Bush Filtration Plant or from the Loudonville Reservoir.

There are two permanent emergency interconnections with the Latham Water District in the Town of Colonie. One near the Loudonville Reservoir with a capacity of 7.4 MGD and one on New Karner Road with 3.5 MGD.

Photo 2-3. Elevated Conduit Crossing located in Coeymans

2.3.1 Condition of the Supply Conduit

The current carrying capacity of the supply conduit is estimated at 30 mgd and appears to be adequate for serving the existing service area. At current and projected system demands, the distribution storage reservoirs at Loudonville, combined with the available capacity of the Latham Water interconnects, will provide approximately twenty days of capacity for the City during a filtration plant shut down or emergency repair.

There are two areas along the supply conduit that are not easily accessible due to large stones that were backfilled into the original supply conduit excavation. The AWD plans on removing the stones and providing better access at these locations.

The CSX Tunnel gate house could use repair. The building windows are in need repair or replacement. Three valve gate stands are located inside the building and need to be replaced. The pressure inside the supply conduit is monitored with a pressure sensor and the data is transmitted to the SCADA system.

At the Coeymans Crossing, one of the concrete roof panels has broken and partially collapsed. The cause is unknown and will be further investigated in 2022.

2.3.2 Recently Completed and Planned Projects

The Normans Kill crossing was reconstructed in 2000 after a major landslide along Delaware Avenue. NYSDOT relocated the channel of the Normanskill and the original watermains were replaced in the new alignment.

The Onesquethaw Bridge was replaced in 2001. This project started as a repair to the existing bridge, but as the existing concrete was removed for replacement, it became clear that the entire structure needed to be replaced. New ductile iron piping, control valves and waste blow-offs were included in construction.

In the mid 2000's, repairs on the Selkirk Yard Tunnel were performed around the same time as part of security improvements.

In 2017, the elevated conduit crossing in Coeymans was repaired. In addition, the area surrounding the crossing was regraded and a drop stormwater structure installed. The exterior flat roof was temporarily repaired with weighted tarps to mitigate precipitation entering the structure. The AWB is considering options for repairs or replacement of this structure. In 2019, the road was washed out at this location. The road was reestablished, and a new culvert installed.

Repairs to the slate roof and the brick wall of the gate house at the CSX tunnel was completed in 2018.

In 2017, erosion was discovered at two locations in the vicinity of the supply conduit at Normanskill Farm in Albany, NY. The farm is situated between I-87 and the Normans Kill Creek. Stormwater runoff from I-87 flows down an area with a steep grade and little vegetation, and had caused the development of small channels, or rill erosion. A design was completed in 2018 for improved access and drainage, and construction was completed in 2019. This location now has a 3000 linear foot gravel access road, vegetated and stone lined drainage swales, and a three-foot by eight-foot concrete culvert to convey stream flow under the access road.

In 2019 construction began for two permanent emergency interconnections with the Latham Water District in the Town of Colonie. One near the Loudonville Reservoir with a capacity of 7.4 MGD and one on New Karner Road with 3.5 MGD. This was completed and placed in service in 2020.

In 2019, a 24-inch branch valve off the transmission main was replaced in the vicinity of the Stephen and Harriet Myers School. This required a shut down at the Feura Bush Water Filtration Plant and the transmission main.

The AWB undertook a project in Tivoli Preserve to daylight the Patroon Creek and provide enhanced protection of the 36-inch and 48-inch supply conduits in the floodplains of the Patroon Creek. This project included grant funding from New York State.

There are (2) 16-inch pressure relief valves on the north side of the Normans Kill, one of which is out of service. AWD installed (2) 12-inch pressure relief valves on the transmission main on the south side of the Normans Kill in 2021. The old pressure relief valve location on the north side will now be utilized as a blow-off. A pressure reducing valve was also replaced on Eagle Street (PRV 6).

The AWD has allocated funds each year to perform condition assessments of the supply conduit and valves as part of the preventative maintenance program. Bonds of 2021 include $200,000 for condition assessment which will be used to inspect and exercise the large valves along the transmission and feeder mains.

Table 2-2. Recent Improvements to the Raw Water Supply Conduit

Recent Improvements	Construction Date
Replacement of Onesquethaw Bridge	2001
Repairs to Selkirk Yard Tunnel	Mid 2000's
Repairs to elevated conduit crossing in Coeymans	2017
Repairs to CSX Tunnel Gate house roof	2018
Improved access and drainage at Normanskill Farm	2019
24-inch branch valve replacement	2019
Emergency interconnections with Latham Water District	2019
Tivoli Preserve Stream Daylighting	2019
New pressure relief valves	2021

For 2022, the following projects are planned.

- Evaluation of the elevated conduit crossing in Coeymans.
- Inspect and exercise valves on the transmission main and feeders.

Other projects to be considered, but are not currently scheduled, include

- Two locations along the supply conduit are not easily accessible due to large stones that were backfilled into the original trench. Project would include removing the stones, backfilling with select fill, and perhaps construction of an access road.
- Rehabilitation of gate house windows at the CSX tunnel and the replacement of valve housing and components.

Tables showing summaries of planned projects for the next five years is provided in Appendix A, Five Year Capital Improvement Program (2022-2026) Summary of Costs.

2.4 Feura Bush Filtration Plant

The Feura Bush Filtration Plant, located in the Town of Bethlehem, is a conventional rapid sand filtration plant, rated for 32 million gallons of water daily (MGD).

Photo 2-4. Ceiling View of the Sand Filter Gallery in the Feura Bush Filtration Plant

The current treatment process within the plant features:

- Aeration
- Hydraulic flocculation
- Settling of solids in the sedimentation basins
- Chlorination on the influent of the filters
- Filtering of the water through the rapid sand dual-media filters
- Addition of lime for corrosion control
- Addition of chlorine for disinfection and residual
- Storage of the treated water in the clearwell

The AWD made substantial changes to the water treatment process in 2018. Chemical upgrades included finalizing the change from gaseous chlorine to liquid sodium hypochlorite and committing to a permanent sodium permanganate addition facility at the Alcove Reservoir instead of adding potassium permanganate at the plant. At this time, a temporary sodium permanganate system is being used at the

water filtration plant while a permanent facility is under construction with anticipated completion in spring 2022. Mechanical mixers installed in 1962 are not used because hydraulic mixing was found to be adequate. All switch gear was removed as part of the building renovation work that commenced in 2018, but removal of the flocculators (paddles, drives, and motors) is scheduled for 2022.

Although major capacity upgrades have not been necessary, the filtration plant has been the subject of many improvement programs since its original construction. The enclosed structures are subject to high humidity and water submergence in the interior, as well as to normal wear from weather exposure on the exterior. The existing water treatment processes consistently produce high quality water.

2.4.1 Condition of the Feura Bush Filtration Plant

In recent years the AWD has been evaluating the plant as a whole and a Water System Comprehensive Improvement Plan was developed. In 2019, the AWB and Albany Municipal Water Finance Authority (AMWFA) adopted this plan, passed a bond resolution, and a financial application for the next improvement was submitted to EFC (EFC DWSRF #18523). Significant repair and upgrades to the facility are planned and/or underway, and long term financing has either been acquired, or applied for. Below is a bulleted list of items that should be addressed and the plans that the AWB has to address them. This list has been categorized by area of the facility, starting with the raw water entering the facility and ending with finished water leaving the facility.

Raw Water:

Existing taps on the 60-inch venturi are leaking and a repair is needed. An opportunity to do this will occur when work is done to damp-proof the aeration building. (The repair is included in list of projects under the Comprehensive Plan).

Treatment:

- Mechanical flocculators are no longer used. The baffles in the flocculation chambers were hydraulically modelled and found to provide suitable mixing, so the mechanical mixers can be removed.

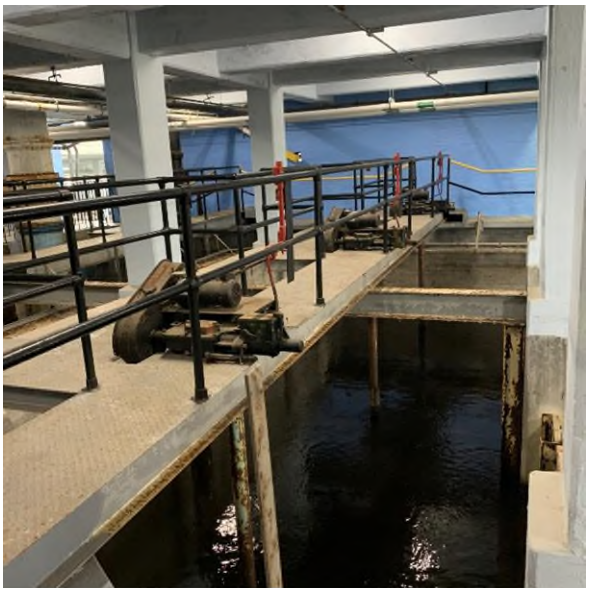

Photo 2-5. Partially Demolished Mixers in the Feura Bush Filtration Plant

- Sluice gates at the flocculation chambers are in need of repair or replacement. The concrete walls of the rapid mix and flocculation chambers need to be assessed.
- The inlet sluice gates in sedimentation basins 1, 2, and 3 were inspected and adjusted in 2016. The Filtration Plant staff believe they still leak, particularly Basin 1. The 2016 inspection of the gates suggested that the gate stems are too short to seat properly. Actuators associated with Basins 1-3 were repaired in the summer of 2019.The gate operators for Basins 1,2, and 3 will be replaced in 2022 with manual operators.
- Filter media was replaced in Filters 3 and 4 in 2013 but the performance of these filters was initially not as good as the other six filters, so plans to continue with media replacement for the other filters were cancelled. During replacement of media in Filters 3 and 4, filter wall deterioration was noted.

  Additionally, the filter actuators are outdated and increasingly hard to repair as replacement parts become unavailable. Full rehabilitation of all the filters is scheduled over the course of a two-phase project for 2022 and 2023. Rehabilitation includes replacement of the underdrains with a new system, new filter media, structural repairs, and filter actuator replacement. Replacement of filter valves and actuators is included in Bonds of 2021 and engineering has begun for construction in 2022.
- The existing lime feed system needs replacement. The lime slurry tanks are in extremely poor condition. AWD considered purchasing lime slurry instead of dry lime that needs to be mixed in the slurry tanks, but after further evaluation decided to continue with a dry lime system. The design for the new upgraded lime feed system is ongoing, with construction anticipated to begin in 2022.

Photo 2-6. Lime Feed System in the Feura Bush Filtration Plant

- Filtration Plant sedimentation basins are cleaned by decanting clean water from the basins to near the top of the sludge blanket and discharging the sediment basin's entire remaining contents to wastewater lagoons. The decanting pumps were installed as part of the sedimentation basin building rehabilitation project to prevent the plant from having to discharge the volume of a full sedimentation basin to clean sludge from the basins. However, there is no additional sludge removal equipment to further limit the amount of water dumped with the sludge.

  Additional sludge management alternatives are being considered, such as purchasing sludge dewatering equipment. This would allow the operators to thicken and stage dewatered sludge at the plant site, thereby allowing better lagoon management with a smaller quantity of sludge from filter backwashes.

- The facility stopped using acid alum in recent years, and as a result, there is less sludge being created so the sedimentation basins require cleaning less frequently. A beneficial use determination (BUD) is being pursued to allow continued use of the Feura Bush Filtration plant site for the ongoing storage of dried sludge and use of an old quarry site at the Alcove Reservoir as a site for fill.

Finished Water:

- The AWD had divers investigate the finished water clearwells at the end of 2017. The concrete was found to be in good condition.

Facilities:

The sedimentation basin building roof (Basins 4-6) was replaced in 2021, and repairs made to Basins 4-6. Masonry repairs were also made to the west wall of the Filter Building as a change order to the

sedimentation basin building project.

Photo 2-7. Roof Replacement Over Sedimentation Basins 4-6 Completed in the Feura Bush Filtration Plant

- The oil-fired boiler and the heating distribution system for the building heating system was replaced in 2019.
- Extensive renovations were undertaken to rehabilitate the offices, operator's lab, and men's and women's restrooms. This work was completed in 2019. The HVAC systems in the renovated spaces is being modified as a warrantee item, as it is not yet completed to the satisfaction of the operating staff.
- The domestic water is distributed through the building though the use of a compressor and hydropneumatic tank. The AWD staff reported that the compressor had been running more than expected. AWD staff completed repairs in 2019.
- Multiple exterior doors at the plant require replacement, including the front double door, the back double and single doors, the exit onto the roof of the sedimentation building, and the double doors at the loading docks. These replacements are being undertaken by plant personnel.
- The main plant building's brick exterior has been repointed on the front and partially on the sides. Repointing must continue around the sides and back of the building and along the retaining wall by the loading dock.

Photo 2-8. Deteriorating Brick Mortar on North Side of Building and Retaining Wall

- The plant is in the process of implementing a Utility Cloud system for asset management. The assets for Feura Bush and the Pine Bush pump station have been entered into the system, but the system has not yet been implemented to log maintenance and track work flows and orders. Plant personnel believe the system will be effective to manage asset maintenance once implemented.
- Plant personnel indicated a desire to move plant process data which is currently manually recorded on tour sheets or entered into Excel spreadsheets to a cloud-based format for instant access. However, they noted that the Utility Cloud system is not well-suited to digital management of process data due to lack of direct access to the server and the need to go through a third party to enter information in the system. Plant personnel are in the process of developing an in-house digital data management system to record process data in a way that allows instant access.

The Feura Bush facility is manned 24 hours a day, 7 days a week. As such, the furnishings and domestic equipment is used regularly.

2.4.2 Recently Completed and Planned Projects

A variety of studies and construction projects were completed at the Feura Bush facility over the last couple of years which included improvements to the roof, office space, and water treatment.

In 2016, a study was completed to evaluate embankment stabilization near Lagoon #2. This included surveying and subsurface exploration for embankment stability. The recommended risk reduction measures were implemented in 2019.

In 2017, an energy efficiency study was completed that evaluated the potential for energy generation at the plant, identified deficiencies in the building envelop, and discussed potential system improvements to improve energy efficiency.

In 2017 the filtration plant stopped adding acidified liquid alum to the treatment process, with the storage tanks repurposed to store sodium hypochlorite. Replacement sodium hypochlorite tanks were purchased following a 2020 routine Chemical Bulk Storage Tank inspection due to minor leaks in the existing tanks. The new storage tanks were installed in 2021.

Photo 2-9. New Sodium Hypochlorite Tanks

SCADA system hardware and software upgrades began in 2017 and are ongoing. This will include having new PLCs and a new SCADA operating platform. Hardware needing upgrades was purchased in 2018 and will be installed along with HMI compatible equipment after the office, lab, and other building upgrades are completed. Control room updates have been completed in 2021. Currently, the legacy SCADA system and the new system are operating in parallel while the controls are being integrated into the new system. The final transition to the new system is anticipated to occur in 2023.

Repairs to the sedimentation basins were completed in 2021. Work included replacing the roof over the sedimentation basins and replacing the drain valves, bracketry, and inlet outlet gates and actuators for sedimentation basins 4-6.

A summary of the improvements is presented in Table 2-3 below.

Table 2-3. Recent Improvements to the Feura Bush Water Treatment Facility

Recent Improvements	Construction Date
Replacement of Media in Sand Filter #3 & #4	2013
Replacement of the Influent PRV and Building Modifications	2014
Roof replacement and masonry work (Main Office Wing)	2016
Repairs to influent gates in Sedimentation Basins 1,2, and 3 and inspection of Basin walls.	2016
Replaced electric actuator on the plant influent valve (36" butterfly valve)	2017
Roof repairs and masonry work - Aeration and Laboratory building	2017

Recent Improvements	Construction Date
Sodium hypochlorite chemical feed systems	2017
SCADA system hardware and software upgrades	2017-Continue
Lagoon #2 stabilization	2018
Boiler/Heating system	2018
Domestic water compressor repairs	2018
Employee space improvements DWSRF #18378	2019
Sedimentation basin roof replacement and Basins 4-6 repairs.	2021
Sodium hypochlorite tanks replaced	2021
Plant electrical upgrades	2021-Continue
Masonry repairs to the west wall of the Filter Building	2021

2.4.2.1 Current Studies and Designs

The following studies and construction projects are currently proceeding at the Filtration Plant:

- Electrical upgrades at the plant are nearing completion. The new electrical room is ready and awaiting delivery of new motor control centers. Construction is anticipated to be complete in Spring 2022.
- New lime storage and feed system design.
- Elevator replacement design.
- SCADA improvements are ongoing. The plant is in the process of integrating controls into the new system.

The following projects are planned for 2022:

- Design of Phase 1 of the rapid sand filtration system rehabilitation. This project will include full rehabilitation of two filters, rehabilitation of the mixing/flocculation basins, and removal of the abandoned mixing paddles and replacement of sluice gates in the flocculation basins.
- Construction of the new lime storage and feed system.
- Construction of the elevator replacement.
- Replacement of the filter valves and actuators.
- Replacement of operators for influent sluice gates and drain valves for Basins 1,2, and 3.
- Improvement of the ventilation and damp-proofing and re-coating pipes in the aeration basin room.
- Repair leaks on the raw water venturi.

Other projects to be considered, but are not currently scheduled, include:

- Install the final meter to measure the wash water discharged to the lagoons. This will be completed by AWD staff after a power source is identified.
- Maintenance building construction is anticipated for 2023.
- Lead paint remediation for walls in Filter Pipe Gallery. Paint has tested positive for lead and is peeling from walls. This work will likely be incorporated into either Phase 1 or Phase 2 of the filters rehabilitation project.

Photo 2-10. Peeling Lead Paint Leading to Filter Pipe Gallery in the Feura Bush Filtration Plant

AWB has allocated funds for general improvements each year. A Water System Comprehensive Improvement Plan (Water Comprehensive Plan) has been developed and funding for some of the projects was acquired through the 2018 Drinking Water State Revolving Fund (DWSRF 18523). Additional funding for these projects was acquired through AMWFA bonds of 2021, and in 2022 AWB will apply for additional funds through the DWSRF (18903). Tables showing summaries of planned projects for the next five years is provided in Appendix A, Five Year Capital Improvement Program (2022-2026) Summary of Costs.

2.5 Loudonville Reservoir

The Loudonville Reservoir consists of three open-surface, irregularly shaped, reinforced-concrete structures, generally referred to as Basins A, B, and C. Basin A (79,531,000 gallon capacity) and Basin B (27,415,000 gallon capacity) were constructed in 1930. Basin C (103,932,000 gallon capacity) was constructed in 1936. The total storage is capable of providing the City with eight to ten days of water.

The current process at the Facility consists of:

- Storage of treated water in the three basins delivered from the Feura Bush Water Treatment Facility through the supply conduit.

- Addition of calcium hypochlorite to the basins manually as needed in the spring, summer and fall.
- Addition of sodium hypochlorite for viricidal disinfection.
- Ultraviolet (UV) disinfection of treated water leaving the storage basins.
- Addition of sodium hypochlorite via pacing to treated water entering the distribution system to maintain the disinfection residual.

The draining, cleaning, and inspection of a single basin is performed as needed when no planned shutdowns are anticipated for the water plant or supply pipeline. Cleaning of the basins on a routine basis and repair of noted deficiencies will increase the longevity of the reservoir structures. A recirculation pump is used by the AWB to circulate flow between A Basin, and B and C Basins. The pump is mounted on a trailer and will also be used at the New Karner Road interconnection to pump water from the Town of Colonie when needed. The chlorination and flow-control facilities, combined with proper maintenance, provide satisfactory water quality.

2.5.1 Condition of the Loudonville Reservoir

The facilities at Loudonville are currently in serviceable condition, but the age of the facilities lead to a host of minor problems. Below is a bulleted list of items that should be considered for inclusion in the long-term capital improvements for the facility. This list has been broken down by areas of the Reservoir, starting with the treated water arriving for storage and ending with the water leaving the Reservoir for distribution.

Basin Condition:

- Basin C has not been drained in several years, the AWD is planning on draining Basin C next for cleaning, inspection and maintenance.
- The existing Basin C inlet structure is deteriorating and only accessible via boat for inspection and maintenance. A new inlet structure and walkway is scheduled for construction in 2022.

Photo 2-11. Loudonville Reservoir - Basin A

UV Treatment Building:

- The existing UV control equipment, including the HMI and PLC, are becoming obsolete and replacement parts are not readily available. The design of replacement UV disinfection equipment and controls is planned for 2022.
- The UV Treatment building is staffed with an operator during the daytime on weekdays and is monitored continuously from the Feura Bush Filtration Plant. Construction of a bathroom in the UV Building or old Chlorine Building should be considered.

Photo 2-12. Interior of UV Treatment Building

Photo 2-13. UV Building Chemical Room

Gate Houses:

- Gatehouses A/B and C are generally in good condition.
- The HVAC systems in both gatehouses are not currently working so options for heating should be considered. There is existing HVAC equipment that is not working and can be removed or modified. The gates are only accessed periodically, not manned regularly. The HVAC equipment was installed when chemical feed systems were operated in the gate houses. These systems were moved to the UV Building.

Support Structures:

- The former chlorination building is currently being used for storage, control and instrumentation. Some of these instruments and controls are now redundant to the equipment in the UV Facility and potentially could be eliminated. This building is in the process of being repurposed to dose the treated water with caustic soda for corrosion control.
- The existing guard house is scheduled to be demolished and a new office building and garage installed in a different location on site.

Water Leaving the Site:

The 36-inch cast iron drain-pipe to Patroon Creek has not been inspected. This drain is used to transmit surface drainage away from the site to the Patroon Creek, so it is in continuous use. It discharges to the new day lighted portion of the Creek. The manholes along the drain on Albany Shaker Road are equipped with blind flanges and tees. This drain should be considered for inspection. The drain was utilized to drain Basin A for cleaning and inspection and appeared to function properly.

2.5.2 Recently Completed and Planned Projects

The largest recent project at the site was the construction of the UV treatment building in 2002 and 2003. The UV system has four 10 mgd units, for a total capacity of 40 mgd. This system was installed to provide the best available disinfection at this location and to comply with EPA regulations for uncovered finished water storage.

In 2010, a major project was undertaken for viricidal disinfection using sodium hypochlorite.

Basin A was emptied, cleaned, and repaired in 2019.

Basin B was cleaned and inspected in 2015. No immediate repairs were required when the Basin was drained; however, repairs were recommended for the near term. Basin A was cleaned and inspected in 2019 and repairs were made to the basin.

A sodium hypochlorite feed system and piping was installed at the A/B gatehouse for Basin A viricidal disinfection in 2020. In addition, work began to install caustic soda feed equipment in the old Chlorination Building. This is being implemented by plant staff.

A dam safety inspection will be required in 2023, and a 10-year Engineering Assessment due in 2028.

There has been an assortment of additional upgrades to the facility. Table 2-4 below lists some of the site's most recent construction projects

Table 2-4. Recent Improvements to the Loudonville Reservoir

Recent Improvements	Construction Date
Additional low-light CCTV cameras	2015-2016
Chemical storage sheds	2016
Gate house and northwest perimeter fence repair and replacement	2017
New chemical feed pump in the UV building	2017
Concrete cap repair for Basin C and construction of an influent channel screen in Basin A	2018
Basin A was drained and repaired	2019
Interconnection between Town of Colonie and the City of Albany	2019
Sodium hypochlorite feed system installed in gatehouse A/B	2020
Painted above grade piping	2020
Caustic soda feed system at the former chlorination building	2020
Installation of sodium hypochlorite feed to Basin A effluent from gatehouse A/B	2021
Upgrades to the controls in gatehouse A/B.	2021

The following projects are planned for 2022:

- Miscellaneous basin repairs.
- UV disinfection equipment and control upgrades (Design 2022, Construction 2023)
- Demolition and replacement of the existing guard building and the construction of a new office building and garage.
- Upgrades of the control processors in all of the existing control panels.
- Basin C Inlet and walkway construction.

Other Items to be considered, but are not currently scheduled, include:

- Operation and rehabilitation of 1930's vintage valves currently in service at the site.
- Review the potential of relocating the sodium hypochlorite feed systems to gatehouse A/B or gatehouse C.

- Construction of a bathroom in the UV Building or old Chlorine Building. The UV building is currently being manned and the closest bathroom is in the guard building.
- Replacement of existing sodium hypochlorite metering pumps with new peristaltic pumps in UV Building chemical room.
- Replacement of sodium hypochlorite storage tanks in UV Building chemical room.
- The bottom side of floor slabs in both gatehouse A/B and C show signs of spalling and should be monitored to assure there are no structural deficiencies and repaired as needed.

Tables showing summaries of planned projects for the next five years is provided in Appendix A, Five Year Capital Improvement Program (2022-2026) Summary of Costs.

2.6 Six Mile Water Works (Rensselaer Lake)

In 2002, the AWB acquired from the City of Albany a fifty-year leasehold interest in Rensselaer Lake (AKA Six Mile Waterworks) and surrounding properties owned by the City of Albany for possible future discretionary use as a supplemental emergency water supply.

Rensselaer Lake, approximately 43.4 acres in size, was created in 1851 and 1852 to serve as a water supply for the City through the construction of a low earth dam across the Patroon Creek. The dam was constructed of an earthen embankment with an 8-foot thick clay puddle core in its center. The top width of the dam is approximately 10 feet with an upstream slope of 1.5 vertical to 1.0 horizontal, and a downstream slope of 2.0 vertical to 1.0 horizontal.

The Lake actively served the City from 1852 to 1909, at which time it was placed in a reserve status. Intermittent use continued until its cessation in April 1926. In 1947, the City created the Six Mile Waterworks Picnic and Recreation Area. The 200-acre grounds, including the Lake, were opened to the public for fishing, non-motorized boating, and picnicking. Since then, the Lake has generally been used for such recreational purposes. The site is part of the Albany Pine Bush Preserve.

Rensselaer Lake is replenished by both surface water and groundwater flows. The Lake's watershed is about 2.8 square miles in size, and includes residential, commercial, industrial, and transportation land uses. A mass water balance analysis indicates that the estimated safe yield of Rensselaer Lake as an emergency water supply, based solely on the surface water inflow, is 1.7 million gallons per day.

The geology is characterized by thick sand deposits with high permeability, containing large quantities of groundwater. A rough estimate of the groundwater inflow to the Lake was derived from a previous study using a theoretical approximation. According to the study, at the minimum level of the Lake used to determine the safe yield from surface water inflow, the estimated groundwater recharge or inflow to the Lake would be 0.7 to 2.2 million gallons per day. Combining the estimated surface water and groundwater inflows would indicate a total safe yield of the Lake as an emergency water supply of 2.4 to 3.9 million gallons per day.

The New York State Office Building Campus was connected to the Lake by piping constructed in the 1960's to provide cooling water to the Campus under an agreement with the City. The State of New York stopped using this prior to the AWB lease. The connection was severed, and the piping used to create a new blow-off to control lake level.

2.6.1 Condition of the Six Mile Waterworks

Based on a limited water quality sampling and testing program undertaken in 2002, it appears the existing Lake water is of sufficient quality to meet current drinking water standards after treatment by conventional, readily available mobile treatment equipment. A suitable area exists at the site that would allow ready ingress of the mobile equipment and would provide good access to the required electrical power and interconnecting piping. The AWB made significant improvements in 2003-2004, rebuilding the gate house, replacing the main drain, extending the drain piping away from the embankment, and grouting the embankment of the dam.

2.6.2 Recently Completed and Planned Projects

In 2015 emergency repairs were made when a sink hole appeared at the base of the embankment. The sink hole was due to the failure of the original brick conduit that once carried water from Six Mile Waterworks to Bleeker Reservoir. Flowable fill was used to fill the void and conduit.

A dam safety Engineering Assessment was initiated in 2016 and completed and sent to the NYSDEC in 2017. The assessment concluded that the dam should be reclassified as a high hazard dam and that improvements were needed. The NYSDEC responded that they were agreement and reclassified the dam as high hazard. Further they assigned the dam a condition rating of “Unsound, Deficiency Recognized” due to the inadequate spillway capacity and slope stability. The NYSDEC found the schedule provided for remediation of the dam acceptable but indicated that lowering the reservoir should be implemented as an interim safety measure. The preliminary design for the Rensselaer Lake Dam rehabilitation was completed in 2017 and 60% design was completed in 2019.

The interconnection with the Town of Colonie water supply has provided more flexibility and the AWB no longer views Rensselaer Lake as a potential supplemental emergency water supply. This provides several options to bring the dam into compliance. A consultant completed an Alternatives Analysis for Rensselaer Lake in 2019 and the findings of this evaluation provided recommendations for specific rehabilitation activities to bring the dam into compliance with NYSDEC Dam Safety regulations. Alternative one raises the dam embankment approximately one-foot and includes a new auxiliary spillway on the left side of the berm. Alternative two focuses on reducing the normal pool elevation at the dam to achieve a Class B-Intermediate Hazard Designation.

The AWB no longer views Rensselaer Lake (Six Mile Waterworks) as having a role as an emergency source of supply, and is seeking ways to fund dam safety improvements without placing a burden on water rate payers. Rensselaer Lake is an important regional resource as a park and component of the Pine Bush Preserve.

The table below lists some of the site’s most recent construction projects

Table 2-5. Recent Improvements to Six Mile Waterworks

Recent Improvements	Completion Date
Filling of Brick Conduit	2015
Upgrades to Pavilion and Bathrooms	2016-2017
Exercising the lake's drain valve	2017

In 2022, the AWB and City will further evaluate alternatives to decide whether to proceed to detailed design of dam safety improvements.

Tables showing summaries of planned projects for the next five years is provided in Appendix A, Five Year Capital Improvement Program (2022-2026) Summary of Costs.

2.7 Tivoli Lake Preserve

The Tivoli Lake Preserve is an 80-acre urban nature preserve located on the edges of the Arbor Hill and West Hill neighborhoods. In 1850 the City purchased the land in order to dam the Patroon Creek to form a reservoir for the public water system. In 1851 dams were constructed across Patroon Creek forming Upper and Lower Tivoli lakes, the upper lake was for storing and the lower for distribution. The Patroon Creek, a small urban creek approximately 6.8 miles long, flows through the Preserve on its way to the Hudson River from the Albany Pine Bush. Historically, the natural course of Patroon Creek has been altered many times by construction projects, dams and reservoirs and currently is used as natural drainage for the City of Albany, parts of Colonie and Guilderland, and Interstate I-90.

2.7.1 Recently Completed and Planned Projects

AWB has completed projects within the Tivoli Lake Preserve to protect the 36-inch and 48-inch transmission mains and other infrastructure that is located in the Preserve.

- Erosion mitigation study was completed in 2017
- A Hazard Class Assessment was completed and submitted to the NYSDEC in early 2018 and they accepted the Class A determination.
- Tivoli Lake Preserve Stream Daylighting Project – The AWB was involved with this project as it relates to the protection of the water transmission main. The construction includes measures to protect the transmission main during flooding conditions. Construction was completed in 2019. In 2020 there was additional work to repair damage done by storms and to provide additional hardening of the Tivoli Lake spillway.

Tables showing summaries of planned projects for the next five years is provided in Appendix A, Five Year Capital Improvement Program (2022-2026) Summary of Costs.

2.8 Water Pump Stations and Elevated Tanks

The City's distribution system is gravity fed from the Feura Bush Filtration Plant, with the exception of three areas. The Upper Service Water District (USWD) adjacent to Loudonville Reservoir and the Pine Bush both require pumping to provide adequate service pressure and fire protection.

The USWD pump station is located within the Loudonville Reservoir property. The USWD elevated tank is located in the southeasterly section of the Loudonville Reservoir site. The 150,000-gallon storage tank operates with a normal high-water level of 472.5 feet above mean sea level. The water level is controlled through tank level telemetry.

The Pine Bush pump station, constructed in 1969 and located near Rensselaer Lake, pumps water to the western end of the City and the Guilderland service connection. The Pine Bush elevated tank is sited just off Karner Road at the end of Washington Avenue Extension and provides one million gallons of water storage for this section of the City. Normal operating high water level of the tank is 470.5 feet above mean sea level. The single pedestal tank support provides a ground level storage enclosure for materials and equipment.

2.8.1 Condition of the Stations and Tanks

Back-up generators are provided at the Pine Bush and Upper Service pump stations and are exercised regularly. The sites are secure and in good repair. For preventative maintenance, an evaluation of the controls, piping, and infrastructure supporting the elevated tanks is recommended.

Upper Service Pump Station

The USWD Pump Station building is in need of upgrades, and renovation. This project has been included with the projects being funded by the upcoming bond issuance and design is anticipated to begin in 2022.

Upper Service Water District Elevated Tank

In 2021, a connection was made to allow the Upper Service to be supplied from the Latham Water District on an emergency basis. This allowed the Upper Service Tank to be taken out of service for cleaning, inspection, and repair. It will be used in the future when the work on the Upper Service Tank continues.

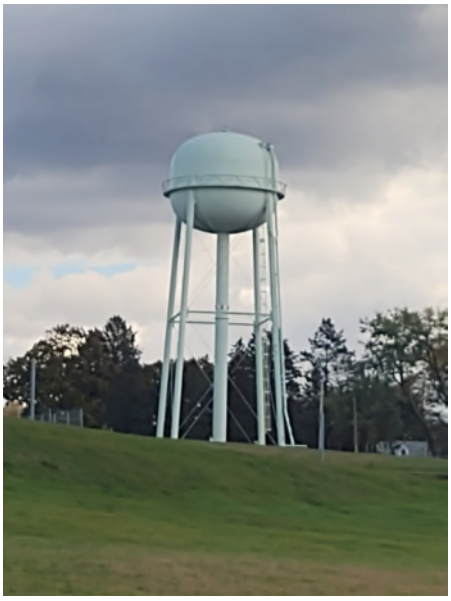

Photo 2-14. Upper Service Water District Elevated Tank

Pine Bush Pump Station

In 2015, a major system upgrade was completed at the Pine Bush Pump Station. The HVAC system is still in need of updating and is on the Comprehensive Plan for 2022. It is recommended that the size of the ventilation equipment be evaluated to determine if it is sized to properly ventilate the space. At a minimum, the louver actuators will need replacement, the ventilation equipment needs to be connected to the panel, and the ventilation system should be controlled via a thermostat or a controller.

2.8.2 Recently Completed and Planned Projects

In 2013, the exterior of the Pine Bush elevated tank was painted. In 2015, a major system upgrade was completed at the Pine Bush Pump Station, including 3 new pumps (3 MGD) and variable-speed drives. During 2016, divers entered both elevated tanks for inspections. Only minor cleaning of the sediment build-up was needed. The results of the inspections were encouraging as the tanks have not experienced any premature deterioration.

To improve pressure in the Upper Washington corridor, a new pressure zone was created by constructing a 1 million-gallon standpipe at the W. Averell Harriman State Office Campus along with a 5 MGD booster pump station off of Colvin Avenue. The construction was completed in 2020. In addition, the Office of General Services (OGS) is transferring ownership of a 750,000-gallon concrete water tank, a pump station, and 12-inch water mains to the Albany Water Board for adaptive re-use instead of these items being removed/abandoned. The tank has been cleaned and is the system is expected to be operational by early 2022. These facilities allow for a feed to the new Upper Washington Pressure Zone from Western Avenue.

The table below lists some of the site’s most recent construction projects

Table 2-6. Recent Improvements to the Stations and Tanks

Recent Improvements	Construction Date
Exterior painting of Pine Bush elevated tank	2013
Pine Bush Pump Station rehabilitation	2015
Upper Washington corridor standpipe and booster pump station	2019-2020
8-inch emergency connection constructed from the Upper Service to the Latham Water District.	2021
Upper Service Tank cleaned, inspected, and repaired	2021
750,000 gallon water tank, pump station and 12-inch mains transferred to AWB and put into service	2022

The following projects are planned for 2022:

- Pine Bush HVAC Updates.
- Upgrades to the UWSD Pump Station including repairs to riser, concrete foundation, pumps and piping.

Tables showing summaries of planned projects for the next five years is provided in Appendix A, Five Year Capital Improvement Program (2022-2026) Summary of Costs.

2.9 Finished Water Distribution

The distribution system, with approximately 376 miles of pipe, constitutes the oldest segment of the water system. Some of the smaller mains date to pre-1851 and are still in use. Feeder mains, ranging in size from 16 to 36 inches and encompassing a length of approximately 80 miles, carry water from the supply conduit to the smaller distribution mains. Roughly 180 miles of the distribution mains are 6 inches or less in diameter.

The EPA has proposed revisions to the Lead and Copper Rule (LCR) that would affect drinking water monitoring and compliance. The process of finalizing the revisions has been underway for several years, including rounds of modifications and publishing proposed changes for public comment. At this time, the following major revisions are anticipated, but they are not yet final.

- Prepare a public lead service line inventory
- Address individual sites with elevated lead instead of reacting when overall system exceedance occurs
- Re-optimize corrosion control treatment if new lead trigger level of 10 mg/L is exceeded
- Increased focus on lead service line replacement
- Improved lead and copper testing via revised sample collection methodology and location selection
- More rapid public notification of lead action level exceedances and increased public education

- Required testing at schools and child care facilities.

In anticipation of the new requirements the AWB has been proactively replacing lead services and has started adding caustic soda at the Loudonville Reservoir to increase pH and reduce corrosion in the water system. The AWD laboratory was Environmental Laboratory Accreditation Program (ELAP) certified for analysis of lead and copper in 2021.

The City Code has been modified to eliminate partial replacements and spot repairs on lead services. Instead, a lead service needing repair must be replaced in full. The AWB offers two programs for residents. The first is a free Brita filtered pitcher for temporary mitigation of lead in drinking water. The second is a grant to reimburse the cost of lead service replacement up to $2,000. AWD operations staff have modified in-house policies for lead service replacement in the street at no cost to the homeowner in emergencies. The AWD has a goal of replacing all customers lead service lines by 2040.

2.9.1 Condition of the Finished Water Distribution

There are approximately 8,700 valves and 3,000 fire hydrants in the distribution system. As with the distribution mains, the valves and hydrants are subject to a tuberculation, which results in the need for repair or replacement.

Table 2-7. Water Mains in Use

Size	Length (ft)	Size	Footage	Size	Footage
3”	300	12”	267,700	30”	29,050
4”	31,400	16”	51,300	36”	20,500
6”	947,200	18”	4,200	42”	7,700
8”	347,600	20”	71,250	48”	108,100
10”	12,200	24”	69,750	60”	600

*Approximate lengths derived from historic reports and Water System Atlas.

Table 2-8. Valves in Operations

Size	Type	No.	Size	Type	No.	Size	Type	No.	Size	Type	No.	Size	Type	No.
3”	Gate	30	8”	Gate	1000	16”	Cone	28	20”	Bfly	15	30”	Gate	21
4”	Gate	500	10”	Gate	50	16”	Ball	6	24”	Gate	30	30”	Cone	2
4”	Gate (hydrant)*	130	12”	Gate	660	16”	Bfly	20	24”	Cone	5	36”	Gate	35
6”	Gate	3160	14”	Gate	2	20”	Gate	70	24”	Ball	2	36”	Bfly	1
6”	Gate (hydrant)*	2860	16”	Gate	55	20”	Cone	1	24”	Bfly	30	48”	Gate	10

*Each system hydrant is protected by a gate valve installed on the hydrant branch piping. Quantities from historic reports and Water System Atlas

The system contains automatic control valves for the purpose of regulating the water pressure. The valves either reduce pressure or blow-off to relieve excessive pressure. Regular maintenance schedules have kept the valve units properly functioning. However, many of the valves are original, have been rebuilt many times, and now replacement is warranted.

2.9.2 Recently Completed and Planned Projects

Funds for water distribution system improvements have typically been directed to areas that are frequently repaired and areas that are scheduled for major street reconstruction projects by the City.

During 2015, $500,000 was allocated for water distribution upgrades. This was increased in 2016 to $700,000, with $400,00 dedicated solely to water main replacement. During 2016, there was a high-profile waterline break in South Lake Avenue at the intersection of Elberon Place. This break took place on the main 42-inch distribution line and collapsed a 60-inch combined sewer located next to the break. The repair of both pipes lasted for approximately two months.

In 2017, the Department began a construction project for the replacement of approximately 2325 linear feet of water main. This included 1850 linear feet of 16-inch ductile iron pipe on Hackett Boulevard from Samaritan Road to Holland Avenue, and 475 linear feet of 12” DIP on new Crown Terrace from Hackett Boulevard to the dead end. This project was expanded to include some additional areas, and this project was completed in 2018 for a total construction cost of $873,889.

In 2018, the AWB awarded a contract for the water main replacement and extension in Shaker Park. The main goal of this project is to improve fire flows. Project includes the replacement of approximately 800 feet of existing water main with 8” ductile iron pipe, the installation of an additional 800 feet of 8” ductile iron pipe, the installation of new valves and hydrants, and the installation of new water services to affected residents. Contract was awarded in 2018, construction was completed in 2019.

As of the date of this report, the Albany Water Department has repaired or replaced over 77 valves and performed leak detection for 476 City blocks. There were 25 leaks detected and repaired as a result of the leak detection work.

In 2018, the AWB received a grant in the amount of $516,565 for the replacement of lead services for Albany residents. These funds were used to replace 47 services in conjunction with the Ramsey Place green infrastructure project in 2019. The remaining funds were used to replace lead services in 2020 on Orange Street (19 services), Winnie Street (5 services), Briar Avenue (3 services), and Spring Street (10 services).

The Town of Colonie and the Albany Water Board (AWB) entered into an intermunicipal water supply agreement in 2017 to construct an emergency interconnection between their water districts to allow for water supply to their customers in the event the water capacity is inadequate during emergency situations. Construction of this project began in 2019 and was completed in 2020.

For the Loudonville connection, approximately 4000 linear feet of 24-inch interconnecting pipes was installed. There are provisions for portable pumps having the capacity of 10 MGD to draw suction from

reservoir piping conveying UV-treated water, and a flow meter. The agreed upon maximum amount of water that can be transferred from the AWB to the Town is 10 MGD, and from the Town to the AWB is 7.4 MGD. The New Karner Road connection includes approximately 3500 linear feet of 16-inch interconnecting pipe. There are provisions for portable pumps having a capacity of 2,400 gal/min and for a flow meter. The agreed upon maximum amount that can be transferred from the AWB to the Town shall be 3.5 MGD, and 3.2 MGD from the Town to the AWB.

In 2020, AWD replaced approximately 2100 linear feet of distribution system piping. This included replacement made on Clara Barton Drive, Bethlehem Avenue, Briar Avenue, Princeton Drive, and Orange Street. A developer constructed and transferred ownership of new water mains for an apartment complex located on Sandidge Way.

In 2021, AWB replaced sections of 12-inch main and valves on Washington Avenue, near City Hall. Water main replacement was also completed on 3rd Avenue, Everett Road, Catherine Street, and Westerlo Street. In 2022, replacement is planned for 3400 linear feet of 8-inch to 16-inch water mains located on Crescent Street, Commerce Street, and South Pearl Street. The addition of a pressure relief valve for a New Scotland pressure zone was completed in 2021.

In 2022, AWD plans to undertake the purchase and installation of new telemetry for all of the pressure reducing valves and pressure relief valves in the water system.

The table below lists some of the site's most recent construction projects

Table 2-9. Recent Improvements to the Finished Water Distribution

Recent Improvements	Construction Date
Rebuilt Pressure Regulating Valves	Multiple Years
Additional Telemetry to Feura Bush	2002
Conversion of PRV telemetry from radio to cellular	2015
Emergency repair of the 42" water main	2016
Hackett Boulevard and Crown Terrace Water Main Replacement	2017 and 2018
Shaker Park watermain replacement	2019
Town of Colonie Emergency Interconnections	2020
New Scotland pressure zone pressure relief valve, and new pressure relief valve and vault at both Eagle Street and McCormick Road	2021
New Eagle Street pressure reducing valve (PRV 6)	Yearly

Projects planned for 2022:

- Continue a systematic hydrant testing and leak detection program. In 2022, will also consider initiating a new program to perform leak detection at hydrants.
- Pressure reducing valve telemetry
- Distribution system pipe replacement
- Lead service replacement

Tables showing summaries of planned projects for the next five years is provided in Appendix A, Five Year Capital Improvement Program (2022-2026) Summary of Costs.

2.10 Service Connections

The Water System supplies water to the City, which had a reported population of 98,251 in 2017. Water service is provided to approximately 28,000 accounts. The Water System is the sole source of water for consumption and fire protection in the City. Average daily water demand within the City peaked in the late 1950's and early 1960's at approximately 25 mgd. Average demand remained steady through the late 1960's and early 1970's despite slight declines in the City's population. Largely as a result of conservation measures, and a leak detection and repair program undertaken in the early 1980's, daily demand within the City was reduced. The City continues to have an aggressive leak detection program and has a dedicated leak detection team. In 2020, the daily demand averaged approximately 17 mgd.

2.10.1 Municipal Connections

In addition to supplying water to residents and businesses located in the City, the System also supplies treated water to the CSX Rail Yard at Selkirk, and supplemental quantities of treated water to the Town of Bethlehem and the Town of Guilderland. Untreated water from the Alcove Reservoir is released to the Hannacroix Creek, the Village of Ravena, and surrounding hamlets that are within the Village service area.

2.10.1.1 Contract with the Town of Bethlehem

The AWB's 2004 contract with the Town of Bethlehem provides that the AWB will supply treated water to the Town of Bethlehem at certain contractual billing rates. The initial rate under the contract was $1.81 per thousand gallons. The rate under the current contract is subject to the same percentage increases set by the AWB for water furnished to residential customers within the City. In 2019, the rate was $3.86 per thousand gallons. This agreement allows the Town to comply with their water supply permit (WSA 10824), which states they have up to 2.5 mgd available to them through the interconnection with the City of Albany.

The Town of Bethlehem purchased 500 million gallons of water in 2019. The current contract expires in December 2023.

2.10.1.2 Contract with the Town of Guilderland

The AWB entered into a contract with the Town of Guilderland in 2018, which provided that the AWB would supply up 70 million gallons a year, up to 2,000,000 gallons per day of treated water to Guilderland to supplement its water supply.

Guilderland agrees to pay the AWB at the beginning of each year for the 70 MG to be provided by AWB over the course of the year. This will be at an initial rate of $3.57 per thousand gallons (the rate is subject to the same percentage increases set by the Board for water furnished to residential customers within the City). The term of this agreement shall be for 10 years. In year 5 of this agreement, the water demand will be reevaluated. The Town of Guilderland's greatest demand for Albany water comes in July and August of each year.

2.10.1.3 Contract with the Village of Ravena.

Under a contract with the Village of Ravena, the AWB is required to, upon request and at no cost, release up to 2,000,000 gallons of untreated water per day from the Alcove Reservoir for supply to the Village of Ravena. Under this contract, the Village of Ravena has requested approximately 1,000,000 gallons of untreated water per day, historically.

2.10.1.4 Contract with the Town of Colonie

The Town of Colonie and the Albany Water Board (AWB) entered into an intermunicipal water supply agreement in 2017 to construct an emergency interconnection between their water districts to allow for water supply to their customers in the event the water capacity is inadequate during emergency situations.

The AWB entered into a contract with the Town of Colonie in 2018, which provided that the AWB would supply up to 10 mgd; or receive 7.4 mgd from the Town of Colonie via the Loudonville Interconnection. The AWB also would supply 3.2 mgd to or receive 3.5 mgd from the Town of Colonie via the New Karner Road interconnection. In the event that there is a need for either party to provide "Emergency Water" then the payment for said water shall be determined by the formulas stated in the Intermunicipal water supply agreement.

The cost of the Loudonville Interconnection was approximately $1,960,000, and the New Karner Road Interconnection $1,210,000. The Town and AWB agreed to pay 50% of the construction and maintenance cost associate of these interconnections. Construction was completed in 2020. In 2021, a new water main was installed to allow feeding the Upper Service from the Town of Colonie.

2.11 Albany Water Department Office - (10 North Enterprise Drive)

The Department of Water and Water Supply headquarters for operations is located at 10 North Enterprise Drive. This location has offices, a garage, and a customer service area. The Department moved in 2010 from the former location at 35 Erie Boulevard. Space and systems renovations were made in an attempt to make the North Enterprise building more functional; however, there are some current space use and systems controls problems that seem to make the building awkward and inefficient for the spectrum of

programming in its current state. In addition, the Department anticipates upcoming space needs and increases in total personnel, and the building will not accommodate projected needs.

In 2016, a consultant performed a feasibility and space planning analysis of the Department of Water and Water Supply facility at 10 North Enterprise Drive. This study included an examination of existing utilization of the facility and identified potential solutions to improve efficiency, workflow and communication amongst members of the Department; suggested renovations that would improve and make more secure the functions and communications between the Department, customers and the general public; and provided diagrammatic solutions for improved physical layout of the building. The results of the study presented several alternatives for updating the building to better serve the Department's needs.

The 35 Erie Boulevard facility is still owned by the AWB. The property continues to be utilized for staging of material and equipment due to the space limitations at the North Enterprise Drive location. The Erie Boulevard building has exceeded its useful life and is no longer serviceable.

In 2018, the AWD awarded a contract to an architectural firm for renovation design and plans for utilization for both the 35 Erie Boulevard and 10 North Enterprise Drive locations. AWB plans to demolish the current building at 35 Erie Boulevard and build a new structure to better suit their current needs of staging and storage. This will include general site improvements to help streamline operations and transportation of materials on and off site. AWB will also be completing modifications to 10 North Enterprise Drive to improve the administration area, garage, and inventory area. These improvements will improve the functionality, security, and safety of the facility.

In 2020, AWB awarded a contract for SHPO consultation and SEQRA compliance for the proposed demolition at 35 Erie Boulevard and awarded a contract for architectural and engineering services for a new building and site improvements at this location. The demolition of the building was completed in 2021. AWB solicited bids for two new pre-engineered buildings, but the bids came in higher than anticipated and were rejected. A separate bid package for site improvements was awarded and work is anticipated to be substantially completed by the end of the year. AWB anticipates rebidding the buildings and starting construction in 2022.

The following projects are planned for 2022:

- Construct two new pre-engineered buildings for storage and staging.

2.12 Miscellaneous Engineering

Miscellaneous engineering is an account to pay for consulting engineering services. It may be used for surveying, mapping, inspections or other work to assist the AWB in its operations. It is also used for monthly consultations and capital program monitoring services.

2.13 Meters and Computers

This account is for improvements and upgrades to computer, meters, and AWD software.

A contract was awarded for computer maintenance management software (CMMS) in 2018. Utility Cloud, a cloud-based CMMS system deployment was initiated in 2019 and is expanded upon each year. The

program is currently used for logging customer calls, scheduling and tracking work, and permits. More specifically the following is included:

- Logging customer calls
- Development and tracking of work orders
- Sewer and water investigations and repairs
    - Manhole and catch basin rebuilds
    - Water service, hydrant, valve, and water main repairs and replacement
    - Hydrant painting and flushing
    - Preventative maintenance and response
- Camera inspection scheduling and tracking
- Dig Safe New York tickets
- Restoration tracking

In 2021 the AWB completed a project to develop an online GIS application that syncs with Utility Cloud. Reporting is completed through Power BI.

The AWB has been undertaking upgrades to the water facilities local control systems and remote monitoring systems on an annual basis, with a goal of completing conversions by 2024.

The table below lists some of the recent projects.

Table 2-10. Recent Projects for Meters and Computers

Recent Improvements	Completion Date
Upgraded Geographic Information System (GIS) licensing with ESRI to include more desktop licenses and ArcGIS Online capabilities	**2016**
Migration to Orion radio read meters is more than 98% complete	**2017**
Conversion of the large users to an advanced metering system using cellular communications	**2017**
Water system SCADA Improvements	**2018**
Utility Cloud Software Deployment	**2019-Continue**

The following is planned for 2022:

- Various system-wide security improvements
- Continue to expand the use of the CMMS system and improve the sync with the online GIS system.

Projects that have been identified, but not yet scheduled

- Track water metering in Utility Cloud, including usage, service work, and historical records.

Tables showing summaries of planned projects for the next five years is provided in Appendix A, Five Year Capital Improvement Program (2022-2026) Summary of Costs.

3 ALBANY SEWER SYSTEM

The Albany County Sewer District, now renamed the Albany County Water Purification District (ACWPD), was formed in 1967 and the City signed an agreement for ACWPD participation on December 3, 1970. Under the agreement, the City was responsible for operating and maintaining the collection system within its boundaries. The sewer system connects with the ACWPD facilities at the Hudson River Interceptor and the Patroons Creek Trunk Sewer, both of which are maintained and operated by ACWPD. The ACWPD operates the overflow regulators, which control the amount of sewage bypassed to the Hudson River during storms and owns and operates two (North and South) treatment plants, which treat sewage from the sewer system as well as the other municipalities in ACWPD.

The sewer system is divided into eight sewer districts within the corporate boundaries of the City. ACWPD's North Plant treats sewage from three of the sewer districts, which had an average daily flow of 4.73 mgd in 2020, and the ACWPD's South Plant treats sewage from the remaining five districts, with an average daily flow of 20.28 mgd in 2020.

The Patroons Creek Trunk Sewer and the Hudson River Interceptor South are the two main conveyance facilities, which connect with the collection and trunk sewers of the Sewer System. The Patroons Creek Trunk Sewer was constructed between 1969 and 1974 by ACWPD. The ACWPD monitors flow in this trunk sewer through the use of remote flow metering stations.

The Hudson River Interceptor South owned and operated by ACWPD. The sewer system connects to the interceptor through eight small collector sewers and 21 trunk sewer connections. Each of the 21 trunk sewer connections has an intercepting manhole and flow regulator to control the flow of sewage to the interceptor and to provide for the diversion of excessive flows to the Hudson River.

The sewer system includes approximately 900 miles of sanitary, storm, and combined sewers. Recent sewer system improvements include the completion of six phases of the Beaver Creek Sewer District Improvements, which have substantially mitigated street flooding and sewer backup problems in the largest of the City's districts. These improvements are designed to store storm water and combined sewage at various points throughout the sewer system to mitigate street flooding and the occurrence of combined sewage overflows. The AWB is responsible for maintaining these projects going forward.

In 2020, a new Harriman Sewage Pump Station was completed and placed in service. This pump station diverts wastewater from the University of Albany and the W. Averell Harriman State Office Campus to the ACWPD Patroons Creek trunk and North Plant. This wastewater flow previously contributed to the Beaver Creek Combined Sewer District.

Photo 3-1. Overall View of Broadway Pump Station

3.1 Albany Pool CSO Long Term Control Plan

NYSDEC issued an Order on Consent which required six communities (Albany, Troy, Rensselaer, Cohoes, Green Island, and Watervliet) to facilitate the implementation of the Albany Pool CSO Long Term Control Plan (LTCP). The LTCP was created to study the current health of the Hudson River, identify programs and projects that will aid in the clean-up of the river, and demonstrate the effectiveness of the program. In 2015, the six communities signed an intermunicipal agreement that guide the shared implementation of programs and projects. The Capital District Regional Planning Commission acts as administrator for the contract. The communities also established a Local Development Corporation, named the Albany CSO Pool Communities Corporation. This is a not-for-profit corporation tasked with keeping track of the financial contributions for each community for LTCP projects.

Working with the Department of Environmental Conservation, the communities will implement more than 50 projects and programs that will significantly improve the water quality of the Hudson River and its tributaries.

Each of the communities shall pay its percentage share, as determined by an Allocation Formula established during the development of the LTCP, of the total costs of the projects less any grants received. The costs for projects as identified in the approved LTCP are estimates and subject to change upon project design and implementation. Adjustments to each community's required payment, to account for actual costs, will be made based on the Allocation formula. The LTCP project costs will include all costs, as required to implement the LTCP, of planning, design, procurement, permitting, administration, implementation, and post-construction inspection and approval. Costs of management, operation and

maintenance of facilities and equipment are LTCP project costs if such activities are within the purview of the LTCP.

The Allocation Formula is weighted 85% by total CSO flow from each Community, and 15% by population of each Community, based on the 2010 Census. Each Party's percentage share of LTCP project costs is as follows: Albany - 58.68%; Cohoes - 2.74%; Green Island - 0.53%; Rensselaer - 2.13%; Troy - 34.76%; Watervliet - 1.16%.

Over the life of the program more than $136m will be invested; $100m of which will be invested by the communities and $36m by the sewer districts. The working group for the Albany Pool Communities developed a financial plan that has been approved in concept by all of the participants. The fifteen year Capital Improvement Plan, developed by the Albany Pool Joint Venture Team, outlines all of the construction costs plus contingencies for each year. The allocated annual costs, plus administrative expenses, have been allocated to the participants based on their percentage share of the overall costs.

The AWB plans on meeting their financial obligation through funding from the Environmental Facilities Corporation (EFC) Clean Water Act State Revolving Fund (CWSRF).

AWB's first three-year (2015-2017) tranche (was applied for through the EFC CWSRF in early 2015 and the application for funding was approved (CY-5402-14-00). The AWB share of the approved funds included $3,595,500 in grants, $5,083,286 in long term financing. AWB local share was $293,000.

In 2017, the Albany Municipal Water Finance Authority (AMWFA) applied for a New York State Intermunicipal Water Infrastructure Grant (IMG) on behalf of the Albany CSO Pool Communities for the $45 million Beaver Creek Clean River Disinfection and Floatables Control Project (previously Big C Regulator Screening and Disinfection project). The State of New York awarded a $10 million-dollar IMG grant for the project, of which $5,868,000 (58.68%) is Albany's share. The project is being implemented in five phases. The project includes a 100 mgd satellite treatment facility, improvement to screening at the ACWPD South Plant, two diversion tunnels, and a new connection to the Hudson River interceptor.

The AMWFA applied for the next five-years (2018-2022) of LTCP funding in 2017 and the application for funding was approved (CY-5402-14-01) for Floatables and other Albany CSO Pool Community projects. AMWFA received a $5 million Water Quality Improvement Project (WQIP) grant for the Beaver Creek Clean River Project, of which $2,934,000 (58.68%) benefited Albany. AWB has also been granted long term financing for this project through EFC CWSRF (CY-5402-14-02).

AWB applied for Flood Mitigation funding through EFC for the Elberon Place and Hansen/Rykman projects described below. The AWB was approved for $2,887,500 in grants and 3,962,500 in Long Term Financing.

The AWD has met all milestones dates associated with the Consent Order to abate Combined Sewer Overflows. The NYSDEC approved the Design of the Beaver Creek Clean River Floatables and Disinfection Facility, and construction began in 2021. The AWB will continue to participate in EFC's CWSRF program for the duration of the Capital Improvement Plan.

3.2 Sewer System Areas

The recent upgrades and maintenance to the approximately 900 miles of sanitary, storm, and combined sewers currently serving the City of Albany has been focused on two areas of improvement. The first has

been sewer separation and flood mitigation projects. The goals of these projects are to either separate the storm water flow from the combined sewer, or to provide stormwater storage and retention. The second area improvement has been the rehabilitation of the existing sewer pipes based on their condition.

3.2.1 Sewer Separation and Satellite Treatment

A description of some of the improvements made to the combined sewer system in compliance with the Long-Term Control Plan are provided below.

- Mariette Place Green Infrastructure Project – This project was implemented to remove flow to the combined sewer system. It included four new bioretention areas, 600 feet of new stormwater collection pipe, and a new 15” outfall pipe, discharging to a tributary of the Normans Kill.
- Satellite Treatment Floatables Control Facilities for the Maiden Lane, Steuben St., Orange St., Quackenbush Square, Jackson/Livingston regulators - These facilities collect floatables from the combined sewer overflows (CSOs) in the vicinity of the Corning Preserve. They screen, separate and trap debris and sediment that would otherwise flow to the Hudson River. The facilities at Orange St, Quackenbush Square, and Jackson/Livingston are equipped with sewage pump stations.
- Quail Street and Elberon Place CSO Abatement and Flood Mitigation Project - There has been a history of flash flooding and system surcharging issues occurring within the Quail Street neighborhood along Elberon Place. There is a clearly defined low-lying area in the topography within this flood zone that can become inundated during precipitation events resulting in flash flooding.
    - Under Phase 1 of the project, green infrastructure practices were implemented as part of the “Quail Street Green Infrastructure Project”. The City constructed infiltration cells or galleries along the linear street corridor (under the sidewalks) to intercept stormwater and promote maximum infiltration to reduce the runoff volume and flow rates conveyed to the combined sewer system. Runoff enters the infiltration cells via porous buffer strips along the sidewalks, tree and planting areas, and through interceptor structures in the street which provide for pre-treatment of flows to capture heavy grit and sediment, along with other pollutants and floatable materials. In addition, passive controls were constructed in the system to manage flows and maximize infiltration within the cells.
    - In Phase 2, a 5-foot diameter storm sewer was extended from Quail Street to Washington Park Lake, along Elberon Place, and an outlet control system was installed for continuous monitoring and adaptive control of lake level.
- North Swan Street Green Infrastructure Project – Included the reduction of impervious surfaces by approximately 25% to promote natural filtration for improved quality of stormwater runoff. Green Initiatives within the North Swan Street Park redevelopment design included permeable pavers, bioretention, soil restoration and decompaction, vegetated swales and tree plantings.
- Mereline Green Infrastructure Project - Installation of porous pavement and underdrain system to divert local drainage from the combined sewer to a tributary of the Normans Kill.
- Beaver Creek Clean River Project – This project includes sewer improvements and the construction of a satellite floatables control and disinfection facility to reduce fecal coliform discharges to the

Hudson River with a goal of treating additional 285 million gallons on an average annual basis This project is being completed in five phases, which are outlined below.

- Phase 1 – Third Avenue Improvements – A new connection to the ACWPD Hudson River Interceptor, which will prioritize transport of screenings from the new satellite treatment facility to the South Plant.
- Phase 2 – ACWPD South Plant Screening Upgrades - Three new screens, conveyor and washer compactor.
- Phase 3 – Beaver Creek Diversion Tunnel – Divert flow upstream at Delaware Avenue to the new satellite treatment facility.
- Phase 4 – Third Avenue Tunnel – Divert flow from the satellite treatment facility to Third Avenue to carry screenings.
- Phase 5 – Beaver Creek Clean River Disinfection and Floatables Control Facility (previously Big C Disinfection & Floatables Control) - The proposed satellite treatment facility will provide screening for flows up to 120 mgd to remove floatables and disinfection of up to 100 mgd, reducing microbiological load (2-log enterococci reduction) to the Hudson River.

- Bouck Regulator – This regulator is located at the intersection of Bouck Street and South Pearl Street in the Island Creek Sewer District. The overflow from the regulator is adjacent to Island Creek Park, a fishing and recreation area. On May 8, 2018, a dry weather overflow to the Hudson River was observed and reported to the NYSDEC, and the pipe to the Albany County interceptor was discovered to be failing. There was already a defined scope of work for upgrades to this regulator in the CSO Long Term Control Plan, but the upgrades were not scheduled for several years. AWB decided to move the scheduled project forward, through an emergency repair. This eliminated the dry weather overflow incidents and the work resulted in an improved and larger 30-inch connection to the County Interceptor, greatly reducing the occurrence of overflows.

Additional projects completed or are being completed to help reduce the potential for flooding in the City that are not Long-Term Control Plan projects are provided below.

- Hansen/Ryckman CSO Abatement and Flood Mitigation Project - Hansen Alley is located within a residential area of the City of Albany, located between Hansen Avenue and Woodlawn Avenue. Hansen Alley is located in a low-lying region of the neighborhood and a large amount of localized stormwater runoff is conveyed to the area via overland flow. This project includes a series of underground chambers and an associated outlet control structure to mitigate captured runoff and provide a controlled release of the runoff back into the existing combined sewer system.

  Ryckman Alley is located within a residential area of the City of Albany, located between Ridgefield Street and Ryckman Avenue. Topographically, Ryckman Alley is located in a low-lying region of the neighborhood and a large amount of localized rainfall (or runoff) is conveyed to the area via overland flow. For this project, engineered wetlands and an associated outlet control structure mitigate captured stormwater runoff and provide a controlled release of the flows back into the combined sewer system.

- Phase 2 of the Quail Street Green Infrastructure Project - A dedicated storm sewer line constructed along Elberon Place provides conveyance of runoff from Quail Street and Elberon Place to the

Washington Park Lake. Conveyance of flows to the lake provide for the "free drainage" of the low-lying area on Elberon Place and serve to re-establish natural floodplain storage which previously existed along Beaver Creek.

- Beaver Creek Phase 6 Combined Sewer Overflow Abatement improves the Beaver Creek system and helps mitigate flooding. Beaver Creek sewer construction Phases 1-5 was previously completed in the late 1990's. Beaver Creek Phase 6 converted Beaver Creek Phase 1 from detention storage of combined sewage to separated stormwater storage. Albany High School stormwater drainage now connects directly to Beaver Creek Phase 1 and is stored as separated stormwater. Albany High School installed additional stormwater detention as part of their improvements. Opti Adaptive Controls have been installed on Albany High School stormwater detention and connecting this detention to separated Beaver Creek Phase 1 sewers. Additionally, Beaver Creek Phase 2 (North Main) and Beaver Creek Phase 3 (West Lawrence) have been disconnected from the trunk sewer by installing a 42" HDPE pipe from North Main to the Albany High School detention. The end result is Beaver Creek Phases 1-3 and Albany High School detention along with Opti Adaptive Controls provides an additional 1.9 million gallons of stormwater storage within the Beaver Creek drainage area.
- Proposed Hackett Boulevard and Sheridan Avenue green infrastructure projects will address current flooding conditions in the combined sewer system in those areas.
- Ramsey Place Green Infrastructure Project is a green infrastructure and storm sewer separation project that includes the installation of separated storm sewers, an underground stone reservoir, and tree pits on Ramsey Place to mitigate flooding on Hackett Boulevard and combined sewer overflows.
- Hansen Alley Overflow Abatement and Flood Mitigation Project - Installation of pump station and irrigation system to utilize the existing 750,000 gallons of separate stormwater storage underneath Woodlawn Park baseball field.
- Arch Street Relief Sewer – Mitigate sewer surcharge due to heavy rain events at the intersection of Arch Street and South Pearl Street. The Arch Street relief sewer is an Albany Water Board trunk sewer that was put into use for the Empire State Plaza cooling water discharge in the 1960s. In 2020, a new connection was made to re-establish this trunk as a relief sewer for the Beaver Creek trunk.
- Flood Mitigation in the Melrose Area - AWB has developed a plan to begin systematically remove catch basins from the combined sewer system in this area that is prone to flooding. They will replace traditional catch basins with green infrastructure practices and/or replace the traditional asphalt road with porous pavement. Streets planned for work in the next five years includes Homestead Avenue, Terrace Avenue, Fairlawn Avenue, and Hawthorne Avenue.

3.2.2 Recently Completed and Planned Projects

- The design of satellite treatment floatable facilities for the Maiden Lane, Steuben St, Orange St, Quackenbush Square, and Jackson/Livingston regulating structures was completed in 2017. The floatables facilities collect floatable debris and materials associated with CSOs from the regulator structures. The construction of the floatables facilities began in 2018 and was completed in 2019.
- There was a Phase 3 Archaeological survey completed at the locations for the Jackson/Livingston regulators. The field work for the Archaeological survey was completed in November 2018. Artefacts

were collected, cleaned, and the findings documented. The final Archaeology report will be completed by the end of 2021.

- Beaver Creek Clean River Project – In 2021, the construction of the Beaver Creek Clean River Disinfection & Floatables Control facility began, and the Third Avenue Improvements were substantially completed. The facility is scheduled to be completed in December 2022. The ACWPD South Plant Screening Upgrades, Beaver Creek Diversion Tunnel, and the Third Avenue Tunnel are scheduled for completion in 2022.
- Mereline Green Infrastructure Project - Construction began in 2019 and was completed in 2020. A $500,000 grant was received for this work.
- Hackett Boulevard and Sheridan Avenue Green Infrastructure – Heavy debris was removed from the Sheridan Avenue Fox Creek sewer in 2019, a new manhole structure was installed in the First Church parking lot, and masonry repairs were made to the sewer. A one-million dollar Water Quality Improvement Act grant was executed in 2019 for the planned green infrastructure improvements on Hackett Boulevard. In 2020, modified the scope to include modifications to an existing stormwater detention pond on an easement from the Congregation of Beth Emeth and for the installation of Opti stormwater controls. The AWD plans on enlarging the size of the stormwater detention basin in 2022 with constructed wetlands on the lower areas of the basin. Opti controls will be integrated to control the water elevation in the detention basin.
- Ramsey Place Green Infrastructure Project –This project includes road milling and filling, impervious surface reduction, porous pavement, separated storm sewers, stone reservoirs for temporary stormwater retention, and tree pits. It was completed in 2019.
- Hansen Alley Overflow Abatement and Flood Mitigation Project – AWD purchased the pump station and filtration system equipment and contracted installation. This project was completed in 2020.
- Mountainview Avenue Drainage Improvements Project – The plan for this project included the modification of the existing stormwater sewer system to divert runoff and flooding from a swale at the rear of houses. AWD is not moving forward with this sewer separation project. It was dependent on obtaining an easement for construction on private property, which was unsuccessful.
- Mariette Place – In 2019 sewer cleaning and inspection was completed, and AWB completed rehabilitation of 1000 ft of sewer in 2020.
- Beaver Creek Phase 6 Combined Sewer Overflow Abatement – Project was completed in 2020.
- AWD awarded a contract in 2019 for a Stormwater Modeling and Flood Mitigation Study for the Melrose, Western, Marion Avenue Segment of the Beaver Creek Pump Station. The goal of this project is to model a low lying are of the City that is prone to flooding and evaluate alternatives to reduce the frequency and impact. The project was completed in April 2020 with several alternatives for potential flood mitigation projects.
- Flood Mitigation in the Melrose Area – In 2021, traditional pavement along the curblines was replaced with porous pavement on Hawthorne Street from Belvidere Avenue to Melrose Avenue. AWB will continue to work on flood mitigation in this area in 2022.

- Replaced brick and slate combined sewer with new separated sanitary and storm sewers on Westerlo Street from Trinity Place to South Pearl Street to help mitigate flooding.

Table 3-1. Recent Projects for Sewer Separation

Recent Improvements	Completion Date
Ground water recharge basins were constructed in the Melrose/Winthrop Avenue Area and Upper Washington Avenue Area	2014
North Swan Street Green Infrastructure Project	2014
Quail Street Green Infrastructure Project	2016
Elberon Place Drainage Project	2017
Mariette Place Stormwater Project	2017
Hansen and Ryckman Drainage Project	2017
Floatables Control Facilities - Maiden Lane and Steuben Street	2018
Phase 2 of the Sewer Automation and Data Collection System.	2018
Beaver Creek Phase 6 Combined Sewer Overflow Abatement	2019
Ramsey Place Green Infrastructure Project	2019
Floatable facilities for the Maiden Lane, Steuben St, Orange St, Quackenbush Square, and Jackson/Livingston regulating structures	2019
Hansen Alley Overflow Abatement	2020
Hawthorne Avenue porous pavement Street separated storm sewer.	2021
Westerlo Street separated sanitary and storm sewers	2021
Arch Steet surcharge mitigation	2021

The following projects are planned for 2022:

- Continued construction of Beaver Creek Clean River Disinfection and Floatables Control Facility – Completion scheduled for December 2022.
- Continue flood mitigation in the Melrose Area.

- Stormwater retention improvements on Hacket Boulevard.

Tables showing summaries of planned projects for the next five years is provided in Appendix A, Five Year Capital Improvement Program (2022-2026) Summary of Costs.

3.2.3 Sewer Rehabilitation and Upgrades

The AWD is proactive in the inspection and preventative maintenance of sewer pipes. AWD crews perform jet-vac cleaning and video inspection of small diameter sewers to identify sewer lines in need of maintenance. Contracts are awarded for the inspection and condition assessment of large diameter sewers. Large diameter sewers are inspected by either walking from manhole to manhole, while equipped with lights and a video camera, or specialty floats and crawlers are used carry the camera through the pipe.

In 2020, AWD cleaned over approximately 343,000 linear feet of sewer, of which 288,000 was for preventative maintenance. Approximately 40,000 linear feet of sewer was inspected with CCTV.

Each year a significant portion of the budget is allocated to the rehabilitation of sewers through the installation of cured-in-place pipe (CIPP). In 2017, nineteen small diameter segments of pipe were identified for CIPP. These nineteen segments total approximately 5,290 feet in length and include 12-inch, 15-inch and 18-inch diameter pipes.

Three segments of pipe totaling 1075 linear feet, and one alternate 89 linear foot segment of pipe, were lined in 2018. The segments are located on four streets on one segment of the Beaver Creek Trunk sewer including Park Avenue, South Lake Avenue, Myrtle Avenue, and Warren Street. In 2019, approximately 15,000 linear feet of small diameter sewer was lined throughout the City.

Historically, the SUNY Alumni Quad had flooded during heavy rain events as stormwater was unable to discharge to the combined sewer at full capacity. In 2018, SUNY Albany separated sanitary and storm sewers on campus and the stormwater was redirected to Western Avenue storm sewers on Quail Street, discharging to Washington Park Lake.

Construction of a new larger diameter forcemain for the I-90 pump station as part of the 1385 Washington Avenue development project was completed by the developer, in 2019. The forcemain was upgraded from 6-inch to 10-inch, along with increasing the size of the piping in the pump station and installing a larger meter. This project resulted in increased capacity without increasing the size of the pump station pumps.

In 2021, approximately 13,000 linear feet of 8-inch to 36-inch diameter sewer was lined with cured-in-place liner. In addition, 1400 linear feet of 5.5-foot elliptical brick trunk sewer in Washington Park was rehabilitated using cementitious spray liner.

AWB awarded a contract for rehabilitation of three brick chimney manholes in poor condition in 2020, and is planning for the rehabilitation of six more brick chimney manholes in 2022

2021 construction work also included replacing brick and slate sewers that cause operational problems at Catherine Street and Westerlo Street. The combined sewer on Westerlo was replaced with new sanitary and storm sewers, as discussed in the previous section. The AWB is planning for the rehabilitation of three segments of brick and slate sewers in 2022.

Table 3-2. Recent Projects for Sewer Rehabilitation and Upgrade

Recent Improvements	Completion Date
Lined approximately 5290 linear feet of sewer	2017
Lined approximately 1075 linear feet of sewer	2018
SUNY Alumni Quad sewer updates	2018
Upgraded forcemain on Washington Avenue	2019
Lined approximately 15,000 linear feet of sewer	2019
Lined approximately 11,000 linear feet of sewer	2020
Rehabilitated three brick chimney manholes	2020
Lined approximately 13,000 linear feet of sewer using cured-in-place liner, and 1400 linear feet of sewer using cementitious spray lining	2021
Replaced brick and slate sewers on Catherine Street and Westerlo Street.	2021

The following projects are planned for 2022:

- Chimney manhole rehabilitation
- Replace sections of brick and slate sewer
- Continue the systematic sewer inspection and condition assessment program.
- Sewer rehabilitation with cured-in-place pipe at various locations.

Tables showing summaries of planned projects for the next five years is provided in Appendix A, Five Year Capital Improvement Program (2022-2026) Summary of Costs.

3.3 Sewer Pump Stations

The entire sewer system includes 30 pump stations (including small pump stations serving residential sub-developments). The pump stations consist of multiple pumps, meters, controls, and appurtenances which require periodic repair or replacement. In each of the future years, amounts will be set aside for the ongoing update, modification, and equipment replacement needs for these pump stations, as determined by AWB. Currently there are 8 pump stations with permanent generators.

3.3.1 Condition of the Sewer Pump Stations

Three representative pump stations were visited during the system examination and found to be in serviceable to good condition. These stations included Woodville, Meadow Lane and Northern Boulevard pump stations. Operators were interviewed on issues regarding the other pump stations.

The existing generators at Broadway, New Scotland and South Pearl pump stations are nearing the end of their useful life and require a lot of maintenance according to AWB staff. Also, replacement parts are not readily available for the units. Replacement of the generator at South Pearl pump station and removal of the buried fuel storage tank is scheduled for 2022. The AWD is planning for the replacement of the New Scotland and South Pearl generators replacement of the New Scotland buried fuel tanks, but they the work has not yet been scheduled. AWB staff also reported that power at the Par Circle pump station is not reliable, and the addition of a generator would cut back on time being spent at Par Circle during power outages. AWB has been addressing many of these projects inhouse.

The existing controls at Marlborough, Wilan Lane, Delaware 1 and 2, and Whitehall pump stations are outdated and require frequent maintenance. The controls at these three pump stations should be replaced with new control systems. The Northern Boulevard pump station is located adjacent to a nursing home. Large amounts of rags are conveyed to the pump station presumably from the nursing home. There is currently a screenings basket on the influent pipe that is required to be cleaned on a biweekly basis, at a minimum. The installation of a comminutor at this pump station would alleviate some of the maintenance required at the pump station. A comminutor for the Northern Boulevard pump station and the replacement of the Marlborough pump station and controls are planned for 2022.

Photo 3-2. South Pearl Pump Station

3.3.2 Recently Completed and Planned Projects

In 2014, the comminutor was replaced at the McCormack Road Pump Station. The following year, this pump station was upgraded with SCADA equipment and variable speed drives.

In recent years updates to the SCADA systems at numerous pump stations have been completed. This enables the AWD to acquire real time alarm and flow data. A new control panel was installed in the Par Circle pump stations in 2016, and in the I-90 and Delaware Avenue pump station #1 in 2017. In 2016, SmartCover® flow level monitoring devices were installed at Woodville pump station.

The generator at the Woodville Avenue Sewage pump station was replaced in 2019 and at Meadow Lane Pump Station in 2020.

A new sewage pump station was constructed at the W. Averell Harriman State Office Building Campus to pump sewage to the Patroon Creek sewer system and free up capacity in the Beaver Creek sewer system. (Upper Washington Corridor Project - 2016-2018 - CWSRF & DWSRF). This project was completed in 2020.

New submersible pumps were installed at the Northern Boulevard Pump Station in 2021. The existing pumps were in need of repair and the lead time and costs of parts made it cost effective to just replace the pumps. A single pump at Woodville Pump station was replaced with a dry-pit submersible pump to protect the pump from flooding that occasionally occurs at this location. The remaining two pumps are scheduled to be replaced with dry-pit submersible pumps in 2022.

Photo 3-3. New pumps at Northern Boulevard Pump Station

Photo 3-4. New pump at Woodville Pump Station

AWB is in discussion with the Town of Guilderland regarding diverting approximately 200,000 gallons per day of average dry weather flow from Albany sewer to the Town of Guilderland's Dillenback Pump Station. Under the current plan, AWB would contribute to the upgrade of the Guilderland pump station. AWB has been awarded an Engineering Planning Grant to prepare a report for this project so that AWB can proceed to determine costs and funding sources.

Additional planned pump station improvements in 2022 include a new flow meter at the McCormack pump station, the installation of a comminutor at the Northern Boulevard pump station, and replacement of the Marlborough Court pump station and controls.

The AWD will be transitioning from a third party that hosts Ignition SCADA data to their own servers. The servers were purchased in 2021 and the transition will be completed in 2022. The AWD has a fiberoptic system and will be adding/updating SCADA software and hardware at pump stations, system meters\monitoring devices, and at the new Beaver Creek Clean River Floatables and Disinfection Facility once completed.

Table 3-3. Recent Projects for Sewer Pump Stations

Recent Improvements	Completion Date
McCormack Road Pump Station Improvements – Upgraded SCADA and variable speed drives	**2014**
Par Circle Pump Station Control Panel and SCADA	**2016**
Woodlawn Pump Station SmartCover®	**2016**
I-90 and Delaware Avenue Pump Station #1 Control Panel and SCADA	**2017**
I-90 Pump Station piping upgrades	**2018**
Generator Replacement at Woodville Pump Station	**2019**
Generator Replacement at Meadow Lane Pump Station	**2020**
W. Averell Harriman State Office Building Campus pump station	**2020**
Woodville Pump Station pump replacement	**2021**
Northern Boulevard pump replacement	**2021**
Various SCADA Upgrades	**2021**

The following projects are planned for 2022:

- Continue to update site SCADA systems at the pump stations.
- Replacement of the Marlborough Court Pump Station.
- Addition of a new comminutor upstream of the Northern Boulevard pump station.
- Replacement of the generator at South Pearl pump station and removal of the buried fuel storage tank.
- Installation of a flow meter at the McCormack pump station.
- Gravity diversion of 200,000 average gpd to the Town of Guilderland.
- Replacement of two pumps at Woodville Pump Station
- Transition of SCADA data management from a third party hosted system to AWB servers.

These projects are recommended but not currently scheduled:

- Replacement of generators at Broadway and New Scotland pump stations. Removal of buried fuel storage tanks at New Scotland pump station.
- Addition of a generator at Par Circle pump station.
- Replacement of controls at Wilan Lane, Whitehall, Delaware 1 and Delaware 2 pump stations.

- Removal of power converter (Add A Phase) at Wilan Pump Station.

Tables showing summaries of planned projects for the next five years is provided in Appendix A, Five Year Capital Improvement Program (2022-2026) Summary of Costs.

3.4 Combined Sewer Overflows (CSOs)

The sewer system includes 22 combined sewer overflows regulators that discharge to 11 outfalls. The 11 outfall locations are listed in Table 3-4 below. An additional overflow was discovered in 2016 from historic drawings showing the construction of the Empire State Plaza. The AWB notified the NYSDEC of this during their CSO State Pollutant Discharge Elimination System (SPDES) permit negotiations. The overflow discharges to the Arch Street outfall.

One of the 22 overflows are from sewer system pump stations and provide discharge to waterways should the pump stations fail. The remaining 21 are combined sewer overflows that discharge to the Hudson River during wet weather conditions. These overflows minimize the potential for sewage backing up into basements and streets as a result of the storm water surcharge. The amount of overflow is governed by the ACWPD regulators on the Hudson River Interceptor South.

As part of the LTCP, three of the CSO shown in the chart below are scheduled to be removed and/or modified to eliminate discharges to the Hudson River. Bouck Street was modified in 2018.

It was discovered in the late 1980's that the Hudson River at high tides was flowing to Hudson River Interceptor South through the overflow/outfall systems. A series of backflow devices were constructed in the early 1990's to prevent the backflow conditions. New data collected in 2019 indicates inflow from the Hudson River whenever the tide is above 5.5 feet (USGS NGVD 1929). Two new tide gates were installed and one dam was raised in 2019. A Preliminary Engineering Report was prepared for two new tide gates to be installed closer to the Hudson River. There will also be an actuated gate at the Big C regulator that will be used to divert treated flow from the new Beaver Creek Clean River Disinfection and Floatables Control facility to the river once the facility is in operation. This will allow untreated combined sewage to be conveyed to the WWTP as a priority over the treated wastewater from the satellite facility. A Water Quality Improvement Program application was submitted for this project.

Table 3-4. CSO No. Location Outfall

No.	Location	To
012	Woodville Pump Station	To Krum Kill
013	Bouck Street	To Hudson River near Gansevoort Street extension
014	Gansevoort Street	To Hudson River near Gansevoort Street extension
015	Schuyler Street	To Hudson River near Schuyler St. via I-787 sewer
016,017,018	Rensselaer Street	To Hudson River near Rensselaer Street extension
020	Arch Street	To Hudson River near Arch Street extension

No.	Location	To
022	Hamilton Street	To Hudson River near Hamilton St. ext. via I-787 sewer
024	Division Street	To Hudson River near Division Street
026	Maiden Lane	To Hudson River near Corning Preserve Pedestrian Bridge
030	Spencer Street	To Hudson River near Corning Preserve Parking Lot
032	Thatcher Street	To Hudson River via Patroon Creek

The Arch Street location had two outfalls. A stone arch sewer discharged to outfall 019 and a monolithic concrete relief sewer to outfall 020. The overflow at Regulator A was redirected to the monolithic concrete relief sewer and now discharges to outfall 020 under a CSO event. Outfall 019 has been eliminated, and the NYSDEC has been notified of the new diversion.

3.4.1 Recently Completed and Planned Projects

The SmartCover® System is wireless flow level monitoring device that allows the AWB to monitor flows, analyze trends, and to be notified when combined sewer overflows occur.

SmartCovers® were installed at three locations in 2016. They were installed at the Woodville Pump Station and the dam on the Big C regulator to detect combined sewer overflows for the Sewage Pollution Right to Know Act. One was also installed on Elberon Place, between Quail Street and South Lake Street, to monitor flow level during heavy rain events as an early detection system of potential street flooding.

Phase 2 of this project began in 2017. This included the installation of an additional ten SmartCovers®. Six of these devices were installed at regulators to identify combined sewer overflows, two monitor flow entering the County interceptor (Green Street and Orange Street), and two are used for early detection for potential street flooding (Hackett Trunk and Fox Creek Trunk).

In 2017 the ACWPD agreed to allow the AWB to install SCADA on four of their meters to transmit real time flow information to the AWB. The locations were chosen to assist with understanding flow conditions for planning upcoming projects.

In 2018, the AWB awarded a contract for the expansion of the SmartCover® program. It included the installation of thirteen (13) new data collection sites at existing manholes that integrate with the existing Sewer SCADA system. Eight (8) of the sites measure level and flow data, while the remaining five (5) measure level data only. The project was completed in 2020.

Hach Flo-Dar Meters are installed in three (3) locations:

- Big C Regulator- on pipe to ACWPD (36-inch)
- Big C outfall pipe to the Hudson River
- Warren Street on the Beaver Creek Trunk, below the site of the Beaver Creek Satellite Treatment Facility.

Table 3-5. Recent Projects for the Combined Sewer Overflows

Recent Improvements	Completion Date
SmartCovers® installed at the Woodville Pump Station, Big C regulator, and in an Elberon Place manhole.	2016
SmartCovers® installed at the combined sewer overflow regulators located at Maiden Lane, Steuben St, Orange St, Quackenbush Square, Jackson/Livingston. SmartCovers® also installed at the Green Street interceptor, Orange Street interceptor, Hackett Boulevard Trunk, and the Fox Creek Trunk.	2017
SCADA installation at four ACWPD flow meters to transmit real time flow information to the AWD (I-90 sewer pump station meter, Pine Bush meter on Fuller Road, South Plant meter, Russell Road meter)	2017
SmartCover ® program – 13 new data collection integrated with the SCADA system. Eight with level and flow, 5 with just level.	2019-2020

The following projects are planned for 2022:

- Design of new tide gate and regulator diversion

Tables showing summaries of planned projects for the next five years is provided in Appendix A, Five Year Capital Improvement Program (2022-2026) Summary of Costs.

3.5 ACWPD Facilities Serving the Sewer System

Although not a part of the sewer system, several major components of the ACWPD are integrally connected with and serve the System and are briefly described here.

3.5.1 Patroons Creek Trunk Sewer

The Patroons Creek Trunk Sewer was constructed between 1969 and 1974 by ACWPD. Most of it is located within the northern boundary of the City. The sewer serves three City Districts as well as the Town and Village of Colonie and the Town of Guilderland. It begins at a point in the Town of Colonie in the vicinity of the southernmost reach of the Village of Colonie and terminates at the North Plant. ACWPD monitors flows in this trunk sewer through the use of sixteen ACWPD owned and operated meter units and a telemetering system.

3.5.2 North and South Plants

The North and South Plants are virtually identical in process design, differing only in installed capacities. Both plants employ a conventional activated sludge treatment process to achieve secondary treatment levels (85% reduction of the influent biochemical oxygen demand and suspended solids levels). Sludge at both plants is dewatered prior to incineration, with the resultant ash being landfilled. The North and South

Plants were constructed during the period from 1969 to 1974. The North Plant has a permitted average flow of 35 mgd and is located in the Village of Menands on a 28-acre site adjacent to the Hudson River. The South Plant has a permitted 29 mgd flow and is located in the City on a 32-acre site just north of the Port of Albany.

4 ASSET MANAGEMENT PLAN UPDATE (2021)

In 2017, AWD developed an Asset Management Plan (AMP) for the water and sewer system. The development of this plan assists the AWB prioritize and implement asset management elements into its operations. Recommendations included the need to inventory assets and perform condition assessments of infrastructure to support the next steps of the asset management program. Elements of the Plan that require funding from the Capital Budget have been included in this CIP and will be updated annually.

Asset Management Status Update tables provide a list of initiatives, details about the tasks planned, and a timeline for completion. This updated table is included in this document as Appendix D. A general summary of the focused efforts for 2021, the updates to the schedule, and planned work for 2022 is shown below.

Work Completed in 2021 and Planned for 2022

- **CCTV Inspection of Large Diameter Sewers** –The completion of critical trunk sewer inspections is planned for 2024 and has been budgeted in the CIP.
- **Based on Results of CCTV Inspections, Perform Sewer Rehabilitation, Replacements, and Spot Repairs –**

  In 2021 approximately 13,000 linear feet of sewer was lined ranging from 8-inches to 36-inches in diameter and 1400 linear feet of 5.5-foot elliptical brick trunk sewer in Washington Park was rehabilitated using cementitious spray liner. Rehabilitation also included replacing brick and slate sewers that cause operational problems at Catherine Street and Westerlo Street.

  2022 will include the rehabilitation of six brick chimney manholes in poor condition, three segments of brick and slate sewers, and a cured-in-place lining of small diameter sewer.
- **Add Pipeline Assessment Certification Program (PACP) scoring to GIS –** AWD is actively adding the PACP scoring to pipe segments in GIS. To date they have adding scores to 40 pipe segments or about 10,600 linear feet. The scoring of the critical trunk sewers is scheduled to be completed by 2025.
- **Computerized Maintenance Management Software (CMMS)** - AWB began using the program Utility Cloud in 2019 and has expanded upon its use each year.

  The program is currently used for logging customer calls, developing and tracking of work orders, sewer and water investigations and repairs, sewer inspection scheduling and tracking, dig safe tickets, and restoration tracking. The program has been synced with an online GIS application. AWB will continue to expand upon utilization of the program and expanding upon the use of GIS.
- **Service Levels and Key Performance Indicators (KPIs) –** Service levels are reviewed and discussed annually by AWB staff and are periodically adjusted. KPIs are used to track the success of meeting service levels. The data stored and managed in the Utility Cloud program is used to track and manage KPIs.

- **Develop criticality (CoF) scores for all AWB sewers** - This was planned to be completed in 2019 but was not completed. The development of criticality scoring for all sewers is a significant effort and will be a priority task in 2022.

- **Improved Combined Sewer System and MS4 Basin Monitoring** - A one-million dollar Water Quality Improvement Act grant was executed in 2019 for the planned green infrastructure improvements on Hackett Boulevard. In 2020, modified the scope to include modifications to an existing stormwater detention pond on an easement from the Congregation of Beth Emeth and for the installation of Opti stormwater controls. The AWD plans on enlarging the size of the stormwater detention basin in 2022 and constructing wetlands on the lower areas of the basin. Opti controls will be integrated to control the water elevation in the detention basin.

4.1 Items to Include in Future CIPs

- **Conduct Inventory & Condition Assessment of Wastewater Pump Station Equipment –** A formal condition assessment of all large pump stations is scheduled to be completed by 2024 and all pump stations by 2029. This is a significant effort and should be planned and included in the CIP if being completed by a consultant.
- **Improved Sewer Pump Station Monitoring** – AWD has recently updated the SCADA system at four pumps stations and plans to continue to update two pump stations a year. SCADA updates are budgeted in the CIP, and these SCADA updates are scheduled to be completed by 2029.
- **Improved Combined Sewer Overflow Monitoring** - AWB has been installing flow meters with telemetry to measure flow to the County interceptor and identify overflow when they occur. Meters and telemetry will be installed at all dam structures within the combined sewer system by 2024.

APPENDIX A

Five Year Capital Improvement Program (2022-2026) Summary of Costs

Albany Water Board/Albany Municipal Finance Authority
Five Year Capital Improvement Program (2022-2026)
Projects Funded Through Grants, Long Term Financing, and Ongoing Project Funds

Budget Code	Task Name	2022	2023	2024	2025	2026	Future	Totals
	Long Term Control Plan - CWSRF - C4-5402-14-00, 01, 02, 03	**$20,916,486**	**$3,417,112**	**$299,620**	**$1,368,828**	**$1,773,602**	**$2,131,903**	**$29,907,552**
	Administrative							
	Administratiove Costs & PCMP	$396,090	$176,040	$176,040	$176,040	$176,040	$176,040	$1,276,290
	BMPs/System Optimization							
	Remove Schuyler Overflow - Albany BMP-13				$9,506	$148,930		$158,436
	Remove Liberty Overflow - Albany BMP-11				$38,729	$606,751		$645,480
	System Separation/Stormwater Storage							
	Vliet Street - Cohoes SSS-12	$586,800	$545,724					$1,132,524
	Manor Ave - Cohoes SSS-14					$50,347	$788,777	$839,124
	Columbia Street Phase II - Cohoes SSS-10	$1,173,600						$1,173,600
	Van Buren Street - Troy SSS-13		$2,695,348					$2,695,348
	Polk Street Stream Separation - Troy - SSS-11	$1,155,996						$1,155,996
	Satellite Treatment and/or Floatable Control Facilities							
	Big C Disinfection & Floatables Control - Albany	$17,604,000						$17,604,000
	Floatables Control Facility - Little C - Cohoes			$101,047	$791,534.5	$791,534.0	$791,534.0	$2,475,649
	Tributary Enhancements							
	Cross Street Phase II - Troy			$22,533	$353,019		$375,552	$751,104
	Comprehensive Plan - DWSRF 18903 and Future EFC Financings	**$6,100,000**	**$6,000,000**	**$5,200,000**	**$2,000,000**			**$19,300,000**
7530	Aeration Basin Ventilation and Damp Proofing Upgrades 18903 - Second Tranche	$1,000,000						$1,000,000
7556	Pine Bush Pump Station Renovations - 18903 Second Tranche	$600,000						$600,000
7530	Maintenance Building at Feura Bush - 18903 Second Tranche	$300,000						$300,000
7555	Basin C Inlet - 18903 Second Tranche	$200,000						$200,000
7530	Filter Upgrades Phase 1 - Mixing Basins and 2 Filters - 18903 Second Tranche	$4,000,000						$4,000,000
7530	Filter Upgrades Phase 2 - 6 Filters - Future Third Tranche		$6,000,000					$6,000,000
7556	Pine Bush Tank Interior Coating, Mixer, and Repairs - Future 4th Tranche			$800,000				$800,000
7556	Upper Service Tank Replacement - 4th Tranche			$1,000,000				$1,000,000
7530	Miscellaneous Feura Bush Facility Upgrades - Piping, Valves, Gates - 4th Tranche			$1,000,000				$1,000,000
7530	Influent Flow Control & Hydro Decommission - 4th Tranche			$1,000,000				$1,000,000
7530	Energy Saving Upgrades - 4th Tranche			$400,000				$400,000
7530	Washwater Tank Cleaning and Repair - 4th Tranche			$500,000				$500,000
7530	Clearwell Cleaning and Repair - 4th Tranche			$500,000				$500,000
7530	Improvements to Lagoons and Sludge Management - Future 5th Tranche				$2,000,000			$2,000,000
	Bond Issuance of 2021	**$12,850,000**	**$5,150,000**					**$18,000,000**
7511	Alcove Buildings	$800,000						$800,000
7511	Basic Creek Detailed Design	$120,000	$80,000					$200,000
7512	Supply Conduit Condition Assessment	$100,000	$100,000					$200,000
7530	Feura Bush Elevator Replacement	$630,000						$630,000
7530	Feura Bush Lime System	$1,300,000						$1,300,000
7530	Feura Bush Control System Upgrades	$50,000	$50,000					$100,000
7530	Feura Bush Valves and Actuators	$250,000	$250,000					$500,000
7540	Lead service replacement program	$1,000,000	$1,000,000					$2,000,000
7540	Pressure Reducing Valve Telemetry	$1,000,000						$1,000,000
7540	Lark Street - Madison to Washington, new branch and mainline valves	$425,000						$425,000
7540	University Place - 400 ft of 8-inch pipe	$150,000						$150,000
7540	Crescent - 900 ft of 8-inch pipe	$150,000						$150,000
7540	Commerce - Industrial to Terminal - 1600 ft of 16-inch pipe	$700,000						$700,000
7540	Lancaster Street - Lark to Dove - 750 feet of 8-inch		$500,000					$500,000

Albany Water Board/Albany Municipal Finance Authority
Five Year Capital Improvement Program (2022-2026)
Projects Funded Through Grants, Long Term Financing, and Ongoing Project Funds

Budget Code	Task Name	2022	2023	2024	2025	2026	Future	Totals
7540	South Pearl Street - 787 Ramp to Mount Hope Dr - 500 feet of 12-inch	$500,000						$500,000
7540	South Pearl Street - Kenwood Rd to Old South Pearl - 400 feet of 12-inch	$400,000						$400,000
7540	Fay Street - 60 feet of 8-inch main to connect to Russell Rd		$40,000					$40,000
7555	Loudonville UV Equipment Replacement	$2,300,000						$2,300,000
7555	Loudonville Basin Repairs		$630,000					$630,000
7555	Loudonville New Guard Building and Garage	$75,000	$750,000					$825,000
7556	Pump Station & Tanks - Harriman 750,000 ground storage and pump station	$275,000						$275,000
7556	Pump Stations & Tanks - Upper Service PS Renovations	$275,000						$275,000
7580	35 Erie - New Facilities	$1,000,000						$1,000,000
7580	10 North Enterprise - New Facilities		$200,000.00					$200,000
7620	Sewer Rehab - Sewer Condition Assessment	$50,000	$100,000					$150,000
7620	Sewer Rehab - Sewer lining projects - 24-inch and smaller	$600,000	$1,200,000					$1,800,000
7620	Sewer Rehab - Krumkill Access Roads	$500,000						$500,000
7620	Sewer Rehab - Chimney Manholes							
	Maiden at Broadway MH 5918	$50,000						$50,000
	Hudson at Broadway MH 6098	$50,000						$50,000
	Broadway at N Lawrence MH 7679	$50,000						$50,000
	Van Woert at Broadway 7680		$50,000					$50,000
	Theatre Row at Sheridan MH 5809		$50,000					$50,000
7630	Sewage Pump Stations - SCADA - SmartCover, Ignition, Opti	$50,000	$150,000					$200,000
7610	**Sewer Separation - EFC, DEC**	**$700,000**	**$8,835,000**				**$10,000,000**	**$ 19,535,000**
	GI Banking & Hackett GI Project - WQIP Grant	$500,000	$500,000					$1,000,000
	Beaver Creek Reflection and Learning (WQIP and EPL)		$2,335,000					$2,335,000
	Hackett Constructed Wetlands C4-5402-17-00	$200,000	$3,000,000					$3,200,000
	Thurlow Terrace - Apply for WQIP, WIIA, SUNY Share		$3,000,000					$3,000,000
	Sheridan & Hackett CSO & Flood Mitigation C4-5402-17-01						$10,000,000	$10,000,000
7670	**Overflows - EFC, DEC**	**$200,000**	**$3,000,000**					**$ 3,200,000**
	Beaver Creek Tide Gates and Big C Actuated Valve - WQIP/EFC Applications - C4-5402-18-00	$200,000	$3,000,000					$3,200,000
7630	**Sewage Pump Stations - Future Grants & Financing**	**$30,000**					**$440,000**	**$ 470,000**
	Krum Kill Sewer District - Diversion to Guiderland - EPL	$30,000					$440,000	
7511	**Supply Reservoirs - Bond Financing**			**$2,750,000**	**$2,650,000**		**$7,875,000**	**$ 13,275,000**
	Six Mile Construction						$4,700,000	$4,700,000
	Six Mile Engineering - Construction Phase						$500,000	$500,000
	Basic Creek Construction			$2,500,000	$2,400,000			$4,900,000
	Basic Creek Engineering - Construction Phase			$250,000	$250,000			$500,000
	Alcove Spillway Design						$150,000	$150,000
	Alcove Spillway Construction						$2,400,000	$2,400,000
	Alcove Spillway Engineering - Construction Phase						$125,000	$125,000
7512	**Supply Conduit - Water Revenues or Bond Issuance**			**$25,000**	**$25,000**	**$25,000**		**$ 75,000**
	Studies and Engineering Reports			$25,000	$25,000	$25,000		$75,000
7530	**Feura Bush Filtration Plant - Water Revenues or Bond Issuance**			**$25,000**	**$25,000**	**$25,000**		**$ 75,000**
	Studies and Engineering Reports			$25,000	$25,000	$25,000		$75,000
7540	**Distribution System - Water Revenues or Bond Issuance**			**$1,525,000**	**$1,525,000**	**$1,525,000**		**$ 4,575,000**
	Studies and Engineering Reports			$25,000	$25,000	$25,000		$75,000
	Water main and valve replacements			$1,500,000	$1,500,000	$1,500,000		$4,500,000
7555	**Loudonville Reservoir - Water Revenues or Bond Issuance**			**$25,000**	**$25,000**	**$25,000**		**$ 75,000**
	Studies and Engineers Reports			$25,000	$25,000	$25,000		$75,000
7556	**Water Pumping Stations and Tanks - Water Revenues or Bond Issuance**			**$25,000**	**$25,000**	**$25,000**		**$ 75,000**

Albany Water Board/Albany Municipal Finance Authority
Five Year Capital Improvement Program (2022-2026)
Projects Funded Through Grants, Long Term Financing, and Ongoing Project Funds

Budget Code	Task Name	2022	2023	2024	2025	2026	Future	Totals
	Studies & Engineering Reports			$25,000	$25,000	$25,000		$75,000
7580	**10 North Enterprise & 35 Erie - Water Revenues or Bond Issuance**			**$25,000**	**$25,000**	**$25,000**		**$ 75,000**
	Studies & Engineering Reports			$25,000	$25,000	$25,000		$75,000
7610	**Sewer Separation - Water Revenues or Bond Issuance**			**$150,000**	**$150,000**	**$150,000**	**$600,000**	**$ 1,050,000**
	Remove CBs from combined sewers - GI Practices							
	Terrace			$150,000				$18,150,000
	Fairlawn				$150,000			$150,000
	Hawthorne					$150,000		$150,000
	Eileen						$150,000	$150,000
	Clermont						$150,000	$150,000
	Rosemont						$150,000	$150,000
	Van Buren						$150,000	$150,000
7620	**Sewer Rehabilitation - Water Revenues or Bond Issuance**			**$1,250,000**	**$1,250,000**	**$1,250,000**		**$ 3,750,000**
	Sewer replacements and lining			$1,250,000	$1,250,000	$1,250,000		$3,750,000
7630	**Sewage Pump Stations - Water Revenues or Bond Issuance**			**$250,000**	**$250,000**	**$250,000**		**$ 750,000**
	Sewage Pump Stations improvements, including SCADA, SmartCovers and Opti			$250,000	$250,000	$250,000		$750,000
7670	**Overflows - Water Revenues or Bond Issuance**			**$275,000**	**$275,000**	**$275,000**		**$ 825,000**
	Studies & Engineering reports			$25,000	$25,000	$25,000		$75,000
	Satellite Treatment - Floatables Control Facilities, Beaver Creek Satellite Treatment Facility			$100,000	$100,000	$100,000		$300,000
	Outfall pipes and tide gates			$150,000	$150,000	$150,000		$450,000
	TOTAL	**$40,796,486**	**$26,402,112**	**$11,824,620**	**$9,593,828**	**$5,348,602**	**$21,046,903**	**$115,012,552**
	EFC and NYS Grants and Financing Funding (Finacing in place for 2022)	**$27,946,486**	**$21,252,112**	**$5,499,620**	**$3,368,828**	**$1,773,602**	**$12,571,903**	**$72,412,552**
	AMWFA Bond Series 2021A, 2021B $25 million	**$12,850,000**	**$5,300,000**					**$18,150,000**
	Capital Projects using Water Revenues or AMWFA Bond Issuance			**$6,325,000**	**$6,225,000**	**$3,575,000**	**$8,475,000**	**$24,600,000**

Note: This summary provides the date projects are funded and may not align with the construction dates in the report

Albany Water Board/Albany Municipal Water Finance Authority
Five Year Capital Improvement Program (2022-2026)
Summary of Grants, Long-Term Financing, and Local Share

Task Name	Project	Budget Total	Grant	Budget Financing	AWB Funds
LTCP 2015-2017	**Albany Pool Communities Projects**	**$8,971,786**	**$3,595,500**	**$5,083,286**	**$293,000**
EFC GIGP #764 Grant - Quail Street			$1,795,500		
City Share - Quail Street					$293,000
EFC C4-5402-14-00 CWSRF	LTCP 2015-2017			$5,083,286	
NYS WIIA for C4-5402-14-00 Grant	LTCP 2015-2017		$1,750,000		
DEC HREG T00067GG Grant	Stormwater In-Lieu of		$50,000		
Elberon/Hansen/Ryckman	**Flood Mitigation**	**$7,539,744**	**$2,887,500**	**$4,603,744**	
EFC C4-5402-15-00/01 CWSRF	Elberon/Ryckman/Hansen			$4,603,744	
NYS WIIA 2016 Grant	Elberon/Ryckman/Hansen		$837,500		
EFC ISC Grant			$600,000		
DEC WQIP C00091GG Grant	Elberon/Ryckman/Hansen		$1,000,000		
EFC GIGP #1290 Grant	Ryckman		$450,000		
Upper Washington Corridor	**Water & Sewer Improvements**	**$9,736,644**	**$4,592,534**	**$5,144,110**	
EFC DWSRF #18377 - Bond Resolution $5,863,694	Upper Washington Water Tank & Pump Station	$3,143,350		$874,140	
ESD #AA727/CFA#54968			$1,000,000		
NYS WIIA Grant - DWSRF #18377			$1,269,210		
EFC C4-5402-16-00 CWSRF Bond Resolution $9,898,710	Upper Washington Sewage PS & Force Main	$6,593,294		$4,269,970	
ESD #AA727/CFA#54968			$900,000		
NYS WIIA Grant - CWSRF C4-5402-16-00			$1,423,324		
Feura Bush Filtration Plant Improvements - 2017	**Office, Laboratory**	**$2,615,650**	**$770,790**	**$1,844,860**	
EFC DWSRF 18378 Bond Resolution $5,004,748	Office, Lab	$2,615,650		$1,844,860	
NYS WIIA Grant - DWSRF 18378			$770,790		
Water Comprehensive Plan - $35 million Bond Resolution	**Feura Bush Renovations**	**$9,736,792**	**$3,000,000**	**$6,676,792**	**$60,000**
DWSRF #18523 - First tranche		$9,736,792			$60,000
WIIA			$3,000,000		
Tivoli Preserve Stream Daylighting	**Patroon Creek**	**$3,132,500**	**$2,100,000**		**$1,032,500**
AWB Share - On-going Projects					$1,032,500
EFC GIGP Grant 1387			$1,100,000		
NYSDEC WQIP Grant C00326GG			$1,000,000		
CSO Monitoring	**SPRTK**	**$55,556**	**$50,000**		**$5,556**
AWB Share					$5,556
NYSDEC SPRTK Grant DEC01-CSOR1-2016-00016			$50,000		
LTCP 2018-2022 Phase 2	**Albany Pool Communities Projects**	**$39,347,874**	**$14,779,585**	**$24,568,289**	
EFC CWSRF C4-5402-14-01	Floatables & Other APC Projects	$12,941,874		$6,964,289	
NYS WIIA Grant Awarded - C4-5402-14-01 25% up to 2,501,969	Floatables & Other APC Projects		$2,501,969		
DEC WQIP - C00565GG Floatables Control			$2,934,000		
EFC ISC Grant Mereline - requires amendment to 14-01			$293,400		
DOS Shared Services - CDRPC Administration			$248,216		
EFC CWSRF C4-5402-14-02	Beaver Creek Clean River Project	$26,406,000		$17,604,000	
NYS IMG Grant Awarded $10 million, 58.68% benefit to AWB	Beaver Creek Clean River Project		$5,868,000		
DEC WQIP C01179GG $5 million, 58.68% benefit to AWB	Beaver Creek Clean River Project		$2,934,000		
Albany/Colonie Interconnections		**$1,600,000**	**$960,000**	**$640,000**	
EFC DWSRF #18433		$1,600,000		$640,000	
NYS WIIA Grant Awarded - DWSRF #18433			$960,000		
Flood Mitigation/GI Projects		**$5,460,000**	**$3,050,000**	**$2,000,000**	**$410,000**
DEC WQIP 82305 - EPG	Arch & Pearl & Big C Tide Gates	$60,000	$50,000		$10,000
C4-5402-17-00 Hackett Boulevard - application by 6/25/2021	Hackett GI Project	$4,000,000		$2,000,000	
ISC Potential Grant for C4-5402-17-00			$2,000,000		
DEC WQIP C00845GG	GI Banking/ Hackett GI	$1,400,000	$1,000,000		$400,000
Land Acquisition for Source of Water Supply		**$1,245,500**	**$996,399**		**$249,101**
DEC WQIP 93620 SWP		$1,245,500	$996,399		$249,101
Bond Issuance 2020	**Multiple**	**$22,945,000**		**$22,945,000**	
TOTAL		**$ 112,387,046**	**$ 36,782,308**	**$ 73,506,081**	**$ 2,050,157**

APPENDIX B

Summary of Completed Engineering Reports (2021)

Safe Yield Evaluation – Alcove and Basic Creek Reservoirs

Schnabel Engineering, March 5, 2021

This report includes the project background, key assumptions, development of a calibrated hydrologic model, and a safe yield evaluation that considers combinations of Alcove and Basic Creek Reservoirs and several lower normal pool elevations at Basic Creek Reservoir.

CSO Abatement and Flood Mitigation, 2021 Program Update

CHA, July 16, 2021

This update to the June 28, 2018 report provides strategies to abate the surface water and flood conditions on Upper Hackett Boulevard by expanding upon green infrastructure.

Beaver Creek Flow Management and Inflow Reduction - Preliminary Engineering Report

CHA, July 30, 2021

The Hudson River is tidally influenced within the reach covering the City of Albany combined sewer outfalls. During times of high tidal surge or river stages, inflows enter into the City's CSO's and backflow into the CSS and Hudson River Interceptor Sewer (HRIS). This preliminary engineering report evaluates alternatives and costs for the replacement of the existing Beaver Creek outfall tide gates, modernizing the "Big C" regulator flow controls, and the ancillary work associated with the operational improvements and maintenance of flows.

APPENDIX C

Asset Management Status Update

Phase	Initiative Strategy	Resources (internal/ external)	Task Details	Investment Level	Timeline Comments
Initiative 1 – Sewer Inspection & Rehabilitation Program					
Phase 1	**Strategy 1a** Perform CCTV condition assessment of critical sewers	AWB and Consultant	-Conduct CCTV inspection program for all large diameter interceptors using the PACP scoring methodology. **Status Update:** **AWB inspected critical large diameter sewers in 2016, 2017, and 2018 and the contractor used PACP scoring.** **All large diameter brick sewer manholes located in the road were inspected in 2018, and the rehabilitation design was completed in 2019.** **AWB continues to inspect critical trunk sewers each year and will be completed by 2024.** -Develop criticality (CoF) scores for all AWB sewers. **Status Update:** **The AWB has been updating GIS in order to perform this task. GIS will be used to develop and assign criticality scores. This task was planned to be completed by December 2019, but due to staff changes and the COVID crisis this has been revised to the end of 2021.**	Medium	**Started in 2016** **AWB critical trunk sewer inspections will be completed by 2024.** **Criticality scores were originally planned for completion by December 2019, but has been revised for December 2022**

Phase	Initiative Strategy	Resources (internal/ external)	Task Details	Investment Level	Timeline Comments
Initiative 1 – Sewer Inspection & Rehabilitation Program - Continued					
Phase 1	**Strategy 1a** Perform CCTV condition assessment of critical sewers	AWB and Consultant	-Conduct CCTV inspection program using PACP scoring methodology for additional high priority sewers based on CoF evaluation **Status Update:** **All contractor CCTV inspections have PACP scoring, which is added to the GIS. Likewise, AWD staff review video taken by their own staff, score it using PACP scoring, and add the score to the GIS.** **Although criticality scoring has not been assigned to all sewers, AWB has scheduled inspections for sewers already known to be critical. (AWB plans on inspecting all critical trunk sewers by the end of 2024)** -As more inspection scoring data becomes available, determine whether there are any patterns that emerge that associate key pipe characteristics with poor pipe condition scores (e.g., pipe age, material, size). This can be used to further refine and prioritize the sewer inspection program to focus sewer inspection activities on pipes with these characteristics. **Status Update: This will be completed once more data becomes available.**	Medium	**This CCTV inspection program using PACP scoring has started and will be substantially complete once the critical sewer inspections are complete.** **PACP scoring is entered in GIS as the data becomes available.**
	Strategy 1b Perform sewer rehabilitation as required	AWB	Based on results of CCTV inspections above, perform sewer rehabilitation, replacements, and spot repairs as required. **Status Update: In 2017, 21 small diameter pipe segments totaling about 7,800 linear feet were lined.** **In 2018, 24 small diameter segments totaling about 5,950 linear feet were lined. Additionally, 1,435 linear feet of critical, large diameter sewer were rehabilitated with centrifugally cast concrete pipe.**	High	Based on results of Strategy 1a **This work is completed annually. The locations will be selected based on the results of CCTV inspections. This is an ongoing task.**

			In 2019, approximately 15,000 linear feet of small diameter sewer was lined. **In 2020 approximately 11,000 linear feet of sewer was lined ranging from 12-inch to 36-inches in diameter. This included approximately 2,000 linear feet of 36-inch sewer along I-90. Three critical brick chimney manholes were also rehabilitated** **In 2021, approximately 13,000 linear feet of 8-inch to 36-inch diameter sewer was lined with cured-in-place liner. In addition, 1400 linear feet of 5.5-foot elliptical brick trunk sewer in Washington Park was rehabilitated using cementitious spray liner.** **AWB awarded a contract for rehabilitation of three brick chimney manholes in poor condition in 2020, and is planning for the rehabilitation of six more brick chimney manholes in 2022** **2021 construction work also included replacing brick and slate sewers that cause operational problems at Catherine Street and Westerlo Street. The combined sewer on Westerlo was replaced with new sanitary and storm sewers. The AWB is planning for the rehabilitation of three segments of brick and slate sewers in 2022.** **AWB will continue to CCTV inspect sewers and rehabilitate annually.**		
Phase 1	**Strategy 1c** Assign PACP standard scoring to available CCTV	AWB or Contractor	-Train AWB staff to score CCTV inspection videos using PACP scores, or hire outside entity to score available CCTV recordings. **Status Update:** **AWB had four employees PACP trained in 2018.** -Reference the scores to the pipelines in GIS. **Status Update:**	Low	**Training is complete.** **Adding the PACP scoring to GIS is an ongoing process completed**

			AWB is actively adding PACP scoring to CCTV inspections completed by AWD staff and then adding to GIS. **Continue to do this annually. Currently, 40 pipe segments are scored, or about 10,600 linear feet**. -Require contractors to use PACP scoring **Status Update:** **AWB currently requires CCTV contractors to use PACP scoring.**		**when sewers are inspected. GIS will be updated with scores for all critical trunk sewers by 2025.** **This was completed.**
Phase 3	**Strategy 1d** Perform CCTV inspection of sewers/manholes in high I/I areas	AWB	-Perform PACP and MACP inspections of sewer/manholes in areas that have been separated and flow monitoring data indicates high contributions of I/I	Medium	**This will begin in 2024. Inspection of high I\I areas will be completed by 2029.**

Phase	Initiative Strategy	Resources (internal/ external)	Task Details	Investment Level	Timeline
Initiative 2 – GIS Improvements and CMMS Implementation					
Phase 1	**Strategy 2a** Complete updates to the sewer GIS	AWB with Consultant Participation	Complete desktop updates to AWB's sewer system GIS using existing maps, the LGIM and the methodology established during the GIS pilot program. This includes fixing pipe geometry and connectivity, filling in missing attribute data that is available, and adding missing features such as catch basins. **Status Update: AWB is presently making these updates and anticipates being completed by the end of 2024.**	Medium	**This began in 2016 and is planned for completion by 2024**
	Strategy 2b Obtain a CMMS System	AWB with Consultant Participation	- Compile a list of AWB's functional and technical requirements for a CMMS -Issue an RFP for a CMMS, including a software demonstration evaluation -CMMS Implementation, including software procurement, configuration, data conversion, training, and integration with other City software as required.	Low Low High	**Completed.**

Phase	Initiative Strategy	Resources (internal/ external)	Task Details	Investment Level	Timeline
			AWB began using the program Utility Cloud in 2019. The program is currently used for logging customer calls, developing and tracking of work orders, sewer and water investigations and repairs, sewer inspection scheduling and tracking, dig safe tickets, and restoration tracking. The program has been synced with an online GIS application. AWB will continue to expand upon utilization of the program and expanding upon the use of GIS.		
Phase 2	**Strategy 2c** Maintain and utilize the work order management system that tracks time, materials, cause of the break/damage and type of repair down to the asset level.	AWB with Consultant Participation	-With the CMMS in place, develop operating procedures to manage work orders, notifications, and preventative maintenance activities through the software. -Develop operating procedures for updating the GIS, when field activities find discrepancies.	Medium Low	**Completed** **Completed, but continue to improve upon**

Phase	Initiative Strategy	Resources (internal/ external)	Task Details	Investment Level	Timeline
	Initiative 3 – Service Level Reporting Pilot				
Phase 1	**Strategy 3a** Perform Service Level Reporting Pilot.	AWB with Consultant Participation	-Collect and trend historical performance data for each service level and KPI outlined in the AMP. **Status Update: AWB tracks KPI performance monthly and reports results internally. AWB continues to expand upon the KPIs tracked and reported.** -Begin tracking measures via graphical reports. **Status Update: Some KPIs are currently tracked using graphical reports.** -Define targets where possible for each service level and KPI.	Low	**AWB is currently tracking additional KPIs with Utility Cloud and presenting them through Microsoft Power BI for reporting.**

Phase	Initiative Strategy	Resources (internal/ external)	Task Details	Investment Level	Timeline
			Status Update: Targets have been established for the KPIs that are being tracked. -Review and refine service level measures **Status Update: Service levels are reviewed and discussed annually by AWB staff and are periodically adjusted. KPIs are used to track the success of meeting the service levels. The Utility Cloud program will help to expand upon what is currently tracked.**		

Phase	Initiative Strategy	Resources (internal/ external)	Task Details	Investment Level	Timeline
Initiative 4 – Enhance Monitoring for Better System Understanding					
Phase 1 - 2	**Strategy 4a** Improved sewer pump station monitoring	AWB	-Continue implementation of the SCADA upgrade program at sewer pump stations, including installation of AWB-owned flow meters. **Status Update: In recent years updates to the SCADA system at four pump stations have been completed, these include I-90, McCormack, Woodville, and Par Circle. This allows AWB to acquire real time alarm and flow data.** **Floatables Facilities at Orange Street, Quackenbush, and Jackson/Livingston were added to SCADA in 2019. Each of these locations has a sewage pump station and controls for wash down of the screen.** **The AWD will be transitioning from a third party that hosts Ignition SCADA data to their own servers. The servers were purchased in 2021 and the transition will be completed in 2022.** **Will continue to update site SCADA systems at the pump stations in 2022.**	High	Ongoing **This initial project is complete. AWB plans on completing two pump stations each year and will be complete by 2029.**

Phase	Initiative Strategy	Resources (internal/ external)	Task Details	Investment Level	Timeline
Phase 1	**Strategy 4b** Improved CSO overflow monitoring.	AWB	-Install monitors to quantify wet weather overflows -Install AWB-owned flow meters at regulators that measure flow to the interceptor to enhance confidence in the data and eliminate reliance on the County to properly maintain existing flow meters. **Status Update:** **In 2016, AWB installed Smart Covers at the combined sewer Woodville Pump Station and the dam on the Big C regulator to detect combined sewer overflows.** **In 2017 AWB installed Smart Covers at the combined sewer overflow regulators located at Maiden Lane, Steuben Street, Orange Street, Quackenbush, Jackson Street, and Livingston Avenue Regulators.** **2019 Hach Flo-Dar meters were installed at the Big C regulator and the outfall pipe.**	Low	This initial project is complete. **AWB will continue to install meters with telemetry to better manage the sewer system. All dam structures within the combined sewer system will be completed by 2024**
	Strategy 4c Improved trunk sewer monitoring.	AWB	-Install AWB flow meters in the trunk sewers to determine dry and wet weather for both flow capacity analysis and to assist in sizing bypass pumping in the event of a break **Status Update: In 2016, a Smart Cover was installed on Elberon Place between Quail Street and South Lake to monitor flow level during heavy rains as an early detection system for potential street flooding.** **In 2017, AWB installed SCADA on four of the Albany County Water Purification District flow meters, including Russel Road, Pine Bush, South Plant, and I-90.**	Low	**This initial project is complete**. AWB will continue to update SCADA to better manage the sewer system.

Phase	Initiative Strategy	Resources (internal/ external)	Task Details	Investment Level	Timeline
Initiative 4 – Enhance Monitoring for Better System Understanding – Cont.					
Phase 1	**Strategy 4c** Improved trunk sewer monitoring – Cont.	AWB	**In addition, Smart Covers were installed at Green Street and Orange Street to monitor flows entering the County interceptor, and at Hackett Boulevard Trunk and Fox Creek Trunk for early detection of street flooding.** **In 2019, the AWB installed Smart Covers at thirteen (13) existing manholes that will integrate with the existing Sewer SCADA system. Some of these locations include Albany High School, the Bouck, Lincoln Park Ravine, Myrtle Street, Park Avenue, State Street, Third Avenue, Empire State Plaza, and the Western Avenue/Krumkill Sewer.**	Low	
	Strategy 4d Improved CSS and MS4 basin monitoring	AWB	-Install level monitors to better understand how often CSS and MS4 basins are used. - If beneficial based on an evaluation of data obtained from these monitors, consider installing real-time control mechanisms on the CSS and MS4 basin outlets so that outlet size can be adjusted to optimize system storage during storm events **Status Updates: Hansen/Ryckman CSO abatement and Flood Mitigation project – outlet control structures were added to underground stormwater chambers to provide a controlled release of flows back to the combined sewer.** **Opti Adaptive (real time) Controls were installed on Albany High School separate stormwater detention in 2019 and will be used to control discharge.** **Hacket Blvd. Green Infrastructure project expanded to include modifications to an existing stormwater detention pond for the installation of Opti stormwater controls. Project anticipated to be completed in 2022.**	Low Medium	Much of this task has already been completed. Controls on Hackett Blvd and Sheridan Ave trunks are planned to be completed by 2024.
Initiative 5 – Additional System Cleaning					
Phase 1	**Strategy 5a** Add additional crew for sewer cleaning	AWB	-Add additional crew during a second shift to expand the sewer cleaning program beyond the current list of problem areas	Medium	**Completed**
	Strategy 5b Improved Record Keeping of Cleaning	AWB	-Keep an electronic log of when each catch basin and CSS/MS4 basin has been cleaned, rather than just paper-based work	Low	**Completed**. This data is being

Phase	Initiative Strategy	Resources (internal/ external)	Task Details	Investment Level	Timeline
			orders. This will ultimately be replaced by CMMS system		collected in Utility Cloud.
Phase 3	**Strategy 5c** Additional catch basin cleaning	AWB	-Increase catch basin cleaning to reach a performance goal for frequency of catch basin cleaning	Medium	AWB has increased catchbasin cleaning to approximately 200/year.

Phase	Initiative Strategy	Resources (internal/ external)	Task Details	Investment Level	Timeline
Initiative 6 – Pump Station Condition Assessments					
Phase 2	**Strategy 6a** Conduct inventory & condition assessment of wastewater pump station equipment	AWB with Consultant Participation	-Review available drawings and each wastewater pump station to develop an initial equipment inventory -Conduct site visits to each station to verify equipment inventory and perform visual condition assessments -Review available maintenance logs and conduct interview discussion with AWB staff to develop performance and consequence of failure scores -Develop estimated, remaining, and adjusted remaining useful life for equipment -Gather life-cycle costs of equipment where available -Develop risk scores and assets and assign assets to CIP groups -Develop a rehabilitation/replacement CIP program for wastewater pump stations -Develop business cases for highest priority projects - Require the vendor that performs generator and pump stations inspections provide inspection data electronically which will eventually be incorporated in the CMMS	Medium	After Strategy 2b AWB has 30 pump stations that are visited frequently and evaluated annually. The formal condition assessments listed here will be completed at the large pump stations by 2024. All pump stations will be completed by 2029.
Initiative 7 – AMP Implementation and Continuous Improvements					
Phase 1	**Strategy 7a** Track implementation of AMP initiatives and schedule monthly Steering Committee meetings to review progress	AWB	Monthly Steering Committee meetings to review progress on AMP initiatives	Low	**This has begun and is occurring monthly.**
	Strategy 7b As data and analysis becomes available, add the information to the AMP. The plan should be reviewed and enhanced yearly.	AWB with Consultant Participation	As sections of the plan are developed add the information to the plan.	Low	This will be completed on an annual basis.

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