ATLANTIC CITY MUNICIPAL UTILITIES AUTHORITY

2018 ANNUAL REPORT

Prepared By:

Buchart-Horn, Inc.
2 Eves Drive
Suite 110
Marlton, NJ 08053

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1.0 Introduction

1.1 Background

The Atlantic City Municipal Utilities Authority (ACMUA) was formed by action of the Board of Commissioners of the City of Atlantic City on September 14, 1978. The Authority was created under the provisions of the New Jersey Municipal and County Utilities Law. On January 22, 1980 the ACMUA acquired the Atlantic City Water Utility and assumed operation and maintenance of the system.

ACMUA provides drinking water to Atlantic City which is located on Absecon Island in Atlantic County. In 2010 the United States Census Bureau identifies the size of Atlantic City as approximately 17.35 square miles, of which approximately 11.3 square miles is 'Land'. The City's official population dipped below 40,000 people in the 2010 census.

ACMUA also wholesaled water to the New Jersey American Water Company (NJAW) in the past, but that contract ended in November 2016, so ACMUA now provides only an emergency interconnection should NJAW need additional water.

1.2 Outstanding Bond Obligations

The Authority has issued a series of Revenue Bonds over the years and has refinanced when interest rates are favorable – current balances are shown in Table 1-1 below. In addition they have New Jersey Environmental Infrastructure Trust Loans that are also listed below.

Table 1-1
Revenue Bond Information

Bond Series	Amount	Status
2005 NJEIT Loan	$ 5,543,215	$2,316,142 balance
2006 NJEIT Loan	$ 2,458,103	$780,202 balance
2007 (Refunding)	$ 8,830,000	$5,890,000 balance
2009 NJEIT	$3,132,117	$651,128 balance Apx. half will be forgiven, Stimulus
2010 NJEIT	$1,990,000	$331,699 Apx. half will be forgiven, Stimulus
2012 (Refunding)	$7,030,000	$990,000 balance

All balances are as of 12/2018

Section 606 of the Revenue Bond Resolution for the 1986 Bonds requires that a Consulting Engineer make an inspection of the ACMUA's facilities and prepare an Annual Report to the Authority regarding maintenance, repair, and operation of the water system during the ensuing fiscal year, and complete a review of the annual operating budget for adequacy for the purposes of continued operation and maintenance.
This is the Annual Report for 2018.

1.3 WATER RATES

The water service charge for each ACMUA customer is the sum of the customer charge and the excess water rate. There are four major customer categories: Residential, Business/Commercial, Industrial, and Intergovernmental.

The Authority increased the base water rate on January 1, 2011. Due to the economic slowing and the Annual Appropriation to the City, the Authority entered 2013, 2014, 2015, 2016, 2017 (and now 2018) with essentially no reserve funds for Operations. The Authority issued Bonds to complete postponed capital projects in 2012 and additional NJEIT Funding will be required, as well as increases in user charges and fees, to fund projects in 2019 and beyond.

The connection fee is recalculated each year in accordance with a formula mandated by State law. Based on the Authority's finances in 2017, the connection fee was $15.4352 per gallon (average daily flow) for the year 2018. The adopted flow for single-family dwellings remains 225 gpd. Based on the Authority's finances in 2018, the connection fee is $20.9025 per gallon for the year 2019. The Authority's 2019 budget, including the connection fee, has been approved by the State of New Jersey.

1.4 ACMUA BUDGET

The proposed 2019 budget was revised and adopted by the Authority by resolution at a special meeting on December 19, 2018. Details of the revised budget are reviewed in Section 6.0 of this report.

1.5 ACMUA CUSTOMER BASE

The Authority's average daily water demand generally increased from 1980 through the early 1990's. Following this period, water demands generally decreased. The decreased water demands can be explained by the Authority's leak detection and control program, the decrease in residential water demand due to newer more efficient plumbing fixtures replacing older fixtures, and the closure of two casinos, resulting in mass layoffs with the additional effect of numerous forclosures affecting the Authority's bulk purchaser's supply needs.

In the 2010 Census the population of Atlantic City was given as 39,558. For 2017, the population projection was at 38,429. Data for 2018 is not yet available from the Census Bureau. The number of residential services peaked at 6,978 in 2007, of which 6,085 were single-family accounts. There were a total of 8,127 services ranging in size from 1-inch to 12-inch in diameter in 2010; there are slightly fewer in 2018 but an exact number is not currently available.

The non-residential water usage peaked in 2006. New Jersey American Water Company (NJAW) purchased water from ACMUA from 2001 until November of 2016 with a contractual minimum average daily purchase of 1.5 mgd. Those bulk water purchases by NJAW had largely mitigated reductions in average total demand occasioned by Casino closings, but the non-renewal of that contract had a large effect on 2017 usage. In 2018, the re-openings of two casinos (Hard Rock and Ocean) along with the opening of the new Stockton University Campus provided an increase in usage compared with 2017.

The ACMUA's Master Plan, dated December 2005, is in need of updating to account for a decade of system upgrades (process changes and new technology), as well as the projected reduction of water demands going forward. The Master Plan should also be reviewed and updated as necessary to address the recent Water Quality Accountability Act. Until then, the current Master Plan will continue to guide maintenance of the water treatment and distribution facilities.

2.0 EXISTING FACILITIES

2.1 INTRODUCTION

ACMUA's source waters are from a combination of surface and groundwater sources. Surface water is supplied by Doughty Pond (lower reservoir) which is in turn fed from Kuehnle Pond (upper reservoir) and Absecon Creek. Groundwater is supplied from a series of wells that draw water from the Kirkwood-Cohansey aquifer system. The raw waters from both Doughty Pond and the groundwater wells are conveyed to the headworks and pass through pretreatment and filtration. A list of the Authority's wells, including each well's present status, is provided in Table 2-1.

The coagulant used by the Authority is polyaluminum chloride. Sodium permanganate (oxidant) was added to allow a reduced rate application of sodium hypochlorite for a time, but the plant has discontinued use of that oxidant and resumed higher rates of sodium hypochlorite. Lime is added as part of preliminary and final chemical treatment for pH adjustment and to increase alkalinity.

The ACMUA's treatment system is comprised of screening, aeration, coagulation, flocculation, sedimentation, filtration, corrosion control, and disinfection processes. The solids produced during water treatment are thickened on site by gravity thickeners, and residuals are dewatered on newly re-covered sand drying beds and in open drying beds when needed. Dewatered solids are contracted out for off-site disposal. This disposal method is covered by a NJDEP Beneficial Use Permit most recently reissued in 2015 and remains in effect until February 2020. Daily Monitoring Reports (DMRs) indicate that Iron and Manganese levels in the solids continue to be in compliance.

2.2 Groundwater

In 2018, as previously, approximately 76% of the Authority's source water was drawn from the active groundwater wells. Lists of 'Active' and 'Abandoned' wells are included in this section.

The ACMUA currently utilizes 13 wells: 11 are located in the Kirkwood-Cohansey aquifer system and 2 wells are located in the Atlantic City 800-Foot Sand layer of the Kirkwood Formation. The wells in the Kirkwood-Cohansey aquifer are known as the Cohansey Wells, those in the 800-Foot Sand layer as the Kirkwood Wells.

The water from all active wells is conveyed to the Flow Diversion Box at the headworks of ACMUA's Water Treatment Plant located in Pleasantville, New Jersey. The Authority has seen a treatment benefit from the increased alkalinity contributed by addition of the Kirkwood wells to the other supply sources at the headworks.

Table 2-2
Present Status of ACMUA Supply Wells

ACTIVE/AVAILABLE

Well No.	Type of Aquifer	Status	Capacity, MGD	Treatment
Well No. 3	Cohansey	In Seasonal Service	1.50	ACMUA WTP
Well No. 9	Cohansey	Emergency	1.51	-
Well No. 10	Cohansey	Emergency	1.58	-
Well No. 11	Cohansey	Emergency	1.09	-
Well No. 12	Cohansey	In Service	1.50	-
Well No. 14A	Kirkwood	In Service	1.52	ACMUA WTP
Well No. 16, 17 & 18	Cohansey	In Service	1.73 ea.	ACMUA WTP
Well No. 19	Cohansey	Out of service – sliplining completed, NJDEP requiring 2 year wait due to diesel spill in 2013	1.44	ACMUA WTP
Well No. 20 thru 24	Cohansey	In service	1.73 ea.	ACMUA WTP
Well No. 25	Kirkwood	In Service	1.01	ACMUA WTP

Well No. 3 was previously pumped through two modular Centaur HSL™ granular activated carbon (GAC) adsorption filters but these flows now mix with, and are treated with other source waters. The GAC filters remain and could potentially be reused. Well No. 3 is normally active only from Memorial Day to Labor Day.

Well No. 12 is located next to Doughty's Pond and was also taken out of regular service because of contamination concerns from Prices Pit Landfill. These concerns have reduced over time, and a recent modification to the Authority's Water Allocation Permit allows the use of this well for up to 270 days per year, with a maximum of 90 days in a row. The pump is capable of 1,000 gpm but this Well is not currently needed and so is operated off and on primarily as part of the summer rotation.

Well No. 14 was abandoned and subsequently redrilled as Well 14A in 2005 and a larger pump was installed. Well No. 15 was redrilled and subsequently renamed Well No. 25 as requested by the NJDEP. Well No. 25 recently had a leak, but it has been repaired and the well is now back in service.

Well Nos. 16 through 24 are located on the grounds of the Federal Aviation Administration Technical Center in Egg Harbor Township. These wells were all constructed in 1984 and all the pumps, controls and appurtenances for each well are located in individual brick buildings. Each well pump is equipped with a 40 hp motor except Well No. 22, which received a replacement 50 hp motor in 2003. Well No. 23 had its motor rewound in 2013. This well currently has an electrical issue that is to be addressed. The current Allocation Permit increased the allocation for Well Nos. 16 to 24, and allows the Authority to drill a new Kirkwood Well. Well No. 19 is voluntarily out of service as a precaution after a small diesel spill in 2013. It was briefly placed back in service in early 2017, but was taken out of service again, because the column needed to be sliplined. The column has been sliplined, but NJDEP is requiring a 2-year wait to put this well back in service due to concerns over the diesel spill in 2013.

The remaining wells (shown below) were removed from service, sealed, and abandoned as a result of concerns related to the contamination produced by the Prices Pit landfill. The well houses are currently boarded up, and there are no usable electrical services.

Table 2-2
SEALED/ABANDONED

Well No.	Type of Aquifer	Status	Capacity, MGD	Treatment
Well No. 1	Kirkwood	Sealed	-	-
Well No. 2	Cohansey	Sealed	-	-
Well No. 4, 5, 6, 7 & 8	Cohansey	Sealed	-	-
Well No. 13	Cohansey	Sealed	-	-
Well No. 14	Kirkwood	Sealed	-	-
Well No. 15	Kirkwood	Sealed	-	-

The Authority has completed construction and testing of an Aquifer Storage and Recovery (ASR) ‘Well’ which is more correctly a water storage method and is discussed under section 2.18. The Permit to operate the ASR was revised and reissued on July 14, 2015.

2.3 Surface Water

In addition to groundwater, the ACMUA utilizes surface water to supply approximately 24% of the raw water for the treatment plant. The surface water is withdrawn from the lower reservoir (Doughty’s Pond) at the confluence of the North and South Branches of the Absecon Creek. This reservoir is ~12 feet deep and encompasses approximately 250 acres and has a storage capacity of 0.245 billion gallons of water. The water is diverted from Doughty’s Pond via an intake and gravity fed to the ACMUA Water Treatment Plant.

The upper reservoir (Kuehnle’s Pond) encompasses about 140 acres and provides storage capacity of approximately 0.250 billion gallons of water which is released into the lower reservoir.

The New Jersey Department of Environmental Protection’s *Status of the Water Supply of Southeastern New Jersey* states that the safe yield of Absecon Creek is 9.3 MGD, and the ACMUA has a daily allocation of 7.0 MGD and a monthly allocation of 217 MG from this creek. The allocation from this stream is further based upon maintaining a minimum flow of 3.2 cfs downstream of the Doughty’s Pond Dam. There are no violations of this minimum flow standard on record. The minimum flow is intended to protect water quality within the estuary, and no withdrawals are located downstream of the Authority's intake.

2.4 Surface Water Reservoir Intake and Transmission

Raw water is diverted from Doughty's Pond Reservoir via a submerged intake and includes an adjustable sluice gate located on the inlet-end of a submerged 48-inch pipe that stands about 2 feet above the bottom of the reservoir. Groundwater from Well Nos. 16 through 24 is pumped via a common 36-inch prestressed concrete transmission main into that 48-inch water main just downstream from Doughty Pond, and the combined flows are conveyed to the Water Treatment Plant through a 60-inch cast iron gravity transmission main. A section of this 60-inch, raw water Main was being undermined by erosion, and permanent protection of this Main was completed in early 2017.

2.5 Flow Diversion Box

The 60-inch gravity influent pipe connects to the diversion box at the treatment plant headworks. Recycled water from solids treatment also flows into the diversion box through a 12-inch reinforced concrete pipe and blends with the raw water from the 60-inch transmission main (see section 4.2). Then, the flow is directed through the Screening Chamber and to the low-lift pumps by a cast iron pipe. The flow into and out of diversion box can be isolated by sluice gates.

2.6 Screening Chamber

The screening chamber (aka fish house) is the first treatment unit at the water treatment plant. All raw water conveyed into the treatment plant from the diversion box passes through the screening chamber which consists of uniformly sized openings used to retain debris found in the raw influent water. This structure includes one mechanically self-cleaning, in-channel, traveling screen (Parkson, Model: Aqua Guard A-G-S-T) and one manually-cleaned screen. Small solids in the groundwater and return water from solids handling are too fine to be removed by the screens.

2.7 Aeration: Iron Removal

The existing aeration facilities were designed for the oxidation of iron found in the groundwater and in the reservoir (surface) water; oxidized iron is subsequently removed by the Flocculation/Sedimentation basins and filters. Aeration is achieved through a forced-air cascading tower. Water from the screening chamber is pumped to an aeration tower by three low lift pumps. All three of the pumps are rated at 50 ft total dynamic head. Two of the pumps are powered by 150 hp electric motors and one is powered by a 100 hp electric motor. Each of the larger pumps has a rated capacity of 8,333 gpm and the smaller pump has a rated capacity of 5,556 gpm.

The raw water enters the aeration tower from the top and cascades down over staggered PVC slats while an exhaust fan forces air up through the tower from the bottom. The aeration tower trays were all removed and cleaned in 2012.

2.8 Chemical Feeding: Pre- Treatment

Sodium hypochlorite is added to the water after aeration as an oxidant to help control biological growth within the flocculation and sedimentation tanks.

Polyaluminum Chloride is added to aid the oxidized iron and other matter to agglomerate into floc for removal by sedimentation and filtration. The polyaluminum chloride storage feed equipment is located in the chemical feed building near the low lift pumps.

Lime is added to the meter pit in front of the low lift pump clearwell to adjust/raise pH and aids in Manganese dropout.

2.9 Flocculation

Following aeration, staged, hydraulic flocculation occurs. The flocculation tanks operate in parallel. Each tank is 80 feet long, 21 feet wide and 21.5 feet deep, with an individual volume of 270,000 gallons. At the average daily flow of 12.0+ MGD, the hydraulic detention time is several hours, with both basins in service.

2.10 Sedimentation

The ACMUA utilizes high rate sedimentation to remove flocculated solids. Currently, each sedimentation tank is divided into an upper and lower pass by a concrete slab. Flocculated effluent enters the lower pass which runs the entire tank length. The concrete slab ends approximately seven feet from the end of the tank and the flow is redirected to the upper pass and is then sent through the upper pass in the reverse direction. The flow path is then directed through stalled, stainless steel plate settlers in the upper pass.

2.11 GAC Pressure Filter System

Well No. 3 on the grounds of the Atlantic City Water Treatment Plant is a 207 foot deep Cohansey Aquifer production well used only in the summer. Previously, the well was pumped through GAC filters but now pumps directly to the Diversion Box for treatment in the Aeration/Flocculation and Filtration Plant facilities. The GAC units remain onsite and could be employed for emergency use if necessary.

2.12 Filtration

The existing Filter Building houses a total of six gravity multi-media filters, a pipe gallery for the associated piping and valves, backwash pumps, and instrumentation and control systems. Three filters each straddle the center gallery. Each filter has the dimensions of 30 feet by 18.5 feet. The filters have a Wheeler underdrain system and the media was recently replaced with 36” of Granular Activated Carbon (GAC), Calgon 400, atop 12” of sand, and 12” of gravel. Filter media was replaced in 2017. The reconstruction of the filter units was completed in 2009 and periodic replacement of the GAC is ongoing – See Section 4.10.

2.13 Disinfection

At the ACMUA’s treatment plant, sodium hypochlorite is used for chemical disinfection. Sodium hypochlorite is added to the Sedimentation/Flocculation Basins; to the in-ground, covered, finished water storage basins; and then in the wetwell for the high lift pumps for final disinfection. The purpose of chlorination in this final point is to maintain residual disinfectant concentration in the distribution system as required by NJDEP regulations.

2.14 Chemical Feed

In order to prevent lead and copper from leaching out of the Authority’s distribution piping, a polyphosphate is added as a corrosion inhibitor. The Authority had previously used Klenphos as the polyphosphate, however, the Authority now has a contract with Shannon Chemical to provide liquid phosphate. The liquid phosphate is stored and fed in the same location as the final residual chlorine addition.

Fluoride is commonly added to water distribution systems as a means of preventing dental caries. The water fluoridation system was returned to operation in 2008 and the fluoridation is injected at 100 psi downstream of the high lift pump discharge and downstream of the interconnection with the New Jersey American Water Company. This feed point allows New Jersey American Water to receive water that has not been fluoridated. The Fluoride concentration for the City system is maintained below the AWWA recommended maximum of 0.7 mg/L.

Currently, Lime is also added to the wetwell of the high service pumps for pH adjustment prior to being conveyed to storage and the distribution system.

2.15 Water Treatment Plant Storage Facilities and Pumping Stations

Water from Filtration Plant effluent is disinfected and stored in Basins B and C. Treated water is also stored in the 6 million gallon (MG) standpipe. The total storage capacity of the ACMUA Pleasantville Treatment Plant with all basins and tanks in service is 9 million gallons.

Clearwell ‘B’ has a 2 million gallon capacity where the bottom of basin elevation is -4.68 ft and the height of the basin is 11 ft. Clearwell ‘C’ has a 1 million capacity where the bottom of basin elevation is -1.56 ft and height of basin is 7.75 ft. The clearwells can be operated either in parallel or in series as needed. The normal operation is for flow to progress in series through Clearwell ‘C’, then ‘B’ except when one Basin is off-line. A new floating cover was installed on Basin B in 2017.

The finished water flows from Clearwells B and/or C to the high service pump station wetwell by gravity. The bottom of this wetwell is at elevation -6.84 and it is 16.3 ft deep. The water is pumped from the sump to two 48-inch transmission mains by seven (7) High Lift Pumps. Four (4) of the High Lift Pumps are electrically powered; three (3) of these pumps are driven by variable frequency drives. Two (2) of the electrically powered pumps have capacities of 10.5 MGD and two (2) of these pumps have capacities of 6 MGD. Three (3) of the High Lift Pumps are powered by diesel engines and each pump has a capacity of 7,600 gpm.

The 6 MG standpipe storage tank has been in service since 2003. This tank has a common 24-inch inflow/outflow pipe. The inner diameter of the tank is 91 ft. The bottom of the tank is at 7 ft elevation and it overflows at elevation of 132 ft.

A booster pumping station currently serves the 6 MG standpipe. This station provides additional water flows and pressure to the transmission mains during periods of high demand. The booster pump station includes two pumps. Each pump has a capacity of 3,200 gpm.

2.16 Solids Handling

There are two sources of solids at ACMUA's water treatment plant: settled solids from the sedimentation basins and waste backwash water from backwashing of filters. The solids from ACMUA's treatment plant are handled in a circular thickener with a 70 ft diameter and/or a backup thickener of 40 ft diameter before pumping to the sludge drying beds. The polymer ZetaLyte is a primary coagulant and is added to the first thickener in a two stage thickening process where waste washwater is combined with the residue which has been pumped from the sedimentation tanks. After a period of settling, the supernatant from the larger tank is decanted to the head of the plant. The smaller tank can be used in series where it can provide additional settling time, or in parallel to provide additional capacity or to handle a separate residue stream (such as from the sedimentation tanks). The supernatant from the old thickener is also decanted to the head of the plant. The settled solids from the second thickener are mixed with a polymer and then pumped to the sludge drying beds.

There are four covered drying beds, with each bed being 40 ft by 40 ft, and one uncovered drying bed. Each bed is separated by a concrete wall. A new 'Fabric' cover was installed over the beds in 2013. The dewatered solids are currently hauled off-site for disposal, or used as soil conditioner.

2.17 Water Transmission

The potable water produced by the water treatment plant is conveyed to the Absecon Island distribution system by two 48-inch transmission mains (Missouri Avenue Main and Albany Avenue Main). These two mains are the only means of transmitting drinking water to the Atlantic City drinking water distribution system. Both of the mains are cast iron, and are supported on concrete and aluminum pipe cradles, which are subsequently supported by timber piles, across the tidal marshlands from Pleasantville to Atlantic City. The Missouri Avenue Main is 4.8 miles long and has been in service since 1916. The Albany Avenue Main is 4.4 miles long and has been in service since 1936. A number of the original transmission main cradles were rehabilitated in 1987 with aluminum supports. The Authority has completed several projects involving cradle replacements; most recently in 2012 and totaling 540 cradle replacements. Additional replacements (of ~135 cradles) were contracted in 2016 – see Section 4.16. A new phase consisting of ~135 cradles was potentially going to be bid in 2018, but was not. This phase may be bid in 2019.

Currently, there are two valve interconnection complexes serving the transmission main system. One interconnection is in the city limits of Atlantic City (behind the Convention Center) and the other interconnection is in Pleasantville (Meadows Valve Complex). These valve complexes allow the ACMUA to remove a section of 48-inch main from service during routine maintenance and emergency situations. With the completion of construction of these two valve complexes in 1999, older valve boxes were abandoned in place.

The Meadows Valve Complex is covered with a fiberglass enclosure. The valve complex is in a remote location through which the transmission main passes, approximately half-way along the pipeline between the water treatment plant and Atlantic City. The hardware needed for remote operation of the valves and actuators is in-place; and the control logic to support remote operation was added as part of the SCADA Upgrade Project that was completed in 2009.

The second valve complex is located behind the Convention Center in an underground vault. The hardware needed for remote operation of the valves and actuators is in-place, and the control logic was updated in the SCADA Upgrade Project to support this function.

A 24” High Density Polyethylene (HDPE) bypass transmission main for the Missouri Avenue interconnection crossing under the Beach Thorofare was installed using Horizontal Directional Drilling (HDD) in 2004 near the Convention Center. The original 48” cast iron transmission main resting on the bottom of Beach Thorofare was subsequently lined with a new 36” HPDE pipe to restore it to service in 2008.

The Albany Avenue transmission main, where it was an aerial crossing over Beach Thorofare since 1936, had to be replaced on an emergency basis in 2010. A new 42” OD (36” ID) HDPE pipe was drilled under the Thorofare and the aerial pipe was removed. This required the relocation of an existing 48” Butterfly valve on the North side of the Thorofare and the installation of a new 36” valve on the Bader Field side.

2.18 WATER STORAGE TANKS

The 1 million gallon (MG) Maryland Avenue storage tank is located at the intersection of North Virginia and Caspian Avenues. This tank is made of steel and has been in service since 1953 and is supported with tubular columns. An inside and out inspection of this tank was completed in December of 2014. The bottom elevation of the tank is 90.5 ft and the overflow elevation is located at 125.5 ft. This tank has a common inlet/outlet pipe, which is 16 inches in diameter. The interior of the Maryland Avenue Tank was drained and cleaned in the spring of 2015. The repainting of this tank was completed in 2016 – See Section 4-17. The tank was painted with the historic Absecon Lighthouse on it and is currently back in service.

The 2 MG Absecon Boulevard storage tank is located at the intersection of Maryland Avenue and Absecon Boulevard. This tank has been in service since 1999. The tank is made of steel and is of a single pedestal configuration. The overflow is located at an elevation of 125.5 ft. The base elevation is 10.0 ft. This tank has a common inlet/outlet pipe, which has a 16-inch diameter. This tank received surface cleaning and repainting beginning in 2013, with minor repairs and finishing touches (logo) completed in 2014.

The recently completed Aquifer Storage and Recovery Well (ASR) actually functions in a water storage capacity, in that water produced during periods of low demand are pumped into the Aquifer until needed. Water can be recovered from the Well during periods of high system demand. It is re-disinfected and then pumped into the distribution system with a delivery capacity of approximately 700 gpm. The Authority is now considering converting the ASR well to an active supply well, but must review concerns regarding saltwater intrusion, (re)permitting, etc., before deciding.

3.0 WATER DEMAND AND USAGE

3.1 HISTORIC DEMAND

Water delivered to Atlantic City generally falls into three categories:

- Water for which users are charged (billable consumption)
- Water used for fire fighting.
- Unaccounted-for-water, including system leakage, hydrant flushing, and water main breaks.

The total pumpage of the high lift pumps at the water treatment plant (i.e. total water provided to the City) in a year, divided by 365 days constitutes the Average Daily Demand (ADD). Maximum Daily Demand (MDD) is the highest quantity of water delivered in a single day during a given year. The maximum hour rate (in MGD) is the largest quantity of water delivered in a single hour during a given year multiplied by 24 hours. Average daily consumption is the total quantity of water that was measured by meter readings divided by 365 days. Unmetered Atlantic City Government Consumption is an estimate of the quantity of water used by the Atlantic City Government for which no billing records exist. Water usage is from January 1 through December 31, unless otherwise noted.

Table 3-1 shows historical water demand data since 1999. Long Term water use trends include:

- Atlantic City's water usage (ADD) peaked around 1991 then generally decreased through the rest of the 1990's. This is partly the result of changes in the state plumbing code requiring water conserving fixtures in new construction and renovations, and partly due to projects undertaken by the Authority to reduce system leaks.
- Since 2001 the ADD has fluctuated within a relatively narrow range of 12 MGD to 13 MGD, even as the number of connections went up. In 2014 the ADD exceeded 13 MGD for the first time, while the Maximum Daily Demand has reduced. This was affected by bulk purchases (by NJAW) and pumping into the ASR Well.
- In 2015 both ADD and MDD had dropped to below their respective averages for the last 15 years, and the ADD especially has dropped further due to closing of the Taj and non-renewal of NJAW's bulk purchases.
- The maximum hourly rate for 2017 reached ~2.6 times the average daily flow rate.

Table 3-1
Water Demand and Usage

Year	Average Daily Demand (MGD)	Maximum Daily Demand (MGD)	Ratio of Max Day to ADD	Maximum Hourly Rate (MGD)	Average Daily Consumption (Billable) (MGD)	Unmetered AC Govt Consumption (MGD)
1999	12.23	18.315	1.50	21.36	10.09	0.10
2000	11.24	14.362	1.28	17.95	9.34	0.10
2001*	12.22	15.857	1.30	18.89	10.04	0.10
2002	12.66	18.106	1.43	20.04	10.75	0.15
2003	12.97	18.270	1.41	21.00	10.91	0.10
2004	12.94	18.490	1.43	24.73	10.50	0.15
2005	12.86	17.474	1.36	22.44	10.64	0.15
2006	12.52	18.444	1.47	26.52	10.997	0.05[1]
2007	12.16	17.333	1.43	21.50	10.68	0.05[1]
2008	12.15	17.070	1.41	21.00	10.36	0.05[1]
2009	11.73	15.843	1.35	21.50	10.23	0.05[1]
2010	12.53	19.74[2]	1.57	21.50[3]	10.122	0.05[1]
2011	12.97	18.184	1.40	21.50	9.987	0.05[1]
2012	12.81	17.859	1.36	21.50	10.260	0.05[1]
2013	12.996	17.917	1.378	21.50	10.199	0.05[1]
2014	13.206	17.697	1.34	17.697	9.822	0.05[1]
2015	11.323	15.315	1.353	21.50	9.2166	0.05[1]
2016	10.483	16.388	1.563	21.50	8.8486	0.05[1]
2017	8.294	11.250	1.356	21.50	6.876	0.05[1]
2018	9.216	11.470	1.245	21.50	7.237	0.05[1]

* From November 1 of the previous year to October 31 of the listed year.
1 Unmetered consumption includes system flushing water and fire flows.
2 On July 7, 2010 Thermal Energy L.P. leaked > 1MG, and NJAW purchased an additional 2.5 MG.
3 Exclusive of July 7, 2010 as indicated in Note 2 above.

3.2 ABILITY TO MEET DEMANDS

The NJDEP has determined that ACMUA's firm capacity is 24.52 MGD. This capacity exceeds the maximum daily demand for the past 20 years and can support the maximum daily demands projected through 2030 under a high growth scenario in the Master Plan. The maximum recorded hourly demand of 26.52 MGD (in 2006) can be readily met by a combination of the water production and supply facilities and the existing storage capacity. Thus, the Authority possesses adequate water supply and treatment capacity.

Some portions of the water distribution system are not able to supply desired fire flows. As discussed in the Master Plan, these locations are served by fire hydrants located on undersized mains. The Authority places a high priority on relocating fire hydrants to adequately sized mains and replacing mains where needed. Previously, the Capital

Budget contained a five (5) year capital improvement commitment to allocate more than $7.46M to further upgrade the distribution system. However, additional funds have been allocated for this effort and there is currently $14.35M budgeted for the replacement of water mains.

4.0 OPERATION AND CONDITION OF THE SYSTEM

4.1 WELLS

As noted earlier and shown in Table 2-1, the ACMUA has twelve (12) water production wells currently in service with a combined yield of 17.35 mgd. Well #19 (Cap. 1.44 mgd) needs to had its column re-sleeved, but NJDEP is requiring a 2-year wait to put this well back in service due to concerns over the diesel spill in 2013. Well #23 (Cap. 1.73 mgd) has an electrical issue that needs to be addressed. The motor on Well #25 (Cap. 1.01 mgd) shorted out and was replaced. At Well #17 a new transfer switch for the generator is to be installed. Another three wells (Nos. 9, 10, and 11) with capacity of 4.18 mgd are also available for emergency service. The upgraded SCADA system which covers the wells along with the treatment plant was completed in 2009. Routine maintenance to maintain all useable wells in an operable condition should continue as has been the past practice.

The ASR 'Well' is discussed under section 4.17.

4.2 SURFACE WATER RESERVOIR INTAKE AND TRANSMISSION

The surface water intake at Doughty Pond is controlled by a sluice gate that is operated by a 1/2 hp actuator (Limitorque Accutronics MX20). Plant personnel can also manually operate the sluice gate to increase or decrease the amount of reservoir water flowing to the plant. The existing dam spillway itself is sound and minor cracks were resealed in 2016. However the dividing wall and discharge channel wing walls are progressively deteriorating with vegetation growing out of gaping holes. While these structures are separate from the Dam proper, the undermining of the discharge channel's wing walls (both sides) is stressing the fencing around the spillway and therefore site security. The fence mounted 'to' the west wing of the intertidal channel is in danger of collapse and will take electrical conduits and the security camera with it should it collapse. These wing walls and fencing should be scheduled for repair.

The Kuehnle Pond Dam spillway was refurbished/upgraded in Spring 2011 and is in very good condition. A tree fell and damaged a portion of the fence in the Summer of 2018.

4.3 FLOW DIVERSION BOX

The walls of the diversion box were originally raised 3.3 feet in the 1980's and this raised section was permanently replaced with concrete and painted with a concrete sealer. No visible leakage was observed at the time of the current inspection.

4.4 SCREENING CHAMBER

The raw water screens are operational and the mechanical bar screen is fully automatic. Plant operations staff report that the manually-cleaned screen rarely requires cleaning.

The overall Screening Chamber Building and concrete floor are in good shape, but two windows are cracked and surface rusting of structural members was noted. Minor damage to the siding was also noted. A standard household electrical strip outlet is still being used as an extension cord to provide power to the sampling pump. A new outdoor-type outlet should be extended to the vicinity of the pump, or the power cord from the pump should be extended and the strip outlet removed from this wet area. This minor electric revision was to be scheduled in 2016, but remains as was.

Raw water turbidity is determined by collecting grab samples from influent channel in the Screening Chamber.

4.5 AERATION: IRON REMOVAL

The low-lift pumps are used to convey the water to the aeration tower. Low-lift pump #1 was rebuilt and the piping cleaned in 2015. The other low lift pumps, header, and check valves are in good working order. The VFD for low-lift pump #2 is currently out of commission and needs to be repaired. A new VFD for low-lift pump #3 was installed in late 2017. The aeration tower is operable and the trays were removed and cleaned in 2012. The large air distribution manifold atop the building is shedding paint in large flakes and is in need of surface prep and repainting. Other structures viewable from the aeration deck (on adjacent roof) also need paint.

4.6 Chemical Feeding: Pre-Treatment

Pre-treatment chemical feed consists of sodium permanganate, lime, polyaluminum chloride, and sodium hypochlorite. As of June 2015 the Authority has ceased use of the permanganate and increased chlorine injection. Sodium hypochlorite is stored in the Low Lift Building in large capacity (2,000+ gal), conical bottomed tanks and is added after the aeration tower.

The polymer storage and feed pumps were changed to polyaluminum chloride in 2010. The existing tanks and the containment area are in good condition. The original garage door was replaced with customized, removable modular wall panels and a pedestrian door in 2013, and they remain in good condition.

The pre-lime feed system is operable and the metal doors to this Lime Silo were recently replaced and the interior cleaned. Underground lime feed piping was installed in 2008.

The post-lime feed system is deteriorated but still operable. A pre-packaged replacement system, and relocation of the post-lime addition point is currently under contract and construction is anticipated to begin early in 2019.

4.7 Flocculation

The concrete basins and baffles are in generally good working order. Some additional concrete repairs of cracks and spalling were completed in 2015, however, there is ongoing spalling in other areas particularly at the railing mounts (Fish House side) and concrete repairs should continue.

4.8 Sedimentation

The stainless steel plate settler units are generally performing well. All shoes were replaced in 2011 or since, and a 48-hour backwash cycle was being maintained.

4.9 GAC Pressure Filter System

The GAC filter unit is still maintained in stand-by but is no longer used.

4.10 Filtration

Construction of a new filter underdrain system and installation of new filter media was completed in 2009. At the time of the inspection, filter #1 was out of service due to a drain valve issue. The Authority is currently assessing options, as the valve is difficult to access and work on. Other filters were reported to be functioning well. The fiberglass grating is in generally good condition, with minor bowing. The filter control PLC cabinets and MCC cabinets were replaced as part of that 2009 rehabilitation project. A new air dryer was installed in March 2015. A new compressor was installed in 2018. The old unit is maintained as a backup.

The supply to the backwash pumps is taken directly from the filtered water effluent header that feeds the clearwells. Only one filter is backwashed at a time. Backwash frequency varies with production. During peak production in the summer months each of the six filters is typically backwashed daily. During the remainder of the year, each filter is typically backwashed every forty-eight hours; three filters are backwashed each day.

The lower level of the filter building (piping gallery) is a high humidity (corrosive) environment. Testing of the high solids Epoxy paint used successfully in the high lift building has been less successful on this piping due to the environment. This area is susceptible to flooding in heavy rains coincident with severe high tides. Sand bags were previously used to prevent flooding but they created an impediment to access for maintenance and repair and were removed. The surrounding area has been regraded and sloped to provide flood protection without the use of sand bags.

4.11 Disinfection

Sodium hypochlorite is stored in the Low Lift Building and fed after the aeration tower as part of Pretreatment (see section 4.6). Sodium hypochlorite is also fed to Basins B and C via the diversion box, as well as into the wetwell before the High Service Pumps for final disinfection. The sodium hypochlorite tanks in the high service building are in good condition, as are the 500 gallon conical bottom storage tanks. The containment area was rehabilitated and new chemical feed pumps installed in 2009 and remain in good condition at the time of the inspection.

4.12 CHEMICAL FEED

Calcium polyphosphate is added to control corrosion within the distribution system. The polyphosphate is stored in the high service pump building, and fed to the wetwell before the High Service Pumps. The polyphosphate storage tanks are 500 gallon, conical bottom tanks. The polyphosphate feed pumps were observed to be in good condition.

The fluoridation system, restored in 2008 is reportedly operating well and the concentration is maintained below 0.7 mg/L.

The pre-lime system was discussed under section 4.6 of this report. Lime is also added to the pipe header behind the High Service Plant for final pH adjustment. The post-lime system equipment and the old lime building are badly deteriorated and a replacement system is ready to be put out to bid.

4.13 WATER TREATMENT PLANT STORAGE FACILITIES AND PUMPING STATIONS

Clearwell 'B' received a new floating cover in 2017. Clearwell 'C' received a new floating cover in 2002, but it had been showing increasing wear and was repaired by Layfield in 2018. However, Basin 'C' is currently out of service due to seam leakage that needs to be addressed prior to being placed back into service.

The finished water flows from Basins B and/or C to the high service pump station wetwell by gravity. The bottom of this wetwell is at elevation -6.84 and it is 16.3 ft high. The water is pumped from the clearwell under the High Service Plant to two 48-inch transmission mains by seven High Lift Pumps.

The High Service Pump Station includes four electric motor driven pumps and three diesel engine driven pumps. The building housing the High Service Pumps is in excellent condition, and the pumps that were in operation during our inspection were generally in good working order. In general, plant operations staff reports no significant problems with the High Service Pumps themselves, however the VFD drive for pump #3 had to be replaced in 2015. The high-solids epoxy paint of the piping (and fittings) has been completed.

The 6 MG storage tank is filled by a 16-inch main from system pressure produced by the High Service Pumps. The adjacent booster station pumps water out of the 6 MG tank into the 48-inch transmission mains.

4.14 SOLIDS HANDLING

ACMUA's solids handling system has two gravity thickeners that can be operated either in series or in parallel. The 70ft diameter thickener was put into service in 2000 and it has a capacity of approximately 285,000 gal. All of the equipment associated with this thickener is operable, and there is no visible damage to the basin concrete, grating, and/or handrails. The 40 ft. diameter thickener (aka old thickener), has a capacity of approximately 100,000 gal.

The larger thickener works as a decant system. After a period of settling, the supernatant from the first tank is decanted by means of three 10" diameter perforated pipes at different heights along the inner perimeter of the tank. These pipes are located at 3, 5 and 7 feet above the bottom of the wall and decanting in each pipe is controlled by valves. By opening the valve for the pipe below and closest to water surface, the supernatant is decanted to the head of the plant.

The supernatant from the old (smaller) thickener can also be decanted to the head of the plant. If the old thickener is full, any solids it subsequently receives results in supernatant being recycled to the head of the plant, however this flow is not metered. Therefore, plant personnel are not able to determine the exact amount of flow recirculated through the plant. Currently, plant personnel make an estimation of the amount of flow based on backwash wastewater. The Authority should consider installing a flow meter to accurately track the recirculated flows. The settled solids from the second thickener are sent to the sludge drying beds.

The sludge drying beds were recovered in 2013 and the drying beds were doing a good job of drying the solids at the time of our inspection. An auxiliary uncovered sludge drying basin between the filter building and the sedimentation basins was also in use at the time of the inspection.

4.15 WATER TREATMENT PLANT ADMIN/MAINTENANCE BUILDING

The main (entry) building at the water treatment plant houses the administration offices, the laboratory, and storage and maintenance facilities. Overall the building is well maintained and kept clean. The outside pilaster (roof support) on the south side of the building had several (~20) bricks replaced and the entire wall was repointed in 2017.

4.16 WATER TRANSMISSION

The water transmission mains that convey potable water from the water treatment plant to the distribution system have no reported leaks. Both of the transmission mains are supported on concrete and aluminum pipe cradles, which are supported by timber piles. The entire lengths of the mains were inspected after Hurricane Sandy and found to be essentially undamaged. Annual re-inspection of these mains is standard practice. Inspections typically include visual inspection of exposed portions of timber piles, pile caps, and pipe joints.

The Authority continues to undertake regular improvements to the water transmission mains. The Authority's control system was updated to allow remote operation of the two valve interconnection complexes, located in the meadows between Pleasantville and Atlantic City and behind the Convention Center in Atlantic City, however permanent power for the valve operators in the Meadows has not been installed.

The two critical crossings of the Beach Thorofare were replaced: the Missouri Avenue crossing was paralleled in 2004 and the original main was slip lined in 2008; while the Albany Avenue crossing was replaced on an emergency basis in 2010.

4.17 WATER STORAGE

The Maryland Avenue tank was painted in 2016, and the interior ladder, and the exterior elevated platform and ladders, were replaced. The work proceeded once a nesting Falcon was relocated from its' perch beneath the tank bowl. The tank is now decorated with the historic Absecon Lighthouse and is currently in full service. There were some minor touch-ups (ex: turnbuckles) that were completed early in 2017.

The Absecon Boulevard tank completed its' repainting and repairs in 2014. This tank was in good condition at the time of inspection. Miscellaneous valves and fittings are being stored inside.

The Authority has tested its' Aquifer Storage and Recovery (ASR) well system designed to provide additional storage and peak demand capacity to Absecon Island. Initial testing uncovered quality concerns during recovery, and the facility's Permit has been modified to convert pH control to Soda Ash and to allow the as-needed addition of a polyphosphate sequestering Agent. These revisions were approved by NJDEP (via Permit Modification) and full operation can begin upon completion of that work. The output of ASR wells is limited by the Allocation Permit issued by the New Jersey Department of Environmental Protection to the Authority in 2008. The Authority is now considering converting the ASR well to an active supply, but must review concerns regarding saltwater intrusion, permitting, etc., that such conversion would entail. The amp breaker for the ASR well recently broke, therefore, there is currently no power to the ASR well.

4.18 ADMINISTRATION BUILDING/FACILITIES

The Authority's Administrative Office is surrounded by storage and Maintenance Facilities which are located between the two elevated water storage tanks. Some panel and window seals have come loose along the Route 30 frontage of the Administration building. The drain in the Utility Closet was clogged, but has been repaired. Some mold was observed in the ceiling of the Boiler Room, likely due to condensation when the pumps shut off. The Skylight was leaking, but has been sealed with epoxy. The roof was leaking and was repaired in 2018. The roof is scheduled for replacement in Spring 2019. The Administration building and grounds are otherwise generally well maintained.

The Maintenance facilities are well maintained and orderly. The surrounding storage yard is becoming cluttered with salvage (old valves, hydrants, etc.) and new equipment (meter pits, etc.), however, there is less clutter than was observed during the previous year's inspection. A section of the wrought iron fencing on the north side of the vehicle maintenance yard was repaired with chain-link, as was the cantilevered access gate, and yard fencing in several locations has been damaged, but site security is intact.

4.19 WATER DISTRIBUTION

The water distribution system is constantly being upgraded and repaired. Regular upgrades include: valve maintenance and replacement, fire hydrant maintenance and replacement, water main replacement, and metering upgrades. The distribution system is reportedly in generally good condition, but a hydraulic model of the system revealed that a number of fire hydrants in areas served by undersized water mains cannot adequately provide fire flows. Some hydrants have been relocated to larger mains nearby and a five year program of replacing undersized mains began in 2016 and will continue to be a priority in future water main projects.

4.20 PROJECTS UNDERTAKEN IN 2018

In 2018, the Authority undertook a number of upgrades to its facilities. The following improvements were completed.

1. Replacement and upsizing of existing water mains was completed in the following streets as part of ACMUA's 5-year Replacement Project:
   - Ventnor Ave (Albany to Raleigh): Replaced apx. 2,600 LF of 6" and 8" water main with 8" DIP and various 4" and 6" DIP connections.
   - New Jersey Ave (Atlantic to Pacific): Replaced apx. 310 LF of 12" water main with 12" DIP.

2. Design, bidding and shop drawing submittals for Post-Lime Feed System at the Pleasantville Water Treatment Plant.

3. New motor for Well #25.

4. New compressor for the filters at the Pleasantville Water Treatment Plant.

5. Repaired leak in roof at Administration Building (N. Virginia Avenue).

6. 1,000 meter changeout project (427 meters were replaced in 2018).

4.21 OPERATION AND MAINTENANCE PROGRAMS

4.21.1 Procedures

The Authority continues to develop and improve its operation and maintenance procedures. The Authority's operation and maintenance documentation is regularly updated with the manuals provided following the completion of major projects.

4.21.2 Hydraulic Mapping

The entire distribution system was compiled into a Geographic Information System (GIS) program. A Hydraulic Model was created some years back which included the GIS data. This Model was used to perform a fire flow analyses of the distribution system and develop priorities in the replacement of undersized mains. However, some information in the Model's output was found to be incorrect, but the Model cannot be updated or corrected as the Authority has never received an operable (electronic) copy of same.

If an updatable version of the Model cannot be attained so that it can be corrected and newly upsized piping added, then the Authority should consider creating a new Hydraulic Model of the entire water system – to include the transmission mains and storage tanks.

4.21.3 Security

The ACMUA has undertaken a number of security improvements in recent years. Some of these improvements include installing new cameras (PTZ) throughout the Authority's facilities, and improving the ability of Authority personnel to conduct regular security patrols. In addition the upper reservoir (Kuehnle Pond) is within the FAA regulated area where security is tight, and the lower dam is under video surveillance. The Authority continues to regularly improve its security practices.

4.22 REGULATORY COMPLIANCE

4.22.1 Lead and Copper Testing

The ACMUA adds a polyphosphate corrosion inhibitor to ensure compliance with the lead and copper rule. Ongoing testing has shown that the Authority complies with the lead and copper rule and the Authority has received reduced sampling requirements from the New Jersey Department of Environmental Protection (NJDEP). The recent sampling for both Lead and Copper were below the MCL, therefore the reduced sampling will continue.

4.22.2 Groundwater Under the Influence of Surface Water

The Authority has received a determination from the NJDEP Bureau of Safe Drinking Water (BSDW) that the Authority's groundwater sources are not vulnerable to direct influence of surface water.

4.22.3 Water Conservation Requirements

The Authority continues to operate in accordance with the Authority's Diversion Permit that was issued by the New Jersey Department of Environmental Protection.

4.22.4 Turbidity Rule

To achieve compliance with the Interim Enhanced Surface Water Treatment Rule (IESWTR) the Authority must produce filtrate with a monthly 95th percentile turbidity limit of 0.3 NTU. The Authority complies with this requirement by routinely producing filtrate with a 0.03 average NTU.

4.22.5 Water Diversion Rights

The Authority's Water Allocation Permit was revised in 2008 to include the ASR well and revised again in 2009 to increase the maximum diversion from Wells 16 to 24 and allow the Authority to drill a new Kirkwood Well. The Authority has submitted a renewal for their allocation permit during calendar year 2018 and is awaiting response from NJDEP.

4.22.6 Disinfection By-Products Rule

The Authority regularly undertakes testing to determine compliance with the Disinfection By-Products Rule. Testing undertaken by the Authority indicates that all Disinfection By-Products are within the promulgated limits (typically 30-40 mg/L trihalomethanes and 10-15 mg/L of haloacetic acids).

4.22.7 Primary and Secondary Drinking Water Standards

The Authority meets the regulatory schedules for monitoring all Primary and Secondary Drinking Water Standards. Testing indicates that each parameter concentration is either non-detectable or within NJDEP limits.

5.0 PLANNED WORK AND RECOMMENDATIONS

5.1 COORDINATION WITH MASTER PLAN

The Authority's Board of Directors adopted the Master Plan (dated December 2005) in January 2006. The Master Plan includes a number of recommendations for operational and capital improvements through the year 2030 and has been a framework for selecting improvements to the Authority's systems. However, in the intervening years many upgrades have been completed, and changes in technology and water demand in Atlantic City have presented a need for the Authority to update the Master Plan in the near future to guide future decision making. The Master Plan should also be reviewed and updated as necessary to address the recent Water Quality Accountability Act enacted by the New Jersey State Legislature.

5.2 RESERVOIRS AND SURFACE WATER INTAKES

Below the spillway at the Doughty Pond reservoir, the discharge channel wing walls (and fencing) continue to deteriorate and should be scheduled for repairs.

Currently, plant operations staff are unable to directly measure the quantity of source water withdrawn by the surface water intake, and the amount of water recycled from the solids handling units. Where possible, water meters should be added to the treatment facility so that these parameters may be directly measured. This work was originally scheduled in the Master Plan for the 2005-2010 timeframe; however other emergency repair work along with budget constraints have postponed this work.

The fence below the spillway at the Kuehnle Pond Dam should be repaired.

5.3 WELLS

It is generally recommended to redevelop water supply wells once every 5 years, and the transmission main between the Cohansey well field and the surface water intake should also be regularly cleaned to ensure continued hydraulic capacity.

Remediation of the diesel spill at Well #19 has been substantially completed, and the column has been sliplined. The well is ready to return to service upon receipt of permit to use from the Authority's LSRP. Email communication from the LSRP regarding return to service was received in early 2019.

The electrical issue at Well #23 should be addressed.

At Well #17, the new transfer switch for the generator should be installed.

At Well #25 the building is in generally deteriorated condition – rusting out (along the bottom) - and the outdoor piping should be wire brushed and painted. Also, the plywood cover over the discharge piping pit is rotted out.

5.4 RAW WATER TRANSMISSION MAIN

The 60-inch transmission main which conveys the raw water from the Lower Dam to the Treatment Plant is being undermined by erosion at the crossing of Ables Run and construction of a permanent, structural protection at this location was completed in early 2017.

5.5 WATER TREATMENT PLANT

Ventilation of the covered drying beds has been upgraded, however, during peak periods of water production, the covered drying beds can be inadequate to dewater the removed solids and an interim outside drying bed is used. Expansion of covered drying bed capacity is still under consideration, but is not currently planned for 2019.

The Authority possesses a large physical plant. Over time, various components wear out and require maintenance and/or replacement. The Authority conducts various renovations on an ongoing basis. During our inspections, a number of current deficiencies were identified. Correcting these deficiencies as soon as practical is in accordance with the Master Plan. The deficiencies are identified below:

- Repairs to the rest of the spalling concrete atop the Flocculation basins should be scheduled.

- Replacement of the floating cover on Basin 'B' was completed in 2017. Repairs to cover on Basin 'C' were completed in 2018. Replacement of Basin 'C' should be completed within the five year budget.

- Filter #1 is out of service due to a drain valve issue. The Authority is currently assessing options, as the valve is difficult to access and work on.

- The VFD for low lift pump #2 should be repaired.

- Construction of the post lime equipment is scheduled to commence in early 2019. The project is expected to be completed in 2019.

- Repair/replacement of the roof over the screening chamber should be scheduled.

- Replacement of the remaining corroded steel doors throughout the facility.

- Repairs to the discharge channel and wing walls below the spillway of the lower dam. These walls continue to deteriorate and should be addressed promptly.

As equipment ages, it will require periodic maintenance and rehabilitation due to normal wear-and-tear. In accordance with the Master Plan, equipment should be regularly evaluated and maintained or rehabilitated as required. Components that should be regularly evaluated include:

- Chemical Feed Pumps
- Chemical Feed Tanks
- Low Lift Pumps
- High Service Pumps
- Gravity Thickener Drives
- Pre and Post Lime Feed Systems
- Storage Tanks and Basins

An Asset Management system could be considered to better track and manage the equipment.

5.6 TRANSMISSION MAINS

The two 48-inch transmission mains and their cradles are mostly above-ground and exposed to the elements. These transmission mains were inspected after Hurricane Sandy and they held up well, but ongoing evaluation and maintenance of these mains is required. Bid specifications for the next phase of the ongoing replacement of approximately 135 cradles (total - both mains) have been prepared and was originally scheduled to be bid in 2018, but was not. This phase should be bid after the Gateway Bridge Construction phase is completed.

The Authority inspects the transmission mains on an annual basis. Annual inspections should continue and should include visual inspections of exposed portions of timber piles and pile caps. Pipe joints should be inspected to detect visible leaks and any pipe sags should be identified. The Authority should also continue the replacement of piles and pile caps and other support structures, as needed.

5.7 DISTRIBUTION SYSTEM

The Maryland Avenue tank was repainted in 2016 with the historic Absecon Lighthouse depicted on it. Many base nuts and bolts were replaced as was the exterior ladder and platforms and the interior ladder. The tank is back in service and some minor touch-up work has been completed.

The amp breaker for the ASR well needs to be repaired, as there is currently no power to the ASR well.

Many of the residential neighborhoods in Atlantic City are currently/still served by undersized 4” mains. The Authority is pursuing the replacement of undersized and poorly performing mains each year as economically feasible. Regularly replacing and upgrading the distribution system is consistent with the Master Plan. Also, fire hydrants, valves, and meters are to be systematically replaced throughout the distribution system on an ongoing basis whether in conjunction with or independent of the water main replacement program.

The current five (5) year Capital Improvement Plan indicates that at least $14.35M is budgeted for the replacement of selected water mains. In light of the recent Water Quality Accountability Act, efforts to increase the budget for this Capital Improvement Plan resulted in an increase of $5.8M over the previous estimate, with immediate plans to replace more mains in the upcoming 2019 phase, than was previously proposed. Priority has been given to output from the existing hydraulic model indicating underperforming hydrants, as well as staff knowledge of leaking valves and/or hydrants and valves with other known maintenance problems.

The Authority is currently making revisions to its valve exercising program and the its fire hydrant inspection, testing and flushing programs to comply with the Water Quality Accountability Act.

5.8 SECURITY

The Authority will continue to regularly evaluate and improve its security practices, especially as required by the cybersecurity component of the Water Quality Accountability Act. The Authority contracted with a cybersecurity specialist in 2018 to address this component of the Act. The Authority developed a Cybersecurity Program, Policies and Procedures in 2018, and also completed the Water Quality Accountability Act Cybersecurity Program Submission form to the New Jersey Cybersecurity and Communications Integration Cell (NJCCIC).

6.0 REVIEW OF 2019 BUDGET

6.1 Revenue and Expenditures Budget

The 2019 budget of the ACMUA is in compliance with the requirements of the New Jersey Department of Community Affairs.

6.2 Anticipated Revenues

Revenues of $ 17,532,316.00 are anticipated to be produced from the following sources:

Service Charges	$ 17,456,653.00
Connection Fees	----
Other Operating Revenues	$ 35,663.00
Total Operating Revenues	$ 17,492,316.00
Interest on Investments & Deposits	$ 40,000.00
Total Anticipated Revenues	**$ 17,532,316.00**

These anticipated revenues represent an increase of >$2.42M (16.1%) from 2018.

6.3 Budgeted Appropriations

Appropriations of $ 17,532,316.00 have been budgeted in the following areas:

Operating Appropriations	
Administration	
Salary and Wages	$ 1,094,219.00
Fringe Benefits	$ 858,377.00
Other Expenses	$ 795,834.00
Total Administration	$ 2,748,430.00
Cost of Providing Services	
Salary and Wages	$ 3,447,787.00
Fringe Benefits	$ 3,163,492.00
Other Expenses	$ 3,496,539.00
Total Cost of Providing Services	$ 10,107,818.00
Total Principal Payments on Debt Service In Lieu of Depreciation	$ 1,325,580.00
Total Operating Appropriations	$ 14,181,828.00

Non- Operating Appropriations

Total Interest Payments on Debt	$	314,071.00
Renewal and Replacement Reserve(s)	$	3,031,417.00
Municipal Appropriation	$	709,091.00
Other Reserves	$	5,000.00
Total Non-Operating Appropriations	$	4,059,579.00
Total Operating & Non- Operating Appropriations & Deficit	**$**	**18,241,407.00**

Total Appropriations exclusive of the Municipal Appropriation is **$17,532,316.00**

6.4 CAPITAL BUDGET

The ACMUA Capital Budget addresses how improvements to the Authority's infrastructure will be funded over the next five years. The anticipated project amounts are based upon the recommendations in this report and the Master Plan. The projected annual costs are:

Year	Estimated Total Cost
2019	$ 9,883,246.00
2020	$ 6,274,549.00
2021	$ 14,964,274.00
2022	$ 4,999,358.00
2023	$ 7,235,000.00
Total	**$ 43,356,427.00**

Sources of funding for the 2019 Capital Budget are as follows:

Unrestricted Retained Earnings	$	7,183,246.00
Renewal and Replacement Reserve	$	0.00
Debt Authorization	$	2,700,000.00
Other Income	$	0.00
Total for 2019	**$**	**9,883,246.00**

Expected sources for Capital Funding for the Capital Budget for 2019 and inclusive of the next 5 years (until 2024) are as follows:

Unrestricted Net Position	$ 25,856,427.00
Renewal and Replacement Reserve	$ 0.00
Debt Authorization	$ 23,400,000.00
Other Income	$ 0.00
Total for 2019 to 2024	**$ 49,256,427.00**

Analysis of the budget shows that there are sufficient funds to cover all operating expenses. A combination of unrestricted earnings and authorized/new debt is required to fund the proposed 2019 capital projects, and those anticipated for the next five years.

7.0 SUMMARY

The ACMUA continues to provide safe, adequate, and reliable potable water service to its customers in order to meet their domestic, commercial, and fire protection needs. The Authority possesses the needed system capacity to satisfy current and projected potable water demands.

The Authority continuously improves its facilities. A variety of projects to improve the Authority's facilities are recommended for 2019 including:

- Re-roofing (or repairs) of the screening chamber roof.

- Installation of a new Post-Lime system and demolition of the old post Lime system. Construction of this project is scheduled to begin in early 2019.

- Various minor repairs (such as replacing rusted doors, Misc. painting, patching of spalling concrete) at the water treatment plant should continue.

- Scraping and painting of the air piping atop the low lift building.

- Drain valve issue for Filter #1 should be addressed.

- Repair of VFD for low lift pump #2.

- Installation of new transfer switch for the emergency generator for Well #17.

- Sliplining of column for Well #19.

- Repair of electrical issue for Well #23.

- Refurbishment of exposed portions of Well #25 structures, as well as repair of leak.

- Repairs to the discharge channel walls and fencing below the lower dam (Doughty's Pond).

- Repairs to the fencing below the spillway at the upper dam (Kuehnle's Pond).

- Repair of the amp breaker for the ASR well.

- Continued replacement of undersized water mains as part of a 5-year ongoing project.

- Fire hydrants, valves, and meter replacements throughout the distribution system on an ongoing basis.