STATE OF NEW JERSEY
BOARD OF PUBLIC UTILITIES

IN THE MATTER OF AQUA NEW JERSEY, INC.'S 2022 DISTRIBUTION SYSTEM IMPROVEMENT CHARGE FOUNDATIONAL FILING	:	STIPULATION OF SETTLEMENT BPU DOCKET NO. WR22050360

APPEARANCES:

Courtney L. Schultz, Esq. and Colleen A. Foley, Esq., Saul Ewing Arnstein & Lehr LLP, on behalf of the Petitioner, Aqua New Jersey, Inc.

Brian Lipman, Director; Susan E. McClure, Esq., Deputy Rate Counsel, Christine Juarez, Assistant Deputy Rate Counsel; and Emily Smithman, Esq., Assistant Deputy Rate Counsel, on behalf of the Division of Rate Counsel

Meliha Arnautovic, Deputy Attorney General, (Matthew J. Platkin, Attorney General of New Jersey), on behalf of the Staff of the New Jersey Board of Public Utilities

TO THE HONORABLE NEW JERSEY BOARD OF PUBLIC UTILITIES:

The Parties that have participated in this proceeding are Aqua New Jersey, Inc. ("Aqua," "Company," or "Petitioner"), the Division of Rate Counsel ("Rate Counsel"), and the Staff of the Board of Public Utilities ("Staff") (collectively, the "Parties"). There were no intervenors in this proceeding. As a result of an analysis of Aqua's Petition and exhibits, discovery conducted by Rate Counsel and Staff, conferences, and negotiations, the Parties to this proceeding have come to the within agreement. The Parties hereto agree and stipulate as follows:

I. Background & Procedural History.

1. Petitioner is a public utility of the State of New Jersey, with its principal business office at 10 Black Forest Road, Hamilton, New Jersey 08691, subject to the jurisdiction of the Board of Public Utilities (the "Board").

2. Petitioner is in the business of collecting, treating and distributing water for retail service to approximately 55,000 customers located in several municipalities in Warren, Hunterdon, Mercer, Morris, Burlington, Monmouth, Camden, Atlantic, Ocean, Sussex and Gloucester Counties in New Jersey.

3. On May 31, 2022, pursuant to N.J.A.C. 14:9-10.4, Aqua filed the above-captioned Petition with the Board, which was later assigned BPU Docket No. WR22050360, to establish an initial Distribution System Improvement Charge ("DSIC") to become effective January 1, 2023.

4. The matter was retained by the Board for review and disposition.

5. Aqua provided notice of the filing, a statement of its effect and of the scheduling of the public comment hearings to its customers by a public notice placed in newspapers published and circulated in the Company's service areas pursuant to the rules of the Board. Copies of the approved form of Notice and the proposed DSIC rates were also served upon the respective municipalities, County Executives and Clerks of the Boards of County Commissioners pursuant to the Board's regulations. Proofs of service of these notices were filed with the Board in accordance with the Board's regulations.

6. Virtual and telephonic public comment hearings were held on October 26, 2022, at 4:30 p.m. and 5:30 p.m., and were presided over by a Board-appointed legal specialist. No members of the public appeared at the public comment hearings and no written comments were received by the Board.

II. Settlement Provisions.

7. For the reasons set forth in the following paragraphs, the Parties agree that the record herein supports the findings and conclusions set forth below.

8. As required at N.J.A.C. 14:9-10.4(c), the Company concluded a base rate proceeding and implemented base rates pursuant to an Order of the Board effective June 1, 2019 in BPU Docket No. WR18121351.

9. As required by N.J.A.C. 14:9-10.4(b)(1), Aqua's filing was supported by an engineering evaluation report (the "DSIC Report"),[1] which identifies the rationale for the DSIC-eligible work to be performed; demonstrates that the proposed plan is cost-effective; identifies elements of the distribution system that require investment including assets which are susceptible to failure; and identifies efforts to extend the life of the distribution system assets.

10. The DSIC Report also contains project information, by element as follows: (i) a list of DSIC-eligible projects; (ii) project descriptions (with unique project identification numbers) including the nature, location, estimated duration of work (including estimated in-service dates, as well as the vintage and condition of the facilities being replaced or rehabilitated), estimated project costs, and a description and reason for the project; and (iii) aggregate information capturing blanket-type, DSIC-eligible infrastructure projects and the estimated annual cost of such blanket-type replacement programs.[2]

11. As required by N.J.A.C. 14:9-10.4(b)(3), Aqua provided (attached as Exhibit P-2 to the Petition and as Exhibit B hereto) a calculation of its base infrastructure spending. Aqua's base spending requirement is $4,648,617, which was derived utilizing depreciation rates and

[1] The original report, dated May 2022, which was provided with the Petition as Exhibit P-1, was later revised – in October 2022 – during the course of this proceeding and as a condition of settlement at the request of Rate Counsel to include additional detail related to costs for (i) main replacements, (ii) valve and hydrant replacements, and (iii) unreimbursed utility relocation work. A copy of the revised report is attached hereto as Exhibit A.

[2] During the course of the proceeding, Aqua removed from its list of eligible DSIC projects certain projects which had been completed, updated as of October 6, 2022, and were inadvertently included in the Petition.

balances for utility plant accounts 343, 345 and 348 as reported in the Company's 2021 BPU Annual Report.

12. As required by N.J.A.C. 14:9-10.4(b)(3), Aqua provided (attached as Exhibit P-3 to the Petition and as Exhibit C hereto) a proposed DSIC rate assessment schedule showing the maximum dollar amount of the proposed DSIC rate assessment by customer class and meter size (or service connection) over the entire DSIC period, as well as the estimated maximum rate impact on customers for the entire DSIC period. The proposed maximum monthly DSIC rates based on meter size are reflected in the chart below:

Meter Size	Present DSIC Rate	Maximum DSIC Rate
5/8"	$0.00	$2.62
3/4"	$0.00	$3.93
1"	$0.00	$6.55
1-1/2"	$0.00	$13.10
2"	$0.00	$20.96
3"	$0.00	$39.30
6"	$0.00	$131.00
8"	$0.00	$209.60

13. The Parties agree that the maximum amount of annual DSIC revenues Aqua may be authorized to recover through the DSIC is capped at five percent (5%) of Aqua's total revenues[3] established in its most recent base rate proceeding, which is approximately $2,173,326.

14. The Parties further agree that spending for any DSIC-eligible projects included in this filing that (i) were underway as of the date of the filing, or (ii) commenced during the pendency of this filing, will be used to either meet Aqua's base spending requirement or will be recoverable in Aqua's DSIC mechanism consistent with the Board's DSIC regulations.

[3] Total DSIC-eligible revenues are $43,466,531. See Exhibit C.

15. The Parties have engaged in full discovery. The Parties agree that the within Stipulation reflects a mutual balancing of various issues and positions, and that it is being entered into in the spirit of compromise and to avoid protracted and costly litigation.

16. This Stipulation is the product of negotiations by the Parties, and it is an express condition of the settlement embodied by this Stipulation that it be presented to the Board in its entirety without modification or condition. It is also the intent of the Parties to this Stipulation that this settlement, once accepted and approved by the Board, shall govern all issues specified and agreed to herein. The Parties to this Stipulation specifically agree that if adopted in its entirety by the Board, no appeal shall be taken by them from the order adopting same as to those issues upon which the Parties have stipulated herein.

17. The Parties agree that each term within this Stipulation reflects a mutual balancing of various issues and positions and is intended to be accepted and approved in its entirety. Each term is vital to this Stipulation as a whole, since the Parties hereto expressly and jointly state that they would not have signed this Stipulation had any terms been modified in any way. In the event any particular aspect of this Stipulation is not accepted and approved by the Board, then any Party hereto materially affected thereby shall not be bound to proceed under this Stipulation.

18. The Parties further agree that with respect to any policy or other issues which were compromised in the spirit of reaching an agreement, none of the Parties shall be prohibited from, or prejudiced in, arguing a different policy or position before the Board in any other proceeding, as such agreements pertain only to this matter and to no other matter. It is specifically understood and agreed that this Stipulation represents a negotiated agreement and has been made exclusively for the purpose of this proceeding. Except as expressly provided herein, the Parties shall not be deemed to have approved, agreed to, or consented to any principle or methodology underlying or

supposedly underlying any agreement provided herein in total or by specific item. The Parties further agree that this Stipulation is in no way binding upon them in any other proceeding, except to enforce the terms of this Stipulation.

19. This Stipulation may be executed in as many counterparts as there are Parties to this Stipulation, each of which counterparts shall be an original, but all of which shall constitute one and the same instrument.

AQUA NEW JERSEY, INC.

11/7/2022
Date

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11/21/22
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EXHIBIT A

AQUA NEW JERSEY FOUNDATIONAL DSIC FILING REPORT

MAY 2022

(REVISED OCTOBER 2022)

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Project No. 4101.003

Dated: May 2022, Revised October 2022

AQUA NEW JERSEY FOUNDATIONAL DSIC FILING REPORT
May 2022, Revised October 2022

Contents

➢ Transmission and Distribution Assessment

Introduction

Aqua owns and operates water systems throughout the State of New Jersey. There are three main operating divisions, which serve approximately 41,000 customers in Warren, Mercer, and Camden counties. Other satellite operating divisions serving customers in Sussex, Ocean, and Gloucester Counties include numerous smaller systems. Aqua distribution systems have approximately 830 miles of pipe, serving more than 61,000 customers.

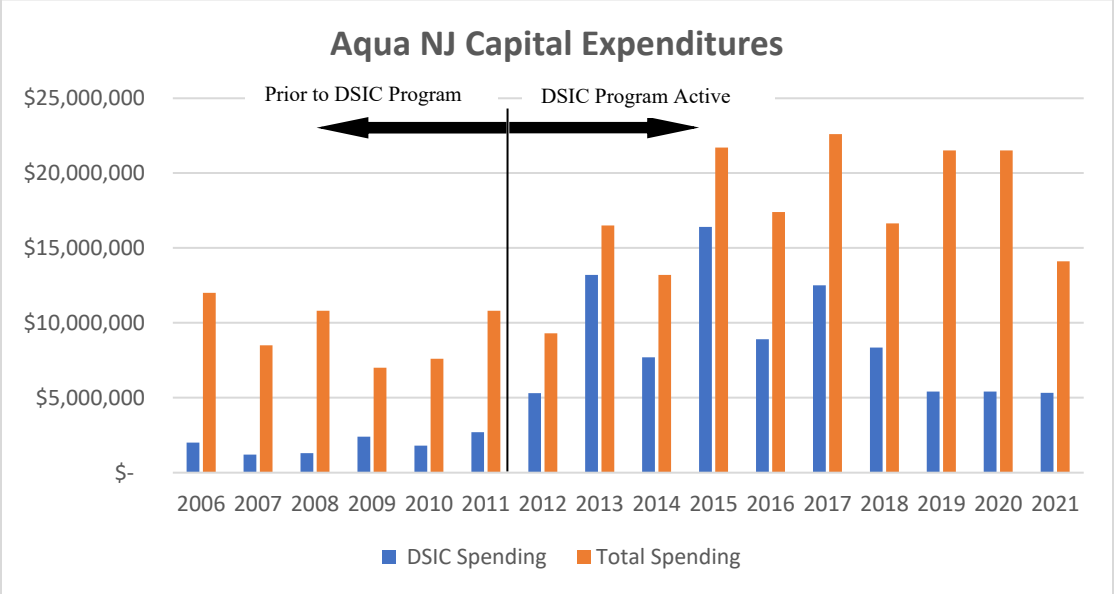
The characteristics of Aqua's systems vary across the state. The oldest three systems include the original Garden State Water Company, which was derived primarily through the previous acquisitions of People's Water Company (Phillipsburg), Hamilton Square Water Company, and Blackwood Water Company. These companies, now identified as the Northern, Central, and Southern Divisions, have expanded over the years. Still, these original companies contain the largest share of the distribution assets and the oldest assets. The other systems are much smaller and are scattered throughout the state. The largest of these other systems are the Berkeley Water Company, Lawrenceville Water Company, and Woolwich Water Company. Aqua acquired these systems within the last ten years. Lawrenceville is typical of an older community with deteriorating infrastructure. The Woolwich Water Company is a newer system that has seen tremendous growth over the past fifteen years. The water distribution systems in some of these acquired systems are in poor condition and have high water loss. Corrective measures, including water main replacement, are needed to curb the ongoing system losses.

Aqua NJ's ongoing water main renewal program includes replacing aged pipes and cleaning and lining unlined cast iron pipes when deemed appropriate. The renewal program is both reactive and proactive. The reactive renewal includes targeting specific pipes that have experienced performance issues or exhibit customer service problems. For example, pipes with multiple main breaks are targeted for a replacement to eliminate service interruptions and mitigate the risk of water quality problems associated with main breaks. Similarly, dirty or red water complaints due to unlined cast iron pipes can typically be addressed by cleaning and lining that pipe. The renewal program is also proactive by targeting broad categories of pipe that have historically been problematic. An example of proactive renewal at Aqua NJ is targeting undersized water mains and asbestos cement water mains for replacement. Undersized Water mains, typically 2", 4" and 6" water mains, do not meet the current Safe Drinking Water regulations for systems with an average demand greater than 1 MGD. Asbestos Cement (AC) water mains tend to have a higher incidence of main breaks, hence demonstrating a shorter life expectancy than cast iron or ductile iron. Asbestos cement pipe failures often require extensive repair efforts and recur over time in adjacent, compromised pipe segments. Targeting this category of pipe for proactive replacement is more cost-effective to our customers and less disruptive to

communities than dealing with emergency response measures associated with main breaks.

The proposed water main renewal program for 2023 and 2024 will be primarily funded through the Distribution System Improvement Charge (DSIC) mechanism. If the NJ State legislation for the DSIC is extended, Aqua NJ will continue funding infrastructure improvements through the DSIC mechanism. All projects previously approved under the last foundational filing may start construction until this foundational filing is approved in a Board Order. The DSIC spending would be in addition to a base level of spending required by the rule-making process. On average, Aqua New Jersey has renewed just over one mile of pipe per year before implementing the NJ DSIC program. Figure 1 is a Capital Expenditure Chart showing total DSIC expenditures (covering all DSIC-eligible categories) and total capital expenditures over the period the DSIC program has been in place.[1] Aqua has increased its investment in DSIC-related assets to improve infrastructure.

Figure 1: Capital Expenditure History



The DSIC program contains a spending limit of a 5% surcharge "ceiling" between rate cases, which creates the regulatory framework needed to increase the rate of capital investment in the water main infrastructure. The regulations require both a base level of spending and the DSIC eligible spending to ensure that water utility companies increase their investment in the DSIC eligible spending categories and not just receive the 5% surcharge on capital each company had already planned to spend. For Aqua New Jersey, the base spending will be approximately $3.99 million/year. The increase

[1] Note that for the expenditures reflected “Prior to DSIC Program” classified as “DSIC Spending” this reflects expenditures made on DSIC-eligible projects, not that there was DSIC spending during that time period, which there was not, as no DSIC was in place.

in expenditures above the base will include increasing the number of water main replacement projects, water main cleaning and lining projects, service line renewal projects, and fire hydrant and valve replacement efforts. Projects may be accelerated or deferred depending on the field conditions and the ability to complete a specific project within the allowed time. Also, projects from new acquisitions may be added to this schedule as needed. The details of this engineering analysis will identify the rationale for accelerating the particular work needed, demonstrate that the accelerated work is the most cost-effective, identify possible failure mechanisms and identify practices that will extend the life of the distribution system assets.

- **Water Main Background**

Aqua NJ initiated coordination of the water main infrastructure records in 2009. Aqua NJ has created mapping to centrally track the location of all water main and service leaks/breaks across all operating divisions. Each division has an AutoCAD map that contains the location of all the pipes, hydrants, and valves and is updated regularly to show main rehabilitation projects and developer main extension projects. This type of tracking allows Aqua to target the most problematic areas of the system with "needle mapping" so that the most problematic areas are addressed on a priority basis for the most prudent expenditure of DSIC funds.

The following tables describe the Aqua pipe inventory in terms of material, diameter, and age.

Table 1
Breakdown of Water Pipe in Aqua NJ

Area	Length (Miles)	% Of Total
Berkeley Eastern System	57.57	6.93
Blackwood System	186.63	22.47
Hamilton System	240.25	28.92
Lawrenceville System	44.29	5.33
Miscellaneous Systems	80.06	9.64
Phillipsburg System	221.78	26.70
Total	830.59	100

Table 2
Breakdown of Aqua NJ Water Pipe by Material

Material	Phillipsburg System		Hamilton System		Blackwood System		All Others	
	Length (Miles)	% of Total	Length (Miles)	% of Total	Length (Miles)	% of Total	Length (Miles)	% of Total
Asbestos Cement	0.00	0.00	12.69	5.28	6.32	3.38	34.74	19.09
Cast Iron	102.33	46.14	25.05	10.43	29.75	15.94	23.42	12.88
Ductile Iron	118.36	53.37	201.95	84.06	145.85	78.15	99.68	54.79
Other (PVC, HDPE, GALV)	0.95	0.43	0.52	0.21	4.24	2.27	23.67	13.01
Unknown	0.14	0.06	0.04	0.02	0.47	0.25	0.41	0.23
Total	221.78	100	240.25	100	186.63	100	181.92	100

Table 3
Breakdown of Aqua NJ Water Pipe by Diameter

Size	Phillipsburg System		Hamilton System		Blackwood System		All Others	
	Length (Miles)	% of Total	Length (Miles)	% of Total	Length (Miles)	% of Total	Length (Miles)	% of Total
<=4	8.86	3.99	10.51	4.37	16.71	8.95	14.85	8.16
6	53.45	24.10	34.70	14.44	30.22	16.19	61.53	33.82
8	67.38	30.38	108.84	45.30	90.10	48.28	73.52	40.41
10	11.15	5.03	2.17	0.90	0.08	0.04	3.60	1.98
12	49.32	22.24	70.88	29.50	47.64	25.53	26.30	14.46
>12	31.63	14.26	13.15	5.47	1.88	1.01	2.12	1.17
Total	221.79	100.00	240.25	99.98	186.63	100.00	181.92	100.00

Table 4
Breakdown of Aqua NJ Water Pipe by Vintage

Year	Phillipsburg System		Hamilton System		Blackwood System		All Others	
	Length (Miles)	% of Total	Length (Miles)	% of Total	Length (Miles)	% of Total	Length (Miles)	% of Total
1885-1899	4.87	2.20	0.00	0.00	0.00	0.00	0.00	0.00
1900-1930	39.61	17.86	1.65	0.69	0.00	0.00	3.11	1.71
1931-1950	9.59	4.32	1.09	0.45	3.45	1.85	3.17	1.74
1951-1980	51.91	23.41	76.71	31.93	76.63	41.06	49.32	27.11
1981-2000	67.38	30.38	82.45	34.32	69.04	36.99	35.32	19.41
>=2001	35.86	16.17	68.34	28.45	33.58	17.99	7.91	4.35
Unknown Year	12.56	5.66	10.01	4.17	3.93	2.11	83.09	45.67
Total	221.78	100	240.25	100	186.63	100	181.92	100

Table 1 shows that most of the water mains within Aqua NJ, approximately 78% of the 831 miles, are located within the three core Aqua Systems of Phillipsburg, Hamilton, and Blackwood. Table 2 breaks down the pipe inventory by material. Of particular interest in the "All Others" systems is the 35 miles of AC pipe. AC pipe has shown to be more problematic than other types of pipe from this vintage. Typically used during the years preceding and immediately following World War II and up into the late 1950s, this material has proven to be more susceptible to main breaks than other pipes of the same age in New Jersey. Much of this pipe is now over 60 years of age and considered problematic due to the frequency and severity of main breaks.

Table 3 provides a breakdown of the pipe inventory by size and shows that between 5% and 10% of all the main systems are ≤ 4-inch diameter. Over 8% of the pipe in the "Other" systems is also this small diameter pipe. This small-diameter pipe continues to be problematic because it has a high break frequency (see Table 8) and often results in severe hydraulic restrictions, limiting the potential for fire protection. Again, both 4-inch and 6-inch diameter mains do not meet the minimum standards of NJAC 7:10-11.10 for systems with an average demand of 1.0 MGD or higher.

Table 4 provides a breakdown of pipe age. The installation date for most of the pipes is known and presented in the table. Some assumptions were made regarding the installation years based on pipe material to gather this information.

- **System Analysis**

Unlike treatment plants or other above-ground facilities, it is not practical or technically feasible to accurately assess the condition of buried assets like the pipe. However, pipe conditions can be assessed indirectly by examining specific performance measures. Examples of pipe performance measures include water main breaks and leaks, reduced hydraulic capacity (typically due to tuberculation), higher than acceptable non-revenue water levels, and customer water quality complaints.

Several mechanisms cause failures in water distribution system assets. One key mechanism causing failures is the mechanical degradation of the water main infrastructure over time. Mechanical degradation can affect all types of water infrastructure and manifests itself in various forms depending on the component. For instance, valves may become dysfunctional depending on the traffic loading and underlain soil conditions. Hydrants will fail and/or leak over time requiring repairs and/or replacement. Service laterals will develop leaks at the corporation and/or the curb stop due to traffic loading and soil conditions and require replacement. Water mains will also experience mechanical degradation based on the soil bedding techniques used, the corrosively of the soil, quality of the construction techniques, type of construction joints, etc. This does not necessarily mean that the oldest water mains should be rehabilitated first.

Further analysis on a case-by-case basis is needed on all the indirect measures to properly assess when a water main should be rehabilitated or replaced. A scoring matrix has been created by Aqua NJ, utilizing the AWWA framework, on an approximate scale of 0-25 to prioritize water main rehabilitation projects. The indirect measures are only one set of reasons why water main infrastructure needs to be rehabilitated. Other reasons such as adequate original hydraulic capacity, inadequate fire protection coverage, and non-conformance with NJDEP Safe Drinking Water sizing standard are accepted principles for upgrading the water main infrastructure.

Aqua NJ maintains a detailed database of main breaks for the main water distribution systems. This database includes the available records of water main breaks, some dating back to the 1990s. These data provide a valuable resource for analyzing main break trends. In acquired systems, Aqua has started tracking water main breaks to ascertain the needs of those systems since the acquisition date.

Table 5 shows break occurrences in the main Aqua systems by pipe material. The table compares the percentage of total breaks represented by each material and the percentage of the total length of pipe represented by each material. If all pipe materials were performing equally well, these percentages would be approximately equal. For example, if 20% of the pipe length were "Material A," we would expect 20% of the main breaks to occur on "Material A". When these percentages differ, it indicates that, in general, pipes of that material are either performing well (% of breaks < % of length) or poorly (% of breaks > % of length). Table 5 shows that pipes in the AC and Other categories are particularly problematic in the Berkeley System. Furthermore, Cast Iron

pipe is more prone to main breaks in the Phillipsburg, Hamilton, and Blackwood systems.

Table 5
Main Breaks in Major Aqua NJ Water Systems by Pipe Material

Material	Phillipsburg System		Hamilton System		Blackwood System		Berkeley System	
	% of Breaks	% of Length	% of Breaks	% of Length	% of Breaks	% of Length	% of Breaks	% of Length
Asbestos Cement	0.00	0.00	9.09	5.28	12.50	3.38	60.00	59.78
Cast Iron	47.83	46.14	48.48	10.43	37.50	15.94	0.00	0.00
Ductile Iron	30.43	53.37	33.33	84.06	37.50	78.16	0.00	11.89
Other (PVC, HDPE, GALV, Unknown)	21.74	0.49	9.09	0.23	12.50	2.52	40.00	28.34
Total	100	100	100	100	100	100	100	100

Although Table 5 focuses on the pipe material, pipe age is also generally viewed as a contributing factor in how often a pipe fails, which is reflected in the data. Cast iron pipe and AC pipe are the two oldest types of pipe in the Aqua NJ systems. As previously mentioned, Table 5 clearly shows that some cast iron pipes and AC pipes are performing poorly in terms of break frequency. AC pipe represents about 60% of the total length of pipe in the Berkeley system and accounts for 60% of the main breaks in that system. Breaks on AC pipes tend to be more serious when they occur, resulting in more prolonged water outages and requiring more extensive repairs to community roads or immediate emergency replacement. Alternate pipe materials, such as galvanized steel and plastics, also fail at a high rate in the Berkeley System and account for 40% of all the breaks within that system.

Cast iron pipes also appear to be failing at a higher rate than their length percentage would indicate. This is not unexpected since the cast iron pipe represents some of the oldest pipes in the system. Most notably in the Hamilton System, cast iron pipes amount to roughly 10% of the total length of all pipe in the system but yet account for almost half of the system's main breaks.

Cast iron pipe also warrants a more detailed analysis due to changes in manufacturing processes and joint types over the years. The oldest cast iron pipes were produced using a "pit cast" method, where molten iron was poured into vertical molds suspended in sandpits. This resulted in a pipe with non-uniform wall thicknesses. To compensate for the variations in thickness, the walls were thicker (0.75 inches or more depending on diameter and pressure rating). In late 1920, a new casting process was introduced using centrifugally spun molds. This allowed for thinner and more uniform pipe walls. It should be noted that the "thin" wall is somewhat of a misnomer, given that the pipe walls were still approximately 0.5 inches or more in thickness.

A more detailed analysis of cast iron main breaks was conducted for the Phillipsburg system break data using breaks occurring between 1998 and 2021. The data was segregated into four categories based on the installation year of the pipe. The categories represented the different pit and spun cast pipe combinations with various joint types. The results are presented in the figure below. This figure presents the percentage of all cast iron pipes represented by each category and the percentage of all cast iron breaks represented by each category. As noted previously, if all the material/joint combinations were performing equally, these percentages would be the same. However, this is not the case, indicating that certain categories of cast iron pipes are performing better than others. For example, approximately 48% of the cast iron pipe in Phillipsburg is pit cast, yet only 28% of the cast iron breaks are from this category. This indicates that this category of cast iron pipe, although the oldest category, is performing reasonably well. This can be attributed to the thicker pipe walls, which provide additional strength to the pipe. On the other hand, spun cast iron pipe represents nearly 72% of the cast iron main breaks even though it only accounts for 52% of the evaluated cast iron pipe. This is believed to be due to the "new" spun cast manufactured pipe combined with the continued use of rigid joints during this period.

Figure 2: Phillipsburg System Main Breaks

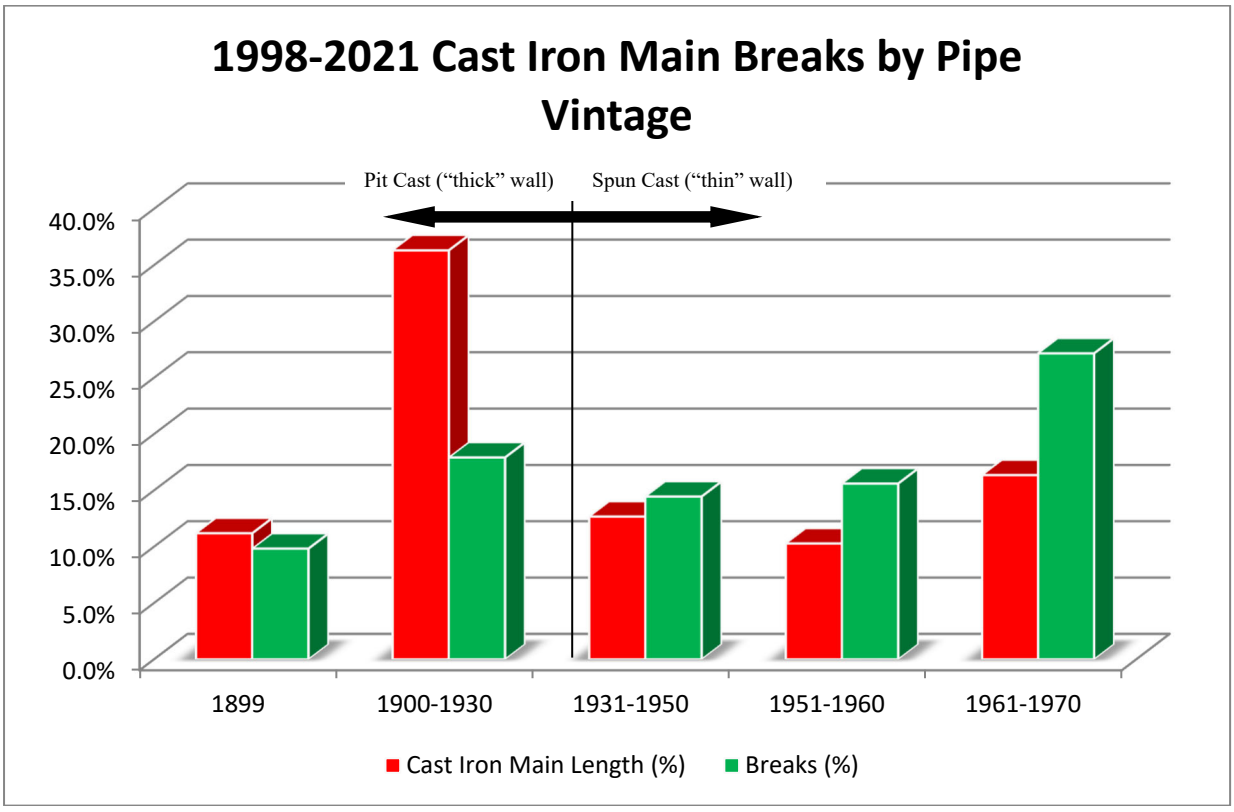


Table 6 presents data comparing breaks and pipe diameter. The table shows that smaller diameter pipes tend to break more often than larger diameter pipes. The table shows that pipes 6-inch in diameter and smaller account for most main breaks in the Aqua NJ systems listed. All of the main breaks within the Berkeley System were experienced on the 6-inch pipe. Also, note that although the 8-inch pipe in Blackwood also has experienced the highest percentage of mains breaks, it constitutes the majority of the pipe within that distribution system.

Table 6
Main Breaks in Major Aqua NJ Water Systems by Pipe Diameter

Diameter	Phillipsburg System		Hamilton System		Blackwood System		Berkeley System	
	% of Breaks	% of Length	% of Breaks	% of Length	% of Breaks	% of Length	% of Breaks	% of Length
<=4	26.09	3.99	12.12	4.37	26.56	8.84	0.00	0.00
6	43.48	24.10	57.58	14.44	21.88	16.19	100.00	61.74
8	26.09	30.38	21.21	45.30	43.75	48.28	0.00	24.61
10	0.00	5.03	0.00	0.90	0.00	0.04	0.00	2.99
12	4.35	22.24	9.09	29.5	7.81	25.53	0.00	10.65
>12	0.00	14.26	0.00	5.47	0.00	1.01	0.00	0.00
Unknown	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00
Total	100	100	100	100	100	100	100	100

Leakage from pipes is a measure that can be used to ascertain the condition of a distribution system generally and when quantified, is one component of the calculation of unaccounted-for water (UAW). In a small system with low water demand, even a single small leak that goes undetected can result in a high UAW percentage. Distribution system infrastructure, including services, valves, and mains in systems with excessive UAW, warrants further investigation as candidates for replacement. In 2009, the Delaware River Basin Commission (DRBC) amended its Comprehensive Plan and Water Code to implement an updated water audit approach to identify and control water loss in the Basin. The new approach is consistent with the International Water Association (IWA) and American Water Works Association (AWWA) Water Audit Methodology, considered a best management practice in water loss

control. NJDEP is also expected to adopt the same practice in the near future. Once the NJDEP formally adopts the audit approach as the metric for water loss, future versions of this report will reflect that change.

NJDEP regulation NJAC 7:19-6.4, as part of its water conservation policy, requires systems to maintain the unaccounted-for water below 15%. While most of Aqua's systems meet the NJDEP's requirements, the DSIC program will provide the incentive to continue to reduce the unaccounted-for water in the smaller systems recently purchased by Aqua and help address the long-standing issues in Phillipsburg. The high unaccounted-for water in Phillipsburg has been isolated to the low side service gradient covering an area of 40 miles. This specific 40-mile stretch is an area that needs to be addressed given the collection of points on the needle maps; it contains the oldest water main and the largest collection of the small diameter water mains.

The hydraulic capacity of the pipe is typically evaluated using fire hydrant flow tests. Computer hydraulic models of the system are also utilized to evaluate hydraulic capacity issues. These tools help Aqua NJ identify candidate water mains with reduced hydraulic carrying capacity for replacement. Small diameter pipe serving areas with insufficient flow, low pressure, or fire hydrants is another priority for water main rehabilitation.

Finally, the additional data requested during a previous foundational filing submission is presented below. The statistic of breaks/100 miles/year for the main operating division can be found in Tables 7, 8, and 9 below for material, size, and vintage. Table 7 shows that ductile iron pipe continues to perform in this statistical category compared to other pipe materials. The length of the newer ductile iron pipe in each system is driving down the break rate in each division. That does not mean the areas of concern should not be addressed, such as cast-iron pipe installed after 1931 in Phillipsburg, Hamilton, and Blackwood.

Furthermore, other areas of concern, such as AC pipes in Blackwood and Eastern, have elevated break rates. Some areas identified in a previous foundational filing can be curtailed given the lower break metric such as the AC pipe in the Blackwood Division, which presented a break rate of 18.08 breaks/100 miles/year. Similarly, other pipe materials (galvanized steel and plastics), which generally tend to be smaller diameter pipes, also show high break rates per 100 miles/year. Much of this AC and other pipes will be considered in the candidate pool for replacement. This is not only for structural integrity reasons but rather NJAC size requirements and availability of fire flows.

Table 7
Main Breaks in Major Aqua NJ Water Systems by Material

Material	Phillipsburg System (2015 - 2021)			Hamilton System (2016 - 2021)			Blackwood System (2015 - 2021)			Berkeley System (2015 - 2021)		
	Length (Miles)	Breaks	Brks/100 Mi/Yr	Length (Miles)	Breaks	Brks/100 Mi/Yr	Length (Miles)	Breaks	Brks/100 Mi/Yr	Length (Miles)	Breaks	Brks/100 Mi/Yr
Asbestos Cement	0	0	0.00	12.69	3	3.94	6.32	8	18.08	34.42	3	1.25
Cast Iron	102.33	11	1.54	25.05	16	10.65	29.75	23	11.04	0	0	0.00
Ductile Iron	118.36	7	0.84	201.95	11	0.91	145.85	26	2.55	6.84	0	0.00
Other (PVC, HDPE, GALV)	0.95	5	75.19	0.52	3	96.15	4.24	7	23.58	16.0	2	1.79
Unknown	0.14	0	0.00	0.04	0	0.00	0.47	0	0.00	0.31	0	0.00
Total	221.78	23	1.48	240.25	33	2.29	186.63	64	4.90	57.57	5	1.24

Table 8
Main Breaks in Major Aqua NJ Water Systems by Diameter

Diameter	Phillipsburg System (2015 - 2021)			Hamilton System (2016 - 2021)			Blackwood System (2015 - 2021)			Berkeley System (2015 - 2021)		
	Length (Miles)	Breaks	Brks/100 Mi/Yr	Length (Miles)	Breaks	Brks/100 Mi/Yr	Length (Miles)	Breaks	Brks/100 Mi/Yr	Length (Miles)	Breaks	Brks/100 Mi/Yr
<=4	8.86	6	9.67	10.51	4	6.34	16.49	16	13.86	0.00	0	0.00
6	53.45	10	2.67	34.7	19	9.13	30.22	12	5.67	35.55	5	2.01
8	67.37	6	1.27	108.84	7	1.07	90.1	32	5.07	14.17	0	0.00
10	11.15	0	0.00	2.17	0	0.00	0.08	0	0.00	1.72	0	0.00
12	49.32	1	0.29	70.88	3	0.71	47.64	4	1.20	6.13	0	0.00
>12	31.63	0	0.00	13.15	0	0.00	1.88	0	0.00	0.00	0	0.00
Unknown	0.00	0	0.00	0.00	0	0.00	0.22	0	0.00	0.00	0	0.00
Total	221.78	23	1.48	240.25	33	2.29	186.63	64	4.90	57.57	5	1.24

Table 9
Main Breaks in Major Aqua NJ Water Systems by Vintage

Year	Phillipsburg System (2015 - 2021)			Hamilton System (2016 - 2021)			Blackwood System (2015 - 2021)			Berkeley System (2015 - 2021)		
	Length (Miles)	Breaks	Brks/100 Mi/Yr	Length (Miles)	Breaks	Brks/100 Mi/Yr	Length (Miles)	Breaks	Brks/100 Mi/Yr	Length (Miles)	Breaks	Brks/100 Mi/Yr
1885-1899	4.87	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00
1900-1930	39.61	1	0.36	1.65	0	0.00	0.00	0	0.00	0.00	0	0.00
1931-1950	9.59	2	2.98	1.09	0	0.00	3.45	5	20.70	0.00	0	0.00
1951-1980	51.91	13	3.58	76.71	24	5.21	76.63	51	9.51	35.41	2	0.81
1981-2000	67.38	2	0.42	82.45	6	1.21	69.04	5	1.03	15.52	2	1.84
>=2001	35.86	5	1.99	68.34	2	0.49	33.58	3	1.28	5.31	1	2.69
Unknown Year	12.56	0	0.00	10.01	1	1.67	3.93	0	0.00	1.33	0	0.00
Total	221.78	23	1.48	240.25	33	2.29	186.63	64	4.90+	57.57	5	1.24

- **System Improvement Plan**

Recognizing the need for continual renewal of the distribution system to maintain quality service to customers, Aqua has rehabilitated the water main, services, hydrants, and valves in its systems for many years. Between 2005 and 2010, Aqua replaced approximately 8 miles of pipe in its systems, equating to approximately a 400-year renewal rate (or a 0.25% renewal rate). This rate is longer than expected for any pipe materials, notwithstanding the specific issues outlined above. The creation of the DSIC rule has allowed the company to accelerate the replacement of certain assets based on macro and micro information. During the first year of the DSIC, Aqua has rehabilitated 8 miles of water main, or 1.2% of the overall system. Since the last DSIC filing in 2019, Aqua has rehabilitated eleven (11) miles of water main or 1.3% per year. This equates to an approximate 76-year renewal rate. This means that the DSIC effort has successfully accelerated rehabilitation to a rate of approximately 1%, which will maintain the current system status. A rate greater than 1% is required to reduce the candidate pool for rehabilitation.

Aqua has prioritized water main rehabilitation "candidates" at both a macro and micro level. At the macro level, general categories of pipe (for example, thin-walled cast iron from 1936-1960 and AC and galvanized pipe of all vintages) and geographic areas within a system have been identified as areas of concern. Any pipe meeting this criterion is considered a potential candidate for rehabilitation. The macro examination also eliminates certain pipes from consideration for rehabilitation. For example, ductile iron pipe less than 30 years old is typically unlikely to need rehabilitation.

Micro-level main replacement planning addresses the order in which specific pipes within the broader categories are replaced. This requires considering existing performance characteristics of the pipe, such as main break history, customer complaints, size, criticality, and other performance criteria. Needle maps have been developed for all major systems to evaluate trends and identify unique failure mechanisms causing main breaks or other operational issues. All listed water mains have been scored based on the included matrix to properly prioritize the work and create minimum standards for mains needing rehabilitation. The minimum score for a water main that will be considered for replacement is a 7 out of 20+. During the first DSIC interval, the lowest score for a project is a 7, and the highest score is a 24. Since its original inception, the Aqua NJ scoring matrix was improved to include more weight on water quality projects that would further enhance and demonstrate that cleaning and lining projects are an important component of the DSIC program as it extends the useful life of a water main in specific circumstances.

- **Macro-Level Planning**

It is helpful to define the pool of potential candidate pipes for rehabilitation at the macro level. From the previous discussion, there are two broad categories of pipe that Aqua is targeting for rehabilitation based on main break trends. These are the problematic areas of AC pipe and cast-iron pipe installed between 1931 and 1950. The total length of AC pipe in all systems equals 54.06 miles. Cast Iron pipe installed between 1931 and 1950 totals 17.3 miles of main. By 2025, the "youngest" of these cast iron pipes will be approximately 75 years old, *i.e.*, installed in 1950, while the oldest thin-walled Cast Iron will be around 95 years old. AC pipe was typically installed between 1940 and 1980 and continues to show a significantly higher break rate than other materials even if those pipes are older. Berkeley AC pipe breaks account for 60% of all system breaks, with 40% of breaks occurring on other pipe materials. These potential candidates have demonstrated that the renewal rate for these classes should be shorter than one hundred years based on their ability to stand the test of time versus older materials and new ductile iron materials.

Another candidate pool is all pipes installed before 1900, regardless of material. This category has been reduced in the candidate pool to reflect the performance of this category over time. The Phillipsburg systems have approximately 40 miles of pipe installed prior to 1930 but only 5 miles were installed before 1900. Mains in these vintages will remain in the candidate pool for replacement. Much of this pipe is already over 100 years old, and over the next 15 years, the remainder will reach the 100-year age. Any pipe reaching a 100-year service life at a macro level should be considered a candidate for rehabilitation.

The last broad category of pipes to be considered are the smaller pipes (≤ 6-inch). As shown in Table 8, these pipes are experiencing some elevation in break rate and can contribute to hydraulic issues, *i.e.*, low pressure or low flow. Some of this pipe was already accounted for in the Pre-1900 and AC pipe categories, so they are not included in the total pipe in Table 10. Each specific pipe identified will be shown in the micro section and the appendices.

Table 10 summarizes these broad categories of pipes for rehabilitation or replacement. Together this totals approximately 96 miles of pipe. The additional ≤ 6-inch not contained in other categories is listed separately to demonstrate the need to still address these sizes of pipe for structural and/or hydraulic reasons. Over the four major systems (Phillipsburg, Hamilton, Blackwood, and Berkeley), there are roughly 190 miles of pipe ≤ 6-inch. This macro approach yields general categories of pipes that are candidates for rehabilitation but doesn't prioritize specific pipes within those categories. At the same time, there may be legitimate reasons for <u>not</u> rehabilitating individual pipes in one of these categories. For example, a 4-inch PVC pipe installed in the 1980s serving a small residential cul-de-sac with no fire hydrants may be perfectly acceptable. The selection of specific pipes for replacement is addressed later in this report.

Table 10
Aqua NJ Candidate Pool of Water Pipe for Replacement

Pipe Category	Miles of Pipe			
	Phillipsburg System	Hamilton System	Blackwood System	Berkeley System
Asbestos Cement Pipe	0	12.69	6.32	34.42
Cast Iron 1931-1950	9.59	2	4	0
1885-1899 pipe	4.87	0	0	0
Other (Galvanized, Plastics)	0.95	0.52	4.24	16
Total	15.41	15.21	14.56	50.42
≤ 6-inch pipe (partially included in above)	62.31	45.21	46.71	35.55

This macro approach suggests that Aqua NJ has a near-term need to replace approximately 96 miles of pipe and up to 190 miles of smaller diameter mains that are potentially undersized.

As noted earlier, Aqua had rehabilitated 8 miles of the pipe over the five years before implementing DSIC. During the past DSIC filing period, 6.5 miles were replaced each year, increasing the replacement rate considerably, showing the increased investment. Virtually all of the mains in the 96-mile "Candidate Pool" shown in Table 10 will require rehabilitation over the next 20 years. At the original 1.6 mile–per-year average pace that Aqua replaced pipe between 2005 and 2010, it would take approximately 60 years to replace just the 96 miles of pipe, or 12% of the system's pipe, identified as candidates for near term replacement and, over this time, the other 88% of Aqua's pipe inventory will continue to age adding to the "Candidate Pool". However, the DSIC program has allowed this rate to increase significantly, thereby showing a path forward to address these areas of concern at the increased rate of 6.5 miles per year. Assuming the DSIC program is renewed, the entire "Candidate Pool" could be addressed over the next fifteen years. The following foundational filing template includes approximately 39 miles of water main that will be addressed from the candidate pool. This represents that 41% of the candidates will be addressed over the next six years of the DSIC program, assuming the program is renewed.

- **Micro-Level Planning**

Per the previous Foundational Filings, increased weight has been given to low-pressure conditions and customer water quality complaints. The weight of these categories has increased from 2 possible points to 10 possible points. This would increase the relative value of these issues by 25%. Aqua has developed and is applying detailed mapping tools to help identify and prioritize specific pipes for replacement. Material, diameter, age, the criticality of the main, hydrant coverage, water quality complaints, and main break history are used to assign scores to pipe

segments based on the pipe's characteristics. Generally speaking, the higher the score, the greater the need for rehabilitation. The individual scores are developed from the needle mapping and are created for all the main breaks, discolored water complaints, and inventory information. This information targets the streets/areas in the most need of rehabilitation. The complete listing of all projects for the Aqua DSIC program is contained in the attached document. The needle mapping for the major company divisions is also attached to this foundation filing. The major categories conform to the macro-level planning outlined above and are further subdivided into Rehabilitation Projects, Hydraulic Improvement Projects, Service/Hydrant/Valve Renewal Programs, and Un-reimbursed Relocations. The issue of UAW is primarily captured in the hydraulic improvement sections below. The attached listing of projects outlines the specific nature of the rehabilitation project, including the information on the existing main, the proposed main the estimated cost for the individual project. For all types of projects, Aqua performs several critical functions to extend the life of the water utility's distribution network assets. At many of our well stations, the corrosion inhibitor is added to provide a film on the water main to protect the pipe from internal corrosion. Flushing is performed on a semiannual basis in all systems to minimize tuberculation accumulation. All systems are surveyed for leaks at various intervals depending on the amount of non-revenue water in the system. The water main rehabilitation scoring system ensures that the water mains in the most need of capital investment are addressed first.

- **Rehabilitation Projects**

Water mains are identified as rehabilitation type projects when: the water main has a history of leakage or breaks and/or history of water quality complaints, the system was created with obsolete material, poor construction standards were in place at the time the system was constructed, or in many cases, all of these factors combined. Historical main break records are reviewed to identify categories of mains with higher break rates. The elevated break rates compared to length are indicators of the aging infrastructure issue that is well recognized and widely accepted across the utility industry. Higher break rates per mile also indicate pockets of issues that will lead to higher rates in the next decade. Needle mapping surveys identify main break clusters and areas to be analyzed for either replacement or rehabilitation. Appendices 1-4 contain detailed lists of all the projects that fit each category; a scoring matrix that outlines the need for each project is individually listed in the appendix. In certain instances, main rehabilitation projects are spread out so that only certain township areas are affected at any one construction season to lessen community impacts. In addition, in some systems, even one main break can cause significant disruption to the system if the wells are sized only to handle the system demands. A criticality component has been incorporated into the scoring matrix to address this issue. Aqua has purchased several systems over the years that experienced periods of no water pressure because one main break usually occurred due to poor craftsmanship at the time of construction. These systems need to be upgraded to provide safe and reliable service to those customers.

By accelerating these rehabilitation projects, customers will benefit from a more reliable water system that is less likely to fail and sustain the existing customer base over a longer period. The proposed rehabilitation projects are the most cost-effective solution because the program targets specific regions of the water system in which targeted rehabilitation is needed. With continuation of the DSIC program, particular areas of Aqua NJ's service area are expected to continue to experience noticeable improvements in system reliability with fewer service interruptions due to water main breaks and service breaks. As shown on Table 11, unplanned outages have significantly decreased since implementation of the DSIC program. Acceleration of Aqua NJ's main replacement program brought about with the help of DSIC funding can be credited with improved system reliability.

Table 11 – Aqua NJ Unplanned Service Outages

Year	Unplanned Outages	Unplanned Outages/ 10,000 Customers
2011	36	7
2012	20	4
2013	18	3
2014	31	6
2015	34	6
2016	35	6
2017	25	4
2018	25	4
2019	29	5
2020	17	3
2021	26	4

Several mechanisms are causing the failures in the targeted areas of the distribution system. The mechanisms typically found are poor construction practices at the time of original installation, such as improper bedding, poor joint connection, and mismatched and random materials. Also, inferior materials utilized at the time of construction are a failure mechanism. Thin-walled cast iron has been shown to have a shorter service life than a thick-walled pipe but is less likely to break compared to the specific vintages outlined in Figure 2. Asbestos cement pipe, in certain instances, can have a shorter service life than typically expected.

Aqua intends to budget $3,926,515.48, $3,783,310.08, and $2,878,450.12 for the years 2022, 2023 and 2024, respectively, for the replacement of service lines. This effort includes the removal and replacement of service lines which have been identified as being constructed of lead.[2] The work under this effort includes the removal and replacement of the identified service lines from the existing water main

[2] Note, however, that any costs spent on replacement of the customer-side for any lead service lines will not be recovered through the DSIC (it will be recovered in a separate future filing) and such work is not included in the above estimates.

to the customer's water meter including a new corporation stop, curb stop, copper water service and all work required for the installation, including but not limited to excavation, backfill and restorations. Based on an estimated cost of $7,500 to remove and replace a water service completely, Aqua anticipates removing and replacing up to 523 water services in the first year, 504 water services in the second year, and 383 water services in the third year.

- **Hydraulic Improvements**

The system hydraulic model identifies mains requiring improvements within the following areas: Transmission, fire flow, undersized mains, and criticality/redundancy. Improvements can involve installing a new main, replacing the existing main, and/or cleaning/lining. These projects aim to remedy existing deficiencies, and they all have a relatively high priority to complete. Projects to improve fire flow, water quality, and transmission problems are generally given higher priority and scheduled earliest. Hydraulic Bottlenecks are used as an analysis criterion when hydraulic modeling demonstrates that the fire flow conditions are restrained due to high-pressure drop sections of the distribution system in accordance with NJAC 7:10-11.10. The undersized pipe is an analysis criterion when water mains do not meet the criteria set forth in NJAC 7:10-11.10. The timing of renewal projects may coincide with a municipal paving project. Appendix 1 contains a detailed list of all projects that fit this category and a scoring matrix that outlines the need for each project. The scoring matrix comprises age, the main size, break history, water quality complaints, dead ends, inferior pipe materials, and divergence from the acceptable distribution main size regulations. These criteria provide a solid basis for the water main selection process. By accelerating these hydraulic improvements, customers will benefit from higher pressure and higher fire flow availability, sustaining the water distribution system. The ISO rating score for the water supply section typically can also be positively affected when distribution system assets are upgraded. The specific hydraulic improvements proposed are the most cost-effective solution because the program targets specific regions of the water system in which hydraulic improvements are needed. Over the DSIC program life, entire neighborhoods in Phillipsburg, Hamilton, Lawrenceville, and Gloucester Township will experience noticeable increases in flow and fire protection. To increase the amount of flow, the water main must be replaced in all cases to increase cross-sectional surface area. In reference to the statistics above, many of the smaller water mains, 4" and 6" are more susceptible to leakage and failure. By replacing these sections due to hydraulic limitations, two issues are addressed simultaneously.

- **Cleaning and Lining Projects**

Aqua has evaluated whether to perform cleaning and lining projects in the past, using the protocol outlined in AWWA Manual M-28. Internal pipe corrosion, known as tuberculation, reduces hydraulic capacity and can produce red water complaints in metallic water mains. Mains in this structurally sound category have no graphitization or external corrosion evidence, have specific service issues and are candidates for

nonstructural cement mortar linings. Mains with structural issues are candidates for fully structural lining or replacement per the matrix presented in AWWA Manual M-28. Aqua does not do cleaning and lining projects, as it has determined that these projects are not worth the expense and effort, compared to main replacement.

- **Service/Hydrant/Valve Renewals**

The renewal of services, hydrants, and valves are integral to sustainable infrastructure. Aqua replaces all these components on a routine basis to maintain safe and reliable service. Service replacement also reduces leakage and prevents future breaks. Service connections of lead and galvanized are obsolete and need to be replaced. Aqua NJ intends to be very aggressive in replacing galvanized service lines to eliminate lead fittings sometimes found on galvanized service lines. Hydrants support community fire protection and need to be replaced when deteriorated or obsolete. Proper fire protection saves lives, reduces property damage, and lowers insurance rates. Aqua intends to budget $265,000 for each of the years 2022, 2023 and 2024 for the replacement of fire hydrants. This effort includes the removal and replacement of fire hydrants which have been damaged or exceeded their useful life, or the addition of fire hydrants identified by Aqua or government entities in need of installation. The work under this effort includes a new six (6) inch tee, six (6) inch valve, a section of six (6) inch diameter pipe, the fire hydrant and all work required for the installation, including but not limited to excavation, backfill and restorations. Based on an estimated cost of $12,000 to remove and replace a fire hydrant completely, Aqua anticipates removing and replacing 22 fire hydrants per year.

Valves are critical components of distribution systems and need to be replaced when broken. Valves are used to isolate mains when repairs are needed. If valves are not operational, shutdowns take longer to execute, and a larger customer area is impacted. As part of the DSIC program, regularly scheduled leak surveys for all divisions will continue to identify service renewal areas better. The highest focus areas will come from known problem areas identified on the needle mapping. Aqua intends to budget $370,000 for each of the years 2022, 2023 and 2024 for the replacement of various valves. This effort includes the removal and replacement of valves which Aqua has identified as inoperable, damaged, or having exceeded their useful life. The work under this effort includes a new valve, valve box and all work required for the installation, including but not limited to excavation, backfill and restorations. Based on an estimated cost of $10,000 to remove and replace a valve completely, Aqua anticipates removing and replacing 37 valves per year.

- **Un-reimbursed Utility Relocations**

Counties and Townships often require water mains to be relocated at the cost of the utility to accommodate community improvement projects such as road construction and storm and sanitary sewer improvement projects. Notification for this work varies widely and is often relayed to the utility after funding decisions on water main projects have already been reached. Because this work cannot be postponed, the priority and

timing will often result in the shifting of other priorities. Rehabilitations of water utility infrastructure in coordination with these activities of others are beneficial to the community and general public by minimizing multiple disruptions of the same area. The foundation filing template captures all known water main relocation projects. It is estimated that $300,000 of unreimbursed utility relocation work will occur in the filing period (2022 to 2024). This encompasses four projects with an average cost of $75,000 each.

- **Conclusions**

Aqua will maximize, to the extent possible, the amount of water main renewal possible using the new DSIC mechanism of 5%. However, a pool of 96 miles of pipe (or 12% of the system) is in near-term need of renewal. This pool targets:

- Asbestos Cement pipe can have a high main break frequency and creates severe customer service disruptions and peripheral property damage when failures occur,
- Cast iron pipe installed between 1931 and 1950 exhibits a much greater frequency of breaks than other cast iron pipe in the system,
- Pipe of all materials installed before 1900 that is over 100 years old and at the end of its expected service life,
- Alternate pipe materials, such as galvanized steel and plastics that are of smaller diameter, aged have a higher break frequency, and sources of water quality and low-pressure complaints,
- Pipe in small, troubled systems where wholesale replacement of pipe may be the best remedy to excessive lost water due to leaks and service outages,
- Cleaning and Lining projects that meet the necessary criteria and will extend the useful life of the infrastructure,
- Smaller mains, especially in the larger systems, to increase system pressure and fire flows.

At the pre-DSIC historical average pace of 1.6 miles per year, it would take about 60 years to replace this targeted 96 miles of pipe and 115 years to replace the potentially undersized pipe. At average historic replacement costs, the requested increase to the DSIC cap may allow Aqua NJ to replace pipe at a pace nearly four times the pre-DSIC average pace and achieve the level of system renewal necessary to address this current backlog in 20 years. A 5% DSIC cap will also help offset the inordinately high-cost escalation for necessary materials and increased costs for municipal permitting, which have had, and will continue to have, a direct impact on Aqua NJ's main replacement program.

Figure 3 below illustrates the makeup of Aqua's distribution system in 2009 before the DSIC program. Figure 4 below shows the current makeup of Aqua's distribution after eleven years of rehabilitation under the DSIC program. The requested main replacement program will allow Aqua to continue to address the 96-mile backlog of distribution system water mains requiring near-term replacement on a timely basis.

When the DSIC period work is completed over the next two (2) years, the makeup of Aqua's distribution system will be as shown in Figure 5. Over 69% of the mains would be ductile iron pipes. The problematic AC pipe would be reduced to approximately 6% in the system, and cast-iron water mains would be reduced to under 22%. Also, the Other (galvanized and plastic) mains would be reduced to about 3% of all pipe.

The benefits of the DSIC program are apparent from the tables below. Re-adopting the program would further improve these values and allow continued focus on the other areas of need to decrease service interruptions and make improvements to water quality and fire flows.

Figure 3: Prior to the DSIC Program, Miles of Main (by Material)

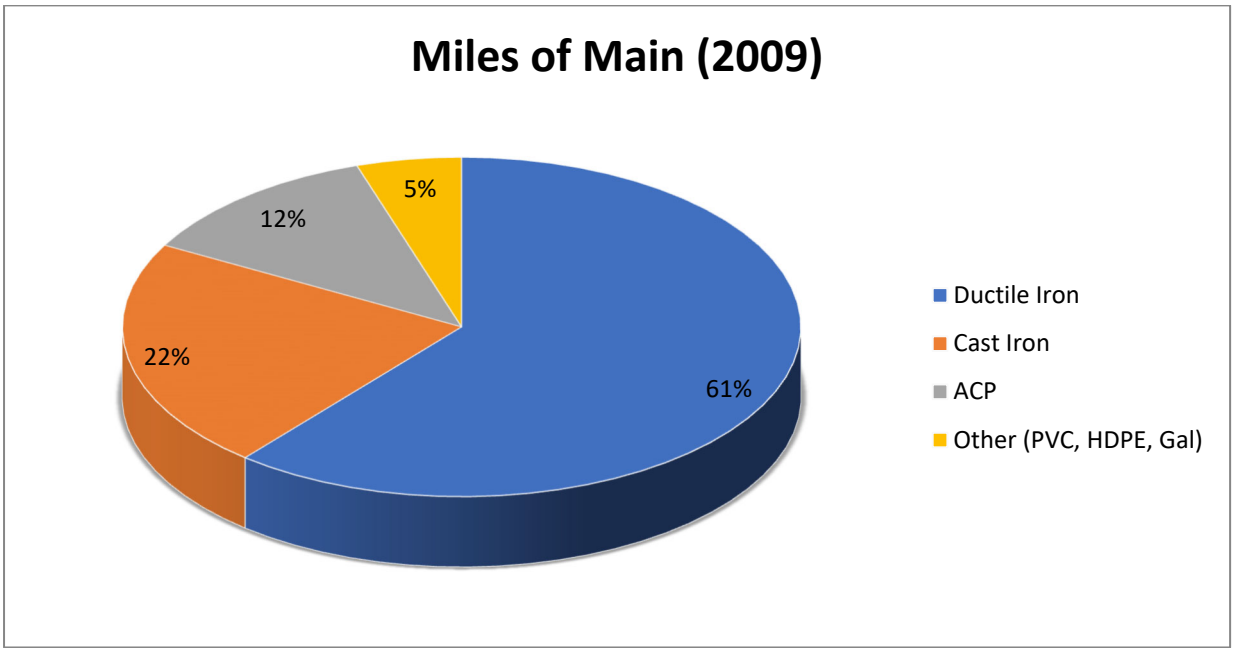


Figure 4: Current Miles of Main (by Material)

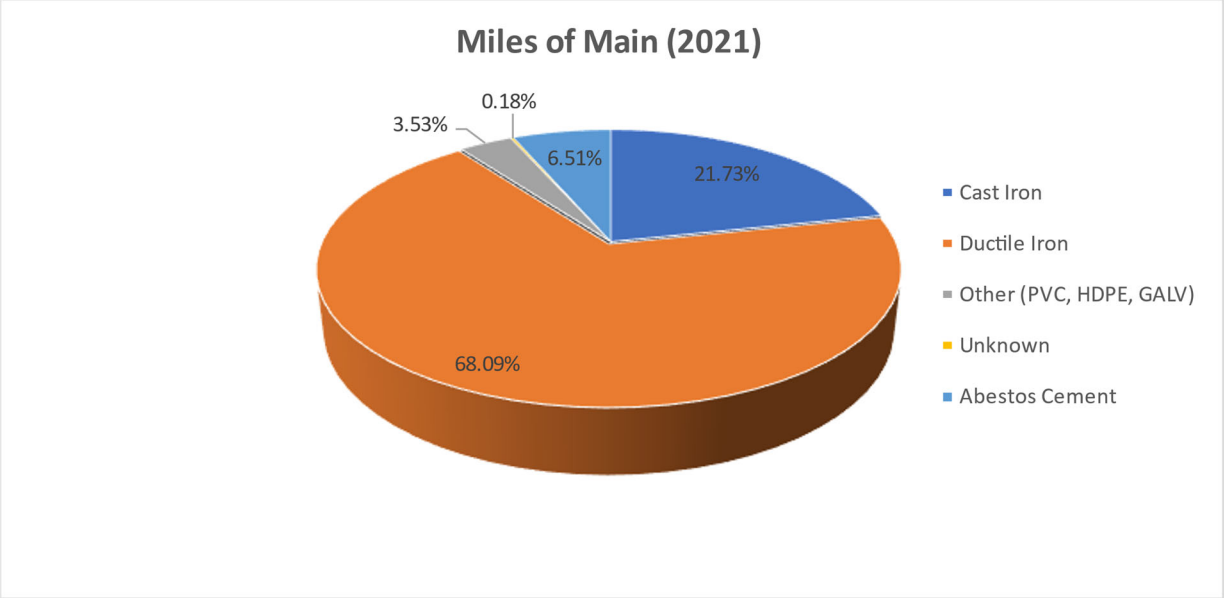
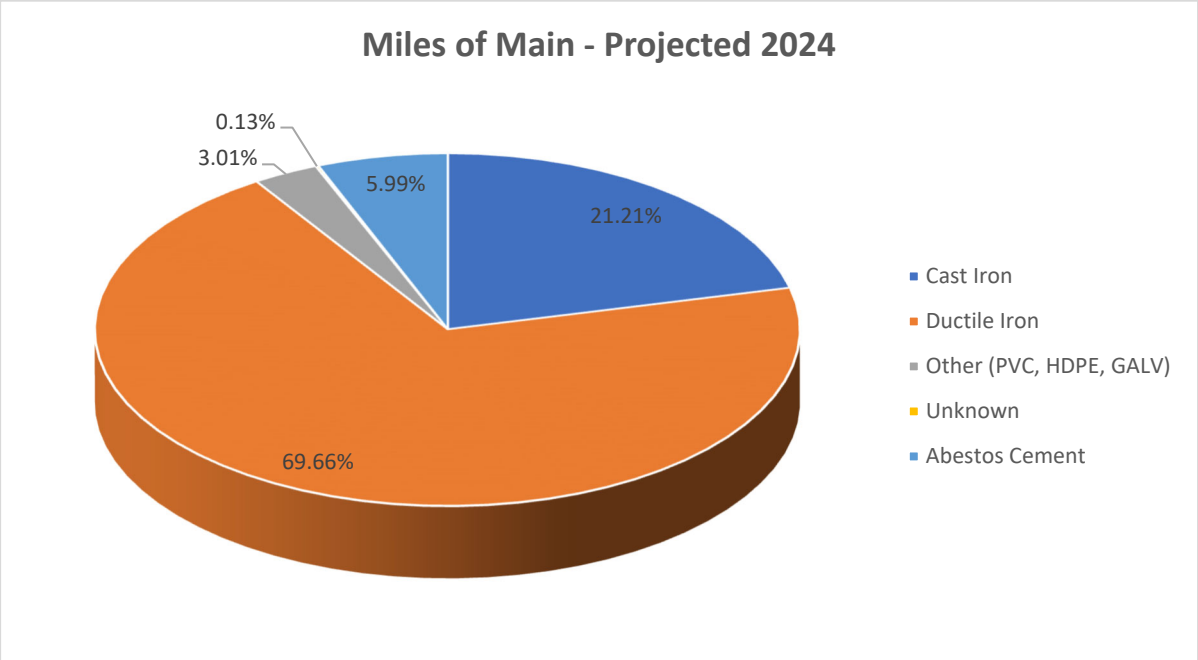


Figure 5: Projected Miles of Main (by Material)



Division	Project Number	Streets	Location Parameters	Type	Construction Year Planned	System	Township	Pressure Zone	Total Length per Zone	Length (LF)	Original Size	Original Material	Age/Era	Proposed Size	Proposed Material	Performance Criteria	Est Cost
Northern	WMR - N120	Reigel Ridge	Clarkson, Elmhurst, Fernwood, Maplewood, Oak, Sycamore	Replacement	2026	Riegel Ridge	Holland			8000	8,6,4	CI	1950	8, 6	CLDIP	Undersized - fire protection	$2,000,000
Northern	WMR- N10	South Main/North Main	End to End	Replacement	2025	Greenwich	Greenwich			3500	6	CI	1920's	8	CLDIP	Undersized	$875,000
Northern	WMR- N11	Tindall, Front & Bullman	End to End	Replacement	2023	Phillipsburg	Phillipsburg			830	2-4	Gal.	1886	8	CLDIP	Undersized	$207,500
Northern	WMR- N14	Brainard	Brainard	Replacement	2023	Phillipsburg	Phillipsburg			1050	4	CI	1886	8	CLDIP	Undersized	$472,500
Northern	WMR- N16	Heckman	Chambers to Firth	Replacement	2026	Phillipsburg	Phillipsburg			1700	6	CI	1910	8	CLDIP	Undersized	$765,000
Northern	WMR- N17	Hudson	Evelyn to Filmore	Replacement	2025	Phillipsburg	Phillipsburg			700	4	CI	1886	8	CLDIP	Undersized	$175,000
Northern	WMR- N18	Hudson	So. Main to Brainard	Replacement	2023	Phillipsburg	Phillipsburg			350	4	CI	1893	8	CLDIP	Undersized	$87,500
Northern	WMR- N21	Tyndall	Brainard to So. Main	Replacement	2026	Phillipsburg	Phillipsburg			300	4	CI	1886	8	CLDIP	Undersized	$75,000
Northern	WMR- N25	Harris Street	Harris (Bullman to Tyndell)	Replacement	2023	Phillipsburg/Bloomsbury	Bloomsbury	Phillipsburg_Low_Service_Area	506,107.00	430	4	CI	1,886	8	CLDIP	undersized	$107,500
Northern	WMR- N27	Mercer	East of Mckeen	Replacement	2025	Phillipsburg	Phillipsburg			530	4	CI	1886	8	CLDIP	Undersized	$132,500
Northern	WMR- N28	Miller	Morris to Henderson	Replacement	2025	Phillipsburg	Phillipsburg			1700	4&6	CI	1898	8	CLDIP	Undersized	$425,000
Northern	WMR- N29	Randall	Randall	Replacement	2025	Phillipsburg	Phillipsburg			200	4	CI	1886	8	CLDIP	Undersized	$50,000
Northern	WMR- N30	Rose & Third St.	Forth to Broad St.	Replacement	2023	Phillipsburg	Phillipsburg			1100	4	CI	1912	8	CLDIP	Undersized	$275,000
Northern	WMR- N31	Railroad	Heckman to Marshall	Replacement	2025	Phillipsburg	Phillipsburg			700	4	CI	1902	8	CLDIP	Undersized	$175,000
Northern	WMR- N32	So. Main	Market to Hudson	Replacement	2023	Phillipsburg	Phillipsburg			350	4	CI	1893	8	CLDIP	Undersized	$157,500
Northern	WMR- N35	Wilson	Heckman to Marshall	Replacement	2023	Phillipsburg	Phillipsburg			700	4	CI	1898	8	CLDIP	Undersized	$175,000
Northern	WMR- N36	West Mercer	West of River St.	Replacement	2025	Phillipsburg	Phillipsburg			450	4	CI	1888	8	CLDIP	Undersized	$112,500
Northern	WMR- N37	Warren	Marshall to Irwin	Replacement	2025	Phillipsburg	Phillipsburg			650	4	CI	1905	8	CLDIP	Undersized	$162,500
Northern	WMR- N38	Irwin	Filmore to Henderson	Replacement	2025	Phillipsburg	Phillipsburg			1400	6	CI	1940	8	CLDIP	Undersized	$350,000
Northern	WMR- N41	Ann	Sayre to Green	Replacement	2026	Phillipsburg	Phillipsburg			1800	6	CI	1920	8	CLDIP	Undersized	$450,000
Northern	WMR- N53	North Street	Church to Wilson to end	Replacement	2025	Bloomsbury	Bloomsbury			2100	4	CI	1930's	8	CLDIP	Undersized	$525,000
Northern	WMR- N54	Liberty	Shimer to Bliss	Replacement	2026	Phillipsburg	Phillipsburg			1600	6	CI	1955	8	CLDIP	Undersized	$400,000
Central	WMR-C100	Miry Brook	Route 33 to Century	Replacement	2023	Hamilton	Hamilton			2,000	6	ACP	1955	8	CLDIP	Undersized	$500,000
Central	WMR-C101	Overton Dr	All	Replacement	2024	Hamilton	Hamilton			1000	6	ACP	1955	8	CLDIP	Undersized	$250,000
Central	WMR-C101	Fleetwood Dr	All	Replacement	2023	Hamilton	Hamilton			1900	6	ACP	1955	8	CLDIP	Undersized	$475,000
Central	WMR-C102	Coleman Rd and Denise	N Crest to nottingham and Sunset	Replacement	2023	Hamilton	Hamilton			1000	6 and 8	ACP	1955	8	CLDIP	Undersized	$250,000
Central	WMR-C103	N. Crest Ave	Nottingham to Coleman	Replacement	2023	Hamilton	Hamilton			625	10	ACP	1955	12	CLDIP	Undersized	$156,250
Central	WMR-C104	Route 33 at deerwood	4" connection at deerwood	Replacement	2024	Hamilton	Hamilton			600	4	ACP	1955	8	CLDIP	Undersized	$270,000
Central	WMR-C105	Sunset blvd	Matthew to nottingham	Replacement	2025	Hamilton	Hamilton			600	8	ACP	1955	8	CLDIP	Undersized	$150,000
Central	WMR-C106	Jericho	Doreen to Sayen	Replacement	2024	Hamilton	Hamilton			1000	6	ACP	1965	8	CLDIP	Undersized	$250,000
Central	WMR-C108	Doreen	Paxson to Sayen	Replacement	2023	Hamilton	Hamilton			1300	6	ACP	1965	8	CLDIP	Undersized	$325,000
Central	WMR-C109	Hughes	Mercer to Applegate	Replacement	2025	Hamilton	Hamilton			1700	10	ACP	1965	12	CLDIP	Undersized	$765,000
Central	WMR-C110	Hirsch and Walter	Cubberly to park	Replacement	2025	Hamilton	Hamilton			800	10	ACP	1965	12	CLDIP	Undersized	$360,000
Central	WMR-C111	Route 33	Herbert to Crest Ave	Replacement	2024	Hamilton	Hamilton			800	4	ACP	1965	12	CLDIP	Undersized	$360,000
Central	WMR-C19	Jonathon/Daniels	End to End	Replacement	2023	Hamilton	Hamilton			2000	6	ACP	1955	8	CLDIP	Undersized	$500,000
Central	WMR-C20	Cannon	End to End	Replacement	2023	Hamilton	Hamilton			2000	6	ACP	1955	8	CLDIP	Undersized	$500,000
Central	WMR-C22	Whitehorse-Ham. Sq.	Nottingham Way to Rte 33	Replacement	2023	Hamilton	Hamilton			500	4	CI	1924	8	CLDIP	Undersized	$225,000
Central	WMR-C23	Yardville-Ham. Sq.	Nottingham Way to Rte 33	Replacement	2023	Hamilton	Hamilton			1050	4	CI	1924	8	CLDIP	Undersized	$472,500
Central	WMR-C25	Whitehorse-Ham. Sq.	South of Nottingham	Replacement	2026	Hamilton	Hamilton			400	6	ACP	1955	12	CLDIP	Undersized	$180,000
Central	WMR-C26	Bordentown-Crosswicks	Bend in Road to Adelphia	Replacement	2026	Chesterfield	Chesterfield			2000	8	unknown	1957	12	CLDIP	Undersized	$500,000
Eastern	WMR-C44	Shore Boulvelard	mill Creek to End	Replacement	2023	Berkeley	Berkeley			2400	6	ACP	1958	12	CLDIP	Undersized	$600,000
Eastern	WMR-C45	Tudor Ave	Chelsea to End	Replacement	2024	Berkeley	Berkeley			1600	6	ACP	1961	12	CLDIP	Undersized	$400,000
Eastern	WMR-C46	Mill Creek Road	Route 9 to Chelsea	Replacement	2026	Berkeley	Berkeley			5100	8	ACP	1958	12	CLDIP	Undersized	$1,275,000
Central	WMR-C51	Coronet Ct.	Estates Blvd. to dead end	Replacement	2025	Hamilton	Hamilton			225	4"	CI	1968	8	CLDIP	Undersized	$56,250
Central	WMR-C52	School Dr. (Windsor)	Main St. to Church St.	Replacement	2025	Robbinsville	Robbinsville			735	4"	CI	1974	8	CLDIP	Undersized	$183,750
Central	WMR-C53	Rte. 33	Yard. Ham. Sq. to Endicott	Replacement	2025	Hamilton	Hamilton			1150	6	ACP	1958	8	CLDIP	Undersized	$517,500
Central	WMR-C54	Whitehorse Ham. Sq. Rd.	Estates Blvd. to Klockner	Replacement	2024	Hamilton	Hamilton			2000	10"	ACP	1957	12	CLDIP	Undersized	$900,000
Central	WMR-C55	Whitehorse Ham. Sq. Rd.	Shoprite to Rte. 33	Replacement	2026	Hamilton	Hamilton			1000	10"	ACP	1957	12	CLDIP	Undersized	$450,000
Central	WMR-C57	Barry Way	Off Philrich Road	Replacement	2024	Hamilton	Hamilton			350	4"	PVC	1976	8	CLDIP	Undersized	$87,500
Lawrenceville	WMR-C61	West Chruch Road	End to End	Replacement	2023	Lawrenceville	Lawrenceville			550	4	CI	1900	6	CLDIP	Age	$137,500
Lawrenceville	WMR-C63	GARDEN ROAD	WEST LONG TO WEST CHURCH	Replacement	2023	Lawrenceville	Lawrenceville			1000	6	CI	1900	6	CLDIP	Age	$250,000
Central	WMR-C64	UNDER I95	WEST CHURCH TO I95 RAMP	Replacement	2023	Lawrenceville	Lawrenceville	Lawrenceville_Service_Area		600	8	CI	1900	8	CLDIP	Age	$150,000
Central	WMR-C73	TITUS	EDGEHILL TO ROUTE 206	Replacement	2023	Lawrenceville	Lawrenceville	Lawrenceville_Service_Area		1200	2	GAL	1900	6	CLDIP	Undersized	$540,000
Lawrenceville	WMR-C74	EDGEHILL	TITUS TO GREEN	Replacement	2025	Lawrenceville	Lawrenceville			550	2	GAL	1900	6	CLDIP	Undersized	$247,500
Lawrenceville	WMR-C77	ROUTE 206 AND GREEN	ROUTE 206 CONNECTED TO GREEN	Replacement	2023	Lawrenceville	Lawrenceville			225	6	CI	1900	6	CLDIP	Age	$101,250
Central	WMR-C79	Broad Street	Under Turnpike	Replacement	2024		Hamilton			800	6	CI	1950	6	CLDIP	Low Pressure	$500,000
Eastern	WMR-C80	BAYVILLE AVE	EAST OF MILLCREEK	Replacement	2023	Berkeley	Berkeley			2700	6	ACP	1955	8	CLDIP	Undersized	$675,000
Eastern	WMR-C81	RED BANK	MOORAGE TO VEEDER	Replacement	2023	Berkeley	Berkeley			1650	6	ACP	1975	8	CLDIP	Undersized	$412,500
Eastern	WMR-C82	SHERMAN AVE	MOORAGE TO BELL	Replacement	2023	Berkeley	Berkeley			950	6	ACP	1975	8	CLDIP	Undersized	$237,500
Eastern	WMR-C83	BELMONT	RED BANK TO SHERMAN	Replacement	2025	Berkeley	Berkeley			1200	6	ACP	1965	8	CLDIP	Undersized	$300,000
Eastern	WMR-C84	CARVER	RED BANK TO SHERMAN	Replacement	2023	Berkeley	Berkeley			1200	6	ACP	1975	8	CLDIP	Undersized	$300,000
Eastern	WMR-C85	FORD	RED BANK TO SHERMAN	Replacement	2025	Berkeley	Berkeley			1200	6	ACP	1975	8	CLDIP	Undersized	$300,000
Eastern	WMR-C86	BELL	RED BANK TO SHERMAN	Replacement	2025	Berkeley	Berkeley			1200	6	ACP	1975	8	CLDIP	Undersized	$300,000
Eastern	WMR-C87	EDISON	RED BANK TO SHERMAN	Replacement	2024	Berkeley	Berkeley			1200	6	ACP	1975	8	CLDIP	Undersized	$300,000
Central	WMR-C88	Bernath dr	Applegate to end	Replacement	2023	Hamilton	Hamilton			480	6"	ACP	1965	8	CLDIP	Undersized	$120,000
Central	WMR-C89	Clarion Ct and Fordham	all	Replacement	2023	Hamilton	Hamilton			1000	4	CI	1975	6	CLDIP	Undersized	$250,000
Central	WMR-C91	Evergreen Ln	all	Replacement	2023	Hamilton	Hamilton			875	6	ACP	1955	8	CLDIP	Undersized	$218,750
Central	WMR-C92	Brandywine Way	all	Replacement	2023	Hamilton	Hamilton			1300	6	ACP	1955	8	CLDIP	Undersized	$325,000
Central	WMR-C93	Duncan Dr	all	Replacement	2023	Hamilton	Hamilton			1000	6	ACP	1955	8	CLDIP	Undersized	$250,000
Central	WMR-C94	Gateway Ln	all	Replacement	2024	Hamilton	Hamilton			200	6	ACP	1955	8	CLDIP	Undersized	$50,000
Central	WMR-C95	Friendly Way	all	Replacement	2023	Hamilton	Hamilton			200	6	ACP	1955	8	CLDIP	Undersized	$50,000
Central	WMR-C95	Ryerson Dr	all	Replacement	2023	Hamilton	Hamilton			800	6	ACP	1965	8	CLDIP	Undersized	$200,000
Central	WMR-C96	Imperial	Estates to 8" at stream	Replacement	2023	Hamilton	Hamilton			300	6	ACP	1965	8	CLDIP	Undersized	$75,000
Central	WMR-C97	Matthew Dr	Sunset blvd, end to end	Replacement	2024	Hamilton	Hamilton			2000	6	ACP	1955	8	CLDIP	Undersized	$500,000
Central	WMR-C98	Shelly	Sunset blvd to Matthew	Replacement	2023	Hamilton	Hamilton			1300	6	ACP	1955	8	CLDIP	Undersized	$325,000
Central	WMR-C99	Jean Dr	Sunset blvd to Shelly	Replacement	2023	Hamilton	Hamilton			900	6	ACP	1955	8	CLDIP	Undersized	$225,000
Northern	WMR-N108	ETHAN PLACE	STONEHENDGE TO POWDERHORN	Replacement	2025	Phillipsburg	Phillipsburg			660	6	CI	1970	8	CLDIP	Undersized	$165,000
Northern	WMR-N110	LYNDALE	LOGAN TO STANLEY	Replacement	2024	Phillipsburg	Phillipsburg			900	6	CI	1965	8	CLDIP	Undersized	$225,000
Northern	WMR-N112	MAPLE	South of Cedar	Replacement	2026	Phillipsburg	Phillipsburg			1650	6	CI	1935	8	CLDIP	Undersized	$412,500
Northern	WMR-N113	ZELLER ALLEY	END TO END	Replacement	2024	Phillipsburg	Phillipsburg			1150	6	CI	1935	8	CLDIP	Undersized	$287,500
Northern	WMR-N114	POHATCONG	ZELLER TO HAWK	Replacement	2026	Phillipsburg	Phillipsburg			1150	6	CI	1935	8	CLDIP	Undersized	$287,500
Northern	WMR-N115	MARCH AND NEW BRUNSWICH	MIDDLESEX TO PERSHING	Replacement	2026	Phillipsburg	Phillipsburg			1300	6	CI	1960	8	CLDIP	Undersized	$325,000
Northern	WMR-N116	YOUNGS	ROSE HILL TO RED SCHOOL	Replacement	2023	Phillipsburg	Phillipsburg			2000	6	CI	1955	8	CLDIP	Undersized	$500,000
Northern	WMR-N117	LYNDA	BRAKELEY TO RED SCHOOL	Replacement	2026	Phillipsburg	Phillipsburg			2600	6	CI	1955	8	CLDIP	Undersized	$650,000
Northern	WMR-N119	EAST MEMORIAL PARKWAY	MILLER TO WAREEN	Replacement	2025	Phillipsburg	Phillipsburg			1075	6"	CI	1900	12	CLDIP	Undersized	$268,750
Northern	WMR-N125	Congress Street	Green St. to Columbus Ave	Replacement	2024	Riegel Ridge	Holland	Phillipsburg_Low_Service_Area	28,097.10	810	4"			8"	CLDIP	Undersized	$202,500
Northern	WMR-N127	Oak Lane, Millview & Fernwood	All	Replacement	2023	Riegel Ridge									CLDIP	Undersized	
Northern	WMR-N67	Carrpentersville to Kent Street	Knoll View and Mill Street	Replacement	2023	Phillipsburg	Phillipsburg			2200	8"	CI	1953	8	CLDIP	Undersized	$550,000
Northern	WMR-N70	Hoffman		Replacement	2024	Califon	Califon			750	2"	GAL		8	CLDIP	Undersized	$187,500
Northern	WMR-N72	Gardinier St	North St. to Bethlehem	Replacement	2025	Bloomsbury	Bloomsbury			1200	4 and 6		1900	8	CLDIP	Undersized	$300,000
Northern	WMR-N73	Main St.	Church to Wilson to end	Replacement	2025	Bloomsbury	Bloomsbury			3700	6	CI	1900	8	CLDIP	Undersized	$925,000
Northern	WMR-N74	Wilson St.	Off of Brunswick Ave.	Replacement	2024	Bloomsbury	Bloomsbury			260	6	CI	1900	8	CLDIP	Undersized	$65,000
Northern	WMR-N75	East St.	Main St. SE to Storage Tank	Replacement	2024	Bloomsbury	Bloomsbury			4600	8	CI	1900	8	CLDIP	Age	$1,150,000
Northern	WMR-N76	Church St.	Main St. to Rt. 173	Replacement	2025	Bloomsbury	Bloomsbury			770	6	CI	1900	8	CLDIP	Undersized	$192,500
Northern	WMR-N77	Route 173 to Bloomsbury	Int. Vault to Brunswick Ave	Replacement	2026	Bloomsbury	Bloomsbury			2500	6	CI	1931	16	CLDIP	Undersized	$1,125,000
Northern	WMR-N78	Center St.	Main to North	Replacement	2023	Bloomsbury	Bloomsbury			350	4	CI	1900	8	CLDIP	Undersized	$87,500
Northern	WMR-N79	N. Main	Fourth to Memorial Parkway	Replacement	2023	Phillipsburg	Phillipsburg			670	4	CI	1900	8	CLDIP	Undersized	$167,500
Northern	WMR-N80	Stull Alley	Chambers to Filmore	Replacement	2025	Phillipsburg	Phillipsburg			425	4	CI	1900	8	CLDIP	Undersized	$106,250
Northern	WMR-N83	Reese Ct	Market to Main	Replacement	2023	Phillipsburg	Phillipsburg			350	4	CI	1899	4 or 6	CLDIP	Age	$87,500
Northern	WMR-N84	MARKET	REESE TO HANOVER	Replacement	2023	Phillipsburg	Phillipsburg			160	2	PLASTIC	1931	6	CLDIP	Undersized	$40,000
Northern	WMR-N85	JERSEY ST	So. Main to Sitgreaves	Replacement	2023	Phillipsburg	Phillipsburg			200	4	CI	1900	4 or 6	CLDIP	Age	$50,000
Northern	WMR-N86	COLBY PLACE & FILMORE	HECKMAN TO RAILROAD	Replacement	2023	Phillipsburg	Phillipsburg			1000	4	CI	1899-1930	8	CLDIP	Undersized	$250,000
Northern	WMR-N87	FIRTH ST	MARSHALL TO HECKMAN	Replacement	2024	Phillipsburg	Phillipsburg			720	4	CI	1900	8	CLDIP	Undersized	$180,000
Northern	WMR-N88	WARREN	MARSHALL TO HECKMAN	Replacement	2023	Phillipsburg	Phillipsburg			700	4	CI	1900	8	CLDIP	Undersized	$175,000
Northern	WMR-N89	GRANT AND STOCKTON	HECKMAN TO STOCKTON	Replacement	2024	Phillipsburg	Phillipsburg			450	4	CI	1930	6	CLDIP	Undersized	$112,500
Northern	WMR-N90	BELT	BEST TO CENTER	Replacement	2023	Phillipsburg	Phillipsburg			650	4	CI	1955	8	CLDIP	Undersized	$162,500
Northern	WMR-N91	BEST	NO. RIVERVIEW TO ELMHERST	Replacement	2025	Phillipsburg	Phillipsburg			900	4	CI	1955	8	CLDIP	Undersized	$225,000
Northern	WMR-N92	OHIO	SUSSEX TO PASSIAC	Replacement	2024	Phillipsburg	Phillipsburg			550	6	CI	1965	8	CLDIP	Undersized	$137,500
Northern	WMR-N93	RIVERSIDE WAY	RIVERSIDE WAY	Replacement	2023	Phillipsburg	Phillipsburg			425	2	CI	1900	6	CLDIP	Undersized	$106,250
Northern	WMR-N94	E. SHORE TRAIL 6" PIPE	E. SHORE TRAIL	Replacement	2023	Summit Lake	Summit Lake			1300	6	ACP	1950	6	CLDIP	Material & Age	$325,000
Northern	WMR-N95	E. SHORE TRAIL 2"PIPE	E. SHORE TRAIL	Replacement	2023	Summit Lake	Summit Lake			390	2	GAL	1950	4	CLDIP	Age	$97,500
Northern	WMR-N96	W. SHORE TRAIL 4" PIPE	W. SHORE TRAIL	Replacement	2024	Summit Lake	Summit Lake			420	4	ACP	1950	4	CLDIP	Age	$105,000

Division	Project Number	Streets	Location Parameters	Type	Construction Year Planned	System	Township	Pressure Zone	Total Length per Zone	Length (LF)	Original Size	Original Material	Age/Era	Proposed Size	Proposed Material	Performance Criteria	Est Cost
Northern	WMR-N97	OAK AND W. SHORE TRAIL 2" PIPE	OAK AND W. SHORE TRAIL	Replacement	2024	Summit Lake	Summit Lake			700	2	GAL	1950	4	CLDIP	Age	$175,000
Northern	WMR-N98	W. SHORE TRAIL 6" PIPE	W. SHORE TRAIL	Replacement	2024	Summit Lake	Summit Lake			1020	6	CI	1950	6	CLDIP	Age	$255,000
Northern	WMR-N99	BEACH PLAZA	BEACH PLAZA	Replacement	2023	Summit Lake	Summit Lake			310	2	GAL	1950	8	CLDIP	Age	$77,500
Southern	WMR-S26	4" Line	Between Fairmount & Asyla	Replacement	2024	Gloucester	Gloucester			570	4	ACP	1963	8	CLDIP	Undersized	$142,500
Southern	WMR-S31	Service to B'Wood Sch	Theresa to School	Replacement	2026	Gloucester	Gloucester			510	4	ACP	1957	8	CLDIP	Undersized	$127,500
Southern	WMR-S32	Theresa	Church to South	Replacement	2025	Gloucester	Gloucester			440	4	ACP	1957	8	CLDIP	Undersized	$110,000
Southern	WMR-S35	Barbara	Barbara	Replacement	2024	Gloucester	Gloucester			320	6	ACP	1963	8	CLDIP	Undersized	$80,000
Southern	WMR-S36	Carol	Carol	Replacement	2023	Gloucester	Gloucester			1570	6	ACP	1957	8	CLDIP	Undersized	$392,500
Southern	WMR-S38	Cornell	Cornell	Replacement	2024	Gloucester	Gloucester			810	6	ACP	1957	8	CLDIP	Undersized	$202,500
Southern	WMR-S40	Dearbourne	High to End	Replacement	2024	Gloucester	Gloucester			2570	6	ACP	1963	8	CLDIP	Undersized	$642,500
Southern	WMR-S43	Fairmount	High to State	Replacement	2026	Gloucester	Gloucester			1800	6	ACP	1963	8	CLDIP	Undersized	$450,000
Southern	WMR-S44	Fay Ann	Fay Ann	Replacement	2026	Gloucester	Gloucester			1070	6	ACP	1963	8	CLDIP	Undersized	$267,500
Southern	WMR-S45	Grand	High to State	Replacement	2025	Gloucester	Gloucester			1800	6	ACP	1957	8	CLDIP	Undersized	$450,000
Southern	WMR-S46	Hillcrest	Hortman to Frankford	Replacement	2026	Gloucester	Gloucester			2450	6	ACP	1957	8	CLDIP	Undersized	$612,500
Southern	WMR-S47	Hortman	Drexel to Hillcrest	Replacement	2024	Gloucester	Gloucester			650	4	ACP	1957	8	CLDIP	Undersized	$146,250
Southern	WMR-S48	Jerome	Jerome	Replacement	2026	Gloucester	Gloucester			810	6	ACP	1957	8	CLDIP	Undersized	$202,500
Southern	WMR-S51	Lehigh	Fairmount to End	Replacement	2026	Gloucester	Gloucester			650	6	ACP	1963	8	CLDIP	Undersized	$162,500
Southern	WMR-S52	Linda	Barbara to 4"p	Replacement	2023	Gloucester	Gloucester			1370	6	ACP	1963	8	CLDIP	Undersized	$342,500
Southern	WMR-S54	Mathews	Drexel to Hillcrest	Replacement	2026	Gloucester	Gloucester			500	6	ACP	1957	8	CLDIP	Undersized	$125,000
Southern	WMR-S55	Pennsylvania	Pennsylvania	Replacement	2025	Gloucester	Gloucester			930	6	ACP	1957	8	CLDIP	Undersized	$232,500
Southern	WMR-S56	South	South	Replacement	2026	Gloucester	Gloucester			1320	6	ACP	1957	8	CLDIP	Undersized	$330,000
Southern	WMR-S57	State	Lake to Carol	Replacement	2024	Gloucester	Gloucester			1100	6	ACP	1957	8	CLDIP	Undersized	$275,000
Southern	WMR-S58	State	Carol to Hillcrest	Replacement	2026	Gloucester	Gloucester			1350	6 (8)	ACP	1963	8	CLDIP	Undersized	$337,500
Southern	WMR-S59	Theresa	South to the end	Replacement	2026	Gloucester	Gloucester			660	6	ACP	1957	8	CLDIP	Undersized	$165,000
Southern	WMR-S60	Trinity	Indiana to Ceciliia	Replacement	2024	Gloucester	Gloucester			1150	6	ACP	1957	8	CLDIP	Undersized	$287,500
Southern	WMR-S66	Vassar	Vassar Pl.	Replacement	2024	Gloucester	Gloucester			100	6	ACP	1957	8	CLDIP	Undersized	$25,000
Southern	WMR-S68	Presidential	Kings Road to Noble	Replacement	2024	Blackwood	Blackwood			1200	4	DI	1975	8	CLDIP	Undersized	$300,000
Southern	WMR-S70	LAKELAND ROAD	BLACKHORSE PIKE TO RAILROAD	Replacement	2023	Gloucester	Gloucester			1000	6	CI	1955	12	CLDIP	Undersized	$250,000
Southern	WMR-S72	Kay Lane & Jarvis Ct.	All	Replacement	2026	Blackwood	Blackwood			600	4	PLASTIC	1975	6	CLDIP	Undersized	$150,000
Southern	WMR-S74	Apple Ave	Cummins to dead end	Replacement	2023	Blackwood	Blackwood			400	2	PLASTIC	1975	6	CLDIP	Undersized	$100,000
Southern	WMR-S75	Frankford Ave	Black Horse Pike to Hillcrest easement	Replacement	2023	Blackwood	Blackwood			2400	6	ACP	1955	8	CLDIP	Undersized	$600,000
Southern	WMR-S76	Blackhorse Pike	Black Horse Pike to Hillcrest easement	Replacement	2024	Blackwood	Blackwood			2400	6	ACP	1940	12	CLDIP	Undersized	$1,080,000
Southern	WMR-S78	Pennsylvania Ave	Lake to End	Replacement	2024	Blackwood	Blackwood			325	2	Gal	1940	6	CLDIP	Undersized	$81,250
Southern	WMR-S79	Lincoln Ave	Blackhorse Pike to Washington	Replacement	2023	Blackwood	Blackwood			1000	6	CI	1940	8	CLDIP	Undersized	$250,000
Southern	WMR-S80	Garfield	Blackhorse Pike to Washington	Replacement	2023	Blackwood	Blackwood			1000	6	CI	1930	8	CLDIP	Undersized	$250,000
Southern	WMR-S81	Lakeview	Prospect to End	Replacement	2023	Blackwood	Blackwood			1000	4	CI	1930	8	CLDIP	Undersized	$250,000
Southern	WMR-S82	Lehigh	Indiana to Ceciliia	Replacement	2024	Blackwood	Blackwood			1000	6	ACP	1957	8	CLDIP	Undersized	$250,000
Southern	WMR-S87	Central Lakeview Woodlyn	franchise boundary/creek to 8" on Woodlyn	Replacement	2025	Blackwood	Gloucester	Blackwood_Low_Service_Area		1,300	12	ACP		12	CLDIP	material breaks	$250,000
Northern	WMR-N132	Route 173 (Church St)	Under the Bridge	Replacement	2024	Greenwich	Greenwich			200	6	ACP	1956	16	CLDIP	Undersized	$200,000
Eastern	WMR-C112	Vedar Lane	Ocean Gate Dr to Baview Ave	Replacement	2023	Berkeley	Berkeley			6,300	10	ACP		12	CLDIP	material, breaks	$1,200,000
Eastern	WMR-C113	Point Pleasant Ave	Berkeley Dr to Mill Creek Rd	Replacement	2023	Berkeley	Berkeley			1,730	6	ACP		6	CLDIP	material, breaks	$350,000
Eastern	WMR-C114	Scott Drive	Full length	Replacement	2023	Berkeley	Berkeley			2,350	8	ACP		8	CLDIP	material, breaks	$450,000
Eastern	WMR-C115	Storm Jib Ct	End to End	Replacement	2023	Berkeley	Berkeley			1,490	6	PVC		6	CLDIP	material, breaks	$290,000
Northern	WMR-N121	Lawrence Trail	End to End	Replacement	2023	Cliffside Park	Washington			596	4	PVC		4	CLDIP	material, breaks	$112,000
Northern	WMR-N122	La Bounty Trl	Hillcrest Ave to Lawrence Trl	Replacement	2023	Cliffside Park	Washington			650	4	PVC		4	CLDIP	material, breaks	$130,000
Northern	WMR-N123	Roosevelt Ave	End to End	Replacement	2023	Cliffside Park	Washington			1,130	4	PVC		4	CLDIP	material, breaks	$220,000
Northern	WMR-N124	Hillcrest Ave	Lawrence Trl to end of main	Replacement	2023	Cliffside Park	Washington			475	4	PVC		4	CLDIP	material, breaks	$90,000
Northern	WMR-N125	Cleveland Ave	Hillcrest Ave to River Dr	Replacement	2023	Cliffside Park	Washington			1,007	4	PVC		4	CLDIP	material, breaks	$200,000
Northern	WMR-N126	To Wells	Roosevelt Ave to Well 1 & 2	Replacement	2023	Cliffside Park	Washington			307	4	PVC		4	CLDIP	material, breaks	$80,000
Northern	WMR-N127	S River Dr	Cleveland Ave to end of main	Replacement	2023	Cliffside Park	Washington			215	4	PVC		4	CLDIP	material, breaks	$60,000
Northern	WMR-N128	Sitgreaves St	Stockton St to Mckeen St	Replacement	2025	Phillipsburg	Phillipsburg			1,280	6	CI		6	CLDIP	LSL remediation	$250,000
Northern	WMR-N129	S Main Street	Stockton St to Abboots St	Replacement	2025	Phillipsburg	Phillipsburg			2,430	10	CI		12	CLDIP	LSL remediation	$500,000
Northern	WMR-N130	Stockton St	Howard St to S Main St	Replacement	2025	Phillipsburg	Phillipsburg			1,025	6	CI		8	CLDIP	LSL remediation	$200,000
Northern	WMR-N131	Mercer St	McKeen St to River St	Replacement	2025	Phillipsburg	Phillipsburg			2,270	6	CI		8	CLDIP	LSL remediation	$450,000

EXHIBIT B

Aqua New Jersey, Inc.
Distribution System Improvement Charge Baseline Depreciation
Docket No. WR
Mains, Services, Hydrants

	Plant Balances as of 12/31/2021*	Depreciation Rate	DSIC Base Spending Requirement
Account #343: Mains	$ 162,534,737	2.15%	$ 3,494,497
Account #345: Services	$ 56,735,381	3.87%	$ 2,195,659
Account #348: Hydrants	$ 9,070,288	3.00%	$ 272,109
	$ 228,340,406		*$ 5,962,265*
CIAC & CAC Mains	$ (56,651,600)	2.23%	$ (1,263,331)
CIAC & CAC Services	$ (1,102,066)	4.55%	$ (50,144)
CIAC & CAC Hydrants	$ (5,764)	3.00%	$ (173)
	$ (57,759,430)		*$ (1,313,648)*
Total			$ 4,648,617
			-

Date of Foundational Filing Submission 5/31/2022
Date of Most Recent BPU Annual Report at the time the Foundational Filing was Submitted 12/31/2021

Note: The above amounts agree to Aqua New Jersey Inc.'s 2021 Annual Report to the BPU. The depreciation rates utilized were approved in Docket No. WR18121351

EXHIBIT C

Aqua New Jersey, Inc.
Monthly DSIC Assessment Revenues at 5.00%
Docket No. WR

Applicable to General Metered Service Connections noted below:

DSIC Eligible Revenues	$43,466,531
Maximum Annual DSIC Revenue Surcharge at 5.00%	$2,173,326
Annual Assessment per Meter Equivalent at 5.00%	$31.42
Monthly Assessment per Meter Equivalent at 5.00%	$2.62 **

Class	Size	Customers	Meter Equivalents	Monthly DSIC Assessment $	Weighted Meter Equivalents	Monthly DSIC Assessment Revenues at 5.00%
Residential						
	5/8"	45,072	1.0	$2.62	45,072	$118,089
	3/4"	5,579	1.5	$3.93	8,369	$21,927
	1"	918	2.5	$6.55	2,295	$6,013
	1-1/2"	144	5.0	$13.10	720	$1,886
	2"	153	8.0	$20.96	1,224	$3,207
	3"	5	15.0	$39.30	75	$197
	6"	1	50.0	$131.00	50	$131
	8"	1	80.0	$209.60	80	$210
	Total Base RES	**51,873**			**57,885**	**$151,659**
Commercial						
	5/8"	1,294	1.0	$2.62	1,294	$3,390
	3/4"	159	1.5	$3.93	239	$626
	1"	351	2.5	$6.55	878	$2,300
	1-1/2"	179	5.0	$13.10	895	$2,345
	2"	494	8.0	$20.96	3,952	$10,354
	3"	40	15.0	$39.30	600	$1,572
	4"	21	25.0	$65.50	525	$1,376
	6"	5	50.0	$131.00	250	$655
	8"	10	80.0	$209.60	800	$2,096
	Total Base COM	**2,553**			**9,433**	**$24,714**
Industrial						
	5/8"	10	1.0	$2.62	10	$26
	3/4"	1	1.5	$3.93	2	$5
	1"	1	2.5	$6.55	3	$8
	1-1/2"	3	5.0	$13.10	15	$39
	2"	14	8.0	$20.96	112	$293
	3"	0	15.0	$39.30	0	$0
	4"	7	25.0	$65.50	175	$459
	6"	2	50.0	$131.00	100	$262
	8"	1	80.0	$209.60	80	$210
	10"	0	115.0	$301.30	0	$0
	Total Base IND	**39**			**497**	**$1,302**
Public Authority						
	5/8"	20	1.0	$2.62	20	$52
	3/4"	0	1.5	$3.93	0	$0
	1"	3	2.5	$6.55	8	$21
	1-1/2"	10	5.0	$13.10	50	$131
	2"	56	8.0	$20.96	448	$1,174
	3"	4	15.0	$39.30	60	$157
	4"	3	25.0	$65.50	75	$197
	6"	9	50.0	$131.00	450	$1,179
	8"	3	80.0	$209.60	240	$629
	Total Base PUB	**108**			**1,351**	**$3,540**
Totals		**54,573**			**69,166**	**$181,215**

SERVICE LIST

In the Matter of Aqua New Jersey Inc.'s
2022 Distribution System Improvement Charge Foundational Filing
BPU Docket No. WR22050360

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