PENNSYLVANIA
AMERICAN WATER

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VIA UPS Overnight Delivery

January 30, 2019

Rosemary Chiavetta, Secretary
Commonwealth of Pennsylvania
Pennsylvania Public Utility Commission
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120

Re: Petition of Pennsylvania-American Water Company Wastewater Division for Approval of Modification of Long-Term Infrastructure Improvement Plan

Docket No. P-2014-2431005

Dear Secretary Chiavetta:

In response to the Order entered on January 7, 2020, at the docket number referenced above, specifically Ordering Paragraph 3, Pennsylvania-American Water Company Wastewater Division (PAWC-WD) is filing the enclosed Amended Long-Term Infrastructure Improvement Plan ("Amended Plan").

A copy of the Amended Plan is being provided to the parties as indicated on the enclosed Certificate of Service.

Additionally, as directed in the Public Utility Commission's Secretarial Letter dated January 14, 2020, PAWC-WD is including a red line version of the Amended Plan to highlight the differences from the original Long-Term Infrastructure Improvement Plan filed on December 12, 2018.

Please contact me if you have any questions.

Sincerely,

Susan Simms Marsh

Enclosures

cc: Certificate of Service
K. Shaffer, Bureau of Technical Utility Services (Email) w/Enclosures

PENNSYLVANIA-AMERICAN WATER COMPANY

5-YEAR WASTEWATER
LONG-TERM INFRASTRUCTURE IMPROVEMENT PLAN

August 15, 2019

Amended January 30, 2020

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Introduction

In accordance with the requirements of 66 Pa. C.S. §1350 - §1360 and the Public Utility Commission's Final Order for the Implementation of Act 11 of 2012 (Public Meeting of August 2, 2012, Docket No. M-2012-2293611), Pennsylvania-American Water Company (PAWC or Company) submitted a Wastewater Long-Term Infrastructure Improvement Plan (LTIIP) dated October 31, 2018 for calendar years 2019-2023, which was revised in accordance with the Joint Petition for Settlement dated August 19, 2019 and approved by the Pennsylvania Public Utility Commission's (the Commission's or PUC's) Opinion and Order entered January 7, 2020 at Docket No. P-2014-2431005. This plan modifies PAWC's 2014 Wastewater LTIIP used for the initial establishment of a Wastewater Distribution System Improvement Charge (DSIC), referred to in this report as "Wastewater DSIC" or "DSIC". This LTIIP is submitted in support of an expanded Wastewater DSIC mechanism for the current PAWC wastewater systems referenced below and modifies the existing LTIIP approved by the PUC on December 4, 2014, at Docket No. P-2014-2431005, and covers the period of 2019-2023.

PAWC is a wholly owned subsidiary of American Water Works Company, Inc. and provides public water and sewer service to residents in Pennsylvania. PAWC owns and operates 18 wastewater systems located in 12 Counties across the Commonwealth, and serves approximately 65,139 customer connections (customer count as of 7/31/2018), including several bulk municipal customers.

Provided in Table 1 is a list of all wastewater systems owned and operated by PAWC. The location of each wastewater system is shown in Figure 1. The wastewater system list in this LTIIP is more detailed than the listing in PAWC's wastewater tariff because long-term infrastructure improvement planning is completed by system and the tariff list is grouped by wastewater district. Districts that have multiple wastewater systems include the Fairview, Northeast, and McKeesport Districts.

Table 1 - List of PAWC Wastewater Systems

Wastewater System Grouped by State Region		Rate Zone	Areas Served	Number of Customers as of 7/31/18
Central	Fairview North	1	York County. Portions of Fairview Township	1,498
	Fairview South	1	York County. Portions of Fairview Township	2,498
	Franklin	5	Adams County. Portions of the Townships of Franklin, Hamiltonban, and Highland	348
	McEwensville	1	Northumberland County. McEwensville Borough	133
	New Cumberland	2	Cumberland County. New Cumberland Borough	3,066
Northeast	Blue Mountain Lake	1	Monroe County. Portions of the Townships of Smithfield and Stroud	830

Wastewater System Grouped by State Region		Rate Zone	Areas Served	Number of Customers as of 7/31/18
	Lehman Pike [a]	1	Monroe County: Portions of Middle Smithfield Township. Pike County: Portions of Lehman Township	2,714
	Marcel Lake [b]	1	Pike County. Portions of Delaware Township	354
	Pocono	1	Monroe County. A portion of Coolbaugh Township	3,689
	Scranton	3	Lackawanna County. The City of Scranton and the Borough of Dunmore	29,551 [c]
Southeast	Coatesville	1	Chester County. The City of Coatesville, the Borough of Parkesburg and portions of the Borough of South Coatesville and portions of the Townships of Caln, East Fallowfield, Highland, Sadsbury, Valley, West Caln, and West Sadsbury	6,226 [d]
West	Clarion	1	Clarion County. Clarion Borough and portions of the Townships of Clarion and Monroe	2,157 [e]
	Claysville	1	Washington County. Claysville Borough and portions of the Township of Donegal	503
	Koppel	4	Beaver County. Koppel Borough	351 [f]
	McKeesport	6	Allegheny County. The City of McKeesport, Port Vue Borough, and the following through bulk municipal connections: Boroughs of White Oak, East McKeesport, Lincoln, Liberty, Versailles, Glassport, and the Townships of North Versailles and Elizabeth	8,096 [g]
	Dravosburg	6	Allegheny County. Borough of Dravosburg	625
	Duquesne	6	Allegheny County. The City of Duquesne and a portion of West Mifflin Borough	1,840
	Paint-Elk	1	Clarion County. Shippenville Borough and portions of the Townships of Elk and Paint	660

[a] Also known as "Saw Creek Estates"
[b] Also known as "Clean Treatment"
[c] Number of customers does not include customers in portions of the Boroughs of Taylor, Dickson City, and Moosic served through inter-municipal agreements; bulk municipal customers own and maintain their own wastewater collection systems and are counted as single customers
[d] Caln, Sadsbury, Valley, and West Brandywine Townships are bulk municipal customers counted as single customers
[e] Strattanville Borough is a bulk municipal customers that is counted as a single customer
[f] Big Beaver Borough is a bulk municipal customer that is counted as a single customer

[9] Customers in the eight surrounding municipalities (Boroughs of White Oak, East McKeesport, Lincoln, Liberty, Versailles, Glassport, and the Townships of North Versailles and Elizabeth) are served through inter-municipal agreements and are not included in the total customer count and counted as single customers..

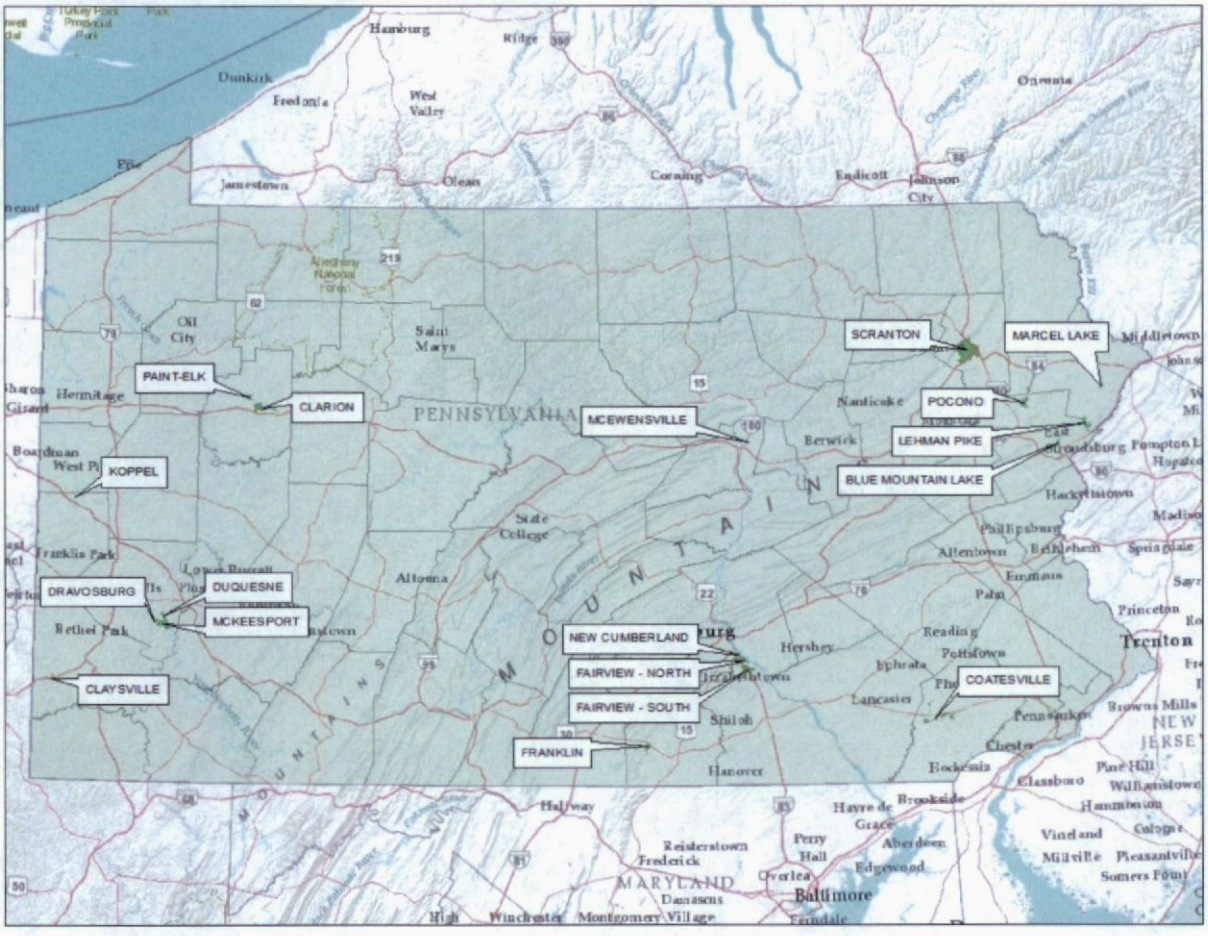

Figure 1 – Location of PAWC Wastewater Systems

The condition of the wastewater systems varies, depending on age, material, local conditions and quality of initial design or installation. Some systems require significant capital investment to maintain efficient, safe, and reliable service for existing customers. PAWC has acquired its wastewater systems from prior ownership in various states of disrepair. Many systems have aging infrastructure and significant inflow and infiltration (I&I) from rainfall runoff and groundwater.

During dry-weather conditions, the impact of I&I varies. Some wastewater collection systems have minimal impact from I&I during dry weather, while other systems experience high I&I even in dry weather conditions. For example, a wastewater collection system with a high-groundwater table can be significantly impacted by infiltration in dry weather conditions. In wet weather conditions, the impact of I&I is amplified. Flow entering a wastewater treatment plant (WWTP) can increase significantly due to the inflow of groundwater, rainfall runoff, and/or snowmelt. This may cause a sanitary sewer overflow (SSO) or combined sewer overflow (CSO) to occur if flow exceeds the plant's peak hydraulic capacity. Similarly, lift stations can become

hydraulically overloaded if the inflow of sewage mixed with groundwater and rainfall runoff exceeds the pumping capacity, causing raw sewage to be released to streets or a local waterway. I&I due to rainfall runoff, groundwater, or snowmelt can exceed the hydraulic carrying capacity of collection system piping, causing manhole lids to be lifted and raw sewage to be released into the environment. Hydraulically overloaded pipes and manholes can also cause sewer backups into homes and businesses. SSO's, CSO's and sewer backups due to I&I pose a public health risk and may violate many local and federal environmental regulations.

I&I has multiple causes, many of which are related to aging infrastructure. I&I can enter the wastewater collection system in various ways, such as cross connections, uncapped cleanouts, below-grade manhole lids, or roof drains. Groundwater inflow can enter the collection system through cracks in sewer pipes, faulty lateral connections, cracks in manhole walls, or deteriorated pipe joints. Groundwater can also enter the collection system through broken service laterals, root intrusion into a lateral pipe, or cracks in the walls of customer-owned grinder pump pits.

The focus of the wastewater LTIIP is to replace or rehabilitate collection system infrastructure based on strategic condition assessment and hydraulic evaluations; reduce I&I levels to address SSO and CSO issues; and to correct deficiencies in certain newly acquired wastewater system. These types of system improvements will improve system safety and reliability, customer service, and environmental compliance.

I&I has been reduced in a number of areas since the Wastewater DSIC rate mechanism was implemented. For instance, after significant capital investment in collection system upgrades which occurred over a multiple year timeframe, the Clarion collection system no longer experiences SSO events. Additionally, after a complete rebuild of Marcel Lake collection system with a resultant dramatic reduction in I&I, PAWC believes that PA Department of Environmental Protection (PaDEP) will now permit planning module approvals to resume.

Accelerated infrastructure replacement and rehabilitation is needed to continue meeting the challenges of PAWC wastewater systems, including systems that have been acquired by PAWC since the last wastewater LTIIP was submitted in 2014. PAWC wastewater customer base has increased from approximately 16,803 at the time the 2014 LTIIP was filed to the current total of 65,139 customer connections. Many newly acquired systems such as Scranton, McKeesport, Duquesne, and Dravosburg are currently under PaDEP Consent Orders and require accelerated rehabilitation and replacement.

This LTIIP provides a comprehensive description of the wastewater systems and establishes how PAWC plans to continue to accelerate the rehabilitation, improvement, and replacement of aging wastewater infrastructure (hereinafter referred to as eligible property) within these systems for the five year period from 2019 to 2023. The LTIIP includes an inventory and discussion of the types and age of property eligible for wastewater DSIC recovery; schedule for its planned rehabilitation and replacement; location of eligible property; reasonable estimate of the quantity of property to be improved; projected annual expenditures; manner in which replacement or rehabilitation of aging infrastructure will be accelerated; workforce management plan to ensure work is performed in cost-effective, safe and reliable manner; and description of outreach and coordination with other utilities to minimize disruptions to customers.

Section 1 – Types and Age of Eligible Property

An inventory of all eligible property, as defined in 66 Pa. C.S. §1351 (4), is provided in this Section. PAWC has developed and is applying Geographic Information Systems (GIS) as the spatial component of its Enterprise Asset Management (EAM) Program. Wastewater assets, such as collection mains, manholes, and lift stations are spatially located and attributed with critical information about PAWC systems. GIS data will be updated continually to include system changes, such as replacement of old pipes or expansion of the wastewater collection system. GIS data was used to identify types and age of eligible property. For some recently acquired systems, there is limited information on the wastewater properties. For each system, all data sources were analyzed and the best available information was used to quantify the types of eligible property.

PAWC owns the following types of sewer collection systems:

Gravity – In a gravity collection system, service laterals from the customer premise connect to a sewer main usually located in an alley or street. For combined systems, catchbasins / inlets convey rainfall runoff directly to the gravity collection system. Eligible property also includes facilities that are unique to combined sewer collection systems, such as CSO regulators, diversion manholes, storage structures, outfalls, and equalization chambers. Sewer mains and interceptor sewer mains (also referred to as "trunk lines") form a branched network that generally follows street layout, and can be accessed through manholes. Service laterals can be accessed through lateral cleanouts. Gravity collection systems either convey sewage directly to a WWTP or to a lift station. In total, the wastewater collection systems are comprised of approximately 65,139 service laterals, 20,874 manholes, and 4,156,078 linear feet (LF) of gravity main which includes combined sewer gravity mains. Gravity main and manhole material generally depends on installation date. Newer mains are polyvinyl chloride (PVC) and older mains are mostly vitrified clay pipe (VCP). Newer manholes are pre-cast or cast in place concrete and older manholes are brick.

Low Pressure – In a low-pressure collection system, individual customer sewage collects in a grinder pump and pit installation. Sewage is pumped from the pit through a service lateral into a low pressure force main. Depending on topography and layout, some low pressure collection systems include lift stations to boost pressure. A low pressure force main may contain in-line flow meters, valve vaults, and air and vacuum release chambers. A low pressure system can convey sewage directly to a WWTP, a lift station, or a manhole in the gravity system. On low pressure systems, the eligible property associated with the service lateral extends from the sewer main to the individual customer's grinder pump unit. One exception to this exists in the Blue Mountain district where there are 5 company grinder pump and pit installations. PAWC owns approximately 458,177 LF of low pressure sewer main.

Force Main – A force main is a pressurized discharge pipeline from a lift station. A force main pipeline may contain in-line flow meters, valve vaults, and air and vacuum release chambers. Force mains can convey sewage directly to a WWTP or to a manhole in the gravity system.

PAWC owns and operates 95 lift stations and approximately 257,725 LF of force main. In general, force main material is cast iron for older pipes, ductile iron or PVC for newer pipes.

"Eligible property" is defined in the Pa Code as property that is part of a distribution system and eligible for repair, improvement and replacement of infrastructure under 66 Pa. C.S. §1351, as follows:

4(i) Collection sewers, collecting mains and service laterals, including sewer taps, curb stops and lateral cleanouts installed as in-kind replacements for customers.

4(ii) Collection mains and valves for gravity and pressure systems and related facilities such as manholes, grinder pumps, air and vacuum release chambers, cleanouts, main line flow meters, valve vaults and lift stations installed as replacements or upgrades for existing facilities that have worn out, are in deteriorated condition or are required to be upgraded by law, regulation or order.

4(iii) Collection main extensions installed to implement solutions to wastewater problems that present a significant health and safety concern for customers currently receiving service from the wastewater utility.

4(iv) Collection main rehabilitation including inflow and infiltration projects.

4(v) Unreimbursed costs related to highway relocation projects where a wastewater utility must relocate its facilities.

4(vi) Other related capitalized costs.

For the purposes of this LTIIP, the term "sewers" refers to sewer mains which convey either sanitary or combined sewage.

Table 2 and Table 3 provide examples of eligible properties for each wastewater system. Table 4 lists pipe length by diameter for each system. Figure 2 and Figure 3 provide a breakdown by material for gravity pipe and pressurized pipe, respectively. Pipe install date breakdown is provided in Figure 4.

Table 2 - Types and Age of Eligible Property

Wastewater System		Gravity Main (LF)	Combined Sewer Gravity Main (LF)	Force Main / Low Pressure Main (LF)	Lift Stations	Manholes	Service Laterals [a]	General System Age
Central	Fairview North	165,600	0	18,844	11	869	1,498	>1950
	Fairview South	198,722	0	13,068	6	1,050	2,498	>1992
	Franklin	55,239	0	12,423	1	198	348	>1972
	McEwensville	12,669	0	1,242	4	57	133	>1984
	New Cumberland	144,692	0	6,898	3	608	3,066	>1950
Northeast	Blue Mountain Lake	0	0	68,250	6	0	830	>1990
	Lehman Pike	0	0	268,447	13	0	2,714	>1980
	Marcel Lake	30,732	0	28,597	3	130	354	>1980
	Pocono	150,648	0	99,795	2	777	3,689	>1975
	Scranton	552,748	1,186,820	12,032	7	9,055	29,551	>1900
Southeast	Coatesville	352,945	0	93,605	17	1,670	6,226	>1930s
West	Clarion	200,860	0	36,293	6	930	2,157	>1930s
	Claysville	62,082	0	1,149	1	342	503	>1983
	Koppel	25,909	0	0	0	87	351	>1920s
	McKeesport	73,403	616,877	32,731	9	3,236	8,096	>1900
	Dravosburg	19,604	32,544	1,219	1	308	625	>1900
	Duquesne	59,963	124,596	0	0	1,125	1,840	>1900
	Paint-Elk	89,425	0	21,310	5	432	660	>1960s
TOTAL		2,195,241	1,960,837	715,902	95	20,874	65,139	

[a] I. The entire customer service lateral on a gravity collection system is deemed to be DSIC-eligible property.

Table 3 – Types of Eligible Property for Combined Sewer Systems

System	CSO Structures	Diversion Chambers	Inlets / Catchbasins
Scranton	70	4	3,013
McKeesport	26	4	1,852
Dravosburg	1	0	264
Duquesne	4	0	944

Table 4 - Pipe Length by Diameter for each Wastewater System

	DIAMETER (in)	Blue Mountain Lake	Clarion	Claysville	Coatesville	Dravosburg	Duquesne	Koppel	Fairview North	Fairview South	Franklin	Marcel Lakes	McEwensville	McKeesport	New Cumberland	Paint-Elk	Pocono	Saw Creek	Scranton	TOTAL
Sanitary-Only Gravity Main (LF)	Unknown		10,233		1,468		3,825						105	7,755		1,382			3,761	**28,529**
	1																			**0**
	4		279		156											578	1,607			**2,619**
	5							5,694												**5,694**
	6		12,402		3,899			1,545	607						398	11,597			3,402	**33,851**
	8		130,881	52,931	299,147	18,627	31,679	13,331	147,862	193,075	46,511	27,205	10,947	28,455	121,349	74,338	127,690		389,731	**1,713,759**
	9																		239	**239**
	10		13,109	9,151	8,808	145	6,387	1,070	14,945	5,647	8,729		1,617	15,065	13,501	274	5,547		72,261	**176,257**
	12		19,657		7,278	122	7,769	1,266	2,186			3,526		13,531	1,666		875		33,727	**91,604**
	14						478													**478**
	15		3,984		14,222	710	2,332	3,004						4,454	4,324	691	6,577		24,777	**65,075**
	16																736		72	**808**
	18		5,701		8,430		877							1,452	2,848	565	6,280		7,352	**33,505**
	20													193					3,968	**4,161**
	21														298					**298**
	22																		228	**228**
	24		2,243		4,706		2,129							447			863		4,508	**14,895**
	30		751		2,152		1,066										473		1,638	**6,081**
	32																		428	**428**
	33													208						**208**
	36		1,618		1,482		204							1,206						**4,511**
	39													637						**637**
	42				1,197										306					**1,504**
	48						878												560	**1,437**
	54						716													**716**
	60						1,624													**1,624**
	78																		3,400	**3,400**
	80																		353	**353**
	25 x 41																		172	**172**

	DIAMETER (in)	Blue Mountain Lake	Clarion	Claysville	Coatesville	Dravosburg	Duquesne	Koppel	Fairview North	Fairview South	Franklin	Marcel Lakes	McEwensville	McKeesport	New Cumberland	Paint-Elk	Pocono	Saw Creek	Scranton	TOTAL
	31 x 48																		155	**155**
	32 x 47																		168	**168**
	32 x 48																		835	**835**
	32 x 49																		403	**403**
	34 x 53																		558	**558**
	48 x 53																		53	**53**
	TOTAL	**0**	**200,860**	**62,082**	**352,945**	**19,604**	**59,963**	**25,909**	**165,600**	**198,722**	**55,239**	**30,732**	**12,669**	**73,403**	**144,692**	**89,425**	**150,648**	**0**	**552,748**	***2,195,241***
Force/ Low Pressure Main (LF)	Unknown				10,811						35		499				804	4		**12,153**
	1																343	609		**952**
	1.25															1,101				**1,101**
	1.5								396											**396**
	2	20,366	739		2,276				2,478				516			1,065	49,918	68,507		**145,865**
	2.5															2,502				**2,502**
	3	28,866	1,219	1,149								755	227			2,149	19,747	89,086	391	**143,588**
	4	6,943	1,923		34,555				1,337			27,842			556	4,168	10,569	63,457	1,043	**152,395**
	6	12,075	29,361		19,517	1,219			4,406		12,388				1,781	1,910	18,291	26,542	7,760	**135,251**
	8		2,904		7,443				8,812	13,068				122	4,562	8,415	122	12,207		**57,655**
	10		148		9,808				1,315									8,035	1,446	**20,752**
	12				9,194				100					562					1,391	**11,247**
	16													9,254						**9,254**
	18													1,286						**1,286**
	20													9,032						**9,032**
	30													7,101						**7,101**
	36													5,373						**5,373**
	TOTAL	**68,250**	**36,293**	**1,149**	**93,605**	**1,219**	**0**	**0**	**18,844**	**13,068**	**12,423**	**28,597**	**1,242**	**32,731**	**6,898**	**21,310**	**99,795**	**268,447**	**12,032**	***715,902***
Combined Gravity Main (LF)	Unknown						21,354							25,346					24,035	**70,735**
	4													511					768	**1,279**
	6													537					5,854	**6,390**
	8					3,888	32,748							137,430					320,113	**494,179**

	DIAMETER (in)	Blue Mountain Lake	Clarion	Claysville	Coatesville	Dravosburg	Duquesne	Koppel	Fairview North	Fairview South	Franklin	Marcel Lakes	McEwensville	McKeesport	New Cumberland	Paint-Elk	Pocono	Saw Creek	Scranton	TOTAL
	10					6,663	10,463							43,054					209,354	**269,535**
	12					9,021	17,082							164,011					249,454	**439,568**
	14													335					807	**1,142**
	15					3,576	15,967							133,411					90,530	**243,485**
	16						949												1,054	**2,003**
	18					3,484	3,716							49,217					58,959	**115,375**
	20					874	273							9,347					47,084	**57,577**
	21													5,079					3,096	**8,175**
	22																		1,656	**1,656**
	24					3,138	11,278							18,748					51,333	**84,497**
	26																		984	**984**
	27													2,226					4,349	**6,574**
	30						6,205							623					37,429	**44,256**
	32																		2,249	**2,249**
	33																		1,373	**1,373**
	36						783							12,485					2,553	**15,821**
	38																		418	**418**
	39													2,931						**2,931**
	40																		489	**489**
	42													6,048					1,072	**7,121**
	44																		409	**409**
	45					59														**59**
	48					649	260							1,908					6,636	**9,454**
	49																		355	**355**
	52																		401	**401**
	54						2,734							171					4,000	**6,905**
	56																		285	**285**
	59																		480	**480**
	60					424								2,833					10,663	**13,919**
	63																		362	**362**
	66																		3,860	**3,860**
	72					768	210							558						**1,536**

	DIAMETER (in)	Blue Mountain Lake	Clarion	Claysville	Coatesville	Dravosburg	Duquesne	Koppel	Fairview North	Fairview South	Franklin	Marcel Lakes	McEwensville	McKeesport	New Cumberland	Paint-Elk	Pocono	Saw Creek	Scranton	TOTAL
	78																		2,593	**2,593**
	80						573													**573**
	84													31						**31**
	112													39						**39**
	121																		28	**28**
	12" x 12"																		15	**15**
	15.4" x 7.5"																		15	**15**
	2' x 2'3"																		187	**187**
	2'10" x 4'3"																		624	**624**
	2'X2'4"																		31	**31**
	2 x 3																		618	**618**
	20x39																		187	**187**
	24"X24"																		45	**45**
	24"x27"																		669	**669**
	25x36																		129	**129**
	25X40																		113	**113**
	26"x36"																		372	**372**
	26"x38"																		2,260	**2,260**
	26"x39"																		4,541	**4,541**
	26"X41"																		1,787	**1,787**
	27"x37"																		395	**395**
	28"x42"																		1,180	**1,180**
	29"x18"																		146	**146**
	29"x44"																		2,226	**2,226**
	29X56																		14	**14**
	3'4"X5'0"																		217	**217**
	3'9"X2'6"																		681	**681**
	3'X2'																		269	**269**
	3'x4'																		708	**708**
	3'x4'6"																		396	**396**
	30"x42"																		304	**304**
	30"x54"																		241	**241**
	32"x41"																		818	**818**
	32"x60"																		377	**377**
	32round																		264	**264**
	32x38																		323	**323**

	DIAMETER (in)	Blue Mountain Lake	Clarion	Claysville	Coatesville	Dravosburg	Duquesne	Koppel	Fairview North	Fairview South	Franklin	Marcel Lakes	McEwensville	McKeesport	New Cumberland	Paint-Elk	Pocono	Saw Creek	Scranton	TOTAL
	34"x35"																		204	**204**
	34"x48"																		216	**216**
	34"x51"																		1,368	**1,368**
	36"x36"																		1,521	**1,521**
	36"x38"																		903	**903**
	36"X41"																		35	**35**
	36"X57"																		430	**430**
	36X46																		89	**89**
	37"x57"																		454	**454**
	38"x44"																		195	**195**
	38"X57"																		189	**189**
	38x38																		61	**61**
	38x92																		83	**83**
	4'8"x7'2"																		2,643	**2,643**
	40"x60"																		807	**807**
	40"x64"																		859	**859**
	42"x60"																		968	**968**
	44"x44"																		297	**297**
	44"x68"																		595	**595**
	45"x68"																		218	**218**
	45X66																		151	**151**
	46"x66"																		469	**469**
	48"x78"																		607	**607**
	48"x84"																		2,233	**2,233**
	48"X84"Egg																		928	**928**
	48X90																		665	**665**
	52x53																		222	**222**
	56X80																		228	**228**
	59X64																		174	**174**
	6"X5"																		9	**9**
	60"x72"																		358	**358**
	62"X95"																		663	**663**
	66"x99"																		520	**520**
	7.5"X5"																		16	**16**
	72"x108"																		1,254	**1,254**
	78.5"X54"																		536	**536**

	DIAMETER (in)	Blue Mountain Lake	Clarion	Claysville	Coatesville	Dravosburg	Duquesne	Koppel	Fairview North	Fairview South	Franklin	Marcel Lakes	McEwensville	McKeesport	New Cumberland	Paint-Elk	Pocono	Saw Creek	Scranton	TOTAL
	87" C.B.																		396	396
	9.25"X5"																		18	18
	TOTAL	**0**	**0**	**0**	**0**	**32,544**	**124,596**	**0**	**0**	**0**	**0**	**0**	**0**	**616,877**	**0**	**0**	**0**	**0**	**1,186,820**	***1,960,837***

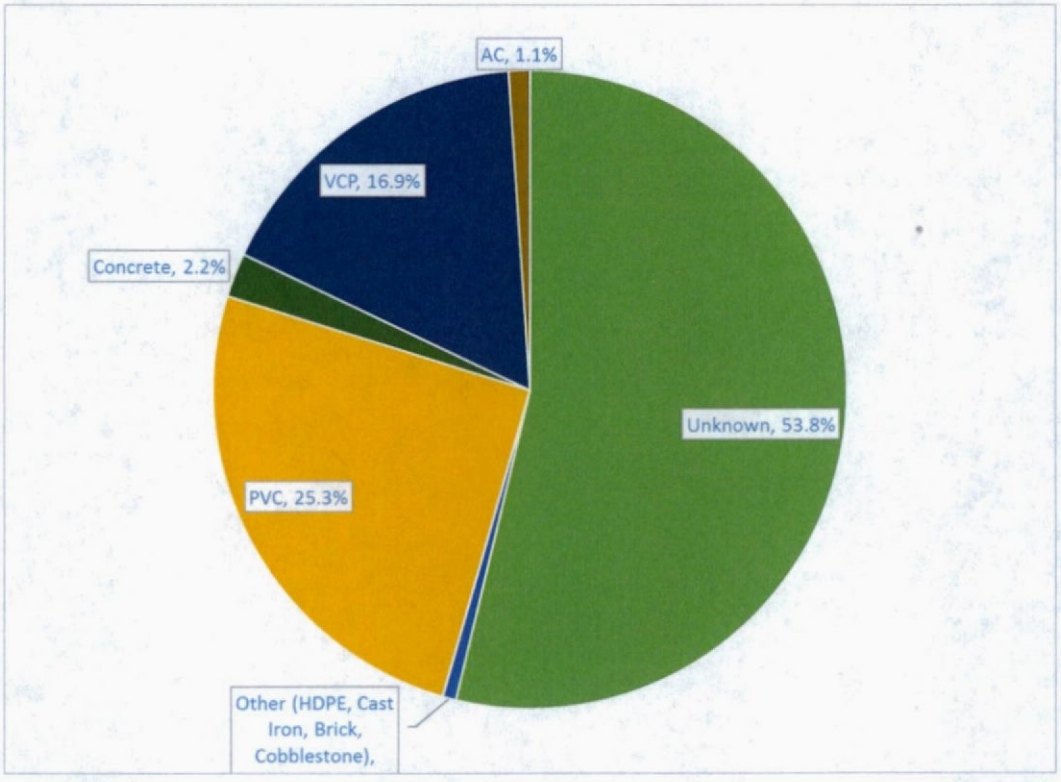

Figure 2 - Gravity Main Material Breakdown by length [unknown percentage due in large part to acquisitions of Scranton and McKeesport]

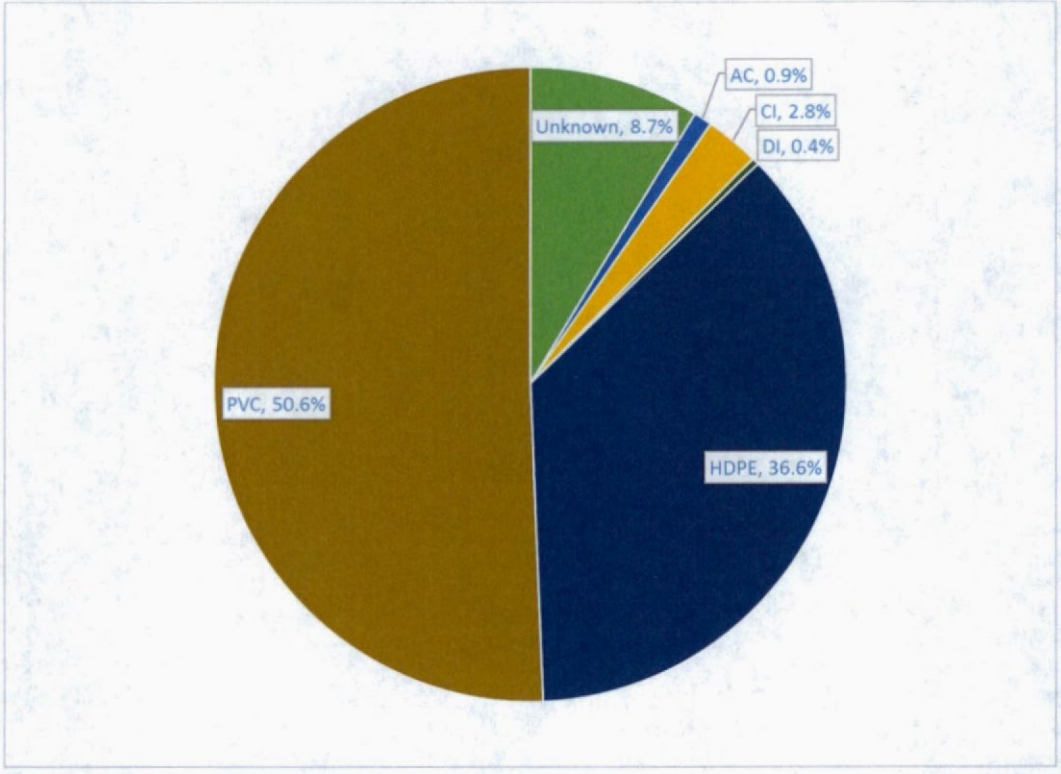

Figure 3 - Pressurized Main Material Breakdown by length

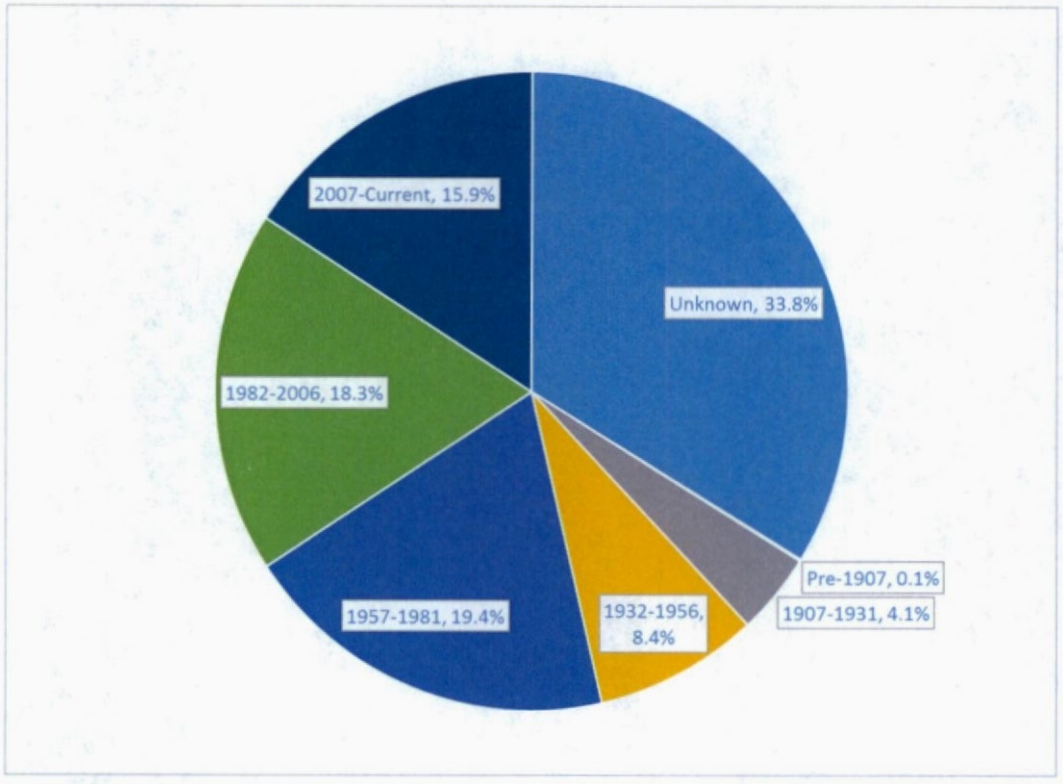

Figure 4 - Pipe Install Date Breakdown by length

Section 2 – Schedule for Planned Rehabilitation and Replacement of Eligible Property

PAWC recognizes the importance of continuous renewal of aging infrastructure in order to ensure and maintain adequate, efficient, safe, and reliable service to existing customers. This Section provides an overview of the planning process for replacement of aging wastewater collection system infrastructure. Planning related to collection main extensions due to the increase in the number of customers is not included, except those projects that implement solutions to wastewater problems for existing customers. Planning for WWTP improvements is not included in this Section, as WWTP improvements are not DSIC eligible.

Capital investment programs and projects are needs based and prioritized within a strategic planning process utilizing drivers associated with various asset investment strategies (such as regulatory compliance, reliability, capacity, customer satisfaction, etc.) Within a 5-year strategic capital expenditure plan, PAWC has established longer term funding levels for main replacement and rehabilitation based on program needs. The Company determines an overall investment level based upon the performance of the existing assets and the anticipated remaining life expectancy of the asset, taking into account the impact of investment on customer rates. Ideally, PAWC's spending level for main replacement and rehabilitation should be adequate to keep pace with the anticipated remaining service life of the collection system infrastructure. Expecting pipelines to continue to provide service beyond their useful life generally results in higher levels of service failure, potential environmental impact and disruptions to customers.

The first step of the planning process is to conduct a macro-level overview of each wastewater system. GIS tools may be used to help identify and prioritize groups of wastewater properties that are likely candidates for replacement or rehabilitation. GIS tools are not the sole determinant for identifying groups of wastewater assets. Other data that may be applied includes operational knowledge / records, condition of lift stations, number and location of sanitary and/or dry weather sewer overflows, and recorded flows into the WWTP. This system specific information assists in identifying structural and hydraulic deficiencies within each collection system in order to assess potential vulnerabilities.

Properties may be divided into general categories based on the following:

- Systems that are currently or projected to be hydraulically overloaded as defined by 25 Pa. C.S. §94.1
- Known problem areas based on operation and maintenance records
- Sewer collection basins with high I&I
- Material and age; for example, old terra cotta pipes and deteriorated brick manholes are potential candidates for replacement / rehabilitation, while lift stations and polyvinyl chloride (PVC) sewers less than 20 years old are less likely to need replacement

Using these general categories, areas of concern can be identified which may contain properties in need of replacement. The macro-level planning process helps identify groups of assets which are potential candidates, and those groups of assets that are unlikely to need near-term replacement. This allows resources required for micro-level planning to be more efficiently targeted to those areas most likely to contain aging infrastructure in need of rehabilitation or replacement.

The next step in the planning process is to conduct a more detailed, micro-level planning analysis. A comprehensive sewer system evaluation study is conducted, which is a systematic approach to identify specific properties to be rehabilitated or replaced. This study may include:

- Continuous flow monitoring
- Rainfall monitoring
- Hydraulic modeling
- Smoke testing
- Dye testing
- Traditional Closed circuit TV (CCTV) inspection of mains and service laterals
- Multi-sensor robotic inspection including synchronized laser, sonar, and CCTV for the collection of the system's physical attributes
- Manhole inspection
- Lift station inspection / monitoring
- CSO inlet, outfall, and regulator inspections
- Subbasin analysis / prioritization

During the micro-level planning process, specific properties are identified as candidates for replacement or rehabilitation using a risk based methodology based on a condition assessment and hydraulic capacity evaluation. Focusing on replacement of aging infrastructure and reduction of I&I, strategic improvements identified in the micro-level planning process can be grouped in the following categories:

Manhole replacement / rehabilitation – Work may include frame and cover replacement, internal grouting, lining, or complete replacement. Manhole lining can be used for structural reinforcement, reduction of groundwater infiltration, or protection from corrosive gases. Whether replacement or rehabilitation is best depends on various factors, such as location, structural integrity, and manhole depth. For example, replacement cost may be similar to rehabilitation cost for shallow manholes. In such cases, replacement is likely the best option. For manholes located in areas that are difficult to excavate, lining may be the best option. For each individual project, all factors are considered to select the most prudent and cost-effective method.

Pipe replacement / rehabilitation – Work may consist of complete replacement, partial replacement, or trenchless rehabilitation such as cured-in-place pipe lining (CIPP), slip lining,

close-fit pipe lining (fold and form), other pipe coatings/lining systems, pipe bursting, horizontal directional drilling using fused high-density polyethylene (HDPE) pipe or fused PVC pipe. Work could include replacement of air and vacuum release chambers, valves, and flow meters. Pipe replacement and rehabilitation could be part of a relocation project due to highway construction, I&I project, or other project that addresses aging infrastructure. In some cases, projects may include main extensions installed to implement solutions to wastewater problems that present a health and safety concern for existing customers. For low pressure sewers and force mains, which have a shallower installation than gravity mains, replacement is often the best method. For gravity sewers, trenchless rehabilitation is often most cost-effective; however, replacement may be the best option in cases where the pipe is misaligned or has lost its structural integrity. Another option is to combine partial replacement with cured in place liner, such that ground disturbance is minimized to only those sections of pipe in need of replacement. PAWC has embraced trenchless technologies that allow underground infrastructure to be rehabilitated without the need for excavation. In general, trenchless rehabilitation is the preferred method to address aging infrastructure. Collapses or other significant defects that cannot be rehabilitated using trenchless technology on critical pipe segments (e.g. deformation) will be repaired or replaced using open-cut methods. For each individual project, all factors are considered to select the most prudent and cost-effective method.

Service lateral replacement / rehabilitation – Work may consist of replacing or rehabilitating gravity or low pressure sewer laterals, including taps, and cleanouts. A cured-in-place liner is a trenchless alternative that may be best for service laterals that are difficult to excavate. Depending on the condition and number of connections, service lateral replacement may be combined with main line replacement / rehabilitation. PAWC also utilizes the installation of a "top-hat" during a relining project to help seal the sewer lateral connection to the main.

Lift station replacement / rehabilitation – Lift stations are evaluated on a case by case basis. A scoring system is provided at the end of this Section. Necessary improvements can usually be completed by full or partial rehabilitation. Replacement may be the best option for older and outdated lift stations.

Combined sewer overflow facility replacement / rehabilitation – CSO facilities are evaluated on a case by case basis. Replacement or rehabilitation of these facilities may include features such as outfall structures, bar screens, piping, valves, or diversion chamber / flow weirs.

Once specific properties are identified as needing replacement or rehabilitation, the final step in the micro-level planning process is prioritization. To better understand and evaluate the complex characteristics of its properties and the various drivers for improvements, PAWC plans to apply a prioritization model to score capital improvement projects which will be funded through the wastewater DSIC program.

The prioritization model for wastewater collection mains will use pipe condition information to assess the system's ability to meet performance measures associated with the following level of service factors. Defining the level of service that is expected from a pipe is dependent on the specific customers that it is serving.

Level of Service Factors

- Reliable service (prevent disruptions)
- Customer satisfaction
- Environmental sustainability
- Regulatory compliance
- Public safety

Service reliability, or continuity of operations, is based on factors such as the number of service interruptions (due to pipe failures or operational issues), events impacting critical facilities and the length of time associated with these service interruptions. Customer satisfaction is influenced by events such as sewage back-ups and blockages, odors and overflow discharges. Environmental sustainability and regulatory compliance is primarily determined by the number of dry weather or sanitary sewer overflow events that could impact waterways. Public safety includes events that impact critical facilities, the general public and the utilities employees.

The list of identified projects will cover multiple wastewater systems and geographical areas across the Commonwealth. Each project may have drivers based on local conditions. What follows below is a standardized condition based risk assessment prioritization system developed by the National Association of Sewer Service Companies (NASSCO) that can be applied to score and rank projects in different wastewater systems against each other to ensure cost-effective prioritization of capital investment.

In order to cost-effectively prioritize wastewater collection system replacement and rehabilitation projects, PAWC will utilize a risk-based condition assessment approach. To accomplish this prioritization, PAWC will perform a GIS analysis to assign a risk score to each project, where risk is defined as:

Risk = Likelihood of Failure (LoF) x Consequence of Failure (CoF)

By establishing of standardized definitions and a scoring system for Likelihood of Failure (LoF) and Consequence of Failure (CoF), a risk rating is obtained.

The LoF component represents the probability that the asset will fail based on the asset's physical condition. For linear assets, such as sewer pipelines, this score will be determined by reviewing CCTV or multi-sensor robotic inspections allowing pipes to be coded using the NASSCO's Pipeline Assessment Certification Program (PACP) which is an industry standard for performing condition assessments. Table 5 below lists the PACP grading that is used for LoF scoring.

Table 5 – PACP Grading for LoF (NASSCO)

Grade	Description
5	Immediate Attention – Defect requires immediate attention
4	Poor – Severe defects that will become Grade 5 defects within the near future
3	Fair – Moderate defects that will continue to deteriorate
2	Good – Defects that have not begun to deteriorate
1	Excellent – Pipe functional with minor defects

For pipelines without existing inspection data, desktop assessment using operations and maintenance history (if available), material, and date of construction will be used until condition assessment data is available. For newly acquired wastewater systems that have known deficiencies in the gravity collections system (e.g., significant I&I, pipe defects, and installation deficiencies), which were observed during the pre-acquisition due diligence process, PAWC will assume the highest risk factor (Grade 5) for these known deficiencies. Once the condition assessment is completed, the risk factor will be adjusted to reflect actual conditions.

Non-linear assets, such as lift stations, can be classified using the Condition Index (CI) Scale developed by the US Army Corps of Engineers, which is shown in Table 6 below. A typical evaluation would include field inspection, interviews with operational personnel, and review of operation and maintenance records. The CI scale ranges from 0 to 100, with 0 indicating complete failure and 100 indicating perfect condition and function.

Table 6 - US Army Corps of Engineers Condition Index Scale

Zone	CI	Condition Description	Recommended Action
1	85 to 100	Excellent: No noticeable defects. Some aging or wear may be visible.	Immediate action is not required
	70 to 84	Good: Only minor deterioration or defects are evident.	
2	55 to 69	Fair: Some deterioration or defects are evident, but function is not significantly affected.	Economic analysis of repair alternatives is recommended
	40 to 54	Marginal: Moderate deterioration. Function is still adequate	
3	25 to 39	Poor: Serious deterioration in at least some portions of structure.	Detailed evaluation is required to determine the need for repair, rehabilitation, or reconstruction
	10 to 24	Very Poor: Extensive deterioration. Barely functional.	
	0 to 9	Failed: No longer functions. General failure or complete failure of a major structural component.	

The CoF score presents the direct and indirect impact to the customers and environment if the asset fails. When assigning weighting factors, one should consider how much the parameter contributes to the economic, social and environmental impacts in the event of a failure, commonly referred to as a "triple bottom line" accounting framework:

- Economic impact resulting from the need to conduct an urgent repair: accounts for the relative cost to repair failures (i.e. depth, pipe size, and accessibility) and any fines or other regulatory costs incurred due to a failure.
- Societal impact resulting from the loss of service of the asset: accounts for the number of customers affected by the failure, the type of customers affected (i.e. hospitals, schools, etc.) and the location of the asset.
- Environmental impact resulting from any discharges: accounts for the relative impact to the surrounding environment if a failure leads to a discharge.

CoF may be assigned to a scale from 1 to 6 with 6 being the highest consequence and 1 being the least. An overall CoF score will be calculated as a weighted average of all the individual CoF factors as shown in Table 7. The weighting factors will be 0.25 for each financial and social criterion and 0.50 for environmental criteria. Proposed weightings and ranges presented may be adjusted as the statewide analysis is performed. Weighting factors include diameter, depth, relative network position of pipe, class of road, distance from environmentally sensitive features, and distance between downstream pipe to a service lateral of customer with high importance, and accessibility for maintenance and inspection. Diameter ranges have been customized to fit small or large wastewater systems. Relative network position is calculated as the sum of relative positions of all pipes discharging to an upstream structure. A larger relative network position would indicate more customers upstream and thus a larger impact of failure. Relative network position requires accurate maps of the system and will be calculated when available. Utilities have a set of customers who are very significant for the well-being of the community. These customers may include hospitals, schools, manufacturing facilities, and emergency services, etc., as determined by the utility. Providing uninterrupted service to these critical facilities is a priority.

Access to manholes and pipes are very important for inspection and repairs. Large construction equipment is sometimes required to repair the failure of a pipe. Response time for a service crew may be significantly higher, if access to the pipe is difficult. The failure of such a pipe may cause significant damage to the environment, as well as private properties, due to delays in response created by difficulties in accessing the failure point. A higher CoF should be assigned to these pipes. This will affect the economic costs, due directly to the difficulty and social costs, if the property needs to be disrupted to gain access.

Table 7 - Consequence of Failure Scoring (NASSCO)

CoF Factor	Description	CoF Score	Criteria
Diameter (inch) – small wastewater systems	< 8"	1	Economic, Social
	≥ 8" < 10"	2	
	≥ 10" < 15"	3	
	≥ 15" < 21"	4	
	≥ 21" < 30"	5	
	≥ 30"	6	
Diameter (inch) – large wastewater systems	< 10"	1	
	≥ 10" < 15"	2	
	≥ 15" < 24"	3	
	≥ 24" < 36"	4	
	≥ 36" < 60"	5	
	≥ 60"	6	
Depth (ft),or	< 6'	1	Economic, Social
	≥ 6' < 10'	2	
	≥ 10' < 14'	3	
	≥ 14' < 18'	4	
	≥ 18' < 24'	5	
	≥ 24'	6	
	≤ 10	1	Social

CoF Factor	Description	CoF Score	Criteria
Relative Network Position of Pipe	11 – 30	2	
	31 – 70	3	
	71 – 120	4	
	121 – 150	5	
	> 150	6	
Class of Road	Unpaved Road	1	Economic, Social
	Minor Local Road	2	
	Major Local Road	3	
	Collector Road	4	
	Arterial / Building / Pool	5	
	Highway / Waterway / Railroad	6	
Distance from Environmentally Sensitive Features	≥ 150 LF	1	Environmental
	100 to 150 LF	2	
	75 to 100 LF	3	
	50 to 75 LF	4	
	25 to 50 LF	5	
	< 25 LF	6	
Distance between Downstream Pipe to a Service Lateral for Customer with High Importance	≥ 20,000 LF	1	Social
	15,000 to 20,000 LF	2	
	10,000 to 15,000 LF	3	
	5,000 to 10,000 LF	4	
	1,000 to 5,000 LF	5	
	< 1,000 LF	6	
Accessibility of Pipe	On Right-of-Way – no traffic control	1	Economic, Social
	On Right-of-Way – with traffic Control	2	
	On public land with vehicle access	3	
	On public land without vehicle access	4	
	On private land without vehicle access	5	
	Behind or under built structures and no vehicle access	6	

The scoring system will have flexibility by allowing adjustment in how each criterion is weighted, and accounting for special circumstances which may be difficult to quantify. The prioritization model will serve as a tool that helps PAWC develop a schedule for planned rehabilitation and replacement of eligible property in order to maintain safe, reliable service to existing customers.

The overall risk associated with a failure event is a function of the LoF event and its consequence. Not all highly probable events need the same attention, since they may not have equally high consequence (impact) to the community.

Increased LoF should result in more aggressive maintenance and repair. Increased CoF should result in increased assessment. This approach provides the basis for an economically efficient, balanced and proactive assessment, maintenance and replacement/rehabilitation program.

This risk-based management approach allows for proactive planning. For example, pipelines serving critical community services, such as hospitals and other critical care facilities, can be proactively assessed and managed to minimize potential service disruptions. To reduce the impact to customers and save on mobilization and demobilization costs, project can be grouped together by geographic proximity and similar risk rankings. Likewise, pipeline construction work can be coordinated with other roadwork such as road restoration, detours and other utility work. Improvement projects can be better scheduled by area to achieve unit cost savings rather than reactive projects scattered across a system.

In general, preference will be given to those systems with high I&I, and older systems with aging lift stations, brick manholes, and vitrified clay pipe. Some parameters may impact just one of the three triple bottom line categories, while some may have varying degrees of impacts. An example of this would be a sewer line that crosses a waterway. This clearly can impact the environmental aspect of the triple bottom line, considering the likelihood for contamination of the stream. There may also be some social impacts with respect to an interruption in recreational use of the waterway, and economic impacts that result from penalties and fines.

Appendix A to this LTIIP outlines the projected schedule for completion of the Company's risk-based condition assessment for each wastewater system covered by the LTIIP. The information presented in Appendix A is organized by three categories of systems: (1) newly acquired systems; (2) systems subject to a Pennsylvania Department of Environmental Protection or United States Environmental Protection Agency Consent Order; and (3) all other "routine" systems that do not fall under the other two categories. In addition, Appendix B provides detailed information on the Company's projected schedule for replacement and rehabilitation of DSIC-eligible property for each wastewater system based on the preliminary results of the Company's condition assessment. Appendix B includes a breakdown of expenditures for each type of eligible property by year and by wastewater system (district), with expenditures for combined and sanitary systems displayed separately. PAWC will include an annual update of the Company's Condition Assessment Schedule with its Annual Asset Optimization Plan (AAOP) filing.

Section 3 – Location of Eligible Property

Below are brief summaries of each wastewater system, including the types of eligible property and strategies for accelerated rehabilitation and replacement in each system.

PAWC is conducting a multi-sensor robotic inspection for all gravity pipelines of its various wastewater collection systems over the next three years. Some gravity pipelines that have been recently inspected will not be re-inspected, but the majority of gravity pipelines of recently acquired wastewater systems have either old CCTV inspection records or no inspection records. This statewide multi-sensor robotic inspection program will collect condition assessment data allowing each gravity pipe to be assigned a NASSCO score. In addition, pipe and manhole attribute data will be collected to improve GIS records and improve hydraulic

model accuracy. The robotic inspection captures GPS data, including the coordinates of every service lateral flowing into the gravity system, which will improve PAWC's ability to respond to PA one-call requests.

The strategic approach for all gravity collection systems is to utilize a condition-based assessment, hydraulic capacity information, and GIS-based system attributes to prioritize accelerated replacement or rehabilitation work based on a triple bottom line risk assessment methodology using industry standard LoF and CoF factors.

Central Pennsylvania

Fairview North

The Fairview North wastewater system is located in York County and provides wastewater collection and treatment service to approximately 1,498 mostly residential customers. The collection system serves portions of Fairview Township. PAWC purchased the assets of the Fairview North system in 2015.

The Fairview North collection system consists of approximately 165,600 LF of gravity main, ranging in diameter from 6-inch to 12-inch; and approximately 18,844 LF of force main, ranging in diameter from 1.5-inch to 12-inch. The collection system was originally installed around 1950. The system includes 11 lift stations. The approximately 869 manholes are brick or concrete. The system includes VCP, asbestos cement (AC), and PVC gravity mains. Force main material includes ductile iron, AC, and PVC.

The Fairview North system includes one WWTP with a permitted annual average daily flow of 1.206 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-0081868. The 2017 annual average daily flow into the plant was 0.304 MGD, and the ratio of 3 consecutive month maximum to annual average was 1.13. During wet weather events, the system can experience flows up to five times the annual average.

Previous collection system investigations for the Fairview North wastewater system included some CCTV investigation in the collection system. This investigative work led to the 2017 project of lining 5,100 feet of 8-inch and 10-inch gravity trunk lines along Old York Road in Fairview Township, and 2,775 feet of 8-inch gravity trunk lines in 2018. Flow in the subbasins that service the Green Lane Farms area will be the initial focus of the rehabilitation efforts. This area contains approximately 42,200 LF of predominantly concrete gravity mains and appears to be more significantly impacted by I&I during wet weather events than other areas in the system.

Fairview South

The Fairview South wastewater system is located in York County and provides wastewater collection and treatment service to approximately 2,498 mostly residential customers. The collection system serves portions of Fairview Township. PAWC purchased the assets of the Fairview South system in 2015.

The Fairview South collection system consists of approximately 198,722 LF of PVC gravity main, ranging in diameter from 8-inch to 10-inch; and approximately 13,068 LF of 8-inch PVC

force main. The collection system was originally installed around 1992. The system includes 6 lift stations. The approximately 1,050 manholes are concrete.

The Fairview South system includes one WWTP with a permitted annual average daily flow of 0.94 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-0082589. The 2017 annual average daily flow into the plant was 0.509 MGD, and the ratio of 3 consecutive month maximum to annual average was 1.05. During wet weather events, the system can experience flows up to three times the annual average.

Based on system age and observed wet weather flows, the collection is assumed to be in relatively good condition. However, some I&I rehabilitation projects are anticipated over the 5 year planning horizon. Wet weather flows in the subbasins that flow to the Corn Hill pump station and the Fairmont pump station appear to be more significant than other areas in the system and will be the initial focus of the investigative and rehabilitation work.

Franklin

The Franklin wastewater system is located in Adams County and provides wastewater collection and treatment service to portions of the Townships of Franklin, Hamiltonban, and Highland. The system consists of approximately 348 mostly residential customers. PAWC purchased the assets of the Franklin system in 2013 and neighboring Hamiltonban system in 2014. Hamiltonban was interconnected with the Franklin system in 2016.

The Franklin collection system consists of approximately 55,239 LF of mostly PVC and some VCP gravity main, ranging in diameter from 8-inch to 10-inch, and 12,423 LF of 6-inch PVC force main. Most of the collection system was installed in 2004 or later; the Hamiltonban portion was originally constructed around 1972. Most of the approximately 198 manholes are concrete.

Included in the above footages of gravity main is a stand-alone area known as the "sand mound," which serves 14 homes and was installed in 2004. The sand mound area consists of 6-inch PVC gravity mains that discharge into two 1,500 gallon septic tanks with an 1,800 gallon final settling tank, a lift station, and a 10,000 square-foot elevated sand mound. At this time, there are no plans to connect the sand mound area to the Franklin collection system.

The system contains one WWTP with a permitted annual average daily flow of 0.2 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-00248088. The 2017 annual average daily flow into the plant was 0.074 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.12. There is one lift station that was installed in 2016 to deliver flows from Hamiltonban to the Franklin WWTP. The WWTP is not expected to be hydraulically or organically overloaded in the next five years.

Rehabilitation projects will focus on the older Hamiltonban subbasin that consists of VCP and is impacted by I&I during wet weather events. For the newer areas within the Franklin subbasin, PAWC plans to complete repairs and rehabilitation projects on an as-needed basis.

McEwensville

The McEwensville wastewater system is located in Northumberland County and provides wastewater collection and treatment service to approximately 133 mostly residential customers. The collection system serves McEwensville Borough. PAWC purchased the assets of the McEwensville system in 2015.

The McEwensville collection system consists of approximately 12,669 LF of 8-inch and 10-inch PVC gravity main, and 1,242 LF of 2-inch to 3-inch PVC force main. The collection system was originally constructed in 1984. The approximately 57 manholes are concrete.

The system contains one WWTP with a permitted annual average daily flow of 0.045 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-0111414. The 2017 annual average daily flow into the plant was 0.013 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.23. The system includes 4 lift stations.

PAWC plans to rehabilitate or replace all lift stations located in the collection system, including the lift station at the headworks of the WWTP. In addition, PAWC plans to complete targeted rehabilitation work in the collection system.

New Cumberland

The New Cumberland wastewater system is located in Cumberland County and currently provides wastewater collection and treatment service to approximately 3,066 mostly residential and commercial customers in New Cumberland Borough. PAWC purchased the assets of the New Cumberland system in 2016.

The collection system consists of approximately 144,692 LF of gravity, mostly VCP and some PVC ranging in diameter from 6-inch to 42-inch diameter; and approximately 6,898 LF of force main, 4-inch to 8-inch diameter. The collection system includes 3 lift stations. The collection system was originally constructed around 1950. Most of the gravity collection system consists of vitrified clay pipe with concrete manholes.

The New Cumberland system includes one WWTP with a permitted annual average daily flow of 1.25 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-0026654. The 2017 annual average daily flow into the plant was 0.453 MGD, and the ratio of 3 consecutive month maximum to annual average was 1.12. During wet weather events, the system can experience flows up to ten times the annual average.

Previous collection system investigations included some CCTV investigation. Some lining projects were completed in the subbasin that flows by gravity to the Southeast lift station. According to the lift station flows, they have had some effect on reducing the amount of I&I in the subbasin, however an additional 1,452 feet of 8-inch and 10-inch VCP trunk lines are planned to be lined in 2018.

The Southeast lift station subbasin contains approximately 56,900 LF of predominantly vitrified clay pipe collection mains, ranging from 8-inch to 15-inch diameter, and is impacted by I&I during wet weather events. During wet weather events, the Southeast lift station subbasin

appears to be more significant impacted with I&I than other areas in the system and will be the initial focus of rehabilitation efforts.

Northeastern Pennsylvania

Blue Mountain Lake

The Blue Mountain Lake (BML) wastewater system is located in Monroe County and currently provides wastewater collection and treatment service to approximately 830 mostly residential customers in portions of Stroud and Smithfield Townships. PAWC purchased the assets of the BML system in 2005.

The BML collection system consists of about 68,250 LF of low pressure sewer main, and does not contain any gravity or force main. The low pressure main was installed in 1990 or later, and consists of PVC main ranging in diameter from 2-inch to 6-inch. The system includes 6 lift stations.

The system contains one WWTP with a permitted annual average daily flow of 0.183 MGD. The plant is operated under NPDES permit PA-0062464. The 2017 annual average daily flow into the plant was 0.0919 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.039. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years. The collection system is in relatively good condition and experiences little to no I&I.

PAWC plans to continue to assess the condition of the system, and complete targeted rehabilitation work as needed. BML lift stations will be continuously evaluated, which may result in improvement or replacement projects for the purpose of increasing reliability of service.

Lehman Pike

The Lehman Pike (LP) wastewater system serves portions of Middle Smithfield Township in Monroe County, and portions of Lehman Township in Pike County. LP provides wastewater collection and treatment service to approximately 2,714 mostly residential customers, mostly in Pike County. PAWC purchased the assets of the LP system in 2002.

The LP collection system consists of approximately 268,447 LF of low pressure main, and does not contain any gravity or force main. The low pressure main was installed in 1980 or later, and consists of PVC main ranging in diameter from 1-inch to 10-inch. Each customer owns and maintains their own grinder pump and pit installation. The system includes 13 lift stations.

One of the lift stations owned by PAWC is located at an aerated equalization basin, which receives flow from the Timothy Lakes Campground. The Campground maintains its own collection system.

The LP system contains one WWTP with an NPDES permitted discharge of 0.75 MGD. The plant is operated under NPDES permit PA-0060640. The WWTP has an average day design flow capacity of 0.532 MGD. The 2017 annual average daily flow into the plant was 0.208 MGD,

and the ratio of 3 consecutive month maximum to annual average flow was 1.090. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years.

The LP collection system is in relatively good condition and experiences low I&I. Since the acquisition in 2002, PAWC has completed rehabilitation and replacement work at most of the lift stations. Over the next few years, work will focus on replacing poor quality original lateral installations. Additionally, PAWC plans to continue to assess the overall condition of the system, and complete targeted rehabilitation and improvement work as needed.

Marcel Lake

The Marcel Lake (ML) wastewater system is located in Pike County and provides wastewater collection and treatment service to approximately 354 mostly residential customers in the Marcel Lake Estates development in Delaware Township. In 2013, PAWC purchased the assets of the Marcel Lake system from the Clean Treatment Sewage Company.

The original gravity collection system was CCTV inspected in 2013 and found to be in extremely poor condition with about 82 percent of mains having severe or immediate attention deficiencies. In addition, about 39 percent of the gravity collection system was found to be installed with inadequate slope or depth. All lift stations were found to be of inadequate design and in very poor condition.

The system contains one WWTP with a permitted annual average daily flow of 0.100 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-0060313. The 2017 average daily flow into the plant was 0.0897 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.630. In 2017, the peak three month hydraulic loading to the plant was 0.145 MGD which exceeds the WWTP capacity. Based on this historic data, the WWTP is still considered to be in hydraulic overload condition, More recent data is expected to change this designation, as is described below. The WWTP is not currently nor expected to be organically overloaded in the next five years.

In the first quarter of 2018, the replacement gravity collection system was placed into service. Data show the gravity system replacement to be very successful in reducing I&I. The ML system experiences dramatically lower WWTP influent sewage flow under all conditions. During periods of dry weather, the ML system experiences WWTP influent flows that are lower than the output of the water system (approximately 0.035 MGD). In periods of rainfall in excess of 5 inches, the ML system experiences flows rising only to 0.077 MGD. Past rainfall events of lesser magnitude have caused overflows in the collection system and have resulted in WWTP influent flows greater than 0.450 MGD. Data for a full year of operation will be analyzed in the annual Chapter 94 report filing with the PaDEP. After the Chapter 94 report is submitted to PaDEP, PAWC believes that PaDEP will permit planning module approval to resume.

In its current state, the Marcel Lake collection system consists of approximately 30,732 LF of 8-inch and 12-inch PVC gravity main, and approximately 28,597 LF of PVC low pressure main, ranging in diameter from 3-inch to 4-inch. The newly installed gravity system includes three submersible lift stations whereas the previous layout design required 10 lift stations. The gravity collection area includes approximately 130 manholes. The low pressure system was originally installed in the 1980s or later.

Pocono

The Pocono wastewater system is located in Monroe County and provides wastewater collection and treatment service to approximately 3,689 mostly residential customers in the Pocono Country Place residential development within Coolbaugh Township. PAWC purchased the assets of the PCP system in 1995.

The Pocono collection system consists of approximately 150,648 LF of gravity main, ranging in diameter from 4-inch to 30-inch; 99,795 LF of low pressure main, ranging in diameter from 1-inch to 8-inch, about 5,400 LF of which is 4-inch and 6-inch diameter force main. The collection system was installed in 1975 or later. The system includes 2 lift stations. The force mains are ductile iron; the majority of low-pressure and gravity mains are PVC; and the approximately 777 manholes are concrete.

The system contains one WWTP with a permitted annual average daily flow of 1.256 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-0060097. The 2017 annual average daily flow into the plant was 0.555 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.21. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years.

An aggressive I&I abatement program has been implemented. Between 2013 and 2015, CCTV inspection was completed for the entire gravity collection system. Based on the inspection results, during the subsequent three year period PAWC rehabilitated a portion of the gravity collection system, primarily utilizing trenchless rehabilitation methods where feasible, and rehabilitated manholes through pressure testing, grouting, and lining. Work completed has corrected numerous deficiencies in an effort to reduce I&I. However, the PCP collection system still experiences I&I due to high groundwater, aging grinder pump systems, roof drain cross connections, and cracks of the collection system mains and service laterals. PAWC plans to maintain an accelerated I&I abatement program, and to inspect the entire collection system. Furthermore, to improve I&I monitoring, PAWC plans to add metering pits to planned pipeline replacement projects in strategic locations for permanent flow monitoring in lieu of portable area-velocity meters.

Scranton

The Scranton combined sewer system (formerly Scranton Sewer Authority) is located in Lackawanna County and provides sanitary and combined sewage collection and treatment service to approximately 29,551 customers, comprised of 26,735 residential, 2,723 commercial, 27 industrial customers, and 66 other / institutional / bulk customers. The collection system services the City of Scranton and Borough of Dunmore. PAWC's Scranton Wastewater System also provides conveyance and treatment of wastewater from portions of the adjacent Boroughs of Taylor, Dickson City, and Moosic through inter-municipal agreements with the Lower Lackawanna Valley Sanitary Authority (LLVSA) and the Lackawanna River Basin Sewer Authority (LRBSA). PAWC purchased the assets of Scranton Sewer Authority in 2016.

The Scranton Sewer Authority entered into a Consent Decree with the Environmental Protection Agency (EPA) and the PaDEP on January 31, 2013. The Consent Decree was amended with

the approval of the District Court to substitute PAWC as the successor to the Scranton Sewer Authority effective as of the date of closing on the Company's acquisition from the Scranton Authority, which was December 29, 2016. Scranton Sewer Authority adopted a Long Term Control Plan (LTCP), that was approved by the PaDEP and EPA, for the purpose of reducing combined sewer overflows into the Lackawanna River and its tributaries from the Scranton Wastewater System service area in accordance with the requirements of the Clean Water Act. Under the amended Consent Decree, PAWC is required to implement the approved LTCP.

The LTCP was adopted in 2012. The ultimate goal of the LTCP is to attain water quality standards within the receiving streams of the Scranton Wastewater System's seventy-eight (78) CSO facilities. A variety of measures were evaluated to control the frequency and duration of the CSO events. With the use of hydraulic modeling, the primary control measures selected include in-line and off-line storage systems, strategic sewer separation, CSO regulator adjustments, and interceptor capacity improvements. Due to the large number of CSO facilities in the system, and the associated number of identified control projects, the LTCP will be implemented over a twenty-five (25) year period. Using a ranking system, which took into account the "triple bottom line" (financial, social, and environmental) attributes of each project, the LTCP CSO control projects were ranked and then divided into five implementation phases, with higher ranking projects generally placed in the earlier phases. The LTCP has a final completion date of December 1, 2037, with a current total estimated cost of approximately $140M.

The Scranton wastewater collection system consists of approximately 1,739,568 LF (329 miles) of gravity collection main ranging in diameter from 4-inch to 108-inch, approximately 68 percent (224 miles) of which is combined sewer. The collection system includes 12,032 LF of force main ranging in diameter from 3-inch to 12-inch inch. The 9,055 manholes are mostly brick with some concrete. Most of the collection system consists of 8-inch to 24-inch vitrified clay, reinforced concrete, and PVC pipe that is about 50 to 60 years old. Some pipes are over 100 years old. The system includes 7 lift stations.

Combined sewage is conveyed to CSO regulator chambers prior to connecting with an interceptor sewer. Under high wet-weather flow conditions that exceed the capacities of downstream facilities, the CSO regulators direct combined sewage to the receiving streams. Including the WWTP bypass, the Scranton collection system contains 78 permitted CSO discharge points: seventy (70) CSO regulator structures / outfalls, four (4) diversion manholes, and four (4) pumping station overflow outlets.

The main interceptor sewer for the Scranton system runs parallel to the Lackawanna River, which generally flows through the middle of Scranton City. The main interceptor is approximately 5.8 miles in length, starting as a 24-inch diameter pipe at the upstream end of the system at the Leggetts Creek CSO Regulator and increasing to a 78-inch diameter pipe at the headworks to the Scranton WWTP. The 78-inch diameter portion of the main interceptor has a peak flow capacity of about 110 MGD compared to the existing peak capacity of the Scranton WWTP of 39 MGD. The main interceptor averages about 30 feet deep at its downstream end and crosses the Lackawanna River at three locations.

The Scranton system includes one WWTP with annual average daily flow hydraulic capacity of 20 MGD. Improvements are currently underway to comply with the PaDEP / EPA Combined Sewer Overflow Long Term Control Plan and NPDES permit in order to upgrade the BNR

process to treat up to 46 MGD with 14 MGD biological nutrient reduction bypass flow, for a peak flow of 60 MGD. The plant discharges to the Lackawanna River under NPDES permit PA-0026492A-1. The 2017 annual average daily flow into the plant was 12.00 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.29. The WWTP is not in a current hydraulic or organic overload condition, nor is it projected to be within the next five years.

Preventative maintenance activities are continually performed by PAWC staff to optimize the operation of the collection system and to minimize the occurrences of blockages. The strategy for accelerated replacement and rehabilitation of aging infrastructure in the collection system will be a targeted, multi-year process. PAWC plans to use an approach that includes consent order compliance, long-term control plan and nine minimum control measures to address combined sewer overflows; and CCTV inspection of mains and laterals, multi-sensor robotic inspection, and hydraulic model development for the main replacement and rehabilitation program.

Using continuous information from PAWC collection system staff, including CCTV inspection results and multi-sensor robotic inspection of the system, PAWC plans to address immediate concerns and known areas of deficiency within the first 1-2 year period. These projects will generally include full asset replacement due to identified significant structural deficiencies, hydraulic limitations or restrictions (reverse slope, sage, etc.), and associated manhole surcharging and overflow conditions in the project areas. More specifically, over 9,000 LF of sewer main is anticipated to be replaced in 2019, including over 4,000 LF of interceptor main that currently experiences manhole surcharging and overflows during wet weather events. Other near term projects include replacement of sewer mains that have experienced structural failure as discovered via hydraulic issues and/or during regular cleaning, inspection, and condition assessment activities. Over the following years, the remaining areas of the system will continue to be inspected with the goal of accelerating asset renewal and rehabilitation.

The 7 lift stations are in good condition and are cleaned / maintained on a regular basis by PAWC staff. Two have been upgraded within the past two years, and one lift station is being upgraded in 2018.

Southeastern Pennsylvania

Coatesville

The Coatesville wastewater system is located in Chester County and provides wastewater collection and treatment service to approximately 6,226 customers, comprised of 5,852 residential customer connections, 352 commercial, 2 industrial, 16 other / institutional, and 4 bulk municipal customers. The collection system serves the City of Coatesville, the Borough of Parkesburg and portions of the Borough of South Coatesville and portions of the Townships of Caln, East Fallowfield, Highland, Sadsbury, Valley, West Caln, and West Sadsbury. The system includes the following bulk municipal customers: Caln, Sadsbury, Valley, and West Brandywine Townships. PAWC purchased the assets of the Coatesville system in 2001.

The Coatesville collection system consists of approximately 352,945 LF of gravity main, ranging in diameter from 4-inch to 42-inch; and approximately 93,605 LF of force main, ranging in

diameter from 2-inch to 12-inch. The collection system was installed in the 1930s or later. The system includes 17 lift stations. The approximately 1,670 manholes are brick or concrete. The system includes clay, PVC, and ductile iron gravity main. Force main material includes ductile iron and PVC.

The system contains one WWTP with a permitted annual average daily flow of 7.0 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-0026859. The 2017 annual average daily flow into the plant was 3.698 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.161. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years.

Since the 2001 acquisition, PAWC has maintained a regular program of monitoring collection system conditions. An aggressive I&I abatement program has been implemented to minimize extraneous flows into the system. The collection system is divided into ten subbasins, from which additional subbasins are identified and prioritized for the I&I monitoring and abatement program. Trenchless technologies, such as cured-in-place liners, have been an important tool to complete the rehabilitation work in a cost effective, safe and reliable manner. Work has continued in the high priority subbasins since the mid 1990's.

The general strategy to maintain an accelerated pace of replacement and rehabilitation of eligible property is to inspect portions of the collection system each year, and use the inspection results to identify projects to be completed the following year. The entire collection system was inspected in 2005, and a hydraulic model was developed. Some new additions to the system have not been inspected. The original inspection was completed over 13 years ago; therefore, some areas in critical subbasins have been re-inspected over the past two years. PAWC plans to continue inspections in order to maintain an accelerated I&I abatement program and continue to assess the condition of the system.

The Coatesville District has been under a regulatory requirement of a Connection Management Plan (CMP) since 2005. The treatment facility and restricted pipe segments of the interceptors have been replaced over the years, but two remaining projects of the West End Truck Line Phases 3-6 and the Parkesburg Pump Station Phase 2 Improvements are planned to move to construction in 2019.

Western Pennsylvania

Clarion

The Clarion wastewater system is located in Clarion County and provides wastewater collection and treatment service to approximately 2,157 mostly residential customers. The collection system serves Clarion Borough, and portions of Monroe Township, Clarion Townships, and Strattanville Borough. Strattanville Borough is a bulk municipal customer that owns and maintains its own wastewater collection system. PAWC purchased the assets of the Clarion system in 2008.

The Clarion collection system consists of approximately 200,860 LF of gravity main, ranging in diameter from 4-inch to 36-inch; and approximately 36,293 LF of force main, ranging in diameter from 2-inch to 10-inch. The collection system was installed in the 1930s or later. The system includes 6 lift stations. Most of the approximately 930 manholes are brick, and the remaining

ones are concrete. Most of the gravity collection mains are clay, and the remaining ones are PVC. Force mains are PVC, ductile iron, and HDPE. A recently installed 6-inch HDPE force main, which serves the Clarion-Limestone School District, accounts for most of the force main length in the Clarion system.

The system contains one WWTP with a permitted annual average daily flow of 2.9 MGD. The plant hydraulic capacity was increased in 2015 after WWTP improvements were completed. The plant is operated under NPDES permit PA-0029491. The 2017 annual average daily flow into the plant was 1.26 MGD, and the ratio of the 3 consecutive month maximum to annual average flow was 1.25. System improvements were completed, which include wet weather storage basins at the Liberty lift station and the WWTP. Prior to completion of system improvements, during excessive wet weather, bypasses would occur at the WWTP and SSOs would occur at the WWTP and within the collection system. In 2017, the system experienced no SSOs. The WWTP is not currently nor projected to be hydraulically or organically overloaded in the next five years.

Since the 2008 acquisition, PAWC has implemented an aggressive I&I abatement program to correct defects in priority subbasins of the collection system that were potential sources of I&I. Work has included main line, manhole, and lateral rehabilitation, as well as upgrades to lift stations. Trenchless technologies, including cured-in-place liners and pipe-bursting, have been an important tool to complete the rehabilitation work in a cost-effective, safe and reliable manner. PAWC has worked with Clarion University to address I&I issues in the University's collection system. The University hired a consultant in 2015 and has reported improvements to address the problems. PAWC plans to continue to work with Clarion University to minimize the impact of I&I from their collection system. Most of the inspection was completed over 12 years ago, and PAWC plans to re-inspect the targeted subbasins as well as other areas of the collection system. Most of the lift stations are in good condition and are inspected regularly and maintained as needed. The Mays Lift Station is in need of improvement and is scheduled for replacement in 2020.

I&I remains an issue in high priority subbasins in the collection system as well as several other subbasins, which will need to be addressed to prevent future hydraulic overload conditions. PAWC plans to maintain an accelerated I&I abatement program and inspect the entire collection system over the next three years. The basins that flow to the Liberty Lift Station will be targeted over the next several years due to significant I&I within the basins. Pipe segments consisting of VCP pipe with known I&I issues and root infiltration will be replaced or rehabilitated. The 2019 projects will replace VCP pipe in heavily wooded areas near the Liberty Lift Station that have major root infestation / blockage and I&I issues. For 2020, in addition to the Mays Lift Station project, a section of sewer main in the Applewood Valley development is targeted for replacement.

Claysville

The Claysville wastewater system is located in Washington County and currently provides wastewater collection and treatment service to approximately 503 mostly residential customers in the Borough of Claysville and portions of Donegal Township. PAWC purchased the assets of the Claysville system in 2008.

The Claysville collection system consists of approximately 62,082 LF of gravity main, 8-inch and 10-inch diameter; and approximately 1,149 LF of 3-inch force main. The majority of the collection system was installed in 1983, with two small extensions installed since that time. All mains are PVC, and all of the approximately 342 manholes are concrete. The system includes one lift station which serves the I-70 highway rest stop along with a few residential connections.

The system contains one WWTP with a permitted annual average daily flow of 0.16 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-0093165. The 2017 annual average daily flow into the plant was 0.097 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.21. The WWTP is not currently nor projected to be hydraulically or organically overloaded in the next five years.

A sewer system evaluation study was conducted in 2008. Based on the results of this study, it was determined that the collection system is in relatively good condition. Some defective areas were identified and corrective actions were completed. After corrective actions, the collection system remains affected by I&I. In 2015, a wet weather storage tank was constructed at the WWTP to minimize sanitary sewer overflows due to I&I. Over the next three years, PAWC plans to re-inspect the entire collection system. PAWC plans to assess the condition of the system, and complete selected / limited rehabilitation work as needed based on findings of the investigative work.

Koppel

The Koppel wastewater system is located in Beaver County and provides wastewater collection and treatment service to approximately 351 mostly residential customers in Koppel Borough. PAWC purchased the assets of the Koppel system in 2013.

The Koppel system consists of approximately 25,909 LF of gravity main, ranging in diameter from 4-inch to 15-inch. The system was installed in the 1920s or later. Most of the gravity main is vitrified clay, with some PVC. The approximately 87 manholes are composed of brick. There are no lift stations or force mains in the Koppel collection system.

The system contains one WWTP with a permitted annual average daily flow of 0.24 MGD, which is the basis for the plant's hydraulic capacity. It is operated under NPDES permit PA-0023434. The 2017 annual average daily flow into the plant was 0.191 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.20. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years.

A general inspection was completed for all manholes in the Koppel system. Portions of the collection system have been inspected with CCTV. Based on the inspection results, several projects have been identified to address NASSCO grade 4 and 5 defects.

PAWC plans to inspect the entire gravity collection system in order to continue an accelerated I&I abatement program. Pipe replacement and rehabilitation projects will be implemented in the areas that contain significant defects with the higher priority basins being targeted first. Some of the initial projects in 2019 and 2020 include replacement of VCP pipe near Koppel Steel with major defects and alignment / slope issues along with rehabilitation of other VCP pipe within the priority basins.

McKeesport

The McKeesport combined sewer system is located in Allegheny County and provides wastewater and combined sewage collection and treatment service to approximately 8,096 mostly residential customers and commercial with some other / institutional customers. The collection system does not directly serve any industrial customers. The McKeesport collection system and regional WWTP also supply customers in eight surrounding municipalities through inter-municipal agreements, which include the Boroughs of White Oak, East McKeesport, Lincoln, Liberty, Versailles, Glassport, and the Townships of North Versailles and Elizabeth. PAWC purchased the assets of the McKeesport system in 2017.

The McKeesport collection system consists of approximately 690,280 LF of gravity main, ranging in diameter from 4-inch to 112-inch. Approximately 89 percent of gravity main is combined sewer. The McKeesport collection system includes approximately 32,731 LF of force main, ranging in diameter from 8-inch to 36-inch. The collection system was installed in the 1900 or later. The interceptor lines were installed in the 1950s or early 1960s to intercept flow that was going into the river and direct flow to the WWTP. The McKeesport collection system includes 9 lift stations. Most of the approximately 3,236 manholes are brick. Most of the gravity collection mains are vitrified clay pipe. Force main materials include cast iron and PVC. The system includes 4 diversion chambers / manholes and 26 combined sewer overflow outfalls.

The McKeesport system contains one WWTP with a permitted annual average daily flow of 13.0 MGD, which is the basis for the plant's hydraulic capacity. It is operated under NPDES permit PA-0026913. The 2017 annual average daily flow into the plant was 11.41 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.23. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years.

The City of McKeesport area of the collection system has fewer inspection records compared to Port Vue Borough. The strategy for accelerated replacement of aging infrastructure in the McKeesport collection system will be a pragmatic, targeted, and a multi-year process. PAWC plans to use a holistic approach that includes consent order compliance, long-term control plan and nine minimum control measures to address combined sewer overflows, flow monitoring, lateral inspection and GPS surveying, hydraulic model development, and CCTV inspection. Using continuous information from PAWC collection staff, and information from multi-sensor robotic inspections, PAWC plans to initially address immediate concerns and known areas of deficiency, followed by accelerated asset renewal / replacement based on future inspection results.

In order to comply with the PaDEP & the US EPA requirements, a LTCP was prepared by McKeesport. The conclusion of the study determined that several capital projects were to be constructed to comply with regulatory wet weather flow policies. These projects were completed prior to acquisition by PAWC. PAWC is presently monitoring flows to verify the completed projects have met the goal of the LTCP.

The Port Vue Borough portion of the McKeesport collection system is located mostly west of the Youghiogheny River. Upon acquisition of the McKeesport System, PaDEP issued a consent order that the Grade 4 & 5 defects found in a prior CCTV inspection were to be repaired within 24 months of closing. The strategy for the Port Vue area of the McKeesport system is to initially

rely on previous inspection records to identify a prioritized list of projects for accelerated rehabilitation and replacement. The list will be verified by multi-sensor robotic inspections in 2018 with the rehabilitation starting 2019.

Dravosburg

The Dravosburg combined sewer system is located in Allegheny County and provides sanitary and combined sewage collection and treatment service to approximately 625 mostly residential customers. The collection system serves the Borough of Dravosburg. PAWC purchased the assets of the Dravosburg system in 2017.

The Dravosburg collection system consists of approximately 52,148 LF of gravity main, ranging in diameter from 8-inch to 72-inch. Approximately 62 percent of the gravity main is combined sewer. The Dravosburg collection system includes approximately 1,219 LF of 6-inch force main. The collection system was installed in the 1900s or later. The system includes one lift station and one CSO outfall. Most of the approximately 308 manholes are brick. Most of the gravity collection mains are vitrified clay pipe.

The system contains one WWTP with a permitted annual average daily flow of 0.48 MGD, which is the basis for the plant's hydraulic capacity. It is operated under NPDES permit PA-0028401. The 2017 annual average daily flow into the plant was 0.201 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.40. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years.

The strategy for accelerated rehabilitation and replacement of existing infrastructure in the Dravosburg collection system will be similar to other recently acquired combined sewer systems such as McKeesport. The entire collection system will be inspected with multi-sensor robotics with condition and data attributes collected for use in developing a prioritized list of projects for rehabilitation or replacement of aging infrastructure. PAWC plans to initially address immediate concerns and known areas of deficiency, followed by accelerated asset renewal / replacement based on future inspection results.

Duquesne

The Duquesne combined sewer system is located in Allegheny County and provides sanitary and combined sewage collection and treatment service to approximately 1,840 mostly residential customers. The collection system serves the City of Duquesne and approximately 17 residential customers in West Mifflin Borough. PAWC purchased the assets of the Duquesne system in 2017.

The Duquesne collection system consists of approximately 184,560 LF of gravity main, ranging in diameter from 8-inch to 80-inch. Approximately 68 percent of the gravity main is combined sewer. There are no pumping stations or force mains in the Duquesne collection system. The Duquesne system includes four CSO structures. The collection system was installed in the 1900s or later. Most of the approximately 1,125 manholes are brick. Most of the gravity collection mains are vitrified clay pipe.

The system contains one WWTP with a permitted annual average daily flow of 2.0 MGD, which is the basis for the plant's hydraulic capacity. It is operated under NPDES permit PA-0026981. The 2017 annual average daily flow into the plant was 0.821 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.35. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years.

The strategy for accelerated rehabilitation and replacement of existing infrastructure in the Duquesne collection system will be similar to Dravosburg. The entire collection system will be inspected with multi-sensor robotics with condition and data attributes collected for use in developing a prioritized list of projects for rehabilitation or replacement of aging infrastructure. PAWC plans to initially address immediate concerns and known areas of deficiency, followed by accelerated asset renewal / replacement based on future inspection results.

Paint-Elk

The Paint-Elk wastewater system is located in Clarion County and provides wastewater collection and treatment service to approximately 660 mainly residential customers. The collection system serves Shippenville Borough and portions of the Townships of Elk and Paint. PAWC purchased the assets of the Paint-Elk system in 2014 and acquired the Shippenville Borough system in 2015.

The Paint-Elk collection system consists of approximately 89,425 LF of gravity main, ranging in diameter from 4-inch to 18-inch; and approximately 21,310 LF of force main, ranging in diameter from 1.25-inch to 8-inch. The collection system was installed in the 1960s or later. The system includes 5 lift stations. Most of the approximately 432 manholes are concrete. The majority of the gravity collection mains are PVC. Force main material includes PVC and HDPE. A lift station and sewer main extension was completed in 2017 to interconnect the Shippenville system to the Paint-Elk system. The Shippenville system is now a basin within the Paint-Elk system.

The system contains one WWTP with a permitted annual average daily flow of 0.6 MGD, which is the basis for the plant's hydraulic capacity. It is operated under NPDES permit PA-0034924. The 2017 annual average daily flow into the plant was 0.13 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.23. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years.

Some of the lift stations are in good overall condition but major improvements are needed for many of the stations. The collection system is in good overall condition, however there are several areas of the system that need to be addressed. The entire system was inspected in 2017. Several projects have been identified within the priority basins that will include improvements to the existing VCP pipe. The 2019 projects will replace VCP pipe in one of the priority basins. The VCP pipe has major defects and is in need of replacement. Improvements to 4 of the 5 lift stations are also planned for 2019 and 2020.

Section 4 – Estimate of the Quantity of Property to Be Improved

The estimated quantities of property to be improved are listed in Table 8 below. To compile these estimates, the best available information was used regarding the infrastructure needs for each wastewater system. Actual quantities and scheduling may change depending on the outcome of sewer system evaluation or other planning studies, as described in Section 2 of this LTIIP.

Table 8 – Projected Wastewater DSIC Eligible Properties to Be Replaced / Rehabilitated for 2019 to 2023

Year	Gravity Pipe (LF)	Manholes (ea)	Service Laterals (ea)	Lift Stations (ea)
2019	35,298	197	453	6
2020	62,531	172	632	7
2021	83,786	240	747	3
2022	91,038	303	888	2
2023	104,701	392	1,071	2
McKeesport CO & Coatesville CMP				
McKeesport	24,044	55	100	0
Coatesville	14,955	50	13	1

Section 5 – Projected Annual Expenditures

The projected annual expenditures for 2019 to 2023 are listed in Table 9 below. These estimates are based on the quantities listed in Table 8 and recent, competitively-bid prices in Pennsylvania. Non-regulatory wastewater DSIC investments are expenditures that exclude regulatory driven costs such as projects associated with a consent order agreement (CO) or a connection management plan (CMP). In future AAOPs and other LTIIP-related filings, the Company will continue to distinguish between non-regulatory and regulatory investments and will separately identify expenditures for combined and sanitary systems.

Table 9 - Projected Annual Wastewater DSIC Expenditures 2019 to 2023 (in millions)

Year	Non-Regulatory Investment	Regulatory		Total Investment
		McKeesport CO	Coatesville CMP	
2019	$11.69M	$9.55M	$9.26M	$30.50M
2020	$20.07M			$20.07M
2021	$20.98M			$20.98M
2022	$20.36M			$20.36M
2023	$22.63M	$1.21M		$23.84M

Some quantities may change depending on the results of sewer system evaluation and engineering studies. Costs may vary depending on whether a replacement or rehabilitation method was selected during the final design. For example, competitive bid prices for gravity replacement varied with depth of pipe and diameter, so an average depth and diameter was assumed to generate a projected cost. Annual expenditures may be subject to periodic fluctuation due to larger wastewater upgrades associated with regulatory compliance; therefore these are listed separately. For all projects, the most prudent and cost-effective method will be selected. In addition, PAWC uses competitive bidding to ensure all major capital projects are completed in a cost-effective manner.

Pursuant to Ordering Paragraph 7 of the Commission's October 26, 2017 Order in Docket No. A-2017-2606103, PAWC may collect a DSIC related to the McKeesport system prior to the first base rate case in which the McKeesport system's plant-in-service is incorporated into PAWC's rate base, subject to three conditions. The first of those conditions (Ordering Paragraph 7(a)) is met because the LTIIP does not re-prioritize other existing commitments in other service areas. In future LTIIP and AAOP filings, any changes in projected quantities or projected expenditures for the McKeesport system will be condition assessment-related and will not re-prioritize existing commitments in other service areas. In such filings, if projected quantities or projected expenditures are higher for the McKeesport system and lower for other service areas than the projections in its approved LTIIP, PAWC will include an explanation why the shift was appropriate and does not re-prioritize existing commitments in other service areas. In addition, in future water and wastewater LTIIP and AAOP filings, if projected quantities or projected expenditures are higher for systems acquired under 66 Pa. C.S. § 1329 and lower for other service areas – compared to its approved LTIIP – the Company will include an explanation why the shift was appropriate and does not re-prioritize existing commitments in other service areas.

Section 6 – Acceleration of Infrastructure Replacement / Renewal

PAWC has continuously invested in its wastewater infrastructure to maintain safe, reliable service to its customers. As shown in Table 10 below, from 2015 to 2018 PAWC spent an average of $7.39 million annually on wastewater DSIC eligible infrastructure improvements (regulatory driven projects shown separately). Appendix C provides a detailed table of historic annual DSIC-eligible expenditures in each district, from 2015 through 2019 and also contains a summary of historic annual replacement for DSIC-eligible categories of plant for 2015 through 2018, by district.

From 2019 to 2023, PAWC proposes to increase non-regulatory wastewater DSIC eligible spending to over $20 million annually in order to continue making necessary improvements at an accelerated pace. The proposed spending for 2019 to 2023 represents a 159 percent increase in wastewater DSIC spending, excluding regulatory driven projects.

Table 10 - Historic Annual Wastewater DSIC Expenditures (in millions)

* Existing WW DSIC Qualified Districts

Year	Annual DSIC Expenditures
2015	$8.92M
2016	$5.51M
2017	$8.42M
2018	$3.86M
2019	$11.90M

** Existing plus Future WW DSIC Qualified Districts under modified LTIIP

Year	Annual DSIC Expenditures
2015	$8.92M
2016	$5.51M
2017	$8.42M
2018	$6.18M
2019	$39.44M

Section 7 – Workforce Management Plan

To ensure system reliability and public safety, all wastewater DSIC eligible projects will be constructed by qualified contractors or PAWC staff. For some wastewater systems, PAWC staff complete investigative work, spot repairs, or lift station repairs which may be DSIC eligible work. Typically, DSIC eligible projects are bundled together for competitive bidding to prequalified contractors in order to achieve economies of scale.

PAWC utilizes a pre-qualification process to ensure all contractors are qualified to perform work in a cost-effective, safe, and reliable manner. PAWC utilizes Avetta as a third party entity to monitor contractor safety performance. The Avetta contractor prequalification process helps PAWC certify and centralize contractor data, perform pre-project screening, and contractor pre-qualification. Avetta allows PAWC to more effectively manage its risk and contractors' performance. During the pre-qualification screening process, contractors are required to submit pertinent documentation, such as:

- Safety: company policy, designated safety inspector, OSHA lost workdays and recordable incidents, OSHA violations
- Worker's Compensation Experience Ratings (Experience Modifier)
- Staffing information
- Annual value of work and percentage of work relevant to bid project
- Work experience schedule
- Bonding capacity
- Liability Insurance coverage
- References

All construction projects performed by independent contractors are properly inspected. PAWC employees are actively engaged in the direct supervision of project inspections. The project close-out process includes a punch-list to ensure all work is completed according to contract documents. PAWC will use only pre-qualified contractors or trained Company employees to *perform work on all wastewater DSIC-eligible projects.*

Section 8 – Outreach and Coordination with Other Utilities

The acceleration of aging infrastructure proposed in this LTIIP will lead to disruptions as work is performed in the right of ways of the roadways and streets across the PAWC service area. Local municipalities and other utilities / agencies may be planning paving projects or underground infrastructure replacement projects located in the same right-of-way as PAWC wastewater infrastructure. PAWC recognizes that coordination with other utilities minimizes disruption and ensures that infrastructure replacement is efficient and cost effective. Therefore, PAWC plans to take the following steps to reach out to customers about disturbances, and to coordinate with other utilities and the Pennsylvania Department of Transportation (PennDOT) located within the PAWC service area:

- Utilize Pennsylvania's one-call system for "design notifications," to coordinate design work with other utilities and municipalities and Coordinate PA to identify targeted areas of anticipated work planned over a two-year look ahead period
- Maintain open communication with local municipalities to stay informed about planned utility and paving projects

- Maintain communication with PennDOT Utility Administrators and review the "letting" schedule
- Maintain communication / working relationships with other utilities operating in our service area
- Where applicable and cost-effective, use trenchless technologies to minimize roadway disturbance
- Prior to working within a community, issue door-to-door notifications, press releases, and / or information letters to notify those customers / community associations affected by the work.
- PAWC has launched its "CodeRED" system, which delivers high-speed notifications to customers when water emergencies occur. Customers enrolling in CodeRED can be contacted quickly by text, email, telephone, and the CodeRED mobile app depending on their personal preferences. CodeRED rapidly contacts large numbers of customers about emergency situations, which include boil water advisories, main breaks, water conservation requirements and other major events impacting water service. The system will also be used for non-urgent notification, such as planned service outages, local hydrant flushing, low-pressure events and major traffic impacts.
- Leverage areas where PAWC owns both sewer and water lines to replace both simultaneously as appropriate

PENNSYLVANIA-AMERICAN WATER COMPANY

5-YEAR WASTEWATER
LONG-TERM INFRASTRUCTURE IMPROVEMENT PLAN

~~October 31, 2018~~

August 15, 2019

Amended January 30, 2020

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Introduction

In accordance with the requirements of 66 Pa. C.S. §1350 - §1360 and the Public Utility Commission's Final Order for the Implementation of Act 11 of 2012 (Public Meeting of August 2, 2012, Docket No. M-2012-2293611), Pennsylvania-American Water Company (PAWC~~) is submitting this~~ or Company) submitted a Wastewater Long-Term Infrastructure Improvement Plan (LTIIP) dated October 31, 2018 for calendar years 2019-~~2023.~~2023, which was revised in accordance with the Joint Petition for Settlement dated August 19, 2019 and approved by the Pennsylvania Public Utility Commission's (the Commission's or PUC's) Opinion and Order entered January 7, 2020 at Docket No. P-2014-2431005. This plan modifies PAWC's 2014 Wastewater LTIIP used for the initial establishment of a Wastewater Distribution System Improvement Charge (DSIC), referred to in this report as "Wastewater DSIC" or "DSIC". This LTIIP is submitted in support of an expanded Wastewater DSIC mechanism for the current PAWC wastewater systems referenced below and modifies the existing LTIIP approved by the ~~Public Utility Commission~~PUC on December 4, 2014, at Docket No. P-2014-2431005, and covers the period of 2019-2023.

PAWC is a wholly owned subsidiary of American Water Works Company, Inc. and provides public water and sewer service to residents in Pennsylvania. PAWC owns and operates 18 wastewater systems located in 12 Counties across the Commonwealth, and serves approximately 65,139 customer connections (customer count as of 7/31/2018), including several bulk municipal customers.

Provided in Table 1 is a list of all wastewater systems owned and operated by PAWC. The location of each wastewater system is shown in Figure 1. The wastewater system list in this LTIIP is more detailed than the listing in PAWC's wastewater tariff because long-term infrastructure improvement planning is completed by system and the tariff list is grouped by wastewater district. Districts that have multiple wastewater systems include the Fairview, Northeast, and McKeesport Districts.

Table 1 - List of PAWC Wastewater Systems

Wastewater System Grouped by State Region		Rate Zone	Areas Served	Number of Customers as of 7/31/18
Central	Fairview North	1	York County. Portions of Fairview Township	1,498
	Fairview South	1	York County. Portions of Fairview Township	2,498
	Franklin	5	Adams County. Portions of the Townships of Franklin, Hamiltonban, and Highland	348
	McEwensville	1	Northumberland County. McEwensville Borough	133
	New Cumberland	2	Cumberland County. New Cumberland Borough	3,066
Northeast	Blue Mountain Lake	1	Monroe County. Portions of the Townships of Smithfield and Stroud	830

Wastewater System Grouped by State Region		Rate Zone	Areas Served	Number of Customers as of 7/31/18
	Lehman Pike [a]	1	Monroe County: Portions of Middle Smithfield Township. Pike County: Portions of Lehman Township	2,714
	Marcel Lake [b]	1	Pike County. Portions of Delaware Township	354
	Pocono	1	Monroe County. A portion of Coolbaugh Township	3,689
	Scranton	3	Lackawanna County. The City of Scranton and the Borough of Dunmore	29,551 [c]
Southeast	Coatesville	1	Chester County. The City of Coatesville, the Borough of Parkesburg and portions of the Borough of South Coatesville and portions of the Townships of Caln, East Fallowfield, Highland, Sadsbury, Valley, West Caln, and West Sadsbury	6,226 [d]
West	Clarion	1	Clarion County. Clarion Borough and portions of the Townships of Clarion and Monroe	2,157 [e]
	Claysville	1	Washington County. Claysville Borough and portions of the Township of Donegal	503
	Koppel	4	Beaver County. Koppel Borough	351 [f]
	McKeesport	6	Allegheny County. The City of McKeesport, Port Vue Borough, and the following through bulk municipal connections: Boroughs of White Oak, East McKeesport, Lincoln, Liberty, Versailles, Glassport, and the Townships of North Versailles and Elizabeth	8,096 [g]
	Dravosburg	6	Allegheny County. Borough of Dravosburg	625
	Duquesne	6	Allegheny County. The City of Duquesne and a portion of West Mifflin Borough	1,840
	Paint-Elk	1	Clarion County. Shippenville Borough and portions of the Townships of Elk and Paint	660

[a] Also known as "Saw Creek Estates"
[b] Also known as "Clean Treatment"
[c] Number of customers does not include customers in portions of the Boroughs of Taylor, Dickson City, and Moosic served through inter-municipal agreements; bulk municipal customers own and maintain their own wastewater collection systems and are counted as single customers
[d] Caln, Sadsbury, Valley, and West Brandywine Townships are bulk municipal customers counted as single customers
[e] Strattanville Borough is a bulk municipal customers that is counted as a single customer
[f] Big Beaver Borough is a bulk municipal customer that is counted as a single customer

[9] Customers in the eight surrounding municipalities (Boroughs of White Oak, East McKeesport, Lincoln, Liberty, Versailles, Glassport, and the Townships of North Versailles and Elizabeth) are served through inter-municipal agreements and are not included in the total customer count and counted as single customers..

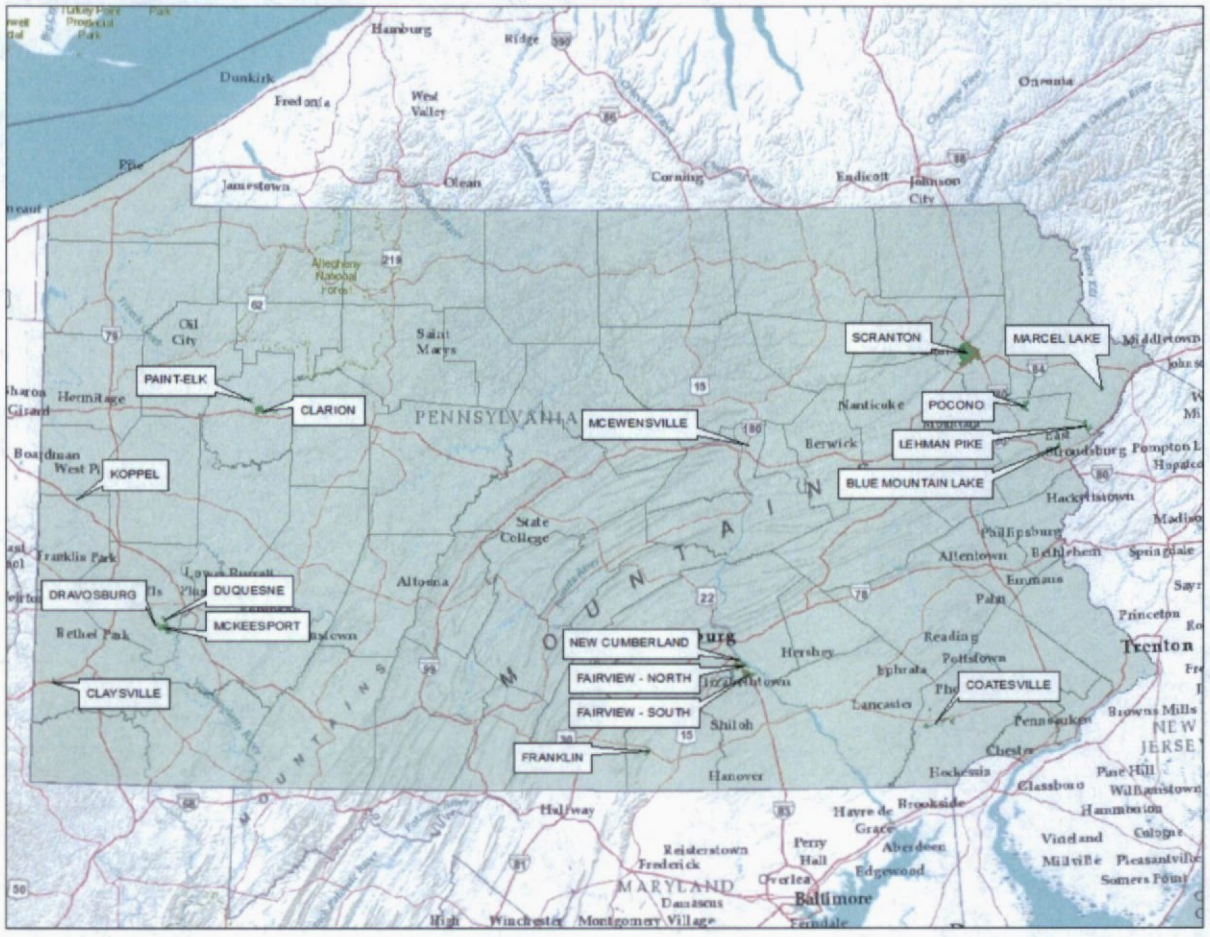

Figure 1 – Location of PAWC Wastewater Systems

The condition of the wastewater systems varies, depending on age, material, local conditions and quality of initial design or installation. Some systems require significant capital investment to maintain efficient, safe, and reliable service for existing customers. PAWC has acquired its wastewater systems from prior ownership in various states of disrepair. Many systems have aging infrastructure and significant inflow and infiltration (I&I) from rainfall runoff and groundwater.

During dry-weather conditions, the impact of I&I varies. Some wastewater collection systems have minimal impact from I&I during dry weather, while other systems experience high I&I even in dry weather conditions. For example, a wastewater collection system with a high-groundwater table can be significantly impacted by infiltration in dry weather conditions. In wet weather conditions, the impact of I&I is amplified. Flow entering a wastewater treatment plant (WWTP) can increase significantly due to the inflow of groundwater, rainfall runoff, and/or snowmelt. This may cause a sanitary sewer overflow (SSO) or combined sewer overflow (CSO) to occur if flow exceeds the plant's peak hydraulic capacity. Similarly, lift stations can become

hydraulically overloaded if the inflow of sewage mixed with groundwater and rainfall runoff exceeds the pumping capacity, causing raw sewage to be released to streets or a local waterway. I&I due to rainfall runoff, groundwater, or snowmelt can exceed the hydraulic carrying capacity of collection system piping, causing manhole lids to be lifted and raw sewage to be released into the environment. Hydraulically overloaded pipes and manholes can also cause sewer backups into homes and businesses. SSO's, CSO's and sewer backups due to I&I pose a public health risk and may violate many local and federal environmental regulations.

I&I has multiple causes, many of which are related to aging infrastructure. I&I can enter the wastewater collection system in various ways, such as cross connections, uncapped cleanouts, below-grade manhole lids, or roof drains. Groundwater inflow can enter the collection system through cracks in sewer pipes, faulty lateral connections, cracks in manhole walls, or deteriorated pipe joints. Groundwater can also enter the collection system through broken service laterals, root intrusion into a lateral pipe, or cracks in the walls of customer-owned grinder pump pits.

The focus of the wastewater LTIIP is to replace or rehabilitate collection system infrastructure based on strategic condition assessment and hydraulic evaluations; reduce I&I levels to address SSO and CSO issues; and to correct deficiencies in certain newly acquired wastewater system. These types of system improvements will improve system safety and reliability, customer service, and environmental compliance.

I&I has been reduced in a number of areas since the Wastewater DSIC rate mechanism was implemented. For instance, after significant capital investment in collection system upgrades which occurred over a multiple year timeframe, the Clarion collection system no longer experiences SSO events. Additionally, after a complete rebuild of Marcel Lake collection system with a resultant dramatic reduction in I&I, PAWC believes that PA Department of Environmental Protection (PaDEP) will now permit planning module approvals to resume.

Accelerated infrastructure replacement and rehabilitation is needed to continue meeting the challenges of PAWC wastewater systems, including systems that have been acquired by PAWC since the last wastewater LTIIP was submitted in 2014. PAWC wastewater customer base has increased from approximately 16,803 at the time the 2014 LTIIP was filed to the current total of 65,139 customer connections. Many newly acquired systems such as Scranton, McKeesport, Duquesne, and Dravosburg are currently under PaDEP Consent Orders and require accelerated rehabilitation and replacement.

This LTIIP provides a comprehensive description of the wastewater systems and establishes how PAWC plans to continue to accelerate the rehabilitation, improvement, and replacement of aging wastewater infrastructure (hereinafter referred to as eligible property) within these systems for the five year period from 2019 to 2023. The LTIIP includes an inventory and discussion of the types and age of property eligible for wastewater DSIC recovery; schedule for its planned rehabilitation and replacement; location of eligible property; reasonable estimate of the quantity of property to be improved; projected annual expenditures; manner in which replacement or rehabilitation of aging infrastructure will be accelerated; workforce management plan to ensure work is performed in cost-effective, safe and reliable manner; and description of outreach and coordination with other utilities to minimize disruptions to customers.

Section 1 – Types and Age of Eligible Property

An inventory of all eligible property, as defined in 66 Pa. C.S. §1351 (4), is provided in this Section. PAWC has developed and is applying Geographic Information Systems (GIS) as the spatial component of its Enterprise Asset Management (EAM) Program. Wastewater assets, such as collection mains, manholes, and lift stations are spatially located and attributed with critical information about PAWC systems. GIS data will be updated continually to include system changes, such as replacement of old pipes or expansion of the wastewater collection system. GIS data was used to identify types and age of eligible property. For some recently acquired systems, there is limited information on the wastewater properties. For each system, all data sources were analyzed and the best available information was used to quantify the types of eligible property.

PAWC owns the following types of sewer collection systems:

Gravity – In a gravity collection system, service laterals from the customer premise connect to a sewer main usually located in an alley or street. For combined systems, catchbasins / inlets convey rainfall runoff directly to the gravity collection system. Eligible property also includes facilities that are unique to combined sewer collection systems, such as CSO regulators, diversion manholes, storage structures, outfalls, and equalization chambers. Sewer mains and interceptor sewer mains (also referred to as "trunk lines") form a branched network that generally follows street layout, and can be accessed through manholes. Service laterals can be accessed through lateral cleanouts. Gravity collection systems either convey sewage directly to a WWTP or to a lift station. In total, the wastewater collection systems are comprised of approximately 65,139 service laterals, 20,874 manholes, and 4,156,078 linear feet (LF) of gravity main which includes combined sewer gravity mains. Gravity main and manhole material generally depends on installation date. Newer mains are polyvinyl chloride (PVC) and older mains are mostly vitrified clay pipe (VCP). Newer manholes are pre-cast or cast in place concrete and older manholes are brick.

Low Pressure – In a low-pressure collection system, individual customer sewage collects in a grinder pump and pit installation. Sewage is pumped from the pit through a service lateral into a low pressure force main. Depending on topography and layout, some low pressure collection systems include lift stations to boost pressure. A low pressure force main may contain in-line flow meters, valve vaults, and air and vacuum release chambers. A low pressure system can convey sewage directly to a WWTP, a lift station, or a manhole in the gravity system. On low pressure systems, the eligible property associated with the service lateral extends from the sewer main to the individual customer's grinder pump unit. One exception to this exists in the Blue Mountain district where there are 5 company grinder pump and pit installations. PAWC owns approximately 458,177 LF of low pressure sewer main.

Force Main – A force main is a pressurized discharge pipeline from a lift station. A force main pipeline may contain in-line flow meters, valve vaults, and air and vacuum release chambers. Force mains can convey sewage directly to a WWTP or to a manhole in the gravity system. PAWC owns and operates 95 lift stations and approximately 257,725 LF of force main. In general, force main material is cast iron for older pipes, ductile iron or PVC for newer pipes.

"Eligible property" is defined in the Pa Code as property that is part of a distribution system and eligible for repair, improvement and replacement of infrastructure under 66 Pa. C.S. §1351, as follows:

4(i) Collection sewers, collecting mains and service laterals, including sewer taps, curb stops and lateral cleanouts installed as in-kind replacements for customers.

4(ii) Collection mains and valves for gravity and pressure systems and related facilities such as manholes, grinder pumps, air and vacuum release chambers, cleanouts, main line flow meters, valve vaults and lift stations installed as replacements or upgrades for existing facilities that have worn out, are in deteriorated condition or are required to be upgraded by law, regulation or order.

4(iii) Collection main extensions installed to implement solutions to wastewater problems that present a significant health and safety concern for customers currently receiving service from the wastewater utility.

4(iv) Collection main rehabilitation including inflow and infiltration projects.

4(v) Unreimbursed costs related to highway relocation projects where a wastewater utility must relocate its facilities.

4(vi) Other related capitalized costs.

For the purposes of this LTIIP, the term "sewers" refers to sewer mains which convey either sanitary or combined sewage.

Table 2 and Table 3 provide examples of eligible properties for each wastewater system. Table 4 lists pipe length by diameter for each system. Figure 2 and Figure 3 provide a breakdown by material for gravity pipe and pressurized pipe, respectively. Pipe install date breakdown is provided in Figure 4.

Table 2 - Types and Age of Eligible Property

Wastewater System		Gravity Main (LF)	Combined Sewer Gravity Main (LF)	Force Main / Low Pressure Main (LF)	Lift Stations	Manholes	Service Laterals [a]	General System Age
Central	Fairview North	165,600	0	18,844	11	869	1,498	>1950
	Fairview South	198,722	0	13,068	6	1,050	2,498	>1992
	Franklin	55,239	0	12,423	1	198	348	>1972
	McEwensville	12,669	0	1,242	4	57	133	>1984
	New Cumberland	144,692	0	6,898	3	608	3,066	>1950
Northeast	Blue Mountain Lake	0	0	68,250	6	0	830	>1990
	Lehman Pike	0	0	268,447	13	0	2,714	>1980
	Marcel Lake	30,732	0	28,597	3	130	354	>1980
	Pocono	150,648	0	99,795	2	777	3,689	>1975
	Scranton	552,748	1,186,820	12,032	7	9,055	29,551	>1900
Southeast	Coatesville	352,945	0	93,605	17	1,670	6,226	>1930s
West	Clarion	200,860	0	36,293	6	930	2,157	>1930s
	Claysville	62,082	0	1,149	1	342	503	>1983
	Koppel	25,909	0	0	0	87	351	>1920s
	McKeesport	73,403	616,877	32,731	9	3,236	8,096	>1900
	Dravosburg	19,604	32,544	1,219	1	308	625	>1900
	Duquesne	59,963	124,596	0	0	1,125	1,840	>1900
	Paint-Elk	89,425	0	21,310	5	432	660	>1960s
TOTAL		2,195,241	1,960,837	715,902	95	20,874	65,139	

[a]. The entire customer service lateral on a gravity collection system is deemed to be DSIC-eligible property.

Table 3 – Types of Eligible Property for Combined Sewer Systems

System	CSO Structures	Diversion Chambers	Inlets / Catchbasins
Scranton	70	4	3,013
McKeesport	26	4	1,852
Dravosburg	1	0	264
Duquesne	4	0	944

Table 4 - Pipe Length by Diameter for each Wastewater System

	DIAMETER (in)	Blue Mountain Lake	Clarion	Claysville	Coatesville	Dravosburg	Duquesne	Koppel	Fairview North	Fairview South	Franklin	Marcel Lakes	McEwensville	McKeesport	New Cumberland	Paint-Elk	Pocono	Saw Creek	Scranton	TOTAL
Sanitary-Only Gravity Main (LF)	Unknown		10,233		1,468		3,825						105	7,755		1,382			3,761	**28,529**
	1																			**0**
	4		279		156											578	1,607			**2,619**
	5							5,694												**5,694**
	6		12,402		3,899			1,545	607						398	11,597			3,402	**33,851**
	8		130,881	52,931	299,147	18,627	31,679	13,331	147,862	193,075	46,511	27,205	10,947	28,455	121,349	74,338	127,690		389,731	**1,713,759**
	9																		239	**239**
	10		13,109	9,151	8,808	145	6,387	1,070	14,945	5,647	8,729		1,617	15,065	13,501	274	5,547		72,261	**176,257**
	12		19,657		7,278	122	7,769	1,266	2,186			3,526		13,531	1,666		875		33,727	**91,604**
	14						478													**478**
	15		3,984		14,222	710	2,332	3,004						4,454	4,324	691	6,577		24,777	**65,075**
	16																736		72	**808**
	18		5,701		8,430		877							1,452	2,848	565	6,280		7,352	**33,505**
	20													193					3,968	**4,161**
	21														298					**298**
	22																		228	**228**
	24		2,243		4,706		2,129							447			863		4,508	**14,895**
	30		751		2,152		1,066										473		1,638	**6,081**
	32																		428	**428**
	33													208						**208**
	36		1,618		1,482		204							1,206						**4,511**
	39													637						**637**
	42				1,197										306					**1,504**
	48						878												560	**1,437**
	54						716													**716**
	60						1,624													**1,624**
	78																		3,400	**3,400**
	80																		353	**353**
	25 x 41																		172	**172**
	31 x 48																		155	**155**
	32 x 47																		168	**168**
	32 x 48																		835	**835**
	32 x 49																		403	**403**
	34 x 53																		558	**558**
	48 x 53																		53	**53**
	TOTAL	**0**	**200,860**	**62,082**	**352,945**	**19,604**	**59,963**	**25,909**	**165,600**	**198,722**	**55,239**	**30,732**	**12,669**	**73,403**	**144,692**	**89,425**	**150,648**	**0**	**552,748**	***2,195,241***
Force/Low Pressure Main (LF)	Unknown				10,811						35		499				804	4		**12,153**
	1																343	609		**952**
	1.25															1,101				**1,101**
	1.5								396											**396**
	2	20,366	739		2,276				2,478				516			1,065	49,918	68,507		**145,865**
	2.5															2,502				**2,502**
	3	28,866	1,219	1,149								755	227			2,149	19,747	89,086	391	**143,588**
	4	6,943	1,923		34,555				1,337			27,842			556	4,168	10,569	63,457	1,043	**152,395**
	6	12,075	29,361		19,517	1,219			4,406		12,388				1,781	1,910	18,291	26,542	7,760	**135,251**
	8		2,904		7,443				8,812	13,068				122	4,562	8,415	122	12,207		**57,655**
	10		148		9,808				1,315									8,035	1,446	**20,752**

	DIAMETER (in)	Blue Mountain Lake	Clarion	Claysville	Coatesville	Dravosburg	Duquesne	Koppel	Fairview North	Fairview South	Franklin	Marcel Lakes	McEwensville	McKeesport	New Cumberland	Paint-Elk	Pocono	Saw Creek	Scranton	TOTAL
	12				9,194				100					562					1,391	**11,247**
	16													9,254						**9,254**
	18													1,286						**1,286**
	20													9,032						**9,032**
	30													7,101						**7,101**
	36													5,373						**5,373**
	TOTAL	**68,250**	**36,293**	**1,149**	**93,605**	**1,219**	**0**	**0**	**18,844**	**13,068**	**12,423**	**28,597**	**1,242**	**32,731**	**6,898**	**21,310**	**99,795**	**268,447**	**12,032**	***715,902***
Combined Gravity Main (LF)	Unknown						21,354							25,346					24,035	**70,735**
	4													511					768	**1,279**
	6													537					5,854	**6,390**
	8					3,888	32,748							137,430					320,113	**494,179**
	10					6,663	10,463							43,054					209,354	**269,535**
	12					9,021	17,082							164,011					249,454	**439,568**
	14													335					807	**1,142**
	15					3,576	15,967							133,411					90,530	**243,485**
	16						949												1,054	**2,003**
	18					3,484	3,716							49,217					58,959	**115,375**
	20					874	273							9,347					47,084	**57,577**
	21													5,079					3,096	**8,175**
	22																		1,656	**1,656**
	24					3,138	11,278							18,748					51,333	**84,497**
	26																		984	**984**
	27													2,226					4,349	**6,574**
	30						6,205							623					37,429	**44,256**
	32																		2,249	**2,249**
	33																		1,373	**1,373**
	36						783							12,485					2,553	**15,821**
	38																		418	**418**
	39													2,931						**2,931**
	40																		489	**489**
	42													6,048					1,072	**7,121**
	44																		409	**409**
	45					59														**59**
	48					649	260							1,908					6,636	**9,454**
	49																		355	**355**
	52																		401	**401**
	54						2,734							171					4,000	**6,905**
	56																		285	**285**
	59																		480	**480**
	60					424								2,833					10,663	**13,919**
	63																		362	**362**
	66																		3,860	**3,860**
	72					768	210							558						**1,536**
	78																		2,593	**2,593**
	80						573													**573**
	84													31						**31**
	112													39						**39**
	121																		28	**28**

	DIAMETER (in)	Blue Mountain Lake	Clarion	Claysville	Coatesville	Dravosburg	Duquesne	Koppel	Fairview North	Fairview South	Franklin	Marcel Lakes	McEwensville	McKeesport	New Cumberland	Paint-Elk	Pocono	Saw Creek	Scranton	TOTAL
	12" x 12"																		15	**15**
	15.4" x 7.5"																		15	**15**
	2' x 2'3"																		187	**187**
	2'10" x 4'3"																		624	**624**
	2'X2'4"																		31	**31**
	2 x 3																		618	**618**
	20x39																		187	**187**
	24"X24"																		45	**45**
	24"x27"																		669	**669**
	25x36																		129	**129**
	25X40																		113	**113**
	26"x36"																		372	**372**
	26"x38"																		2,260	**2,260**
	26"x39"																		4,541	**4,541**
	26"X41"																		1,787	**1,787**
	27"x37"																		395	**395**
	28"x42"																		1,180	**1,180**
	29"x18"																		146	**146**
	29"x44"																		2,226	**2,226**
	29X56																		14	**14**
	3'4"X5'0"																		217	**217**
	3'9"X2'6"																		681	**681**
	3'X2'																		269	**269**
	3'x4'																		708	**708**
	3'x4'6"																		396	**396**
	30"x42"																		304	**304**
	30"x54"																		241	**241**
	32"x41"																		818	**818**
	32"x60"																		377	**377**
	32round																		264	**264**
	32x38																		323	**323**
	34"x35"																		204	**204**
	34"x48"																		216	**216**
	34"x51"																		1,368	**1,368**
	36"x36"																		1,521	**1,521**
	36"x38"																		903	**903**
	36"X41"																		35	**35**
	36"X57"																		430	**430**
	36X46																		89	**89**
	37"x57"																		454	**454**
	38"x44"																		195	**195**
	38"X57"																		189	**189**
	38x38																		61	**61**
	38x92																		83	**83**
	4'8"x7'2"																		2,643	**2,643**
	40"x60"																		807	**807**
	40"x64"																		859	**859**
	42"x60"																		968	**968**
	44"x44"																		297	**297**

	DIAMETER (in)	Blue Mountain Lake	Clarion	Claysville	Coatesville	Dravosburg	Duquesne	Koppel	Fairview North	Fairview South	Franklin	Marcel Lakes	McEwensville	McKeesport	New Cumberland	Paint-Elk	Pocono	Saw Creek	Scranton	TOTAL
	44"x68"																		595	**595**
	45"x68"																		218	**218**
	45X66																		151	**151**
	46"x66"																		469	**469**
	48"x78"																		607	**607**
	48"x84"																		2,233	**2,233**
	48"X84"Egg																		928	**928**
	48X90																		665	**665**
	52x53																		222	**222**
	56X80																		228	**228**
	59X64																		174	**174**
	6"X5"																		9	**9**
	60"x72"																		358	**358**
	62"X95"																		663	**663**
	66"x99"																		520	**520**
	7.5"X5"																		16	**16**
	72"x108"																		1,254	**1,254**
	78.5"X54"																		536	**536**
	87" C.B.																		396	**396**
	9.25"X5"																		18	**18**
	TOTAL	**0**	**0**	**0**	**0**	**32,544**	**124,598**	**0**	**0**	**0**	**0**	**0**	**0**	**616,877**	**0**	**0**	**0**	**0**	**1,186,820**	***1,960,837***

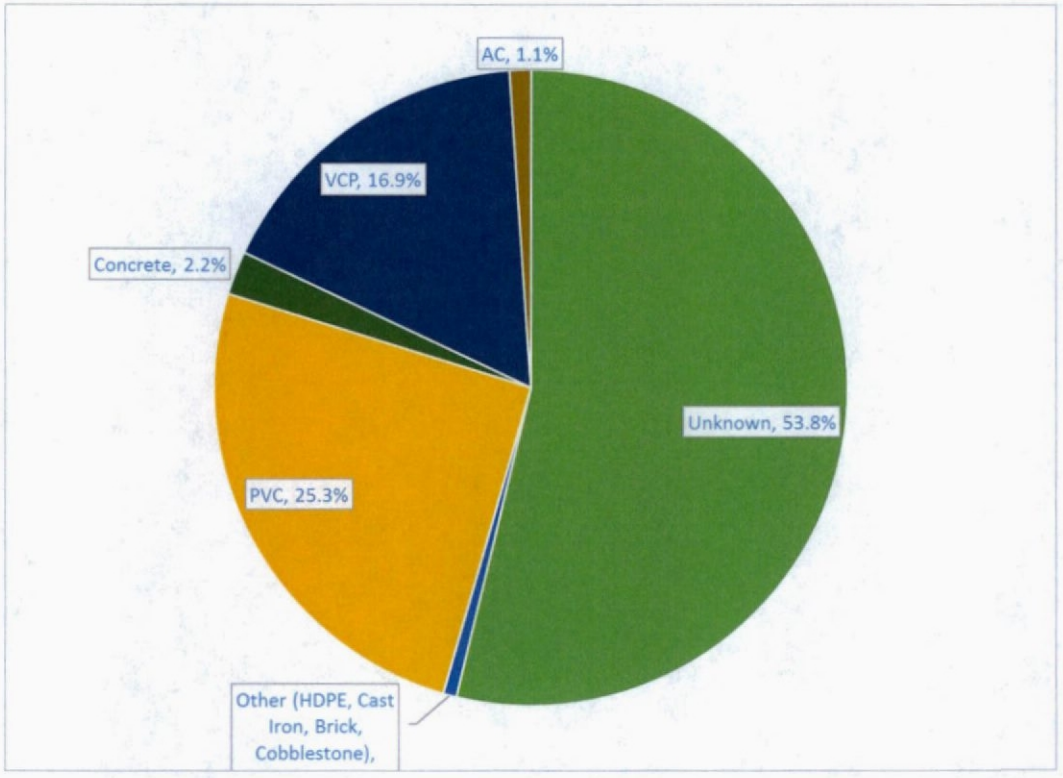

Figure 2 - Gravity Main Material Breakdown by length [unknown percentage due in large part to acquisitions of Scranton and McKeesport]

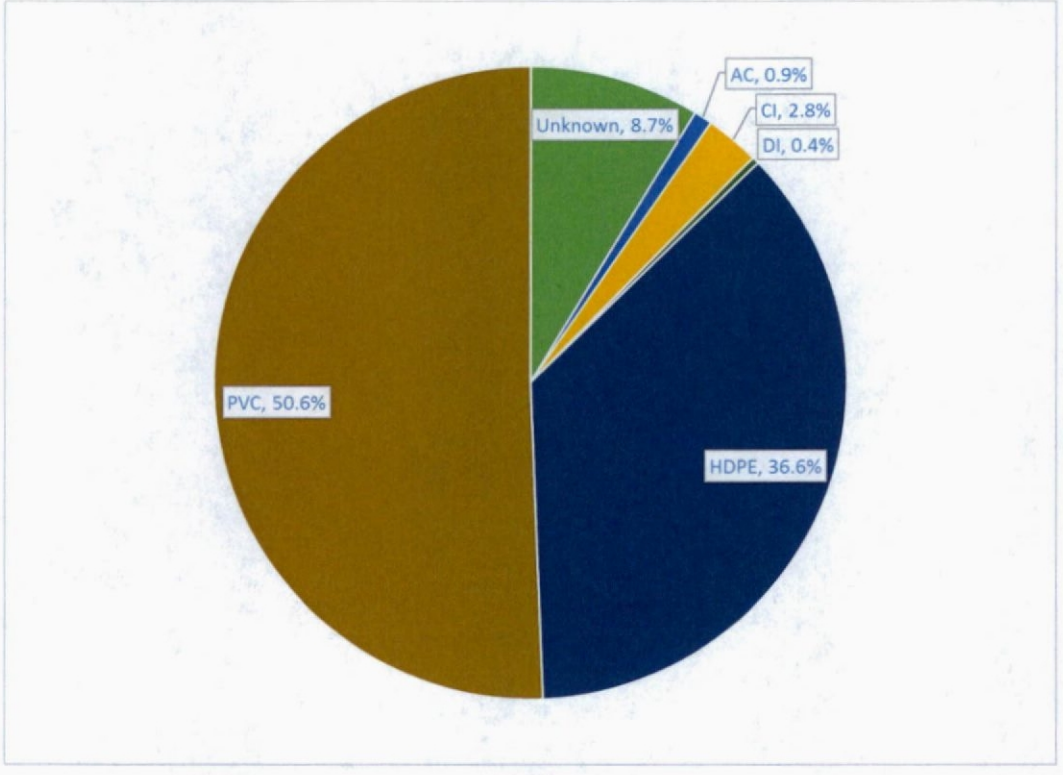

Figure 3 - Pressurized Main Material Breakdown by length

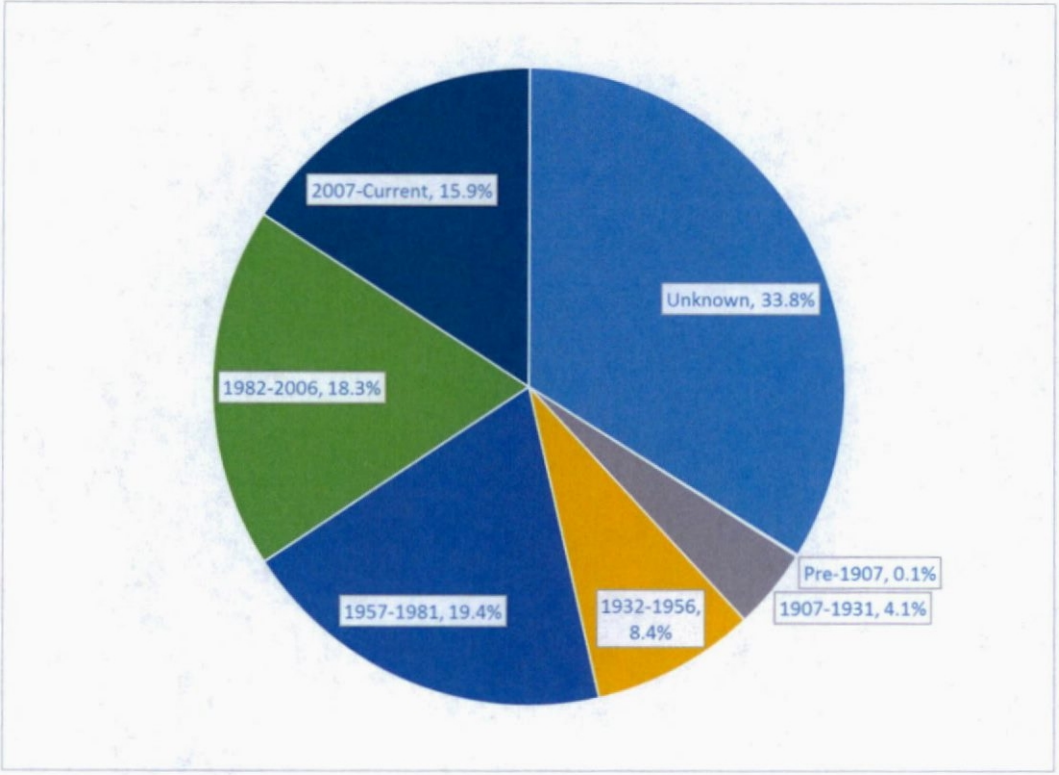

Figure 4 - Pipe Install Date Breakdown by length

Section 2 – Schedule for Planned Rehabilitation and Replacement of Eligible Property

PAWC recognizes the importance of continuous renewal of aging infrastructure in order to ensure and maintain adequate, efficient, safe, and reliable service to existing customers. This Section provides an overview of the planning process for replacement of aging wastewater collection system infrastructure. Planning related to collection main extensions due to the increase in the number of customers is not included, except those projects that implement solutions to wastewater problems for existing customers. Planning for WWTP improvements is not included in this Section, as WWTP improvements are not DSIC eligible.

Capital investment programs and projects are needs based and prioritized within a strategic planning process utilizing drivers associated with various asset investment strategies (such as regulatory compliance, reliability, capacity, customer satisfaction, etc.) Within a 5-year strategic capital expenditure plan, PAWC has established longer term funding levels for main replacement and rehabilitation based on program needs. The Company determines an overall investment level based upon the performance of the existing assets and the anticipated remaining life expectancy of the asset, taking into account the impact of investment on customer rates. Ideally, PAWC's spending level for main replacement and rehabilitation should be adequate to keep pace with the anticipated remaining service life of the collection system infrastructure. Expecting pipelines to continue to provide service beyond their useful life generally results in higher levels of service failure, potential environmental impact and disruptions to customers.

The first step of the planning process is to conduct a macro-level overview of each wastewater system. GIS tools may be used to help identify and prioritize groups of wastewater properties that are likely candidates for replacement or rehabilitation. GIS tools are not the sole determinant for identifying groups of wastewater assets. Other data that may be applied includes operational knowledge / records, condition of lift stations, number and location of sanitary and/or dry weather sewer overflows, and recorded flows into the WWTP. This system specific information assists in identifying structural and hydraulic deficiencies within each collection system in order to assess potential vulnerabilities.

Properties may be divided into general categories based on the following:

- Systems that are currently or projected to be hydraulically overloaded as defined by 25 Pa. C.S. §94.1
- Known problem areas based on operation and maintenance records
- Sewer collection basins with high I&I
- Material and age; for example, old terra cotta pipes and deteriorated brick manholes are potential candidates for replacement / rehabilitation, while lift stations and polyvinyl chloride (PVC) sewers less than 20 years old are less likely to need replacement

Using these general categories, areas of concern can be identified which may contain properties in need of replacement. The macro-level planning process helps identify groups of assets which are potential candidates, and those groups of assets that are unlikely to need near-term replacement. This allows resources required for micro-level planning to be more efficiently targeted to those areas most likely to contain aging infrastructure in need of rehabilitation or replacement.

The next step in the planning process is to conduct a more detailed, micro-level planning analysis. A comprehensive sewer system evaluation study is conducted, which is a systematic approach to identify specific properties to be rehabilitated or replaced. This study may include:

- Continuous flow monitoring
- Rainfall monitoring
- Hydraulic modeling
- Smoke testing
- Dye testing
- Traditional Closed circuit TV (CCTV) inspection of mains and service laterals
- Multi-sensor robotic inspection including synchronized laser, sonar, and CCTV for the collection of the system's physical attributes
- Manhole inspection
- Lift station inspection / monitoring
- CSO inlet, outfall, and regulator inspections
- Subbasin analysis / prioritization

During the micro-level planning process, specific properties are identified as candidates for replacement or rehabilitation using a risk based methodology based on a condition assessment and hydraulic capacity evaluation. Focusing on replacement of aging infrastructure and reduction of I&I, strategic improvements identified in the micro-level planning process can be grouped in the following categories:

Manhole replacement / rehabilitation – Work may include frame and cover replacement, internal grouting, lining, or complete replacement. Manhole lining can be used for structural reinforcement, reduction of groundwater infiltration, or protection from corrosive gases. Whether replacement or rehabilitation is best depends on various factors, such as location, structural integrity, and manhole depth. For example, replacement cost may be similar to rehabilitation cost for shallow manholes. In such cases, replacement is likely the best option. For manholes located in areas that are difficult to excavate, lining may be the best option. For each individual project, all factors are considered to select the most prudent and cost-effective method.

Pipe replacement / rehabilitation – Work may consist of complete replacement, partial replacement, or trenchless rehabilitation such as cured-in-place pipe lining (CIPP), slip lining,

close-fit pipe lining (fold and form), other pipe coatings/lining systems, pipe bursting, horizontal directional drilling using fused high-density polyethylene (HDPE) pipe or fused PVC pipe. Work could include replacement of air and vacuum release chambers, valves, and flow meters. Pipe replacement and rehabilitation could be part of a relocation project due to highway construction, I&I project, or other project that addresses aging infrastructure. In some cases, projects may include main extensions installed to implement solutions to wastewater problems that present a health and safety concern for existing customers. For low pressure sewers and force mains, which have a shallower installation than gravity mains, replacement is often the best method. For gravity sewers, trenchless rehabilitation is often most cost-effective; however, replacement may be the best option in cases where the pipe is misaligned or has lost its structural integrity. Another option is to combine partial replacement with cured in place liner, such that ground disturbance is minimized to only those sections of pipe in need of replacement. PAWC has embraced trenchless technologies that allow underground infrastructure to be rehabilitated without the need for excavation. In general, trenchless rehabilitation is the preferred method to address aging infrastructure. Collapses or other significant defects that cannot be rehabilitated using trenchless technology on critical pipe segments (e.g. deformation) will be repaired or replaced using open-cut methods. For each individual project, all factors are considered to select the most prudent and cost-effective method.

Service lateral replacement / rehabilitation – Work may consist of replacing or rehabilitating gravity or low pressure sewer laterals, including taps, ~~curb stops,~~ and cleanouts. A cured-in-place liner is a trenchless alternative that may be best for service laterals that are difficult to excavate. Depending on the condition and number of connections, service lateral replacement may be combined with main line replacement / rehabilitation. PAWC also utilizes the installation of a "top-hat" during a relining project to help seal the sewer lateral connection to the main.

Lift station replacement / rehabilitation – Lift stations are evaluated on a case by case basis. A scoring system is provided at the end of this Section. Necessary improvements can usually be completed by full or partial rehabilitation. Replacement may be the best option for older and outdated lift stations.

Combined sewer overflow facility replacement / rehabilitation – CSO facilities are evaluated on a case by case basis. Replacement or rehabilitation of these facilities may include features such as outfall structures, bar screens, piping, valves, or diversion chamber / flow weirs.

Once specific properties are identified as needing replacement or rehabilitation, the final step in the micro-level planning process is prioritization. To better understand and evaluate the complex characteristics of its properties and the various drivers for improvements, PAWC plans to apply a prioritization model to score capital improvement projects which will be funded through the wastewater DSIC program.

The prioritization model for wastewater collection mains will use pipe condition information to assess the system's ability to meet performance measures associated with the following level of service factors. Defining the level of service that is expected from a pipe is dependent on the specific customers that it is serving.

Level of Service Factors

- Reliable service (prevent disruptions)
- Customer satisfaction
- Environmental sustainability
- Regulatory compliance
- Public safety

Service reliability, or continuity of operations, is based on factors such as the number of service interruptions (due to pipe failures or operational issues), events impacting critical facilities and the length of time associated with these service interruptions. Customer satisfaction is influenced by events such as sewage back-ups and blockages, odors and overflow discharges. Environmental sustainability and regulatory compliance is primarily determined by the number of dry weather or sanitary sewer overflow events that could impact waterways. Public safety includes events that impact critical facilities, the general public and the utilities employees.

The list of identified projects will cover multiple wastewater systems and geographical areas across the Commonwealth. Each project may have drivers based on local conditions. What follows below is a standardized condition based risk assessment prioritization system developed by the National Association of Sewer Service Companies (NASSCO) that can be applied to score and rank projects in different wastewater systems against each other to ensure cost-effective prioritization of capital investment.

In order to cost-effectively prioritize wastewater collection system replacement and rehabilitation projects, PAWC will utilize a risk-based condition assessment approach. To accomplish this prioritization, PAWC will perform a GIS analysis to assign a risk score to each project, where risk is defined as:

Risk = Likelihood of Failure (LoF) x Consequence of Failure (CoF)

By establishing of standardized definitions and a scoring system for Likelihood of Failure (LoF) and Consequence of Failure (CoF), a risk rating is obtained.

The LoF component represents the probability that the asset will fail based on the asset's physical condition. For linear assets, such as sewer pipelines, this score will be determined by reviewing CCTV or multi-sensor robotic inspections allowing pipes to be coded using the NASSCO's Pipeline Assessment Certification Program (PACP) which is an industry standard for performing condition assessments. Table 5 below lists the PACP grading that is used for LoF scoring.

Table 5 – PACP Grading for LoF (NASSCO)

Grade	Description
5	Immediate Attention – Defect requires immediate attention
4	Poor – Severe defects that will become Grade 5 defects within the near future
3	Fair – Moderate defects that will continue to deteriorate
2	Good – Defects that have not begun to deteriorate

1	Excellent – Pipe functional with minor defects

For pipelines without existing inspection data, desktop assessment using operations and maintenance history (if available), material, and date of construction will be used until condition assessment data is available. For newly acquired wastewater systems that have known deficiencies in the gravity collections system (e.g., significant I&I, pipe defects, and installation deficiencies), which were observed during the pre-acquisition due diligence process, PAWC will assume the highest risk factor (Grade 5) for these known deficiencies. Once the condition assessment is completed, the risk factor will be adjusted to reflect actual conditions.

Non-linear assets, such as lift stations, can be classified using the Condition Index (CI) Scale developed by the US Army Corps of Engineers, which is shown in Table 6 below. A typical evaluation would include field inspection, interviews with operational personnel, and review of operation and maintenance records. The CI scale ranges from 0 to 100, with 0 indicating complete failure and 100 indicating perfect condition and function.

Table 6 - US Army Corps of Engineers Condition Index Scale

Zone	CI	Condition Description	Recommended Action
1	85 to 100	Excellent: No noticeable defects. Some aging or wear may be visible.	Immediate action is not required
	70 to 84	Good: Only minor deterioration or defects are evident.	
2	55 to 69	Fair: Some deterioration or defects are evident, but function is not significantly affected.	Economic analysis of repair alternatives is recommended
	40 to 54	Marginal: Moderate deterioration. Function is still adequate	
3	25 to 39	Poor: Serious deterioration in at least some portions of structure.	Detailed evaluation is required to determine the need for repair, rehabilitation, or reconstruction
	10 to 24	Very Poor: Extensive deterioration. Barely functional.	
	0 to 9	Failed: No longer functions. General failure or complete failure of a major structural component.	

The CoF score presents the direct and indirect impact to the customers and environment if the asset fails. When assigning weighting factors, one should consider how much the parameter contributes to the economic, social and environmental impacts in the event of a failure, commonly referred to as a "triple bottom line" accounting framework:

- Economic impact resulting from the need to conduct an urgent repair: accounts for the relative cost to repair failures (i.e. depth, pipe size, and accessibility) and any fines or other regulatory costs incurred due to a failure.
- Societal impact resulting from the loss of service of the asset: accounts for the number of customers affected by the failure, the type of customers affected (i.e. hospitals, schools, etc.) and the location of the asset.
- Environmental impact resulting from any discharges: accounts for the relative impact to the surrounding environment if a failure leads to a discharge.

CoF may be assigned to a scale from 1 to 6 with 6 being the highest consequence and 1 being the least. An overall CoF score will be calculated as a weighted average of all the individual CoF factors as shown in Table 7. The weighting factors will be 0.25 for each financial and social criterion and 0.50 for environmental criteria. Proposed weightings and ranges presented may be adjusted as the statewide analysis is performed. Weighting factors include diameter, depth, relative network position of pipe, class of road, distance from environmentally sensitive features, and distance between downstream pipe to a service lateral of customer with high importance, and accessibility for maintenance and inspection. Diameter ranges have been customized to fit small or large wastewater systems. Relative network position is calculated as the sum of relative positions of all pipes discharging to an upstream structure. A larger relative network position would indicate more customers upstream and thus a larger impact of failure. Relative network position requires accurate maps of the system and will be calculated when available. Utilities have a set of customers who are very significant for the well-being of the community. These customers may include hospitals, schools, manufacturing facilities, and emergency services, etc., as determined by the utility. Providing uninterrupted service to these critical facilities is a priority.

Access to manholes and pipes are very important for inspection and repairs. Large construction equipment is sometimes required to repair the failure of a pipe. Response time for a service crew may be significantly higher, if access to the pipe is difficult. The failure of such a pipe may cause significant damage to the environment, as well as private properties, due to delays in response created by difficulties in accessing the failure point. A higher CoF should be assigned to these pipes. This will affect the economic costs, due directly to the difficulty and social costs, if the property needs to be disrupted to gain access.

Table 7 - Consequence of Failure Scoring (NASSCO)

CoF Factor	Description	CoF Score	Criteria
Diameter (inch) – small wastewater systems	< 8"	1	Economic, Social
	≥ 8" < 10"	2	
	≥ 10" < 15"	3	
	≥ 15" < 21"	4	
	≥ 21" < 30"	5	
	≥ 30"	6	
Diameter (inch) – large wastewater systems	< 10"	1	
	≥ 10" < 15"	2	
	≥ 15" < 24"	3	
	≥ 24" < 36"	4	
	≥ 36" < 60"	5	
	≥ 60"	6	
Depth (ft),or	< 6'	1	Economic, Social
	≥ 6' < 10'	2	
	≥ 10' < 14'	3	
	≥ 14' < 18'	4	
	≥ 18' < 24'	5	
	≥ 24'	6	
	≤ 10	1	Social

CoF Factor	Description	CoF Score	Criteria
Relative Network Position of Pipe	11 – 30	2	
	31 – 70	3	
	71 – 120	4	
	121 – 150	5	
	> 150	6	
Class of Road	Unpaved Road	1	Economic, Social
	Minor Local Road	2	
	Major Local Road	3	
	Collector Road	4	
	Arterial / Building / Pool	5	
	Highway / Waterway / Railroad	6	
Distance from Environmentally Sensitive Features	≥ 150 LF	1	Environmental
	100 to 150 LF	2	
	75 to 100 LF	3	
	50 to 75 LF	4	
	25 to 50 LF	5	
	< 25 LF	6	
Distance between Downstream Pipe to a Service Lateral for Customer with High Importance	≥ 20,000 LF	1	Social
	15,000 to 20,000 LF	2	
	10,000 to 15,000 LF	3	
	5,000 to 10,000 LF	4	
	1,000 to 5,000 LF	5	
	< 1,000 LF	6	
Accessibility of Pipe	On Right-of-Way – no traffic control	1	Economic, Social
	On Right-of-Way – with traffic Control	2	
	On public land with vehicle access	3	
	On public land without vehicle access	4	
	On private land without vehicle access	5	
	Behind or under built structures and no vehicle access	6	

The scoring system will have flexibility by allowing adjustment in how each criterion is weighted, and accounting for special circumstances which may be difficult to quantify. The prioritization model will serve as a tool that helps PAWC develop a schedule for planned rehabilitation and replacement of eligible property in order to maintain safe, reliable service to existing customers.

The overall risk associated with a failure event is a function of the LoF event and its consequence. Not all highly probable events need the same attention, since they may not have equally high consequence (impact) to the community.

Increased LoF should result in more aggressive maintenance and repair. Increased CoF should result in increased assessment. This approach provides the basis for an economically efficient, balanced and proactive assessment, maintenance and replacement/rehabilitation program.

This risk-based management approach allows for proactive planning. For example, pipelines serving critical community services, such as hospitals and other critical care facilities, can be proactively assessed and managed to minimize potential service disruptions. To reduce the impact to customers and save on mobilization and demobilization costs, project can be grouped together by geographic proximity and similar risk rankings. Likewise, pipeline construction work can be coordinated with other roadwork such as road restoration, detours and other utility work. Improvement projects can be better scheduled by area to achieve unit cost savings rather than reactive projects scattered across a system.

In general, preference will be given to those systems with high I&I, and older systems with aging lift stations, brick manholes, and vitrified clay pipe. Some parameters may impact just one of the three triple bottom line categories, while some may have varying degrees of impacts. An example of this would be a sewer line that crosses a waterway. This clearly can impact the environmental aspect of the triple bottom line, considering the likelihood for contamination of the stream. There may also be some social impacts with respect to an interruption in recreational use of the waterway, and economic impacts that result from penalties and fines.

Appendix A to this LTIIP outlines the projected schedule for completion of the Company's risk-based condition assessment for each wastewater system covered by the LTIIP. The information presented in Appendix A is organized by three categories of systems: (1) newly acquired systems; (2) systems subject to a Pennsylvania Department of Environmental Protection or United States Environmental Protection Agency Consent Order; and (3) all other "routine" systems that do not fall under the other two categories. In addition, Appendix B provides detailed information on the Company's projected schedule for replacement and rehabilitation of DSIC-eligible property for each wastewater system based on the preliminary results of the Company's condition assessment. Appendix B includes a breakdown of expenditures for each type of eligible property by year and by wastewater system (district), with expenditures for combined and sanitary systems displayed separately. PAWC will include an annual update of the Company's Condition Assessment Schedule with its Annual Asset Optimization Plan (AAOP) filing.

Section 3 – Location of Eligible Property

Below are brief summaries of each wastewater system, including the types of eligible property and strategies for accelerated rehabilitation and replacement in each system.

PAWC is conducting a multi-sensor robotic inspection for all gravity pipelines of its various wastewater collection systems over the next three years. Some gravity pipelines that have been recently inspected will not be re-inspected, but the majority of gravity pipelines of recently acquired wastewater systems have either old CCTV inspection records or no inspection records. This statewide multi-sensor robotic inspection program will collect condition assessment data allowing each gravity pipe to be assigned a NASSCO score. In addition, pipe and manhole attribute data will be collected to improve GIS records and improve hydraulic model accuracy. The robotic inspection captures GPS data, including the coordinates of every service lateral flowing into the gravity system, which will improve PAWC's ability to respond to PA one-call requests.

The strategic approach for all gravity collection systems is to utilize a condition-based assessment, hydraulic capacity information, and GIS-based system attributes to prioritize accelerated replacement or rehabilitation work based on a triple bottom line risk assessment methodology using industry standard LoF and CoF factors.

Central Pennsylvania

Fairview North

The Fairview North wastewater system is located in York County and provides wastewater collection and treatment service to approximately 1,498 mostly residential customers. The collection system serves portions of Fairview Township. PAWC purchased the assets of the Fairview North system in 2015.

The Fairview North collection system consists of approximately 165,600 LF of gravity main, ranging in diameter from 6-inch to 12-inch; and approximately 18,844 LF of force main, ranging in diameter from 1.5-inch to 12-inch. The collection system was originally installed around 1950. The system includes 11 lift stations. The approximately 869 manholes are brick or concrete. The system includes VCP, asbestos cement (AC), and PVC gravity mains. Force main material includes ductile iron, AC, and PVC.

The Fairview North system includes one WWTP with a permitted annual average daily flow of 1.206 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-0081868. The 2017 annual average daily flow into the plant was 0.304 MGD, and the ratio of 3 consecutive month maximum to annual average was 1.13. During wet weather events, the system can experience flows up to five times the annual average.

Previous collection system investigations for the Fairview North wastewater system included some CCTV investigation in the collection system. This investigative work led to the 2017 project of lining 5,100 feet of 8-inch and 10-inch gravity trunk lines along Old York Road in Fairview Township, and 2,775 feet of 8-inch gravity trunk lines in 2018. Flow in the subbasins that service the Green Lane Farms area will be the initial focus of the rehabilitation efforts. This

area contains approximately 42,200 LF of predominantly concrete gravity mains and appears to be more significantly impacted by I&I during wet weather events than other areas in the system.

Fairview South

The Fairview South wastewater system is located in York County and provides wastewater collection and treatment service to approximately 2,498 mostly residential customers. The collection system serves portions of Fairview Township. PAWC purchased the assets of the Fairview South system in 2015.

The Fairview South collection system consists of approximately 198,722 LF of PVC gravity main, ranging in diameter from 8-inch to 10-inch; and approximately 13,068 LF of 8-inch PVC force main. The collection system was originally installed around 1992. The system includes 6 lift stations. The approximately 1,050 manholes are concrete.

The Fairview South system includes one WWTP with a permitted annual average daily flow of 0.94 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-0082589. The 2017 annual average daily flow into the plant was 0.509 MGD, and the ratio of 3 consecutive month maximum to annual average was 1.05. During wet weather events, the system can experience flows up to three times the annual average.

Based on system age and observed wet weather flows, the collection is assumed to be in relatively good condition. However, some I&I rehabilitation projects are anticipated over the 5 year planning horizon. Wet weather flows in the subbasins that flow to the Corn Hill pump station and the Fairmont pump station appear to be more significant than other areas in the system and will be the initial focus of the investigative and rehabilitation work.

Franklin

The Franklin wastewater system is located in Adams County and provides wastewater collection and treatment service to portions of the Townships of Franklin, Hamiltonban, and Highland. The system consists of approximately 348 mostly residential customers. PAWC purchased the assets of the Franklin system in 2013 and neighboring Hamiltonban system in 2014. Hamiltonban was interconnected with the Franklin system in 2016.

The Franklin collection system consists of approximately 55,239 LF of mostly PVC and some VCP gravity main, ranging in diameter from 8-inch to 10-inch, and 12,423 LF of 6-inch PVC force main. Most of the collection system was installed in 2004 or later; the Hamiltonban portion was originally constructed around 1972. Most of the approximately 198 manholes are concrete.

Included in the above footages of gravity main is a stand-alone area known as the "sand mound," which serves 14 homes and was installed in 2004. The sand mound area consists of 6-inch PVC gravity mains that discharge into two 1,500 gallon septic tanks with an 1,800 gallon final settling tank, a lift station, and a 10,000 square-foot elevated sand mound. At this time, there are no plans to connect the sand mound area to the Franklin collection system.

The system contains one WWTP with a permitted annual average daily flow of 0.2 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-

00248088. The 2017 annual average daily flow into the plant was 0.074 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.12. There is one lift station that was installed in 2016 to deliver flows from Hamiltonban to the Franklin WWTP. The WWTP is not expected to be hydraulically or organically overloaded in the next five years.

Rehabilitation projects will focus on the older Hamiltonban subbasin that consists of VCP and is impacted by I&I during wet weather events. For the newer areas within the Franklin subbasin, PAWC plans to complete repairs and rehabilitation projects on an as-needed basis.

McEwensville

The McEwensville wastewater system is located in Northumberland County and provides wastewater collection and treatment service to approximately 133 mostly residential customers. The collection system serves McEwensville Borough. PAWC purchased the assets of the McEwensville system in 2015.

The McEwensville collection system consists of approximately 12,669 LF of 8-inch and 10-inch PVC gravity main, and 1,242 LF of 2-inch to 3-inch PVC force main. The collection system was originally constructed in 1984. The approximately 57 manholes are concrete.

The system contains one WWTP with a permitted annual average daily flow of 0.045 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-0111414. The 2017 annual average daily flow into the plant was 0.013 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.23. The system includes 4 lift stations.

PAWC plans to rehabilitate or replace all lift stations located in the collection system, including the lift station at the headworks of the WWTP. In addition, PAWC plans to complete targeted rehabilitation work in the collection system.

New Cumberland

The New Cumberland wastewater system is located in Cumberland County and currently provides wastewater collection and treatment service to approximately 3,066 mostly residential and commercial customers in New Cumberland Borough. PAWC purchased the assets of the New Cumberland system in 2016.

The collection system consists of approximately 144,692 LF of gravity, mostly VCP and some PVC ranging in diameter from 6-inch to 42-inch diameter; and approximately 6,898 LF of force main, 4-inch to 8-inch diameter. The collection system includes 3 lift stations. The collection system was originally constructed around 1950. Most of the gravity collection system consists of vitrified clay pipe with concrete manholes.

The New Cumberland system includes one WWTP with a permitted annual average daily flow of 1.25 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-0026654. The 2017 annual average daily flow into the plant was 0.453 MGD, and the ratio of 3 consecutive month maximum to annual average was 1.12. During wet weather events, the system can experience flows up to ten times the annual average.

Previous collection system investigations included some CCTV investigation. Some lining projects were completed in the subbasin that flows by gravity to the Southeast lift station. According to the lift station flows, they have had some effect on reducing the amount of I&I in the subbasin, however an additional 1,452 feet of 8-inch and 10-inch VCP trunk lines are planned to be lined in 2018.

The Southeast lift station subbasin contains approximately 56,900 LF of predominantly vitrified clay pipe collection mains, ranging from 8-inch to 15-inch diameter, and is impacted by I&I during wet weather events. During wet weather events, the Southeast lift station subbasin

appears to be more significant impacted with I&I than other areas in the system and will be the initial focus of rehabilitation efforts.

Northeastern Pennsylvania

Blue Mountain Lake

The Blue Mountain Lake (BML) wastewater system is located in Monroe County and currently provides wastewater collection and treatment service to approximately 830 mostly residential customers in portions of Stroud and Smithfield Townships. PAWC purchased the assets of the BML system in 2005.

The BML collection system consists of about 68,250 LF of low pressure sewer main, and does not contain any gravity or force main. The low pressure main was installed in 1990 or later, and consists of PVC main ranging in diameter from 2-inch to 6-inch. The system includes 6 lift stations.

The system contains one WWTP with a permitted annual average daily flow of 0.183 MGD. The plant is operated under NPDES permit PA-0062464. The 2017 annual average daily flow into the plant was 0.0919 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.039. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years. The collection system is in relatively good condition and experiences little to no I&I.

PAWC plans to continue to assess the condition of the system, and complete targeted rehabilitation work as needed. BML lift stations will be continuously evaluated, which may result in improvement or replacement projects for the purpose of increasing reliability of service.

Lehman Pike

The Lehman Pike (LP) wastewater system serves portions of Middle Smithfield Township in Monroe County, and portions of Lehman Township in Pike County. LP provides wastewater collection and treatment service to approximately 2,714 mostly residential customers, mostly in Pike County. PAWC purchased the assets of the LP system in 2002.

The LP collection system consists of approximately 268,447 LF of low pressure main, and does not contain any gravity or force main. The low pressure main was installed in 1980 or later, and consists of PVC main ranging in diameter from 1-inch to 10-inch. Each customer owns and maintains their own grinder pump and pit installation. The system includes 13 lift stations.

One of the lift stations owned by PAWC is located at an aerated equalization basin, which receives flow from the Timothy Lakes Campground. The Campground maintains its own collection system.

The LP system contains one WWTP with an NPDES permitted discharge of 0.75 MGD. The plant is operated under NPDES permit PA-0060640. The WWTP has an average day design flow capacity of 0.532 MGD. The 2017 annual average daily flow into the plant was 0.208 MGD,

and the ratio of 3 consecutive month maximum to annual average flow was 1.090. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years.

The LP collection system is in relatively good condition and experiences low I&I. Since the acquisition in 2002, PAWC has completed rehabilitation and replacement work at most of the lift stations. Over the next few years, work will focus on replacing poor quality original lateral installations. Additionally, PAWC plans to continue to assess the overall condition of the system, and complete targeted rehabilitation and improvement work as needed.

Marcel Lake

The Marcel Lake (ML) wastewater system is located in Pike County and provides wastewater collection and treatment service to approximately 354 mostly residential customers in the Marcel Lake Estates development in Delaware Township. In 2013, PAWC purchased the assets of the Marcel Lake system from the Clean Treatment Sewage Company.

The original gravity collection system was CCTV inspected in 2013 and found to be in extremely poor condition with about 82 percent of mains having severe or immediate attention deficiencies. In addition, about 39 percent of the gravity collection system was found to be installed with inadequate slope or depth. All lift stations were found to be of inadequate design and in very poor condition.

The system contains one WWTP with a permitted annual average daily flow of 0.100 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-0060313. The 2017 average daily flow into the plant was 0.0897 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.630. In 2017, the peak three month hydraulic loading to the plant was 0.145 MGD which exceeds the WWTP capacity. Based on this historic data, the WWTP is still considered to be in hydraulic overload condition, More recent data is expected to change this designation, as is described below. The WWTP is not currently nor expected to be organically overloaded in the next five years.

In the first quarter of 2018, the replacement gravity collection system was placed into service. Data show the gravity system replacement to be very successful in reducing I&I. The ML system experiences dramatically lower WWTP influent sewage flow under all conditions. During periods of dry weather, the ML system experiences WWTP influent flows that are lower than the output of the water system (approximately 0.035 MGD). In periods of rainfall in excess of 5 inches, the ML system experiences flows rising only to 0.077 MGD. Past rainfall events of lesser magnitude have caused overflows in the collection system and have resulted in WWTP influent flows greater than 0.450 MGD. Data for a full year of operation will be analyzed in the annual Chapter 94 report filing with the PaDEP. After the Chapter 94 report is submitted to PaDEP, PAWC believes that PaDEP will permit planning module approval to resume.

In its current state, the Marcel Lake collection system consists of approximately 30,732 LF of 8-inch and 12-inch PVC gravity main, and approximately 28,597 LF of PVC low pressure main, ranging in diameter from 3-inch to 4-inch. The newly installed gravity system includes three submersible lift stations whereas the previous layout design required 10 lift stations. The gravity collection area includes approximately 130 manholes. The low pressure system was originally installed in the 1980s or later.

Pocono

The Pocono wastewater system is located in Monroe County and provides wastewater collection and treatment service to approximately 3,689 mostly residential customers in the Pocono Country Place residential development within Coolbaugh Township. PAWC purchased the assets of the PCP system in 1995.

The Pocono collection system consists of approximately 150,648 LF of gravity main, ranging in diameter from 4-inch to 30-inch; 99,795 LF of low pressure main, ranging in diameter from 1-inch to 8-inch, about 5,400 LF of which is 4-inch and 6-inch diameter force main. The collection system was installed in 1975 or later. The system includes 2 lift stations. The force mains are ductile iron; the majority of low-pressure and gravity mains are PVC; and the approximately 777 manholes are concrete.

The system contains one WWTP with a permitted annual average daily flow of 1.256 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-0060097. The 2017 annual average daily flow into the plant was 0.555 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.21. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years.

An aggressive I&I abatement program has been implemented. Between 2013 and 2015, CCTV inspection was completed for the entire gravity collection system. Based on the inspection results, during the subsequent three year period PAWC rehabilitated a portion of the gravity collection system, primarily utilizing trenchless rehabilitation methods where feasible, and rehabilitated manholes through pressure testing, grouting, and lining. Work completed has corrected numerous deficiencies in an effort to reduce I&I. However, the PCP collection system still experiences I&I due to high groundwater, aging grinder pump systems, roof drain cross connections, and cracks of the collection system mains and service laterals. PAWC plans to maintain an accelerated I&I abatement program, and to inspect the entire collection system. Furthermore, to improve I&I monitoring, PAWC plans to add metering pits to planned pipeline replacement projects in strategic locations for permanent flow monitoring in lieu of portable area-velocity meters.

Scranton

The Scranton combined sewer system (formerly Scranton Sewer Authority) is located in Lackawanna County and provides sanitary and combined sewage collection and treatment service to approximately 29,551 customers, comprised of 26,735 residential, 2,723 commercial, 27 industrial customers, and 66 other / institutional / bulk customers. The collection system services the City of Scranton and Borough of Dunmore. PAWC's Scranton Wastewater System also provides conveyance and treatment of wastewater from portions of the adjacent Boroughs of Taylor, Dickson City, and Moosic through inter-municipal agreements with the Lower Lackawanna Valley Sanitary Authority (LLVSA) and the Lackawanna River Basin Sewer Authority (LRBSA). PAWC purchased the assets of Scranton Sewer Authority in 2016.

The Scranton Sewer Authority entered into a Consent Decree with the Environmental Protection Agency (EPA) and the PaDEP on January 31, 2013. The Consent Decree was amended with

the approval of the District Court to substitute PAWC as the successor to the Scranton Sewer Authority effective as of the date of closing on the Company's acquisition from the Scranton Authority, which was December 29, 2016. Scranton Sewer Authority adopted a Long Term Control Plan (LTCP), that was approved by the PaDEP and EPA, for the purpose of reducing combined sewer overflows into the Lackawanna River and its tributaries from the Scranton Wastewater System service area in accordance with the requirements of the Clean Water Act. Under the amended Consent Decree, PAWC is required to implement the approved LTCP.

The LTCP was adopted in 2012. The ultimate goal of the LTCP is to attain water quality standards within the receiving streams of the Scranton Wastewater System's seventy-eight (78) CSO facilities. A variety of measures were evaluated to control the frequency and duration of the CSO events. With the use of hydraulic modeling, the primary control measures selected include in-line and off-line storage systems, strategic sewer separation, CSO regulator adjustments, and interceptor capacity improvements. Due to the large number of CSO facilities in the system, and the associated number of identified control projects, the LTCP will be implemented over a twenty-five (25) year period. Using a ranking system, which took into account the "triple bottom line" (financial, social, and environmental) attributes of each project, the LTCP CSO control projects were ranked and then divided into five implementation phases, with higher ranking projects generally placed in the earlier phases. The LTCP has a final completion date of December 1, 2037, with a current total estimated cost of approximately $140M.

The Scranton wastewater collection system consists of approximately 1,739,568 LF (329 miles) of gravity collection main ranging in diameter from 4-inch to 108-inch, approximately 68 percent (224 miles) of which is combined sewer. The collection system includes 12,032 LF of force main ranging in diameter from 3-inch to 12-inch inch. The 9,055 manholes are mostly brick with some concrete. Most of the collection system consists of 8-inch to 24-inch vitrified clay, reinforced concrete, and PVC pipe that is about 50 to 60 years old. Some pipes are over 100 years old. The system includes 7 lift stations.

Combined sewage is conveyed to CSO regulator chambers prior to connecting with an interceptor sewer. Under high wet-weather flow conditions that exceed the capacities of downstream facilities, the CSO regulators direct combined sewage to the receiving streams. Including the WWTP bypass, the Scranton collection system contains 78 permitted CSO discharge points: seventy (70) CSO regulator structures / outfalls, four (4) diversion manholes, and four (4) pumping station overflow outlets.

The main interceptor sewer for the Scranton system runs parallel to the Lackawanna River, which generally flows through the middle of Scranton City. The main interceptor is approximately 5.8 miles in length, starting as a 24-inch diameter pipe at the upstream end of the system at the Leggetts Creek CSO Regulator and increasing to a 78-inch diameter pipe at the headworks to the Scranton WWTP. The 78-inch diameter portion of the main interceptor has a peak flow capacity of about 110 MGD compared to the existing peak capacity of the Scranton WWTP of 39 MGD. The main interceptor averages about 30 feet deep at its downstream end and crosses the Lackawanna River at three locations.

The Scranton system includes one WWTP with annual average daily flow hydraulic capacity of 20 MGD. Improvements are currently underway to comply with the PaDEP / EPA Combined Sewer Overflow Long Term Control Plan and NPDES permit in order to upgrade the BNR

process to treat up to 46 MGD with 14 MGD biological nutrient reduction bypass flow, for a peak flow of 60 MGD. The plant discharges to the Lackawanna River under NPDES permit PA-0026492A-1. The 2017 annual average daily flow into the plant was 12.00 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.29. The WWTP is not in a current hydraulic or organic overload condition, nor is it projected to be within the next five years.

Preventative maintenance activities are continually performed by PAWC staff to optimize the operation of the collection system and to minimize the occurrences of blockages. The strategy for accelerated replacement and rehabilitation of aging infrastructure in the collection system will be a targeted, multi-year process. PAWC plans to use an approach that includes consent order compliance, long-term control plan and nine minimum control measures to address combined sewer overflows; and CCTV inspection of mains and laterals, multi-sensor robotic inspection, and hydraulic model development for the main replacement and rehabilitation program.

Using continuous information from PAWC collection system staff, including CCTV inspection results and multi-sensor robotic inspection of the system, PAWC plans to address immediate concerns and known areas of deficiency within the first 1-2 year period. These projects will generally include full asset replacement due to identified significant structural deficiencies, hydraulic limitations or restrictions (reverse slope, sage, etc.), and associated manhole surcharging and overflow conditions in the project areas. More specifically, over 9,000 LF of sewer main is anticipated to be replaced in 2019, including over 4,000 LF of interceptor main that currently experiences manhole surcharging and overflows during wet weather events. Other near term projects include replacement of sewer mains that have experienced structural failure as discovered via hydraulic issues and/or during regular cleaning, inspection, and condition assessment activities. Over the following years, the remaining areas of the system will continue to be inspected with the goal of accelerating asset renewal and rehabilitation.

The 7 lift stations are in good condition and are cleaned / maintained on a regular basis by PAWC staff. Two have been upgraded within the past two years, and one lift station is being upgraded in 2018.

Southeastern Pennsylvania

Coatesville

The Coatesville wastewater system is located in Chester County and provides wastewater collection and treatment service to approximately 6,226 customers, comprised of 5,852 residential customer connections, 352 commercial, 2 industrial, 16 other / institutional, and 4 bulk municipal customers. The collection system serves the City of Coatesville, the Borough of Parkesburg and portions of the Borough of South Coatesville and portions of the Townships of Caln, East Fallowfield, Highland, Sadsbury, Valley, West Caln, and West Sadsbury. The system includes the following bulk municipal customers: Caln, Sadsbury, Valley, and West Brandywine Townships. PAWC purchased the assets of the Coatesville system in 2001.

The Coatesville collection system consists of approximately 352,945 LF of gravity main, ranging in diameter from 4-inch to 42-inch; and approximately 93,605 LF of force main, ranging in diameter from 2-inch to 12-inch. The collection system was installed in the 1930s or later. The

system includes 17 lift stations. The approximately 1,670 manholes are brick or concrete. The system includes clay, PVC, and ductile iron gravity main. Force main material includes ductile iron and PVC.

The system contains one WWTP with a permitted annual average daily flow of 7.0 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-0026859. The 2017 annual average daily flow into the plant was 3.698 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.161. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years.

Since the 2001 acquisition, PAWC has maintained a regular program of monitoring collection system conditions. An aggressive I&I abatement program has been implemented to minimize extraneous flows into the system. The collection system is divided into ten subbasins, from which additional subbasins are identified and prioritized for the I&I monitoring and abatement program. Trenchless technologies, such as cured-in-place liners, have been an important tool to complete the rehabilitation work in a cost effective, safe and reliable manner. Work has continued in the high priority subbasins since the mid 1990's.

The general strategy to maintain an accelerated pace of replacement and rehabilitation of eligible property is to inspect portions of the collection system each year, and use the inspection results to identify projects to be completed the following year. The entire collection system was inspected in 2005, and a hydraulic model was developed. Some new additions to the system have not been inspected. The original inspection was completed over 13 years ago; therefore, some areas in critical subbasins have been re-inspected over the past two years. PAWC plans to continue inspections in order to maintain an accelerated I&I abatement program and continue to assess the condition of the system.

The Coatesville District has been under a regulatory requirement of a Connection Management Plan (CMP) since 2005. The treatment facility and restricted pipe segments of the interceptors have been replaced over the years, but two remaining projects of the West End Truck Line Phases 3-6 and the Parkesburg Pump Station Phase 2 Improvements are planned to move to construction in 2019.

Western Pennsylvania

Clarion

The Clarion wastewater system is located in Clarion County and provides wastewater collection and treatment service to approximately 2,157 mostly residential customers. The collection system serves Clarion Borough, and portions of Monroe Township, Clarion Townships, and Strattanville Borough. Strattanville Borough is a bulk municipal customer that owns and maintains its own wastewater collection system. PAWC purchased the assets of the Clarion system in 2008.

The Clarion collection system consists of approximately 200,860 LF of gravity main, ranging in diameter from 4-inch to 36-inch; and approximately 36,293 LF of force main, ranging in diameter from 2-inch to 10-inch. The collection system was installed in the 1930s or later. The system includes 6 lift stations. Most of the approximately 930 manholes are brick, and the remaining ones are concrete. Most of the gravity collection mains are clay, and the remaining ones are

PVC. Force mains are PVC, ductile iron, and HDPE. A recently installed 6-inch HDPE force main, which serves the Clarion-Limestone School District, accounts for most of the force main length in the Clarion system.

The system contains one WWTP with a permitted annual average daily flow of 2.9 MGD. The plant hydraulic capacity was increased in 2015 after WWTP improvements were completed. The plant is operated under NPDES permit PA-0029491. The 2017 annual average daily flow into the plant was 1.26 MGD, and the ratio of the 3 consecutive month maximum to annual average flow was 1.25. System improvements were completed, which include wet weather storage basins at the Liberty lift station and the WWTP. Prior to completion of system improvements, during excessive wet weather, bypasses would occur at the WWTP and SSOs would occur at the WWTP and within the collection system. In 2017, the system experienced no SSOs. The WWTP is not currently nor projected to be hydraulically or organically overloaded in the next five years.

Since the 2008 acquisition, PAWC has implemented an aggressive I&I abatement program to correct defects in priority subbasins of the collection system that were potential sources of I&I. Work has included main line, manhole, and lateral rehabilitation, as well as upgrades to lift stations. Trenchless technologies, including cured-in-place liners and pipe-bursting, have been an important tool to complete the rehabilitation work in a cost-effective, safe and reliable manner. PAWC has worked with Clarion University to address I&I issues in the University's collection system. The University hired a consultant in 2015 and has reported improvements to address the problems. PAWC plans to continue to work with Clarion University to minimize the impact of I&I from their collection system. Most of the inspection was completed over 12 years ago, and PAWC plans to re-inspect the targeted subbasins as well as other areas of the collection system. Most of the lift stations are in good condition and are inspected regularly and maintained as needed. The Mays Lift Station is in need of improvement and is scheduled for replacement in 2020.

I&I remains an issue in high priority subbasins in the collection system as well as several other subbasins, which will need to be addressed to prevent future hydraulic overload conditions. PAWC plans to maintain an accelerated I&I abatement program and inspect the entire collection system over the next three years. The basins that flow to the Liberty Lift Station will be targeted over the next several years due to significant I&I within the basins. Pipe segments consisting of VCP pipe with known I&I issues and root infiltration will be replaced or rehabilitated. The 2019 projects will replace VCP pipe in heavily wooded areas near the Liberty Lift Station that have major root infestation / blockage and I&I issues. For 2020, in addition to the Mays Lift Station project, a section of sewer main in the Applewood Valley development is targeted for replacement.

Claysville

The Claysville wastewater system is located in Washington County and currently provides wastewater collection and treatment service to approximately 503 mostly residential customers in the Borough of Claysville and portions of Donegal Township. PAWC purchased the assets of the Claysville system in 2008.

The Claysville collection system consists of approximately 62,082 LF of gravity main, 8-inch and 10-inch diameter; and approximately 1,149 LF of 3-inch force main. The majority of the collection system was installed in 1983, with two small extensions installed since that time. All mains are PVC, and all of the approximately 342 manholes are concrete. The system includes one lift station which serves the I-70 highway rest stop along with a few residential connections.

The system contains one WWTP with a permitted annual average daily flow of 0.16 MGD, which is the basis for the plant's hydraulic capacity. The plant is operated under NPDES permit PA-0093165. The 2017 annual average daily flow into the plant was 0.097 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.21. The WWTP is not currently nor projected to be hydraulically or organically overloaded in the next five years.

A sewer system evaluation study was conducted in 2008. Based on the results of this study, it was determined that the collection system is in relatively good condition. Some defective areas were identified and corrective actions were completed. After corrective actions, the collection system remains affected by I&I. In 2015, a wet weather storage tank was constructed at the WWTP to minimize sanitary sewer overflows due to I&I. Over the next three years, PAWC plans to re-inspect the entire collection system. PAWC plans to assess the condition of the system, and complete selected / limited rehabilitation work as needed based on findings of the investigative work.

Koppel

The Koppel wastewater system is located in Beaver County and provides wastewater collection and treatment service to approximately 351 mostly residential customers in Koppel Borough. PAWC purchased the assets of the Koppel system in 2013.

The Koppel system consists of approximately 25,909 LF of gravity main, ranging in diameter from 4-inch to 15-inch. The system was installed in the 1920s or later. Most of the gravity main is vitrified clay, with some PVC. The approximately 87 manholes are composed of brick. There are no lift stations or force mains in the Koppel collection system.

The system contains one WWTP with a permitted annual average daily flow of 0.24 MGD, which is the basis for the plant's hydraulic capacity. It is operated under NPDES permit PA-0023434. The 2017 annual average daily flow into the plant was 0.191 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.20. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years.

A general inspection was completed for all manholes in the Koppel system. Portions of the collection system have been inspected with CCTV. Based on the inspection results, several projects have been identified to address NASSCO grade 4 and 5 defects.

PAWC plans to inspect the entire gravity collection system in order to continue an accelerated I&I abatement program. Pipe replacement and rehabilitation projects will be implemented in the areas that contain significant defects with the higher priority basins being targeted first. Some of the initial projects in 2019 and 2020 include replacement of VCP pipe near Koppel Steel with major defects and alignment / slope issues along with rehabilitation of other VCP pipe within the priority basins.

McKeesport

The McKeesport combined sewer system is located in Allegheny County and provides wastewater and combined sewage collection and treatment service to approximately 8,096 mostly residential customers and commercial with some other / institutional customers. The collection system does not directly serve any industrial customers. The McKeesport collection system and regional WWTP also supply customers in eight surrounding municipalities through inter-municipal agreements, which include the Boroughs of White Oak, East McKeesport, Lincoln, Liberty, Versailles, Glassport, and the Townships of North Versailles and Elizabeth. PAWC purchased the assets of the McKeesport system in 2017.

The McKeesport collection system consists of approximately 690,280 LF of gravity main, ranging in diameter from 4-inch to 112-inch. Approximately 89 percent of gravity main is combined sewer. The McKeesport collection system includes approximately 32,731 LF of force main, ranging in diameter from 8-inch to 36-inch. The collection system was installed in the 1900 or later. The interceptor lines were installed in the 1950s or early 1960s to intercept flow that was going into the river and direct flow to the WWTP. The McKeesport collection system includes 9 lift stations. Most of the approximately 3,236 manholes are brick. Most of the gravity collection mains are vitrified clay pipe. Force main materials include cast iron and PVC. The system includes 4 diversion chambers / manholes and 26 combined sewer overflow outfalls.

The McKeesport system contains one WWTP with a permitted annual average daily flow of 13.0 MGD, which is the basis for the plant's hydraulic capacity. It is operated under NPDES permit PA-0026913. The 2017 annual average daily flow into the plant was 11.41 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.23. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years.

The City of McKeesport area of the collection system has fewer inspection records compared to Port Vue Borough. The strategy for accelerated replacement of aging infrastructure in the McKeesport collection system will be a pragmatic, targeted, and a multi-year process. PAWC plans to use a holistic approach that includes consent order compliance, long-term control plan and nine minimum control measures to address combined sewer overflows, flow monitoring, lateral inspection and GPS surveying, hydraulic model development, and CCTV inspection. Using continuous information from PAWC collection staff, and information from multi-sensor robotic inspections, PAWC plans to initially address immediate concerns and known areas of deficiency, followed by accelerated asset renewal / replacement based on future inspection results.

In order to comply with the PaDEP & the US EPA requirements, a LTCP was prepared by McKeesport. The conclusion of the study determined that several capital projects were to be constructed to comply with regulatory wet weather flow policies. These projects were completed prior to acquisition by PAWC. PAWC is presently monitoring flows to verify the completed projects have met the goal of the LTCP.

The Port Vue Borough portion of the McKeesport collection system is located mostly west of the Youghiogheny River. Upon acquisition of the McKeesport System, PaDEP issued a consent order that the Grade 4 & 5 defects found in a prior CCTV inspection were to be repaired within 24 months of closing. The strategy for the Port Vue area of the McKeesport system is to initially

rely on previous inspection records to identify a prioritized list of projects for accelerated rehabilitation and replacement. The list will be verified by multi-sensor robotic inspections in 2018 with the rehabilitation starting 2019.

Dravosburg

The Dravosburg combined sewer system is located in Allegheny County and provides sanitary and combined sewage collection and treatment service to approximately 625 mostly residential customers. The collection system serves the Borough of Dravosburg. PAWC purchased the assets of the Dravosburg system in 2017.

The Dravosburg collection system consists of approximately 52,148 LF of gravity main, ranging in diameter from 8-inch to 72-inch. Approximately 62 percent of the gravity main is combined sewer. The Dravosburg collection system includes approximately 1,219 LF of 6-inch force main. The collection system was installed in the 1900s or later. The system includes one lift station and one CSO outfall. Most of the approximately 308 manholes are brick. Most of the gravity collection mains are vitrified clay pipe.

The system contains one WWTP with a permitted annual average daily flow of 0.48 MGD, which is the basis for the plant's hydraulic capacity. It is operated under NPDES permit PA-0028401. The 2017 annual average daily flow into the plant was 0.201 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.40. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years.

The strategy for accelerated rehabilitation and replacement of existing infrastructure in the Dravosburg collection system will be similar to other recently acquired combined sewer systems such as McKeesport. The entire collection system will be inspected with multi-sensor robotics with condition and data attributes collected for use in developing a prioritized list of projects for rehabilitation or replacement of aging infrastructure. PAWC plans to initially address immediate concerns and known areas of deficiency, followed by accelerated asset renewal / replacement based on future inspection results.

Duquesne

The Duquesne combined sewer system is located in Allegheny County and provides sanitary and combined sewage collection and treatment service to approximately 1,840 mostly residential customers. The collection system serves the City of Duquesne and approximately 17 residential customers in West Mifflin Borough. PAWC purchased the assets of the Duquesne system in 2017.

The Duquesne collection system consists of approximately 184,560 LF of gravity main, ranging in diameter from 8-inch to 80-inch. Approximately 68 percent of the gravity main is combined sewer. There are no pumping stations or force mains in the Duquesne collection system. The Duquesne system includes four CSO structures. The collection system was installed in the 1900s or later. Most of the approximately 1,125 manholes are brick. Most of the gravity collection mains are vitrified clay pipe.

The system contains one WWTP with a permitted annual average daily flow of 2.0 MGD, which is the basis for the plant's hydraulic capacity. It is operated under NPDES permit PA-0026981. The 2017 annual average daily flow into the plant was 0.821 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.35. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years.

The strategy for accelerated rehabilitation and replacement of existing infrastructure in the Duquesne collection system will be similar to Dravosburg. The entire collection system will be inspected with multi-sensor robotics with condition and data attributes collected for use in developing a prioritized list of projects for rehabilitation or replacement of aging infrastructure. PAWC plans to initially address immediate concerns and known areas of deficiency, followed by accelerated asset renewal / replacement based on future inspection results.

Paint-Elk

The Paint-Elk wastewater system is located in Clarion County and provides wastewater collection and treatment service to approximately 660 mainly residential customers. The collection system serves Shippenville Borough and portions of the Townships of Elk and Paint. PAWC purchased the assets of the Paint-Elk system in 2014 and acquired the Shippenville Borough system in 2015.

The Paint-Elk collection system consists of approximately 89,425 LF of gravity main, ranging in diameter from 4-inch to 18-inch; and approximately 21,310 LF of force main, ranging in diameter from 1.25-inch to 8-inch. The collection system was installed in the 1960s or later. The system includes 5 lift stations. Most of the approximately 432 manholes are concrete. The majority of the gravity collection mains are PVC. Force main material includes PVC and HDPE. A lift station and sewer main extension was completed in 2017 to interconnect the Shippenville system to the Paint-Elk system. The Shippenville system is now a basin within the Paint-Elk system.

The system contains one WWTP with a permitted annual average daily flow of 0.6 MGD, which is the basis for the plant's hydraulic capacity. It is operated under NPDES permit PA-0034924. The 2017 annual average daily flow into the plant was 0.13 MGD, and the ratio of 3 consecutive month maximum to annual average flow was 1.23. The WWTP is not currently nor expected to be hydraulically or organically overloaded in the next five years.

Some of the lift stations are in good overall condition but major improvements are needed for many of the stations. The collection system is in good overall condition, however there are several areas of the system that need to be addressed. The entire system was inspected in 2017. Several projects have been identified within the priority basins that will include improvements to the existing VCP pipe. The 2019 projects will replace VCP pipe in one of the priority basins. The VCP pipe has major defects and is in need of replacement. Improvements to 4 of the 5 lift stations are also planned for 2019 and 2020.

Section 4 – Estimate of the Quantity of Property to Be Improved

The estimated quantities of property to be improved are listed in Table 8 below. To compile these estimates, the best available information was used regarding the infrastructure needs for each wastewater system. Actual quantities and scheduling may change depending on the outcome of sewer system evaluation or other planning studies, as described in Section 2 of this LTIIP.

Table 8 – Projected Wastewater DSIC Eligible Properties to Be Replaced / Rehabilitated for 2019 to 2023

Year	Gravity Pipe (LF)	Manholes (ea)	Service Laterals (ea)	Lift Stations (ea)
2019	~~42,298~~35,298	197	453	~~7~~6
2020	~~59,531~~62,531	172	632	~~6~~7
2021	~~81,786~~83,786	240	747	3
2022	~~89,038~~91,038	303	888	2
2023	104,701	392	1,071	2
McKeesport CO & Coatesville CMP				
McKeesport	24,044	55	100	0
Coatesville	14,955	50	13	1

Section 5 – Projected Annual Expenditures

The projected annual expenditures for 2019 to 2023 are listed in Table 9 below. These estimates are based on the quantities listed in Table 8 and recent, competitively-bid prices in Pennsylvania. Non-regulatory wastewater DSIC investments are expenditures that exclude regulatory driven costs such as projects associated with a consent order agreement (CO) or a connection management plan (CMP). In future AAOPs and other LTIIP-related filings, the Company will continue to distinguish between non-regulatory and regulatory investments and will separately identify expenditures for combined and sanitary systems.

Table 9 - Projected Annual Wastewater DSIC Expenditures 2019 to 2023 (in millions)

Year	Non-Regulatory Investment	Regulatory		Total Investment
		McKeesport CO	Coatesville CMP	
2019	~~$15.06~~11.69M	$9.55M	$9.26M	~~$33.87~~30.50M
2020	~~$18.18~~20.07M			~~$18.18~~20.07M
2021	~~$20.35~~20.98M			~~$20.35~~20.98M
2022	~~$19.50~~20.36M			~~$19.50~~20.36M
2023	$22.63M	$1.21M		$23.84M

Some quantities may change depending on the results of sewer system evaluation and engineering studies. Costs may vary depending on whether a replacement or rehabilitation method was selected during the final design. For example, competitive bid prices for gravity replacement varied with depth of pipe and diameter, so an average depth and diameter was assumed to generate a projected cost. Annual expenditures may be subject to periodic fluctuation due to larger wastewater upgrades associated with regulatory compliance; therefore these are listed separately. For all projects, the most prudent and cost-effective method will be selected. In addition, PAWC uses competitive bidding to ensure all major capital projects are completed in a cost-effective manner.

Pursuant to Ordering Paragraph 7 of the Commission's October 26, 2017 Order in Docket No. A-2017-2606103, PAWC may collect a DSIC related to the McKeesport system prior to the first base rate case in which the McKeesport system's plant-in-service is incorporated into PAWC's rate base, subject to three conditions. The first of those conditions (Ordering Paragraph 7(a)) is met because the LTIIP does not re-prioritize other existing commitments in other service areas. In future LTIIP and AAOP filings, any changes in projected quantities or projected expenditures for the McKeesport system will be condition assessment-related and will not re-prioritize existing commitments in other service areas. In such filings, if projected quantities or projected expenditures are higher for the McKeesport system and lower for other service areas than the projections in its approved LTIIP, PAWC will include an explanation why the shift was appropriate and does not re-prioritize existing commitments in other service areas. In addition, in future water and wastewater LTIIP and AAOP filings, if projected quantities or projected expenditures are higher for systems acquired under 66 Pa. C.S. § 1329 and lower for other service areas – compared to its approved LTIIP – the Company will include an explanation why the shift was appropriate and does not re-prioritize existing commitments in other service areas.

Section 6 – Acceleration of Infrastructure Replacement / Renewal

PAWC has continuously invested in its wastewater infrastructure to maintain safe, reliable service to its customers. As shown in Table 10 below, from 2015 to 2018 PAWC spent an average of $7.39 million annually on wastewater DSIC eligible infrastructure improvements (regulatory driven projects shown separately). Appendix C provides a detailed table of historic annual DSIC-eligible expenditures in each district, from 2015 through 2019 and also contains a summary of historic annual replacement for DSIC-eligible categories of plant for 2015 through 2018, by district.

From 2019 to 2023, PAWC proposes to increase non-regulatory wastewater DSIC eligible spending to over $20 million annually in order to continue making necessary improvements at an accelerated pace. The proposed spending for 2019 to 2023 represents a 159 percent increase in wastewater DSIC spending, excluding regulatory driven projects.

Table 10 - Historic Annual Wastewater DSIC Expenditures (in millions)

** Existing WW DSIC Qualified Districts*

Year	Annual DSIC Expenditures
2015	$8.92M
2016	$5.51M
2017	$8.42M
2018	$3.86M
2019	$11.90M

*** Existing plus Future WW DSIC Qualified Districts under modified LTIIP*

Year	Annual DSIC Expenditures
2015	$8.92M
2016	$5.51M
2017	$8.42M
2018~~a~~	~~$6.70~~6.18M
~~Regulatory Driven~~	
~~McKeesport (2018)~~	~~$0.76M~~
~~Coatesville~~2019	~~0~~$39.44M

~~a Current Projection~~

Section 7 – Workforce Management Plan

To ensure system reliability and public safety, all wastewater DSIC eligible projects will be constructed by qualified contractors or PAWC staff. For some wastewater systems, PAWC staff complete investigative work, spot repairs, or lift station repairs which may be DSIC eligible work. Typically, DSIC eligible projects are bundled together for competitive bidding to prequalified contractors in order to achieve economies of scale.

PAWC utilizes a pre-qualification process to ensure all contractors are qualified to perform work in a cost-effective, safe, and reliable manner. PAWC utilizes Avetta as a third party entity to monitor contractor safety performance. The Avetta contractor prequalification process helps PAWC certify and centralize contractor data, perform pre-project screening, and contractor pre-qualification. Avetta allows PAWC to more effectively manage its risk and contractors' performance. During the pre-qualification screening process, contractors are required to submit pertinent documentation, such as:

- Safety: company policy, designated safety inspector, OSHA lost workdays and recordable incidents, OSHA violations

- Worker's Compensation Experience Ratings (Experience Modifier)
- Staffing information
- Annual value of work and percentage of work relevant to bid project
- Work experience schedule
- Bonding capacity
- Liability Insurance coverage
- References

All construction projects performed by independent contractors are properly inspected. PAWC employees are actively engaged in the direct supervision of project inspections. The project close-out process includes a punch-list to ensure all work is completed according to contract documents. PAWC will use only pre-qualified contractors or trained Company employees to perform work on all wastewater DSIC-eligible projects.

Section 8 – Outreach and Coordination with Other Utilities

The acceleration of aging infrastructure proposed in this LTIIP will lead to disruptions as work is performed in the right of ways of the roadways and streets across the PAWC service area. Local municipalities and other utilities / agencies may be planning paving projects or underground infrastructure replacement projects located in the same right-of-way as PAWC wastewater infrastructure. PAWC recognizes that coordination with other utilities minimizes disruption and ensures that infrastructure replacement is efficient and cost effective. Therefore, PAWC plans to take the following steps to reach out to customers about disturbances, and to coordinate with other utilities and the Pennsylvania Department of Transportation (PennDOT) located within the PAWC service area:

- Utilize Pennsylvania's one-call system for "design notifications~~"~~," to coordinate design work with other utilities and municipalities and Coordinate PA to identify targeted areas of anticipated work planned over a two-year look ahead period
- Maintain open communication with local municipalities to stay informed about planned utility and paving projects
- Maintain communication with PennDOT Utility Administrators and review the "letting" schedule
- Maintain communication / working relationships with other utilities operating in our service area
- Where applicable and cost-effective, use trenchless technologies to minimize roadway disturbance

- Prior to working within a community, issue door-to-door notifications, press releases, and / or information letters to notify those customers / community associations affected by the work.
- PAWC has launched its "CodeRED" system, which delivers high-speed notifications to customers when water emergencies occur. Customers enrolling in CodeRED can be contacted quickly by text, email, telephone, and the CodeRED mobile app depending on their personal preferences. CodeRED rapidly contacts large numbers of customers about emergency situations, which include boil water advisories, main breaks, water conservation requirements and other major events impacting water service. The system will also be used for non-urgent notification, such as planned service outages, local hydrant flushing, low-pressure events and major traffic impacts.
- Leverage areas where PAWC owns both sewer and water lines to replace both simultaneously as appropriate

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Petition of Pennsylvania-American Water Company Wastewater Operations for Approval of Modification of Long-Term Infrastructure Improvement Plan	:	Docket No. P-2014-2431005

Certificate of Service

I hereby certify that I have this day served a true copy of Pennsylvania-American Water Company Wastewater Division's Amended 5-Year Wastewater Long-Term Infrastructure Improvement Plan dated January 30, 2020 with an original date of October 31, 2018, in the above-referenced proceeding, upon the parties, listed below, in the manner indicated, in accordance with the requirements of 52 Pa. Code § 1.54 (relating to service by a party).

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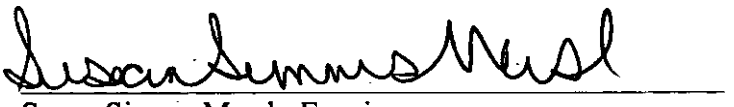

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