



November 17, 2023

Shanna Lodge, Manager
Willistown Township
688 Sugartown Road
Malvern, PA 19355

Dear Shanna:

Subject: Rate Study and Sewer Reserve Study

We are providing our final rate study calculations for the Valley Forge Sewer Authority (VFSA) and Penns Preserve sewer districts and the sewer reserve calculation for the VFSA district. We are also providing a discussion of the methodology for the VFSA sewer rates and sewer reserve. Calculations for the two other sewer districts, East Goshen Township and Easttown, were not performed. The Township does not prepare sewer budgets for these districts. Rather, the customers in these districts pay a flat rate based on quarterly bills received from East Goshen and Easttown divided by the number of customers in each district.

The rate study calculations for the VFSA district are a modification of the Township’s current method of charging customers, which is a fixed rate component and a usage rate component. Three calculations were prepared. The first calculation includes a loan payment of \$105,000 to cover the annual cost of borrowing funds for the Township’s 2024 sewer repair project. The second calculation includes ½ the \$105,000 loan payment, with the remaining 50% of the payment being covered by existing Township cash reserves. The final calculation does not include the loan payment.

The fixed rate and usage rate components for the VFSA rates are calculated as follows:

- The fixed rate is the total of the fixed rate components of the sewer budget divided by the total number of customer units in the VFSA district. A customer unit is single-family residential unit including single-family detached, semi-detached (twins), and townhomes. Customer units for non-single-family customers are calculated by dividing each customer’s average quarterly metered usage by the allowable single unit gallons per the Township Ordinance. Residential customers pay one fixed rate charge. Non-residential customers pay one or more fixed rate charges based on their quarterly metered water usage.
- The usage rate is the usage rate components of the sewer budget divided by the calculated total annual gallons of metered water usage conveyed to VFSA. The usage rate is expressed in a rate per 1,000 gallons. Each customer pays the usage charge based on their quarterly metered water usage.

Today’s Commitment to Tomorrow’s Challenges

Corporate Office: 949 Easton Road Warrington, PA 18976 215.343.5700	630 Freedom Business Center Third Floor King of Prussia, PA 19406 610.572.7093	433 Lancaster Avenue Suite 200 Malvern, PA 19355 610.489.5100	101 Larry Holmes Drive Suite 201 Easton, PA 18042 610.989.4940	105 Raider Boulevard Suite 206 Hillsborough, NJ 08844 908.874.7500
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A series of tables that summarize the methodology and steps for the VFSA rate calculations are enclosed. The example tables use fixed sewer budget costs, including the loan payment.

In the VFSA district, there are residential customers that are not connected to public water. Therefore, they cannot be charged a usage charge based on metered water usage. A flat rate for the usage charge was calculated based on the allowable single unit gallons per the Township Ordinance. The flat rate calculation is shown in the enclosed table.

The sewer reserve for VFSA is the annual funding the Township should provide to replace sewer system components based on current costs and the useful life of the individual components. The complete VFSA reserve funding calculation is enclosed, along with an example calculation that summarizes the steps to arrive at the required annual funding.

The Penns Preserve sewer district rate is also a fixed rate. The rate is calculated by dividing the sewer budget for Penns Preserve divided by the total number of customers in the district. Customers are billed on a quarterly basis.

If you have any questions or require additional information, please feel free to contact me.

Very truly yours,

CARROLL ENGINEERING CORPORATION



William N. Malin, P.E
Vice President

WNM:cam
Enclosures

Table No. RS2023
Willistown Township
2023 Rate Study
Sewer Budget Including \$105,000 Loan Payment

	Fixed Rate	Usage Rate
Total Budget Costs per Category	\$1,594,724	\$1,458,200
Total VFSA Residential Units (usage based)	1,977	
Total VFSA Non-Residential Units (usage based)	650	
Total VFSA Usage Units	2,627	
VFSA Grinder Pump Units (non-usage based)	147	
Total VFSA Units	2,774	
Annual VFSA Fixed Charge per Unit	\$574.88	
Quarterly VFSA Fixed Charge per Unit	\$143.72	
Total Annual VFSA Meter Gallons		156,929,069
Total VFSA Usage Units		2,627
Annual Meter Gallons per Unit		59,737
VFSA Grinder Pump Units (non-usage based)		147
Calculated VFSA Grinder Pump Annual Usage		8,781,337
Calculated Annual VFSA Metered Gallons		165,710,406
VFSA Usage Rate per 1,000 Gallons		\$8.80
Average VFSA Residential Quarterly Usage		11,257
Average VFSA Residential Quarterly Charge		\$99.06
Quarterly VFSA Fixed Charge per Unit	\$143.72	
Total Average VFSA Quarterly Bill	\$242.78	

Table No. RS2023
Willistown Township
2023 Rate Study
Sewer Budget Including 50% of \$105,000 Loan Payment

	Fixed Rate	Usage Rate
Total Budget Costs per Category	\$1,542,224	\$1,458,200
Total VFSA Residential Units (usage based)	1,977	
Total VFSA Non-Residential Units (usage based)	650	
Total VFSA Usage Units	2,627	
VFSA Grinder Pump Units (non-usage based)	147	
Total VFSA Units	2,774	
Annual VFSA Fixed Charge per Unit	\$555.96	
Quarterly VFSA Fixed Charge per Unit	\$138.99	
Total Annual VFSA Meter Gallons		156,929,069
Total VFSA Usage Units		2,627
Annual Meter Gallons per Unit		59,737
VFSA Grinder Pump Units (non-usage based)		147
Calculated VFSA Grinder Pump Annual Usage		8,781,337
Calculated Annual VFSA Metered Gallons		165,710,406
VFSA Usage Rate per 1,000 Gallons		\$8.80
Average VFSA Residential Quarterly Usage		11,257
Average VFSA Residential Quarterly Charge		\$99.06
Quarterly VFSA Fixed Charge per Unit	\$138.99	
Total Average VFSA Quarterly Bill	\$238.05	

Table No. RS2023
Willistown Township
2023 Rate Study
Sewer Budget With No Loan Payment

	Fixed Rate	Usage Rate
Total Budget Costs per Category	\$1,489,724	\$1,458,200
Total VFSA Residential Units (usage based)	1,977	
Total VFSA Non-Residential Units (usage based)	650	
Total VFSA Usage Units	2,627	
VFSA Grinder Pump Units (non-usage based)	147	
Total VFSA Units	2,774	
Annual VFSA Fixed Charge per Unit	\$537.03	
Quarterly VFSA Fixed Charge per Unit	\$134.26	
Total Annual VFSA Meter Gallons		156,929,069
Total VFSA Usage Units		2,627
Annual Meter Gallons per Unit		59,737
VFSA Grinder Pump Units (non-usage based)		147
Calculated VFSA Grinder Pump Annual Usage		8,781,337
Calculated Annual VFSA Metered Gallons		165,710,406
VFSA Usage Rate per 1,000 Gallons		\$8.80
Average VFSA Residential Quarterly Usage		11,257
Average VFSA Residential Quarterly Charge		\$99.06
Quarterly VFSA Fixed Charge per Unit	\$134.26	
Total Average VFSA Quarterly Bill	\$233.32	

Table No. RS2023
 Willistown Township
 2023 Rate Study
 Sewer Budget Including \$105,000 Loan Payment

	Fixed Rate	Usage Rate	Calculation Step
Total Budget Costs per Category	\$1,594,724	\$1,458,200	Budget costs per category are the fixed rate and usage rate costs in the sewer budget. The fixed rate costs are costs for operating and maintaining the sewer system. The usage rate costs are the charges from VFSA and AQUA for wastewater treatment and conveyance respectively.
Total VFSA Residential Units (usage based)	1,977		
Total VFSA Non-Residential Units (usage based)	650		
Total VFSA Usage Units	2,627		
VFSA Grinder Pump Units (non-usage based)	147		
Total VFSA Units	2,774		
Annual VFSA Fixed Charge per Unit	\$574.88		
Quarterly VFSA Fixed Charge per Unit	\$143.72		
Total Annual VFSA Meter Gallons		156,929,069	
Total VFSA Usage Units		2,627	
Annual Meter Gallons per Unit		59,737	
VFSA Grinder Pump Units (non-usage based)		147	
Calculated VFSA Grinder Pump Annual Usage		8,781,337	
Calculated Annual VFSA Metered Gallons		165,710,406	
VFSA Usage Rate per 1,000 Gallons		\$8.80	
Average VFSA Residential Quarterly Usage		11,257	
Average VFSA Residential Quarterly Charge		\$99.06	
Quarterly VFSA Fixed Charge per Unit	\$143.72		
Total Average VFSA Quarterly Bill	\$242.78		

Table No. RS2023
 Willistown Township
 2023 Rate Study
 Sewer Budget Including \$105,000 Loan Payment

	Fixed Rate	Usage Rate
Total Budget Costs per Category	\$1,594,724	\$1,458,200
Total VFSA Residential Units (usage based)	1,977	
Total VFSA Non-Residential Units (usage based)	650	
Total VFSA Usage Units	2,627	
VFSA Grinder Pump Units (non-usage based)	147	
Total VFSA Units	2,774	
Annual VFSA Fixed Charge per Unit	\$574.88	
Quarterly VFSA Fixed Charge per Unit	\$143.72	
Total Annual VFSA Meter Gallons		156,929,069
Total VFSA Usage Units		2,627
Annual Meter Gallons per Unit		59,737
VFSA Grinder Pump Units (non-usage based)		147
Calculated VFSA Grinder Pump Annual Usage		8,781,337
Calculated Annual VFSA Metered Gallons		165,710,406
VFSA Usage Rate per 1,000 Gallons		\$8.80
Average VFSA Residential Quarterly Usage		11,257
Average VFSA Residential Quarterly Charge		\$99.06
Quarterly VFSA Fixed Charge per Unit	\$143.72	
Total Average VFSA Quarterly Bill	\$242.78	

Calculation Step

X	Total residential units are the total number of single-family residential customers in the district. Single-family residential customers include single-family detached, semi-detached (twins) and townhomes.
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Table No. RS2023
 Willistown Township
 2023 Rate Study
 Sewer Budget Including \$105,000 Loan Payment

	Fixed Rate	Usage Rate
Total Budget Costs per Category	\$1,594,724	\$1,458,200
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VFSA Usage Rate per 1,000 Gallons		\$8.80
Average VFSA Residential Quarterly Usage		11,257
Average VFSA Residential Quarterly Charge		\$99.06
Quarterly VFSA Fixed Charge per Unit	\$143.72	
Total Average VFSA Quarterly Bill	\$242.78	

Calculation Step

Non-residential units for individual customers are calculated by dividing each customer's average quarterly metered water usage by the allowable single unit gallons per the Township's Ordinance. The total of each individual customer's units is the total calculated non-residential units. The single unit gallons is 23,400.

Table No. RS2023
 Willistown Township
 2023 Rate Study
 Sewer Budget Including \$105,000 Loan Payment

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Average VFSA Residential Quarterly Usage		11,257
Average VFSA Residential Quarterly Charge		\$99.06
Quarterly VFSA Fixed Charge per Unit	\$143.72	
Total Average VFSA Quarterly Bill	\$242.78	

Calculation Step


 The total VFSA usage units is the total of residential and non-residential units in the district

Table No. RS2023
 Willistown Township
 2023 Rate Study
 Sewer Budget Including \$105,000 Loan Payment

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Quarterly VFSA Fixed Charge per Unit	\$143.72	
Total Average VFSA Quarterly Bill	\$242.78	

Calculation Step


 The VFSA grinder pump units is the number of customers with grinder pumps and private wells.

Table No. RS2023
 Willistown Township
 2023 Rate Study
 Sewer Budget Including \$105,000 Loan Payment

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Average VFSA Residential Quarterly Charge		\$99.06
Quarterly VFSA Fixed Charge per Unit	\$143.72	
Total Average VFSA Quarterly Bill	\$242.78	

Calculation Step


 The total VFSA units are the total residential, non-residential, and grinder pump/well customer units in the district.

Table No. RS2023
 Willistown Township
 2023 Rate Study
 Sewer Budget Including \$105,000 Loan Payment

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Average VFSA Residential Quarterly Charge		\$99.06
Quarterly VFSA Fixed Charge per Unit	\$143.72	
Total Average VFSA Quarterly Bill	\$242.78	

Calculation Step



The annual VFSA fixed charge per unit is the total fixed charge budget costs divided by the total VFSA units. The quarterly VFSA fixed charge per unit is the annual charge divided by four.

Table No. RS2023
 Willistown Township
 2023 Rate Study
 Sewer Budget Including \$105,000 Loan Payment

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Total Average VFSA Quarterly Bill	\$242.78	

Calculation Step


 The total annual VFSA metered gallons is the total annual metered water usage for all VFSA customers.

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 Willistown Township
 2023 Rate Study
 Sewer Budget Including \$105,000 Loan Payment

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Average VFSA Residential Quarterly Charge		\$99.06
Quarterly VFSA Fixed Charge per Unit	\$143.72	
Total Average VFSA Quarterly Bill	\$242.78	

Calculation Step

<p>These calculations calculate the gallons of metered usage for customers with grinder pumps and wells so the total annual metered usage for all VFSA customers can be calculated. The annual metered gallons per unit is calculated and multiplied by the number of grinder pump/well customers for the total calculated metered usage for these customers. Total metered usage for grinder pump/well customers is added to the total actual metered usage for a calculated total for all VFSA customers.</p>

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 Willistown Township
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Average VFSA Residential Quarterly Charge		\$99.06
Quarterly VFSA Fixed Charge per Unit	\$143.72	
Total Average VFSA Quarterly Bill	\$242.78	

Calculation Step



The VFSA usage rate per 1,000 gallons is the usage charge budget costs divided by the total calculated annual VFSA metered gallons

Table No. RS2023
 Willistown Township
 2023 Rate Study
 Sewer Budget Including \$105,000 Loan Payment

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Average VFSA Residential Quarterly Charge		\$99.06
Quarterly VFSA Fixed Charge per Unit	\$143.72	
Total Average VFSA Quarterly Bill	\$242.78	

Calculation Step


 This is the average quarterly usage of all residential customers.

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 Willistown Township
 2023 Rate Study
 Sewer Budget Including \$105,000 Loan Payment

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Total Budget Costs per Category	\$1,594,724	\$1,458,200
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Average VFSA Residential Quarterly Charge		\$99.06
Quarterly VFSA Fixed Charge per Unit	\$143.72	
Total Average VFSA Quarterly Bill	\$242.78	

Calculation Step

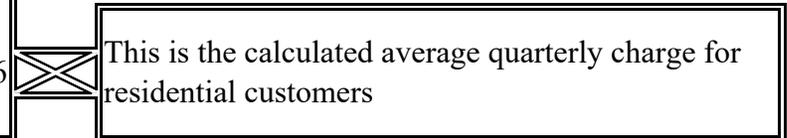

 This is the calculated average quarterly charge for residential customers

Table No. RS2023-FR
Willistown Township
2023 Rate Study
Residential Flat Rate

Flat Rate Usage (gallons) per Township Ordinance	23,400
Quarterly Rate/1,000 Gallons	\$8.80
Quarterly Flat Rate Usage Charge	\$205.92
Quarterly Fixed Rate Charge	\$143.75
Total Flat Rate	\$349.67

Willistown Township
Sewer Reserve Study
Required Annual Funding - VFSA Service Area

Item Description	2023 Replacement Cost	Service Life (years)	ENR Cost Factor	End of Life Cost	Required Annual Funding
Pump Station No. 1					
Pumps	\$ 63,400.00	20	1.8584	\$ 117,822.56	\$ 5,891.13
Pump controls	\$ 30,000.00	30	2.4689	\$ 74,067.00	\$ 2,468.90
Generator & transfer switch	\$ 69,000.00	25	2.1366	\$ 147,425.40	\$ 5,897.02
Autodialer	\$ 600.00	10	1.3518	\$ 811.08	\$ 81.11
Flowmeter & chart recorder	\$ 5,600.00	25	2.1366	\$ 11,964.96	\$ 478.60
Grinder	\$ 43,500.00	30	2.4689	\$ 107,397.15	\$ 3,579.91
Water service	\$ 1,300.00	50	7.0110	\$ 9,114.30	\$ 182.29
Pump building and wetwell/drywell	\$ 79,600.00	50	7.0110	\$ 558,075.60	\$ 11,161.51
Fence	\$ 8,200.00	30	2.4689	\$ 20,244.98	\$ 674.83
Driveway	\$ 6,600.00	25	2.1366	\$ 14,101.56	\$ 564.06
Pump Station No. 2					
Pumps	\$ 92,600.00	20	1.8584	\$ 172,087.84	\$ 8,604.39
Pump controls	\$ 45,000.00	30	2.4689	\$ 111,100.50	\$ 3,703.35
Generator & transfer switch	\$ 69,000.00	25	2.1366	\$ 147,425.40	\$ 5,897.02
Autodialer	\$ 600.00	10	1.3518	\$ 811.08	\$ 81.11
Flowmeter & chart recorder	\$ 5,600.00	25	2.1366	\$ 11,964.96	\$ 478.60
Grinder	\$ 43,500.00	30	2.4689	\$ 107,397.15	\$ 3,579.91
Water service	\$ 1,300.00	50	7.0110	\$ 9,114.30	\$ 182.29
Pump building and wetwell/drywell	\$ 98,000.00	50	7.0110	\$ 687,078.00	\$ 13,741.56
Fence	\$ 8,500.00	30	2.4689	\$ 20,985.65	\$ 699.52
Driveway	\$ 5,200.00	25	2.1366	\$ 11,110.32	\$ 444.41
Pump Station No. 3					
Pumps	\$ 529,000.00	20	1.8584	\$ 983,093.60	\$ 49,154.68
Pump controls	\$ 60,000.00	30	2.4689	\$ 148,134.00	\$ 4,937.80
Generator & transfer switch	\$ 277,500.00	25	2.1366	\$ 592,906.50	\$ 23,716.26
Autodialer	\$ 600.00	10	1.3518	\$ 811.08	\$ 81.11
Flowmeter & chart recorder	\$ 5,600.00	25	2.1366	\$ 11,964.96	\$ 478.60
Grinder	\$ 43,500.00	30	2.4689	\$ 107,397.15	\$ 3,579.91
Water service	\$ 1,300.00	50	7.0110	\$ 9,114.30	\$ 182.29
Pump building and wetwell/drywell	\$ 144,200.00	50	7.0110	\$ 1,010,986.20	\$ 20,219.72
Fence	\$ 13,000.00	30	2.4689	\$ 32,095.70	\$ 1,069.86
Driveway	\$ 3,400.00	25	2.1366	\$ 7,264.44	\$ 290.58

Willistown Township
Sewer Reserve Study
Required Annual Funding - VFSA Service Area

Item Description	2023 Replacement Cost	Service Life (years)	ENR Cost Factor	End of Life Cost	Required Annual Funding
Pump Station No. 4					
Pumps	\$ 85,800.00	20	1.8584	\$ 159,450.72	\$ 7,972.54
Pump controls	\$ 60,000.00	30	2.4689	\$ 148,134.00	\$ 4,937.80
Generator & transfer switch	\$ 75,000.00	25	2.1366	\$ 160,245.00	\$ 6,409.80
Autodialer	\$ 900.00	10	1.3518	\$ 1,216.62	\$ 121.66
Flowmeter	\$ 9,000.00	25	2.1366	\$ 19,229.40	\$ 769.18
Grinder	\$ 43,500.00	30	2.4689	\$ 107,397.15	\$ 3,579.91
Water service	\$ 3,300.00	50	7.0110	\$ 23,136.30	\$ 462.73
Pump building	\$ 30,900.00	50	7.0110	\$ 216,639.90	\$ 4,332.80
Wetwell	\$ 28,600.00	50	7.0110	\$ 200,514.60	\$ 4,010.29
Fence	\$ 16,600.00	30	2.4689	\$ 40,983.74	\$ 1,366.12
Driveway	\$ 9,900.00	25	2.1366	\$ 21,152.34	\$ 846.09
Dovecote Booster Station					
Pumps	\$ 21,000.00	20	1.8584	\$ 39,026.40	\$ 1,951.32
Pump controls	\$ 6,800.00	30	2.4689	\$ 16,788.52	\$ 559.62
Autodialer	\$ 900.00	10	1.3518	\$ 1,216.62	\$ 121.66
Wetwell & valve vault	\$ 43,300.00	50	7.0110	\$ 303,576.30	\$ 6,071.53
Fence	\$ 6,500.00	30	2.4689	\$ 16,047.85	\$ 534.93
Jaffrey Booster Station					
Pumps	\$ 6,000.00	20	1.8584	\$ 11,150.40	\$ 557.52
Pump controls	\$ 6,000.00	30	2.4689	\$ 14,813.40	\$ 493.78
Autodialer	\$ 4,200.00	10	1.3518	\$ 5,677.56	\$ 567.76
Wetwell	\$ 6,700.00	50	7.0110	\$ 46,973.70	\$ 939.47
Appletree Booster Station					
Pumps	\$ 6,000.00	20	1.8584	\$ 11,150.40	\$ 557.52
Pump controls	\$ 6,000.00	30	2.4689	\$ 14,813.40	\$ 493.78
Autodialer	\$ 4,200.00	10	1.3518	\$ 5,677.56	\$ 567.76
Wetwell	\$ 6,700.00	50	7.0110	\$ 46,973.70	\$ 939.47
Required Total Annual Capital Reserve Funding					\$ 221,267.32

Willistown Township
 Sewer Reserve Study
 Required Annual Funding - VFSA Service Area
 Pump Station No. 3 Example

Item Description	2023 Replacement Cost	Service Life (years)	ENR Cost Factor	End of Life Cost	Required Annual Funding
Pump Station No. 3					
Pumps	\$529,000.00	20	1.8584	\$983,093.60	\$49,154.68
Pump controls	\$60,000.00	30	2.4689	\$148,134.00	\$4,937.80
Generator & transfer switch	\$277,500.00	25	2.1366	\$592,906.50	\$23,716.26
Autodialer	\$600.00	10	1.3518	\$811.08	\$81.11
Flowmeter & chart recorder	\$5,600.00	25	2.1366	\$11,964.96	\$478.60
Grinder	\$43,500.00	30	2.4689	\$107,397.15	\$3,579.91
Water service	\$1,300.00	50	7.0110	\$9,114.30	\$182.29
Pump building and wet well/drywell	\$144,200.00	50	7.0110	\$1,010,986.20	\$20,219.72
Fence	\$13,000.00	30	2.4689	\$32,095.70	\$1,069.86
Driveway	\$3,400.00	25	2.1366	\$7,264.44	\$290.58
Total annual funding					\$103,710.80

Individual items were established from site visits and review of existing drawings.

Willistown Township
Sewer Reserve Study
Required Annual Funding - VFSA Service Area
Pump Station No. 3 Example

Item Description	2023 Replacement Cost	Service Life (years)	ENR Cost Factor	End of Life Cost	Required Annual Funding
Pump Station No. 3					
Pumps	\$529,000.00	20	1.8584	\$983,093.60	\$49,154.68
Pump controls	\$60,000.00	30	2.4689	\$148,134.00	\$4,937.80
Generator & transfer switch	\$277,500.00	25	2.1366	\$592,906.50	\$23,716.26
Autodialer	\$600.00	10	1.3518	\$811.08	\$81.11
Flowmeter & chart recorder	\$5,600.00	25	2.1366	\$11,964.96	\$478.60
Grinder	\$43,500.00	30	2.4689	\$107,397.15	\$3,579.91
Water service	\$1,300.00	50	7.0110	\$9,114.30	\$182.29
Pump building and wet well/drywell	\$144,200.00	50	7.0110	\$1,010,986.20	\$20,219.72
Fence	\$13,000.00	30	2.4689	\$32,095.70	\$1,069.86
Driveway	\$3,400.00	25	2.1366	\$7,264.44	\$290.58
Total annual funding					\$103,710.80


The 2023 replacement cost is based on quotes from equipment suppliers (pumps, generator, grinder, etc.) or calculated costs (building, wet well/dry well) from published construction cost data.

Willistown Township
Sewer Reserve Study
Required Annual Funding - VFSA Service Area
Pump Station No. 3 Example

Item Description	2023 Replacement Cost	Service Life (years)	ENR Cost Factor	End of Life Cost	Required Annual Funding
Pump Station No. 3					
Pumps	\$529,000.00	20	1.8584	\$983,093.60	\$49,154.68
Pump controls	\$60,000.00	30	2.4689	\$148,134.00	\$4,937.80
Generator & transfer switch	\$277,500.00	25	2.1366	\$592,906.50	\$23,716.26
Autodialer	\$600.00	10	1.3518	\$811.08	\$81.11
Flowmeter & chart recorder	\$5,600.00	25	2.1366	\$11,964.96	\$478.60
Grinder	\$43,500.00	30	2.4689	\$107,397.15	\$3,579.91
Water service	\$1,300.00	50	7.0110	\$9,114.30	\$182.29
Pump building and wet well/drywell	\$144,200.00	50	7.0110	\$1,010,986.20	\$20,219.72
Fence	\$13,000.00	30	2.4689	\$32,095.70	\$1,069.86
Driveway	\$3,400.00	25	2.1366	\$7,264.44	\$290.58
Total annual funding					\$103,710.80



The service life of individual items is based on the manufacturer's information or industry standards for the item's useful life.

Willistown Township
Sewer Reserve Study
Required Annual Funding - VFSA Service Area
Pump Station No. 3 Example

Item Description	2023 Replacement Cost	Service Life (years)	ENR Cost Factor	End of Life Cost	Required Annual Funding
Pump Station No. 3					
Pumps	\$529,000.00	20	1.8584	\$983,093.60	\$49,154.68
Pump controls	\$60,000.00	30	2.4689	\$148,134.00	\$4,937.80
Generator & transfer switch	\$277,500.00	25	2.1366	\$592,906.50	\$23,716.26
Autodialer	\$600.00	10	1.3518	\$811.08	\$81.11
Flowmeter & chart recorder	\$5,600.00	25	2.1366	\$11,964.96	\$478.60
Grinder	\$43,500.00	30	2.4689	\$107,397.15	\$3,579.91
Water service	\$1,300.00	50	7.0110	\$9,114.30	\$182.29
Pump building and wet well/drywell	\$144,200.00	50	7.0110	\$1,010,986.20	\$20,219.72
Fence	\$13,000.00	30	2.4689	\$32,095.70	\$1,069.86
Driveway	\$3,400.00	25	2.1366	\$7,264.44	\$290.58
Total annual funding					\$103,710.80



The ENR cost factors are an average of a specific time period over the life of the ENR Index. The 25- year factor is the average of increases over consecutive 25-year periods (1900-1925, 1926-1950, 1951-1975, etc.). The factors are show below.

ENR Factors	
5	1.1622
10	1.3518
15	1.5805
20	1.8584
25	2.1366
30	2.4689
50	7.0110
100	62.0839

Willistown Township
 Sewer Reserve Study
 Required Annual Funding - VFSA Service Area
 Pump Station No. 3 Example

Item Description	2023 Replacement Cost	Service Life (years)	ENR Cost Factor	End of Life Cost	Required Annual Funding
Pump Station No. 3					
Pumps	\$529,000.00	20	1.8584	\$983,093.60	\$49,154.68
Pump controls	\$60,000.00	30	2.4689	\$148,134.00	\$4,937.80
Generator & transfer switch	\$277,500.00	25	2.1366	\$592,906.50	\$23,716.26
Autodialer	\$600.00	10	1.3518	\$811.08	\$81.11
Flowmeter & chart recorder	\$5,600.00	25	2.1366	\$11,964.96	\$478.60
Grinder	\$43,500.00	30	2.4689	\$107,397.15	\$3,579.91
Water service	\$1,300.00	50	7.0110	\$9,114.30	\$182.29
Pump building and wet well/drywell	\$144,200.00	50	7.0110	\$1,010,986.20	\$20,219.72
Fence	\$13,000.00	30	2.4689	\$32,095.70	\$1,069.86
Driveway	\$3,400.00	25	2.1366	\$7,264.44	\$290.58
Total annual funding					\$103,710.80

The end-of-life cost is the 2023 replacement cost multiplied by the ENR cost factor to calculate what the replacement cost will be at the end of the item's useful life.

Willistown Township
 Sewer Reserve Study
 Required Annual Funding - VFSA Service Area
 Pump Station No. 3 Example

Item Description	2023 Replacement Cost	Service Life (years)	ENR Cost Factor	End of Life Cost	Required Annual Funding
Pump Station No. 3					
Pumps	\$529,000.00	20	1.8584	\$983,093.60	\$49,154.68
Pump controls	\$60,000.00	30	2.4689	\$148,134.00	\$4,937.80
Generator & transfer switch	\$277,500.00	25	2.1366	\$592,906.50	\$23,716.26
Autodialer	\$600.00	10	1.3518	\$811.08	\$81.11
Flowmeter & chart recorder	\$5,600.00	25	2.1366	\$11,964.96	\$478.60
Grinder	\$43,500.00	30	2.4689	\$107,397.15	\$3,579.91
Water service	\$1,300.00	50	7.0110	\$9,114.30	\$182.29
Pump building and wet well/drywell	\$144,200.00	50	7.0110	\$1,010,986.20	\$20,219.72
Fence	\$13,000.00	30	2.4689	\$32,095.70	\$1,069.86
Driveway	\$3,400.00	25	2.1366	\$7,264.44	\$290.58
Total annual funding					\$103,710.80

The required annual funding is the end-of-life cost divided by the service life. This is the amount that should be funded every year to accumulate the total end-of-life cost, so funding is available to replace the item at the end of its service life.

Willistown Township
Sewer Capital Reserve Study
Required Annual Funding - Penns Preserve Service Area

Item Description	2023 Replacement Cost	Service Life (years)	ENR Cost Factor	End of Life Cost	Required Annual Funding
Pump Station No. 5					
Pumps	\$ 60,000.00	20	1.8584	\$ 111,504.00	\$ 5,575.20
Pump controls	\$ 30,000.00	30	2.4689	\$ 74,067.00	\$ 2,468.90
Autodialer	\$ 900.00	10	1.3518	\$ 1,216.62	\$ 121.66
Flowmeter	\$ 9,000.00	25	2.1366	\$ 19,229.40	\$ 769.18
Grinder	\$ 35,000.00	30	2.4689	\$ 86,411.50	\$ 2,880.38
Driveway	\$ 7,400.00	25	2.1366	\$ 15,810.84	\$ 632.43
Penns Preserve Irrigation Plant					
Pumps	\$ 60,000.00	20	1.8584	\$ 111,504.00	\$ 5,575.20
Pump controls	\$ 30,000.00	30	2.4689	\$ 74,067.00	\$ 2,468.90
Autodialer	\$ 900.00	10	1.3518	\$ 1,216.62	\$ 121.66
Flowmeter	\$ 9,000.00	10	1.3518	\$ 12,166.20	\$ 1,216.62
Aeration System	\$ 19,100.00	30	2.4689	\$ 47,155.99	\$ 1,571.87
Required Total Annual Capital Reserve Funding					\$ 23,402.00