



# 2021 Capital Improvement Plan Wastewater System Facilities

Warren County  
Water District

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Prepared by the Engineering Staff of Warren County Water District

## **INTRODUCTION**

### **General**

Warren County Water District's Sewer Division (Warren Water) provides wastewater service in Warren County, KY outside the service area of Bowling Green Municipal Utilities (BGMU). Within Warren County, Warren Water serves approximately 38% of the City of Bowling Green's land area. Warren Water is the exclusive wastewater service provider in the communities of Smiths Grove, Plum Springs, and Oakland.

A Capital Improvement Plan (CIP) is a long-range plan, which identifies capital projects, estimates the cost of the projects, and provides a planning schedule for the implementation of the projects. This CIP is a Wastewater Master Plan that establishes a road map for wastewater improvements currently anticipated for Warren County during the planning period. The planning period of this CIP is 2021 through 2041.

The purpose of this CIP is to identify projects that are required to:

1. Increase system capacity as system demands increase.
2. Ensure that the system remains in compliance with Kentucky Public Service Commission (PSC) requirements.
3. Replace facilities which will reach the end of their service life within the planning period.
4. Ensure the most efficient use of Warren Water's funds that will result in the best service to all customers.

This report is also intended to provide Warren Water's management and Board of Commissioners with a tool to use in planning and coordinating the

financial and logistical requirements for improvements to the wastewater system.

As with all studies of this type which rely on projections of future occurrences, the certainty regarding the underlying predictions and corresponding recommendations diminishes as the time frame moves further into the future. Therefore, while recommendations listed for the near-term projects should be implemented as described herein, the recommendations for longer term projects should be re-examined prior to implementation. This study will be updated as necessary so that adjustments may be made to account for unanticipated growth in specific areas, the announcement of new industrial customers which have large wastewater flows, or any other factor or set of factors that would have a significant impact on the system.

### Existing Wastewater Collection System

Warren Water receives wastewater from 8,181 active customers (as of December 2020) through approximately 204 miles of collector and interceptor sewers. Wastewater is conveyed through the system with the use of over 70 wastewater lift stations.

Currently, all wastewater collected by Warren Water is metered for billing and discharged into the BGMU wastewater system for transport, treatment, and disposal. Wastewater is discharged to BGMU in five (5) locations around Bowling Green. A map of the existing wastewater collection system is attached as Appendix A.

### Requirements for Customer Demands

Warren County has been and continues to be one of the fastest growing counties in the Commonwealth of Kentucky. According to the State Data Center at the University of Louisville, Warren County's population increased

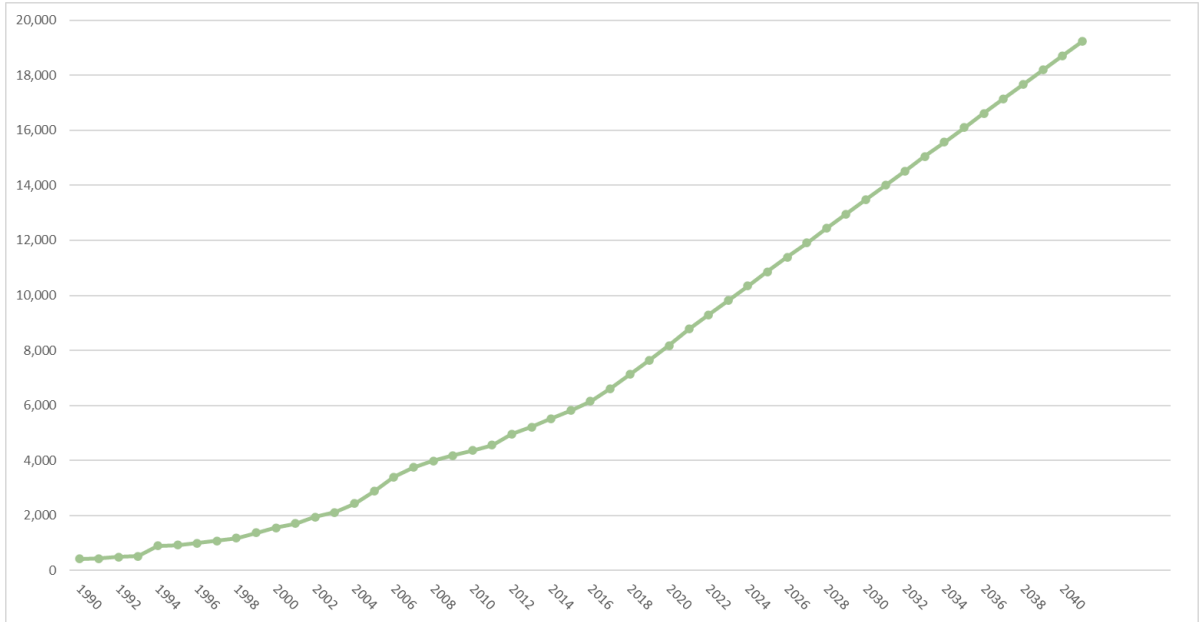
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by 23% from the year 2000 to 2010. From 2010 to 2020 the population increased by 18.2% to 134,554 residents. Each of the last two decades showed a population increase of approximately 21,000 residents or approximately 2,100 new residents per year. Utilizing an average of 2.5 residents per household, this results in approximately 850 new households per year. Many of these new households have been created in Warren Water's sewer service area. Warren County is continuing to grow and is projected to experience a population increase of approximately 35% in the next 20 years to a level of approximately 180,000 residents.

Growth on Warren Water's wastewater system is occurring at a greater rate than that of the county in general. In the last five (5) years, an average of approximately 500 customers per year have been added to the system. Chart 1 displays this projected growth pattern. This growth is very beneficial to Warren Water; however, the system's interceptor and lift station capacities must be increased to continue to meet the demand of these existing customers and provide for future growth.

**CHART 1**

**Warren Water Projected Sewer Customer Growth**



**SUMMARY OF 2019 REGIONAL WASTEWATER FACILITIES**

**PLAN UPDATE**

In 2019, Warren Water and BGMU concluded a Regional Wastewater Facilities Plan Update (FPU). The FPU evaluated the core wastewater systems of both Warren Water and BGMU and recommended wastewater projects to be completed during the 20-year planning period, from 2016 – 2036. The FPU was undertaken to meet Kentucky Division of Water regulatory requirements, ensure cost effective growth of the wastewater

systems to meet the future wastewater demands, and to ensure Warren Water remains eligible for all possible funding sources.

Generally, the FPU focused on large area-wide projects and did not identify all the smaller regional projects within the service area. This CIP for Wastewater System Facilities incorporates the findings and recommendations of the FPU as well as addresses and identifies the next level of projects within the Warren Water wastewater system.

The FPU recommended two large wastewater projects to be completed during the planning period. One of the recommended projects is already complete, the 24-inch Veterans force main. Completion of the Veterans force main has shaped the scope of several of the proposed projects in this CIP. The other large project is to increase the capacity of the BGMU wastewater treatment plant. A 25% capacity increase is recommended to begin design in 2028 and cost approximately \$16,200,000.

## **PROJECTED SYSTEM DEMANDS**

To obtain projections for system demands, three types of flow were evaluated in the FPU: existing flows, future flows resulting from infill on the existing wastewater system, and flows resulting from new areas of wastewater service. Projections for infill flows were established by examining vacant land which has wastewater service available on or near the properties.

Future flows within new areas of wastewater service were established by first identifying areas of projected growth which would be provided wastewater service. Fourteen (14) areas were identified in the FPU within Warren Water's wastewater service area. Population projections were then established for each growth area. Finally, flow projections were created based on the

population projections, projected industrial areas, and other factors. The fourteen growth areas feed into five (5) primary discharge points on the BGMU system. Table 1 summarizes Warren Water's projected flows through the end of the planning period at these five discharge points. Appendix C is a more detailed analysis of the growth projections. Chart 2 graphically shows this same projected growth pattern. 2019 was used as the base year for projections due to system irregularities experienced in 2020 due to the Covid-19 pandemic.

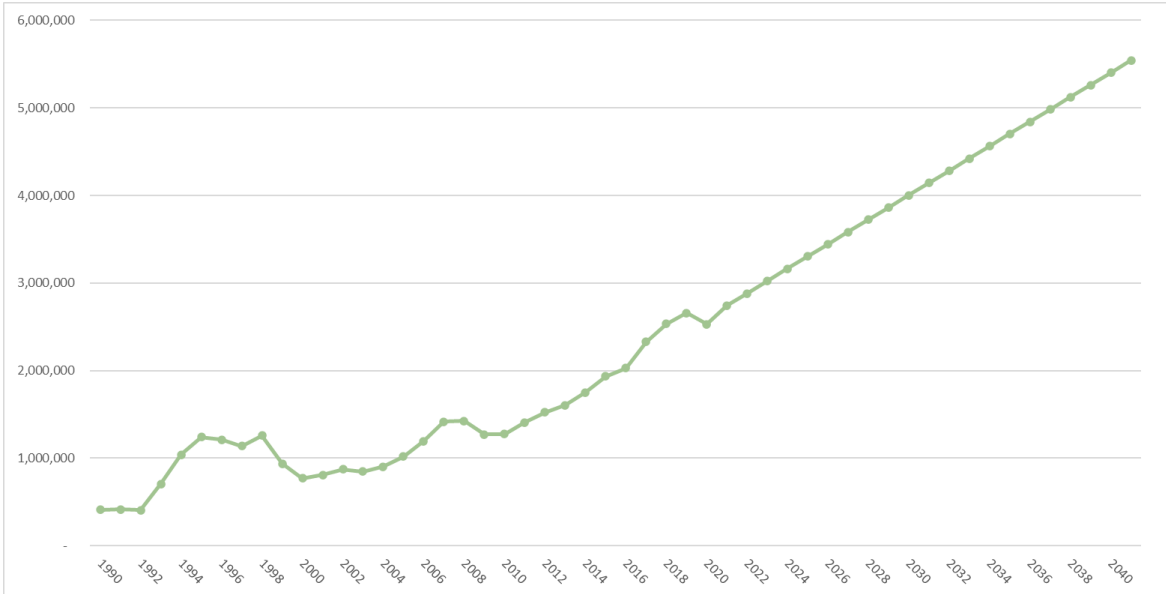
**TABLE 1**

**Warren Water Projected Sewer System Flows 2019-2041**

DISCHARGE METER	2019 ACTUAL FLOW (gpd)	2030 PROJECTED FLOW (gpd)	2041 PROJECTED FLOW (gpd)
Beech Bend MM	877,000	1,500,000	2,076,000
Ewing Ford MM	44,000	75,000	104,000
Parkway MM	412,000	867,000	1,200,000
Pioneer MM	661,000	822,000	1,022,000
Hwy 68W MM	662,000	916,000	1,138,000
<b>TOTAL:</b>	<b>2,658,000</b>	<b>4,180,000</b>	<b>5,540,000</b>

**CHART 2**

**Warren Water Projected Sewer System Flows (GPD)**



**REASONS FOR WASTEWATER SYSTEM IMPROVEMENTS**

System improvements are required due to three primary causes. Some improvements are needed due to an existing system deficiency. Other improvements are required to replace facilities which have reached the end of their service life. Other improvements are required due to increases in customer demand.

There are several situations in which improvements are required due to existing system deficiencies. Redundant facilities are required at critical locations in the system. All lift stations in the system contain a least two pumps, and all lift stations are capable of transmitting the peak flow with the largest pump off-line; such that if a pump fails, the other pump or pumps will be able to maintain system operation.

Due to the critical nature of the public wastewater collection system, facilities must be replaced as they reach the end of their expected service life. The expected life of a system component varies depending upon the type of facility. For example, wastewater pipelines would generally have a longer service life than the electrical motor on a pump. Facilities which are approaching the end of their service life can be identified by frequent failures, increasing maintenance costs, observed degradation, and/or insufficient size.

Some projects have been identified that, rather than alleviating a known deficiency, will increase the overall efficiency of the system. Warren Water continually strives to design and construct system additions in the most efficient manner possible. This may result in lower energy costs and/or greater system reliability.

The major factor that necessitates system improvements is increases in wastewater flows. As the number of customers increase and the total demand on the system becomes larger, improvements to the system must keep pace with this growth. Since the rate of growth is not consistent across the entire service area, and the capacity for growth of the existing components of the system are not the same, each area of the system was considered individually. Once examined, growth-based improvement projects were identified.

Once all system deficiencies and growth-based needs were recognized, solutions to these issues were identified. Every effort was made to resolve as many deficiencies as possible when developing an improvement project. For example, if a lift station must be replaced because it has reached the end of

its service life, the new station was sized to accommodate the projected increases in demand for the area.

## **DESCRIPTION OF PROPOSED PROJECTS**

### **General**

The projects proposed by this CIP have focused on improvements to the existing interceptor system and construction of projects will occur as wastewater flows approach the capacity of a given facility, or as new developments are constructed in previously unserved areas. A map is enclosed in Appendix B which shows the location of all proposed projects.

The scope of the following projects could change as a result of the construction of new wastewater facilities in the future. A force main which is projected to be a certain length may be shortened if gravity sewers are extended, as a result of development, to a point closer to the future lift station. This will result in lower construction costs and an increase in system efficiency. As the system has grown, several force mains have been manifolded together. Manifolded force mains have added to the complexity of the system and can cause challenges as utilization rates increase. Warren Water is in the process of developing a sewer model which will help us make better decisions as the system grows. This model is expected to be completed within the next year. The model will allow refinement of some of the projects contemplated in this document. Based on the additional information obtained from the sewer model, this plan will be updated in 2024.

The funding for the following projects will be provided by either Warren Water, developers, or both will share in the cost of a given project. Generally, Warren Water will fund projects which involve "backbone" facilities within the system.

As service is provided to developments in areas which currently do not have wastewater service, developers typically will fund the construction of the new wastewater facilities. All cost projections in this document are indicated in 2021 dollars.

## **Improvements to Primary Interceptor System (0-5 Years)**

### Hidden River Interceptor

The Hidden River No. 2 lift station, supplies all the flow to the Hidden River No. 1 lift station with the exception of approximately 200 homes. Therefore, the majority of the increase in flow to the Hidden River No. 1 lift station would pass through the Hidden River No. 2 lift station as well. Hidden River No. 2 lift station does not have adequate storage or pumping capacity to accommodate the increasing flows, which are projected to occur in the near future. This project consists of the design and construction of approximately 3,000 feet of 15-inch gravity sewer main from the Hidden River No. 2 lift station to the Hidden River No. 1 lift station. This interceptor will allow Hidden River No. 2 lift station to be removed from service, which will eliminate the need for future upgrades to the lift station and its force mains. The new interceptor will also provide a more reliable and efficient operation. The estimated total cost of this project is \$600,000.

### Pioneer Drive Force Main Upgrade

The Memphis Junction Lift Station receives all wastewater flows from the Nashville Road corridor. This area is projected to experience considerable growth due to infill and service to new areas. The lift station has been recently upgraded along with a section of force main. It is also planned to manifold another force main, originating on Hwy 68 West, to the Pioneer Drive force main. Approximately 2,100 feet of 24-inch force main will be constructed to replace the existing 10-inch force main on the north end of

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Pioneer Drive. This force main will terminate at the beginning of the recently constructed Veterans Force Main (BGMU). The estimated total cost for this project is \$550,000.

### Greystone Interceptor

The area between Russellville Road and Nashville Road in the vicinity of the South Industrial park is experiencing rapid development. This project consists of the design and construction of approximately 7,000' of 15-inch gravity sewer main from the existing 18" gravity on John Jones Road to the Greystone #2 lift station. This interceptor will allow development of the area along the route and eliminate an existing lift station. The estimated total cost of this project is \$2,100,000.

### Three Springs Lift Station Upgrade

This project consists of the upgrade of the pumps and electrical systems at the Three Springs Lift Station (Basil Griffin Park) to result in a total flow rate of 1,000 gpm. This upgrade will be required due to development in the Three Springs Rd, Plano Rd, and Scottsville Rd. areas. The estimated total cost for this project is \$200,000.

### Hwy 68 West Force Main Connector

The Hwy 68 West Lift Station currently receives flows from a portion of the South Central Kentucky Industrial Park (SCKIP), and areas along the Hwy 68 corridor as far west as Rockfield. This area is projected to experience significant growth. The lift station has been recently upgraded and now the limiting factor to growth is the force main capacity. Another large lift station, Springwater, has recently been manifolded into the same dual 8" force mains on Hwy 68. This project consists of 5,800' of 16" force main running from the Springwater lift station to the existing 16" force main on Pioneer Drive which

feeds the BGMU Veterans Force Main. The estimated total cost for this project is \$1,200,000.

#### Dillard Road Lift Station, Gravity Interceptor, and Force Main

The Nashville Road corridor has experienced a large amount of growth and this growth is projected to continue. To accommodate the wastewater flows resulting from development along Nashville Road from Dillard Road to Richpond Road and beyond, a new 1,500 gpm wastewater lift station is proposed to be located on the south side of Dillard Road near Nashville Road. Approximately 8,600 feet of 12-inch force main will transmit the wastewater from the lift station to the 15-inch gravity sewer which flows to the Memphis Junction lift station. The South Industrial lift station will be taken off the 15-inch gravity and an upgraded force-main extended to the Memphis Junction lift station. This project will also include 8,500' of 15" and 12" gravity sewer extended to Bettersworth Road, the existing Summit lift station, and the existing McLellan Farms lift station. The estimated total cost of this project is \$3,500,000.

#### Diesel Generator Additions

The Hwy 68 West lift station, South Industrial lift station, and Memphis Junction lift are the three (3) largest lift stations in the collections system that do not currently have a back-up power system. These stations are also too large to be effectively serviced by a portable diesel pump. This project will add diesel generators to each of these sites to ensure operation during a power outage. The estimated total cost for this project is \$350,000.

## Improvements to Primary Interceptor System (6-20 Years)

### Parkway Force Main Upgrade

This project consists of the upgrade of the Three Springs Lift Station system to result in a total flow rate of 2,000 gpm. This upgrade will be required due to development in the Three Springs Rd, Plano Rd, and Scottsville Rd. areas. To accommodate this larger flow rate, approximately 22,000 feet of 16-inch force main will be constructed parallel to the existing 10-inch force main to the discharge point at the intersection of Dishman Lane and Pioneer Drive (BGMU Veterans Force Main). The estimated total cost for this project is \$4,500,000.

### Hidden River No. 1 Lift Station Upgrade

This project consists of the upgrade of the pumps and electrical systems at the Hidden River No. 1 Lift Station to result in 1,625 gpm. To accommodate this larger flow rate, approximately 5,200 feet of 10-inch force main will be constructed parallel to the existing 8-inch force main to the intersection of Elrod Road and I-165. A portion of this 10-inch force main has been constructed as part of a large sub-division. From this point the two force mains will discharge into a proposed 12-inch force main which will be installed under I-165 and connect to the Parkway Interceptor Force Main. The estimated total cost for this project is 750,000.

### Plano Interceptor

The Plano area is rapidly growing with residential development. This project consists of the design and construction of approximately 8,800 feet of 15-inch gravity sewer main from the existing 21" gravity at the north-east corner of the intersection of I-65 and I-165, across I-165 to Carter Sims Road. This interceptor will add a large amount of sewer capacity to the Plano area and

will reduce the length of force main as well as manifolding for four (4) existing lift stations. The estimated total cost of this project is \$2,700,000.

#### Richpond Interceptor

As development in the Richpond area occurs, the flows to the Richpond Lift Station will exceed its flow capacity. This project consists of the design and construction of approximately 7,000 feet of 15-inch and 12-inch gravity sewer main to transmit wastewater from the Richpond Lift Station site to the proposed Dillard Road Lift Station. This project will allow several hundred acres to develop with sewer service. The estimated cost of this project is \$2,000,000.

#### Hunters Point Interceptor

The existing Hunters Point 10-inch gravity interceptor receives flows from the Cal Batsel Road, Hunters Crossing Subdivision, and The Summit Subdivision areas and discharges into the SCKIP Lift Station. Infill on existing wastewater main and future growth in this area will result wastewater flows exceeding the capacity of this interceptor. This project consists of 2,200 feet of 12-inch gravity sewer which will accommodate future flows. The estimated cost of this project is \$750,000.

#### Ewing Ford Lift Station Upgrade

The Ewing Ford Lift Station is located close to the intersection of Cemetery Road and Lovers Lane. This area is projected to experience significant growth in the coming years. A new hotel and convention center will be going online in 2022. Other commercial development is expected in the near future. As growth continues in this area, the upgrade of the lift station to 400 gpm will be required. A new force-main extension will be required to the intersection of Cherokee Drive and Ewing Ford Road to accommodate the increased flow

rate. An upgrade to 3-phase power will also be required. The estimated cost of the project is \$450,000.

### Porter Pike Area Improvements

The Porter Pike area has experienced a large amount of interest in development. To accommodate the wastewater flows resulting from this planned development, a new 700 gpm wastewater lift station is proposed to be located near the entrance to the Motorsports Park. Approximately 15,500 feet of 12-inch force main will transmit the wastewater from the lift station to the 20-inch force main near the intersection of Bristow Road and the CSX railroad. The estimated total cost of this project is \$2,100,000.

## Major Maintenance

### Lift Station Replacement and Rehabilitation

Due to the rolling topography that is present throughout much of the county, many areas can only be economically served by sewer lift stations. The system has now grown to over seventy (70) lift stations. Approximately twenty (20) of those stations are now twenty (20) years old and approaching the end of their useful life. Approximately \$500,000 per year will be required to replace or perform major maintenance on these stations for a total of \$10,000,000 over the planning period.

## Industrial Growth Improvements

### 24-Inch BGMU Force Main from Beech Bend to WWTP

As flows continue to increase and additional large wastewater customers locate in the Kentucky Transpark, increased capacity to transfer flow to the WWTP is necessary. BGMU's current gravity interceptor in this location is being strained. 9,400' of 24" force main will be constructed from WCWD's

Barren River crossing to BGMU's WWTP. The estimated cost of this project is \$4,000,000. It is anticipated that BGMU will construct and maintain this infrastructure.

### Transpark Area Improvements

Fifteen (15) years ago, major infrastructure was extended to the north-east side of Bowling Green to facilitate the Transpark construction. That infrastructure is nearing full capacity. As the Transpark continues to expand to the east, new infrastructure will be required to support the industrial growth. These new flows will have to be transported back to the WWTP. 58,000' of 24-inch force main will be constructed from WCWD's Barren River crossing to the next phase of the Transpark. A major regional lift station and a new secondary lift station will be constructed as part of the project. A new crossing of the Baren River will also be required. The estimated cost of this project is \$23,000,000.

### **Summary of Improvements to Primary Interceptor System**

The proposed improvements to the primary interceptor system will enhance Warren Water's ability to attract and support residential, commercial, and industrial development; and promote a more environmentally responsible growth pattern by reducing the total number of individual septic systems in the area. A summary of these projects is provided in Table 2, Table 3, Table 4, & Table 5.

**TABLE 2**

**Improvements to Primary Interceptor System (0-5 Years)**

PROJECT	ESTIMATED COST
<b>Hidden River Interceptor</b> 3,000 ft of 15-inch gravity	\$600,000
<b>Pioneer Drive Force Main Upgrade</b> 2,100 ft of 24-inch force main	\$550,000
<b>Greystone Interceptor</b> 7,000 ft of 15-inch gravity	\$2,100,000
<b>Three Springs Lift Station Upgrade</b> Larger Pumps	\$200,000
<b>Hwy 68 West Force Main Connector</b> 5,800 ft of 16-inch force main	\$1,200,000
<b>Dillard Road Lift Station, Gravity, Force Main</b> 8,600 ft of 12-inch force main 8,500 ft of 12-inch & 15-inch gravity	\$3,500,000
<b>Diesel Generator Additions</b> Generators added to three (3) large lift stations	\$350,000
	<b>\$8,500,000</b>

**TABLE 3**

**Improvements to Primary Interceptor System (6-20 Years)**

PROJECT	ESTIMATED COST
<b>Parkway Force Main Upgrade</b> 22,000 ft of 16-inch force main	\$4,500,000
<b>Hidden River No. 1 Lift Station Upgrade</b> Larger Pumps 5,200 ft of 10-inch force main	\$750,000
<b>Plano Interceptor</b> 8,800 ft of 15-inch gravity	\$2,700,000
<b>Richpond Interceptor</b> 7,000 ft of 15-inch and 12-inch gravity	\$2,000,000
<b>Hunters Point Interceptor</b> 2,200 ft of 12-inch gravity	\$750,000
<b>Ewing Ford Lift Station Upgrade</b> Larger Pumps, force-main extension, electrical upgrade	\$450,000
<b>Porter Pike Area Improvements</b> New regional lift station 15,500 ft of 12-inch force main	\$2,100,000
	<b>\$13,250,000</b>

**TABLE 4**

**Industrial Growth Improvements**

PROJECT	ESTIMATED COST
<b>24-inch BGMU Force Main</b> 9,400 ft of 24-inch force main (funded through wholesale rate increase)	\$4,000,000
<b>Transpark Area Improvements</b> New Barren River crossing New regional lift station and secondary lift station 58,000 ft of 24-inch force main	\$23,000,000
	<b>\$27,000,000</b>

**TABLE 5**

**Capital Improvement Plan Cost Summary**

PROJECT	ESTIMATED COST
<b>Improvements (0-5 years)</b>	\$8,500,000
<b>Improvements (6-20 years)</b>	\$13,250,000
<b>Major Maintenance</b>	\$10,000,000
<b>Industrial Growth Improvements</b>	\$27,000,000
	<b>\$58,750,000</b>