

Prepared for:

**Glenwood Community** 

Preble County Commissioners Twin and Lanier Township



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# **ABBREVIATIONS**

EPA	Environmental Protection Agency
GPD	Gallons Per Day
STEP	Septic Tank Effluent Pump
Mg/L	Milligrams Per Liter
MGD	Million Gallons Per Day
BOD	Biochemical Oxygen Demand
CBOD <sub>5</sub>	Five Day Carbonaceous Biochemical Oxygen Demand
MVRPC	Miami Valley Regional Planning Commission
D.O.	Dissolved Oxygen
WWTP	Wastewater Treatment Plant
R/D	Recirculation/Dilution
FPA	Facility Planning Area
O,M&R	Operation, Maintenance, and Repair
E. coli	Escherichia coli

#### Chapter 1 - Executive Summary

#### Purpose of Study

The purpose of this study is to identify, evaluate, and present information pertaining to the existing and future wastewater system within the Glenwood Area. This study will also gain a sense of the potential growth expected in the area, and present options of different wastewater collection and treatment systems. In addition, the study develops cost-effective alternatives for wastewater service in the area. This study will be used by the Miami Valley Regional Planning Commission (MVRPC) and Preble County for the purpose of future planning needs. The Glenwood Area was selected for this study because of the inability to stay within the health regulations when replacing failing septic tanks.

#### **Alternatives Considered**

The existing and future wastewater needs were analyzed to help determine different collection and treatment options. These options include:

Wastewater Collection System Alternatives considered the following:

- Gravity Sewer System
- Septic Tank Effluent Pumping (STEP) System
- Grinder Pump Sewer System
- Vacuum Sewer System

#### Wastewater Treatment System Alternatives considered the following:

- Construct new Wastewater Treatment Plant (WWTP)
  - Extended Aeration
  - o Lagoon
  - o Packed Bed Media Filter
- Regionalize with Adjacent Community
  - o Transport Wastewater to West Alexandria
  - Transport Wastewater to Eaton

#### Conclusion

All of the different collection and treatment alternatives listed above were analyzed incorporating the Glenwood base area (approximately 192 homes) and additional alternate areas (approximately 129 homes). Each scenario looked at the cost of the project, O,M&R, and different environmental factors. All of these factors helped determine a best case scenario for Preble County and residents of the Glenwood area.

#### Recommendation

After considering the economic cost-effective analysis and the environmental conditions, the following solution is recommended:

Preble County should install a Grinder Pump collection system with connection to the Village of West Alexandria collection and treatment system. West Alexandria is experiencing capacity issues and has an older treatment facility. Based on discussions with West Alexandria, the Village is looking into expansion or replacement of their facility. If they proceed with expansion, they MAY consider expanding enough to incorporate the Glenwood area, but there is no commitment at this time.

Preble County may choose to construct only the base area or expand and construct the base area plus the additional service areas. If the base area option is selected and does not reconcile stream and sampling data performed by the EPA, the system will need to be expanded further and funding may be limited having used available funding on the base project.

If negotiations with West Alexandria do not work, the next best scenario for Preble County is to construct a Grinder Collection system and construct its own new mechanical treatment plant – extended aeration system. A revised funding table would need to be developed as the construction cost would increase.

## Table 1-1: Funding Summary

BASE PROJECT (192 CUSTOMERS)

#### BASE + ADDTL. AREAS (321 CUSTOMERS)

			OPWC/EPA Loan	RD Grant/Loan	OPWC/EPA Loan	RD Grant/Loan
CUSTOMERS/EDUs		192	192	321	321	
PROJECT COST- Collection System			\$2,820,540	\$2,820,540	\$4,907,147	\$4,907,147
PROJECT COST- Treatment System			\$444,118	\$444,118	\$444,118	\$444,118
TOTAL PROJECT COST			\$3,264,658	\$3,264,658	\$5,351,265	\$5,351,265
ANNUAL O,M&R			\$93,000	\$93,000	\$102,000	\$102,000
FINANCING						
CDBG Formula Grant			\$30,000	\$30,000	\$30,000	\$30,000
Residential Public Infrastructure Grant			\$480,000	\$480,000	\$480,000	\$480,000
OPWC Grant			\$400,000	\$400,000	\$400,000	\$400,000
Unsewered Area Assistance Program			\$250,000	\$250,000	\$250,000	\$250,000
Local Funds - Capacity Fee \$2,000/Cus	stome	r	\$0	\$0	\$0	\$0
Rural Development Grant (up to 35% o	f Proje	ect Cost)	\$0	\$1,142,630	\$0	\$1,872,943
OPWC Loan	30	0.00%	\$800,000	\$400,000	\$800,000	\$800,000
OWDA Loan	30	2.00%	\$0	\$0	\$0	\$0
OEPA WPCLF Loan	30	0.00%	\$1,304,658	\$0	\$3,391,265	\$0
Rural Development Loan	40	2.75%	\$0	\$562,028	\$0	\$1,518,322
Total Financing		\$3,264,658	\$3,264,658	\$5,351,265	\$5,351,265	
ANNUAL DEBT				1		I
Annual OPWC Payment			\$26,667	\$13,333	\$26,667	\$26,667
Annual OWDA Payment			\$0	\$0	\$0	\$0
Annual OEPA WPCLF Payment			\$43,489	\$0	\$113,042	\$0
Annual Rural Development Payment			\$0	\$23,342	\$0	\$63,058
ANNUAL DEBT PAYMENT			\$70,155	\$36,675	\$139,709	\$89,725
DEBT PAYMENT PER MONTH PER E	DU		\$30.45	\$15.92	\$36.27	\$23.29
O,M&R PAYMENT PER MONTH PER	EDU		\$40.36	\$40.36	\$26.48	\$26.48
TOTAL PAYMENT PER MONTH PER EDU		\$70.81	\$56.28	\$62.75	\$49.77	

#### Chapter 2 - Introduction

#### Background

In accordance with the Water Pollution Control Act amendments of 1972, the Miami Valley Regional Planning Commission (MVRPC) serves as the Designated Water Quality Planning Agency for the 5-county Miami Valley Region. In this role, MVRPC prepared and continually maintains an Areawide Water Quality Management Plan (AWQMP), also known as the 208 Plan. Also, under Section 208 of the EPA's Clean Water Act, MVRPC has the responsibility for reviewing and approving individual Wastewater Treatment Facility Plans and their associated Facility Planning Areas. Within the AWQMP for Preble County, the Glenwood Area, among other communities, was designated as a localized area of concern as noted by the Preble County Combined Health District, Preble County Soil and Water Conservation District and Ohio EPA as a result of failing septic systems

In 2014, MVRPC received a grant sponsored by Ohio EPA to evaluate and provide wastewater collection and treatment alternatives for several communities within the 5-county region agreeing to take part in the study. The Preble County Commissioners selected to participate in this study identifying the Glenwood Area. This report is the result of that commitment.

On January 27, 2015 the Preble County Commissioners received Ohio EPA Findings and Orders from the Division of Surface Water for the discharge of raw or partially treated sewage from failing septic systems in the Glenwood area causing a public health nuisance. These Findings and Orders allow eighteen (18) months from the effective date of these orders to submit to the Ohio EPA for approval a General Plan for sewage improvements or other methods of abating pollution and correcting the unsanitary conditions, pursuant to ORC Chapter 6111.

#### **Objective**

The primary objective of this study is to provide a cost-effective and environmentally sound wastewater collection and treatment system for Preble County's Glenwood planning area. As noted in the EPA's Findings and Orders, the General Plan shall address, at a minimum, the following items:

- a. Alternatives for addressing the unsanitary conditions in the affected areas, including, but not limited to the following options:
  - *i.* Provisions of a sanitary sewer collection system and a new wastewater treatment plant with a proposed discharge location or
  - *ii.* Provision of a sanitary sewer collection system for the affected area with connection to existing sewers and directing sanitary sewage flows to the nearest regional wastewater treatment plant.

- b. The chosen alternative must include:
  - *i.* Proposed locations of collection and treatment facilities;
  - *ii.* Cost estimates for the required improvements and cost effectiveness analysis of the alternatives based on a total present worth. The cost effectiveness analysis must include the total construction costs of each alternative as well as operation, maintenance, and replacement costs, and should use the following assumptions:
  - iii. The analysis must be for a twenty (20) year period; and
  - *iv.* Assume an interest rate of 6.5% per annum
  - v. The financial mechanisms to be used to fund the required improvements, as well as the operation, maintenance, and replacement costs;
  - vi. An implementation schedule for submitting a complete permit to install (PTI) application and approvable detail plans, awarding construction bids, starting and completing construction, and attaining compliance with ORC Chapter 6111 and the administrative rules promulgated thereunder.

The design of a sewer system will take into account growth and development of the area. The new system will meet these requirements as established by the Ohio EPA.

### Planning Area

The Glenwood Area is a small unincorporated community located in the center of Preble County. Glenwood is located along US 35 between the City of Eaton and the Village of West Alexandria.

For the purpose of this study, the Glenwood Area is divided into five separate areas. The limit of the base area was **determined by the limits of a gravity sewer system.** The locations of these areas are shown in Figure 2-1. Table 2-1 provides the locations and number of homes located in the alternate areas.

#### Table 2-1: Alternate Areas

AREA	LOCATION	NUMBER of HOMES
1	West Side of Glenwood Along SR 35 and Yost Rd.	31
2	Quinn Rd.	32
3	Stover Rd.	18
4	Rebecca Dr. and Vanessa Dr. (Stoneridge)	48
BASE	Remaining Area in Glenwood	192

#### Scope of Study

A brief summary of the scope of this study is presented below. The planning period for this study is 25 years or through the year 2040, exceeding OEPA's requirement for a 20 year analysis.

<u>Data Collection and Review</u> - Data relevant to the Planning Area was collected, reviewed and analyzed. This data included previous studies concerning wastewater needs, OEPA documented inspection and water quality data.

<u>Develop Population & Sewer Needs Forecasts</u> – Based on historical and existing population data, the projected future wastewater needs for the designated study area over a 25-year planning period was developed.

Factors such as cost, environmental impacts, regulatory and permitting requirements must be taken into consideration when evaluating wastewater collection and treatment alternatives.

<u>Develop and Evaluate Alternatives</u>- In establishing the criteria for the design of wastewater systems, several factors were considered. These included the length of time the facilities should serve before replacement or expansion is necessary, the population to be served, the type of customers to be served (i.e. residential, commercial, industrial, etc.) and the projected wastewater flows ( both average daily and peak hourly flows) over the span of the planning period.

<u>Draft Report</u>- Based on the work generated in the above tasks, a Draft Report summarizing the findings and recommendations is to be prepared. The draft report will be reviewed with Preble County and other stakeholders and comments/ feedback will be incorporated into the Final Report.

<u>Final Report</u>- After review of the draft report and revisions made pursuant to comments received, a final report will be prepared and delivered to Preble County, MVRPC, and the Ohio EPA.

#### Methodology

Brief descriptions of the methods used in the preparation of this study are shown below.

<u>Study Area Boundary</u>- The general study area was determined by MVRPC and was refined during the first steering committee meeting.

<u>Projections of Sewer Needs for the Study Area -</u> The following calculations were used to determine the average daily flow and the peak hourly flow.

<u>Wastewater Systems</u> Average Daily Flow = Population x 100 gallons/day/person Peak Hourly Flow = Average Daily Flow x 4.0 peaking factor



#### **Chapter 3 - Existing Conditions**

#### **Existing Water Systems**

There is one water main in the area owned and operated by the City of Eaton. The water main goes along US 35 and up Julie Drive and serves a few customers. The remaining residences and commercial establishments in the Glenwood Area receive their drinking water from private wells. With shallow private wells, there is potential for contamination with the onsite septic systems failing. The installation of a centralized wastewater system will help in preservation the drinking water in the area.

#### **Existing Wastewater Systems**

A centralized collection and treatment system does not exist within the Glenwood Area. Each residence and business is responsible for its own on-site treatment system. Many of these on-site systems are comprised of steel or masonry septic tanks with minimal leaching fields or even direct or indirect connections to drainage tiles. Many of these on-lot treatment systems are failing and discharging raw or partially treated sewage to drainage swales which finds its way into the water table and adjacent streams. These systems do not meet Ohio EPA discharge standards.

OEPA sampled tributaries of Bantas Fork in Glenwood on May 26, 2010 for E.coli bacteria with the intent to sample again within 30 days. Stream conditions and/or staff commitments did not allow samples to be obtained with 30 days. On August 7, 2013 sampling was again conducted, this time within 2 hours of each other. The results, as noted below in Table 3-1, demonstrated that a public health nuisance does exist in Glenwood with unsanitary conditions in violation of Ohio's general water quality criteria set forth in OAC Rule 3745-1-04.

## Table3-1: OEPA Water Sample Results

Site Location	Date/Time	E. coli Result #/100 mL	Field Observation/Description	Location
1	8/7/13 9:00 AM	179	Slight odor Clear – no color Algae	Upstream of pond at 2937 US 35
1	8/7/13 11:05 AM	261	Slight odor Clear – no color Algae	Upstream of pond at 2937 US 35
2	8/7/13 9:15 AM	8700	Slight odor Greyish color	West side of bridge on Quaker Trace Rd. approx. 300' south of Sample Dr.
2	8/7/13 11:15 AM	5700	Slight odor Greyish color	West side of bridge on Quaker Trace Rd. approx. 300' south of Sample Dr.
3	8/7/13 9:20 AM	3910	Slight odor Clear – no color Sludge deposits	1200' Est of intersection of Quaker Trace Rd. and US 35 (south side)
3	8/7/13 11:21 AM	5510	Slight odor Clear – no color Sludge deposits	1200' Est of intersection of Quaker Trace Rd. and US 35 (south side)
4	8/7/13 9:30 AM	3580	Slight odor Clear – no color Algae	Trib. ½ mile South of US 35 on west side of Stover Rd.
4	8/7/13 11:31 AM	3440	Slight odor Clear – no color Algae	Trib. ½ mile South of US 35 on west side of Stover Rd.

#### **Environmental Conditions**

The environmental conditions in Preble County and the study area are important factors in determining the wastewater collection and treatment alternatives that are viable for the study area. The environmental conditions are analyzed in the following sections.

#### Soils

The majority of the study area is located within two soil classifications; the soils within the Glenwood Area generate the Celina and Kokomo soil groups. The following information is generated from the United States Department of Agriculture National Resource Conservation Service. Figure 3-1, shows all the soil associations within the Glenwood planning area.

The Celina soil group has two associations in this area: Celina silt loam and Crosby-Celina silt loams. The dominant soil classification is the Celina silt loam. This soil has a slope ranging from 2-6 percent. The slight slope leads this classification to have a moderately well drained natural drainage class. A slight slope also leads to the soil having little to no flooding or ponding. The depth to the water table is from 12-30 inches below the surface. The available water storage in profile is about 6.4 inches, which is a moderate rating.

The Crosby-Celina silt loams soil in the area has a slope ranging from 0-2 percent. These slopes help generate a somewhat poorly drained natural drainage class. The depth to the water table is from approximately 6-18 inches. The runoff has a medium rating which helps create little to no flooding or ponding. The available water storage in profile has a low rating with the ability to store about 5.3 inches of water.

The second soil classification of Kokomo silt loam has a slope ranging only from 0-1 percent. The low slope in the soil creates a very poorly drained drainage class. There is frequent ponding with this soil type. This indicates the depth of the water table is very shallow ranging from 0 - 6 inches. Also, the amount of available water storage in profile has a high rating with about 11.7 inches of storage.

#### Topography

The topography for the Glenwood Area has a general downward slope from the City of Eaton toward the Village of West Alexandria. The highest elevation in the area is approximately 1030 feet on the west side and the lowest elevation is about 930 feet on the east side of the area. The distance between these two areas is roughly 2.3 miles. As such, there is a general 0.8 percent slope across the planning area.

The bedrock in the area slopes down from the west to the east similarly to the topography. The Highest elevation of the bed rock is 928 feet, which is located in the western part of the Area. The lowest bedrock elevation of 835 is also located at the eastern end of the Area. The average depth to the bedrock is 100 feet. Figures 3-2 and 3-3 indicate the elevation of the bedrock in the Area.

#### Surface Water

There is one identifiable body of water within the area. It is an Exceptional Warm Water Habitat known as Lower Bantas Fork. This stream is located just west of the Glenwood Area. Bantas Fork flows southeasterly for approximately 3 miles until it joins Twin Creek. Bantas Fork has a good Invertebrate Community Index with a drainage area of 7,279 acres as identified in the *Updated Twin Creek Watershed Action Plan* dated April, 2010 and *Biological and Water Quality Study of Twin Creek and Selected Tributaries 1995* (see appendix). Bantas Fork could be used as a possible discharge point for a future wastewater treatment plant depending on stream flow of the creek. Additional coordination with the Ohio EPA will be required for discharge limitations to Bantas Fork.

#### Wetlands

There are a few wetlands identified by the National Wetlands Inventory Program in the area. These wetlands do not interfere with the planning of the collection or treatment systems. The location of these wetlands can be found in Figure 3-4.

#### Flood Hazard Area (100 yr. flood plain)

Flood plains are formed by the periodic overflow of the stream and its resulting sediment deposition and realignment of the stream course. They are characteristically flat and fertile, and can extend over large areas of land.

Although flood plains are often perceived as desirable development sites, they are potentially hazardous in terms of loss of life, property, and land. The 100-year flood reoccurrence interval is most commonly accepted as a reasonable measure of flood-prone areas. Figures 3-5 and 3-6 show the aerial extent of the 100-year flood of the Bantas Fork stream and its tributaries, as identified on the Federal Emergency Management Agency (FEMA) map.

#### Land Use

The planning area has three different land categories. The three different categories for this study are residential, vacant/agriculture, and commercial. Figure 3-7 shows the locations of each of the land categories.

The residential category, which is the largest, is comprised of single-family dwellings, multifamily dwellings, and vacant residences with a potential of human habitation. The primary residential area lies on the main roads in the area. Residential land use in the planning area is comprised of approximately 473 acres, which is 61 percent of the total area.

The second largest land use category, vacant/agriculture, is composed of 192 acres and is approximately 24 percent of the land. The majority of this land is located just off of the main roads in the area.

Commercial land comprises the third largest percentage of acres in the planning area. Commercial land is located along SR 35. This land is comprised of lots used to conduct business instead of homes. Commercial land use makes up approximately 15 percent of the planning area and contains approximately 115 acres.

LAND USE TYPE	ACREAGE	PERCENTAGE
Residential	473	61
Vacant/ Agriculture	192	24
Commercial	115	15
Total	780	100

#### Table3-2: Existing Land Use









#### NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. I does not necessarily identify all areas subject to flooding, particularly from coal drainage acources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information. obtain more detailed information in areas where Base Flood Elevation To obtain more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded which of tool elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevations. Accountingf, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or flood plan management.

pastal Base Flood Elevations shown on this map apply only landward of 0.0 oth American Vertical Datum of 1998 (NAVD 85). Users of this FIRM ould be aware that coastal flood dievations are also provided in the Summary of illneter: Elevations table in the Thood Insurance Dudy report for this privid-blown values shown in the Summary of Situlater Elevations table should be used for n and/or floodplain management purposes when they are higher than ns shown on this FIRM.

bundaries of the **floodway** were computed at cross sections and interpolated treeen cross sections. The floodways were based on hydiaulic considerations for egard to requirements of the National Flood humannee Program Floodway drits and other perinant floodway data are provided in the Flood Insurance udy report for this jurisdiction.

ertain areas not in Special Flood Hazard Areas may be protected by flood introl structures. Refer to Section 2.4 "Flood Protection Measures" of the cod Insurance Study report for information on flood control structures for

ma presentation. The projection used in the preparation of this map was Chio State Plane South core 5001 (FIPSZCHE 3402). The horizontal datum was NAD63. Differences in datum, aphenois, projection or state plane zones used in the production of FIRMs for adjacent jurisdictions may result in slipht positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

accuracy of this Finds. Tool elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and regarding conversion between the National Caodelic Vertical Datum of 1920 Survey vehicle at http://www.ngs.noas.gov/ or contact the National Geodetic Survey ut the following address:

IGS Information Services IOAA, N/NGS12 lational Geodetic Survey SMC-3, #9202 1315 East-West Highway 19ver Spring, Maryland 20910-3282 101) 713-3242

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit website at http://www.ngs.noaa.gov/.

Lase Map information shown on this FIRM was derived from multiple sources, ase map files were provided in digital format by Preble Country GIS Department, Inded States Geologic Survey, National Geoderic Survey, and the Chio expantment of Transportation. Additional information was photogrammetifically ompiled at a scalar of 112.000 from lending photography dated 2005.

Interest on a scale of 1.2.200 from and up-to-date stream channel configurations have been been on the previous PIRM for this jurisdiction. The floodplains and odways that were transferred from the previous PIRM may have been djusted to conform to these new stream channel configurations. As a result the load Prefiles and Floodway Data tables in the Flood Insurance Study record which contains authoritative hydraulic data) may reflect stream channel distances have define times value have have the at differ from what is shown on this map.

Propreta limits shown on this may are based on the best data available at the e of publication. Because changes due to annexations or de-annexations y have occurred after this may was published, may users should contact propriate community officials to verify current corporate limit locations.

Please refer to the separately printed Map Index for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

community is located. Contact the FEMA Nap Service Center at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change. a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center topot, mander by Fax at 1-800-358-9620 and its website at the previously issued by the service Center of the service Center topot, service Center of the service Center of the service Center the previousless of the service Center of the service Center of the the previousless of the service Center of the service Cente

If you have questions about this map or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

The **Profile Baseline** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **Profile Baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

## PANEL INDEX





JOINS PANEL 0265 707<sup>000 M</sup>E

84° 33' 45.0"

