

**MIAMI VALLEY REGIONAL  
PLANNING COMMISSION SANITARY  
SEWER FEASIBILITY STUDY  
FINAL REPORT  
JULY, 2015**

Prepared for:

**The Village of Bowersville**

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**MIAMI VALLEY**  
Regional Planning Commission

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Public Involvement Summary

Steering Committee Meeting Agenda #1 October 20, 2014

Steering Committee Meeting Minutes #1 October 20, 2014

Steering Committee Meeting Agenda #2 December 15, 2014

Steering Committee Meeting Minutes #2 December 15, 2014

Steering Committee Meeting Agenda #3 March 16, 2015

Steering Committee Meeting Minutes #3 March 16, 2015

Public Meeting Handout

Public Meeting Minutes June 23, 2015

Press Release

Environmental Overview

## 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	Operation and Maintenance

## Chapter 1 - Executive Summary

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### 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 Village of Bowersville. 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 the Village of Bowersville for the purpose of future planning needs. The Village of Bowersville 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)
- Regionalize with Port William
- Transport Wastewater to Jamestown's WWTP
- Extended Aeration
- Lagoon
- Packed Bed Media Filter

### Conclusion

All of the different collection and treatment alternatives, listed above, were analyzed into many different scenarios. Each scenario looked at the cost of the project, operation and maintenance, and different environmental factors. All of these factors helped determine a best case scenario for the Village of Bowersville.

## Recommendation

After considering the economic cost-effective analysis and the environmental conditions, the following regional solutions are recommended:

The Village of Bowersville should install a gravity collection system with necessary pump stations and force mains to a new lagoon treatment facility stationed just outside of the Village of Bowersville. The Village of Port William is shown as an option in the funding scenario because if Port William is willing to regionalize with Bowersville, the number of treatment customers increase. Since the number of customers for the treatment plant increases the cost will decrease when regionalizing.

In order to design and construct a regional gravity sewer collection system and lagoon treatment system, the following funding plan is proposed:

Table 1-1: Funding Summary

			BOWERSVILLE ONLY	BOWERSVILLE W/ PORT WILLIAM
<b>CUSTOMERS/EDUs</b>			155	155
<b>PROJECT COST- Collection System</b>			\$2,186,617	\$2,186,617
<b>PROJECT COST- Treatment System*</b>			\$930,600	\$781,740
<b>TOTAL PROJECT COST</b>			\$3,117,217	\$2,968,357
<b>ANNUAL O,M&amp;R</b>			\$30,900	\$30,900
<b>FINANCING</b>				
CDBG Formula Grant			\$50,000	\$50,000
Residential Public Infrastructure Grant			\$480,000	\$480,000
OPWC Grant			\$400,000	\$400,000
Unsewered Area Assistance Program			\$500,000	\$500,000
Local Funds - Capacity Fee \$3,000/Customer			\$465,000	\$465,000
OPWC Loan	30	0.00%	\$800,000	\$800,000
OWDA Loan	30	2.00%	\$422,217	\$273,357
<b>Total Financing</b>			<b>\$3,117,217</b>	<b>\$2,968,357</b>
<b>ANNUAL DEBT</b>				
Annual OPWC Payment			\$26,667	\$26,667
Annual OWDA Payment			\$18,852	\$12,205
<b>ANNUAL DEBT PAYMENT</b>			<b>\$45,519</b>	<b>\$38,872</b>
<b>DEBT PAYMENT PER MONTH PER EDU</b>			<b>\$24.47</b>	<b>\$20.90</b>
<b>O,M&amp;R PAYMENT PER MONTH PER EDU</b>			<b>\$16.61</b>	<b>\$16.61</b>
<b>TOTAL PAYMENT PER MONTH PER EDU</b>			<b>\$41.09</b>	<b>\$37.51</b>

\* Bowersville's share of enlarged treatment system is 60% of \$1,302,900 or \$781,740

## Chapter 2 - Introduction

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### 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 Greene County, the Village of Bowersville, among other communities, was designated as a localized area of concern as noted by the Greene County Combined Health District, Greene 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 Village of Bowersville elected to become one of the study participants. This report is the result of that commitment.

### Objective

The objective of this study is to provide a cost-effective and environmentally sound wastewater collection and treatment system for the Village of Bowersville planning area. The design of the system will take the growth and development of the area into consideration. The new system will meet the requirements established by the Ohio Environmental Protection Agency.

### Planning Area

The Village of Bowersville is a small incorporated village located in the southeastern corner of Greene County in Jefferson Township. Bowersville is located approximately 11 miles northeast of Wilmington (Clinton County seat) and 6 miles south of the Village of Jamestown. It has direct access to Interstate 71, being one mile south with State Route 72 as the primary route through the Village.

The planning area for Bowersville includes all property within the corporation limits of Bowersville as well as adjacent residential properties located just outside of the Village limits covering an area of approximately 0.27 square miles. There are currently 132 homes within the Village boundaries and an additional 26 homes and an abandoned elementary school, located just outside of the Village in Jefferson Township. Figure 2-1 illustrates the planning area for the Village of Bowersville.

## 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.

Data Collection and Review - Data relevant to the Planning Area was collected, reviewed and analyzed. This data included previous studies concerning wastewater needs.

Develop Population & Sewer Needs Forecasts – 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.

Develop and Evaluate Alternatives- 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.

Draft Report- 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 the Village and other stakeholders and comments/ feedback will be incorporated into the Final Report.

Final Report- After review of the draft report and revisions made pursuant to comments received, a final report will be prepared and delivered to the Village, MVRPC, and the Ohio EPA.

## Methodology

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

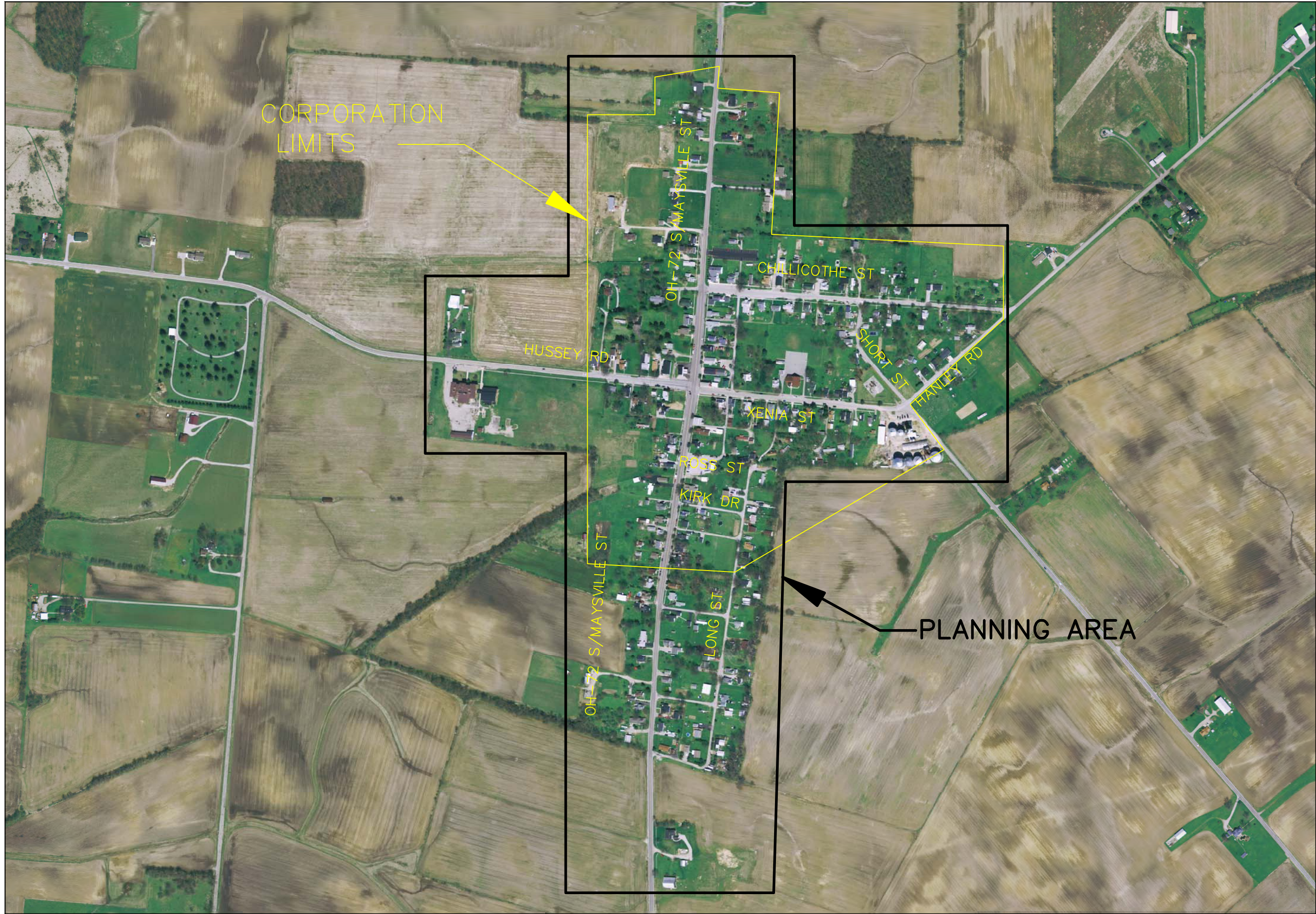
Study Area Boundary- The general study area was determined by MVRPC and was refined during the first progress meeting.

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

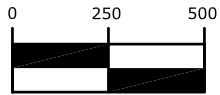
### Wastewater Systems

Average Daily Flow = Population x 100 gallons/day/person

Peak Hourly Flow = Average Daily Flow x 4.0 peaking factor



GRAPHIC SCALE



( IN FEET )  
1 inch = 500 ft.



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SUBMISSION:

VILLAGE OF BOWERSVILLE  
MVRPC  
UNSEWERED  
COMMUNITIES

SHEET TITLE:

PLANNING AREA

FIGURE 2-1

## Chapter 3 - Existing Conditions

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### Existing Water Systems

The Village of Bowersville owns and operates its own public water treatment and distribution system (PWSID # OH 2900212). The system was constructed in the early 1950s. Water supply is groundwater, with two wells pumping between 62 – 76 gpm at a depth of approximately 150 feet located near the plant approximately half a mile northeast of the Village of Bowersville. The only treatment at the plant is the addition of chlorine, otherwise it is raw groundwater. One elevated water storage tank at a volume of 110,000 gallons is located in the eastern part of the Village near the intersection of Xenia Street and Orchard Grove Road.

Bowersville has a part-time Class 1 plant operator. Currently, water is not metered to individual residents and a flat rate billing system is used (Although not within the scope of this study, flat rate billing is generally not a preferred practice as it does not promote water conservation. Bowersville should consider a separate project to install individual water meters so that a usage based billing rate can be implemented. For budgeting purposes, Bowersville should consider a unit price of \$800 per connection to cover material and installation costs as well as non-construction costs such as engineering, design, permitting, and bidding services. Based on 155 customers, the budgeted estimate is \$124,000. Ohio EPA would likely provide funding assistance in the form of a partial grant and zero percent loan as it is a construction type project). ).

Water distribution within the Village is generally 4-inch to 8-inch Ductile Iron. The Village also has fire hydrants located throughout the Village. The spacing of these hydrants is adequate spacing for fire protection.

The following table shows monthly water usage data for the Village of Bowersville as submitted to the Ohio EPA. This table generally shows an average daily water usage for the service area of approximately 28,000 Gallons Per Day (GPD). Figure 3-1 shows the layout of the existing water system, which was provided by the Village of Bowersville.

Table 3-1: Monthly Water Usage

Month	Total (MG)	Max (mgd)	Min (mgd)	Avg. (mgd)
Jan.	1.471	0.063	0.024	0.047
Feb.	1.140	0.056	0.032	0.040
Mar	0.795	0.043	0.015	0.026
Apr	0.730	0.052	0.013	0.024
May	0.805	0.038	0.000	0.026
Jun	0.830	0.040	0.013	0.028
Jul	0.810	0.055	0.019	0.026
Aug	0.786	0.085	0.018	0.025
Sep	0.672	0.036	0.015	0.022
Oct	0.700	0.036	0.015	0.023
Nov	0.742	0.038	0.011	0.025
Dec	0.912	0.033	0.020	0.026
<b>TOTAL</b>	<b>10.393</b>	<b>0.085</b>	<b>0.000</b>	<b>0.028</b>

### Existing Wastewater Systems

A centralized collection and treatment system does not exist within the Village of Bowersville. 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.

### Environmental Conditions

The environmental conditions in Greene 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 three soil classifications; the soils within the Village of Bowersville generate the Brookston-Miamian-Celina Association. The following information is generated from the United States Department of Agriculture National Resource Conservation Service. Figure 3-2 shows all the soil associations within the Bowersville planning area and an outline of the village boundaries.

The Brookston soil series is the dominant soil series covering approximately 42 percent of the planning area. The slope for this soil is primarily a flat terrain with a slope ranging

from 0-2 percent. These slopes help generate poorly drained quality of the soil. The water table is shallow, ranging from 0-12 inches below the surface. The runoff is slow and ponding is a frequent occurrence. If there is artificial drainage, farming is the primary use for the soil. The available water storage in the soil profile is about 8.1 inches, which is a moderate rating.

The second leading soil in the planning area is Miamian silt loam. The soil slope is steeper than the Brookston series, with a range of 2-6 percent slope. The steeper slope leads to this series having a well drained drainage class. This soil class also has little to no flooding or ponding in this area. Within the planning area there is also an eroded Miamian silt loam. A main difference between the two classes is the depth to the water table. The depth to the water table for the eroded Miamian silt loam is 30 to 42 inches and for the Miamian silt loam the depth ranges from 24 to 36 inches. Both of these classes have a low available water storage in profile of about 5.4 inches.

Celina silt loam is the last of the major soils represented in the planning area. One factor that leads to a moderately well drained drainage class is having a soil slope range of 2-6 percent slope. A medium runoff class allows there to be little to no flooding or ponding for this class of soil. The depth to the water table is approximately 12 to 30 inches below the surface. This soil has a moderate available water storage in its profile which is about 6.4 inches. Like the Brookston and Miamian soil series the Celina silt loam's main land classification is prime farmland.

Figure 3-3 indicates the bedrock in the area on the Area Bedrock Topography map.

## **Topography**

Topography is relatively flat with a slight slope from the east side of town going down toward the west. The highest elevation in the study area is 1110 feet on the east side and the lowest elevation is 1080 feet located on the west side over a distance of approximately a half mile. As such, there is a general 1 percent slope across the planning area.

## **Surface Water**

There is only one identifiable body of water within the area. It is a small intermittent stream known as Love Run, located west of the Village. Love Run flows southwesterly for approximately 3 miles until it joins Grassy Run at the Anderson Fork near the Village of Port William. This stream could be a possible discharge point for a future wastewater treatment plant.

## **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. Figure 3-5 shows the aerial extent of the 100-year flood of the Love Run 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: 3-6 shows the locations of each of the land categories.

The residential category, which is the largest, is comprised of single-family dwellings, multi-family dwellings, and vacant residences with a potential of human habitation. The primary residential area lies within the corporation limits of the Village of Bowersville with additional residential areas just outside of the corporation limits. Residential land use in the planning area is comprised of approximately 134 acres, which is 77 percent of the total area.

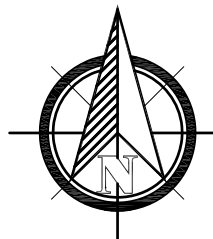
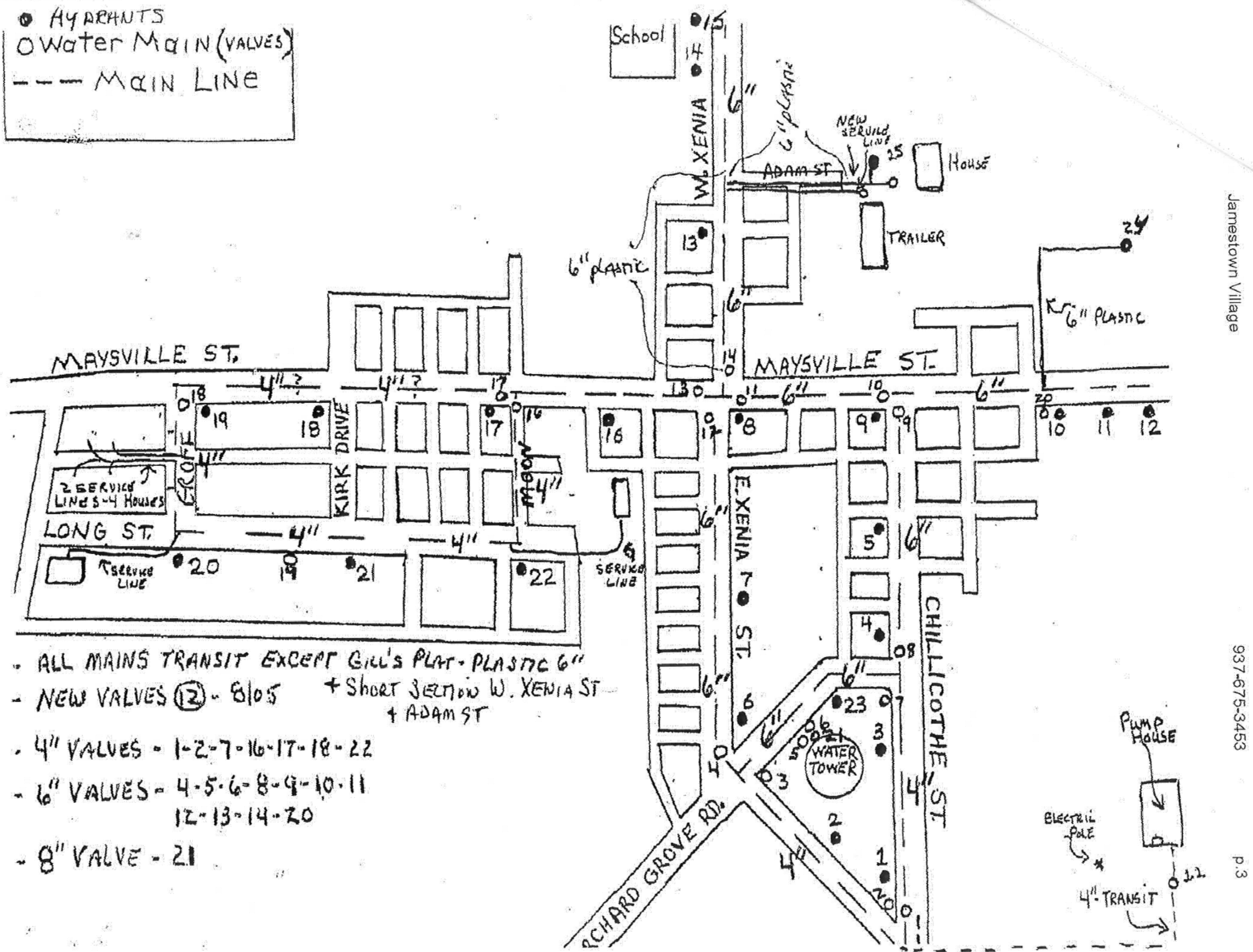
The second largest land use category, vacant/agriculture, is composed of 30 acres and is approximately 17 percent of the land. The majority of this land is located outside of the corporation limits of the Village of Bowersville.

Commercial land comprises the third largest percentage of acres in the planning area. Commercial land is located mostly within the Village of Bowersville along major thoroughfares. This land is comprised of lots used to conduct business instead of homes. Commercial land use makes up approximately 6 percent of the planning area and contains approximately 11 acres.

**Table3-2: Existing Land Use**

<b>LAND USE TYPE</b>	<b>ACREAGE</b>	<b>PERCENTAGE</b>
Residential	134	77
Vacant/ Agriculture	30	17
Commercial	11	6
Total	175	100

● HYDRANTS  
 ○ Water Main (VALVES)  
 --- MAIN LINE



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 COMMUNITIES

SHEET TITLE:

EXISTING WATER  
 SYSTEM

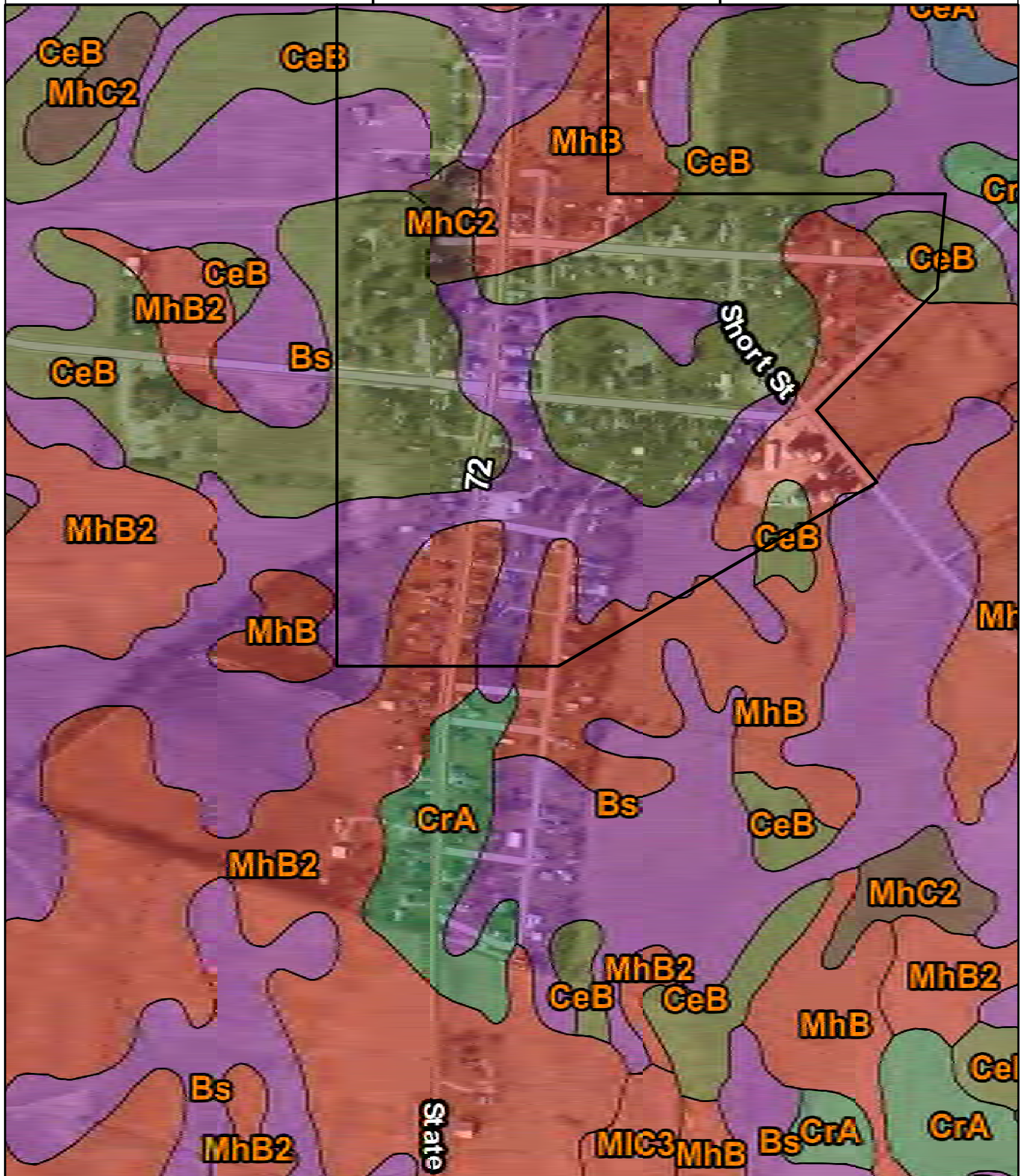
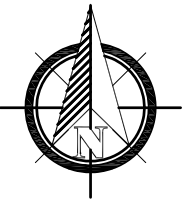
FIGURE 3-1



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VILLAGE OF BOWERSVILLE  
**MVRPC UNSEWERED  
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FIGURE 3-2: AREA SOILS

GRAPHIC SCALE  
0 237.5 475  
( IN FEET )  
1 inch = 475 ft.



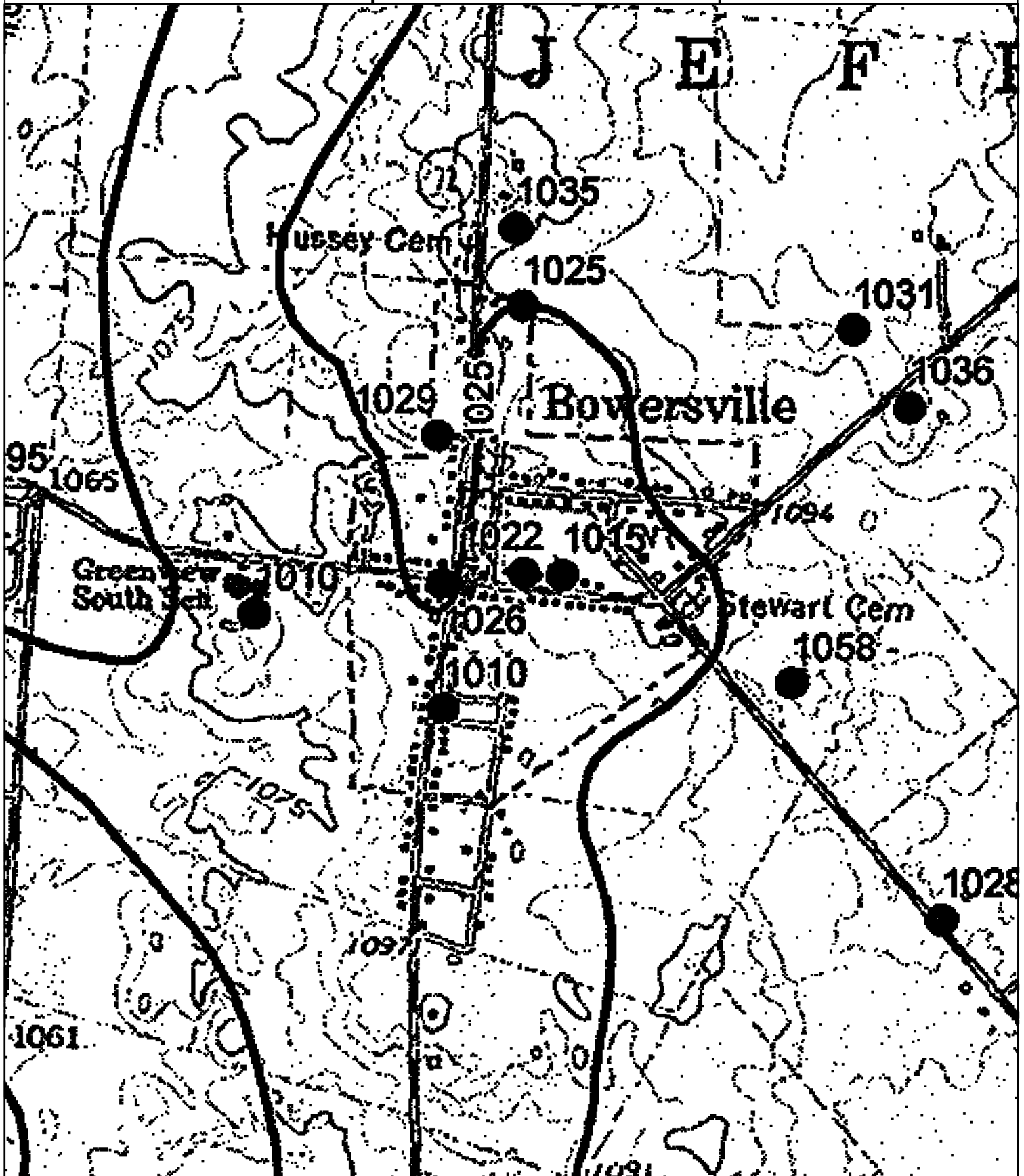
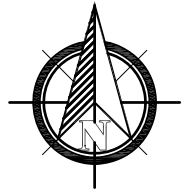


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FIGURE 3-3: AREA BEDROCK TOPOGRAPHY MAP

GRAPHIC SCALE  
0 400 800  
( IN FEET )  
1 inch = 800 ft.

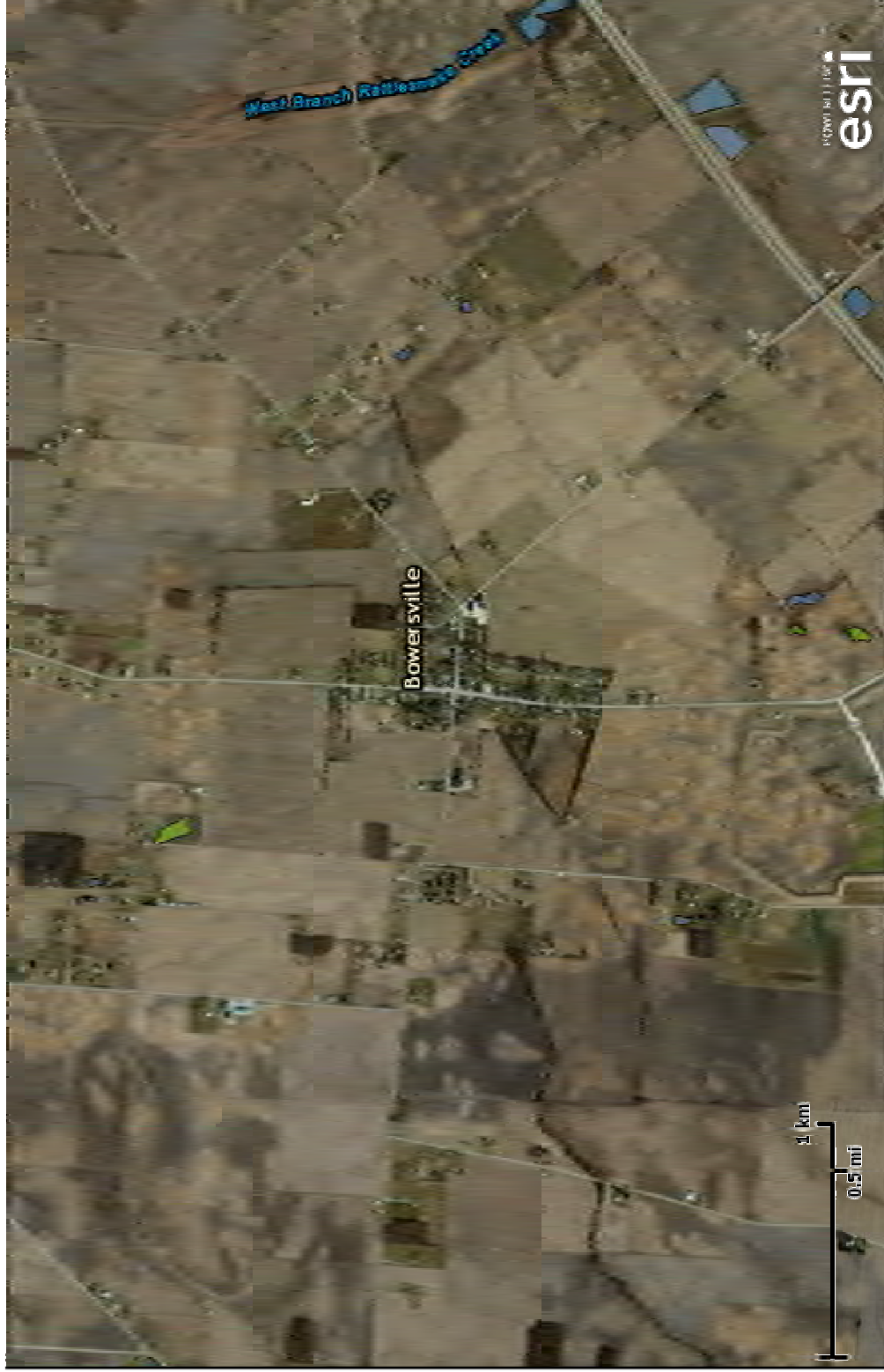




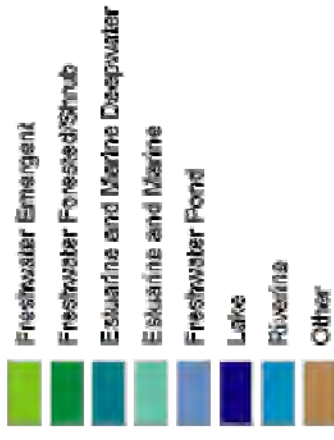
# U.S. Fish and Wildlife Service National Wetlands Inventory

Village of  
Bowersville

Nov 18, 2014



## Wetlands



User Remarks:

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

FIGURE 3-4: WETLANDS