

# **Fulton County Water Supply and Demand Analysis**

## **Final Report**

Fulton County Commissioners  
152 South Fulton Street  
Wauseon, Ohio 43567

July 2012

Presented 10/03/2012

## Background

### ➤ **Current Fulton County Service Areas:**

1. Amboy/Fulton/Royalton TWP – unincorporated areas
2. York TWP – unincorporated areas
3. Village of Metamora
4. Swancreek TWP – Swancreek Water District
5. Clinton/German TWP – unincorporated areas
6. Dover/Clinton TWP – unincorporated areas

### ➤ **Fulton County Water Supply:**

- City of Toledo/Lucas County
- Village of Archbold
- City of Wauseon

### Background

- City of Toledo and Lucas County evaluation of Regional Water System.
- Fulton County evaluation of water supply from current local resources and modifying Toledo/Lucas County connection to emergency supply.
- Fulton County water supply (Phase I) evaluation:
  - Current and Year 2035 water demands for Fulton County & City of Napoleon.
  - Amount of available groundwater and surface water sources.

## Fulton County Incorporated Areas Summary

Village or City	Water Source
Archbold	Tiffin River, Brush Creek and off-stream holding reservoirs
Delta	Bad Creek and off-stream holding reservoirs
Fayette	Groundwater Wells
Lyons	Purchases from Wauseon
Metamora	Purchases from Toledo/Lucas County
Swanton	Swan Creek and off-stream holding reservoirs
Wauseon	Big Ditch, Stuckey Ditch, Maumee River, and off-stream holding reservoirs
Napoleon (Henry County)	Maumee River and off-stream holding reservoir

## Fulton County Unincorporated Areas Summary

<b>Rural Water System</b>	<b>Water Source</b>
<b>Swanecreek Rural Water District</b>	Purchased from Toledo/Lucas County
<b>Ai</b>	Purchased from Toledo/Lucas County
<b>Assumption</b>	Purchased from Toledo/Lucas County
<b>Elmira/Burlington</b>	Purchased from Archbold
<b>Pettisville</b>	Purchased from Archbold
<b>Tedrow/Ottokee</b>	Purchased from Wauseon

## Fulton County Water Supply and Demand Analysis

<b>Fulton County Population Data</b>			
<b>Year</b>	<b>Population (US Census)</b>	<b>Population Change</b>	<b>Percent Change</b>
<b>1980</b>	37,751	N/A	N/A
<b>1985</b>	37,833	82	0.22%
<b>1990</b>	38,601	768	2.03%
<b>1995</b>	40,527	1,926	4.99%
<b>2000</b>	42,136	1,609	3.97%
<b>2005</b>	42,638	502	1.19%
<b>2010</b>	42,669	31	0.07%
<b>Average Annual Increase =</b>		164	
<b>2015</b>	43,489	820	1.92%
<b>2020</b>	44,309	820	1.89%
<b>2025</b>	45,129	820	1.85%
<b>2030</b>	45,949	820	1.82%
<b>2035</b>	46,769	820	1.78%
<b>Average 5 Year Increase: 164 X 5 = 820 people</b>			

**Henry County and Napoleon Population Growth Data**

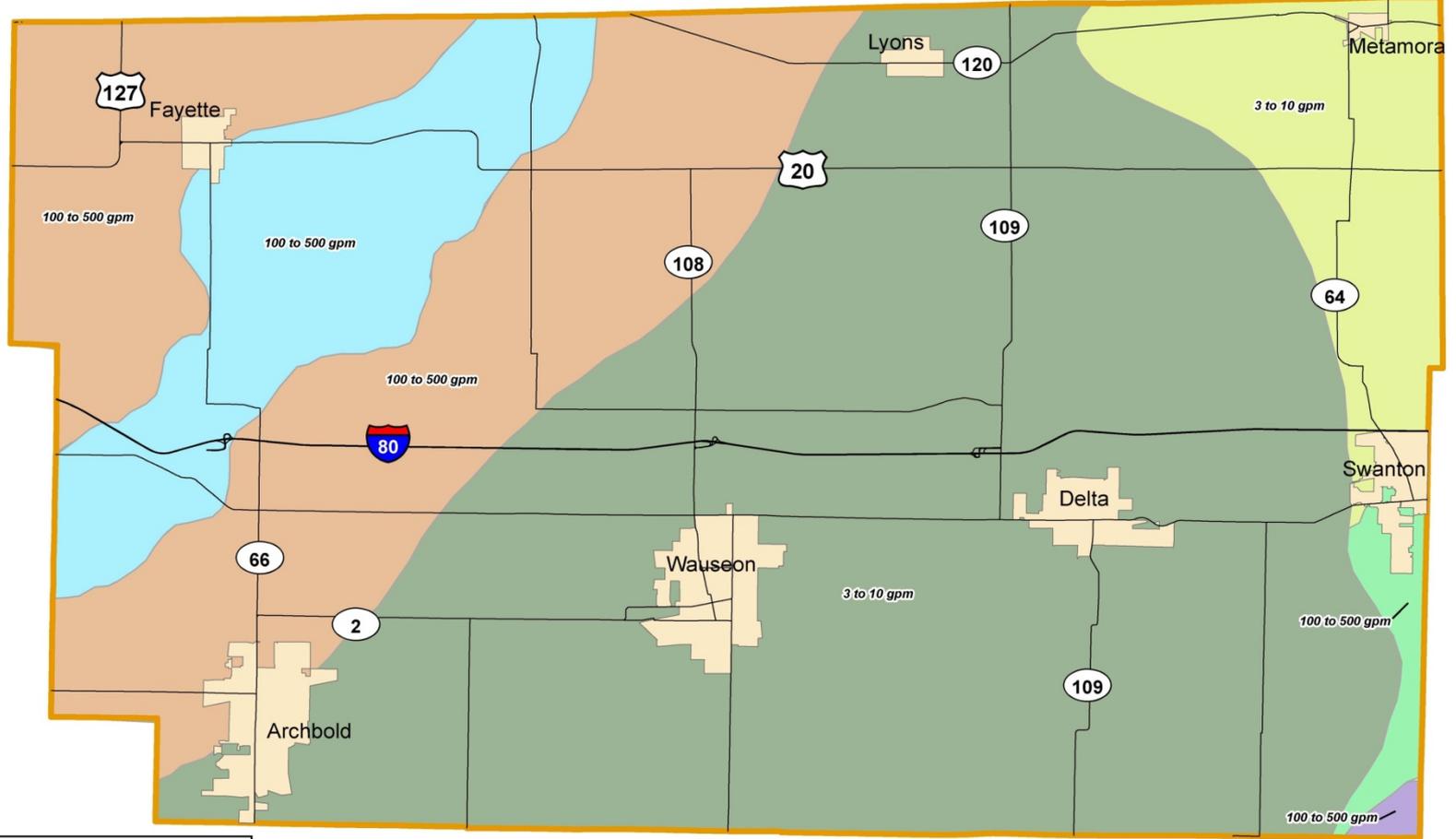
<b>Henry County Population Growth Rate (2000 to 2010)</b>	<b>-3.40%</b>
<b>Projected County Growth Rate</b>	<b>-3.40%</b>
<b>Napoleon Population Growth (2000 to 2010)</b>	<b>-6.10%</b>
<b>Anticipated Napoleon Growth</b>	<b>-6.10%</b>
<b>2010 Napoleon Population</b>	<b>9,300</b>

**Fulton County and Napoleon Population and Water Demand Summary**

	<b>2010</b>	<b>2020</b>	<b>2035</b>
<b>Population<sup>1</sup></b>	45,177	51,136	58,085
<b>Per Capita Water Use, gallons per day</b>	151	150	150
<b>Average Water Demand, MGD</b>	6.8	7.7	8.7
<b>Maximum Daily Water Demand, MGD<sup>2</sup></b>	11.6	13.0	14.7

<sup>1</sup>Population does not include Delta or Swanton

<sup>2</sup>Based on a peaking factor of 1.7



**Groundwater Resources**

- Thick sand and gravel, 100-500 gpm
- Thick sand and gravel, possible artesian conditions, 100-500 gpm
- Glacial fine sand, silty clay, sand and gravel, 3-10 gpm
- Carbonate bedrock, 100-500 gpm
- Carbonate bedrock underlying shale, 100-500 gpm
- Shale, localized sand and gravel lenses, 3-10 gpm

Groundwater resources data modified from Walker (1991).



**Groundwater Resources of Fulton County**

Fulton County Commissioners  
 152 South Fulton Street  
 Wauseon, OH 43567

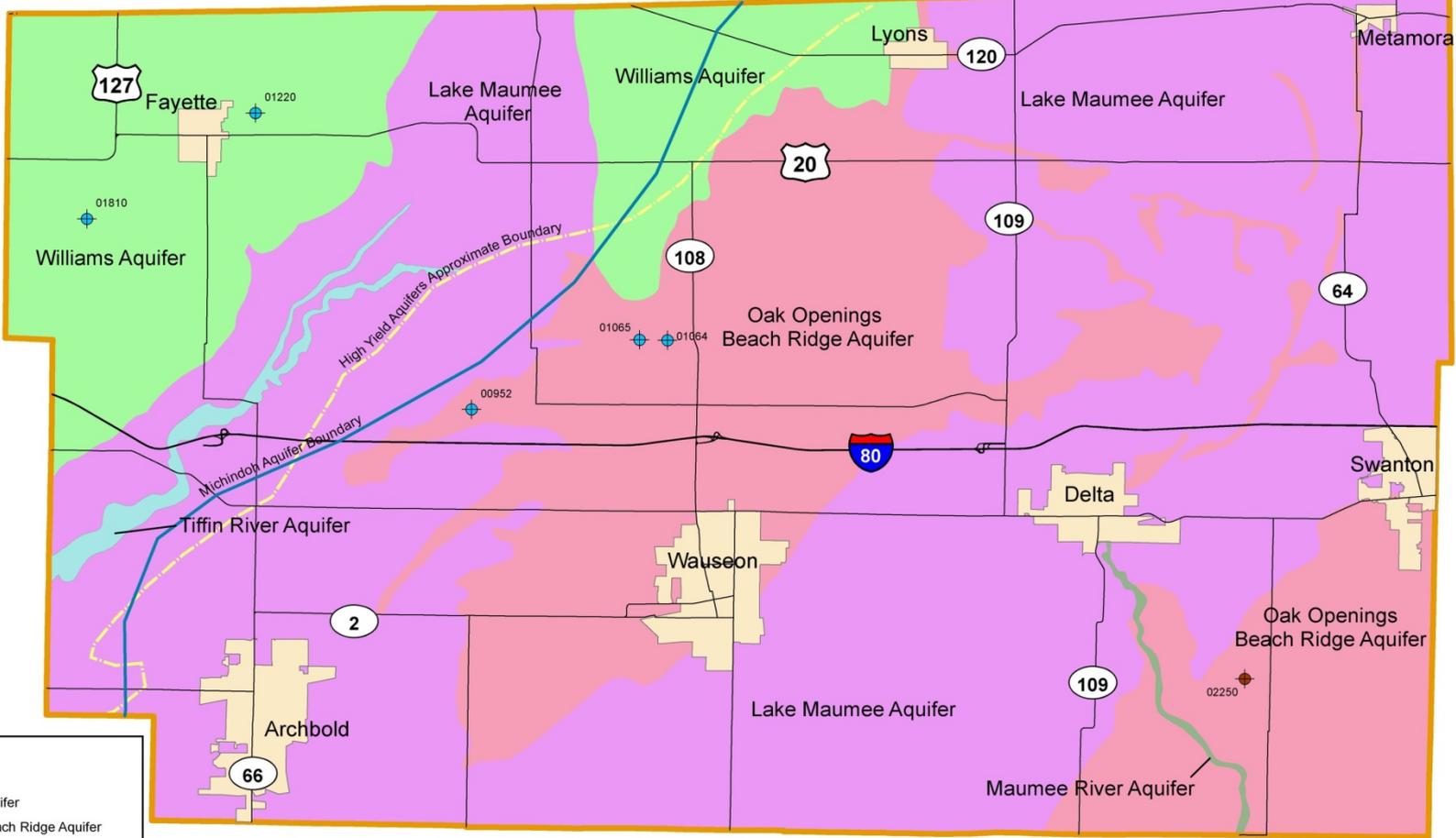
**Fulton County  
 Water Supply and Demand Analysis**

County: Fulton  
 State: Ohio

Date: 5/22/2012

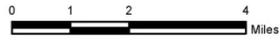
Figure 3-1

File: 0:2011010660.D Drawing: Environment.dwg User: jrb Date: 5/22/2012 1:48:49pm



**Glacial Aquifers**

- Williams Aquifer
- Lake Maumee Aquifer
- Oak Openings Beach Ridge Aquifer
- Tiffin River Alluvial Aquifer
- Maumee River Alluvial Aquifer
- Michindoh Aquifer Boundary
- High Yield Aquifer Approximate Boundary
- Active High Capacity Well Facility
- Inactive High Capacity Well Facility



**STRUCTUREPOINT**
  
www.structurepoint.com

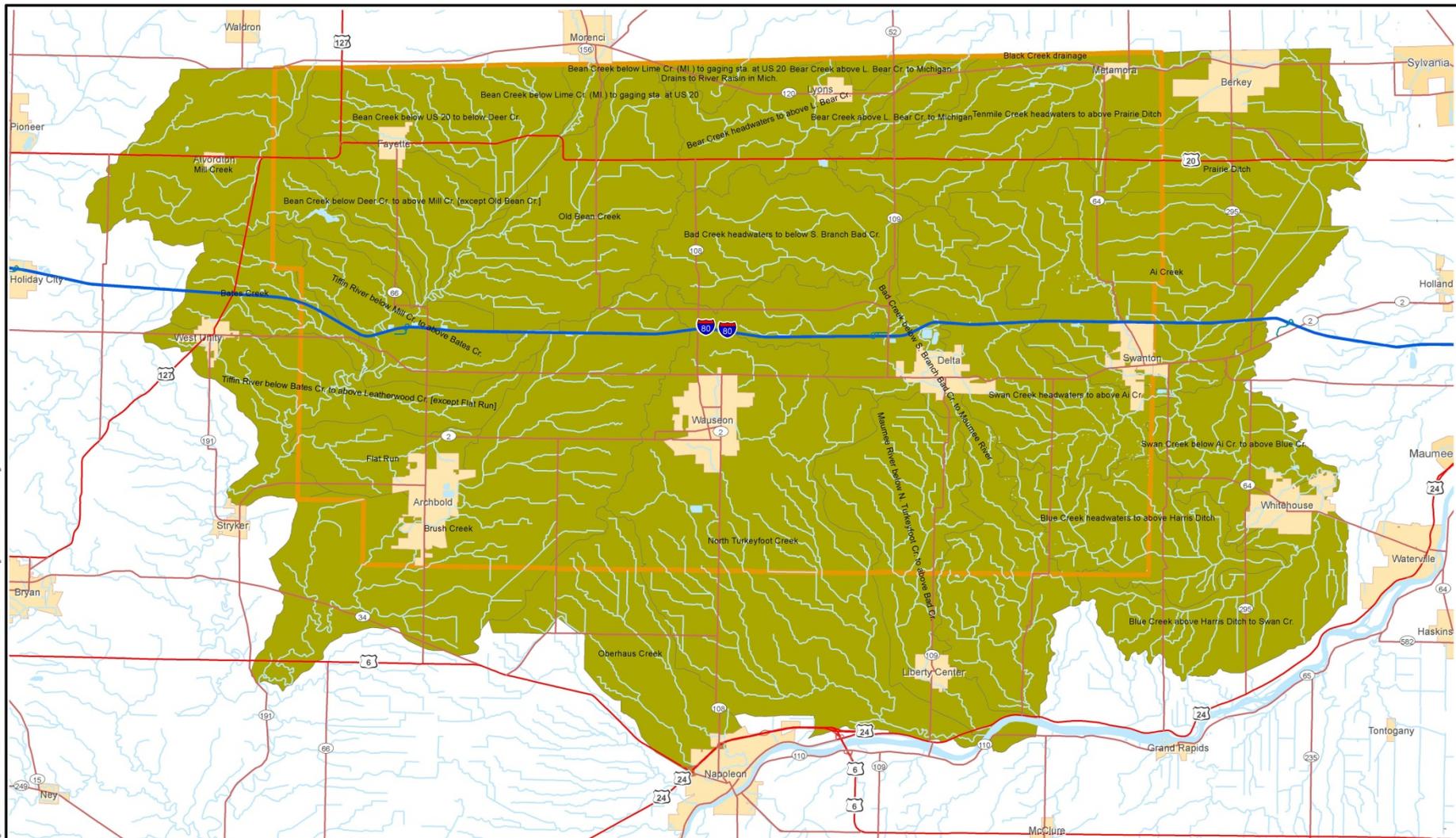
**Aquifers of Fulton County**  
 Fulton County Commissioners  
 152 South Fulton Street  
 Wauseon, OH 43567

**Fulton County**  
**Water Supply and Demand Analysis**  
 County: Fulton  
 State: Ohio  
 Date: 5/22/2012

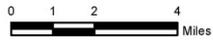
Aquifer data modified from Spahr (2000).

Figure 3-2

Path: C:\2011\06\02\_Drawing\Environment\AsView\Fishb... 20110606 13:27:05-2111717.MXD View=Book.dwg and Date=5/23/2012 User=djones



	Fulton County
	HUC 14 Digit Watersheds




**STRUCTUREPOINT**  
www.structurepoint.com

<b>14 Digit Watersheds</b>	<b>Fulton County</b> <b>Water Supply and Demand Analysis</b>
Fulton County Commissioners 152 South Fulton Street Wauseon, OH 43567	County: Fulton State: Ohio
	Date: 5/22/2012 <span style="float: right;">Figure 3-3</span>

## Fulton County Water Supply and Demand Analysis

### Drainage Areas and Average Daily Streamflow for Principal Streams

Stream	Drainage Area (mi <sup>2</sup> )	Average Daily Streamflow (ft <sup>3</sup> /s)	Notes
Tiffin River	410	348.8	Above Stryker, OH
Bean Creek-North <sup>1</sup>	206	167.2	Portion north of US 20
Bean Creek-Combined <sup>1</sup>	246.1	199.8	Above Mill Creek
Old Bean Creek <sup>1</sup>	33.3	27.1	Above Bean Creek
Mill Creek <sup>1</sup>	31.8	25.8	Above Tiffin River
Bates Creek <sup>1</sup>	12.3	10.0	Above Tiffin River
Brush Creek	65.7	53.3	Above Tiffin River
North Turkeyfoot Creek	75.3	61.1	Above Maumee River
Dry Creek	27.7	22.5	Above Maumee River
Bad Creek	64.7	52.5	Above Maumee River
Blue Creek	44.8	36.4	Above Swan Creek
Swan Creek	45.1	36.6	Above Blue Creek
Ai Creek	50.6	41.1	Above Swan Creek
Ten Mile Creek	39.9	32.4	Above Prairie Ditch
Bear Creek	26.5	21.5	Above Fulton County Line
Maumee River	5,545	4,581.6	USGS Gage near Defiance

<sup>1</sup>Streams tributaries to Tiffin River, upstream of the USGS Gage at Stryker. Analysis data was compiled in May 2012.

## Fulton County Water Supply and Demand Analysis

### Estimated Average Daily Streamflow, Low Flow Statistics and Dependable Yield for Principal Streams

Stream	Average Daily Streamflow (ft <sup>3</sup> /s)	D95 (ft <sup>3</sup> /s)	D99 (ft <sup>3</sup> /s)	Dependable Yield (MGD)
Tiffin River	348.8	17	9.6	4.78
Bean Creek-North	167.2	13	8.2	3.10
Bean Creek-Combined	199.8	19.1	15.53	3.71
Old Bean Creek	27.1	2.10	1.33	0.50
Mill Creek	25.8	2.01	1.27	0.48
Bates Creek	10.0	0.78	0.49	0.19
Brush Creek	53.33	4.15	2.62	0.99
North Turkeyfoot Creek	61.08	4.75	3.00	1.13
Dry Creek	22.46	1.75	1.10	0.42
Bad Creek	52.50	4.08	2.57	0.97
Blue Creek	36.38	2.83	1.78	0.68
Swan Creek	36.56	2.84	1.79	0.68
Ai Creek	41.08	3.19	2.01	0.76
Ten Mile Creek	32.4	2.52	1.59	0.60
Bear Creek	21.5	1.67	1.06	0.40
Maumee River	4,581.6	172	84	56.87

The desired dependability for public water systems is generally in the 95% to 99% range. Analysis data was compiled in May 2012.

## Water Demand and Supply Comparison

### Water Demand and Supply Comparison with Napoleon

Year	Estimated Average Water Demand, MGD <sup>1</sup>	Estimated Max Day Water Demand, MGD <sup>1</sup>	Estimated Ground Water Yield, MGD <sup>2</sup>	Tiffin River, Bean Creek and Maumee River Yield, MGD
2010	6.8	11.6	5.0	65.5
2020	7.7	13.0	5.0	65.5
2035	8.7	14.7	5.0	65.5

### Water Demand and Supply Comparison without Napoleon

Year	Estimated Average Water Demand, MGD <sup>1</sup>	Estimated Max Day Water Demand, MGD <sup>1</sup>	Estimated Ground Water Yield, MGD <sup>2</sup>	Tiffin River, Bean Creek and Maumee River Yield, MGD
2010	5.5	9.5	5.0	65.5
2020	5.7	9.9	5.0	65.5
2035	6.0	10.4	5.0	65.5

<sup>1</sup> For Fulton County communities except Delta and Swanton.

<sup>2</sup> Actual yield may be higher depending on location, well spacing, and test drilling. Additional investigations would be required.

### **Additional Considerations**

- Groundwater source – capacity, property acquisition, treatment, transmission waterlines, pumping, easements.
- Groundwater source combined with surface water sources – water blending, create pressure districts.
- Surface water source – capacity, property acquisition, treatment, transmission waterlines, pumping, easements.
- Through existing intake, Maumee River water could be conveyed for treatment at Wauseon or to Archbold with additional infrastructure.
- Maumee River – most dependable yield for Fulton County – downstream water supplies have to be considered.
- Water service agreements between Fulton County and local suppliers to provide surplus water to Fulton County and use of existing infrastructures/properties.
- Cost and financing of the additional infrastructure (reservoirs, treatment, pumping, distribution, storage, properties...).
- Current Fulton County customer base – debt service.
- Maumee River and local streams water quality – age of treated water.

### **Next Steps**

- Using combination of ground and surface waters
- Serving the City of Napoleon
- With the knowledge that the Maumee River can be a source of supply, identify the necessary infrastructure to establish a Fulton County Regional Water System.
- Financing options for the expected infrastructure.
- Rate analysis – debt, operation, maintenance, capital improvement...
- Water service agreements between Fulton County and all participating entities.