Our Blacklick Creek Watershed Action Plan

(HUC: 05060001-140-050 and 05060001-140-060)

June 2010

Prepared and Written by

Mid-Ohio Regional Planning Commission and Local Partners

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Center for Energy & Environment

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Blacklick Creek Watershed Action Plan Prospective Endorsement

We support and agree to pursue implementation of this plan and agree to seek the necessary resources to improve and protect the water quality of Blacklick Creek.

City of Columbus		
City of Gahanna		
City of Pataskala		
City of Pickerington		
City of Reynoldsburg		
Etna Township		
Harlem Township		
Jefferson Township		
Jersey Township		
Madison Township		
Madison Township		
Monroe Township		
Plain Township		
Village of Brice		
Village of Groveport		
Village of New Albany		
Violet Township		

Ohio EPA		
Ohio DNR		
Friends of Big Walnut Creek and Tributaries		
Friends of Blacklick Creek		
Franklin County Soil and Water Conservation District		
Columbus Metro Parks		
Columbus Department of Recreation and Parks		
Mid-Ohio Regional Planning Commission		

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Blacklick Creek (HUC: 05060001-140-050 and 05060001-140-060)

I. Introduction

Blacklick Creek is a tributary of Big Walnut Creek draining the Eastern portion of Franklin County and the Western edge of Licking County with a smaller portion of the Northwest corner of Fairfield County and a fraction of the Southeast corner of Delaware County also contributing to the creek. It is one of many streams flowing north to south across Central Ohio, crisscrossed by scores of roads, with hundreds of thousands of people driving by, oblivious to the treasure flowing under their wheels.

Nearby Big Darby Creek is known throughout the world for its habitat and diverse plant and animal species. As a state and federally designated scenic river it attracts visitors from around the country yet few outside of the area know the diversity and beauty of Central Ohio's other rivers and streams. Blacklick Creek is one of these hidden gems that meets clean water standards along most of its reaches but has been impacted by urban and suburban development in its middle reaches. Though the headwaters and lower reaches still maintain a rural character with many acres in agricultural production most of the large tracts have been purchased by developers with plans for future neighborhoods, shopping districts, and commercial interests. We know from past experience that increases in impervious surfaces have negative impacts on water quality and stream health. The current economic slowdown and decrease in development pressures provides an opportunity for the stakeholders in the Blacklick Watershed to develop a plan that will protect and improve the waters of Blacklick Creek even as the land use changes around it. The purpose of the Blacklick Creek Watershed Protection Plan is to bring together the communities draining into Blacklick Creek for the purpose of protecting the integrity of the drainage basin where it meets the standards for clean water and to restore those areas where it is not.

Blacklick Creek flows from its headwaters in western Licking, southern Delaware and northeast Franklin counties in a southerly direction, past the Village of Blacklick and through the City of Reynoldsburg before turning southwest and joining Big Walnut Creek at the Alum Creek confluence in southeast Franklin County. Blacklick Creek is approximately 31 miles long and drains an area of 61.3 square miles. The Blacklick Creek basin is comprised mainly of small headwater streams flowing into the mainstem. Blacklick Creek is located in the Eastern Corn Belt Plains (ECBP) ecoregion of Ohio. The gently rolling glacial till plain comprising the ECBP ecoregion is broken by moraines, kames and outwash plains. Local relief is generally less than 50 feet. Soils derived from glacial till materials contain substantial amounts of clay and soil drainage are often poor. Many of the smaller streams in the ECBP ecoregion have been channelized to assist soil drainage.

Within the drainage basin, Franklin County Metro Parks has a number of holdings, including Blacklick Woods and Three Creeks Metro Parks. There are six golf courses in the watershed, which include Tartan East Golf Club, The Golf Club, Jefferson Golf and Country Club, Blacklick Woods Golf Course (an Audubon certified golf course), Turnberry Golf Course, and Walnut Hill Golf Course.

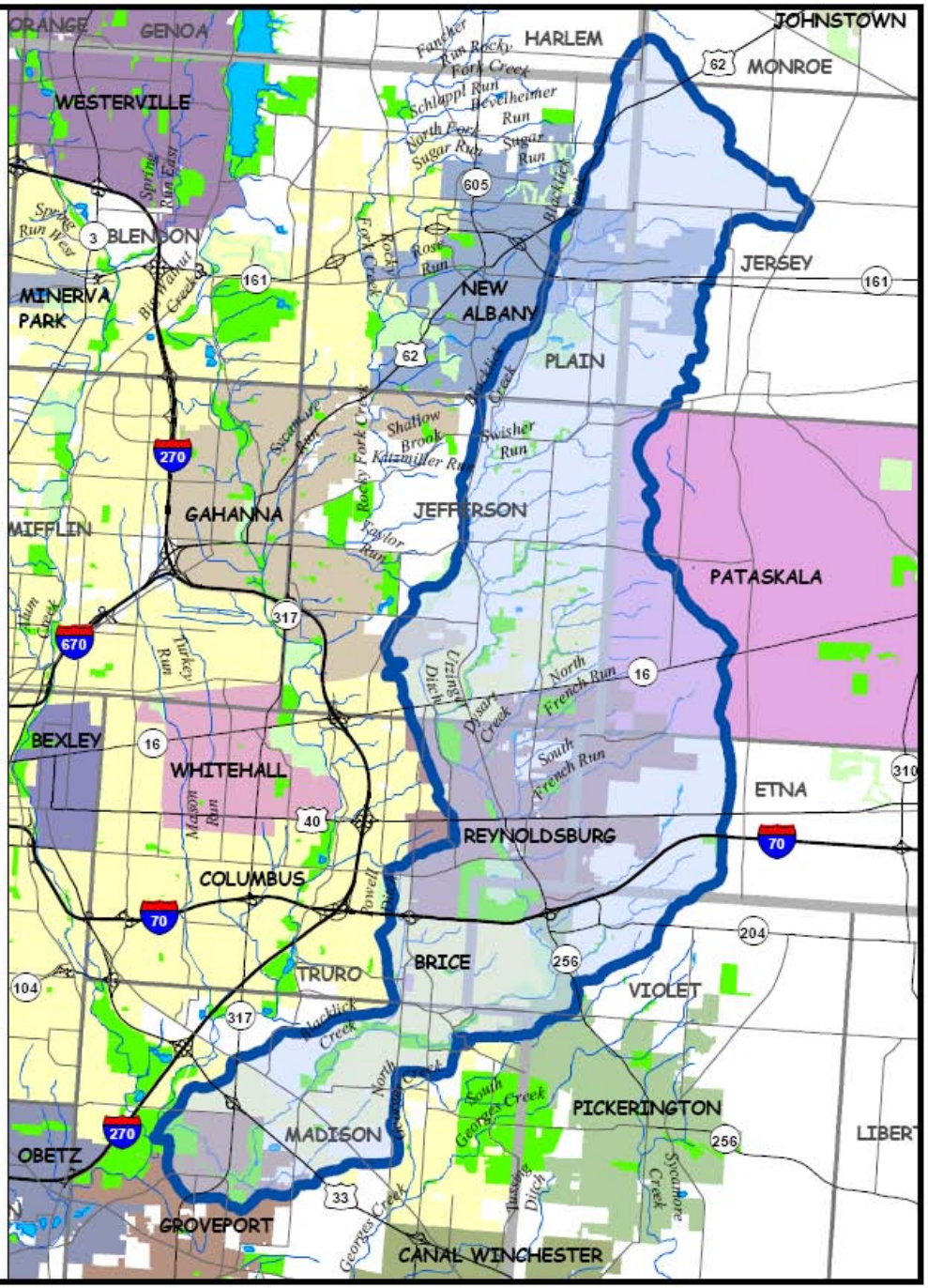
A list of the Phase 1 and 2 Stormwater Communities in the Blacklick Watershed is shown below:

-City of Columbus
-Village of New Albany
-Village of Brice
-Village of Groveport
-City of Gahanna
-City of Pataskala
-City of Reynoldsburg
-City of Pickerington
-Jefferson Twp.
-Violet Twp.
-Madison Twp.
-Plain Twp.
-Etna Twp.

A mixture of rural residential lots (1-5 acres) and suburban housing development is the predominant and increasing land use in the study area. Agricultural land uses are present in the headwaters regions, but represent a shrinking portion of the total land use in the watershed. The main population centers in the watershed area are the cities of Columbus, Pataskala, Pickerington, and Reynoldsburg, the villages of Groveport and New Albany, and the townships of Violet, Madison, Jefferson and Etna. Figure 1 shows a map of the watershed boundary and corporation limits.

Figure 1: Blacklick Watershed Boundaries and Jurisdictions

BLACKLICK WATERSHED JURISDICTIONS



LEGEND

- Blacklick Watershed
- Park/Open Space
- River
- Stream
- Township Boundary
- County Boundary

N

0 2 4 Miles

POPULATION BY JURISDICTION
WITHIN THE BLACKLICK WATERSHED

JURISDICTION	Population	% Total
BRICE	83	0.1
COLUMBUS	28,403	34.3
ETNA TWP	1,683	2.0
GAHANNA	27	0.03
GROVEPORT	751	0.91
HARLEM TWP	21	0.02
JEFFERSON TWP	3,215	3.89
JERSEY TWP	727	0.88
MADISON TWP	5,633	6.81
MONROE TWP	141	0.17
NEW ALBANY	487	0.59
PATASKALA	3,251	3.93
PICKERINGTON	532	0.64
PLAIN TWP	725	0.88
REYNOLDSBURG	30,806	37.28
TRURO TWP	373	0.45
VIOLET TWP	5,779	7.0
TOTAL	82,637	

Based on 2000 Census block data

MORPC

The information shown on this map is compiled from various sources available to us which we believe to be reliable.
T:Greenways/2005 Big Walnut /blacklick watershed.mxd June 2007

Table 1: Census for Blacklick Watershed

Census File SF1

2000 US Census Results: Population and Housing

Blacklick Watershed

POPULATION CHARACTERISTICS		2000	
Total Population		83,295	
Group Quarter Population	(% of the total population)	283	0.3%
Male	(% Male)	40,407	48.5%
Female	(% Female)	42,888	51.5%
White	(% of Total Population)	69,343	83.2%
African American	(% of Total Population)	9,921	11.9%
American Indian/Aleution	(% of Total Population)	228	0.3%
Asian	(% of Total Population)	1,594	1.9%
Other Race (1)	(% of Total Population)	2,209	5.5%
Hispanic	(% Hispanic)	1,498	1.8%
Population Under 18 Years	(% Under 18 Years)	22,861	27.4%
Population 65 Years and Over	(% 65 Years and Over)	6,536	7.8%

FAMILY CHARACTERISTICS			
Total Families		22,675	
Single Fathers	(% Families with Single Fathers)	1,156	5.1%
Single Mothers	(% Families with Single Mothers)	3,663	16.2%

HOUSING CHARACTERISTICS			
Total Housing Units		34,550	
Total Households	(Vacancy Rate)	32,562	5.8%
Households Occupied by Owners	(% Owner Occupied)	21,764	66.8%
Households Occupied by Renters	(% Renter Occupied)	10,798	33.2%
Single Occupant Households	(% Single Occupant)	7,760	23.8%
People Over 65 Years Living Alone	(% Living Alone)	1,685	25.8%
Average Household Size		2.56	
Average Household Size Owner Occupied Units		2.73	
Average Household Size Renter Occupied Units		2.18	

Notes 1) Other race includes population that counted themselves as multi-racial

Sources:
Source: US Census Bureau, 1990 Summary Tape File 1
Source: US Census Bureau, 2000 Summary File 1

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2000 Census: SF3

Blacklick Watershed

Household Income

Less than $10,000:	1,634	4%
$10,000-$14,999	1,523	4%
$15,000-$19,999	1,585	4%
$20,000-$24,999	2,089	5%
$25,000-$29,999	2,273	6%
$30,000-$34,999	2,673	7%
$35,000-$39,999	2,362	6%
$40,000-$44,999	2,379	6%
$45,999-$49,999	2,170	5%
$60,000-$59,999	4,523	11%
$60,000-$74,999	5,834	14%
$75,000-$99,999	5,688	14%
$100,000-$124,99	3,029	7%
$125,000-$149,99	1,038	3%
$150,000-$199,99	797	2%
$200,000 plus	883	2%

Population:	104,152	
Households:	40,480	
Population in Poverty:	5,392	5%
Owner Occupied Households:	27,454	68%
Renter Occupied Households	12,911	32%

Education Levels (pop25 years+)

No School:	171	0%
Fourth Grade Level:	72	0%
Sixth Grade Level:	259	0%
Eighth Grade Level:	695	1%
12th Grade (No Diploma):	1,739	3%
High School Diploma:	20,510	31%
College No Degree:	15,563	24%
Associate Degree:	4,522	7%
Bachelor Degree:	13,565	21%
Master Degree:	4,009	6%
Professional Degree:	1,117	2%
Doctoral Degree:	357	1%

Income Statistics

Average Median Household Income	$56,437	Per Capita Income	$25,128

Autos Per Household

0 Cars:	1273	3%	3Cars:	5884	15%
1Car:	12825	32%	4 Cars:	1446	4%
2 Car:	18460	46%	5+ Cars:	477	1%

Worker Characteristics

Unemployed	1,758	3%
Agriculture:	203	0%
Construction:	3256	6%
Manufacturing:	6448	11%
Wholesale:	2373	4%
Retail:	8734	15%
FIRE:	5992	10%
Professional:	5369	9%
Information:	1752	3%

Food:	6115	11%
Education and Social:	8947	16%
Transportation and Warehouse:	4058	7%
Public Administation:	4098	7%
Other: Employment	2504	4%

Housing Cost Characteristics

Average of Median Rents	$645	Average of Median Owner Occupied Housing:	$157,963

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A. Blacklick Watershed Previous Efforts and Zoning Summary

From watchdog monitoring by local concerned citizens to the passage of zoning ordinances that set very specific setbacks and open space requirements for the preservation of stream corridors, wetlands, and other natural features, many actions have been taken over the years to manage and protect the Blacklick Watershed. However, these efforts are patchwork and carry more or less importance depending on the community. At the most basic level every community with zoning has some regulation limiting development in the floodplain. The level of protection varies. There are very detailed guidelines in City of Columbus and Plain, Harlem, Jersey, and Jefferson Townships to protect the natural functions of the floodplain. Most zoning in the watershed focuses narrowly on health and economic issues associated with flooding. These common zoning ordinances allow for development in the floodplain provided the builder raises the structure high enough to be above the flood level. This unfortunately reduces the floodplain and increases the risks of increasing flooding downstream.

Those communities with the greatest limits on development in the floodplain were more likely to include ordinances to protect the stream riparian corridor and wetlands, and have ordinances specifically geared to storm drainage. At least two communities, Harlem and Jersey Townships, have recently completed or are currently working on new comprehensive plans that call for greater consideration of streams and waterways and other natural features in zoning ordinances. It is anticipated that their zoning codes will go through some modifications to align with these comprehensive plans.

Many of the communities also have zoning for planned developments under a variety of names that encourage the use of Low Impact Development methods that preserve natural features, cluster houses, and provide for significant open space requirements ranging from 15% to 40%. The use of such zoning districts has expanded in recent years leading to the preservation of many miles of stream corridor. Yet the level of protection varies widely across the watershed. Jefferson Township requires all stream corridors to be put in easements and included in the open space requirement. Likewise the city of Columbus has included stream corridors in open space requirements. While the City of Reynoldsburg has not required the preservation of stream corridors in its development, many of the riparian corridors have been preserved. Their continued preservation though, is not assured due to the division of the stream corridor among individual property owners.

Table 2 identifies the types of zoning in each jurisdiction, providing links (where available) to local zoning documents as well as code numbers. Appendix C also includes the text from several of the specific zoning ordinances.

1. Regulatory Controls

Table 2: Regulations for Jurisdictions in the Blacklick Creek Watershed

Jurisdictions	Zoning Regulation				
	Flood Plain	Stream Corridor Protection	Storm Drainage	Wetlands	Additional Environmental Protection
City of Columbus- http://utilities.columbus.gov/DOSD/PDFs/FULL%20SWDM_MARCH_06.pdf	Columbus Stormwater Drainage Manual Section 1 & Zoning Code 3385	Columbus Stormwater Drainage Manual Section 1	Columbus Stormwater Drainage Manual Sections 2 & 3	Columbus Stormwater Drainage Manual Section 1	------
City of Gahanna- http://www.conwaygreene.com/gahanna.htm	Part Eleven, Title Five Chapter 1191- Regulatory Flood Hazard Area	------	Part Eleven, Title Five, Chapters 1193- Stormwater Management Policy & 1195- Soil Erosion and Sedimentation Policy Part Nine, Title Three, Chapters 925- Surface Water Discharge & 927- Storm Sewers	------	Part Eleven, Title One, Chapter 1109.12- Environmental Plan
City of Pataskala- http://pataskala.icohesion.com/Downloads/I-Zoning.pdf	Chapter 1257 Flood Damage Prevention and Flood Plain Overlay District	Chapter 1275.03 I – Preservation of water features	Chapter 1253.07 L- Drainage	Chapter 1283.01 Environmental Plan	Chapter 1283.02 Preservation Zones Chapter 1283.03 Tree Preservation and Replacement

Jurisdictions	Zoning Regulation				
	Flood Plain	Stream Corridor Protection	Storm Drainage	Wetlands	Additional Environmental Protection
City of Pickerington- http://www.ci.pickerington.oh.us/sections/community/2007.Stormwater.Ordinance.pdf	Chapter 1258.22 Stormwater Management and Stream Protection, Section VI (C)	Chapter 1258.22 Stormwater Management and Stream Protection, Section VI (B) & (G)	Chapter 1258.22 Stormwater Management and Stream Protection, Section VI (A) (D) (E) (F) Section VII- Stormwater Design Standards	Chapter 1258.22 Stormwater Management and Stream Protection, Section VI (B)	Chapter 1258.22 Stormwater Management and Stream Protection, Section VI
City of Reynoldsburg- http://www.ci.reynoldsburg.oh.us/resources/10/codes_guidelines_maps/zoning_code.pdf	Chapter 1192 - F-1 FLOOD PLAIN OVERLAY DISTRICT (could not find the ordinance in the on-line pdf)	As of February 2009 the city is working on Stream Corridor Protection zoning	------	------	------
Etna Township- http://www.etnatownship.com/zoning.htm	Section 818-Flood Plain District & 916-Flood Plain District	------	Section 1019 - Erosion Section 1027 – Surface Drainage	------	Section 1020 Water pollution Section 1608 Woodland Resource Preservation
Harlem Township- http://www.dcrpc.org/zoning/zoningcode/HarlemTwpZonCode.PDF	Article XXI, Section 21.09 Flood Plain Regulation	------	Article XXI, Section 21.08 Drainage	------	------

Jurisdictions	Zoning Regulation				
	Flood Plain	Stream Corridor Protection	Storm Drainage	Wetlands	Additional Environmental Protection
Jefferson Township- http://www.jeffersontownship.org/index.aspx	Article VII, Section 710 Floodplain Regulations Article VI, Section 620.06 Natural Resource Protection: 3)Floodplains	Article VI, Section 620.06 Natural Resource Protection: 2)Drainage Ways & 3) Floodplains	Article VI, Section 620.06 Natural Resource Protection: 2) Drainage Ways Article VIII, Section 830.03 Stormwater Runoff	Article VI, Section 620.06 Natural Resource Protection: 1) Wetlands	Article VIII, Section 830 Land Suitability and Environmental Performance Standards Article VI, Section 620.06 Natural Resource Protection: 4)Steep Slopes & 5)Woodlands
Jersey Township- http://jerseytownship.us/forms/resolutionbook.pdf	Article V, Section 5.13-Drainage and Flood Plain Regulations	------	Article V, Section 5.13-Drainage and Flood Plain Regulations	------	Article VII – C-1 Conservation District
Madison Township – Franklin County handles zoning for the township- http://www.franklincountyohio.gov/commissioners/edp/zoning/ZoningResolutionUpdated06122008.pdf	Franklin County Zoning Code: Article VI, Section 610-Floodplain Regulations	------	------	------	------
Monroe Township- No information available	------	------	------	------	------

Jurisdictions	Zoning Regulation				
	Flood Plain	Stream Corridor Protection	Storm Drainage	Wetlands	Additional Environmental Protection
Plain Township- http://plaintownship.org/images/stories/zoning_resolution.pdf	Article III, Sections: 301.05.7-1 Floodway Protection 510 Floodplain Regulations	Article III, Section: 301.05.7-3 Conservation of Riparian Zones	Article III, Section: 304.05.8 Stormwater Drainage 303.06.8 Stormwater Drainage	Article III, Sections: 301.05.7-2 Wetlands Protection	Article III, Sections: 301.04.2 Submission of Application and Final Development Plan; 301.06 Regulations for Restricted Open Space; 301.05.7 Resource Protection Regulations
Truro Township – Franklin County handles zoning for the township- http://www.franklincountyohio.gov/commissioners/edp/zoning/ZoningResolutionUpdated06122008.pdf	Franklin County Zoning Code: Article VI, Section 610- Floodplain Regulations	--------	-------	-------	-------
Violet Township- http://www.violet.oh.us/documents/ZONING%20CODE%20-%20Ammended%202-27-076331243531098437 50.pdf	3G F District - Flood Plain	3V PD District – Planned Residential District	------	3V PD District – Planned Residential District	3V PD District – Planned Residential District
Village of Brice- No information currently Available	------	------	------	------	------

Jurisdictions	Zoning Regulation				
	Flood Plain	Stream Corridor Protection	Storm Drainage	Wetlands	Additional Environmental Protection
Village of Groveport- http://www.conwaygreene.com/Groveport/lpext.dll?f=templates&fn=main-h.htm&2.0	Part Eleven, Title Eleven, Chapter 1185-Floodplain Regulations	------	Part Nine, TitleThree, Chapter 935-Storm-water Management	------	Part Eleven, Title Nine, Chapter 1175-Land Suitability and Environmental Performance Standards
Village of New Albany http://www.amlegal.com/newalbany_oh/	Part Eleven, Title Three, Chapter 1155- Flood Plain Overlay District	------	Part Eleven, Title Seven, Chapters 1181- Stormwater Management and Runoff Control; and 1183- Soil Erosion and Sediment Pollution	------	Part Eleven, Title Nine, Chapter 1187- Subdivision Regulations

2. Previous Plans

a) Columbus Area Plans (Wheeler Memorandum, 2/22/2010)

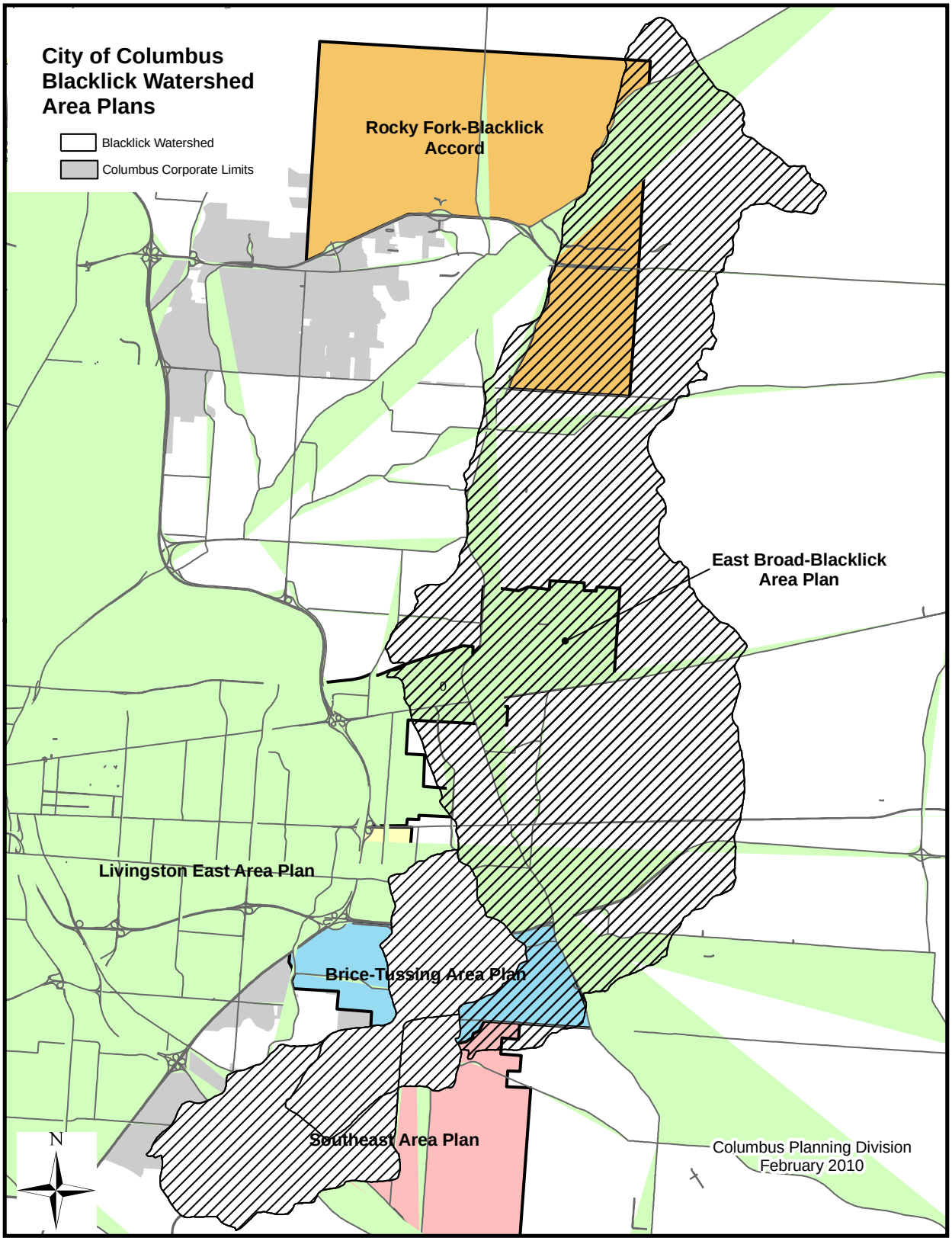
The Blacklick Watershed overlaps with a portion of four adopted Columbus area plans and a current planning effort (see Figure 2). The watershed is also within the boundaries of the Columbus Comprehensive Plan:

- Rocky Fork- Blacklick Accord Plan (Adopted in 1997)
- Brice Tussing Plan (Adopted in 1990)
- Southeast Area Plan (2000)
- Livingston East Area Plan (LEAP) (2009)
- East Broad – Blacklick Area Plan (currently underway)
- Columbus Comprehensive Plan (1993)

Full documents can be reviewed online at the City's Plans and Overlays webpage: http://development.columbus.gov/Bizdevelopment/PlanList.

It is important to note that these documents serve as guidance rather than code requirements. Their implementation depends on many factors. In some cases these recommendations have been superseded by new City policies – particularly in the area of stormwater management.

Figure 2: Columbus Area Plans in the Blacklick Creek Watershed



(1) Rocky Fork- Blacklick Accord Plan:

The Rocky Fork-Blacklick Accord was established as a joint initiative of the village of New Albany and the City of Columbus to provide guidelines for growth and development in northeast Franklin County. The Accord was adopted by Columbus and New Albany in 1997 and has been updated several times, most recently in 2004. Plain Township joined the Accord as a partner jurisdiction earlier in 2008. It is important to note that none of the Rocky Fork-Blacklick Accord portion of Columbus is currently in the Blacklick Watershed. The Accord planning area does include a potential growth area for the City that lies within the watershed. The Accord includes extensive discussion regarding natural resource issues. These include recommendations for the preservation of natural corridors with no development in the floodplain and 300ft wide stream corridors along the Blacklick. One of the ten key principles of the plan is to guarantee permanent protection of greenbelts, streams, creeks, woodlands, grasslands, wetlands and historic sites.

(2) Brice-Tussing Area Plan:

This plan is one of the oldest of the Columbus Plans having been adopted in 1990. A major portion of this largely developed planning area falls within the Blacklick Watershed. The plan does not include a significant emphasis on natural resources but does include a focus on the issue of parkland, including preservation of floodplain along the Blacklick for this purpose. Much of the greenway corridor recommended for protection in this plan has been preserved and incorporated into the Blacklick Greenways trail starting at Three Creeks Metro Park and soon connecting with Blacklick Woods Metro Park's trail.

(3) Southeast Plan:

The Southeast Area Plan was adopted by Columbus City Council on January 31, 2000. This plan covers the area bounded by Blacklick Creek, the county line, and US 33. It incorporates substantial open space and encourages innovative development concepts in an attempt to balance preservation of natural resources with creation of livable neighborhoods. The Southeast Area Plan includes extensive discussion regarding natural resource issues. These include but are not limited to no disturb zones along the riparian corridor within a 150' setback to either side of the centerline of the stream, no development in the floodplain, and preservation of wetlands and natural areas.

(4) Livingston East Planning Area Plan:

Livingston East Area Plan (LEAP) was adopted by Columbus City Council on September 21, 2009. The planning area includes nearly 7.5 square miles (almost 5,000 acres) of land and almost 38,000 residents. A small portion of the eastern part of the planning area is within the Blacklick Watershed. The overall area is predominately built-out and plan provisions focus on redevelopment opportunities and design guidelines.
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(5) East Broad – Blacklick Area Plan (underway):

This effort seeks to establish adopted plan guidance for a portion of Columbus to the east of Big Walnut Creek and north of East Main Street. The eastern half of the 5400 acre planning area lies within the Blacklick Watershed. The plan is intended to address land use, urban design, natural resources and transportation related issues. The effort is still in early stages and no specific plan recommendations have been developed, although community input has reinforced the importance of protecting open space and natural features.

(6) Columbus Comprehensive Plan:

The Columbus Comprehensive Plan was adopted in 1993 and played a key role in establishing a number of City code and policy changes. The Environmental Chapter of the plan addressed the issue of greenways extensively. It is the recommendation of the plan that Columbus develop its river corridors as a system of greenways, containing a mix of cultural, natural, recreational, and transportation opportunities.

b) Harlem Township Comprehensive Plan

The Harlem Township Comprehensive plan is progressive in its recommendations. One of the stressed Ideas is that nothing should be built within the boundary of the 100 year floodplain, though there are no recommendations for riparian setbacks. Along these lines are calls for cluster and Planned Unit Development that preserve natural features and preserve open space. The plan also identifies threats from growth that could have adverse effects on watersheds including the use of alternative sewer systems, allowing more than one unit per acre in area desiring farm preservation, and being cautious when allowing individual treatment plants. Additionally, greenways are identified as an inexpensive way to provide undeveloped open space to assure the linkage of neighborhoods by corridors of natural landscaped paths, and trails.

c) Friends of Blacklick Creek (FOBC) and Friends of Big Walnut Creek and Tributaries (FOBWC & Tribs)

March of 2008 marked the tenth anniversary of the formation of the Friends of Blacklick Creek. Growing out of the Greenways initiative of the Mid-Ohio Regional Planning Commission, the group drew on the experience and expertise of members of the Rocky Fork Protection Task Force to get up and running quickly.

The earliest days of FOBC were spent becoming familiar with the whole of the creek and providing educational opportunities for the group and the community—such as invertebrate sampling and fish-shocking demonstrations, which provided a look at the life of the creek. A good bit of time was also spent monitoring development projects on the creek. At times the group was able to work cooperatively with developers on such sites as the Abercrombie and Fitch headquarters near New Albany. At other times, the relationship was more confrontational.

The group gained their greatest visibility when filing notices under the Clean Water Act, indicating their intent to sue developers, if they did not comply with creek protection laws. These notices had a significant impact on the behavior of developers and resulted in the group being awarded the Environmental Watchdog Award by the Ohio Environmental Council in 2000.

Following this confrontational approach, the Friends of Blacklick Creek chose to attempt to establish a more proactive and positive relationship with developers, holding a community building event, which was well-attended by developers and representatives of the environmental community. The event resulted in a second conference, hosted by EMHT—an engineering/consulting firm—on pollution control strategies for developers. They also began giving awards to developers, whom were deemed to be doing a particularly good job in site design and/or sediment/mud pollution control during construction.

Over the years, work was also done on storm drain labeling, creek clean ups, educational efforts, tree planting, wetland creation, protection of land along the creek, creek sampling for bacteria, and continued monitoring of construction projects. In 2007 Friends of Blacklick Creek joined with Friends of Big Walnut Creek and The Rocky

Fork Watershed Protection Task Force to become Friends of Big Walnut Creek and Tributaries. While the Friends of Blacklick Creek is now a part of a larger organization, it continues to work to protect Blacklick Creek and its tributaries.

II. Watershed Plan Development

A. Watershed Group

Mid-Ohio Regional Planning Commission (MORPC) is the holder of the watershed coordinator grant from Ohio Department of Natural Resources that provides the initial funding for the development of a Watershed Action Plan for Blacklick Creek. This grant requires local matching funds to pay for the watershed coordinator. As a means of meeting this requirement MORPC requested each local jurisdiction to join in the planning process by contributing $0.50 per person in their jurisdiction who lives in the watershed. In this way the local match would be met and each jurisdiction would have a financial stake in insuring that an effective plan was developed. MORPC is uniquely positioned to lead this effort with all of its resources in regional planning available to the group including many years of collaboration with local watershed groups on the development of watershed action plans for the Lower Olentangy River, Alum Creek, Big Walnut Creek, and Rocky Fork Creek. Thirteen of the seventeen local jurisdictions as well as two watershed groups and metro parks elected to join with MORPC in funding the development of a Watershed Action Plan for Blacklick Creek. The planning team also includes representatives from the following organizations providing technical support: Franklin Soil and Water Conservation District, Fairfield Soil and Water Conservation District, Licking Soil and Water Conservation District, Ohio EPA, and Ohio State Extension. The table below provides a complete list of members of the planning team and the organizations they represent.

Table 3: Members of the Blacklick Watershed Action Plan Planning Team

Name	Organization
David Rutter, Blacklick Watershed Coordinator	Mid-Ohio Regional Planning Commission
Kevin Wheeler	City of Columbus
Aaron Domini	City of Reynoldsburg
Jill Snyder	Metro Parks
Mindi McConnel	Metro Parks
Dick Knapp	Etna Township
Chris Harkness	Etna Township
Brenda VanCleave	City of Pickerington
Dennis Moore	The Village of Groveport
Dianne Harris	City of Pataskala
Kyle Wilson	Franklin Soil and Water Conservation District
Bob Kyle	Friends of Big Walnut Creek and Tributaries
Cathy Gray (no longer with the township 3/3/10)	Plain Township
Don Shoemaker (no longer a trustee 3/3/10)	Plain Township
Judy Edwards	Madison Township
Kurt Keljo	Friends of Blacklick Creek
Chad Lucht	Fairfield Soil and Water Conservation District
Lee Brown	Franklin County Dept. of Economic Development
Matt Huffman	Gahanna
Bill Dorman	Village of New Albany
Larry Korrecko	Ohio EPA

Erin Miller	Mid-Ohio Regional Planning Commission
Ellen Walker	Jefferson Township
Al Harter	Friends of Big Walnut and Tributaries
Bill Resch	Friends of Big Walnut and Tributaries
Jim Kiracofe	Licking Soil and Water Conservation District
David Reutter	Franklin Soil and Water Conservation District
Joe Bonnell	OSU Extension
Christina Burri, Blacklick Watershed Coordinator	Mid-Ohio Regional Planning Commission

Structure and legal status will be MORPC's structure along with their operational procedures and Bylaws.

The planning team adopted the following structure for decision making. It was decided that the watershed coordinator will continue as the administrator facilitating the meetings and a relaxed Robert's Rules of Order would be used. These elements are included:
-Need a quorum for decisions
-Each organization has one vote
-Majority vote will decide most matters
-For instances the group feels should be a consensus decision a motion will be made, 2nd and voted upon moving the question to require a consensus vote of those present.

B. Outline of Plans Content

The plan is set up to follow the Appendix 8 format. It begins with an introduction to the watershed followed by discussion of the plans development before inventorying the key components of Blacklick Creek. This is followed with a discussion of the impairments in the stream before proceeding to tables that include the problem statements, action items, and how they will be implemented. The evaluation process describes how the plan will be updated and revised.

C. Endorsement of Plan

The planning team will be seeking endorsement of the watershed action plan by the governing bodies of all partner jurisdictions (A statement of endorsement can be found in the table at the beginning of the plan.) after submission of the plan for state endorsement. Following state endorsement we will be seeking additional support and endorsement from those jurisdictions not participating in the plan development as well as any other interested parties. We will work with local units of government to seek adoption of the plan. A signed table of endorsers will appear at the beginning of the final plan.

D. Communication/Education Outreach

Communication and Education Outreach will be an ongoing action throughout the planning and implementation process. As part of the final portion of the inventory phase of planning a fact sheet was created to share with our elected officials as well as the general public the current status of Blacklick Creek and its surrounding

watershed. This fact sheet provides a general overview of the Blacklick Creek watershed and includes causes of impairments along with their sources and outlines our next steps in planning.

As the team develops a menu of possible action items for restoring and protecting the creek we will be inviting members of the community review and provide feedback. Some of the meetings will be focused on specific stakeholder groups including the development community, business community, agricultural community, as well as the general public.

Following the completion of the planning process, the planning team and others who have invested themselves in the formation of this plan will be configured as a "watershed partnership" and kept apprised of new developments in the watershed. They will also be invited to activities focused on the watershed, such as creek clean-ups and festivals. An annual forum on the watershed will be held to bring together all those interested in the watershed, including these stakeholders, and will provide an opportunity to invite new partners into the partnership. Participants in that event will also be asked to provide suggestions and observations, regarding future the state of the creek and any particular problems that need to be addressed.

III. Watershed Inventory

A. Description of the Watershed

1. Geology(From Big Walnut Creek Watershed TMDLs, 2005)

The Illinoisan and Wisconsin glacial periods strongly influenced the land forms, soil types, and stream substrates of the study area. Terminal and ground moraines are both present in the Big Walnut watershed. The Powell Moraine extends generally northeast from Powell to Sunbury and then along the west side of Big Walnut Creek to the Morrow County line (Soil Survey of Delaware County). The constituents of glacial depositional features and study area substrates also reflect the Mississippian system sedimentary bedrock which underlies the Big Walnut watershed. Bedford Shale, Berea Sandstone, Sunbury Shale, and Cuyahoga Sandstone are present and visibly exposed as alternating beds in both the Big Walnut and Rocky Fork Creek corridors. Similar glaciofluvial deposits are present in the Big Walnut system. They appear in lower level substrates below recent alluvium and on stream terraces. Large amounts of rounded shale fragments and some sandstone fragments are present along Alum Creek and Big Walnut Creek (Soil Survey of Delaware County).

a) Soils

The interaction of bedrock geology, climate, slope-topography, flora, fauna, and the passage of time produced the soils of the Big Walnut Creek study area. Within the Franklin County portion of the Big Walnut system, the Bennington – Pewamo association, formed in glacial tills, predominates both east and west of the flood plain proper. Upstream of the Delaware County line, the Bennington-Pewamo association continues on upland areas to the Big Walnut's source in Morrow County. The Bennington soils are seen on flats, low knolls and ridges while the Pewamo soils are found in depressions and concavities of the landscape.

Land use on the Bennington - Pewamo association is limited by seasonal wetness, ponding, slow or moderately slow permeability, and low strength. Tiles and surface drains are commonly used to facilitate drainage. The Soil Survey of Franklin County notes that both Bennington and Pewamo soils are severely limited for sanitary

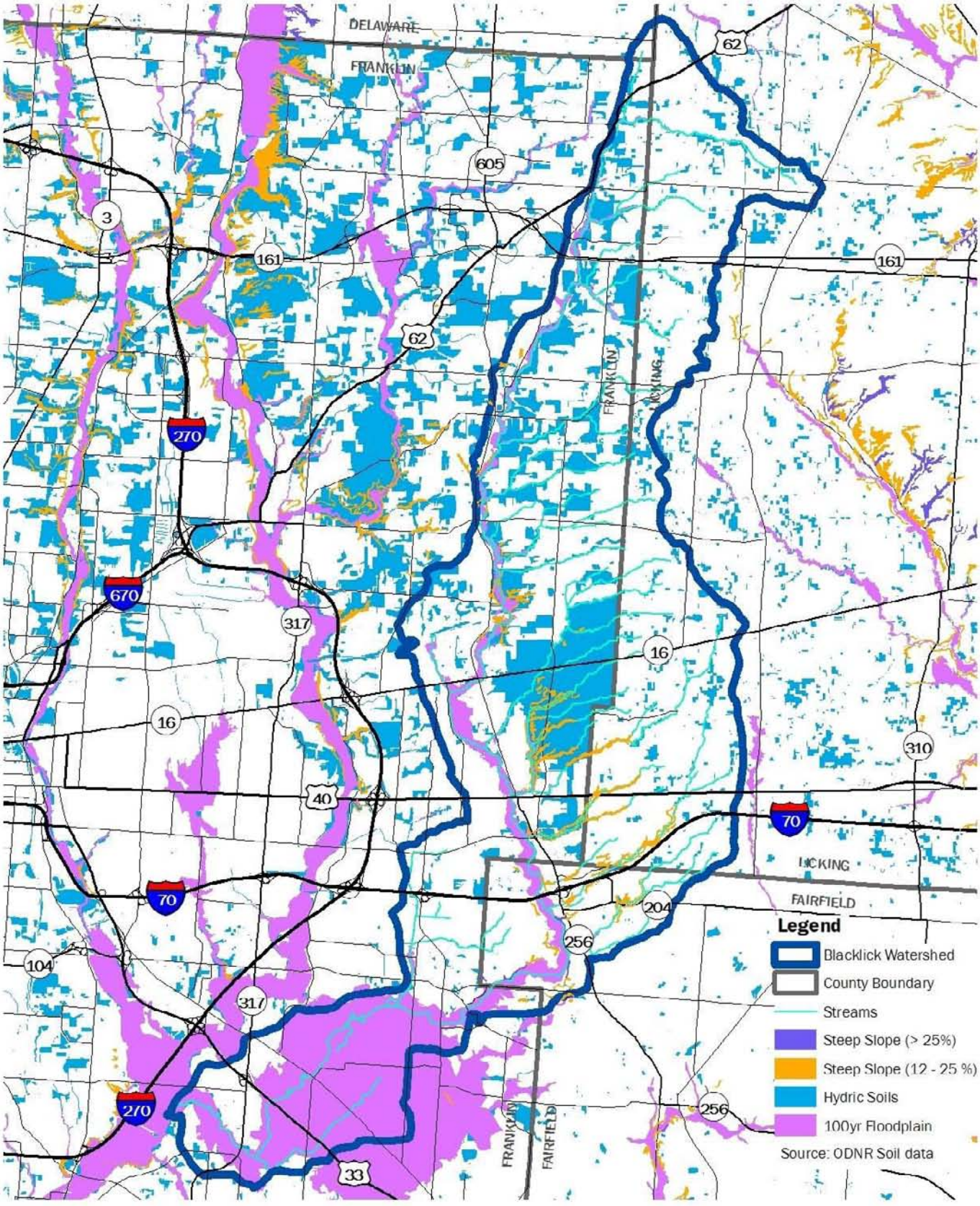
facilities because of their slow permeability, seasonal wetness, and low strength. The survey states that in areas of this association, “Sanitary facilities should be connected to central sewers and treatment facilities”.

Within the flood plain corridors, the most commonly observed association is the Medway-Genesee-Sloan formed in moderately textured recent alluvium. Each of these soils has a silt loam surface layer and high available water capacity. The Medway soils occur in broad areas of the flood plain. Narrow strips of Genesee soil are seen adjacent to streams while the Sloan soils are encountered in depressions. Flooding hazard and seasonal wetness are the chief land use limitations of this soil association. County soil surveys observe that Medway, Genesee, and Sloan soils are severely limited for sanitary facilities due to frequent flooding, wetness, and/or slow permeability.

South of Three Rivers Park and to the confluence, Big Walnut Creek flows between areas of the Crosby-Kokomo-Celina soil association. Due to limitations posed by seasonal wetness and slow permeability, the Soil Survey of Franklin County recommends that “Sanitary facilities should be connected to central sewers and treatment facilities, wherever possible”.

The erosion potential of Big Walnut watershed soils is partly a function of soil structure, permeability and the percentage of silt, sand and organic matter. One measure of erosion which takes these factors into account is Factor K, one of six used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The values of K range from 0.05 to 0.69. The higher the value the more susceptible is the soil to sheet and rill erosion. The highest K values within the Big Walnut watershed are associated with the Bennington soils (.43) which are predominant on extensive upland areas in Franklin, Delaware, and Morrow counties, and the Crosby soils (.43) which flank Alum Creek (west of the flood plain, downstream from Bexley) and Big Walnut Creek, downstream of Three Rivers Park. Through GIS, we found no acres of farmed Highly Erodible Land. The greatest slope of the soil was 12-25%, and is indicated in the figure below. A quick breakdown of major soil types in the Blacklick watershed are Bennington silt loam, Pewamo silty clay loam, Shoals silt loam, and Centerburg silt loam.

Figure 3: Highly Erodible Land and Hydric Soils in the Blacklick Watershed



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The information shown on this map is compiled from various sources available to us which we believe to be reliable.
T:Greenways/2007 Blacklick WS/blacklick hel2.mxd
June 2010

2. Biological Features

a) Rare, Threatened, and Endangered Species

An Ohio Department of Natural Resources Natural Heritage Data Base search turned up only one identified endangered species in the Blacklick Creek Watershed. The golden-winged warbler (*Vermivora chrysoptera*), last identified in 1984, in the northern portion of the watershed around the location currently occupied by the Abercrombie & Fitch facility on Smith's Mill Rd, New Albany. The data base search also identified some high quality forests and forested wetlands including a Maple-ash-oak swamp, a Beech-sugar maple forest, and Beech-sugar maple forest. All of these areas are very close together in the headwaters of South French Run and the unnamed tributary just south of that stream in western Licking County. These areas were last observed, according to the data base in 1982. A survey of aerials taken in the spring of 2008, show most of these woods as still intact. The only portion seeming to have been lost is the Northeastern portion of woods identified as Schmitt Swamp with the construction of a housing development in the late 1990's. All of these areas are in the Northern HUC of Blacklick Creek (05060001-140-050)

Easements or other protections for the preservation of these high quality habitats should be considered as they are in a rapidly developing area and include headwater wetlands. The current slowdown in building and development may aid in this endeavor.

b) Invasive Species

The Division of Natural Areas and Preserves has compiled a list of more than 60 plants that are currently impacting nature preserves, wildlife areas, parks and forests throughout the state. Some of the top invasive non-native plants include: bush honeysuckles (Amur, Morrow and Tatarian), buckthorn (glossy and common), garlic mustard, purple loosestrife, common reed grass, reed canary grass, autumn and Russian olive, multiflora rose, Japanese honeysuckle, narrow-leaved cattail, Canada thistle and tree-of-heaven.

Managing invasive plants is a critical issue, because the very characteristics which help these plants flourish make them difficult to control. Traditional management tools such as hand pulling the most aggressive plants are labor-intensive and unsuccessful at eradicating alien plants long-term. Herbicides have become an effective tool in curbing invasive plant infestation, while protecting native plant species. Effective techniques are only just emerging to meet an ecological challenge that will only increase as more invasive plants gain a foothold in our preserves. (source: http://www.dnr.ohio.gov/dnap/invasive/default.htm)

Invasive species are no doubt present throughout the Blacklick Creek watershed. We are not aware of any organized efforts to address this problem at present.

3. Water Resources

a) Climate

The climate of Franklin County, Ohio is identified as Dfa under the Köppen-Geiger climate classification system. This indicates that the winters are cold, with the coldest average monthly temperature below 37.4°F, and the summers hot, with the hottest monthly average temperature above 71.6°F, and there is no pronounced dry season (Peel et al., 2007). As a result, winter precipitation falls frequently as snow. It results in a good accumulation of soil moisture by spring and minimizes drought during summer on most soils (McLoda & Parkinson, 1976).

Table 4: Precipitation Totals Collected at the Columbus International Airport Authority (2003)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
mm	70.1	58.3	78.8	86.5	96.2	100.1	116.8	86.4	67.0	54.0	76.2	68.2	959.5
inches	2.8	2.3	3.1	3.4	3.8	3.9	4.6	3.4	2.6	2.1	3.0	2.7	37.8

Source: NCDC Cooperative Stations, WorldClimate.com

Table 5: Average Temperature Totals Collected at the Columbus International Airport Authority's National Climatic Data Center (NCDC) Station.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
°C	-3.1	-1.3	4.9	10.5	16.2	20.6	22.8	21.9	18.6	12.0	6.0	0.0	10.7
°F	26.4	29.7	40.8	50.9	61.2	69.1	73.0	71.4	65.5	53.6	42.8	32.0	51.3

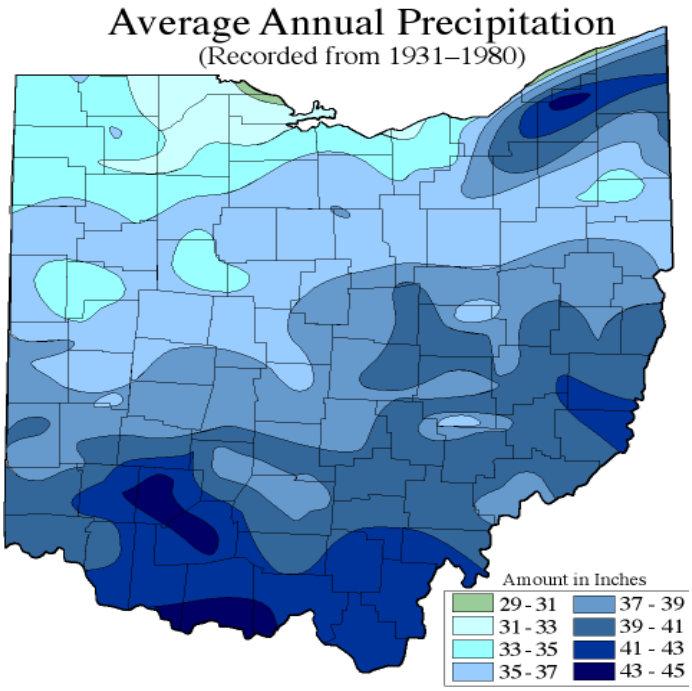
Source: NCDC TD 9641 Clim 81 1961–1990 Normals.

Climate is a contributing factor to the development of natural waterways and soil chemistry. Each eco-region may have a different climate and soil type which creates diversity between streams located in different areas. Because climate governs terrestrial biology and hydrology, waterways in different areas function and perform differently creating uniqueness regarding the effect that climate has on the function of natural waterway systems.

(1) Hydrologic Cycle

Franklin County, Ohio, receives approximately 38 inches of precipitation every year. October, December, January, and February are the months that receive the least amount of precipitation, while May, June, and July are the wettest months. The average monthly precipitation recorded is approximately 3.14 inches.

Figure 4: Average Annual Precipitation for Ohio (Source: The Ohio Department of Natural Resources, Division of Water).



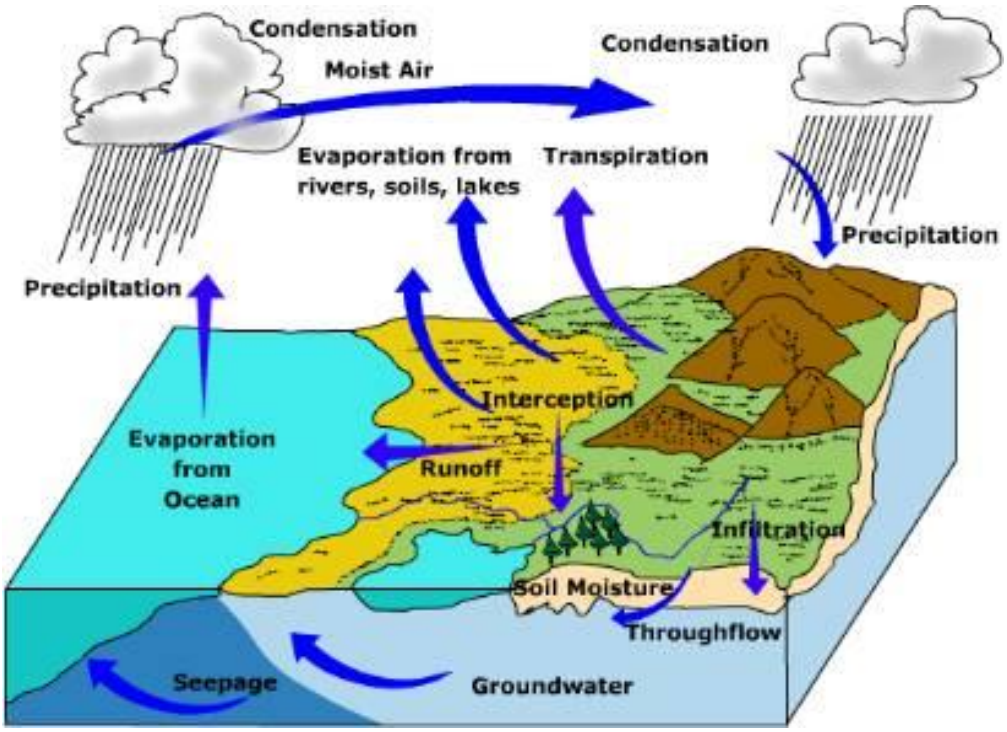
Of these 38 inches, about 10 inches become run-off, which moves immediately to surface-water bodies. Two inches are retained at or near the ground surface and evaporate back into the atmosphere in a relatively short period of time. Twenty-six of the 38 total inches enter the soil surface through infiltration. Twenty of these 26 inches go into soil storage and later are returned to the atmosphere by the combined processes of evaporation and transpiration (evapotranspiration). The remaining 6 inches recharge the groundwater supply. Two of these 6 inches eventually move to springs, lakes, or streams as groundwater discharge. The remaining 4 inches either return to the atmosphere by evapotranspiration or are withdrawn to supply water needs (Brown et al., 1990).

It is important to recognize the significance of the hydrologic cycle, especially how all facets of the cycle are interwoven. This essential cycle is a system that functions between the earth and the atmosphere, providing a replenishment of water for the ground, the air, the vegetation, and the water courses on the land. Development and the interaction between the environment and population growth have impacted the hydrologic cycle and its ability to function. Impervious surfaces such as roads, driveways, parking lots, rooftops, and buildings cause a disruption in the hydrologic cycle by forcing the water to run off into the city stormwater system rather than be absorbed into the ground to replenish the groundwater, thereby increasing the amount of water and the velocity of water entering the receiving stream.

Figure 5: The Hydrologic Cycle

(Source: www.uwsp.edu/geo/faculty/ritter/geog101/uwsp).

The Hydrologic Cycle



Although Ohio is a water-rich state, we must continue to be concerned about the protection and proper use of our valuable water resources. Many human activities (urban, rural, agricultural, and industrial) have an influence on the quantity and quality of water. In order to make wise decisions about the proper protection and use of these resources, we must have a good understanding of the basic processes of the hydrologic cycle through which water continually circulates from the Earth's surface to the atmosphere and back to the Earth (Brown et al., 1990).

b) Surface Water

(1) Wetlands

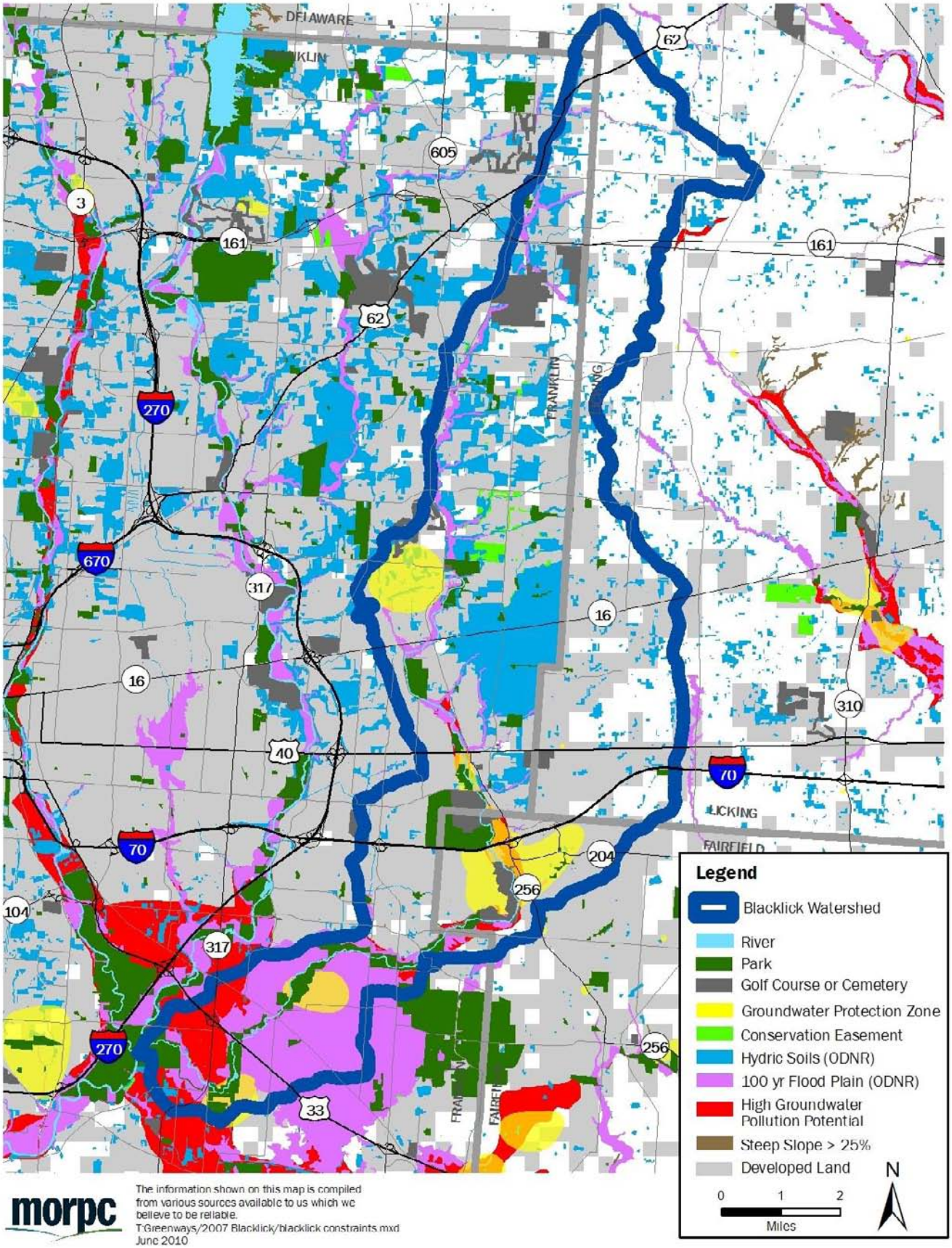
Wetlands are called “nature’s kidney.” They perform the same function our kidneys do by filtering out toxins and contaminants to help the body or the stream stay healthy. According to many EPA studies performed on Franklin County waterways, most streams are in non-attainment status of current EPA-accepted water quality standards. The continued removal of wetlands in Franklin County exacerbates an already alarming situation.

The United States has a “no-net-loss” wetland filling policy. This often results in removing a wetland in one place, where it naturally exists, and manufacturing a “new,” slightly larger, constructed wetland in another location that may be several counties away meets the criterion of the no-net-loss. The cumulative effect of these losses has critically influenced the ability of our waterways to maintain their natural integrity.

In 1990, Dahl indicated that Ohio had lost 85% or more of its original wetlands. Given Blacklick Creek's proximity to a major metropolitan area and the development that has taken place in its watershed during the two decades since that report was published, it is unlikely that the fate of wetlands has been any different in the Blacklick watershed than it has been in the rest of Ohio. Besides filtering pollutants, wetlands provide a temporary storage area for surface water during heavy precipitation events, are sanctuaries for wildlife, help recharge groundwater supplies, and provide recreational opportunities.

Large areas of hydric soils, which support wetlands, are found along perennial, intermittent streams and drainage swales, and in the few remaining wet woodlands that were not utilized for agriculture. Given the widespread presence of hydric soils in the watershed many more un-catalogued wetlands are sure to exist. Figure 6 identifies areas with soils that would support wetlands.

Figure 6: Environmentally Sensitive Areas and Designated/Protected Open Space in Blacklick Watershed



(2) Streams

Table 6: Stream Data (estimated)(http://water.usgs.gov/osw/streamstats/ohio.html)

Tributary Name	Designated Use	Length (mi)	Watershed size (mi^2)	Mean Annual Flow (ft^3/s)	10 Year Flow (ft^3/s)
Blacklick Mainstem (entirety)	WWH	30	63.4	63.7	4410
HUC 05060001-140-050	WWH	21.8	50.6	50.9	3740
HUC 05060001-140-060	WWH	8.2			
Unnamed Trib RM 25.42	NA	1.2	2.45	2.4	462
Unnamed Trib RM 24.29	NA	1.6	3.41	3.35	558
Swisher Creek RM 20.93	WWH	3	2.2	2.16	373
Cole Ditch RM 19.85	NA	1.6	1.26	1.22	218
Unnamed Trib RM 18.77	NA	2.9	1.96	1.91	376
Unzinger Ditch RM 15.88	LRW	1	1.94	1.86	338
Dysar(t) Run RM 14.64	WWH	3.1	4.18	4.11	658
South French Run RM 13.66	WWH	4	5.79	5.74	882
N. Branch French Run RM 0.33	EWH	3.8	3.25	3.2	588
Unnamed Trib RM 12.89	NA	2.9	2.51	2.48	469
Unnamed Trib RM 11.25	WWH	4	2.42	2.4	474
Unnamed Trib RM 10.36	WWH	3.3	2.45	2.43	538
Powell Ditch RM 6.5	WWH	3	3.85	3.76	628

(3) Lakes and Reservoirs

There are numerous small ponds and detention basins in the watershed but no large lakes or reservoirs.

c) Ground Water

The geology in most of the Blacklick Watershed does not support high volume wells and will only support single family applications. Groundwater pollution potential for most of the area is minimal due to low flow rates with the exception of the confluence region in at the mouth of the stream. There are, however, four buried valleys with high enough flow rates to support public sources of ground water with a high pollution potential found in the table below.

Table 7: Public Source Water Wells

Wellfield Owner's Name	Wellfield Location	Wells	Pump rate	Geological Setting
GROVEPORT, VILLAGE OF		2	576000	Buried Valley
OHIO AMERICAN WATER CO.		3	1440000	Buried Valley
JEFFERSON WATER&SEWER	TAYLOR RD WF	3	645000	Buried Valley
FAIRFIELD COUNTY UTILITY	VIOLET TOWNSHIP	7	2002200	Buried Valley

Source Water Assessment Plans and susceptibility analysis for Jefferson Water & Sewer District and Fairfield County Utility can be found in Appendix A.

4. Land Use

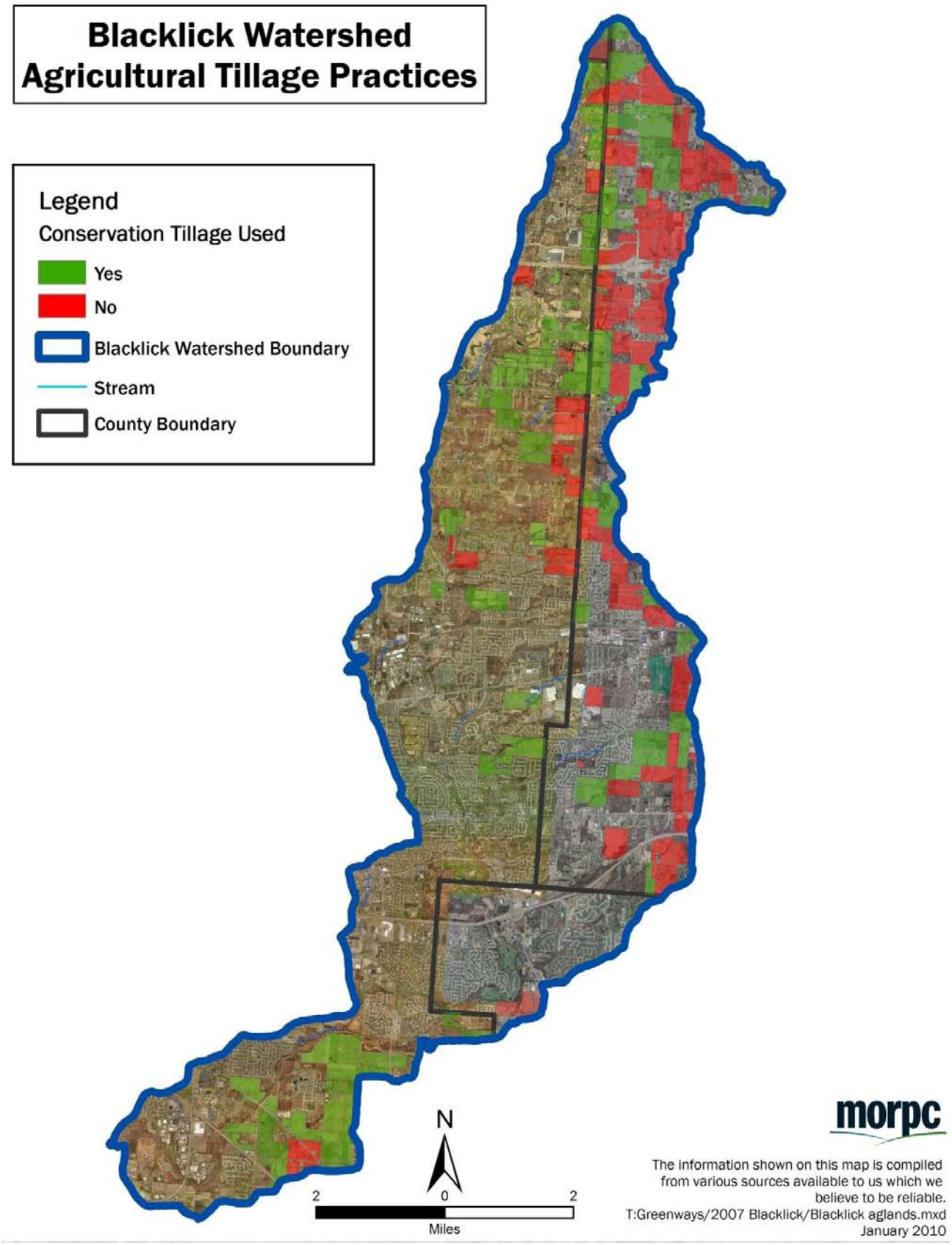
a) Land Cover Description –Urban and Agriculture

Table 8: Land Use Present and Future Percentages

Land Use	Current Percentage	Future Percentage
Agriculture	43.6	0.4
Commercial	6.2	7.0
Industrial	3.9	6.0
Office	1.9	7.0
Open Space	12.5	13.1
Public Service	5.8	5.2
Residential	26.1	63.1

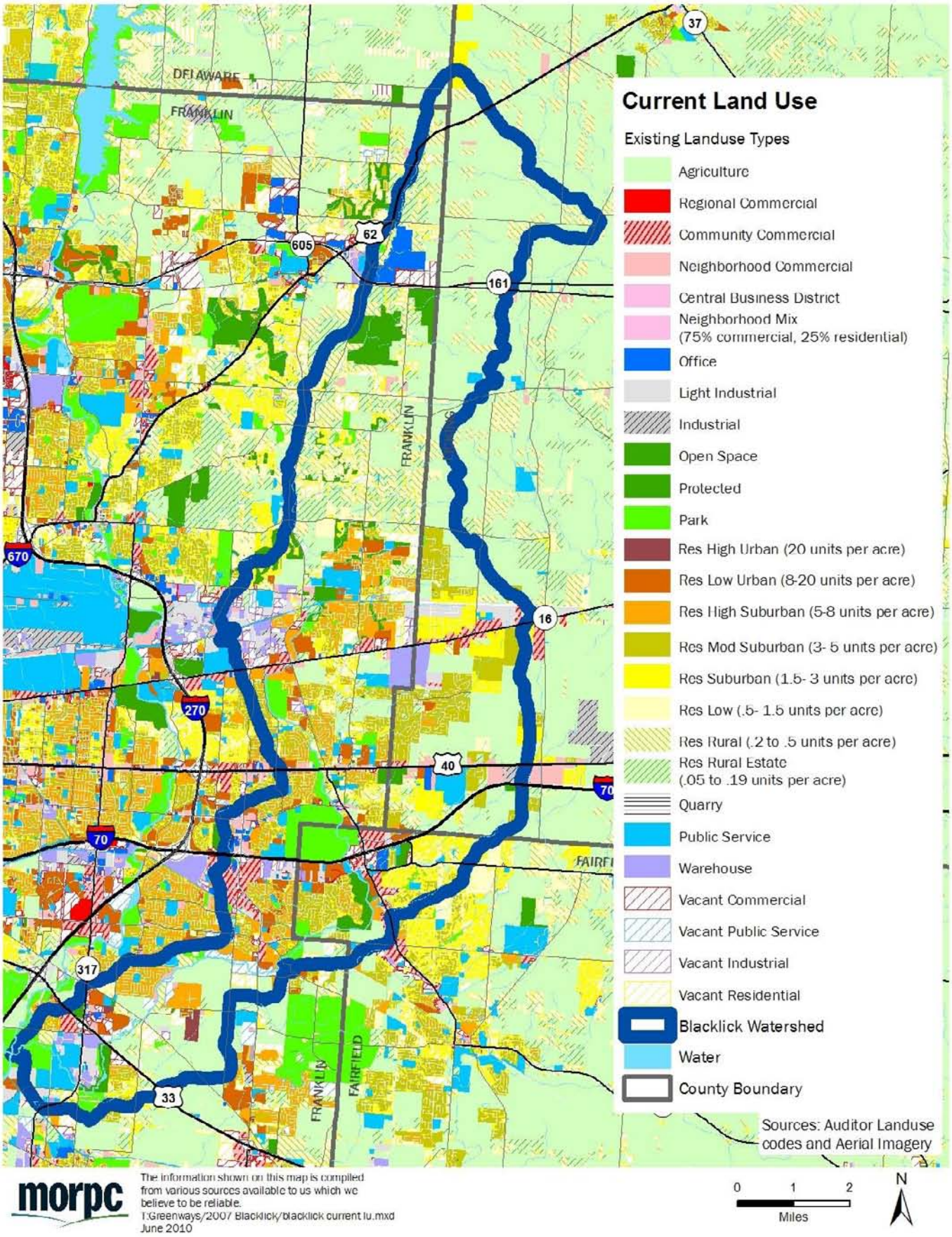
Though the current land usage shows more than two fifths of the land in the watershed still being used for agriculture most of these large tracts are owned by development companies. Most of the agricultural operations are row crops with a rotation of corn and soybeans. Livestock operations include Hendren Farms and a farm where the sheep may have access to the stream near Waggoner Rd., south of Rodebaugh Rd. There is no other livestock noted to have access to the stream. Atrazine is applied at 1-1.5 lb/ac for corn. Roundup is applied for soybeans. The TMDL does not document any impairment from atrazine. Irrigation is not used in the watershed. Figure 7 shows the current conservation tillage in the watershed.

Figure 7: Agricultural Tillage Practices in the Blacklick Watershed



This area has experienced rapid growth since the 1980's that only accelerated in the late 90's and early 2000's. A 1975 "Flood Hazard Analysis Report" for Blacklick Creek identifies only 17% of the watershed in urban land uses. (U.S. Dept. of Agriculture Soil Conservation Service, pg. 3). Since that time land use changed from open agriculture and wooded areas to suburban neighborhoods in the middle section of the watershed. A mixture of rural residential lots (1-5 acres) and suburban housing development is the predominant and increasing land use in the watershed. The current impervious cover is estimated at 18.44%, and is projected to increase. Agricultural land uses are present primarily in the headwaters of both the mainstem and its tributaries with a smaller area in the lower portion of the watershed. The future projections for land use are based on a review of comprehensive plans where available combined with current zoning and growth patterns for those areas without such plans. The projections show a drastic reduction in agriculture and more than doubling residential land use. This change will only exacerbate the far reaching effects on the flow regime and water quality of Blacklick Creek without a change in how storm water is managed. The main population centers in the watershed area are the cities of Columbus, Pataskala, Pickerington and Reynoldsburg, the villages of Groveport and New Albany, and the townships of Violet, Madison, Jefferson and Etna. Figure 8 shows a map of current land uses in the watershed.

Figure 8: Current Land Use In Blacklick Creek Watershed



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The information shown on this map is compiled from various sources available to us which we believe to be reliable.
T:Greenways/2007 Blacklick/blacklick current lu.mxd
June 2010

b) Protected Lands

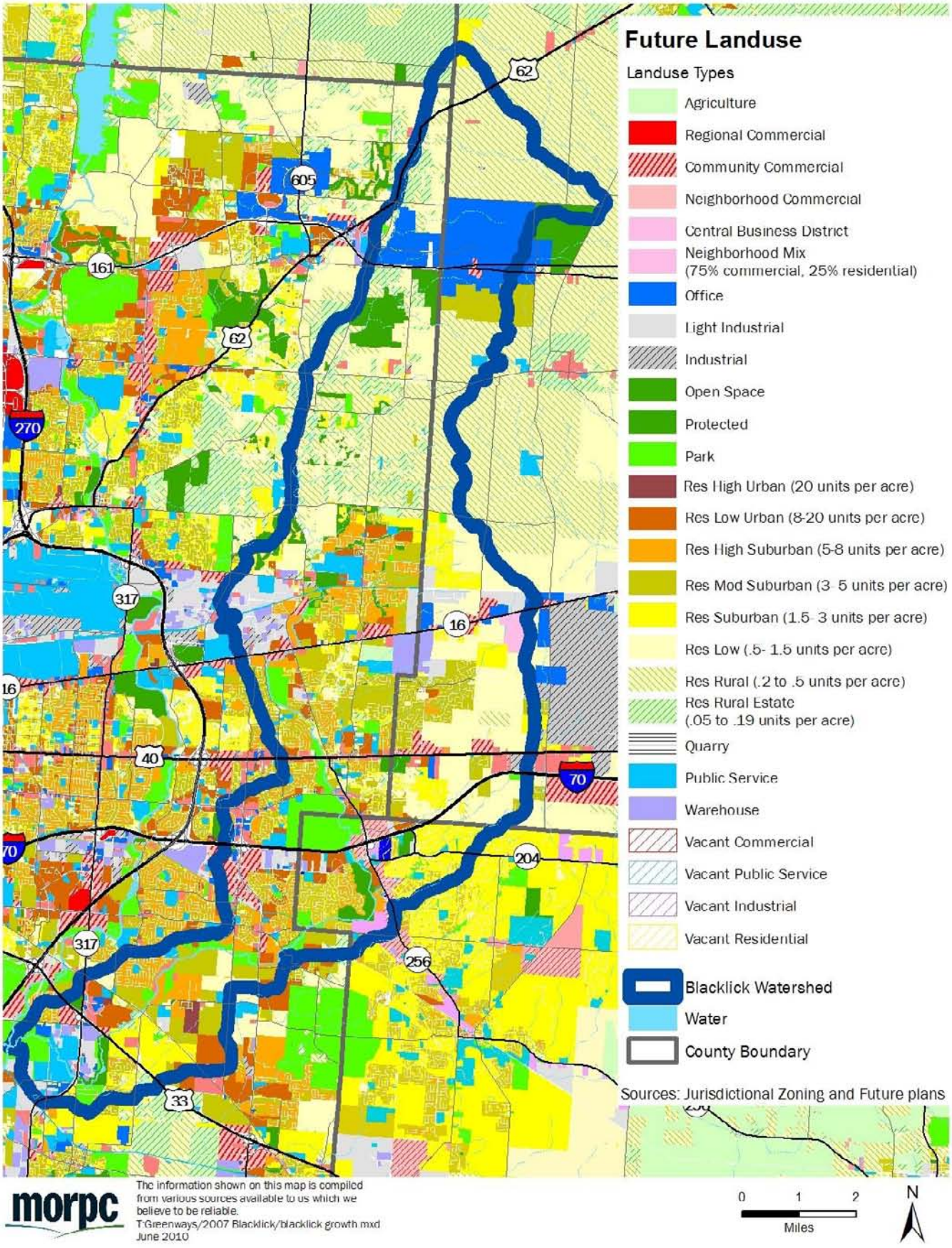
The figure below identifies all of the parks and lands that have easements. Metro Parks and Columbus Recreation and Parks have significant holdings along the stream starting with the confluence at Three Creeks Park. Metro Parks with the City of Columbus have acquired a greenways corridor along the stream that when completed in 2009 will connect Three Creeks Park with Portman Park, Blacklick Metro Park, Huber Park, and J.F. Kennedy Park in downtown Reynoldsburg. This will provide recreational access to roughly 14 river miles of stream and help protect the stream corridor. Blacklick Woods was established in 1945, and was the first Metro Park in the system. The property for Three Creeks was first acquired by Columbus Recreation and Parks in 1969. The park later formed as a result of a joint venture between Columbus Recreation and Metro Parks in 1998.

MORPC and the Blacklick Planning Team support Green Infrastructure to incorporate a planned, managed network of green space that leads to ecological, social and economic sustainability. Greenways are an important part of urban life and deserve planning and funding just as other forms of infrastructure do. These natural areas along streams will help us curb the future cost for flooding prevention, clean water, and clean air. Development of greenways will be according to "Greenways: A Plan for Franklin County", which describes a vision and a plan of action for watercourse protection in the central Ohio region.

c) Status and Trends

With the economic downturn, continued growth and green-field development in the watershed has slowed to a trickle. However, many of the remaining large tracts of open land are owned by developers. A resumption of previous patterns of development is expected as the economy recovers. The figure below shows the projected future land use. The projections are based on current comprehensive plans or in the absence of such plans on the current zoning. They are not connected to a specific year but represent a complete build out based on current plans or zoning. As shown in Table 8 more than 99% of current agricultural lands in the watershed are expected to be converted to other uses. Most of that change will be too residential. Past experience tells us that once a watershed reaches 50% or more impervious surface it is very difficult to meet warm water habitat criteria. It will be essential for jurisdictions to guide further development to protect, preserve, and restore the function of Blacklick Creek and its tributaries.

Figure 9: Future Land Use in the Blacklick Creek Watershed



B. Cultural Resources

The Blacklick Watershed is home to two Columbus Metro Parks: Blacklick Woods Metro Park and Golf Courses and Three Creeks Metro Park. The Blacklick Woods Golf Course is the only Audubon certified golf course in Franklin County. By the end of 2009 both of these parks will be connected by a multipurpose trail that also connects to the Alum Creek Greenways trail at Three Creeks Metro Park and is also connected by trail to Pickerington Ponds Metro Park.

Jefferson Township residents and government have been at the forefront of preserving and protecting the corridors of the stream and its tributaries. The township has acquired many easements along their streams and has instituted zoning that limits development within the stream corridor. This has resulted in a wide wooded riparian corridor of public lands along Blacklick Creek from Wengert Road to Blacklick Ridge Blvd. Small tributaries are also protected in this manner. These smaller streams are required to be left untouched with significant riparian areas on each side of these streams. The township has also preserved its rural character and several roadways are designated scenic byways through ODOT's Ohio Byway program. They include portions of Kitzmiller Road, Clark State Road, Waggoner Road, Havens Road, and Reynoldsburg-New Albany Road. Several of these roads are favorites for cyclists and afford multiple opportunities to see and experience Blacklick Creek and its tributaries.

The City of Columbus has also been intentional in preserving greenway corridors along the streams as development has occurred.

Table 9: Parks, Open Space, and Culturally Significant Sites

Jurisdiction	Park	Location
Pataskala	Freedom Park- City Park	5200 Taylor Road SW
	Citizens Park-City Park	NW Corner Monarch Drive and Wakefield Ave.
	Community Open Space- Owned by HOA	100 Fox Hall Drive
	Liberty Park-City Park	1576 Roscommon Drive
	Licking Heights North Elementary School	6507 Summit Road
	Licking Heights South Elementary School	6623 Summit Road
	Licking Heights Middle School	6565 Summit Road
Reynoldsburg	Kennedy Park	
	Huber Park	
	Civic Park	
	Rodebaugh Park	
	Park at Waggoner	
	Pine Quarry Park	
	Livingston House	
City of Columbus	Independence Park	3075 Arrowsmith Dr.
	Creekstone Parkland	East and West of Crete Lane
	Portman Park	6991 Long Rd (part of Blacklick Greenway)
	Waggoner Chase Parkland	
	Abbie Trails Parkland	Abbie Trails Drive East of Gender Rd (Part of Blacklick Greenway)
	Blacklick Parkland	Gender Rd. (Part of Blacklick Greenway, Just North of Abbie Trails)
	M-5 Parkland	Winchester Pike
	Refugee Rd Parkland	Part of Blacklick Greenway
	Three Creeks Park	Part of Three Creeks Metro Park Area
	Creekstone Parkland	
	Crawford Farms Park	Grandlin Park Dr.
	Shelbourne park	Brice Rd
	Walnut Hills Golf Course	6001 E. Livingston Av
	Retreat at Turnberry	Refugee Road (part of Blacklick Greenway)
	Jefferson Woods Park	Old Ivory Way (Neighborhood park)
	Turnberry Golf Course	Reynoldsburg Baltimore Rd
	Chatterton Park	Deforest Dr. (Part of Blacklick Creek Greenway)
	Kennedy Park at Waggoner Chase	Kennedy Rd

Village of Groveport	Cruiser Park	North and South of Bixby Rd, East of Hamilton (part of Blacklick Greenway)
Jefferson Township	Jefferson Township Wengert Rd. Park (to be developed)	7375 Wengert Road
	Jefferson Twp Open space	520 Reynoldsburg New Albany Rd (Voelker Dirken Owns)
	Plumbers Park (Open by appt.)	860 Reynoldsburg New Albany Rd
	Blacklick Ridge Park	7412 Blacklick Ridge BL
	Jefferson Estates Park (undeveloped)	Jefferson Estate Dr.
	Jefferson Water & Sewer District open space	Wengert Rd. east of Blacklick Creek
	Jefferson Run Park	Jefferson Run (Licking Heights School District)
	Jefferson Community Park	Clark State Road
	Swisher Creek Park	Clark State Road on south
	Jefferson Golf & Country Club	7271 Jefferson Meadows Drive
	Fieldstone park areas	throughout Fieldstone Subdivision
	Royal Elm park areas	east end of Royal Elm Subdivision
	Willowbrook Crossing E.	south side of Prairie Willow Dr.
Village of New Albany/Plain Twp	Kitzmiller Wetland Park	5987 Kitzmiller Rd.
	Smith's Burying Ground Historical Marker	10819 Johnstown Rd.
	Archibald Smith's Mill Historical Marker	6000 Kitzmiller Rd.
	Tidewater Park	7950 Central College Rd.
	Tartan Fields East Golf Club	6140 Babbitt Rd.
	The Golf Club	4522 Kitzmiller Rd
Columbus Metro Parks	Blacklick Woods Metro Park	6975 E. Livingston Ave., Reynoldsburg, OH 43068
	Three Creeks Park	3620 Bixby Rd., Groveport, OH 43125
	Blacklick Parkland	5100 Shannon Road
	Blacklick Parkland	5075 Hamilton Road
	Blacklick Parkland	Brice Road
Etna Township	Palmer Road Swamp Preserve (Not open to public)	Freeway Drive
Madison Twp	Brobst Park	Winchester Pike
Violet Twp	Violet Twp Green Space	Blacklick Eastern Rd.

C. Previous and Complimentary Efforts

Please see the "Blacklick Watershed Previous Efforts and Zoning Summary" section above on page 6.

D. Physical Attributes of Streams and Floodplain Areas

1. Early Settlement Conditions

Previous to European settlement the land draining into Blacklick Creek was a wooded wilderness area with numerous "swamps" in the headwater streams in what is now western Licking and eastern Franklin Counties. The surrounding area is blessed with extensive mound structures, remnants of the mound builders, but no major mound systems are known to be in the watershed. Early settlers' accounts tell of a land filled with old growth forests, abundant game, and streams filled with fish, some reportedly 4-6 ft in length. The original survey of the area around Blacklick Creek was done by Ebenezer Buckingham in 1800. He noted first rate bottom land with birch, hazelnut, locust, walnut, blue and white ash with spice, paw paw, and prickly ash (Snyder, personal email 1/27/09). The area was also used as hunting grounds by several different native tribes. Brief histories of the dominant native groups taken from the Big Walnut Creek Watershed Action Plan are included below.

Native Americans pre-1500 A.D.

Mound Builders

Mound Builders, in North American archaeology, is the name given to those people who built mounds in a large area from the Great Lakes to the Gulf of Mexico and from the Mississippi River to the Appalachian Mountains. The greatest concentrations of mounds are found in the Mississippi and Ohio valleys. Archaeological research indicates the mounds of North America were built over a long period of time by very different types of societies, ranging from mobile hunter-gatherers to sedentary farmers. The prehistoric mounds had a wide variety of forms and fulfilled a range of functions. Many served as burial mounds, individual or collective funerary monuments. Others were temple mounds or platforms for religious structures. Burial mounds were especially common during the Middle Woodland period (c.100 B.C.-A.D. 400), while temple mounds predominated during the Mississippian period (after A.D. 1000). During the Woodland period (c.500 B.C.-A.D. 1000), hunting and gathering was combined with a set of domesticated native agricultural plants (sunflower, goosefoot, erect knot weed, and may grass) to bring about increased population densities and a greater degree of sedentism throughout the Ohio and Mississippi valleys. The Middle Woodland period (c.200 B.C.-A.D. 400) saw the construction of elaborate earthworks from the Great Lakes to the Gulf Coast. Large, mainly dome-shaped mounds appeared throughout the Ohio and Tennessee River valleys, some in the form of animal effigies. In the Hopewell culture, centered in southern Ohio and Illinois, earthen geometric enclosures defined areas ranging from 2.5 to 120 acres (1 to 50 hectares), and some mounds reached 65 ft (20m) in height. Mica, ceramic, shell, pipestone, and other material were traded over a vast area, indicating the growth of a system of widely shared religious beliefs but not overall political unity. Analysis of mortuary remains suggest Middle and Late Woodland communities were characterized by a system of social rank: Particular kin groups are believed to have had high social prestige, differential access to rare commodities, and control over positions of political leadership. In the Late Woodland period (c.A.D. 400-1000), burial mounds decreased in frequency, and the elaborate burial goods of the Hopewell culture largely disappeared. However, there was probably no general decline in social complexity or population density at this time. In the Mississippian period (after A.D. 1000), maize agriculture spread throughout the East. Populations expanded and became increasingly sedentary Mississippian societies are thought to have been complex chiefdoms, the most hierarchical form of political organization to emerge in aboriginal North America. (www.infoplease.com/ce6/sci/A0834239.html)

Native Americans 1500 - 1843 A.D

The Wyandotte

The Wyandots belong to the Iroquoian Family of North American Indians. They are the descendants of the Tionnontates or Tobacco Nation of the Huron Confederacy. Their legends and folklore indicate that they are of extreme Northern origin as a tribe, and their history confirms this. As they increased in strength and became blended into a single tribe or people with the name Wyandot, they gathered about Mackinaw, and from thence began slowly to descend the Great Lakes, and stopped at Detroit. Here they were Pontiac's best and bravest warriors.

In the wars between the British and Americans they were on the side of the English until the war of 1812, when about half the tribe sided with the Americans. At the close of the war that portion of the tribe that had adhered to Great Britain settled permanently in Canada, and those who had espoused the cause of the United States remained about the western end of Lake Erie, in what is now Ohio and Michigan. Their Ohio lands were in what is now Wyandot County. Here Methodism was introduced among them and a mission established. On March 17, 1842, they ceded their Ohio lands to the United States. They were the last of the tribes to relinquish their lands in Ohio.

In July, 1843, the Wyandots followed in the steps of the other tribes and moved beyond the Mississippi. Here in the "Indian Territory" they purchased the land in the fork of the Missouri and Kansas Rivers from the Delawares. They brought with them from Ohio a well organized Methodist Church, a Free Mason's Lodge, a civil government, and a code of written laws which provided for an elective Council of Chiefs, the punishment of crime and the maintenance of social and public order.

The Wyandots were always brave and humane warriors. They adopted persons captured in war; no instance is known of their burning and torturing a prisoner. The Wyandot tribe stood at the head of the Confederacy of the northwestern tribes formed to oppose the settlement by white people of the Territory Northwest of the Ohio River. The tribes composing this Confederacy were all removed. (Walker, www.wyandot.org/ww1.htm#1.)

The Mingo

The Mingo Indians were a small group of natives related to the Iroquois Indians. They are sometimes called the Ohio Seneca Indians. By 1750, the Mingos had left the Iroquois and migrated to the Ohio Country. In the 1760s, the Mingo Indians lived in eastern Ohio near Steubenville. By the early 1770s, they had moved to central Ohio. One of their villages was on the banks of the Scioto River at the site of modern-day Columbus. Captain William Crawford led an attack against the Mingo village on the Scioto River at the close of Lord Dunmore's War in 1774. The Mingos fled across Ohio and became scattered.

By the 1800s, the Mingo Indians had villages along the Sandusky River as well as at Lewistown. The Mingos began to live with other tribes, hoping that together they would be able to stop the westward expansion of white settlers. Some Mingo Indians lived with the Miami Indians, while others lived with the Shawnee Indians. In 1831, the United States forced the Mingos to sell their land, and the natives moved to reservations in the West . Logan was the most famous chief of the Mingo Indians.
Ohio Historical Society, 2005, "Mingo Indians", Ohio History Central: An Online Encyclopedia of Ohio History

The Delaware

The Delaware Indians, also called the Lenape, originally lived along the Delaware River in New Jersey. They speak a form of the Algonquian language and are thus related to the Miami Indians, Ottawa Indians, and Shawnee Indians. The Delawares are called "Grandfathers" by the other Algonquian tribes because of their belief that the Delawares were the oldest and original Algonquian nation. As British colonists immigrated to North America, the Delawares fled westward away from the land-hungry Europeans. While trying to escape the

British colonists, the Delawares encountered the Iroquois Indians, who proceeded to conquer the Delawares and drive them further west.

Some Delaware Indians came to live in eastern Ohio along the Muskingum River, while others resided in northwestern Ohio along the Auglaize River. Once in Ohio, the Delawares grew into a powerful tribe that could resist the further advances of the Iroquois. Upon arriving in the Ohio Country, the Delawares formed alliances with Frenchmen engaged in the fur trade. The French provided the natives with European cookware and guns, as well as alcohol, in return for furs. This alliance would prove to be tenuous at best, as French and English colonists struggled for control of the Ohio Country beginning in the 1740s. Following the American victory in the Revolution, the Delawares struggled against whites as they moved onto the natives' territory. In 1794, General Anthony Wayne defeated the Delawares and other Ohio Indians at the Battle of Fallen Timbers. The natives surrendered most of their Ohio lands with the signing of the Treaty of Greenville in 1795. In 1829, the United States forced the Delawares to relinquish their remaining land in Ohio. They were sent to live in Kansas.
Ohio Historical Society, 2005, "Delaware Indians", Ohio History Central: An Online Encyclopedia of Ohio

White Settlement – Europeans and Americans

The rivers and streams were the primary "highways" for both the historical natives and the early settlers, either as navigable waterways or with footpaths along their banks. The first white settlers to the area came up the Scioto from the Ohio and then probably up the Big Walnut. All of these streams would have been navigable by boat. Blacklick Creek would quickly have become difficult by boat upstream of the confluence at present day Three Creeks Park but would have provided a path for penetrating the thick forests that covered the landscape.

The first settlers began to set up farms in the first decade of the 19th century with populations increasing enough by the second decade to establish townships and villages. Some of the earliest were the Village of New Albany and the Villages of Wert's Grove and Rarey's Port. The last two, on opposite sides of the canal, would eventually combine to become Groveport in the late 1840s. Reynoldsburg was laid out in the 1830's and would become the major population center in the watershed being built along the banks of Blacklick Creek.

The Ohio-Erie canal helped drive development in the lower portion of the watershed. Though the creek itself was not used so much for water transportation the rich farmland and easy access of this area made it a good place to set up a farm. Throughout the area the small streams like Blacklick Creek and its tributaries were more important for their role as a power source for grist and sawmills. The histories of the region discuss dozens of mills throughout the Central Ohio area and their importance to the local economies. Remnants of at least three old mill dams have been located in the mainstem of Blacklick Creek. (These dams will be discussed in detail in a later section.) By the late 1800's most of these mills seem to have been replaced by steam driven operations and they disappeared from the landscape.

Throughout the last century and a half the stream has continued to be used for recreation. In the 1930's during the depression the state bought fishing easements along many of Ohio's streams to provide access for people. Included in appendix C is a map and documentation for easement locations in Plain Township along both Rocky Fork Creek and Blacklick Creek. Up and down the stream where ever there is public access people are also swimming and wading in the creek.

2. Channel and Floodplain Condition

The Channel and floodplain of the mainstem are in good condition along most of the stream corridor. In the northern portion above Broad Street the stream appears to have access to its flood plain with an established wooded corridor along most of this reach. Along Kitzmiller Rd homes do encroach on the 100 year floodplain with an extreme case at 3500 Kitzmiller Road where the house is built across the stream. In the southern reach of the mainstem after Blacklick Creek reenters Franklin County the topography flattens and the flood plain spreads wide. The stream still has access to the flood plain here but, given its width, a great deal of development has occurred inside the 100 year boundaries. Even so, there are still wide swaths of open fields.

It is the middle section through Reynoldsburg, Violet Township, and Pickerington where the stream has the least access to its floodplain and where the channel has down cut the most. Reynoldsburg was founded in the early 1800's along the banks of the creek and most of the roads, houses and buildings constructed during that era were built to convey water to the streams as quickly as possible—a pattern continued into the 1900's. Due to the resulting down cutting the stream must rise about six to eight feet before it is able to overflow its banks putting many of the homes and buildings along the stream at risk. The risk is somewhat mitigated by the streamside parks set aside by Reynoldsburg but the number and severity of flooding occurrences will only increase with upstream development unless steps are taken to preserve and restore the pre-development runoff characteristics of the land.

3. Forested Riparian Corridor Assessment

Streamside Forests provide many benefits to the water quality and aquatic habitat of streams and rivers. These strips of forests, also referred to as riparian buffers or corridors, play a major role in protecting water resources that in many instances provide vital drinking water sources for humans and livestock.

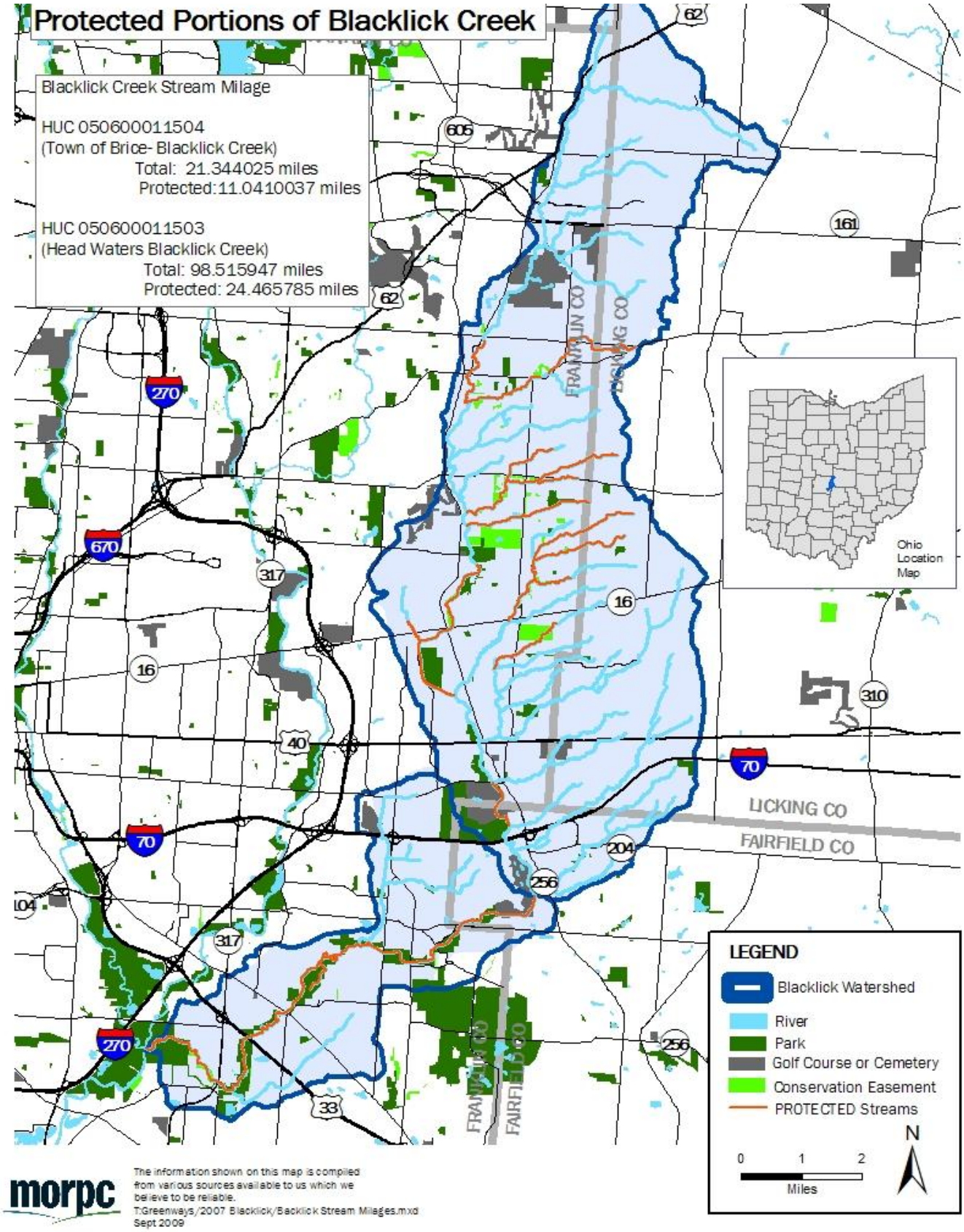
The following are just some of the many services of streamside forests:

- Stream bank stabilization - the roots of trees along the stream banks provide excellent biological structure for holding soils in place.
- Nutrient absorption - the shrubs and trees act as a "sink" for nutrients from fertilizer and animal-waste run-off; they help absorb and process these nutrients before they can reach the stream, river, or lake.
- Temperature control – reduce water temperature by shading the water and allowing for higher dissolved oxygen levels.
- Wildlife habitat – streamside forests form habitat that allows a wide variety of fauna to thrive.
- Detritus – leaves and woody debris that fall into the stream are integrated into the stream ecosystem and provide energy
- Sediment runoff reduction - suspended sediment in surface run-off from exposed areas such as construction sites and eroded pasture and agricultural fields is trapped in streamside vegetation. This prevents covering the rocky substrate of the creek bottom. Sediment may inhibit the feeding and reproduction cycles of fish and aquatic macroinvertebrates. If these species are affected, the disturbance is felt throughout the food web. (http://east.osu.edu/anr/BB%20March%2001.htm and http://www.dnr.state.oh.us/water/pubs/fs_st/stfs13.htm).

The riparian corridor along Blacklick Creek is relatively intact for long stretches. Even where it is not complete one side or the other still has a narrow wooded corridor. The figure below shows the number of miles with forested natural riparian buffer, which is illustrated by the green indicating parks bordering the stream.

4. Number of Miles with Permanent protection

Figure 10: Protected Portions of Blacklick Creek



5. Miles of natural channel

Very little of the mainstem has been modified. The estimate for miles of natural channel that are fully recovered or have never been modified is approximately 21.4 miles.

6. Miles and Location of modified channel

Modified reaches are limited to the headwaters area and the tributaries with some stream bank stabilization projects using armoring with rip rap or other materials.

Table 10: Possible modified sections of Blacklick Creek and Tributaries

Stream	Miles of modified channel
HUC 05060001-140-050	
Unnamed Tributary RM 27.2	Approx. 1 mile maintained as ag ditch
Blacklick Head waters Rm 27.7 to 30	Approx. 2.5 miles maintained as ag ditch
Unnamed Trib to Unnamed Trib RM 24.29/0.2 north of St. Rt. 161	Approx. 0.75 miles rebuilt as natural channel design
Blacklick RM 24.5 to 24.8	Approx. 0.3 miles channelized dam pool for old mill dam
Unnamed Trib RM 24.29/0.6 to 1.2	Approx. 0.6 miles historically ag ditch recovering, fed by a pond on golf course
Blacklick RM 21.85 to 22.05	Approx. 0.2 miles pool caused by dam
Swisher Run RM 20.93/2.0 to 3.4	Approx. 1.4 miles channelized ditch
Unnamed Trib RM 18.77/1.1 to 1.6	Approx. 0.5 miles channelized rip rap through a development. No riparian cover
Unnamed Trib to UnTrib 18.77/1.27/0.0 to 0.3	Approx. 0.3 miles channelized. Starts as rip rap no cover south of Havens Corners then looks to be historically maintained ditch showing some signs of recovery
Unzinger Ditch RM 15.88/0.0 to 1.7	1.7 miles of channelized stream surrounded by industrial land use. Stream is identified as Limited Resource Water in non-attainment.
Dysar(t) Run RM 14.64/Unnamed Trib 1.67	Approximately 0.4 miles of natural channel design of moved stream channel N. side of Broad in front of Meijer and Target plazas. Just upstream of that approximately 0.1 miles enclosed in culvert. Further upstream of this site is roughly 0.3 miles of ditched stream bed that borders former agricultural fields.
Unnamed Trib to Dysar(t) Run 14.64/2.59/1.0	Approximately 0.4 miles of ditched stream that also includes a detention basin as part of the stream at 8400 E. Broad St. at the TS Tech USA Corp Building.
Unnamed Trib to Dysar(t) Run 14.64/2.59/1.4	About 0.9 miles of ditched stream with little or no cover between Taylor Road and Summit Rd SW along the railroad tracks. There is a large mulch operation adjacent to the stream at 6747 Taylor Rd SW with mulch piles next to the stream.
Unnamed Trib to Dysar(t) Run 14.64/3.07/1.0	Roughly 1.1 miles of channelized ditch in the headwaters. Upper most portion still drains tiled agricultural fields while most of the reach drains several

	subdivisions (Brooks Edge) and their detention basins. Opportunity exists for retro fits that may improve the hydrology of this reach and reduce erosion occurring downstream resulting from higher flows during storm events.
North Branch of French Run RM 13.66/0.33/0.2 to0.3	0.1 mile Channelized with no riparian cover
North Branch of French Run RM 13.66/0.33/2.7 to 3.4	0.7 miles culverted under warehouse then ditched along S. side of Broad St. then culverted under parking lot N. of Broad St.
Unnamed tributary to North Branch of French Run RM 13.66/0.33/1.22/0.4 to 0.9	Approximately 0.5 miles of old channelized agricultural ditch that flows through a new subdivision. The houses are built right up to the stream with roof gutters draining directly to the stream. Many of the properties are experiencing severe erosion requiring rip rap to stabilize. Rain gardens and other green infrastructure could help reduce these threats along with planting of trees along the stream.
North Branch of French Run RM 13.66/0.33/2.6 to 3.4	Stream has been moved to the north when The Limited warehouses were built and then runs in a ditch along Broad Street where it cuts under the road at 3.3 and is culverted under a parking lot.
South French Run RM 13.66	
Powell Ditch RM 6.5	Nearly all of Powell Ditch has been modified. Historically it was maintained as an agricultural ditch

7. Dams

Awareness of the impact of dams on water quality and aquatic communities has increased over the past several years. Dams act as barriers to fish migration and recreational activities such as canoeing. Removing or retrofitting dams can improve fish habitat and other recreational opportunities. Despite the benefits of removing dams, the potential for environmental degradation exists if contaminated sediments accumulate behind the dam and are released during removal (http://www.epa.gov/R5water/wqb/wqb_r5mon.htm).

Table 11: Lowhead Dams along Franklin County Portion of Blacklick Creek and Tributaries

OBJECTID	COMMENTS	GPS_HEIGHT	Attainment status of stream at Dam
21	7135 Morse Road, old mill dam, associated pond has been filled in significantly with an island in the middle becoming marshy on the east side. This dam presents a barrier to fish migration during all but the highest flows, removal could make significant improvements in water quality.	1008.733	Probable Non-Attainment of WWH
23	3600 Kitzmiller, Newer well maintained dam associated with the house built over the stream. Presents a barrier to fish migration.	1005.349	Probable Non-Attainment of WWH

87	8236 Kesegs Way, small dam on headwater stream that is typically dry. Little potential for water improvement if removed	1030.435	Not studied
91	4505 S. Hamilton Rd, old mill dam with irregular face allowing for fish migration with possible exceptions during summer low flows. Stream seems to be cutting a new channel north of the dam during high flows. Possible candidate for removal.	727.499	Full-attainment WWH
225	7727 E. Dublin-Granville Rd, old mill dam with a stair step face, does not block fish migration during high flows but does create roughly 1000 linear foot pool behind. Removal might improve water quality and habitat.	1066.224	Non-Attainment of WWH
237 238 239	4522 Kitzmiller Rd, These three dams are on the property of the Golf Club. They create a series of plunge pools forming a water hazard on the course. This is a small headwater stream. Removal is unlikely given their purpose and might not improve water quality in the mainstem.	1061.845 1060.97 1058.018	Not Studied

8. Streams with unrestricted livestock access

No streams were observed to have unrestricted livestock access

9. Eroding banks

Currently known areas of eroding banks are centered primarily in the middle portion of the mainstem through Reynoldsburg and Violet Township. Eastern Banks near Blacklick Woods Metro Park has several high, 20-25ft, banks showing signs of significant eroding. The new Target store development at Interstate 70 and Blacklick Creek has just done some armoring stabilization work on the stream bank behind their store.

Dysar(t) Run through Reynoldsburg also has several areas of severe erosion with some of them beginning to encroach on houses built close to the edge of the ravine. South French Run and North Branch French Run all show evidence of increasing erosion as they flow through the many subdivisions along their banks.

In the lower watershed, the mainstem has eroded the north bank to the point of breaching into a stormwater pond at Winchester Cove (just west of the bridge under Winchester Pike). The pond was originally a borrow pit, and most of the water from the mainstem now flows through that pond (May 7, 2010). Given the current path of the creek, bank erosion could eventually threaten the bike path bridge that has been constructed over the creek, just south of the entry point into the pond. Figure 12 below shows locations of eroding banks in the watershed.

10. Floodplain connectivity

The stream is well connected to its floodplain in most sections of the mainstem. The areas with the least connectivity tend to be in the urbanized sections of the stream from Reynoldsburg to Pickerington. It is the tributaries in these areas that have the least connectivity with their floodplains as they are most subject to storm water surges.

11. Riparian Levees

The only place that levies appear to exist along Blacklick Creek is in Madison Township on the north side of the creek near Groveport Madison High School. This section is less than a mile long. The south bank of the stream is not levied, giving the stream access to its floodplain. There is also a constructed wetland in this same area.

12. Entrenched miles

Most of the entrenched reaches along the stream are tributaries along urbanized areas, specifically Dysar(t) Run, Powell Ditch, and some areas of French Run. An estimate of five entrenched miles is based on those tributaries.

13. Status and Trends (development, roads and bridges)

There are over 570 bridges crossing Blacklick Creek and its tributaries ranging from large freeway bridges to small wooden footbridges in backyards. The complete list of the bridges and their locations is in appendix B.

E. Water Resource Quality

1. General Descriptions of Water Quality

a) Blacklick Creek Mainstem (Taken from Big Walnut Creek TMDL section 5-2)

A TMDL report for Big Walnut Creek that includes the Blacklick Creek Watershed was published in 2005 but was based primarily on data collected in 2000. The study area included 13 stations on the Blacklick Creek mainstem from the headwaters at Walnut St. (RM 27.1) to near its confluence with Big Walnut Creek at Hamilton Rd. (RM 2.6). Seven stations were in FULL attainment of their existing or recommended aquatic life use designation, one was PARTIAL, three were NON, and two were in WWTP mixing zones.

The biological communities in the headwaters of Blacklick Creek were severely impacted by failing HSTS. Both the fish and macroinvertebrate communities were in poor condition at this station and the water quality was likewise highly degraded with very high bacteria counts, low D.O. concentrations, and very high BOD5 and nutrient concentrations. In addition to HSTS, Hendren Farms (250 dairy cows) has had problems with manure spillage into Blacklick Creek near Central College Rd. (RM 26.0). Sediment sampling at Morse Rd. (RM 22.4) found one PAH in excess of the threshold effect concentration and five PAHs in excess of the probable effect concentration. The biological communities gradually improved downstream until the WWH use was fully attained at Havens Rd. (RM 20.4).

In recent conversations with representatives at Ohio EPA, Hendren Farms has complied with all orders to deal with the manure issues they were facing. This has included manure control systems, a manure management plan, and application for an individual NPDES permit. OEPA still needs to conduct a final site visit to monitor compliance but no further events or problems have been reported to the agency since 2005.(Wilson, phone conversation 2/6/2009) Good management by the farm should result in improved water quality in this reach.

The Jefferson Township Wengert Rd. WWTP (RM 18.10) was not specifically evaluated during this study. The WWH aquatic life use was fully attained upstream and downstream from the discharge, however, an unusually high relative predominance of pollution facultative and tolerant macroinvertebrate organisms observed on the natural substrates and increases in elevated nutrient concentrations recorded downstream from the WWTP discharge at Broad St. (RM 16.6) suggested a mild impact from the WWTP. This WWTP was abandoned and connected to the Columbus sewage system on June 25, 2003.

Biological and water chemistry sampling in the vicinity of the Fairfield County – Tussing Rd. WWTP (RM 11.15) indicated only a mild impact from the WWTP discharge. Biological communities upstream from the discharge were in FULL attainment of the WWH aquatic life use. The samples within the mixing zone did not indicate any significant toxicity from the discharge. Sampling outside the mixing zone and immediately downstream revealed a mild impact to the macroinvertebrate community. The aquatic life use attainment status remained FULL, however, the ICI score dropped from 48 upstream from the WWTP at RM 11.3 to 38 downstream at RM 11.0. This decline indicated mild organic/nutrient enrichment from the WWTP discharge. The macroinvertebrate community improved slightly by Refugee Rd. (RM 8.9), upstream from the Blacklick Estates WWTP discharge. The water column chemistry and bacterial sampling detected concentrations of ammonia (7.32 mg/l) and fecal coliform (25,000/100 ml) in the effluent that exceeded the permit limits. One fecal coliform count of 11,181/100 ml measured at RM 11.0 was substantially higher than any found upstream from the WWTP discharge. Elevated nutrient and demand parameter concentrations downstream from the WWTP discharge were evidence of the pollution loadings from the WWTP.

Biological and water chemistry sampling in the vicinity of the Blacklick Estates WWTP (RM 4.85) indicated only a mild to moderate impact from the WWTP discharge. Biological communities upstream from the discharge were in FULL attainment of the WWH aquatic life use. The samples within the mixing zone did not indicate any significant toxicity from the discharge. Sampling outside the mixing zone and immediately downstream revealed a moderate impact to the macroinvertebrate community resulting in a fair community (ICI=26). The fish

community exhibited no decline downstream from the discharge so the attainment status was PARTIAL downstream from the Blacklick Estates WWTP. The biological communities were in FULL attainment farther downstream, upstream from Hamilton Rd. (RM 2.6). The water column chemistry and bacterial sampling were not exceeding levels of water quality criteria attributable to the Blacklick Estates WWTP discharge. A fecal coliform count of 3000/100ml and E. coli counts as high as 2900/100ml collected downstream from the WWTP discharge at RM 4.6 were exceeding the primary and secondary contact recreation criterion, respectively. However, they are not much different from collection sites upstream from the discharge. Similarly, elevated nutrient and demand parameter concentrations sampled downstream from the WWTP discharge were not dissimilar to upstream stations. Sediment chemistry sampling at RM 1.9 found concentrations of two PAHs exceeding the threshold effect concentration.

The biological results from 2000 reflected a similar trend compared to the 1996 survey (Ohio EPA 1998b) with the exception of lower macro invertebrate performance downstream from the Blacklick Estates WWTP. The water chemistry results from the current study were similar to the 1996 survey except for increased mean fecal coliform counts downstream from the Tussing Rd. WWTP, decreased mean BOD5 concentrations downstream from the Tussing Rd. WWTP and Blacklick Estates WWTP, and decreased mean nitrate+nitrite concentrations downstream from Blacklick Estates WWTP. The results of the aquatic life use assessment are included in Table 13 below.

The Blacklick Creek mainstem is impaired for its recreational use for frequency and magnitude of peak values of fecal coliform.

b) Tributaries to Blacklick Creek

Biosurvey sampling was conducted at eight stations in seven streams that were tributaries to Blacklick Creek. Of these, three stations were in FULL attainment of their existing or recommended aquatic life use designation, two were PARTIAL, and three were NON.

The stations on Blacklick Creek tributaries were generally all similar in that the fish communities were meeting biocriteria benchmarks and the macroinvertebrate communities were not. Diversity of pollution sensitive macro-invertebrate taxa was relatively low and facultative or tolerant taxa were present in higher numbers than expected. Persistently high bacteria counts, mild nutrient enrichment and sedimentation at these stations were indications of the increasingly suburbanized nature of this watershed.

“Unzinger Ditch”, a tributary to Blacklick Creek at RM 15.88, was not evaluated during this study, but was assessed by Ohio EPA (2001). That study found the biological communities to be in non-attainment of aquatic life uses due to stream channel modifications, toxicity associated with contaminated sediments, and nutrient enrichment from sewage. The most severe sediment contamination was found downstream from the discharge and potential runoff from the Columbus Steel Drum Company.

Powell Ditch, Tributaries to Blacklick Creek at SR 256 and at Waggoner Road, French Run and Dysar(t) Run were not attaining their Recreational Uses for geometric mean values and for frequency and magnitude of peak values of fecal coliform.

Table 12 breaks out the number of miles in attainment, partial attainment, and non attainment for Blacklick Creek and the tributaries that were studied for the TMDL report. Figure 12 also provides the locations of attainment status for these streams.

Figure 11: Blacklick Creek Attainment Status

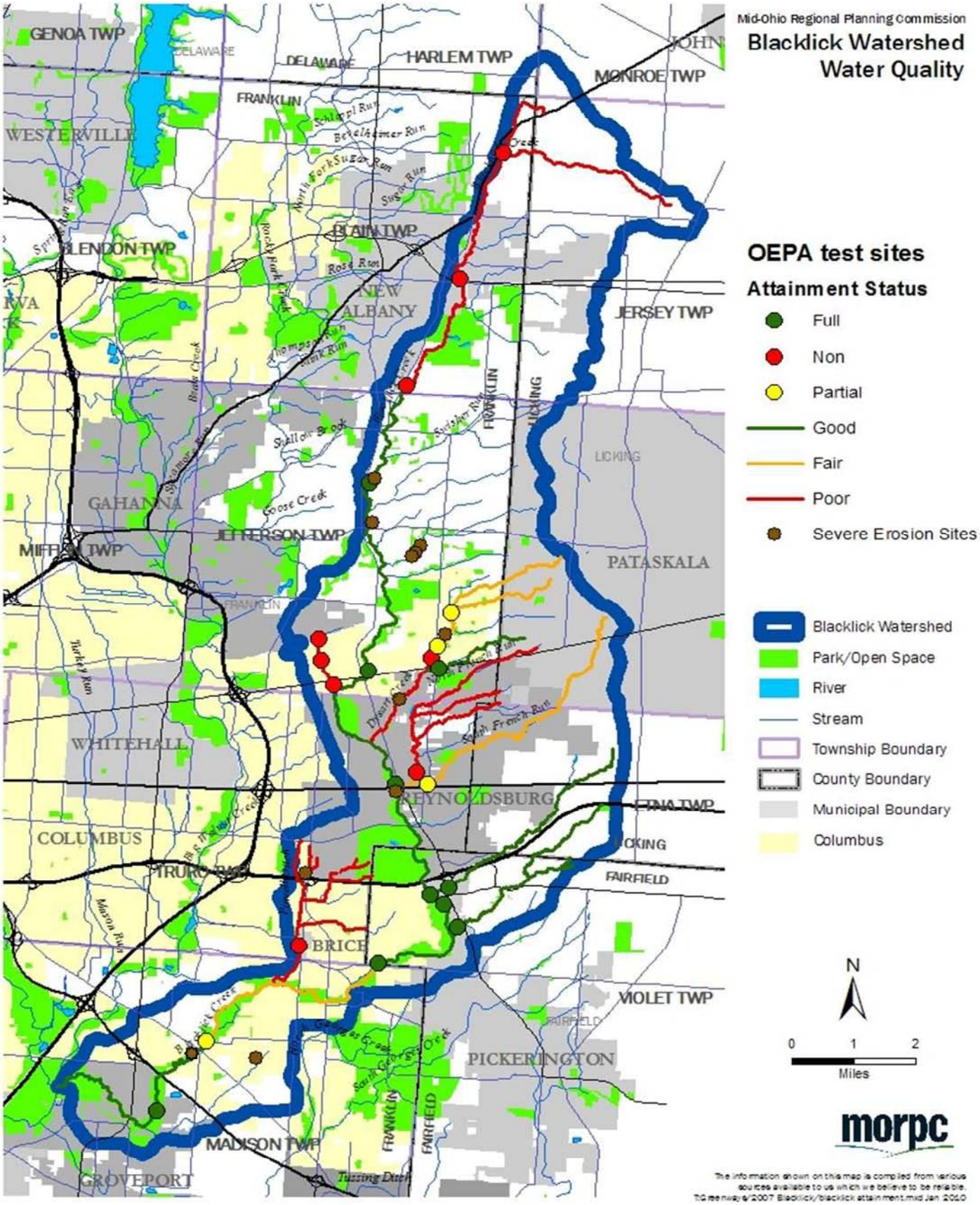


Table 12: Causes and Sources of Impairment in the Blacklick Creek Basin (Big Walnut TMDL)

Watershed Stream Segment [Upper River Mile/Lower River Mile]	Aquatic Life Use Designation	Attainment Status (Miles)			Causes of Impairment [1]	Sources of Impairment [1]
		Full	Partial	NON		
Blacklick Creek [RM 28.0-0.0]	WWH	17.5	3.9	6.6	Ammonia-H Nutrients-H Organic enrichment-H Pathogens-M Siltation-M Priority organics-M	Home sewage treatment syst.-H Minor muni. point source-H Manure lagoons-M Contaminated sediments-M Land development-M
"Unzinger Ditch" Trib. to Blacklick Cr. (RM 15.88) [RM 1.1-0.0]	LRW-WWH			1.1	Contaminated sediment-H Nutrient enrichment-H Habitat alterations-H	Industrial site runoff-H Raw sewage discharge-H Channelization-H
Dysar Run [RM 4.98-0.0]	WWH		1.15	1.85	Siltation-H Pathogens-S Metals-S Priority organics-S Organic enrichment-S Habitat alterations-S	Land development-H Urban runoff-M Home sewage treatment syst.-S Channelization-S Contaminated sediments-S
Trib. to Dysar Run (RM 1.67) [RM 1.88-0.0]	WWH	0.7				
French Run [RM 5.28-0.0]	WWH		1.0		Siltation-H Pathogens-M	Land Development-H Urban runoff-H Home sewage treatment syst.-M
N. Br. French Run [RM 3.8-0.0]	EWH			1.0	Unknown-H Pathogens-M	Unknown-H Urban runoff-M Home sewage treatment syst.-M
"Lees Creek" Trib. to Blacklick Cr. (RM 11.25) [RM 4.28-0.0]	WWH	0.8				
Trib. to Blacklick Cr. (RM 10.36) [RM 3.62-0.0]	WWH	0.8				
"Powell Ditch" Trib. to Blacklick Cr. (RM 6.50) [RM 3.43-0.0]	WWH			1.0	Habitat alterations-H Siltation-M Pathogens-M	Land development-H Urban runoff-H Home sewage treatment syst.-M Removal of riparian veg.-M

Table 13: Aquatic life use attainment status of the Big Walnut Creek basin, June-October, 2000.

The Index of Biotic Integrity (IBI), Modified Index of Well Being (MIwb), and Invertebrate Community Index (ICI) scores are based on the performance of fish (IBI, MIwb) and macroinvertebrate communities (ICI). The Qualitative Habitat Evaluation Index (QHEI) isa measure of the ability of the physical habitat to support biological communities.

River Mile Fisha Invert.		IBI	MIwb	ICIb	QHEI	Attainment Status	Comment
Blacklick Creek (02-130) WWH Use Designation (Existing)							
27.1E		20*	NA	P*	53.5	**NON**	Walnut St.
24.7E		34*	NA	Low F*	76	**NON**	SR 161
22.4E	23	32*	NA	F*	70.5	**NON**	Morse Rd.
20.4E		46	NA	G	63	FULL	Havens Rd.
16.6D		44	8.7	44	70	FULL	Broad St.
13.7D		46	8.5	MGns	71.5	FULL	Main St.
11.3D		39ns	8.0ns	48	76.5	FULL	Ust Tussing Rd. WWTP
11.14D	11.1	40	7	F/F	NA	NA	Tussing Rd. WWTP mixing zone
11.0D		44	8.6	38	70	FULL	Dst. Tussing Rd. WWTP
8.8D	8.9	46	9.4	40	70.5	FULL	Refugee Rd.
4.83D		39	8.5	F/F	NA	NA	Blacklick Estates WWTP mix zone
4.6D	4.5	46	8.9	26*	69	PARTIAL	Dst. Blacklick Estates WWTP
2.6D		43	8.4	42	78	FULL	Ust. Hamilton Rd.
Unzinger Ditch (Trib. To Blacklick Cr. (RM 15.88)) (02-333) LRW Use Designation (Existing) -							
0.9	-	12	NA	P*	27.5	**NON**	Ust. Columbus Steel Drum *WWH Use Designation(Existing)*
0.5	-	30*	NA	VP*	51.0	**NON**	Dst. Columbus Steel Drum
0.1	-	32*	NA	VP*	57.0	**NON**	Near mouth
Dysar(t) Run (Trib. to Blacklick Cr. (RM 14.64)) (02-281) WWH Use Designation (Existing)							
3.0E	2.1c	40	NA	F*	49	PARTIAL	Railroad bridge/Waggoner Rd.
1.9E	1.6	42	NA	P*	68	**NON**	SR 16
Tributary to Dysar(t) Run (RM 1.67) (02-342) WWH Use Designation (Recommended)							
0.2E	-	42	NA	-	52	(FULL)	Waggoner Rd.
French Run (Trib. to Blacklick Cr. (RM 13.66)) (02-290) WWH Use Designation (Existing)							
0.6E	0.7	48	NA	F*	55	PARTIAL	Waggoner Rd.
North Branch French Run (Trib. to French Run (RM 0.33)) (02-291) EWH Use Designation (Existing)							
-	0.2	-	-	MG*	-	**NON**	Behind French Run Elem. Sch.
"Lees Creek" (Trib. to Blacklick Cr. (RM 11.25)) (02-288) WWH Use Designation (Existing)							
0.3E	-	48	NA	-	73.5	(FULL)	Ust. SR 256
Tributary to Blacklick Creek (RM 10.36) (02-287) WWH Use Designation (Existing)							
0.2E	-	42	NA	-	70	(FULL)	Dst. SR 256
"Powell Ditch" (Trib. to Blacklick Cr. (RM 6.50)) (02-286) WWH Use Designation (Existing)							
0.8E	0.9	36ns	NA	P*	49.5	**NON**	Dst. Brice

* Significant departure from ecoregion biocriterion; poor and very poor results are underlined.

ns Nonsignificant departure from biocriterion (#4 IBI or ICI units, #0.5 MIwb units).

a Fish sampling methods: A=Boat, D=Wading, E=Longline.

b Narrative evaluation based on qualitative macroinvertebrate sample (E=Exceptional, VG=Very Good, G=Good, F=Fair, Low F=Low Fair, P=Poor, and VP=Very Poor).

c Macroinvertebrate sample was collected in 2001 and may be replacing a 2000 sample.

2. Causes and Sources of Impairment

a) Blacklick Creek Mainstem

Causes of impairment in the Blacklick Creek mainstem were attributed to ammonia, nutrients, pathogens, and organic enrichment. Sources of these pollutants were attributed to HSTS, agricultural runoff, and to point source discharges from wastewater treatment plants tributary to Blacklick Creek. Recreational use impairment was attributed to these same sources.

b) Tributaries to Blacklick Creek

(1) Dysar(t)(t) Run

Causes of impairment in Dysar(t) Run are attributed to siltation; the source of the impairment was attributed to land development. Causes of impairment of recreational use exceed the standard for peak magnitude and frequency of fecal coliform bacteria. Sources of the impairment of the recreational use are attributed to HSTS that do not adequately treat for bacteria.

Though development continues to occur in the headwaters of Dysar(t) Run the use of detention basin BMPs appears to have reduced the amount of siltation occurring from construction as well as the peak storm flow surges. This has, however, resulted in the slower release of water from storm water basins maintaining a higher base flow in the stream throughout the year based on anecdotal evidence from home owners along the stream. Yet sediment and siltation continue to be a problem. Recent reconnaissance shows an increase in severe erosion in the ravine along the Reynoldsburg portion of the stream. The cause of this erosion appears to be an increase in storm water flows from all the upstream development. Several upstream neighborhoods either have no structures to reduce peak runoff or have basins that were built for a 100 year flood, which do not slow runoff from most rain events. Opportunities exist to retrofit these basins and reconnect the stream to its floodplain reducing peak flows downstream, moving things back towards equilibrium. In the short term, stream bank stabilization in eroded areas may be required to protect homes along the creek and reduce the quantity of sediment entering the stream.

Besides changes in land use from agriculture to suburban housing developments the extreme headwaters of Dysar(t) Run begin in the agricultural fields, which have recently been tiled to improve drainage leading to a potential increase in the runoff peak as more water reaches the stream in less time. Additionally as a part of these agricultural improvements approximately 26 acres of woods was clear cut to expand row crop planting. It is expected that this will also increase the volume of runoff in the upper headwaters.

Figure 12: Stream Bank Erosion in Dysar Run

The increased development is pushing the impervious cover for Dysar Run close to the 25% mark beyond which streams are typically permanently impaired. Current estimates put the impervious cover at approximately 23%

(see appendix D for table and explanation of calculations). Figure 14 shows the current land use for the Dysar(t) Run sub-watershed.

(2) French Run

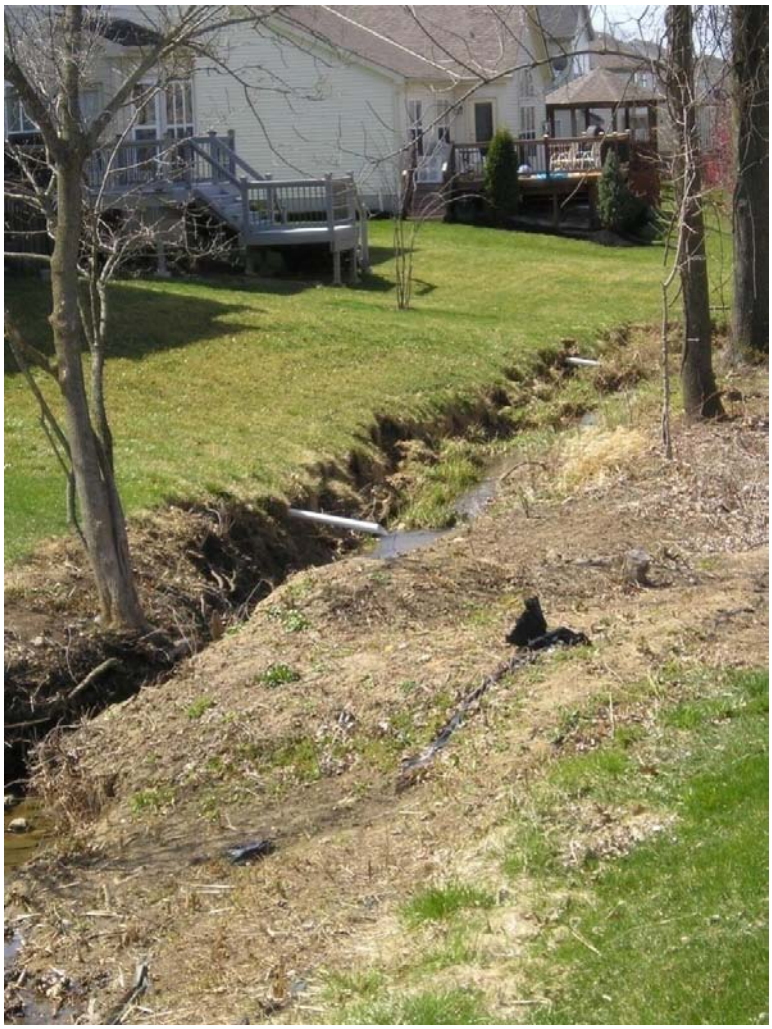
Causes of impairment in South and North French Run were attributed to siltation; the source of the impairment was attributed to land development and urban runoff. Recreational use impairment in French Run results from geometric mean and peak values for fecal coliform that exceed OEPA standards, and are attributed to HSTS that do not adequately treat for bacteria.

The French Run basin, similar to Dysar(t) Run, has been subjected to dense suburban development since the mid 1980's. The riparian corridor has been preserved along most of the streams but the storm water basins were built for the 100 year flood and do not slow down the majority of rain events. These detention basins also offer opportunities for retrofits that would reduce peak flow runoff and improve channel stability.

More testing is needed in the North Branch of French Run to try and determine the unknown cause and source of impairment for the stream.

The North Branch of French Run is identified as Exceptional Warm Water Habitat in non-attainment whereas the mainstem of French Run is identified as Warm Water Habitat in partial attainment. For this reason the two sub-watersheds were evaluated separately for impervious surface estimates.

Figure 13: Downspout pipes directly to the headwaters of North French Run



The North Branch of French Run is built out significantly but has two farms remaining. At least one of them has the property in an easement and will be preserved as agricultural. The impervious cover for this watershed is approximately 26% and will most likely increase in the future. This will make it difficult for the stream to attain full attainment of Exceptional Warm Water Habitat without implementation of a wide variety of storm water BMPs. Figure 15 and 16 show the current lands use for North and South French Run.

Figure 14: Land Use in Dysar(t) Run Watershed

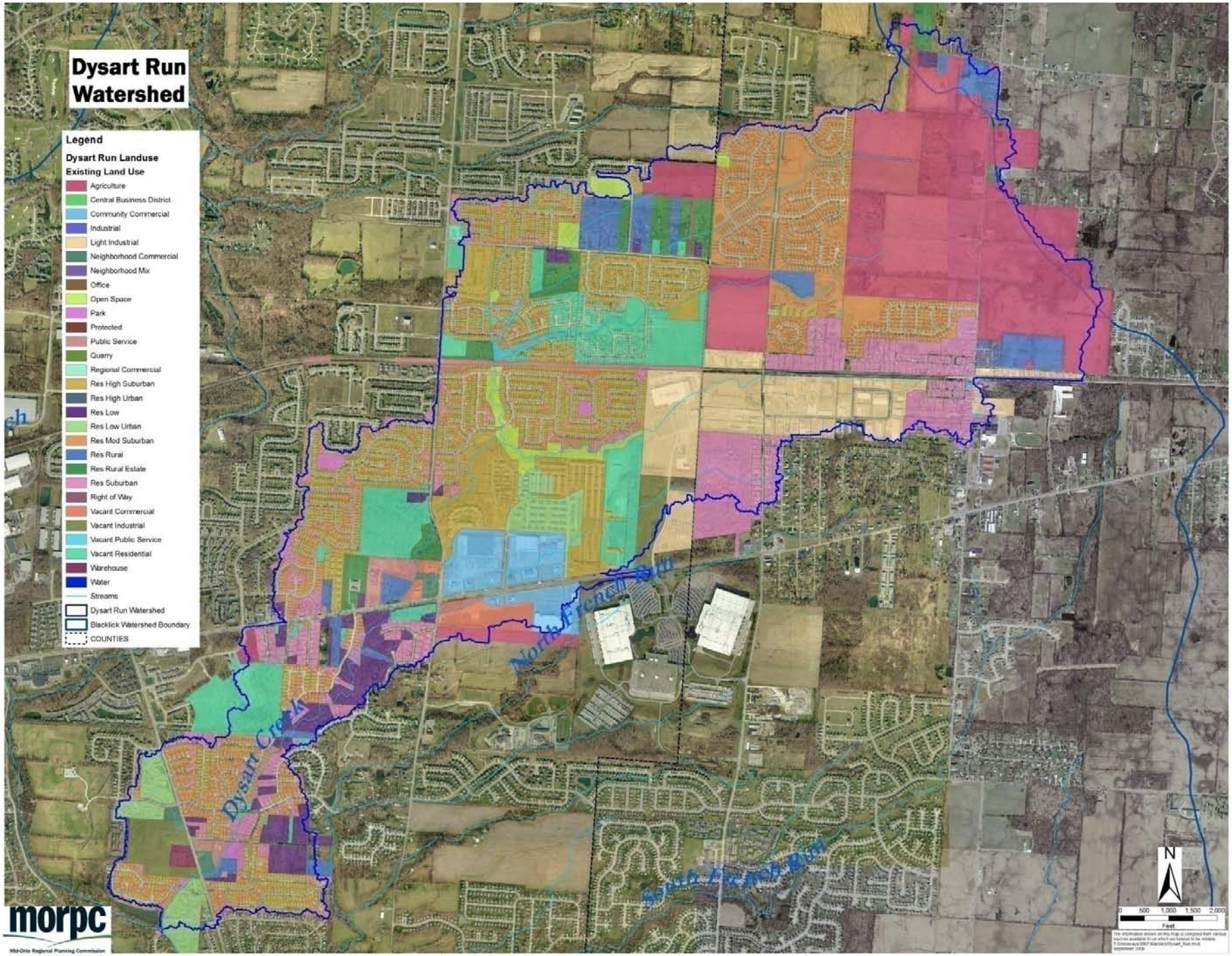


Figure 15: Land Use in North French Run Watershed

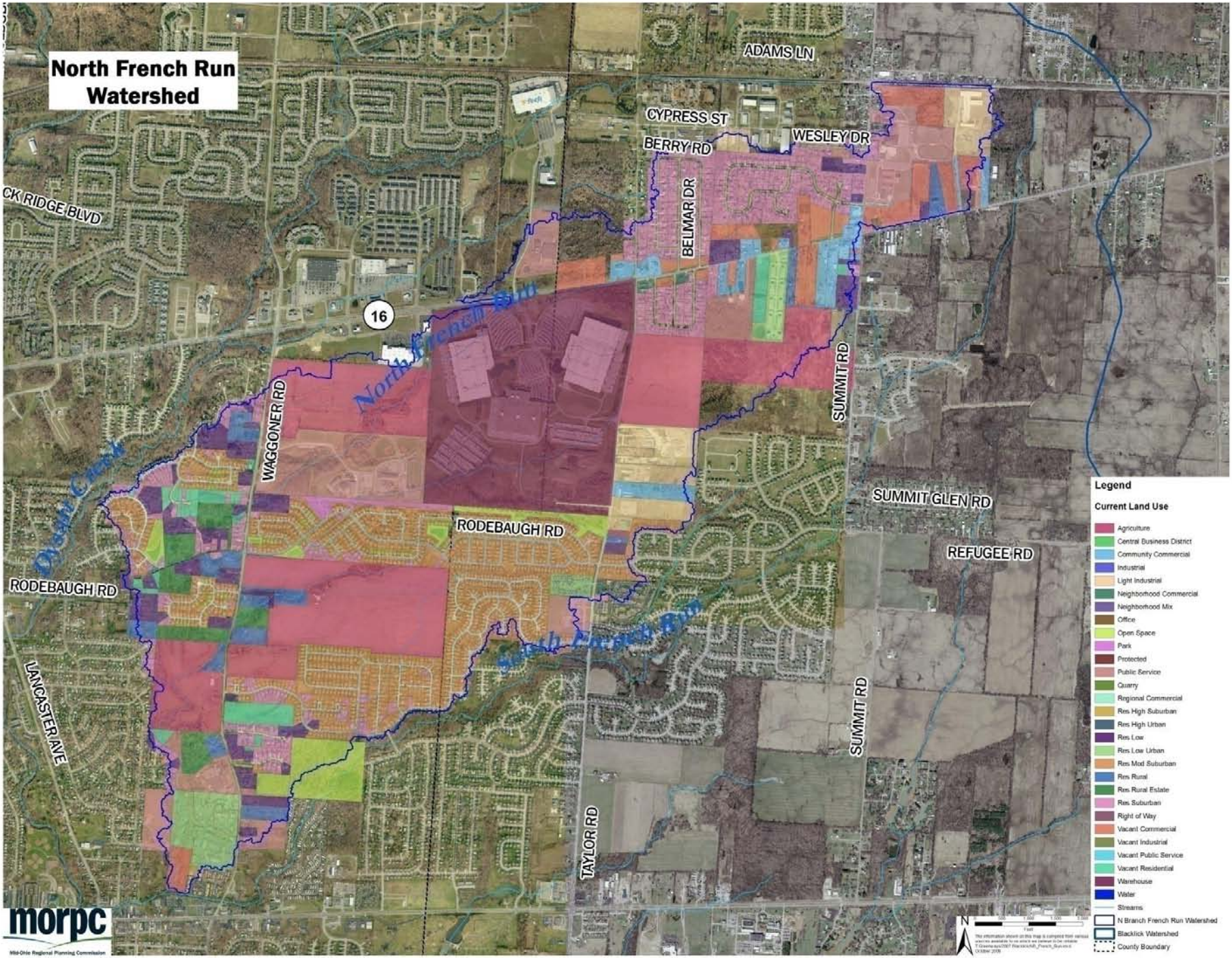
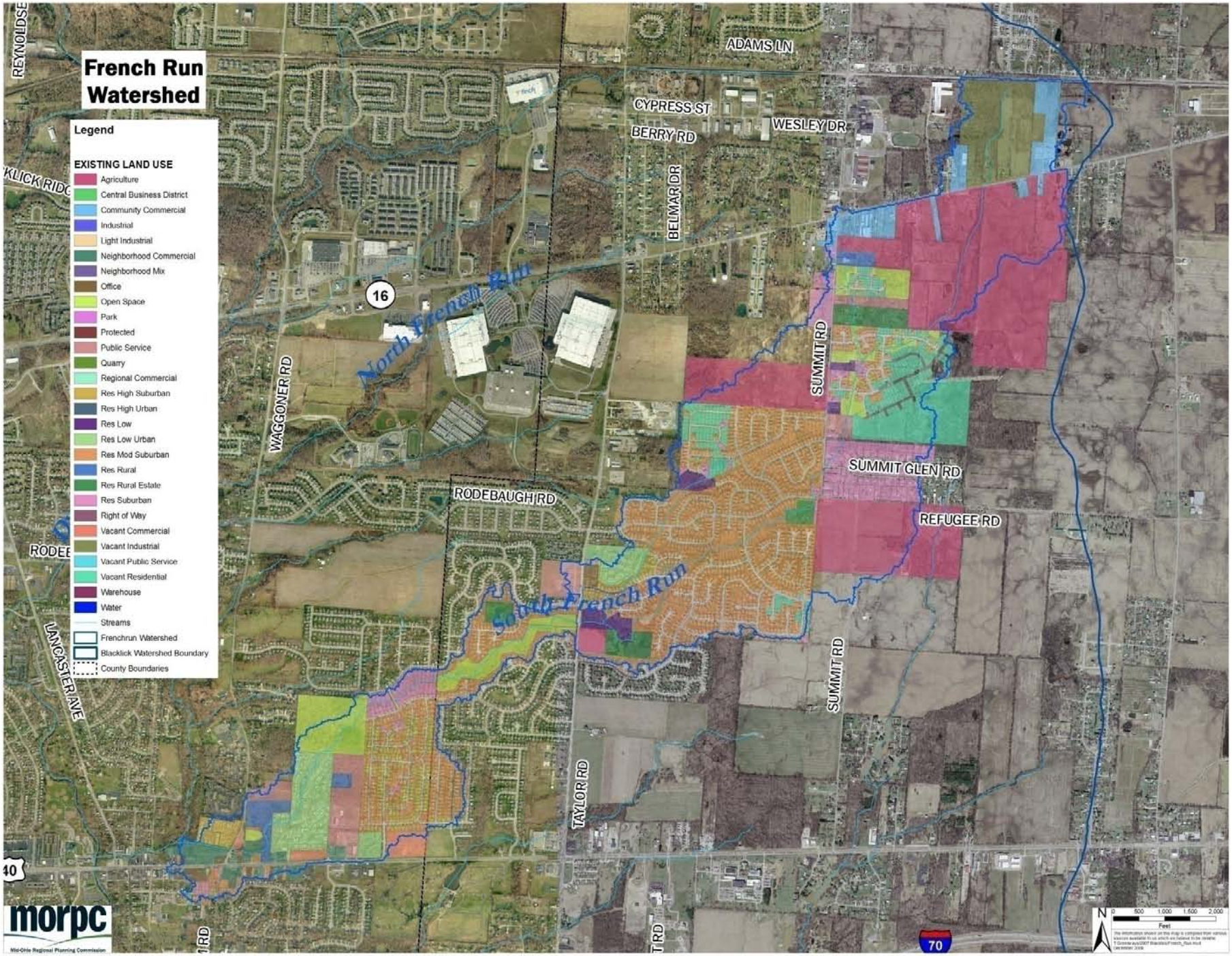


Figure 16: Land Use in the South French Run Watershed



(3) "Powell Ditch" - Tributary to Blacklick Creek at RM 6.50

The cause of impairment in Powell Ditch is habitat modification due to direct alteration of the channel, and the source is attributed to land development and urban runoff.

An analysis of impervious cover based on land use for the Powell Ditch sub-watershed indicates an estimated impervious cover of just over 35%. According to a literature review by the Center for Watershed Protection in Maryland small streams, 3rd order and lower, show a correlation between impervious cover and attainment of water quality standards. (Capiella and Brown, p 1) Streams in watersheds with greater than a 25% impervious cover do not usually meet clean water act attainment standards.

This subwatershed is a very urbanized area with large strip malls that are mostly vacant surrounded by vast parking lots. All of these empty commercial developments though currently economically depressing for the area provide a significant opportunity for stream restoration and protection upon redevelopment.

Additionally roughly 5,000 linear feet of stream channel is confined within a concrete channel. Evidence of substrate formation on top of the concrete channel was observed along with the presence of small minnows. Over 7,000 additional linear feet has been channelized with little access to its floodplain. The remaining portion of the stream from just north of Chatterton Road to the confluence with Blacklick Creek has been channelized at some point in the past but is showing evidence of recovery with meanders and a forested riparian corridor. Most of the headwaters of the mainstem and tributaries are in culverts with the exception of the extreme headwaters that have their source in Blacklick Woods Metro Park.

(4) Unzinger Ditch

The causes of impairment in Unzinger Ditch are stream channel modifications, toxicity associated with contaminated sediments, and nutrient enrichment from sewage. Sources of impairment are largely run-off from the Industrial Container Services, OH LLC (formerly Columbus Steel Drum), and HSTS.

Table 14 provides numbers for the observed conditions of several impairments identified for Blacklick Creek and its tributaries. As can be seen pathogens and nutrients are an issue throughout the watershed but are a larger problem in the upper 14 digit HUC. This can be attributed to a larger number of HSTS and more agriculture in this area.

Table 14: Deviation from Water Quality Targets in HUC 05060001-140, Blacklick Creek

Affected Waterbodies	Cause of Impairment	Target Parameter units	Target	Observed Condition	Deviation from Target
140-050: Blacklick Creek headwaters to near Brice					
All within 14 digit HUC	**Pathogens**	Fecal Coliform cfu[1]	2000 (90th percentile)	4000	50%
	Nutrients	TP mg/l	0.11	0.05 - 5.4	0 - 98%
Blacklick above RM 27.1	**Ammonia**	NH3 mg/l	1.1	4.52	75.7 %
French Run	**Siltation**	QHEI Metrics	33	30	9.1 %
140-060: Blacklick Creek near Brice to Big Walnut Creek					
All within 14 digit HUC	**Pathogens**	Fecal Coliform cfu[1]	2000 (90th percentile)	2939	31.9 %
	Nutrients	TP mg/l	0.11	0.05 - 0.575	0 - 80.9 %

[1]Fecal Coliform counts expressed as cfu (colony forming units) equates to the measurement of fecal coliform, number per 100ml.

3. *Point Sources*

There are five Waste Water Treatment plants identified in the TMDL discharging into Blacklick Creek or its tributaries. The Jefferson WSD plant on Wengert Road was decommissioned in June of 2003 and was dismantled. It no longer contributes nutrients or pathogens to the stream but it also no longer helps contribute to the base flow of Blacklick Creek. The elimination of discharge from the plant impacts the stream in two ways. Jefferson Township provides water to most its residents from a public well. This is ground water that historically would have contributed to the flow of the creek. Since a large majority of this water was treated at the Wengert Road plant it continued to contribute to the flow of the stream as long as the plant operated. With the elimination of this plant and the subsequent pumping of that waste to Columbus' treatment facilities Blacklick creek has lost a significant source of flow during the dry summer months. Further testing is needed to determine the impacts of this change.

Both Fairfield County WWTP and Ohio American Water Co. Blacklick Estates have incorporated upgrades to their plants in recent years that have resulted in improved water quality in their effluent. Table 15 provides the calculated loads for all point sources for fecal coliform and phosphorus.

Table 15: Existing Point Source Loads in HUC 05060001-140

14-Digit HUC[1]	Facility Name NPDES Permit #	Median Q MGD	[TP][2] mg/l	[FC][3] cfu	Facility Loads		HUC Loads	
					TP Lb/year	FC Cfu/season	TP Lb/year	FC Cfu/season
140-050	*Jefferson WSD WWTP Wengert Rd 4PQ00000	0	0	0	0	0	3597	3.48E+11
	Fairfield County WWTP Tussing Rd.	1.177	0.85	34.5	3047	2.83E+10		

14-Digit HUC[1]	Facility Name NPDES Permit #	Median Q MGD	[TP][2] mg/l	[FC][3] cfu	Facility Loads		HUC Loads	
					TP Lb/year	FC Cfu/season	TP Lb/year	FC Cfu/season
	4PU00004							
	Modern MHP 4PV00114	0.004	3.00	200	37	5.58E+09		
	By-Willow MHP 4PV00117	0.004	3.00	200	37	5.58E+09		
140-060	Ohio American Water Co. Blacklick Estates WWTP 4PU00002	0.887	1.43	294.6	3864	1.82E+12	3864	1.82E+12

[1]All presented 14-digit HUCs are within the 8-digit HUC 05060001. The complete HUC identifier is the 8-digit stem followed by the 14-digit extension.
[2]Values in this column represent the historical total phosphorus effluent concentration for each facility. For information regarding the source and period of record for each value, see Table B-4 in Appendix B of the Big Walnut Creek TMDL.
[3]Values in this column represent the historical fecal coliform effluent concentration for each facility. For information regarding the source and period of record for each value, see Table B-18 in Appendix B of the Big Walnut Creek TMDL.
*Jefferson WSD WWTP went off line in mid 2000s and no longer exists or discharges into Blacklick Creek.

a) Spills

There was a spill into the mainstem of Blacklick Creek of Transformer oil from four electrical transformers that were blown over in August 2008. Approximately 50 gallons of oil spilled into a storm sewer in Reynoldsburg and flowed to the stream. The power company erected a boom across the river and pumped out the oily water.

In April of 2008 a milk truck rolled on Dublin Granville Rd east of New Albany resulting in the spillage of 100 of gallons of milk into an unnamed tributary to Blacklick Creek.

b) Illicit Discharges

Each community required to obtain an NPDES permit is required to identify illicit discharges as a part of their permit. New Albany, Pickerington, and Columbus are actively working to identify sources. The Franklin County Board of Health is also working with the Franklin Soil and Water Conservation District to locate and identify illicit discharges for unincorporated areas of the county. Fairfield Soil and Water Conservation District is likewise working with Violet Township to do the same. Figure 18 shows the illicit discharge hotspots within the Franklin County portion of Blacklick Creek. These are based on preliminary data collected by Franklin Soil and Water Conservancy District for the Franklin County Health Department. This preliminary data is being used to identify areas for further testing to eliminate illicit discharges.

4. Non-Point Sources

Causes of non-attainment for the recreational use and the aquatic life use categories were pathogens, with nutrients being a contributing factor, especially in the headwaters. Sources for these pollutants were determined to be failing HSTS, land development, and agriculture (Ohio EPA, Big Walnut Creek, TMDL).

Blacklick Creek's non-point source loading of fecal coliform primarily occurs from surface run-off, cattle, and failing aerators. Non-point source phosphorus loading occurs principally from surface run-off, but also has substantial loading from failing aerators and groundwater (GW). Existing loading of fecal coliform and phosphorus within the Blacklick Creek watershed is attributed to non-point source run-off and point sources. The TMDL has been determined using these known quantities and the equation WLA + LA + MOS = TMDL. The Waste Load Allocation (WLA) figure is used to quantify the point source loading areas, whereas the Loading Allocation (LA) figure is given to the non-point source amount. The Margin of Safety (MOS) is based upon acceptable EPA water quality standards. The TMDL is then figured using the predetermined "acceptably safe" loading amount (the TMDL target) and dividing that figure by the actual existing loading amount. The result is the target loading reduction percentage or the TMDL. Table 16 shows the existing non-point source loads for Blacklick Creek.

Table 16: Existing Non-Point Source Loads in HUC 05060001-140

14-Digit HUC[1]	Sub-Watershed	Sub-Watershed Extent (Upper RM-Lower RM)	Parameter (units)	Existing Non-Point Source Loads						
				Runoff	Cattle	Septic	Aerator	GW	Upstream	**Total**
140-050	Blacklick Cr.	Headwaters - 8.2	FC (count $*10^{13}$ $*season^{-1}$)	58.9	43.0	0.044	3.46	0	0	105
	Blacklick Cr.	Entirety	TP (lbs * $year^{-1}$)	36,041	0	137	6,692	1,761	0	44,631
140-060	Blacklick Cr.	8.2 - Big Walnut	FC (count $*10^{13}$ $*season^{-1}$)	9.55	0	0.035	0.577	0	22.1	32.3

[1]All presented 14-digit HUCs are within the 8-digit HUC 05060001. The complete HUC identifier is the 8-digit stem followed by the 14-digit extension.

The Big Walnut Creek TMDL report identifies a total of 944 Home Sewage Treatment Systems (HSTS) in the Blacklick watershed. The majority of these are discharging systems that do not provide any treatment for nutrients and if not maintained properly do little to treat for pathogens. The majority of the soils within the watershed are not suitable for either septic systems or discharging systems and in most cases discharging systems can no longer be installed. Table 17 breaks out the number of systems per county in the watershed and what types.

Table 17: HSTS, discharging systems, and septic systems per county

Sub-Watershed	Total HSTSs			Discharging Systems			Septic Systems			Total Systems	
	DELAWARE	FRANKLIN	LICKING	DELAWARE	FRANKLIN	LICKING	DELAWARE	FRANKLIN	LICKING	DISCHARGING	SEPTIC
Blacklick Creek	2	192†	394	-	506	350	2	42	44	856	88

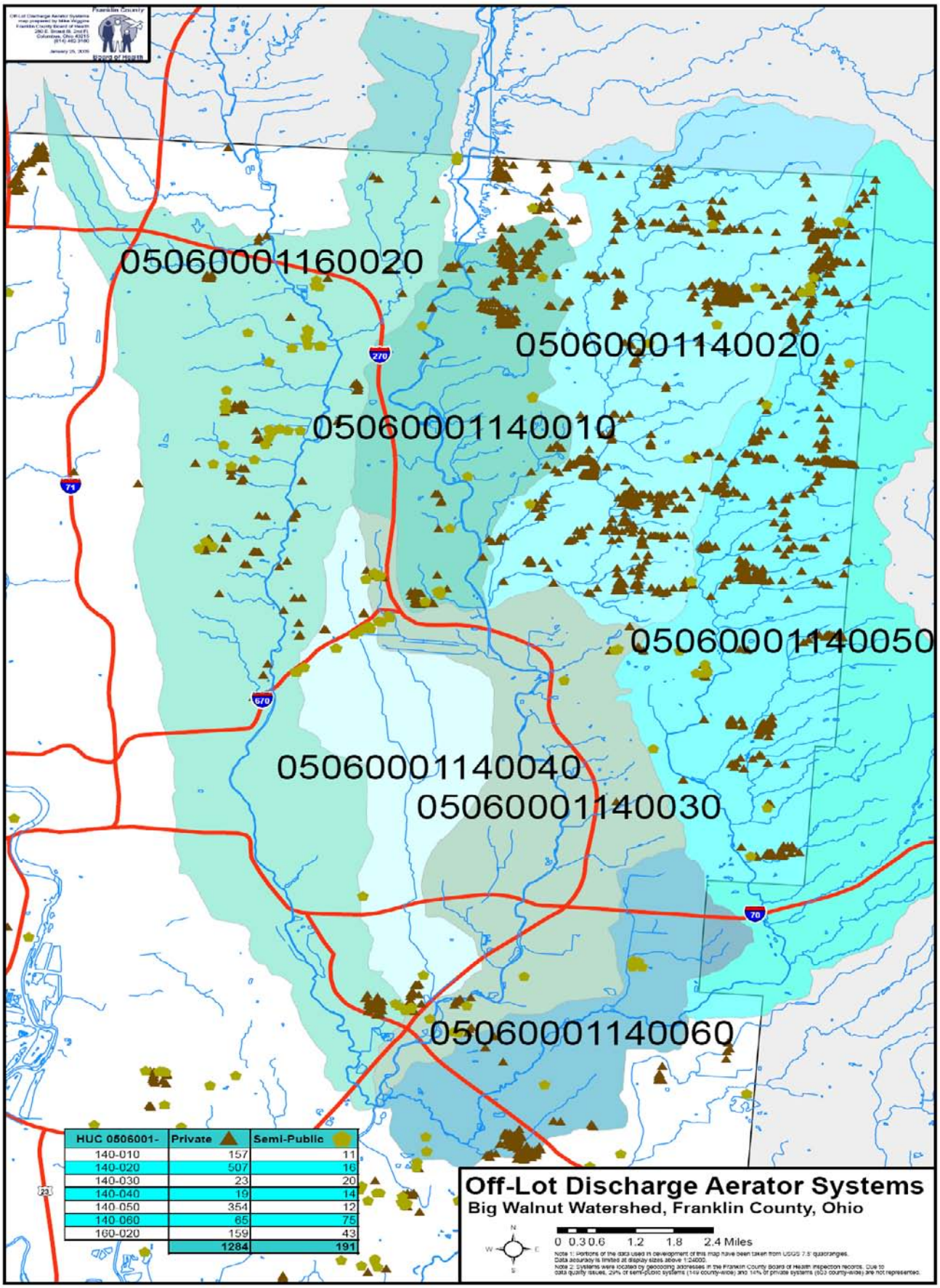
† - This number has been taken directly from the Table B-20.B in the Final Big Walnut TMDL. However, it appears that 548 would be the correct number, given the other data in this table and in Table 18.

Ohio EPA considers all discharging systems to be failing because they do no treat for nutrients and can so easily fail for pathogens if not maintained properly. The table below shows the calculated phosphorus load from HSTS and the figure below shows the location of HSTS systems throughout the Big Walnut Watershed in Franklin County.

Table 18: Discharging systems, septic systems, and total HSTS phosphorus loads

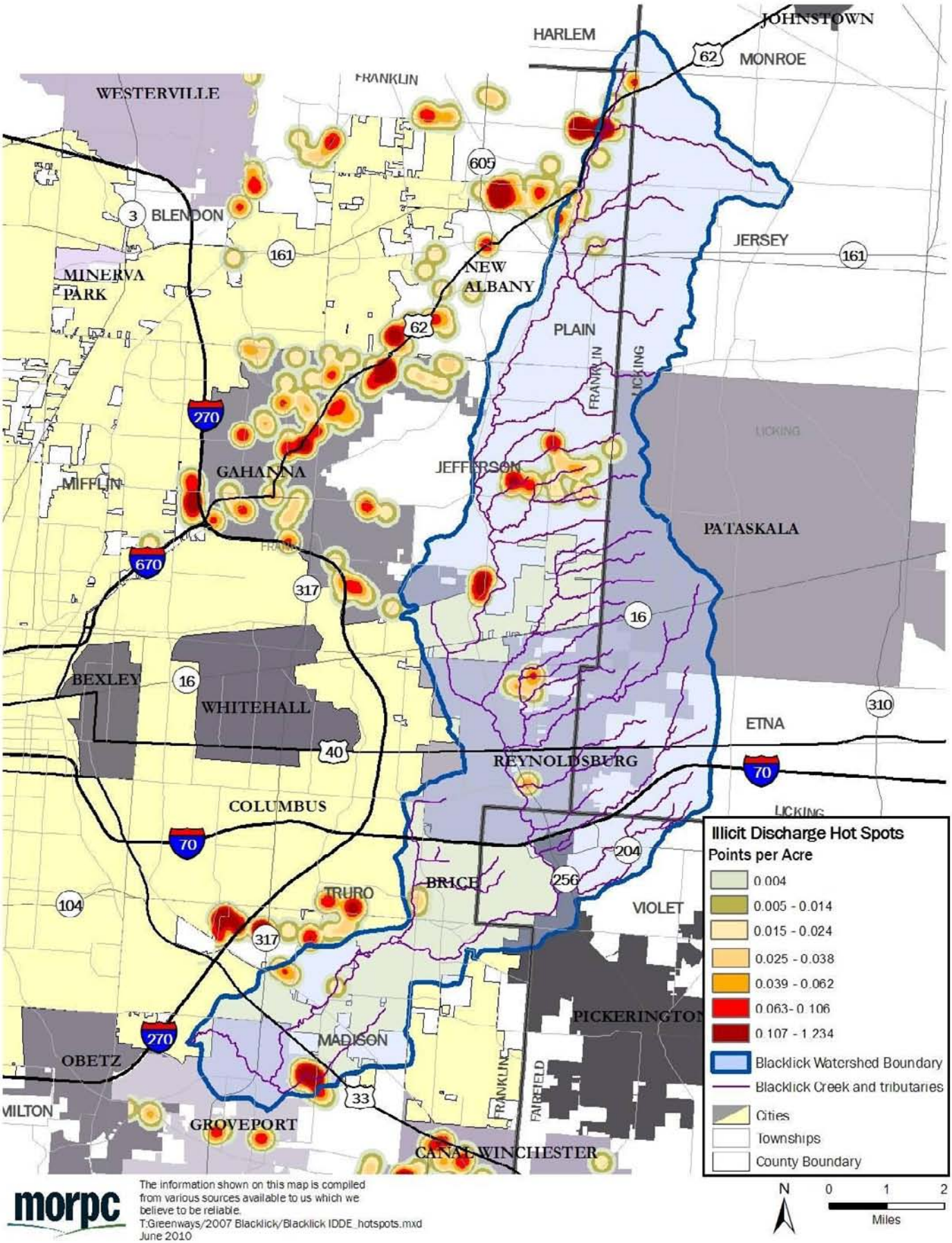
14-Digit HUC	Total Systems		Failed Systems		PERSONS/ SYSTEM	Phosphorus Load (lbs/year)		
	Discharging	SEPTIC	Discharging	SEPTIC		Discharging	SEPTIC	TOTAL
Blacklick Creek	856	88	856	18	2.38	6692	137	6830

Figure 17: Home Sewage Treatment Systems Map.



HUC 0506001-	Private	Semi-Public
140-010	157	11
140-020	507	16
140-030	23	20
140-040	19	14
140-050	354	12
140-060	65	75
160-020	159	43
	1284	191

Figure 18: Illicit Discharge Hot Spots



Even with large numbers of failing HSTS systems in the watershed the majority of phosphorus and bacteria loads come from runoff and cattle. Table 19 lists the calculated non-point source loads from the TMDL. Runoff alone accounts for more than 50% of the bacteria load and more than 80% of the phosphorus load. When cattle are combined with runoff roughly 97% of the bacterial load from NPS in the upper portion of the watershed is accounted for.

As can be seen in Table 19, NPS pollution accounts for the vast majority of the current pollution load in Blacklick Creek. It is in this area that the majority of our efforts will be focused to bring Blacklick Creek into attainment. This table also shows the allocated load for each impairment and its source. WLA stands for Waste Load Allocation and represents the allowable load from point sources, HSTS's, and upstream flow including ground water. LA stands for Load Allocation and represents the allowable load from surface runoff including Municipal Separate Stormwater Sewer Systems (MS4) entities.

Table 19: Total Existing Load, TMDL, and Allocations for HUC 05060001-140

14-Digit HUC1	Sub-Watershed	Sub-Watershed Extent (Upper RM-Lower RM)	Parameter (units)	Existing Loads			%Reduction	TMDL	Allocations		
				PS	NPS	Total			Waste Load Allocation (WLA)	Load Allocation (LA)	Margin of Safety (MOS)
140-050	Blacklick Cr.	Headwaters - 8.2	FC (count $*10^{13}$ $*season^{-1}$)	0.035	105	105	78%	23.1	12.3	10.8	0
	Blacklick Cr.	Entirety	TP (lbs * $year^{-1}$)	7,461	44,631	52,092	62%	19,884	11,502	8,382	1,988
140-060	Blacklick Cr.	8.2-Mouth	FC (Count$*10^{13}*season^{-1}$)	0.182	32.3	32.5	5%	30.7	6.21	24.5	0

[1]All presented 14-digit HUCs are within the 8-digit HUC 05060001. The complete HUC identifier is the 8-digit stem followed by the 14-digit extension.

[2]A phosphorus TMDL was developed for the entirety of Blacklick Creek, which includes HUCs 05060001-140-050 and 05060001-140-060.

IV. Watershed Impairments

Table 20: Point Source Allocations for HUC 05060001-140

Facility Name NPDES Permit #	Design Q Million Gallons per Day (MGD)	Permit Limit		WLA	
		TP mg/l	FC cfu	TP lb/year	FC count/season
Fairfield County WWTP Tussing Rd. 4PU00004	3.0	0.5	1000	4,569	1.91E+13
Modern MHP 4PV00114	.004	1.0	1000	12	2.54E+10
By-Willow MHP1 4PV00117	0	-	-	0	0
Ohio American Water Co. Blacklick Estates WWTP 4PU00002	1.2	0.5	1000	1,828	7.63E+12

Table 21: Non-Point Source Allocations for HUC 0506000-140

14-Digit HUC[1]	Sub-Watershed (Upper RM-Lower RM)	Parameter		Non-Point Source Allocations				
				Cattle	Septic	Aerator	GW	Upstream
140-050	Blacklick Cr. (Headwaters - 8.2)	FC (count *10^{13} *season^{-1})	Allocation:	0	0	0.761	0	0
			% Reduction:	100%	100%	78%	0%	0%
140-060	Blacklick Cr. (Entirety)	TP (lbs * year-1)	Allocation:	0	0	2554	1761	0
			% Reduction:	0%	100%	62%	0%	0%
	Blacklick Cr. (8.2 -Mouth)	FC (count *10^{13} *season^{-1})	Allocation:	0	0	0.545	0	22.1
			% Reduction:	0%	100%	5%	0%	0%

[1]All 14-digit HUCs are within the 8-digit HUC 05060001. The complete HUC identifier is the 8-digit stem followed by the 14-digit extension.

[2]Allocated loads are expressed in cfu *10_{13} * season$_{-1}$ for fecal coliform and lbs * year $_{-1}$ for total phosphorus.

Table 22: MS4 Wasteload Allocations and Surface Runoff Load Allocations for HUC 05060001-140

14-Digit HUC1	Sub-Watershed	Sub-Watershed Extent (Upper RM-Lower RM)	MS4 Entities	Parameter (units)	Remaining Loading Capacity	%of Watershed that is MS4	MS4 Wasteload Allocation	Surface Runoff Load Allocation
140-050	Blacklick Cr.	Headwaters - 8.2	-City of Columbus -Village of New Albany -City of Gahanna -City of Pataskala -City of Reynoldsburg -City of Pickerington -Jefferson Twp. -Etna Twp.	FC (count $*10^{13}$ $*season^{-1}$)	20.4	50.8%	10.4	10.0
140-060	Blacklick Cr.	8.2-Mouth	Columbus Reynoldsburg Village of Brice Village of Groveport Madison Twp	FC (count $*10^{13}$ $*season^{-1}$)	7.29	74.7%	5.44	1.85

Table 23: MS4 Phosphorus Allocations

Sub-Watershed	MS4 Entity	HUC Area mi^2	Urbanized Area mi^2	Percent Urbanized	Surface Runoff LA *lbs/year*	MS4 Allocation *lbs/year*
Blacklick Creek	-City of Columbus -Village of New Albany -Village of Brice -City of Gahanna -City of Pataskala -City of Reynoldsburg -City of Pickerington -Jefferson Twp. -Etna Twp.	63.3	35.4	55.6%	7,183	3,993

Table 24: Summary of Phosphorus Allocations and TMDLs

Sub-basin	*lbs-TP/year*						
	Point Source	Discharging Systems	Septic Systems	Surface Runoff	Ground-water	MOS	TMDL
Blacklick Creek	6,409	2,543	0	7,183	1,761	1,988	19,884

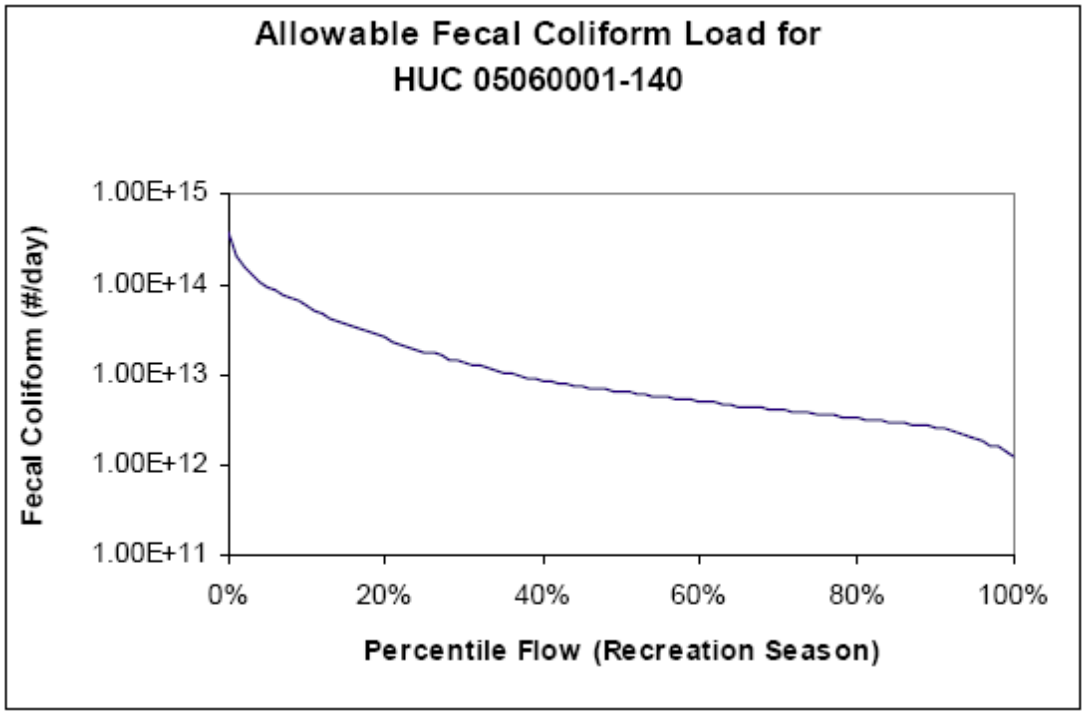
Table 25: Monthly Fecal Coliform Loads from Runoff

Sub-Basin *14-Digit HUC*	*count/month*[1]						**Total** *count/season*
	May	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	
Blacklick Creek Headwaters to RM 8.20 *05060001-140-050*	1.93E+14	3.02E+13	2.81E+13	2.25E+13	2.77E+13	2.88E+14	**5.89E+14**
Blacklick Creek RM 8.20 to Mouth *05060001-140-060*	3.08E+13	6.84E+12	6.38E+12	5.10E+12	6.24E+12	4.01E+13	**9.55E+13**

1. Loads are median values for the period 1990-2003.

The fecal coliform TMDLs and allocations presented above are the core of the pathogen TMDL. It should be noted, however, that the acute fecal coliform criterion of 2000 cfu must be maintained to ensure complete attainment of recreational designated use. The load duration curve presented in the figure below is a visual depiction of the allowable daily fecal coliform as specified by OAC. To achieve full attainment, no more than ten percent of fecal coliform samples collected may be plotted above the line on the graph. To plot a sample it must be converted to a load by multiplying by daily flow volume. The daily load is then plotted with percentile flow as the independent variable.

Figure 19: Fecal Coliform Load Duration Curve



Habitat and Sediment TMDLs

QHEI assessment results for habitat and flow limited streams are presented in Table 21. Both the observed and target condition for individual variables (e.g. substrate, cover, etc.) and the aggregate score are provided. The presence of modified habitat attributes, and their relative magnitude (high vs. moderate), is also noted for each assessment site.

Habitat and sediment TMDL scores and targets are also presented in Table 26. Sediment scores are the sum of the substrate, channel, and riparian categories. The target sediment score of ≥33 is analogous to a loading capacity, and the target scores for substrate, channel, and riparian are the rough equivalent of allocations. The habitat score is the sum of the high and moderate influence attribute scores, and the QHEI to target ratio score. See Section 4.1.1 for more information.

Table 26: Existing and Target Habitat and Sediment Conditions

Habitat Limited Stream	River Mile	Assessment Results										TMDL Scores	
		QHEI Categories							QHEI	Modified Attributes		Sediment	Habitat
		Substrate	Cover	Channel	Riparian	Pool	Riffle	Gradient		High Influence	Moderate Influence		
Targets		s14	s12	s14	s5	*Sum s15*			s60	<2	*Total Modified Attributes <5*	s33	*3*
Unzinger Ditch	0.9	7.0	3.0	5.0	4.5	-2.0	0.0	10	27.5	1,2,3,4,5	4,5,6,7,8	16.5	0
	0.5	8.5	9.0	10.0	5.0	8.5	0.0	10	51.0	3,4,5	1,4,7,8	23.5	0
	0.1	8.5	12.0	11.0	5.0	9.5	3.0	8	57.0	3,4	1,4,7,8,9	24.5	0
French Run	0.6	12.5	13.0	13.0	3.5	7.0	2.0	4	55.0		1,4,7,8,9	29.5	1
Powell Ditch	0.8	15.5	7.0	12.0	2.5	5.5	1.0	6	49.5	4	1,4,7,8,9	30.0	1

Key to High-Influence Modified Attributes:

1 Channelized with no recovery
2 Silt or muck substrates
3 Low sinuosity
4 Sparse or no cover
5 Max. pool depth less than 40 cm

Key to Moderate Influence Modified Attributes:

1 Channelized, but recovering	High to moderate substrate embeddedness
2 Intermittent or poor pool quality	Fair or poor channel development
3 Sand substrate	Extensive to moderate riffle embeddedness
4 No fast current	Only one or two cover types
5 Hardpan substrate origin	No riffle

V. Evaluation

Evaluation criteria are listed with the actions in the action items. Additional evaluation criteria will be developed as additional objectives and actions are determined. The OEPA will play a pivotal role in identifying changes in water quality in the watershed, especially any changes associated with the implementation of action items. In addition, a volunteer monitoring group will be formed (see "Actions the Entire Watershed" below). The formation of the group will require the training of volunteers and the development of a Project Study Monitoring Plan. The plan will propose collecting data at the sites samples by the OEPA for the TMDL report, adding sites along tributaries that have not previously been sampled as resources allow. The data will be recorded on appropriate volunteer monitoring sites on the Internet and used to modify the Watershed Action Plan, if the data indicate the need to do so.

Process for Implementation of WAP

An annual forum will be held with each of the jurisdictions or stakeholders represented. The members of this forum will review what each entity responsible for action items has accomplished as well as what is being worked on. Upcoming opportunities or emerging priorities will also be shared. This will also serve as the venue for updating the plan as implementation goals are accomplished. The group will not be the primary decision maker as each jurisdiction and entity will make those choices for their own areas. Outlined below are the roles of those involved in implementation of the plan.

Role of the Watershed Coordinator

- Coordinator's primary tasks are to work with stakeholder groups to develop Watershed Action Plans for Rocky Fork Creek and Blacklick Creek
- Aid in implementation of plans
    - "Implementation" entails
        - Education (of self, stakeholders, and community)
        - Coordination (e.g., building partnerships, focusing resources on critical areas, identifying target audiences)
        - Coordinator is not a watch dog or regulator looking for violations
- Report to ODNR on annual progress of work plan and actions taken to improve water quality in the stream
- Represent MORPC's interests in regional solutions to water quality issues

    - Role of the Blacklick WAP Implementation Steering Work Group

- Providing support and guidance to Watershed Coordinator
    - guidance on plan implementation
    - review progress of implementation (help evaluate progress)
    - Identify emerging issues or unanticipated issues that require urgent attention
    - Identify opportunities for collaboration and partnership to achieve WAP goals
    - Assist coordinator in adapting and updating the plan as needed in response to changing circumstances
- Promote awareness among key stakeholder groups and residents about the WAP and implementation goals/activities.

VI. Plan Updates and Revisions

The Blacklick Creek Watershed Action Plan is a “living document” which will be updated and revised as new information emerges and implementation practices are put into place. As stakeholders reflect on the past accomplishments and forge ahead into the future to plan the watershed’s new direction. This Action Plan has been written to aid the development of water quality and community support. Short and long term benefits will come from the implementation of the Action Plan. The Plan is designed to be flexible and continuously updated. The plan will be reevaluated on a yearly basis. Additions to the plan can be submitted to the Watershed Coordinator at any time.

VII. Action Items

HUC: 05060001-140-050

- **Background:** Blacklick Creek in its entirety does not meet the TMDL for Phosphorus and pathogens from Non Point Sources (NPS) due to agricultural runoff, urban runoff, and failing home sewage treatment systems (HSTS).

- **Problem 1:** Phosphorus is causing nonattainment throughout this subwatershed. Sources are identified as agricultural runoff, urban runoff and failing home sewage treatment systems (HSTS).The TMDL allocates 19,884 lbs/year of total phosphorus (TP) from all sources, and the current load is calculated at 52,092 lbs/year requiring a 62% reduction to meet the TMDL.

- **P1 Goal 1**: Reduce total phosphorus attributed to HSTS by 63% from 6829 lbs/yr to 2554 lbs/yr.

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Replace 10 failing HSTS systems per year, targeting Plain Township's unincorporated area north of Central College as primary area for HSTS upgrades or replacements. OR Connect 10 failing HSTS to municipal sanitary sewer per year over the next five years.	Working with local health departments, landowners, and the EPA using Water Pollution Control Loan Fund (WPCLF)	~$8,000 per replacement system.	2010-2015	Funds achieved and implementation in place for septic upgrades, replacements, and/or connection to sewer. Reduction of loading rate by 390 lbs/year of TP at the end of five years . (Load reduction was calculated by dividing total calculated load by the number of failing systems in TMDL to get load per system of approximately 7.8 lbs/year.) Documented reduced total phosphorus levels through EPA chemical monitoring.

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Utilize 208 planning to maximize growth around areas with potential for sewer connections	208 Program through OEPA		2010-2020	Future development has secured connections to sewer to prevent failing HSTS loading of phosphorus.
Implement 500 linear feet of stream restoration and stream bank stabilization in the headwaters area near Clouse Rd. in Plain Township, to prevent further erosion and flooding of existing HSTS.	Working with local health departments, landowners, and the EPA using Water Pollution Control Loan Fund (WPCLF) or 319 funds	$400,000 (based on estimate provided by Oxbow for natural channel design)	2010-2020	Reduction in erosion and therefore reduction of sediment loading by 86.1 tons/year, phosphorus loading by 86.1 lbs/year, and nitrogen loading by 172.2 lbs/year

- **P1 Goal 2:** Reduce total phosphorus (TP) load attributed to runoff by 50% from agricultural fields and operations.

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Institute Conservation Tillage on 4844 acres of farm land.	EQIP and CRP USDA Programs through NRCS Franklin and Licking Counties	Rental Fee of No-Till Drill (Approx. $9 per acre)	2010-2020	~750 acres per year using No-Till Drill for Conservation Tillage BMP 10,740 lbs/yr reduction in TP from runoff[1]. Documented reduced total phosphorus levels through EPA chemical monitoring.

Install filter strips along 3868 linear feet of stream along farm fields draining 98 acres.	EQIP and CRP USDA Programs through NRCS Franklin and Licking Counties	Cool season grasses ($135/ac) Warm season grasses w/ chemical treatment ($200/ac) Warm season grasses w/o chemical treatment ($150/ac) Seeding costs estimated by acres.	2010-2020	1000 linear feet of filter strips installed per year Decreased total phosphorus levels through increased assimilative capacity and filtering provided by increased riparian vegetation. 286 lbs/year reduction in TP[1]. Documented reduced total phosphorus levels through EPA chemical monitoring. Increase in assimilative capacity by increasing riparian vegetation and stream cover. Documented increased QHEI scores by EPA biological monitoring.
Promote and implement 120 acres of conservation crop rotation	CRP USDA Programs through NRCS Franklin and Licking Counties	$12 per acre	2011-2020	Two or more farms in the watershed practicing conservation crop rotation. Documented reduced total phosphorus levels through EPA chemical monitoring. 258 lb/yr phosphorus load reduction (according to DNR load reduction spreadsheet)

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Promote and implement 120 acres of Field Border (CP 33 Quail Habitat Seeding or Warm Season Grass mix).	CP 33 Bobwhite Quail Initiative through Pheasants Forever CRP USDA Programs through NRCS Franklin and Licking Counties	CP 33 Quail Habitat Seeding ($225/ac) Warm Season Grass ($200/ac)	2010-2020	Two or more farms in the watershed install field border 258 lb/yr phosphorus load reduction (according to DNR load reduction spreadsheet) Documented reduced total phosphorus levels through EPA chemical monitoring.
Promote and implement 85 acres of nutrient management.	EQIP and CRP USDA Programs through NRCS Franklin and Licking Counties	Nutrient management ($5.00/ac) Nutrient management w/ precision (grid) farming ($10.00/ac)	2010-2020	85 acres enrolled 189 lb/yr phosphorus load reduction Documented reduced total phosphorus levels through EPA chemical monitoring.

[1]Calculated using Region 5 Model 05 based on a before practice Cover Management Factor of 0.2 and an after practice Cover Management Factor of 0.02

- **Problem 2:** Pathogens are a widespread impairment of recreational uses in the subwatershed of 050. Pathogens are impairing the attainment of Dysar(t) Run, French Run, the headwaters and some of Blacklick's mainstem. Agricultural runoff, urban runoff, and failing home sewage treatment systems (HSTS) are sources of pathogen loading into this subwatershed. The existing calculated load for pathogens is 105(count $*10^{13}$ $*season^{-1}$) and the TMDL Load Allocation for NPS pollution is 23.1 (count $*10^{13}$ $*season^{-1}$).

- **P2 Goal 1**: Reduce fecal coliform counts from failing HSTS from 3.5 (count $*10^{13}$ $*season^{-1}$) to 0.761 (count $*10^{13}$ $*season^{-1}$).

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Replace 10 failing HSTS systems per year, targeting Plain Township's unincorporated area north of Central College as primary area for HSTS upgrades or replacements. OR Connect 10 failing HSTS systems per yearto municipal sanitary sewer per year over the next five years.	Working with local health departments, landowners, and the EPA using Water Pollution Control Loan Fund (WPCLF)	~$8,000 per replacement system.	2010-2015	Funds achieved and implementation in place for septic upgrades, replacements, and/or connection to sewer. A 6% reduction in fecal coliform levels (0.204 (count $*10^{13}$ $*season^{-1}$)) Reduced levels documented by OEPA sampling.
Utilize 208 planning to maximize growth around areas with potential for sewer connections	208 Program through OEPA		2010-2020	Future development has secured connections to sewer to prevent failing HSTS loading of phosphorus.

- **P2 Goal 2**: Reduce fecal coliform counts from runoff from 59.8 (count $*10^{13}$ $*season^{-1}$) to 20.4 (count $*10^{13}$ $*season^{-1}$). Reduce fecal coliform counts from cattle from 43 (count $*10^{13}$ $*season^{-1}$) to 0. (From field surveys we have not found evidence of large populations of livestock with access to the streams. This load was based on an estimate of cattle with access to the stream derived from the county average.) In the past, Hendren Farms (250 dairy cows) has had problem with manure spillage from the manure lagoon into Blacklick Creek near Central College Road (RM 26.0). The EPA has evaluated the farm and all necessary quality measures are in place, which should have significantly reduced fecal coliform levels from agricultural sources.

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Install filter strips along 3868 linear feet of stream along farm fields draining 98 acres.	EQIP and CRP USDA Programs through NRCS Franklin and Licking Counties	Cool season grasses ($135/ac) Warm season grasses w/ chemical treatment ($200/ac) Warm season grasses w/o chemical treatment ($150/ac) Seeding costs estimated by acres.	2010-2020	1000 linear feet of filter strips installed per year 0.176 (count $*10^{13}$ $*season^{-1}$) reduction in fecal coliform from agricultural surface runoff Reduced levels documented by OEPA sampling.
Implement manure management plan for 85 acres.	EQIP USDA Programs through NRCS Franklin and Licking Counties	$6.00/ac (greater than 50 ppm) $30.00/ac (less than or equal to 50 ppm)	2010-2020	1 nutrient management plan implemented for 85 acres 0.155 (count $*10^{13}$ $*season^{-1}$) reduction in fecal coliform from surface runoff Reduced levels documented by OEPA sampling.

Eliminate manure lagoon and promote and build waste storage facility	EQIP USDA Programs through NRCS Franklin and Licking Counties	Maximum cost of $31,000 for cost incentives	2011-2020	Waste storage facility built and reduction in pathogen loading to meet EPA's 100%, 43.0 (count $*10^{13}$ $*season^{-1}$)), reduction goal for cattle non-point source allocations.

- **Problem 3: Stream Corridor, Wetlands, and Highly Erodible Land Protection:** Roughly 29% of riparian corridors in the Blacklick watershed are preserved and protected. However, most of the tributary riparian corridors in the developed areas are not protected. There is a need for more uniform regulations protecting the stream corridor, wetlands, and highly erodible lands. Preservation of these valuable water resources could be through establishing easements or parkland.

- **P3 Goal 1:** Work with local regulatory agencies to establish Stream Corridor Protection setbacks in communities without such regulations (as uniform across jurisdictions as possible – based on comments from the public meetings). Work with local regulatory agencies to revise subdivision regulations to protect environmental features such as riparian areas, wetlands, and highly erodible lands

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Meet with regulatory agencies for Etna, Harlem, Jefferson, Jersey, Monroe, Plain, and Violet townships. Meet with Franklin County, Licking County, City of Columbus, Gahanna, New Albany, Pataskala, and Reynoldsburg regulatory agencies.	Working with regulatory authorities	n/a	2010-2020	Setback regulations established and increase in protected riparian corridors from 29% to 40%.

- **P3 Goal 2:** Work with local park districts and land conservation groups to acquire land to protect environmental features such as riparian areas, forests, wetlands, and highly erodible lands.

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Acquire 50 acres of new parkland in the watershed.	Work with local park districts with jurisdiction in the watershed, including Metro Parks, to identify potential parcels and funding sources.	$15,000/acre	2010-2020	Parkland in the watershed increased by 50 acres.

HUC: 05060001-140-050: Dysar(t) Run

- **Background:** Along Dysar(t) Run of Subwatershed 050, RM 4.98 -0.0 is in non-attainment as a warm water habitat (WWH) due to habitat alteration, siltation, and pathogens. However, the tributary to Dysar(t) Run (RM 1.67) is meeting attainment for a WWH. The primary cause of the siltation is the erosion of the banks from the large volume of stormwater runoff from urbanization. "Increased urbanization in the watershed has led to Dysar(t) Run being forced to convey greater volumes of water from given rain events. This increase in the volume of water the stream is transmitting has led to severe bank erosion along several bends in the channel." (Based on OSU Graduate Student Research in June 2008)

- **Problem 1:** There is 22% impervious surface in the Dysar(t) Run watershed. Siltation from bank erosion is a major cause of impairment in Dysar(t) Run. The source of the increased volume of stormwater is an increase in development and non-pervious surfaces. There have been extensive changes in the landscape from agricultural to residential areas and businesses. Stormwater retention ponds from housing developments were not designed to reduce volume, and there is a lack of floodplain to dissipate the energy of the flow. The Woods at Jefferson and Creekstone Subdivisions do not have stormwater infrastructure to address stormwater volume or water quality.

- **P1 Goal 1:** Create wetlands and rain gardens where the stormwater retention ponds are not designed to reduce volume. Implement land management practices to reduce the volume of stormwater runoff from developed communities.

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Create wetlands and/or large scale rain gardens where stormwater retention ponds on Brunfield and Braeburn Drives, Brooksedge Drive and Stonemast Loop, Woodington and Bellebrook Drives, Bellebrook Drive, and Adams and Taylor Roads, are not designed to reduce volume.	Working with Home Owners Assoc., City of Columbus, City of Pataskala, City of Reynoldsburg, local townships, counties, and OEPA to apply for a SWIF Grant	$60,000 - $100,00 per retention pond (depending on volume of fill removed and extent of plantings/ landscaping	2010-2020	Increased protection of stream channel by reducing the volume and velocity of outlet pipe discharge. Improvement of existing habitat conditions by creating wetland Reduction of sediment loading by 929 ton/yr
Secure land for wetland or rain garden creation at the existing storm drain outfalls of the Woods at Jefferson and Creekstone Subdivisions	Working with Home Owners Assoc., City of Columbus, City of Pataskala, City of Reynoldsburg, local townships, counties and OEPA to apply for a SWIF Grant	$60,000 - $100,00 per retention pond (depending on volume of fill removed and extent of plantings/ landscaping	2010-2020	Increased protection of stream channel by reducing the volume and velocity of outlet pipe discharge. Improvement of existing habitat conditions by creating wetland Reduction of sediment loading by 11 ton/yr
Install 9 rain gardens with a total area of 400 square feet. Install 4 rain barrels for a total storage volume of 2,000 gallons.	Working with homeowners and Home Owners Assoc.	$100-$500 per rain garden/$100 per rain barrel	2010-2020	18% reduction in runoff from driveways and rooftops (calculation taken from OSU graduate student group)

- **P1 Goal 2:** Reconnect 150 linear feet of stream to the floodplain and stabilize 3 sections of bank with severe erosion to reduce erosion and siltation

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Reconnect the stream to its floodplain by installing a series of Newbury riffles on 150 lf of stream. These riffles would be installed upstream of the bend with problematic erosion, where Dysar(t) Run runs through an area surrounded by forest, rather than houses. (Based on OSU Graduate Student Research on Dysar(t) Run)	Working with local homeowners, City governments, townships, and OEPA to secure 319 grant	$6,000 per riffle (Based on OSU Graduate Student Research)	2010-2020	The riffles would raise the elevation of the flow in the stream, so that when the stream was forced to handle large volumes of runoff, it would be able to spread out into the current forested areas, creating a hardwood swamp. (Based on OSU Graduate Student Research on Dysar(t)) Increase QHEI score from 49
Stabilizing 3 banks with severe erosion (properties off of Rodebaugh Rd). Planting bare root natives along 150 lf riparian zone to increase bank stabilization and assimilation	Working with local homeowners, City and county governments, townships, and OEPA to secure 319 grant	$160,000 (Based on quote from Oxbow)	2010-2020	Reduction in erosion and therefore reduction of sediment loading by 28.7 tons/year, phosphorus loading by 28.7 lbs/year, and nitrogen loading by 57.4 lbs/year

- **Problem 2:** Recreational use is being impaired by the fecal coliform bacteria loads from failing HSTS on Kennedy Road.

- **P2 Goal 1:** Reduce fecal coliform counts from failing HSTS from 3.5 (count $*10^{13}$ $*season^{-1}$) to 0.761 (count $*10^{13}$ $*season^{-1}$) in this entire Blacklick subwatershed.

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Extend sewer lines out to homes on Kennedy Rd., or upgrade 10 HSTS systems over next five years	WPCLF with City of Columbus or Pataskala	$8,000 per system replacement	2010-2005	Reduction of 0.041(count $*10^{13}$ $*season^{-1}$) in fecal coliform from failed HSTSs in Dysar(t) Run Reduced levels documented by OEPA sampling

HUC: 05060001-140-050: Fieldstone Tributary

- **Background:** This tributary is just North of Dysar(t) Run and is named after the Fieldstone subdivision that was developed in 2003. The watershed area of this tributary is 1.77 square miles.

- **Problem 1:** According to research performed by OSU graduate students in 2008, residents of Ashley Meadow Drive and Pateo Pass Drive have expressed concern with flooding. The OSU students were able to perform a hydrologic study to develop methods to reconnect stream to floodplain to reduce flooding. Siltation from bank erosion is a major cause of impairment in this tributary. The source of the increased volume of stormwater is an increase in development and non-pervious surfaces. There have been extensive changes in the landscape from agricultural to residential areas and businesses.

- **P1 Goal 1:** Reconnect 1100 linear feet of stream to the floodplain and stabilize banks to reduce erosion and siltation

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Reconnect 1100 linear feet of stream to its floodplain by using two –stage or natural channel design methods	Working with local homeowners, Jefferson Township, Franklin County and OEPA to secure 319 grant	$500,000 (based on estimate provided by Oxbow for natural channel design)	2010-2020	Reduction in erosion and therefore reduction in sediment by 233 tons/yr

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Planting bare root natives along 1100 lf riparian zone to increase stream cover, bank stabilization, and assimilation	Working with local homeowners, Jefferson Township, Franklin County and OEPA to secure 319 grant	$7 per plant; approx. 4,000 plants needed for an estimate of $28,000 (Based on quote from Oxbow)	2010-2020	Reduction in erosion and therefore reduction of sediment loading by 233 tons/year

HUC: 05060001-140-050: North Branch French Run

- **Background:** According to the TMDL, North Branch of French Run is identified as Exceptional Warm Water Habitat in non-attainment due to siltation and an unknown cause and source of impairment. The North Branch of French Run is built out significantly but has two farms remaining. At least one of them has the property in an easement and will be preserved as agricultural.

- **Problem 1:** There is 26% impervious surface in the North Branch French Run watershed. The source of the increased volume of stormwater is an increase in development and non-pervious surfaces. There have been extensive changes in the landscape from agricultural to residential areas and businesses. Stormwater retention ponds from the development were not designed to reduce volume, and there is a lack of floodplain to dissipate the energy of the flow.

- **P1 Goal 1:** Create wetlands and rain gardens where the stormwater retention ponds are not designed to reduce volume. Implement land management practices to reduce the volume of stormwater runoff from developed communities.

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Create wetlands and/or large scale rain gardens where two stormwater retention ponds near Rodebaugh Road and Waggoner Road, one basin on Daugherty Dr., and one dry basin on Ardennes Ct. are not designed to reduce volume.	Working with Home Owners Assoc., City of Columbus, City of Pataskala, City of Reynoldsburg, local townships, counties, and OEPA to apply for a SWIF Grant	$60,000 - $100,00 per retention pond (depending on volume of fill removed and extent of plantings/ landscaping	2010-2020	Increased protection of stream channel by reducing the volume and velocity of outlet pipe discharge. Improvement of existing habitat conditions by creating wetland Reduction of sediment loading by 346 ton/yr
Install 9 rain gardens with a total area of 400 square feet. Install 4 rain barrels for a total storage volume of 2,000 gallons.	Working with homeowners and Home Owners Assoc.	$100-$500 per rain garden/$100 per rain barrel	2010-2020	18% reduction in runoff from driveways and rooftops (calculation taken from OSU graduate student group)

HUC: 05060001-140-050: French Run/South French Run

- **Background:** The South French Run basin similar to Dysar(t) Run has been subjected to dense suburban development since the mid 1980's. The riparian corridor has been preserved along most of the streams but the storm water basins do not slow down the majority of rain events. These detention basins offer opportunities for retrofits that would reduce peak flow runoff and improve channel stability.

- **Problem 1:** There is 19% impervious surface in the South French Run watershed. Impairment in South French Run is attributed to siltation; the source of the impairment was attributed to land development and urban runoff.

- **P1 Goal 1:** Create wetlands and rain gardens where the stormwater retention ponds are not designed to reduce volume. Implement land management practices to reduce the volume of stormwater runoff from developed communities.

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Create wetlands and/or large scale rain gardens where stormwater retention ponds are not designed to reduce volume. Specifically focus on dry basin with concrete channels on Bedlington Ct.	Working with Home Owners Assoc., City of Columbus, City of Pataskala, City of Reynoldburg, local townships, and OEPA to apply for a SWIF Grant	$60,000 - $100,00 per retention pond (depending on volume of fill removed and extent of plantings/ landscaping	2010-2020	Increased protection of stream channel by reducing the volume and velocity of outlet pipe discharge. Improvement of existing habitat conditions by creating wetland Reduction of sediment loading by 346 ton/yr
Install 9 rain gardens with a total area of 400 square feet. Install 4 rain barrels for a total storage volume of 2,000 gallons.	Working with homeowners and Home Owners Assoc.	$100-$500 per rain garden/$100 per rain barrel	2010-2020	18% reduction in runoff from driveways and rooftops (calculation taken from OSU graduate student group)

- **Problem 2:** Recreational use impairment in French Run results from exceeding the geometric mean and peak values for fecal coliform, and is attributed to HSTS that do not adequately treat for bacteria.

- **P2 Goal 1:** Meet attainment for recreational use by reducing fecal coliform loading by 50%.

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Extend sewer lines out to 8 homes or upgrade systems	WPCLF with City of Columbus or Pataskala	$8,000 per system replacement	2010-2020	Reduction of 0.033(count $*10^{13}$ $*season^{-1}$) in fecal coliform from failed HSTSs in Dysar(t) Run Reduced levels documented by OEPA sampling

HUC: 05060001-140-050: Unzinger Ditch

- **Background:** Unzinger Ditch is a tributary to Blacklick at RM 15.88. OEPA studies in 2001 have found the biological indicators to be in non-attainment due to stream channel modifications and toxicity from contaminated sediments. Severe sediment contamination was found downstream of the discharge and potential runoff of the Columbus Steel Drum Company, which is now Industrial Container Services, OH LLC.

- **Problem 1:** Habitat alteration is a cause of impairment. The QHEI score of 27.5 needs to be raised to meet attainment goals for habitat. The source of the impairment is industrial site runoff and channelization.

- **P1 Goal 1:** Restore habitat to increase assimilation. Increase QHEI to 40.

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Install series of riffles along 500 lf of stream to provide habitat and increased aeration to promote breakdown of runoff contaminants	Working with Industrial Container Services for permission, and working with City of Columbus and OEPA to apply for a 319 grant.	$3,000 - $6,000 per riffle	2010-2020	Increase in the QHEI score from 27.5. Obtain a higher QHEI riffle category score from the original score of 0.

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Planting bare root natives on 500 lf of riparian zone to increase stream cover and assimilation	Working with Industrial Container Services for permission, and working with City of Columbus and OEPA to apply for a 319 grant.	$7 per plant; approx. 600 plants needed for an estimate of $4,200.00 (Based on quote from Oxbow from a similar sized area on Dysar(t) Run)	2010-2020	Increase in the QHEI score from 27.5. Obtain a higher QHEI cover category score from the original score of 3.0.
Utilize restoration design methods of natural channel design or two stage design along 500 lf of stream to reduce channelization	Working with Industrial Container Services for permission, and working with City of Columbus and OEPA to apply for a 319 grant.	Topsoil: $3 per cubic yard Channel excavation/ embankment: $7 per cubic yard Grading: $2,000 (Based on quote from Oxbow from a similar sized area on Dysar(t) Run. Estimated cost does not include design and hourly rates of professionals, which vary according to company.)	2010-2020	Increase in the QHEI score from 27.5. Obtain a higher QHEI channel category score from the original score of 5.0.

HUC: 05060001-140-060

- **Background:** Blacklick Creek in its entirety does not meet the TMDL for Phosphorus and pathogens from Non Point Sources (NPS) due to agricultural runoff, urban runoff, and failing home sewage treatment systems (HSTS).

- **Problem 1:** Phosphorus is impairing attainment of Blacklick's mainstem. Failing home sewage treatment systems (HSTS) are a primary source of phosphorus loading into this subwatershed. The TMDL allocates 19,884 lbs/year of total phosphorus (TP) from all sources and the current load is calculated at 52,092 lbs/year requiring a 62% reduction to meet the TMDL.

- **P1 Goal 1:** Reduce total phosphorus attributed to HSTS by 63% from 6829 lbs/yr to 2554 lbs/yr.

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Replace 10 failing HSTS systems per year over the next five years. OR Connect 10 failing HSTS to municipal sanitary sewer per year over the next five years.	Working with local health departments, landowners, and the EPA using Water Pollution Control Loan Fund (WPCLF)	~$8,000 per replacement system.	2010-2015	Funds achieved and implementation in place for septic upgrades, replacements, and/or connection to sewer. Reduction of loading rate by 380 lbs/year of TP at the end of five years . (Load reduction was calculated by dividing total calculated load by the number of failing systems in TMDL to get load per system of approximately 7.8 lbs/year.) Documented reduced total phosphorus levels through EPA chemical monitoring.
Utilize 208 planning to maximize growth around areas with potential for sewer connections	208 Program through OEPA		2010-2020	Future development has secured connections to sewer to prevent failing HSTS loading of phosphorus.

- **Problem 2:** Pathogens are a widespread impairment of recreational uses in the subwatershed of 060, including impairing attainment of Blacklick's mainstem. Failing home sewage treatment systems (HSTS) are a primary source of pathogens into this subwatershed. The existing calculated load for pathogens is 105(count $*10^{13}$ $*season^{-1}$) and the TMDL Load Allocation for NPS pollution is 23.1 (count $*10^{13}$ $*season^{-1}$).

- **P2 Goal 1:** Reduce fecal coliform counts from failing HSTS from 0.611 (count $*10^{13}$ $*season^{-1}$) to 0.545 (count $*10^{13}$ $*season^{-1}$).

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Replace 2 failing HSTS systems per year over the next five years. OR Connect 2 failing HSTS to municipal sanitary sewer per year over the next five years.	Working with local health departments, landowners, and the EPA using Water Pollution Control Loan Fund (WPCLF)	~$8,000 per replacement system.	2010-2015	Funds achieved and implementation in place for septic upgrades, replacements, and/or connection to sewer. A 0.041 (count $*10^{13}$ $*season^{-1}$) reduction in fecal coliform levels Reduced levels documented by OEPA sampling.
Utilize 208 planning to maximize growth around areas with potential for sewer connections	208 Program through OEPA		2010-2020	Future development has secured connections to sewer to prevent failing HSTS loading of pathogens.

- **Problem 3: Stream Corridor, Wetlands, and Highly Erodible Land Protection:** Roughly 29% of riparian corridors in the Blacklick watershed are preserved and protected. However, most of the tributary riparian corridors in the developed areas are not protected. There is a need for more uniform regulations protecting the stream corridor, wetlands, and highly erodible lands. Preservation of these valuable water resources could be through establishing easements or parkland.

- **P3 Goal 1:** Work with local regulatory agencies to establish Stream Corridor Protection setbacks in communities without such regulations. (as uniform across jurisdictions as possible – based on comments from the public meetings). Work with local regulatory agencies to revise subdivision regulations to protect environmental features such as riparian areas, wetlands, and highly erodible lands

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Meet with Madison Township, Truro Township, Violet Township, Franklin County, City of Brice, and City of Columbus regulatory agencies to discuss future developments and adoption of WAP	Working with regulatory authorities	n/a	2010-2020	Setback regulations established and increase in protected riparian corridors from 29% to 40%.

HUC: 05060001-140-060: Powell Ditch

- **Background:** Powell Ditch is impaired by habitat modification. The sources are identified as land development and urban runoff.

- **Problem 1:** A cause of impairment documented in the TMDL is habitat modification. The sources of impairment are land development and urban runoff, Over 12,000 linear feet (lf) of the stream is channelized with 5000 lf in concrete channels. Thirty five percent of the sub-watershed is covered by impervious surfaces. Numerous studies have linked watersheds with impervious surface cover above 25 % with non-attaining streams.

- **P1 Goal 1:** Restore 3839 linear feet of stream channel to increase QHEI scores and decrease siltation from erosion

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Reestablish riparian vegetation to stabilize banks and provide cover for 1564 lf of riparian corridor along tributary of Powell Ditch in Independence Park	City of Columbus, Groveport, Madison Local Schools, and FSWCD	Approx. $28 per lf (Based on quote from Oxbow for similar planting project)	2010-2020	Increase in the QHEI from 49.5 Increase in the cover category score from 7.0 Increase in the riparian category score from 2.5 Reduction in erosion and therefore reduction of sediment loading by 332 tons/year, phosphorus loading by 332 lbs/year.
Reestablish riparian vegetation to stabilize banks and provide cover for 1175 lf of riparian corridor along Powell Ditch South of Refugee Rd	Working with Village of Brice, Property Owners, FSWCD, and OEPA to apply for a 319 or SWIF grant	Approx. $28 per lf (Based on quote from Oxbow for similar planting project)	2010-2020	Increase in the QHEI from 49.5 Increase in the cover category score from 7.0 Increase in the riparian category score from 2.5 Reduction in erosion and therefore reduction of sediment loading by 249 tons/year, phosphorus loading by 249 lbs/year

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Restore 1100 linear feet of Powell Ditch using self forming, two stage, or natural channel design, to allow access to floodplain between Scarborough Blvd and Chantry Dr.	Working with City of Columbus, Property Owner, and OEPA to apply for a 319 or SWIF	Topsoil: $3 per cubic yard Channel excavation/ embankment: $7 per cubic yard Grading: $2,000 (Based on quote from Oxbow from a similar project. Estimated cost does not include design and hourly rates of professionals, which vary according to company.)	2010-2020	Increase in the QHEI from 49.5 Increase in the channel category score from 12.0 Reduction in erosion and therefore reduction of sediment loading by 233 tons/year, phosphorus loading by 233 lbs/year

- **P1 Goal 2:** Reduce impervious area by 5% or 107 acres (4,660,920 ft^2)

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Install pervious pavement, asphalt or pavers to infiltrate 1" rain event for 2,330,460 ft^2 of impervious surface.	Working with homeowners and Homeowners Associations to apply for a USEPA Targeted Watersheds Grant	Approx. $3 per sq. ft. (Based on LID Urban Design Tools Guidebook)	2010-2030	A 2.5% reduction in impervious surface. Pervious pavement installed on 58,261 sq. ft.
Install 233,046 ft^2 of rain garden/bioswales/wetlands to handle 1" rainfall from 1,165,230 ft^2 of impervious surfaces, a 1:5 ratio.	Working with homeowners, Central Ohio Rain Garden Association (CORGI), and Homeowner's Associations to apply for a USEPA Targeted Watersheds Grant	$3-$12 per square ft (estimate from McCormick Taylor Engineering Firm)	2010-2030	A 1.25% reduction in impervious surface Rain gardens/ bioswales/ wetlands installed on 58,261 sq. ft.
Install 1,165,230 ft^2 of green roof.	Working with homeowners and Homeowners Associations to apply for a USEPA Targeted Watersheds Grant	$9/sq .ft. for 3" of growing media. More commonly the range is between $14 - $25/sq. ft., including roofing membranes. (Estimate from greenroofs.com)	2010-2030	Reduce impervious surfaces by 1.25% 58,261 sq. ft. of green roof installed.

Actions for the entire watershed

- **Problem 1 - Data Quality:** The data available for determining water conditions within Blacklick Creek is almost ten years old. Many things have changed in the watershed that have the potential to significantly alter water quality including decommissioning of the Jefferson Township Waste Water Treatment Plant, clean up of operations at Hendren Farms, and many more acres of farmland converted to suburban housing. On- going monitoring is needed to develop a clear picture of current conditions as well as detect changes both positive and negative. Continual monitoring will also help guide future actions to protect and restore the health of the stream.

- **P1 Goal 1:** Collect and compile annual seasonal data on Macro-invertebrate populations using level 1 and 2 monitoring techniques. (Level one monitoring is a monitoring program designed for education or public awareness purposes and is not considered credible data for regulatory purposes.)

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Establish a volunteer level 1 water quality monitoring program for the Blacklick Creek Watershed. (Level one monitoring is designed for education or public awareness purposes and is not considered credible data for regulatory purposes.)	Recruit and train volunteers from Friends of Big Walnut Creek and Tributaries, Friends of Blacklick Creek, City of Columbus, and MORPC	Cost of Level 1 trainings (usually low cost)	2010-2020	Volunteer monitoring group trained
Collect and compile annual seasonal data on Macro-invertebrate populations using level 1 monitoring techniques.	Use data from volunteer monitoring group	None	2010-2020	Determine tolerant counts of macroinverts vs. intolerant for unscored tributaries
Establish and train volunteers to collect physical and chemical water data from the stream (dissolved oxygen, TSS, Ph, ammonia-nitrates, total phosphorus, pathogens) using level 2 monitoring. (Level 2 monitoring must follow the requirements of OAC 3745-4-05 Level 2 data requirements and reporting. This level of monitoring is considered credible data.)	Recruit and train volunteers from Friends of Big Walnut Creek and Tributaries, Friends of Blacklick Creek, City of Columbus, and MORPC	Cost of Level 2 trainings (usually low cost)	2010-2020	Volunteer monitoring group trained

Collect and compile physical and chemical water data from the stream (dissolved oxygen, TSS, Ph, ammonia-nitrates, total phosphorus, pathogens) using level 2 monitoring.	Using Level 2 data collectors from Friends of Big Walnut Creek and Tributaries, Friends of Blacklick Creek, City of Columbus, Ohio American WWTP, Fairfield WWTP, and MORPC	None	2010-2020	Determine IBI, ICI, and QHEI scores for unscored tributaries Determine chemical data using City and WWTP monitoring equipment (i.e. YSI data sondes)

- **P1 goal 2:** Develop a Project Monitoring Plan for the whole watershed

Task Description (Objective)	How	Estimated Cost	Time Frame	Performance Indicators
Learn how to develop a high quality monitoring plan.	Attend Project Study Monitoring Plan workshop.	Approximately $25	2010	Watershed coordinator attends workshop
Develop monitoring plan.	Work with volunteers to assemble a workable monitoring plan.	None	2010-2011	An approved Project Study Monitoring Plan is in place.

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IX. Appendix A: Susceptibility Analysis, Protective Strategies and Proposed Consumer Confidence Report

Language for Jefferson Water & Sewer District, Taylor Road Wellfield

Susceptibility Analysis:

The aquifer that supplies drinking water to Jefferson Water & Sewer District's Taylor Road Wellfield has a relatively high susceptibility to contamination. This determination was made because of the following reasons:

- The buried valley aquifer is a regionally extensive thick, permeable sand and
- gravel deposit, and is sensitive to potential ground water contamination;
- The aquifer is overlain by only 10-25 feet of sandy clay with gravel in some
- areas;
- Potential contaminant sources exist within the protection area; and
- There is documented ground water contamination within the wellhead protection
- area.

Ground Water Quality. A review of Jefferson Water & Sewer District's water quality record currently available in Ohio EPA's drinking water compliance database did not reveal any evidence of chemical contamination in the District's supply wells. This water quality evaluation has some limitations:

1. The database evaluated is for treated water samples only, as Ohio EPA's quality requirements are for the water being provided to the public, not the water before treatment.
2. Sampling results for coliform bacteria and naturally-occurring inorganics were not evaluated for this assessment, because they are not a reliable indicator of aquifer contamination.

Although the drinking water provided by Jefferson Water & Sewer District meets drinking water quality standards, ground water contamination has been documented in this aquifer, related to an industrial facility located at the outermost boundary of the wellhead protection area. The industrial facility plans to implement corrective measures and the District has a network of ground water quality monitoring wells within the
wellfield to provide early warning if the plume should approach the pumping wells.

Potential Contaminant Source Inventory. The Jefferson Water & Sewer District has identified 36 potential contaminant sources that lie within the determined wellhead/source water protection area for the Taylor Road Wellfield, two of which are located within the inner management zone (or one-year time-of-travel zone). Some of the types of potential contaminant sources present are the CSX/Ohio Central railway, commercial and industrial facilities, septic systems, golf course and agricultural activities.

Consequently, it is possible that the aquifer that supplies the District's wellfield could become further contaminated. It is critical that potential contaminant sources are handled carefully with the implementation of appropriate protective strategies.

Protective Strategies:

Protective strategies are activities that help protect a drinking water source from becoming contaminated or further contaminated. Implementing these activities can provide a number of long-term benefits, including protecting the health of the consumers; preserving water resources for future generations; avoiding the expense of cleaning up a contaminated water supply or finding alternative sources of water; and preserving or enhancing the economic value of the area by securing an abundant supply of clean water. Jefferson Water & Sewer District should place a priority on developing protection strategies for the contaminant sources identified. Additional recommendations include:

Educational Outreach: Informing people who live, work, or own property within your protection area about the benefits of drinking water protection is very important. Although some communities develop their own educational outreach resources, assistance is available at no cost from various agencies. For example, staff from Ohio EPA's Office of Pollution Prevention can visit businesses (free of charge) and provide recommendations on how they can modify their processes, materials and practices to generate less pollution in a cost-effective and technically feasible manner. County agricultural extension agents, who are skilled at assisting farmers with technical issues, can provide advice on reducing the risk of contaminating the water supply (through proper application rates, enrollment in conservation reserve programs, and other management practices). Homeowners should also be made aware of the potential threat they can pose to the water supply. For more information on available brochures and educational information please contact the Wellhead/Drinking Water Protection staff at (614) 644-2752.

CSX/Ohio Central Railway: There is a potential for spills exists along the CSX/Ohio Central Railway. Tanker cars are capable of carrying large volumes of toxic materials. The Jefferson Water & Sewer District may want to consider contacting the local fire department and local emergency planning agency about the location of the drinking water source protection area, so that strategies can be developed to avoid spilled materials impacting the aquifer.

Columbus Steel Drum Company Contaminant Plume: The Jefferson Water & Sewer District should continue careful monitoring of the groundwater near the wellfield. Jefferson Water & Sewer District should select protection strategies from the above listed recommendations and incorporate them into a Drinking Water Source Protection Plan. A guidance document that describes how to develop a Protection Plan is attached to this letter.

Fairfield County Violet Township Well Field (Taken from the Fairfield County Regional Drinking Water Source Protection Plan April, 2007)

Tussing Road

Located in the northwest corner of Violet Township, the Tussing Road Water Treatment Plant currently provides water to most areas of the Township north of Pickerington. The plant draws water from seven (7) wells of varying capacities ranging from 0.230 MGD to 1.08 MGD.

Treatment consists of aeration/filtration, ion-exchange softening, corrosion control, fluoridation and chlorination. The plant is currently rated at 3.0 MGD. There are no plans to expand the facility, however, the plant is designed to accommodate expansion to 5.0 MGD.

The distribution system is composed of PVC pipe and is reportedly in good condition, with pressures adequate throughout the distribution system. There are two elevated storage tanks in the system, each with a capacity of 750,000 gallons. The older tank (1990) was repainted in 1999. The newer tank was constructed in 1999. Average daily demand from over 3,200 accounts is 1.7 MGD. Peak demand is reported to be 2.3 MGD.

The County charges a flat rate per 1,000 gallons up to a fixed amount; a higher flat rate is then charged per 1,000 gallons above the fixed amount. There is a slightly different rate structure for residential use than for commercial/industrial/institutional use.

The County Utilities Department has projected 20-year service area growth to the east into Liberty Township and south to the main railroad line. Assuming the plant upgrade is completed as planned, growth should be able to be supported. Growth to the east should be able to proceed unabated; however, expansion to the south will compete with Pickerington expansion plans. Also, expansion Fairfield County Regional Drinking Water Source Protection Plan beyond an average demand of 1.5 MGD would probably require an increase in distribution storage in order to meet the OEPA criteria of storage equaling average daily demand. (pg. 66-67)

Emergency Response to Spills in the Protection Areas

Given that nine out of the eleven participating community water systems have well fields that are rated with high to moderate susceptibility to infiltration of contaminants (see previous subsection titled "Susceptibility Analysis" on page 7 of this document), emergency response is a critical element of the protective strategies. This is especially true if chemical spills were to occur along transportation routes where they pass through the WHP Area. Such spills have been prioritized as having a high potential risk to the well fields (see previous subsection titled "Regional Prioritization of Potential Contaminant Sources" on page 9 of this document). Specialized responses may need to be adapted for spills/accidents occurring within or adjacent to the WHP areas to minimize the infiltration of contaminants into the aquifer.

As previously described under the Education and Outreach heading of this report, an important initiative of this regional drinking water protection plan involves the development of a notification/incident response plan with the County 911 system. As part of this Section 319 (h) grant work, the language in Annex J (i.e., Engineering, Utilities and Public Works) of the County EMA's EOP was revised to acknowledge that a map of the WHP areas, together with jurisdictional names and phone numbers, for public water wells throughout Fairfield County is available through the County Auditor's GIS Department. This digital layer of WHP areas with contact information was furnished to the County Auditor's GIS Department and can be incorporated and thereby automated into the 911 computer-aided dispatch system or, at a minimum, the County Auditor's Department can provide traditional paper prints with related contact information. Language in Annex J of the County EOP was also amended to stipulate that the jurisdictional water department will be notified either by the Sheriff's 911 Dispatch Center or the Incident Commander (typically, Fairfield County Regional Drinking Water Source Protection Plan the local fire official) in the event that a hazardous materials release/incident occurs within a WHP area. The name of the current contact person and phone number for each of the participating community water systems is included in Table 27. Additional information regarding the procedures for responding to spills, including chain-of-command and emergency communications, can be found in each of the individual community water system's Contingency Plan. A copy of the revised Annex J of the County EOP is included in Appendix C of this report.

Table 27. Emergency Contact Information

Water System	Contact Name	Business Hours	After Hours/ Emergency
Baltimore	Dennis Rose	(740) 862-4491	(740) 808-3142 (cell)
Millersport	Tom Boso/ John Wood	(740) 808-0165 (cell)/ (740) 467-2374 (WTP)	(740) 808-6553 (cell) (740) 467-2497 (home)
Pleasantville	Ralph George	(740) 468-2237	(740) 468-3178 (home)
Bremen	Byron Bowersox	(740) 569-4100 (WTP)	(740) 385-8591
Sugar Grove	Mike Puchta/ Greg Foltz	(740) 808-6266 (cell)/ (740) 503-7788 (cell)	(740) 603-4669 (home) (740) 862-4088 (home)
Amanda	Ralph Martin	(740) 438-6332 (cell)	(740) 438-6332 (cell)
Lithopolis	Mark Anderson	(614) 837-2031	(614) 774-9408 (cell)
Pickerington	Gary Armentrout	(614) 833-2290	(614) 207-4351
Violet Twp. (FCU)	John Wood	(614) 864-3370	(614) 419-3974
Little Walnut (FCU)	John Wood	(614) 864-3370	(614) 419-3974
Greenfield Twp.	John Wood	(614) 864-3370	(614) 419-3974

The Ohio EPA's Division of Emergency and Remedial Response is also capable of providing expertise and assistance related to prevention, containment, and clean-up of chemical spills. The Ohio EPA's Emergency Response 24-hour phone number is 1-800-282-9378. The day-time contact number for the Central District Office in Columbus, Ohio is 614-728-3778. (pgs. 69-71)

X. Appendix B: Bridges and Crossings over Blacklick Creek and Tributaries in Franklin County.

OBJID	DIAM	TYPE	COMMENTS	GPS_HGHT	NORTHING	EASTING	Location
1	60	Wood	backyard bridge	1110.535	769142.5133	1893528.812	8250 Walnut Street
2	96	Wood	backyard bridge	1112.466	769106.2819	1893212.841	8190 Walnut Street
3	96	Wood	backyard bridge	1108.209	769295.482	1893032.177	8168 Walnut Street
4	78	Corrugated Metal	Drway to home	1112.932	769677.9959	1892817.967	11088 Johnstown Road
5	72	Wood	arched footbridge in front yard	1106.013	769853.8836	1892876.44	11230 Johnstown Road
6	36	Concrete	Two concrete culverts under Drway	1117.687	769994.1966	1892869.958	11230 Johnstown Road
7	54	Metal	tractor bridge to reach farm field	1108.047	770187.8722	1892838.918	11428 Johnstown Road
8	30	Wood	backyard bridge	1106.196	771020.1694	1893227.802	11530 Johnstown Road
9	240	Concrete	State Rte 62 Bridge over the stream	1115.109	771581.433	1893489.017	St Rt 62 Johnstown Road near Licking County
10	144	Concrete	Babitte Rd Crossing UN Trib	1065.025	753684.4215	1891334.764	Just East of 5633 Babbitt Rd
11	96	Wood	RR ties over steel beams backyard UN Trib	1069.878	753168.3312	1891774.648	5596 Babbitt Rd
12	24	Concrete	Three culverts for field access UN Trib	1068.13	752664.3726	1892356.562	Just East of 5566 Babbitt Rd
13	96	Wood	Golf cart bridge	1108.468	754000.1404	1893336.315	Tartan East Golf Club
14	36	Wood	foot bridge	1091.399	754062.3891	1893372.437	Tartan East Golf Club
15	36	Wood	foot bridge	1093.785	754161.8687	1893461.628	Tartan East Golf Club
16	36	N12		1095.833	754192.4133	1893780.759	Tartan East Golf Club
17	36	Wood	foot bridge	1095.693	754200.9942	1893886.374	Tartan East Golf Club
18	36	Wood	foot bridge	1099.382	754275.9722	1893986.27	Tartan East Golf Club
19	120	Wood	Golf cart bridge	1098.715	754287.2506	1894020.865	Tartan East Golf Club
20	120	Wood	Golf cart bridge	1079.569	752425.6286	1893290.08	Tartan East Golf Club
21	84	Wood	Covered foot bridge	1065.346	753762.6364	1891226.843	5633 Babbitt Rd
22	75	Metal	Culvert under Drway	1070.459	753880.4566	1891102.549	5701 Babbitt Rd
23	240	Concrete	Morse Rd over Blacklick Creek	1004.674	747748.1486	1883727.926	Morse Rd Near Kitsmiller Rd

24	48	Wood	Backyard foot bridge over UN Trib	1023.943	748282.9057	1885211.571	7280 Morse Road
25	36	Wood	Backyard foot bridge over UN Trib	1033.364	748252.9048	1885246.833	3875 Avis Rd
26	12	N12	Culvert under Drway	1037.556	748507.7221	1885480.882	3909 Avis Rd
27	48	Wood	Backyard foot bridge over UN Trib	1034.145	748062.9659	1885383.364	Just south of 3875 Avis Rd
28	110	CMT (Headwall)	Culvert under Morse Rd	1031.883	747738.085	1885536.17	Morse and Avis Rd
29	48	N12	Farm Equipment access	1041.792	747375.2606	1886107.011	South of Morse East of Avis
30	30	Corrugated Metal	Un Trib buried in culvert behind two houses	1038.674	747437.7837	1886245.251	7473 Morse Rd
31	54	Wood	Backyard foot bridge over UN Trib	1044.864	747399.9254	1886599.93	7485 Morse Rd
32	60	Wood	Backyard foot bridge over UN Trib	1046.421	747413.0961	1886715.448	7495 Morse Rd
33	24	Concrete	Culvert in backyard	1050.344	747395.3479	1886844.172	7501 Morse Rd
34	18	Concrete	Culvert under Avis Rd	1044.945	749085.923	1885625.625	In front of 3973 Avis Rd
35	18	Metal	Culvert under Drway	1041.394	749034.5781	1885494.873	3961 Avis Rd
36	48	Concrete (headwall)	Culvert under Avis Rd	1036.847	750348.1737	1885709.199	SW corner of 4230 Avis Rd
37	96	Wood	RR ties over steel beams old farm bridge	1056.585	745041.2914	1889868.264	7900 Clark State Rd
38	108	Concrete	square concrete Drway over creek	1060.847	745092.5196	1890019.122	7920 Clark State Rd
39	120	Wood	RR ties over steel beams old farm bridge	1062.382	745203.2019	1890156.622	7946 Clark State Rd
40	48	Wood	foot bridge	1068.004	745360.9829	1890229.675	7946 Clark State Rd
41	84	Wood	Wood over steel beams	1069.707	745682.3702	1890390.394	3465 Babitt Rd
42	72	Concrete (headwall)	square concrete Drway over creek	1065.768	745824.3949	1890445.402	3493 Babitt Rd
43	132	Concrete (headwall)	Babitt Rd Bridge over Swisher Run	1067.345	745996.794	1890800.61	In front of 3515 Babbitt Rd
44	24	Wood	Old footbridge over Swisher Run	1075.603	746356.2185	1891083.261	East of 3551 Babitt Rd on other side of rd
45	60	Wood	backyard foot bridge over Swisher Run	1071.368	746998.9298	1891187.278	8079 Morse Rd

46	36	Wood	backyard foot bridge over Swisher Run	1066.864	747140.7328	1891190.319	8079 Morse Rd
47	192	Metal	Morse Rd Bridge over Swisher Run	1077.57	747288.5941	1891198.02	In front of 8079 Morse Rd
48	54	Corrugated Metal	Two metal culverts under Drway, Stream channel is bricked	1074.959	747324.0009	1891309.746	8078 Morse Rd
49	48	Corrugated Metal	Metal culvert farm bridge Swisher Run	1073.864	747617.4668	1892158.976	8200 Morse Rd
50	120	Concrete (headwall)	Morse Rd Bridge over Swisher Run	1076.872	747200.5313	1893143.579	8383 Morse Rd
51	36	Wood	foot bridge Swisher Run	1081.035	746642.4969	1893237.922	NE corner of farm at 8070 Clark State Rd
52	48	Concrete	Concrete Culvert with Sheet metal laid over it Swisher Run	1082.971	746486.4915	1893541.86	NE corner of farm at 8070 Clark State Rd
53	24	Concrete	Culvert under Clark State Rd UN Trib of Swisher Run	1062.593	745096.0616	1890154.287	In front of 7911 Clark State Rd
54	168	Concrete	Swisher Creek Crossing Bridge	1055.485	744833.7084	1889614.221	Entrance to Woods at Swisher Creek
55	60	Wood	Old foot bridge over Swisher Creek	1062.938	744564.88	1889314.211	7860 Clark State Rd
56	192	Concrete	Drway to home	1057.015	744508.9151	1889312.282	7860 Clark State Rd
57	42	Concrete	Clark State Bridge over UN Trib to Swisher Creek	1060.383	744500.8391	1889506.533	7868 Clark State Rd
58	56	Concrete (headwall)	Drway over UN Trib Swisher Creek	1060.584	744386.2693	1890010.815	7865 Clark State Rd
59	12	N12	Small Plastic Culvert under Drway	1064.274	743141.8638	1892364.501	3487 Dixon Rd
60	18	N12	Two Plastic Culvert under Drway	1075.867	743147.418	1892523.393	3487 Dixon Rd
61	12	N12	Small Plastic Culvert under Drway	1072.165	743108.9202	1892796.585	3487 Dixon Rd
62	10	Corrugated Metal	Culvert under Drway	1085.194	742891.374	1892948.088	3462 Dixon Rd
63	30	Concrete	Culvert under Dixon Rd	1079.549	743272.208	1893343.443	4101 Dixon Rd

64	40	Metal	Swisher Run Two Metal culverts, Old field access bridge	1050.352	744264.1842	1888993.253	7790 Clark State Rd
65	144	Concrete	Wood deck bed over Drway Swisher Run	1050.689	744189.0454	1888706.448	7790 Clark State Rd
66	144	Concrete (headwall)	Clark State Bridge over Swisher Creek	1036.604	744138.4833	1887878.637	Near 7664 Clark State Rd
67	84	Wood	Backyard Footbridge over Swisher Creek	1004.709	742466.7854	1884061.979	8000 Wills Run Rd
68	108	Wood	Wooden Foot Bridge over Swisher Creek	996.054	742214.4815	1883095.29	7560 Wills Run Ln
69	168	Concrete (headwall)	Wills Run Ln Bridge over Swisher Creek	988.263	742139.9955	1882754.63	7570 Wills Run Ln
70	72	Concrete (headwall)	Culvert under Clark State Rd	1026.75	744278.5391	1885507.729	At Jefferson Twp Park on Clark State
71	24	Concrete	Backyard concrete arch over stream	1027.412	744175.5237	1885694.668	2788 Skelton Ln
72	36	N12	Backyard culvert with Riprap	1026.621	743832.3445	1885802.876	7365 Clark State Rd
73	60	Concrete (headwall)	Culver under Skelton Court	1025.834	743544.8559	1885709.187	8238 Skelton Court
74	36	Corrugated Metal	Culvert under farm road	1055.45	743783.7797	1888020.969	7765 Clark State Rd
75	20	Concrete (headwall)	Culvert under Waggoner Rd	1053.032	743759.0588	1887972.812	in front of 4313 Waggoner Rd
76	160	Concrete (headwall)	Waggoner Rd Bridge over creek	1032.075	740033.2612	1887705.945	in front of 3825 Waggoner Rd
77	144	Wood	Wooden footbridge in backyard	1034.026	739988.9453	1888183.162	3772 Waggoner Rd
78	144	Wood	Wooden footbridge in backyard	1036.264	739832.3299	1888596.825	7780 Havens Rd
79	120	Wood	Old foot bridge in backyard	1059.169	740000.4469	1890499.611	8060 Havens Rd
80	48	Wood	narrow footbridge in backyard	1067.725	740073.7624	1890636.167	8190 Havens Rd

81	36	Wood	Two wooden beams across creek	1070.202	740163.5959	1890767.055	8190 Havens Rd
82	8	Corrugated Plastic	Two plastic Culvert under pathway	1064.153	740220.3747	1890969.546	8190 Havens Rd
83	12	Corrugated Plastic	Two plastic Culvert under pathway	1061.562	740251.8053	1890951.422	8190 Havens Rd
84	24	Concrete (headwall)	brick headwall culvert under grassway	1075.21	740596.4079	1892623.908	3842 Dixon Rd SW
85	18	Concrete	culvert under Dixon Rd	1078.651	740926.6405	1893185.981	in front of 3742 Dixon Rd
86	22	N12	Culvert under pasture road	1076.669	739801.8956	1892885.277	4108 Dixon Rd
87	18	Concrete	Culvert under Drway	1078.912	739651.943	1893094.848	4108 Dixon Rd
88	24	Concrete	Culvert under Drway	1063.784	738208.8234	1891419.862	8223 Havens Rd
89	24	Concrete	Half uncovered culvert in middle of yard and stream	1062.488	738245.9166	1891270.055	8223 Havens Rd
90	24	Concrete	Culvert under Drway	1062.819	738237.3139	1891230.819	8215 Havens Rd
91	24	Corrugated Plastic	Culvert under Drway	1063.954	738224.8042	1891172.597	8207 Havens Rd
92	36	Concrete	Culvert under Drway	1061.063	738203.3898	1890928.824	8201 Havens Rd
93	36	Concrete	Culvert under Drway	1058.59	738216.2308	1890735.649	8181 Havens Rd
94	36	Wood	Wooden footbridge in backyard	1054.45	738216.9376	1890635.186	8111 Havens Rd
95	36	Concrete	Culvert under Drway	1058.947	738011.3921	1890063.915	8015 Havens Rd
96	24	Concrete	Culvert under Drway	1032.217	737667.1287	1888362.527	3480 Waggoner Rd
97	48	Wood	Wooden footbridge in backyard	1031.038	737499.0079	1888151.514	3454 Waggoner Rd
98	24	Metal	cinderblock headwall with large bridge	1040.779	737473.1754	1888163.348	3454 Waggoner Rd
99	48	Metal	Gravel covered bridge over stream	1036.055	737335.8947	1888086.907	3440 Waggoner Rd
100	15	PVC	Culvert under grassway	1026.712	737294.3354	1888055.507	3440 Waggoner Rd
101	56	Concrete (headwall)	Crumbling Box culvert under Waggoner Rd	1027.181	736892.6837	1887479.447	In front of 3376 Waggoner Rd
102	170	Concrete (headwall)		1006.901	735709.2689	1886016.378	Havens Corners Rd at 7500
103	48	Concrete		1007.375	735700.9363	1886180.416	7500 Havens Corners Rd

104	24	Metal		1011.31	735690.4585	1886373.512	7530 Havens Corners Rd
105	36	Concrete		1010.609	735760.0252	1886503.08	7580 Havens Corners Rd
106	24	Concrete		1014.659	735827.7408	1886615.467	7600 Havens Corners Rd
107	14	PVC		1013.134	736000.2518	1886850.482	7608 Havens Corners Rd
108	14	Concrete	Two	1013.703	736084.057	1887021.012	7630 Havens Corners Rd
109	36	Concrete		1017.454	736033.1288	1887366.571	3251 Waggoner Rd
110	24	Concrete (headwall)		1008.595	746027.6978	1882703.158	3500 Kitzmiller Rd
111	24	Concrete		1024.68	746539.7918	1883910.409	3600 Kitzmiller Rd
112	240	Concrete		1002.375	746184.4136	1882916.259	3600 Kitzmiller Rd
113	240	Concrete	House	1002.024	746000.87	1882774.603	3500 Kitzmiller Rd
114	240	Concrete		995.397	744508.0352	1882352.666	6895 Clark State Rd
115	15	Concrete		993.507	743575.994	1882921.482	Southern portion of 6985 Clark State Rd
116	48	Wood		977.191	741142.9736	1881909.734	2546 Reynoldsburg-New Albany Rd
117	120	Concrete		1006.963	738707.8491	1885714.877	Havenswood Place at 2070
118	36	Concrete	Four	1018.257	738744.3951	1885235.449	7333 Havens Rd
119	48	Concrete	Three	996.883	738522.4826	1884415.102	Daves Dr at 7235/7245 Havens Rd
120	240	Concrete		986.557	738216.5096	1882993.316	Havens Court E. at 2062/2080
121	40	Concrete	Three	985.133	737899.1144	1882602.007	7726 W. Havens Ct
122	36	Wood		985.453	737868.7953	1882397.397	7726 W. Havens Ct
123	24	Concrete		999.515	739310.4823	1883419.05	7095 Havens Rd
124	40	Concrete		999.75	739821.4191	1883855.87	7913 Creek Hollow Rd
125	12	Concrete	Start	1007.046	740198.149	1884428.802	2291 Old Stone Rd
126	48	Wood		1007.946	740720.4422	1884794.668	2752 Colts Neck Rd
127	94	Wood		1021.704	740585.7919	1884642.518	2752 Colts Neck Rd
128	12	Metal	Four	1009.682	737318.0118	1885625.216	2019 Surrey Rd
129	18	N12		1004.251	737093.766	1885244.111	2007 Surrey Rd
130	28	Concrete		995.008	736737.543	1884359.726	1981 Belangee Dr
131	94	Wood		1004.235	736544.5974	1884054.638	1959 Belangee Dr
132	76	Corrugated Metal		997.904	736464.2638	1883971.148	1945 Belangee Dr
133	240	Concrete		969.825	739505.5771	1880928.038	Havens Rd at 6799
134	240	Concrete		946.723	735677.8037	1880922.192	Havens Corners Rd east of 6794
135	24	Concrete		968.101	734316.6977	1880801.873	Reynoldburg-New Albany Rd, SE of

							Karsten Place
136	48	Corrugated Metal	Three	1115.268	771784.9597	1893502.683	St Rt 62 Johnstown Road near Licking County
137	240	Concrete		1096.406	769004.7549	1892256.874	11048 Johnstown Road
138	24	Metal		1105.465	768623.2465	1892183.161	East of 10980 Johnstown Road
139	240	Concrete		1099.319	766387.0084	1890890.257	West of 8000 Clouse Road
140	12	Corrugated Plastic	Start	1013.837	739121.5256	1886197.036	7595 Havens Rd
141	240	Concrete (headwall)		1012.883	739089.4069	1886386.356	7615 Havens Rd
142	18	Corrugated Metal		1026.786	737438.7237	1886937.033	3491 Waggoner Rd
143	12	N12		1017.345	737490.5642	1886983.257	3491 Waggoner Rd
144	8	Clay		1017.655	737516.8334	1887000.313	3491 Waggoner Rd
145	12	N12		1018.906	737645.3702	1887089.127	3491 Waggoner Rd
146	12	Concrete	Tributary	1020.074	737992.1655	1887238.628	3545 Waggoner Rd
147	60	Wood		1029.765	738020.7379	1887412.173	3545 Waggoner Rd
148	16	Metal		1028.253	738043.2278	1887531.312	3545 Waggoner Rd
149	16	Concrete		1038.429	736850.8264	1888999.538	3440 Waggoner Rd
150	16	Concrete		1038.827	736855.811	1889018.48	3440 Waggoner Rd
151	16	Concrete		1032.028	736449.3178	1888514.122	3420 Waggoner Rd
152	12	Metal	Outlet from Pond	1024.528	736162.2624	1888256.038	NE of Havens Corners Rd/Waggoner Rd
153	21	Concrete		1030.432	736141.7752	1888133.288	NE of Havens Corners Rd/Waggoner Rd
154	24	Concrete		1022.103	736052.4655	1887653.279	East of 3254 Waggoner Rd
155	30	Concrete		1021.19	736032.5685	1887440.902	3254 Waggoner Rd
156	48	Wood		1001.639	735428.7192	1885889.342	West of Ashley Meadows Dr, North of Pateo Pass
157	108	Concrete (headwall)		1008.941	735028.4806	1887299.979	West of Waggoner Rd, East of Ashley Meadow Dr
158	42	Concrete		1007.374	735044.7123	1887861.414	Waggoner Rd, just north of 8353 Almond Park Dr
159	42	Concrete	Two	1026.006	735254.0371	1888490.864	7835 Havens Corners Rd
160	144	Concrete (headwall)		1033.454	735476.5032	1888880.835	7871 Havens Corners Rd
161	12	Concrete		1038.239	735928.7126	1889925.233	8000 Havens Corners RD

162	14	Corrugated Metal	Two with Two 14" Concrete	1045.416	736314.2734	1890426.735	Northern portion of 8050 Havens Corners Rd
163	18	Concrete	Two	1052.611	736352.4932	1890940.468	Northern portion of 8150 Havens Corners Rd
164	36	Wood		1058.034	736357.0461	1891093.318	Northern portion of 8150 Havens Corners Rd
165	24	Corrugated Metal	Overflow from Pond	1061.895	736520.4392	1891672.675	8270 Havens Corners Rd
166	48	Metal		1059.444	736629.8492	1891897.832	Northern portion of 8306 Havens Corners Rd
167	84	Wood		1070.885	737022.5061	1892609.449	1925 Dixon Rd
168	8	Corrugated Metal		1069.822	737360.4481	1892676.858	1969 Dixon Rd
169	24	Concrete	County Line	1070.847	737219.4093	1892928.673	1969 Dixon Rd
170	36	Corrugated Metal		1057.351	735469.0605	1891320.032	8182 Havens Corners Rd
171	36	Concrete (headwall)		1053.06	735408.9389	1890872.154	8130 Havens Corners Rd
172	24	Concrete (headwall)		1055.147	735415.7887	1890873.645	8150 Havens Corners Rd
173	60	Concrete (headwall)		1049.55	735397.2909	1890460.348	8050 Havens Corners Rd
174	42	Concrete	Two	1043.533	735269.8505	1890340.359	8049 Havens Corners Rd
175	36	Concrete		1048.752	735270.3479	1890238.884	8049 Havens Corners Rd
176	14	Concrete	Two	1033.161	735069.596	1888522.624	7835 Havens Corners Rd
177	30	Corrugated Metal	Three	996.346	735007.1679	1885604.847	West of Ashley Meadows Dr, North of Pateo Pass
178	72	Concrete (headwall)		1017.181	734130.7777	1887312.879	East side of Waggoner Rd, South of Almond Park Dr
179	36	Concrete		1017.921	732401.6531	1888103.394	Jefferson Run, NW of 7794 Birch Creek Dr
180	120	Concrete (headwall)		1025.969	732831.6571	1889588.361	Jefferson Run, west of Aspen Ridge Dr
181	240	Concrete		1003.665	732150.8891	1887168.675	Waggoner Rd at 1121
182	24	Concrete	Two	995.929	731999.3501	1886792.169	1121 Waggoner Rd

183	168	Concrete (headwall)		1006.166	732051.6333	1886251.416	1121 Waggoner Rd, SW portion
184	54	Concrete		960.577	734633.0991	1882086.352	1740 Stoney Brook Way
185	240	Concrete (headwall)		967.072	724895.7224	1886792.741	N. Waggoner Rd, north of 121
186	36	Wood		1011.479	726352.9665	1889886.459	Kestrel Dr, south of 341
187	240	Concrete		975.791	726698.3579	1888189.442	Arbor Rose Way, east of 8213
188	240	Concrete (headwall)		987.094	727820.7548	1888069.844	Chapel Stone Rd, East of 8196
189	180	Concrete (headwall)		1008.663	728028.8605	1888048.884	Crete Lane West of 8227
190	120	Concrete (headwall)		1002.096	728330.1503	1888462.185	Crete Lane, NW of 8227
191	144	Concrete (headwall)		1016.89	728679.9996	1889558.714	Loreto Lane, north of 657
192	30	Concrete	Two	1041.305	729421.1094	1892134.108	SE of Towler Dr/Grayfeather Dr intersection
193	48	Concrete		1048.746	730758.3474	1892499.151	East od 8380 Kennedy Rd
194	24	Concrete		1045.32	730706.5486	1892201.238	8380 Kennedy Rd
195	36	N12		1044.788	730710.7852	1892204.372	8380 Kennedy Rd
196	42	Corrugated Metal		1044.309	730678.6479	1892039.511	8332 Kennedy Rd
197	48	Concrete		1027.196	730511.9738	1891759.306	8316 Kennedy Rd
198	48	Concrete		1043.178	730465.1747	1891651.688	8278 Kennedy Rd
199	30	Corrugated Metal	Two	1041.466	730449.959	1891619.675	8254 Kennedy Rd
200	36	Concrete		1034.165	730427.3548	1891261.278	8216 Kennedy Rd
201	18	Concrete	Three	1046.189	730467.5997	1891161.352	8200 Kennedy Rd
202	36	Concrete	Plus (3) 24 inch N12 and (1) 12 inch N12	1048.208	730581.9762	1890908.391	8176 Kennedy Rd
203	144	Concrete (headwall)		1044.786	730538.545	1890831.805	8160 Kennedy Rd
204	36	Concrete	Plus Two 12 inch Concrete	1040.44	730475.7533	1890745.267	8136 Kennedy Rd
205	48	N12		1045.86	730459.2017	1890532.71	8110 Kennedy Rd
206	72	Concrete (headwall)		1032.541	730376.4253	1890354.205	8084 Kennedy Rd

207	96	Concrete (headwall)		1029.09	730095.3256	1890003.725	Cedar Run Dr south of 857
208	60	Concrete		1024.276	729877.5492	1889695.989	8021 Kennedy Rd
209	144	Concrete (headwall)		1008.595	729154.1298	1888500.2	Creekstone Lane, just east of 8233
210	144	Concrete (headwall)		1004.358	728680.0224	1888211.257	Crete Lane, just east of 8184
211	144	Concrete (headwall)		1006.206	729191.1551	1887946.143	8174 Creekston Lane
212	42	Corrugated Metal		1003.231	729418.2104	1887926.227	860 N. Jefferson Chase Way, SE portion
213	48	Concrete		1009.931	730480.4919	1888070.076	South of Kennedy Rd, west of Preble Dr
214	48	Concrete		1001.112	728751.6735	1887986.898	8160 Crete Lane
215	144	Concrete (headwall)		1004.178	728704.3437	1887996.449	8160 Crete Lane
216	240	Concrete		940.477	732132.9174	1882066.368	1414 Reynoldsburg-New Albany Rd
217	240	Concrete		923.983	730606.1472	1882164.243	Clear Creek Ct east of Reynoldsburg-New Albany Rd
218	240	Concrete (headwall)		918.113	727896.0293	1883044.333	Railroad crossing east of 726 Reynoldsburg-New Albany Rd
219	240	Concrete (headwall)		1089.375	763699.6348	1890376.884	7950 Central College Road
220	48	Wood		1099.762	764549.9056	1892162.1	Aldie Mill Dr (9265 McClellan Dr)
221	24	Corrugated Metal		1103.903	764551.2936	1892350.635	5430 Aldie Mill Dr
222	48	Wood		1116.639	765461.2671	1893382.359	South of 8263 Clouse Road
223	12	Corrugated Metal		1118.4	766585.807	1892761.518	8164 Clouse Road
224	16	Concrete	Two	1110.583	766538.1239	1892102.777	8080 Clouse Road
225	16	Concrete	Two	1106.684	766410.6457	1891932.891	8070 Clouse Road
226	18	Concrete		1107.799	766332.6501	1891852.944	8060 Clouse Road
227	12	Concrete		1103.921	766259.3632	1891428.611	8033 Clouse Road
228	12	Concrete		1101.937	766243.216	1891358.025	8019 Clouse Road
229	12	Metal		1097.469	766176.6663	1891157.234	7989 Clouse Road

230	8	Corrugated Plastic		1105.24	765938.0254	1891353.11	8001 Clouse Road
231	60	Wood		1098.116	765759.1374	1890897.558	10696 Johnstown Road
232	70	Wood		978.714	729522.0092	1885311.904	877 Wengert Rd
233	70	Wood		988.324	729622.7255	1885557.672	877 Wengert Rd
234	8	PVC		989.592	729649.6588	1885715.307	877 Wengert Rd
235	60	Concrete	15 Inch Concrete In Crossover	930.382	721902.4444	1884982.632	134 Kingsmeadow Ln
236	48	Wood	Deck to House	938.472	722204.9171	1884933.718	7204 East Broad Street
237	60	Concrete (headwall)	Two	936.114	719755.1338	1886139.796	7780 Rodebaugh Rd
238	144	Metal		925.369	719758.2926	1885825.822	7780 Rodebaugh Rd
239	36	Wood		939.39	719819.869	1885546.879	7780 Rodebaugh Rd
240	36	Concrete (headwall)		925.072	718904.2039	1885270.326	7655 Rodebaugh Rd
241	36	Corrugated Metal		936.188	718997.0136	1885617.19	555 Waggoner Rd
242	30	Concrete		943.233	719023.3975	1886142.385	555 Waggoner Rd
243	48	Corrugated Metal		918.508	717412.5218	1885888.203	00700 Waggoner Rd
244	24	Concrete		951.359	716315.5654	1887015.446	7841 Priestley Dr
245	240	Metal		842.944	706726.8681	1884787.296	2067 Stonehill Dr
246	240	Metal		845.357	706301.2427	1884797.656	2067 Stonehill Dr
247	240	Metal		839.643	705937.5486	1884915.952	2067 Stonehill Dr
248	24	Corrugated Metal		874.206	704228.3288	1884641.472	Blacklick Woods Metro Park Fairfield County
249	12	Concrete (headwall)		870.734	704043.8718	1883700.407	Blacklick Woods Metro Park Fairfield County
250	240	Concrete		782.374	698827.6509	1874787.911	Cityof Columbus Intersects Refugee Rd
251	240	Concrete		774.028	697754.8901	1875074.153	3121 Brice Rd
252	240	Concrete		774.755	696901.3444	1874944.936	Chatterton Rd, west of Brice Rd
253	240	Concrete		783.201	701658.9165	1875132.201	5800 Chantry Dr Meijer Realty Group
254	30	Concrete		970.669	729369.3731	1884782.606	831 Wengert Rd
255	36	Concrete		958.367	729322.926	1884507.719	831 Wengert Rd

256	96	Concrete (headwall)		992.575	723484.1499	1887879.63	8050 E Broad Street
257	144	Concrete (headwall)		999.056	723510.4288	1888192.613	8050 E Broad Street
258	144	Concrete (headwall)		1004.961	723623.0214	1888951.252	200 E Broad Street
259	180	Concrete (headwall)		1016.98	724827.5401	1890146.519	Northern portion of 8156 Wyncrest
260	72	Wood		1034.305	725315.429	1891232.169	E. Broad St, northern portion, west of 8372
261	48	Concrete		1024.438	725293.8804	1891583.799	8372 E. Broad St
262	24	N12		996.318	723664.7919	1888310.737	Cft Developments LLC E Broad Street
263	48	Concrete		1027.03	741527.5107	1885987.748	8263 Kesegs Way
264	48	Concrete		1027.356	741366.0476	1885718.053	8263 Kesegs Way
265	56	Wood		1026.48	741166.1874	1885438.493	2858 Colts Neck Rd
266	21	Concrete		1012.952	739787.1794	1885214.193	NE quadrant of Cob Tail Way & Creek Hollow Rd
267	21	Concrete		1013.442	739726.9935	1884986.739	2229 Cob Tail Way
268	24	Concrete		995.674	740330.8192	1883553.428	2576 Colts Neck Rd
269	12	Concrete	Start	996.176	740461.7374	1883275.374	2542 Colts Neck Rd
270	12	Concrete	From Pond	991.423	739612.4474	1882102.601	East side of Colts Neck Rd, north of Havens Rd
271	24	Concrete		993.399	739891.2291	1882257.424	East side of Colts Neck Rd, north of Havens Rd
272	24	Concrete	Road Drainage	1012.401	741484.5326	1885084.021	West side of Colts Neck Rd, south of Swisher Creek Dr
273	15	Concrete (headwall)		1035.146	741625.5338	1886780.604	4055 Waggoner Rd
274	40	Concrete		1039.775	741544.5454	1887784.125	3995 Waggoner Rd
275	12	Concrete	Road Drainage	1042.33	741879.2664	1887845.805	4055 Waggoner Rd
276	12	Concrete		1055.253	739219.225	1890005.584	7910 Havens Rd
277	12	N12		1052.933	739137.7082	1889698.984	7860 Havens Rd
278	240	Metal		773.078	694531.3911	1879537.426	6991 Long Rd
279	240	Metal		768.113	693190.034	1877342.519	City of Columbus intersects Gender Rd
280	240	Metal		763.724	693738.7214	1876343.513	Bd of Pk Commons of the Cols

281	240	Metal		797.065	694100.3567	1874981.821	3701 Brice Rd
282	240	Concrete		742.486	688817.9116	1866423.129	4901 Ebright Rd intersects Winchester
283	240	Concrete	Two	741.266	686554.3102	1863225.263	City of Columbus Oh S Hamilton Rd
284	240	Metal		808.785	696281.8556	1881713.616	City ofColumbus Intersects Refugee Rd
285	240	Concrete		798.223	696357.7179	1881722.673	City of Columbus Intersects Refugee Rd
286	240	Concrete		755.622	682726.6095	1860578.534	Hamilton Rd, SW of 4581 Homer Ohio Ln
287	24	Clay		982.359	728124.506	1885011.146	Railroad at 7750 Coppershell St
288	240	Metal		926.178	726766.9641	1882048.086	600 Reynoldsburg-New Albany Rd drive, east of Dale Dr
289	240	Concrete		912.954	725586.8402	1881452.5	Blacklick Ridge Blvd, west of 520
290	24	Concrete		902.048	725106.5937	1881569.799	SW of 520 Blacklick Ridge Blvd
291	36	Concrete (headwall)		1125.981	773378.0891	1895208.494	8001 Tippet Road
292	96	Metal		1118.433	773850.9877	1894110.763	8001 Tippet Road
293	88	Metal		1109.902	772922.2161	1893681.508	8001 Tippet Road
294	48	Concrete (headwall)		1093.264	761889.4821	1892889.313	Abercromie & Fitch Central College Road, north of Evans Rd cul-de-sac
295	48	Corrugated Metal		1090.397	761753.2351	1892557.26	Abercromie & Fitch Central College Road, west of Evans Rd cul-de-sac
296	48	Concrete (headwall)		1118.854	762573.6368	1892957.15	6446 Evans Rd
297	40	Concrete		1102.359	763449.4801	1894045.627	West of 8383 Central College Road
298	204	Concrete (headwall)		1109.265	763468.0468	1894124.341	West of 8383 Central College Road
299	240	Metal		901.069	722424.8109	1880961.555	170 Heather bridge ln
300	240	Metal		892.421	722100.6788	1880595.747	7141 East Broad Street
301	12	Corrugated Metal		889.664	721978.1085	1880802.547	7141 East Broad Street
302	36	Concrete		885.491	722198.1718	1880224.052	Gilligan Oil Co New Albany Rd
303	240	Metal		890.941	721776.134	1879729.732	6819 East Broad Street Intersects blacklick
304	240	Metal		881.342	721550.0983	1877950.792	60 Rosehill Rd

305	240	Metal		882.152	721880.8129	1877728.504	655 Rosebrook Ln
306	96	Concrete	Two	875.254	722731.9328	1877231.929	South of Brice Rd/McCormick Blvd intersection
307	54	Concrete	New construction (functioning?)	888.758	723260.2108	1877047.182	West side of McCormick Blcd, south of Broughton Ave
308	12	Corrugated Metal		900.251	726268.6324	1878588.543	Railroad NW of Shady Rock Ln/Granite Falls Dr
309	48	Corrugated Metal		901.2	726268.0529	1878592.316	Railroad NW of Shady Rock Ln/Granite Falls Dr
310	60	Concrete (headwall)		908.715	726008.4084	1876910.608	Railroad SW of Blatt Blvd/Eastgate Pkwy
311	36	Concrete	Two	907.953	725742.4329	1875759.968	Railroad South of Blatt Blvd
312	36	N12	Two	920.707	727425.2896	1879315.83	Deffenbaugh Ct, east of Easgate Pkwy
313	36	N12	Two	908.323	727374.1802	1878829.278	East of 1600 Eastgate Pkwy
314	15	Concrete		903.015	727392.0214	1878710.779	1600 Eastgate Pkwy
315	36	N12	Two	908.379	726951.6038	1878682.203	1600 Eastgate Pkwy
316	18	N12		895.776	726599.8002	1878320.974	South of Eastgate Pkwy
317	36	N12		898.596	726184.4663	1877181.215	Railroad SW of Blatt Blvd/Eastgate Pkwy
318	36	N12		895.484	726818.1039	1877115.438	Eastgate Pkwy at 1525 Blatt Blvd
319	42	Concrete		899.497	729137.1483	1877243.422	Taylor Rd at 6455
320	30	Concrete		934.821	728817.4772	1879633.547	6695 Taylor Rd
321	48	Concrete		923.1	729173.4972	1878422.855	Taylor Rd at 6580
322	36	Concrete (headwall)		955.293	729629.7934	1878851.716	Hawks Crest Lane, north of Taylor Rd
323	36	Concrete		906.544	722568.7809	1881966.542	7300 East Broad Street
324	10	PVC	Two	898.904	722096.3068	1882167.708	Dominion Homes Inc Reynolds Crossing Dr
325	10	PVC	Two	899.83	721616.9944	1882124.337	Shallotte Dr, SE of 121
326	8	PVC	Two	887.708	721062.2647	1881183.527	Reynolds Crossing Master Tatum Way
327	24	Concrete		884.658	720826.299	1881008.859	193 Tatum Way
328	24	Wood		909.937	729645.9775	1876760.769	1089 Jackson Hole Dr
329	48	Wood		927.921	730928.657	1876860.501	1221 Jackson Hole Dr
330	18	Concrete		896.217	728330.372	1877248.545	6455 Taylor Rd

331	12	Corrugated Metal		899.605	728794.9513	1877281.53	6455 Taylor Rd
332	24	Concrete		902.272	728911.7073	1877288.266	6455 Taylor Rd
333	12	Concrete		1060.915	742298.1838	1889034.618	McOwen Road, east of Waggoner Rd
334	240	Concrete		967.307	724829.8756	1886764.788	N. Waggoner Rd, north of 121
335	120	Concrete	Two with 15 inch Concrete Under	943.168	723172.5075	1885954.685	7619 Broad Street
336	60	Concrete (headwall)		944.976	722957.7181	1884665.733	7402 e broad street
337	60	Concrete		954.233	722697.5594	1884748.527	7421 East Broad Street
338	24	Wood		939.728	722418.6264	1884866.158	7421 East Broad Street
339	240	Concrete		942.565	719968.943	1886463.34	455 Waggoner Rd
340	48	Wood		945.255	719965.2443	1886565.58	446 WaggonerRd
341	48	Wood		948.903	720015.7666	1886693.073	466 Waggoner Rd
342	36	Concrete (headwall)		951.393	721240.8186	1886596.993	333 S Waggoner Rd
343	36	Concrete		947.119	719053.8728	1886361.279	700 Waggoner Rd
344	24	Corrugated Metal		972.519	718661.0707	1888591.197	700 Waggoner Rd
345	120	Concrete		957.457	718357.0889	1887456.279	700 Waggoner Rd
346	24	Wood		944.267	718213.618	1886509.4	734 Waggoner Rd
347	15	Concrete		949.931	718291.4546	1886485.241	730 Waggoner Rd
348	48	Concrete (headwall)	Two	921.908	717828.0966	1886164.222	Waggoner Rd at 733
349	30	Concrete (headwall)		926.666	716392.2287	1886051.504	7727 Priestly Dr
350	36	Concrete (headwall)		921.057	716302.7905	1885960.205	849 Waggoner Rd
351	240	Concrete		782.105	701137.0643	1875070.785	5800 Chantry Dr
352	240	Concrete		780.941	700831.7052	1875043.955	5865 Chantry Dr intersects Chantry
353	240	Concrete		780.628	699949.3313	1874917.081	5865 Chantry Dr
354	240	Concrete		780.111	699449.672	1874872.103	Weber Randall Brice Rd
355	240	Concrete		781.407	702235.3447	1875225.098	5800 Chantry Dr Meijer Realty Group
356	240	Concrete		786.889	702284.7195	1875342.122	5970 Scarborough Bl
357	240	Concrete		785.067	703257.703	1875435.142	5930 Scarborough Bl Swami Hariprasad

							Inc
358	240	Concrete		786.094	704017.0886	1874807.174	5890 Scarborough Bl Nnn Retail Magic Mtn
359	168	Concrete (headwall)		785.209	700055.4108	1875324.648	5855 Chantry Dr
360	120	Concrete		783.91	700166.9336	1876487.628	2995 Gender Road intersects gener rd
361	216	Corrugated Metal		784.789	700341.1355	1877552.61	6572 Centennial Dr
362	216	Corrugated Metal		780.888	700166.4119	1878477.443	2985 Deepwood Dr
363	240	Metal		794.789	699637.852	1878965.153	3075 Arrowsmith Dr
364	240	Metal		793.301	699576.221	1879497.939	3075 Arrowsmith Dr
365	192	Concrete (headwall)		794.971	699710.9295	1879859.247	3075 Arrowsmith Dr
366	240	Metal		798.125	706783.3401	1874962.389	1875 fountainview ct
367	240	Metal		799.626	706314.737	1874878.151	1875 fountainview ct
368	240	Metal		793.919	705809.0471	1874770	6044 Lake club Square
369	240	Concrete		790.443	705585.5827	1874693.113	2005 Olde Noe Bixby Rd
370	180	Wood		797.644	705242.47	1874612.462	6011 W livingston Av
371	180	Wood		793.399	705079.4023	1874597.702	6011 W livingston Av
372	180	Wood		787.675	704914.1359	1874649.719	6011 W livingston Av
373	96	Concrete		782.128	704436.3664	1874860.626	5810 Chatford Drice Intersects Chatford Dr
374	240	Concrete	Two	781.767	704307.2464	1874858.396	Intersects Brice to I70E
375	84	Concrete		787.401	704898.7641	1875699.269	5083 Myers Rd
376	120	Metal		800.58	705262.1154	1876512.446	East of Brice Rd, west of Birchview Dr. S.
377	120	Metal		797.701	705526.1421	1876506.428	East of Brice Rd, west of Birchview Dr. S.
378	48	Wood		971	719622.6641	1888021.946	8086 Bellow Park Dr
379	72	Concrete (headwall)		983.446	719776.7479	1888243.43	8118 Bellow Park Dr
380	60	Concrete (headwall)		970.022	719176.0964	1887547.303	7998 Bellow Park Dr
381	60	Concrete (headwall)		995.155	719169.6777	1889777.612	8357 Rodebaugh Rd

382	48	Wood		996.383	719503.7559	1890117.64	8340 Rodebaugh Rd
383	48	Wood		998.469	719529.5215	1890167.711	8340 Rodebaugh Rd
384	48	Wood		1002.7	719525.8682	1890469.418	8340 Rodebaugh Rd
385	54	Concrete (headwall)		1007.371	719531.2442	1891218.164	8340 Rodebaugh Rd
386	24	Corrugated Metal		1013.797	720002.4685	1891992.68	8340 Rodebaugh Rd
387	36	N12		1001.255	721112.3181	1889655.923	340S Waggoner Rd
388	240	Corrugated Metal	Twenty-Four Feet	960.209	720868.4893	1888108.059	340 S Waggoner Rd
389	144	Concrete		903.091	713497.4598	1887272.798	290 E Estates Ln
390	240	Metal		940.98	714655.165	1887899.043	1110 Waggoner Dr
391	240	Metal		944.057	715235.7449	1888392.195	1110 Waggoner Dr
392	96	Concrete		956.969	715569.8661	1889003.464	8075 Priestley Dr
393	120	Concrete (headwall)		978.502	722926.7209	1886841.987	137 Waggoner Rd
394	36	Corrugated Metal		971.967	722802.1303	1886751.159	137 Waggoner Rd
395	240	Concrete		876.694	712662.9377	1885951.715	140 Waggoner Rd
396	18	PVC		889.988	714434.0289	1885447.301	W beavercreek blvd E hillridge rd
397	240	Metal		886.998	714902.1889	1885046.577	1051 Waggoner Rd
398	12	N12		918.488	715447.2288	1885427.855	917 Waggoner Rd
399	48	Concrete (headwall)		902.563	715489.5005	1886029.471	Intersects 999 Waggoner Rd
400	24	N12		908.771	715541.1995	1886144.208	970 Waggoner Rd
401	30	Concrete (headwall)		909.83	715594.9188	1886270.656	7793 Jordan Crossing
402	60	Concrete (headwall)		927.961	715646.2529	1886775.256	7807 Jordan Crossing
403	48	Wood		935.962	715789.7591	1887204.753	7828 Jordan Crossing
404	12	Concrete (headwall)		946.505	715836.0964	1887392.567	7899 Jordan Crossing
405	36	Concrete		956.194	716001.648	1887697.363	7910 Priestley Dr
406	48	Wood		962.371	715994.5675	1887737.986	7910 Priestley Dr
407	24	Wood		974.549	715980.6852	1887798.934	7910 Priestley Dr

408	48	Wood		960.83	715989.7081	1887945.726	7971 Windrift Place
409	30	Corrugated Metal		965.458	716029.9101	1888145.268	7975 Windrift Place
410	48	Concrete		870.192	719211.9351	1879876.144	City of Reynoldsburg N of Daughtery Dr
411	36	Concrete		866.897	718038.4585	1879492.227	City of Reynoldsburg W of Rose hill Rd
412	72	Concrete		858.632	711255.3734	1883473.896	7215 East Main Street
413	12	Concrete		856.747	711408.2792	1883473.203	7215 E main street
414	240	Concrete		852.572	712249.6068	1883225.195	7215 east main street intersects east main
415	240	Concrete	5 PVC Drain Pathway	860.47	708877.8633	1884428.552	Livingston Ave, west of Lancaster Ave
416	48	Concrete (headwall)	Outlet into Blacklick	844.358	708926.4992	1884302.466	Livingston Ave, west of Lancaster Ave
417	240	Concrete	Two 12" Concrete Under Bridge	881.567	718233.8433	1882645.891	intersects 7270 rodebaugh rd
418	240	Concrete		878.976	717555.8652	1882015.498	intersects 640 Lancaster Ave
419	240	Concrete		877.999	717315.8721	1881662.5	735 Marlan Ave
420	240	Metal		866.521	712605.8359	1884319.168	7408 E Main Street
421	240	Concrete	Four 12" Under Bridge	855.967	712519.7933	1883655.426	North of E Main steet intersects lancaster ave
422	48	Wood		912.718	719709.7601	1884660.393	315 Fallriver Dr
423	48	Wood		927.982	719971.0606	1884642.007	319 Fallriver Dr
424	48	Wood		924.328	720410.3674	1884885.386	7609 Asden Ct
425	240	Concrete	Four 6" PVC Under Bridge	909.707	718826.1065	1884689.352	Crystal Lake Homeowners Fallriver Dr
426	240	Concrete		914.844	718687.4574	1884604.724	7539 Rodebaugh Rd
427	72	Concrete		1057.801	759477.561	1888586.135	5818 Kitzmiller Rd
428	84	Wood		1064.418	759562.9772	1888605.075	5818 Kitzmiller Rd
429	120	Wood		1051.622	759757.7584	1888649.477	5824 Kitzmiller Rd
430	67	Wood		1065.082	760025.7691	1888721.245	5824 Kitzmiller Rd
431	126	Concrete		1067.557	760226.1838	1888747.668	Kitzmiller Rd, NE of Plainview Dr
432	48	Wood		1069.78	760473.7658	1888487.59	5762 Plainview Dr
433	60	Wood		1071.542	760907.8437	1888452.483	5798 Plainview Dr
434	24	N12		1076.382	761464.1558	1888521.129	NE of Plainview Dr cul-de-sac
435	24	Concrete		1077.016	760159.8737	1889884.17	5840 Kitzmiller Rd
436	24	Concrete		1077.506	760057.1368	1889794.8	5824 Kitzmiller Rd

437	240	Concrete		1063.847	759463.3704	1889109.371	Smiths Mill Rd, NE of 7696 Dublin-Granville Rd, Just east of Kitzmiller Rd
438	240	Corrugated Metal		852.952	709045.009	1885075.217	Lancaster Ave
439	240	Concrete		861.059	709118.5104	1885443.071	1793 Graham Rd
440	24	Concrete		876.225	709687.8007	1885915.099	7366 Cherry Brook Dr
441	48	Wood		881.261	709945.8044	1885959.861	1712 Graham Rd
442	240	Metal		876.44	709204.5308	1887620.149	East of Drugan Ct S of Palmer Road
443	240	Concrete		889.801	709348.3367	1887910.095	7840 Grandley Ct
444	32	Concrete (headwall)		890.787	709541.4765	1888000.839	7866 Palmer Rd
445	48	Wood		920.179	710315.4259	1888016.737	7838 Palmer Rd
446	30	Concrete (headwall)		924.472	710404.2277	1888068.099	Palmer Rd inersects Court
447	48	Metal		913.793	710534.0694	1888040.09	7862 Country Brook Ln
448	120	Corrugated Metal	Headwall	901.286	709762.6384	1888770.933	7846 Palmer Rd
449	36	Concrete		747.179	686149.3656	1869925.468	5480 Winchester
450	24	Concrete		749.495	686766.1374	1870738.226	5701 Shannon Rd
451	18	Metal	Two	752.5	687193.1109	1871126.655	5701 Shannon Rd
452	24	CMT (Headwall)		757.896	688118.8396	1871824.778	5701 Shannon Rd
453	240	Concrete		753.56	685823.368	1869764.173	Bachman Farm Ltd 5600 Winchester
454	120	Concrete		747.107	684290.0432	1867920.998	Lee Smith Farms Ltd 5100 Ebright Rd
455	48	Concrete		744.261	683440.6647	1867271.901	Abl Group LMD Ebright Rd N Columbus Lanchaster
456	240	Concrete		748.634	683207.824	1867197.879	Abl Group LMD Ebright Rd N Columbus Lanchaster
457	240	Concrete		743.731	682257.554	1866023.137	Ebright Rd S of Bixford Av N of Blair Av
458	36	N12	Two	730.99	681796.7973	1861238.06	Village of Groveport N of Old Bixby Rd
459	144	Concrete (headwall)		735.142	681796.5367	1861842.705	Village of Groveport N of Old Bixby Rd
460	60	Concrete (headwall)		733.029	681302.9241	1862552.854	Village of Groveport E of Old Bixby Rd N of Bixby Rd
461	24	N12		727.691	680908.5336	1862882.734	Villiage of Groveport N of Bixby NW of Davenport Rd

462	48	Corrugated Metal	Two	755.498	681016.0779	1863159.995	4870 Bixby Rd
463	22	Concrete (headwall)		738.661	681321.2419	1863898.341	Bank Streek Partners Scott Dr N of Bixby Rd
464	48	Concrete (headwall)	Two	737.674	681663.4379	1864362.71	Bank Streek Partners Scott Dr N of Bixby Rd
465	120	Concrete		739.949	681813.3866	1864353.747	Bank Streek Partners E of Scott Dr W of Bixby
466	240	Metal		739.554	682201.7875	1864755.081	5048 Bixby Rd
467	240	Concrete		739.408	682070.5409	1864692.719	5048 Bixby Rd
468	54	Concrete		737.176	683424.9355	1863367.615	5031 Birch Grove Dr
469	120	Concrete (headwall)	Two	782.291	702190.7316	1876598.478	6380 tussing rd Rb-3 Associates
470	120	Concrete (headwall)	Two	788.028	702165.8768	1877086.588	638o tussing rd Rb-3 Associates
471	240	Concrete (headwall)		789.727	702134.3814	1877470.106	6530 Tussing Rd Benderson Randall Tr
472	84	Concrete		792.706	702073.2041	1877927.089	66-6 Tudssing Rd Kobacker co
473	48	Concrete		795.036	702032.4717	1878566.031	6700 Tussing Rd Daifuku USA Inc
474	72	Concrete (headwall)		802.752	701991.7717	1879168.56	6720 Tussing Rd Roby Co
475	240	Concrete (headwall)	Interstate 70	799.907	704093.9493	1877682.163	6301 Cherry blossom Way
476	54	Concrete		874.34	720520.6406	1877943.662	City of Reynoldsburg rosehill Rd
477	60	Concrete		850.475	710604.7901	1883737.208	1615 truro Ave
478	48	Wood		727.292	683467.2728	1858797.59	4465 S. Hamilton Rd, just north of 4200 Bixby Rd
479	240	Wood	Bike Path	729.342	683184.0838	1858465.208	4465 S. Hamilton Rd, just north of 4200 Bixby Rd
480	40	Concrete		869.317	704520.9312	1881333.719	Board of Park East Livingston Av
481	30	Corrugated Metal		858.599	704311.4653	1880510.797	Board of Park East Livingston Av
482	24	Corrugated Metal		856.965	705217.2645	1880284.689	Board of Park East Livingston Av
483	12	Corrugated Metal		865.036	705276.3562	1880284.015	Board of Park East Livingston Av

484	18	Concrete (headwall)		861.16	705406.5117	1880640.625	Board of Park East Livingston Av
485	48	Wood		867.212	704511.1952	1882682.22	Blacklick Woods Metro Park Fairfield County
486	36	Corrugated Metal		850.839	704009.8658	1882944.188	Blacklick Woods Metro Park Fairfield County
487	48	Wood		833.384	705029.0515	1878862.924	Board of Park East Livingston Av
488	48	Concrete (headwall)		849.335	703724.3539	1882922.01	Blacklick Woods Metro Park Fairfield County
489	30	Concrete		1022.706	747775.899	1883349.538	3687 Kitzmiller Rd
490	30	Concrete		1019.243	747313.4622	1883420.212	Kitzmiller Rd at 3752
491	36	Concrete		1101.839	762564.0606	1892667.027	Abercromie & Fitch Central College Road, west of 6446 Evans Rd
492	24	Wood		1099.678	762387.3445	1892489.685	Abercromie & Fitch Central College Road, SW of 6446 Evans Rd
493	24	Metal		1094.321	762358.9805	1892437.728	Abercromie & Fitch Central College Road, SW of 6446 Evans Rd
494	12	Corrugated Metal		1100.934	762400.7172	1892434.744	Abercromie & Fitch Central College Road, SW of 6446 Evans Rd
495	60	Corrugated Metal		1104.665	762242.8131	1892406.879	Abercromie & Fitch Central College Road, SW of 6446 Evans Rd
496	27	Concrete		1101.025	761156.6893	1890264.347	East of 6080 Kizmiller Road
497	240	Concrete		1099.737	761154.4621	1891592.967	Abercromie & Fitch Central College Road, SW of Evans Rd cul-de-sac
498	15	Metal	Two	1103.624	760444.1456	1893550.178	SE of Evans Rd cul-de-sac, North of Smith's Mill Rd
499	48	Wood		1060.339	759189.1509	1888472.928	Abercrombie & Fitch 7696 Dublin-Granville Rd

500	96	Wood		1068.693	759123.6236	1888432.444	Abercrombie & Fitch 7696 Dublin-Granville Rd
501	108	Wood		1064.726	759061.8231	1888649.086	Abercrombie & Fitch 7696 Dublin-Granville Rd
502	240	Concrete	Three Rt. 161 Bridges	1051.388	757926.6869	1888858.253	SR 161, just east of Kitzmiller Rd
503	144	Concrete		1056.995	755576.9619	1889234.581	Golf Club Co., east of Kitzmiller Rd
504	144	Wood		1074.57	756556.4254	1890170.526	Southern portion of 7971 E. Dublin-Granville Rd
505	12	Corrugated Plastic		1085.365	756837.8538	1890756.98	East of 7971 E. Dublin-Granville Rd
506	120	Concrete		1078.816	757403.953	1890587.471	7899 E. Dublin-Granville Rd
507	24	Concrete		1076.846	757426.0049	1890775.526	East of 7971 E. Dublin-Granville Rd
508	144	Concrete		1067.473	757534.2005	1890698.993	7971 E. Dublin-Granville Rd
509	120	Corrugated Metal		1069.485	757620.5559	1890750.105	North of 7971 E. Dublin-Granville Rd
510	120	Concrete		1082.212	755212.5567	1891421.717	Babbitt Rd at 5900
511	12	Concrete	Two	1084.427	755229.1171	1891566.582	5900 Babbitt Rd
512	120	Wood		1089.483	755696.195	1892475.262	5920 Babbitt Rd
513	132	Wood		1097.277	755797.5328	1892852.563	5920 Babbitt Rd
514	36	N12		1102.167	755823.8153	1892902.983	5920 Babbitt Rd
515	132	Wood		1097.98	756003.1134	1893124.481	5920 Babbitt Rd
516	36	Concrete		1094.112	758535.3074	1892435.819	Abercrombie & Fitch South of Smiths Mill Rd near Licking County, west of Fitch Path Rd
517	72	Concrete		1105.819	758918.9298	1893342.136	Abercrombie & Fitch South of Smiths Mill Rd near Licking County, west of Fitch Path Rd
518	72	Concrete		1107.334	758995.7869	1893577.566	Abercrombie & Fitch South of Smiths Mill Rd near Licking County, west of Fitch Path Rd
519	60	Concrete		1112.01	759079.5982	1894181.435	North of Smiths Mill Rd near Licking County, west of Fitch Path Rd

520	24	Concrete		1089.457	759109.8549	1891281.198	Smiths Mill Rd
521	96	Wood		1064.78	754218.7388	1889170.749	Golf Club Co., east of Kitzmiller Rd
522	36	Wood		1062.422	754295.9784	1889118.088	Golf Club Co., east of Kitzmiller Rd
523	108	Wood		1059.355	754286.9452	1888844.069	Golf Club Co., east of Kitzmiller Rd
524	96	Wood		1047.047	754794.3825	1888167.237	Golf Club Co., east of Kitzmiller Rd
525	120	Metal	Box Car	1045.402	754292.2825	1887845.804	Golf Club Co., 4522 Kitzmiller Rd
526	12	Concrete	Three	1046.447	754279.9971	1887720.835	Golf Club Co., 4522 Kitzmiller Rd
527	96	Wood		1039.962	753250.5507	1887627.247	Golf Club Co., 4522 Kitzmiller Rd
528	240	Wood		1040.275	753002.0149	1887601.577	Golf Club Co., 4522 Kitzmiller Rd
529	96	Wood		1048.333	752990.5591	1887799.094	Golf Club Co., 4522 Kitzmiller Rd
530	96	Wood		1046.981	752980.7108	1887820.126	Golf Club Co., 4522 Kitzmiller Rd
531	10	Concrete		1054.815	752985.7363	1887804.812	Golf Club Co., 4522 Kitzmiller Rd
532	18	Corrugated Metal		1058.305	753173.6393	1888022.458	Golf Club Co., 4522 Kitzmiller Rd
533	84	Concrete		1055.634	752788.1512	1888362.584	Golf Club Co., 4522 Kitzmiller Rd
534	24	Metal	Two	1057.098	752353.2156	1888923.579	Golf Club Co., 4522 Kitzmiller Rd
535	10	Concrete		1059.021	752304.2674	1889131.227	Golf Club Co., 4522 Kitzmiller Rd
536	12	Concrete		1060.464	752536.0065	1889278.929	Golf Club Co., 4522 Kitzmiller Rd
537	30	Corrugated Metal		1066.209	751348.5529	1888437.671	Golf Club Co., 4522 Kitzmiller Rd
538	12	Concrete		1052.283	751568.7597	1887511.76	Golf Club Co., 4522 Kitzmiller Rd
539	36	Corrugated Metal	Two\Outlets to Blacklick Creek	1040.545	751801.4245	1887371.77	Golf Club Co., 4522 Kitzmiller Rd
540	96	Wood		1040.779	752757.3989	1887570.016	Golf Club Co., east of Kitzmiller Rd
541	12	N12		751.738	690788.3698	1870230.049	5510 Armaugh St
542	36	N12	To Pond	751.211	689851.6133	1871566.336	5800 Shannon Rd
543	24	Concrete	Submerged	735.381	690756.539	1862221.009	South of 4430 Drycott St
544	48	Concrete (headwall)		739.643	687126.0573	1866449.826	Rennob Inc intersects Ebright Rd
545	108	Concrete (headwall)		743	687142.5778	1866411.764	Rennob Inc intersects Ebright Rd
546	12	Concrete	To Road Drainage	743.268	688153.9027	1866480.461	4901 Ebright Rd
547	12	PVC		757.577	695741.9526	1870777.072	5555 Tinley Park Rd
548	27	Concrete		753.698	695772.8802	1870731.887	5555 Tinley Park Rd
549	24	Concrete		753.307	694794.6684	1870312.24	3691 Arnsby Rd

550	24	N12		752.381	694645.1383	1870321.7	3691 Arnsby Rd
551	12	Concrete	For Road Drainage	779.351	695987.0455	1878871.017	6767 Refuge Rd
552	15	Concrete (headwall)		733.217	686825.0115	1863140.573	City of Columbus Oh N of Columbus - Lancaster
553	40	N12		738.269	687374.2327	1862458.474	City of Columbus Oh N of Columbus - Lancaster
554	36	Concrete		741.515	686867.3865	1866435.662	Rennob Inc Intersects Ebright Rd
555	48	Concrete (headwall)		777.81	696257.7412	1878395.734	6690 Stratford Lakes Blvd
556	240	Concrete	Two	736.317	689008.2955	1864470.221	Winchester CoveLC W of Wincove Dr
557	36	N12	With Riser Pipe On Pond Side	736.667	687225.2706	1865248.574	Rennob Inc West of Ebright Rd
558	18	Concrete		751.573	695617.2635	1871194.255	5555 Tinley Park Rd
559	24	N12		752.334	695178.1436	1871370.899	City of Columbus Deforest Dr
560	48	Corrugated Metal		755.968	694718.8701	1871339.69	City of Columbus Deforest Dr
561	12	N12		752.763	695228.9778	1871836.315	City of Columbus Deforest Dr
562	15	Other		770.971	694633.3359	1881192.752	City of Colmbus S of Refugee Rd
563	36	Concrete (headwall)		840.512	702806.4137	1882666.488	Blacklick Woods Metro Park Fairfield County
564	24	Concrete (headwall)		833.914	701885.2509	1882499.442	Blacklick Woods Metro Park Fairfield County
565	27	Concrete (headwall)		835.194	703115.5196	1882692.152	Blacklick Woods Metro Park Fairfield County
566	48	Concrete (headwall)		845.211	703473.4063	1882908.492	Blacklick Woods Metro Park Fairfield County
567	18	N12	Headwall	773.272	693375.2864	1879739.236	7260 Long Rd
568	240	Concrete		817.244	702646.3494	1886401.087	Blacklick Woods Metro Park Fairfield County
569	60	Concrete (headwall)		783.544	696935.2431	1883037.698	City of Columbus N Refugee Rd E Brook Colony
570	240	Concrete (headwall)		822.616	703790.8171	1885645.828	Blacklick Woods Metro Park Fairfield County
571	240	Metal	Headwall\Wooden Top	811.308	699897.8989	1887672.086	Blacklick Woods Metro Park Fairfield County

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XI. Appendix C: Regulatory Controls

All page number given corresponds to the page numbers of the PDF document and not to the actual codified ordinance or comp plan document.

BRICE –

Limited information

COLUMBUS –

Section 1 of the City of Columbus Stormwater Drainage Manual is the City's regulations for development in the Stream Corridor Protection Zone that includes the 100 year floodway. The complete manual can be found at http://utilities.columbus.gov/DOSD/PDFs/FULL%20SWDM_MARCH_06.pdf.

Section 1

Preservation and Protection

The City has determined that establishing a Stream Corridor Protection Zone along streams is necessary to protect structures from damage caused by natural erosion. Unless otherwise exempt, all development and redevelopment projects that include a portion of the Stream Corridor Protection Zone must minimize alterations of the stream, keep new structures out of the Stream Corridor Protection Zone, and maintain a riparian corridor along the stream to
minimize streambank erosion and to protect stream habitat. Section 1 of the Manual provides stream protection standards for all development and redevelopment projects in the City.

1.1 Stream Protection Policy Statement

With the exception of roadside ditches and approved roadway crossings, all Tier I (those identified on the United States Geologic Survey (USGS) quad maps with solid or blue dashed lines) and Tier II (those not classified as Tier I but having a well-defined bed and bank) streams shall remain open and shall not be enclosed within a storm sewer or other engineered structure. A Stream Corridor Protection Zone shall be established that allows for the natural, lateral
movement of streams and to prevent structures from being impacted by natural streambank erosion. Stream relocation and/or realignment projects are permitted through proper permitting requirements (including, but not limited to, requirements under Section 401 and 404 of the Clean Water Act) and the use of appropriate stream restoration techniques.

Zoning Code

Chapter 3385 of the City zoning resolution addresses regulation of the floodplain. The zoning resolution is administered by the Department of Development, Division of Building Services. **Please note that the following points represent only a small portion of the entire floodplain chapter.** More information is available by consulting the city code online or contacting the floodplain coordinator at 645-0704.

Methods of reducing flood losses (3385.013)

- Restricting or prohibiting uses which are dangerous to health, safety, and property due to flooding, or which result in damaging increases in erosion, in flood heights or in flood water velocity.
- Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage.

- Controlling the alteration of flood plains, watercourse channels, and natural protective barriers, which help accommodate or channel flood waters.
- Controlling the filling, grading, dredging, and other development which may increase flood damage.
- Preventing or regulating the construction of flood barriers which shall unnaturally divert flood waters or which may increase flood hazards in other areas. (Ord. 635-87; Ord. 0230-04 § 10.)

Sample Definitions

"Base flood elevation" means the projected water surface level, measured from mean sea level, at any given point in a base flood. The base flood is a flood having a one (1) percent chance of being equaled or exceeded in any given year. The base flood may also be referred to as the one hundred (100) year flood.

"Floodway" means that portion of the "Special Flood Hazard Area," excluding the "floodway fringe," which is the channel of a river or other watercourse and the adjacent land areas that shall be reserved in order to discharge the "base flood" without cumulatively increasing the water surface elevation by more than one-half (1/2) foot.

"Floodway fringe" means that portion of the "Special Flood Hazard Area," excluding the "floodway," which is subject to inundation by the "base flood" in which development may occur.

Key Provisions of 3385

- No filling is permitted in the floodway.
- Allowable uses in the floodway are very limited with the most common being natural areas, passive recreation, agriculture.
- Filling may be allowed in the floodway fringe only if associated with a grade and fill plan.
- Allowable uses within the floodway fringe are determined by underlying zoning code, but must comply with floodplain regulations and all other city code requirements.
- Development in the floodplain requires elevation to 1.5 feet above the base flood elevation. This can be accomplished through fill or structural means.

ETNA TOWNSHIP –
http://www.groveport.org/
– Etna Township's codified ordinances can be found at: http://www.etnatownship.com/zoning.htm

PG 53 –
Section 818 Flood Plain District (FP)
The purpose of the FP District is to guide development in the flood prone areas of any water course that are consistent with the requirements for the conveyance of flood flows, and to minimize the expense and inconvenience to the individual property owners and the general public through flooding. Uses permitted in this district are generally associated with open space, recreational, and agricultural land uses and shall not hinder the movement of floodwaters.

PG 79 -
Section 916 Flood Plain District (FP)
Permitted uses, dimensional requirements and other regulations of the FP, Flood Plain District;
the following regulations shall apply:
Permitted Uses:
A. Agricultural uses such as general farming, pasture, grazing, outdoor plant nurseries, horticulture, viticulture, forestry, sod farming, and wild crop harvesting.

B. Industrial-commercial uses such as loading areas, parking areas, airport landing strips.
C. Private and public recreational uses such as golf courses, tennis courts, driving ranges, archery ranges, picnic grounds, boat launching ramps, swimming areas, parks, wildlife and natural preserves, hiking and horseback trails.
D. Residential uses limited to lawns, gardens, parking areas, and play areas.
Conditionally Permitted Uses:
After obtaining a valid conditional use permit in accordance with Article 5, and the other provisions of these regulations, the following uses may be conditionally permitted:
A. Circus, carnival, and similar non-permanent, temporary and/or transient use of the flood plain.
B. Target ranges, trap and skeet ranges, and gun clubs.

PG 86 -

Section 1019 Erosion

No erosion, by either wind or water, shall be permitted which will carry objectionable substances onto neighboring properties.

Section 1020 Water Pollution

Water pollution shall be subject to the requirements and regulations established by the Director of the Ohio Environmental Protection Agency.

PG 88 -

Section 1027 SURFACE DRAINAGE All grading shall be done in such a way as to not impede, increase or alter the natural flow of drainage on adjacent properties. Resolution 04-04-05-01

PG 118 –

Section 1608 Woodland & Resource Preservation

It shall be required that efforts be made to preserve natural vegetation areas. Consideration shall be given to laying out streets; lots, structures, and parking areas to avoid unnecessary destruction of heavily wooded areas or outstanding tree specimens. It is further required that, whenever possible, heavily wooded areas be designated as park reserves. Certain credits are available for conservation efforts. To be eligible for these credits, the following criteria must be met:

A. Quantity of Woodland. The minimum amount of woodland preserved shall be one-eighth of an acre (5,445 sq. ft.). The woodland canopy shall be contiguous and fifty percent (50%) of the canopy shall be from trees that have an 18" DBH (diameter of trunk at breast height, typically four and one-half (4 ½) feet above ground level) or greater.
B. Location. Any woodland area eligible for credit must be located within one hundred feet (100') of the principal building or an impervious surface that directly serves the principal use on the site and is partially or wholly physically located within a required buffer area.
C. Credit. If the above conditions are met, credit may be granted as follows:
1. Buffer Reduction Bonus. The buffer requirements, specified in this and other related chapters, that are applicable to the site may be reduced or eliminated upon the determination by the Zoning Inspector that the Woodland Preservation area amenities fully compensate for the reduced or eliminated landscape requirements.
2. Parking Reduction Bonus. The Etna Township Zoning Commission may approve a reduction of up to ten percent (10%) of the required number of parking spaces if adequate parking will remain on the subject site and if land area for required number of spaces remains available for future development on the subject site.

3. Intensity Reduction Bonus. The Etna Township Zoning Commission may approve an increase in the intensity of up to ten percent (10%) of the district limits for any use permissible as a PUD.
4. Square Footage Increase Bonus. The Etna Township Zoning Commission may approve an increase in square footage in excess of established requirements of up to ten percent (10%) of the district restrictions (GB1 and GB2 only). All other requirements and restrictions shall be calculated from the actual square footage (i.e. parking spaces, loading spaces, etc).

GAHANNA -
Gahanna's zoning code - http://www.conwaygreene.com/gahanna.htm Complete to July 31, 2007

GROVEPORT –
– http://www.groveport.org/
- Groveport's codified ordinances can be found at:
http://www.conwaygreene.com/Groveport/lpext.dll?f=templates&fn=main-h.htm&2.0
- Groveport's comp plan can be found at
http://www.groveport.org/sections/development/Comprehensive%20Plan%202004.pdf
- Groveport's Stormwater management info can be found at
http://www.groveport.org/sections/development/Stormwater%20Management.pdf

Overview

According to Groveport's Comp plan there are an abundance of natural features including streams, wetlands, and woodlands that make an important contribution to the quality of life in the Village of Groveport. Retention of these natural resources is of primary importance to many residents. However no strategies of action were found to back this up.
(Grove port Comp Plan Pg 17)

The future land use plan map shows buffer along the river. However, there is no policy that goes along with this suggestion. (FIGURE 9 – Future Land Use Plan, Comp plan Pg 32)

HARLEM TOWNSHIP –
http://www.harlemtwp.com/
(Harlem's Twp Comp Plan can be found at
(http://www.dcrpc.org/compplan/document/HarlemCompPlan_Dec_07.pdf)
(Harlem's Zoning Code can be found at http://www.dcrpc.org/zoning/zoningcode/HarlemTwpZonCode.PDF)
(Delaware County's sub-division regulations: http://www.dcrpc.org/files/2007SubdivisionRegulations.pdf)
(Delaware county's floodplain regulation:
http://www.delawareohio.net/departments/Building/Floodplain%20Regulations%20and%20Requirements)

Harlem's Twp Comp Plan
Overall Harlem Township Comp plan is progressive in its recommendations in its comp plan. However, one of the stressed Ideas is that nothing should be built within the boundary of the 100 year floodplain. There is no evidence of recommended riparian setback to prevent pollution. However, in its zoning code Harlem allows its lower density developments such as agriculture and low density residential to be "used specifically for watershed protections, conservation of soil or water or for flood control." (Zoning code Pg. 35, 47)

Watershed Impact Summary
Harlem's comp plan is one that recognizes the overall importance of natural resources. This plan has multiple GIS maps and information to identify and locate important assets. A broad array of strategies have been

identified and recommended. Many of these strategies are beneficial to a watershed management plan. Some of recommendations and quotes are:

- Using FEMA's benefits Harlem Twp's Comp Plan promotes undisturbed floodplains. This summary explains that benefits of this is: Natural flood and erosion control, Water Quality Maintenance, Groundwater Recharge, Biological Resources, Fish and Wildlife habitats, Societal Resources, Recreation, Scientific Study/Outdoor Education. (Pg 44 Harlem Twp Comp Plan)
- "For all these reasons, the 100-year floodplains and riparian zones of streams in Harlem Township should be protected." (Pg 52 Harlem Twp Comp Plan)
- The combined Critical Resources map displays generalized floodplains, water, wetlands, prime agricultural soils and 100-foot suggested setbacks from major watercourses. (Pg 44 Harlem Twp Comp Plan)
- Mining operations should not be permitted within the 100-year floodway, and should only be permitted within the 100-year floodplain with strict environmental controls to prevent water pollution, flotation of equipment and other related hazards.

Harlem's comp plan also integrates progressive thinking when it comes to development opportunities and threats. In summary Harlem Township is open to cluster development, planned unit developments, planned residential development, and traditional neighborhood design. (Pg. 107-114)

Harlem's comp plan also identifies threats to growth that could have adverse effects on watersheds as well. In summary many of these threats include being cautious in using alternative sewer systems, allowing more than one unit per acre in area desiring farm preservation, and being cautious when allowing individual treatment plants.

Under open space and the Open Space and Recreation (Ch. 12) greenways are mentioned:
An inexpensive way to provide undeveloped open space is to assure the linkage of neighborhoods by greenways, or corridors of natural landscaped paths, and trails. These can be placed easily along drainage ways creeks, sewer easements and portions of the land that cannot be otherwise developed. These paths can maintain undisturbed wildlife habitat, or create new habitat through plantings and creative use of storm water retention and detention facilities. These areas of development area often afterthoughts in the design and planning process. They should be view as opportunities to improve the value of the development and link developments. (Harlem Twp Comp Plan Page 99)

Excerpts from Harlem's zoning code

Harlem's zoning can be found at: http://www.dcrpc.org/zoning/zoningcode/HarlemTwpZonCode.PDF

PG 114 –

If any driveway crosses a drainage swale, stream or ditch the same should be bridged by pipe or such structure as required to permit the unobstructed passage of all surface water generated by a five-year storm. Any pipe should be of sufficient length to extend not less than three (3) feet beyond the two of the slope of the fill over said pipe unless a properly designed headwall is installed to protect the end of such pipe. Any bridge or structure spanning a stream or ditch should be designed with HS 15 loading by a Professional Engineer. No bridge should be less than twelve (12) feet in width. If the driveway serves a commercial or industrial use, the bridge should be not less than eighteen (18) feet in width.

PG – 109-110 Section 21.09 - FLOOD PLAIN REGULATION:

Certain limited areas of the Township lie within 100 year flood plain. Inundates of those area during periods of high water can impose great loss of property value unless controls are imposed to ensure that land use within

those areas consider such risks and minimize the impact of such flooding. In an effort to control such uses, in the best interest of the township, the following regulations shall be imposed.

a) The Delaware County Building Department shall maintain on file for public examination current maps, delineating the boundaries within the township of all lands designated "flood way". In the event a property owner contests the boundaries of such flood way, he shall be given reasonable opportunity to present technical evidence to support his position.
b) Open space uses shall be permitted within the flood plain to the extent that they are permitted within the zoning district controlling use of said land and provided they do not require structures, fill or storage of material or equipment.
c) No new structure shall be permitted within the one hundred (100) year flood way, and no use shall be permitted within the flood way which will adversely affect the efficiency or which will unduly restrict the capacity of the channel or floodway of any tributary to the main stream, drainage ditch or other drainage facility or system.
d) No fill shall be deposited within the flood plain without permission from the Board of Zoning Appeals. Showing must be made that such fill is for some beneficial purpose and will be protected against erosion by rip-rap, vegetation cover or bulk heading. No dredging shall be permitted of the channel or flood-way unless the applicant provides evidence to the Board of Zoning Appeals that all State and Federal permits are issued as required by law.

JEFFERSON TOWNSHIP–
http://www.jeffersontownship.org/index.aspx
Land use Map
http://www.jeffersontownship.org/Departments/Zoning/docs/comp%20plan%208x11%20nov06.pdf
Zoning Map http://www.jeffersontownship.org/Departments/Zoning/docs/zoning%208x11%20nov06.pdf
Zoning Document –
http://www.jeffersontownship.org/Departments/Zoning/docs/ConservationDevelopmentZoningCategory.pdf

PG -7-10 of Document
F. Natural Resource Protection.
Floodplains, steep slopes, mature and young forests, wetlands, and drainage ways shall be protected as required in this Part. The following are findings of fact:
1) Wetlands.
(a) Determination.
Wetland areas shall be determined by reference to the following sources in the order indicated below. If the first source is considered inaccurate or inappropriate, the succeeding techniques may be used:
i. Wetland inventory maps prepared by Franklin County.
ii. Field survey of plant material by a botanist.
iii. Soil borings provided by a registered soil engineer or soils scientist.
(b) Protection Levels.
One hundred (100) percent of all wetland areas shall be protected except as follows:
i. Where disturbance of filling is essential to provide access to the buildable portions of the property, if no other alternative is feasible.
ii. Where required to provide access to a water-related use.
iii. Where a crossing of the wetland is essential to the establishment of a permitted use provided that a Conditional Use Permit is obtained; and also provided that:
a) The street cannot, as a practical matter, be located outside a wetland; and
b) The street is designed and constructed to minimize the adverse
impact upon the natural functions of the wetland and meets the following standards:

1) The street shall be designed and constructed for the minimum cross-section practical to serve the intended use;
2) Street construction activities are to be carried out in the immediate area of the road bed only; and
3) Any filling, flooding, draining, dredging, ditching, tiling, or excavating that is to be done must be necessary for the construction or maintenance of the street.

(c) Disruption and/or Modification.

All development proposals which will disrupt the wetlands shall, in addition to the provisions of this Ordinance, provide proof of approval by the U.S. Army Corp of Engineers.

2) Drainage ways.

(a) Determination.

Drainage ways are determined as follows:
i. The land, except where areas are designated as floodplain, on either side of and within fifty (50) feet of the center line of any intermittent or perennial stream shown on the U.S. Geological Survey's 7 ½ minute quadrangle sheets covering Franklin County.
ii. The land, except where areas are designated as floodplain, on either side of and within twenty-five (25) feet of the centerline of any swale identified by topography and hydrologic analysis as serving as the principal stormwater outfall rather than tributary for, at a minimum, the sub-basin of a sub-watershed area.
iii. The land included within the following soil classes as mapped in the soil maps provided by the U.S. Department of Agriculture as published in Soil Survey of Franklin County Ohio dated February 1980 (or as amended) determined to be flood plain soils.

(b) Protection Levels.

Drainage ways shall be provided with one hundred (100) percent protection levels from all land uses. All such protected areas shall be permanent open space.

3) Floodplains.

(a) Determination.

The definition of floodplain as applied to this section appears in Section VI 6.B of this Zoning Resolution. The one hundred (100) year recurrence interval floodplain and floodways shall be determined by the National Flood Plain Insurance Rate Maps.

(b) Protection Levels.

i. For all developments, the level of protection provided flood lands shall distinguish between the floodway and the one hundred (100) year recurrence interval floodplain boundary (as designated on the Flood Boundary and Floodway Maps or as determined by a required on –site survey). Floodways and one hundred (100) year recurrence interval floodplains shall be provided with one hundred (100) percent protection.
ii. All protected areas shall be retained in permanent open space. No uses or improvements, other than those permitted herein, shall be permitted in any area consisting of floodway or one hundred (100) year recurrence interval floodplain as defined by this Zoning Resolution.
iii. All development shall have the approval of the National Flood Plain Insurance Program Coordinator.

4) Steep Slopes.

(a) Determination.

Steep slopes shall be determined through the use of a topographic survey prepared by and certified by a registered land surveyor at a contour interval of not less than two (2) feet.

(b) Methodology.

Steep slopes shall be measured and graphically indicated on a topographic drawing and submitted with the development plan. Such steep slope drawing shall graphically indicate those steep slope areas of the property pursuant to the "steep slope" definition hereinafter provided.

(c) Definition.

Any slope in any of the following categories shall be considered a steep slope: 8 to16 percent, 17 to 25 percent, and greater than 25 percent. No land area shall be considered a steep slope unless the steep slope area has at least a ten (10) foot vertical drop and a minimum area of five thousand (5,000) square feet. If other slope classes within such a defined area which are too small to qualify by themselves as a steep slope under the two hundred (200) foot provision, then these slope areas shall be combined with slope categories which are less than eight (8) percent.

(d) Protection Levels.

The standard to use determining the open space necessary for preserving steep slopes is an open space ratio of 0.50 for slopes ranging from 12 to 18 percent; 0.70 for slopes ranging from 18 to 25 percent; and 0.85 for slopes greater than 25 percent.

5) Woodlands.

(a) Determination.

The determination of woodland boundaries shall be based on a field tree survey compiled by a registered land surveyor, engineer, landscape architect, or forester.

(b) Methodology.

Woodland areas shall be measured and graphically indicated on either a topographic or property boundary survey and submitted with the development plan. Such woodland area drawing shall graphically indicate those forest areas of the property pursuant to the "Woodland" definition hereinafter provided.

(c) Definition.

Woodland, Mature: An area of mature deciduous trees covering one (1) acre or more and consisting of thirty (30) percent or more largely deciduous canopy trees having a ten (10) inch or greater caliper or any grove of deciduous trees consisting of eight (8) or more trees having an eighteen (18) inch or greater caliper.
Woodland, Young: An area of deciduous or evergreen trees covering one (1) acre or more and consisting of seventy (70) percent or more of canopy trees having a three (3) inch caliper or greater.

(d) Protection Levels.

No less than 50% of the trees within the wooded area in "mature woodlands" shall be preserved. No less than 20% of the trees within the wooded are in "young woodlands" shall be preserved.

JERSEY TOWNSHIP– http://jerseytownship.us/
(Zoning/ Resolution Document - http://jerseytownship.us/forms/resolutionbook.pdf)

Pg 16

Section 5.13 Drainage and Flood Plain Regulations

1. Adequate Drainage Required: No principal building shall be erected, structurally altered, or relocated on land which is not adequately drained at all times nor which is subject to periodic flooding, nor so that the lowest floor level is less than three feet above the highest anticipated seasonal ground water level.

2. Obstruction to Drainage Prohibited: The damming, filling, relocating or otherwise interfering with the natural flow of surface water along any surface water drainage channel or natural water course shall not be permitted except with approval of the Zoning Commission and Board of Township Trustees.

3. Building Restricted Adjacent to Drainage Channels or Watercourses: No building other than a bridge, dam or revetment subject to the aforesaid approval, shall be erected, structurally altered or relocated within 20 feet of the ordinary high water line of such surface water that the lowest floor of said building is less than three feet above the ordinary high ground water line, except with approval of the Zoning Commission and Board of Township Trustees.

PG 18 – (The conservation district section continues to page 19)

C-1, CONSERVATION DISTRICT

Section 7.0 Purpose

The purpose of the Conservation District is to protect the public health and to reduce the financial burdens imposed on the community, its governmental units, and its individuals which may result from improper use of lands having excessively high water tables or are subject to frequent and periodic floods and overflow.

Section 7.1 Uses Permitted in the C-1, Conservation District

1. Any customary agricultural use, forestry.
2. Recreational facilities such as fishing lakes, golf courses, golf driving ranges, and parks.
3. Water conservation works; including water supply works, flood control and watershed protection, fish and game hatcheries and preserves, hydro-electric power installation, etc.
4. Accessory use and buildings.
5. Essential services.

MADISON TOWNSHIP –

Madison Township relies on Franklin County for all zoning services. Zoning regulations dealing with water appear to be limited to floodplain regulations. Franklin County zoning codes may be found at the following site: http://www.franklincountyohio.gov/commissioners/edp/zoning/zoning.cfm

NEW ALBANY –

http://www.villageofnewalbany.org/

(New Albany codified ordinances (zoning and stormwater – http://www.amlegal.com/nxt/gateway.dll/Ohio/newalbany_oh/codifiedordinancesofnewalbanyohio?f=templates$fn=default.htm$3.0$vid=amlegal:newalbany_oh)

(New Albany Land Use Strategy - http://www.villageofnewalbany.org/uploadedFiles/Government/Development/Land%20Use%20Strategy.pdf)

(New Albany Corridor Strategy - http://www.villageofnewalbany.org/uploadedFiles/Government/Development/Corridors%20Strategy.pdf)

CODIFIED ORDINANCES (excerpts)

Part Eleven, Title Three, Chapter 1155 – Flood Plain Overlay

1155.01 Purpose

It is the purpose of this chapter to promote the public health, safety and general welfare and to minimize losses resulting from periodic inundation of flood waters in the Municipality of New Albany by:

(a) Restricting or prohibiting uses which are dangerous to health, safety or property in times of flooding, or cause excessive increases in flood heights or velocities;

(b) Requiring that uses vulnerable to floods be protected from flood damage at time of initial construction;

(c) Controlling the filling, grading, dredging and other development which may increase flood damage; and

(d) Controlling the alteration of nature/flood plains, stream channels, and natural protective barriers which are involved in the accumulation of flood waters.

The code has extensive regulations regarding **stormwater management, runoff control, soil erosion, and sediment pollution** in Part Eleven, Section Seven, Chapters 1181 and 1183.

Part Eleven, Title Nine, Chapter 1187 – Subdivision Regulations
1187.04 Preliminary Plat
(d)(4) Verification that an application, if required, has been submitted to the Ohio Environmental Protection Agency in compliance with Section 401 of the Clean Water Act in which anyone who wishes to discharge dredged or fill material into waters of the United States must obtain a Water Quality Certification Permit from the Ohio Environmental Protection Agency. In the case of an isolated wetland, either a general state or individual state isolated wetland permit must be obtained from the Ohio Environmental Protection Agency (Sections 6111.021 - 6111.024 of House Bill 231).

LAND USE STRATEGY (Excerpts)
"The Land Use Strategy includes
- *2006 Land Use Map Updates*
- *Future Land Use Map*
- *Overall Land Use Policy Strategies*
- *District Development Standards"* (p. 1)

In that strategy, it includes "preserving open space and natural stream corridors" as a goal for residential development (p. 46). The recommendations for office, and research and information developments include the following recommendations: "preserve open spaces and other amenities" (p. 56), "reduce environmental impact" (p. 58), "Employ 'green' site design and building techniques" (p. 56), and "development sites should strive to retain and incorporate existing natural features into overall designs" (p. 63).

CORRIDORS STRATEGY (Excerpts)
This strategy includes a section on "green corridors," which focuses on both streams and roadways. Regarding streams, the strategy document states, "The stream corridor setbacks should be a minimum of 150' per side for a total of no less than a 300' riparian preservation zone. While intended to roughly mirror the stream pattern the riparian corridor width can adjust based on floodplain and stream preservation conditions as long the 300' corridor is maintained." (p. 74)

PATASKALA –
http://www.ci.pataskala.oh.us/
(Pataskala Zoning Code – http://pataskala.icohesion.com/Downloads/I-Zoning.pdf)
(Pataskala Comp Plan http://www.ci.pataskala.oh.us/docs/PataskalaComprehensivePlan_20060918.pdf)

PG 125 –
L. Drainage: The amount and rate of runoff from a developed site shall be no greater after development than it was prior to development. The method used to determine this shall be in accordance with the latest version of "Water Management and Sediment Control for Urbanizing Areas" (Available from the U.S. Soil Conservation Service).
(Ord. 2006-3733. Passed 12-18-06.)

PG 142-153 -

Methods of Reducing Flood Losses. In order to accomplish its purposes, these regulations include methods and provisions for:

(1) Restricting or prohibiting uses which are dangerous to health, safety, and property due to water hazards, or which result in damaging increases in flood heights or velocities;

(2) Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;

(3) Controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;

(4) Controlling filling, grading, dredging, excavating, and other development which may increase flood damage;

(5) Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas. (Ord. 2004-3552. Passed 5-17-04.)

PG 155 -

1257.05 USE AND DEVELOPMENT STANDARDS FOR FLOOD HAZARD REDUCTION.

(a) Use Regulations.

(1) Permitted uses. All uses not otherwise prohibited in this section or any other applicable land use regulation adopted by the City of Pataskala are allowed provided they meet the provisions of these regulations.

(2) Prohibited uses.

A. Private water supply systems in all special flood hazard areas identified by FEMA, permitted under Chapter 3701 of the Ohio Revised Code.

B. Infectious waste treatment facilities in all special flood hazard areas, permitted under Chapter 3734 of the Ohio Revised Code.

(b) Water and Wastewater Systems. The following standards apply to all water supply, sanitary sewerage and waste disposal systems not otherwise regulated by the Ohio Revised Code:

(1) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the systems;

(2) New and replacement sanitary sewerage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters; and,

(3) On-site waste disposal systems shall be located to avoid impairment to or contamination from them during flooding.

(c) Subdivisions and Large Developments.

(1) All subdivision proposals shall be consistent with the need to minimize flood damage and are subject to all applicable standards in these regulations;

(2) All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage;

(3) All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage; and

(4) In all areas of special flood hazard where base flood elevation data are not available, the applicant shall provide a flood elevations for all subdivision proposals and other proposed developments containing at least 50 lots or 5 acres, whichever is less.

(5) The applicant shall meet the requirement to submit technical data to FEMA in Section 1257.04(j)(1)A.4. when a hydrologic and hydraulic analysis is completed that generates base flood elevations as required by subsection (c)(4) hereof.

PG 159 –

(3) Alterations of a watercourse. For the purpose of these regulations, a watercourse is altered when any change occurs within its banks. The extent of the banks shall be established by a field determination of the "bankfull stage." The field determination of "bankfull stage" shall be based on methods presented in Chapter 7 of the USDA Forest Service General Technical Report RM-245, Stream Channel Reference Sites: An Illustrated Guide to Field Technique or other applicable publication available from a Federal, State, or other authoritative source. For all proposed developments that alter a watercourse, the following standards apply:

A. The bankfull flood carrying capacity of the altered or relocated portion of the watercourse shall not be diminished. Prior to the issuance of a floodplain development permit, the applicant must submit a description of the extent to which any watercourse will be altered or relocated as a result of the proposed development, and certification by a registered professional engineer that the bankfull flood carrying capacity of the watercourse will not be diminished.

B. Adjacent communities, the U.S. Army Corps of Engineers, and the Ohio Department of Natural Resources, Division of Water, must be notified prior to any alteration or relocation of a watercourse. Evidence of such notification must be submitted to the Federal Emergency Management Agency.

C. The applicant shall be responsible for providing the necessary maintenance for the altered or relocated portion of said watercourse so that the flood carrying capacity will not be diminished. The Floodplain Administrator may require the permit holder to enter into an agreement with the City of Pataskala specifying the maintenance responsibilities. If an agreement is required, it shall be made a condition of the floodplain development permit.

D. The applicant shall meet the requirements to submit technical data in Section 1257.04(j)(1)A.3. when an alteration of a watercourse results in the relocation or elimination of the special flood hazard area, including the placement of culverts.

(Ord. 2004-3552. Passed 5-17-04.)

PG 187 –

1275.03 REGULATIONS.

I. Preservation of water features. Water features such as drainageways and streams must be left in a natural state unless altered to improve the amenity of the water feature for the development's residents or to improve stormwater drainage. Water features must be in common ownership unless otherwise approved as part of the subdivision review.

PG 195 – 204

1283.01 ENVIRONMENTAL PLAN.

A. Environmental Plan. An environmental plan shall be required to be submitted by the developer; in the case of any Planned Development District (PDD), with the preliminary site design upon request for rezoning the parcel or parcels of land to be developed; in the case of development of a subdivision, with the site design of the preliminary plan. This plan is required so that all environmental concerns are evaluated before a development occurs and to ensure that the natural environment is protected. Each environmental plan shall include, but not be limited to the following:

1. A description of the general nature of the proposed action/development;
2. A description of the existing environmental features on the property including wetlands, ravines, flood plains, streams, lakes, ponds, and steep slopes (areas with an average slope of greater than 35%);
3. A description of the potential environmental impact of the action/development; and
4. A description of the alternatives and other proposed actions to avoid, minimize, and mitigate any potential short-term or long-term impacts on the existing environmental conditions.

B. Impact Statement. An impact statement shall be required to be submitted by the developer with the environmental plan. This statement shall include a statement of the short and long term direct and indirect effects of the proposed development on natural features of the development including, but not limited to soils, geology, surface water, and ground water, vegetation, wetlands, woodlands, wildlife, air, reflected or generated light, noise, historical areas, and visual aesthetics.

C. Mitigation Statement. A mitigation statement may be required by the City if conditions exist that may cause significant adverse environmental impacts as a result of the development. The mitigation statement shall become part of the environmental plan and shall include:
1. A site plan, drawn to scale, showing the location of the natural features that are to be disturbed and to be left undisturbed;
2. A site plan showing the location of the proposed buffer zones and preservation zone that will alleviate the adverse impacts of the development;
3. A statement that addresses the plans for mitigating the adverse environmental impacts and the replacement or restoration of areas that are considered environmentally significant. This statement shall address the type, size, and amount of materials and/or vegetation that shall be used for replacement or restoration;
4. A statement, if applicable, that includes all other means by which the developer plans to address the environmental impacts (e.g., purchase of mitigation acreage for impacted wetlands habitat).

D. The Planning and Zoning Commission shall consider the environmental plan:
1. When considering the zoning request in the case of a requested PDD;
2. During consideration of the preliminary plan in the case of the proposed development of a subdivision.
E. The developer shall provide proof of compliance from the applicable regulatory agency with all other requirements as governed by the Flood Damage Prevention Regulations for the City of Pataskala and the following statutes prior to breaking ground: Section 404 of the Clean Water Act, Section 401 of the Clean Water Act.

1283.02 PRESERVATION ZONES.

A. Description of Preservation Zones. Preservation zones are natural areas that protect both aesthetic appearance and environmental significance including but not limited to, woodlands, wetlands, ravines, flood plains, streams, lakes, ponds and/or steep slopes by providing effective buffers between land uses. Such zones shall be designated on the preliminary site plan. It is the intent of this Code to encourage the use of these preservation zones in all subdivision development. It is further intended that this Code not preclude and/or prevent development, but protect and preserve environmentally significant areas by fostering the use of buffer zones that could be integrated into the development. Preservation zones shall be used in a manner that promotes and protects public safety, convenience, comfort, property, and general welfare of the City.

B. Determination of Preservation Zones. Determination of Preservation Zones shall be designated on the basis of the Environmental Plan and in accordance with the areas identifying groundwater resources, woodlands, and wetlands as identified by Lima Township Comprehensive Plan; and Section 6, Land Capability, of the Pataskala Comprehensive Plan, or the revised City of Pataskala Comprehensive Plan, when adopted. The preservation zones shall be clearly marked on the Comprehensive Plan and/or development site plan, if any and all shall be a guide in determining the areas that are considered as preservation zones. However, this shall not preclude the Planning and Zoning Commission from recommending and/or approving preservation zones in other areas that are considered to be environmentally significant. In determining the preservation zones, the Planning and Zoning Commission shall determine the area(s) identified on the site plan that need to be protected from development and which could serve as a buffer between land uses. No approval shall be given to impact a preservation zone

unless prior written approval from the Planning and Zoning Commission is provided. Clearing a site of trees prior to submitting for zoning review or site plan review shall result in a penalty as identified in 1283.02 F., Violations.

PG 225 –
1287.12 EROSION. Erosion standard. No erosion, by either wind or water, shall be permitted which will carry objectionable substances onto neighboring properties. All requirements as outlined in Chapter 1283, in the Pataskala Subdivision Regulations, and/or all State laws pertaining to erosion control must be adhered to.

PICKERINGTON-
http://www.ci.pickerington.oh.us
Zoning Map – http://www.ci.pickerington.oh.us/sections/business/Pick_Zone_4_24_06.pdf
Stormwater Protection Ordinance –
http://www.ci.pickerington.oh.us/sections/community/2007.Stormwater.Ordinance.pdf

The sections that specifically apply to stream preservation is VI (B) and VI (G).

Pg 9 -
VI(B) – Streams and wetlands subject to protection under Section 404 of the Clean Water Act shall be protected from the impacts of development. Setbacks from streams and wetlands shall be established and regulated to protect structures from flooding and erosion as well as to maintain water quality within the stream and wetland. The stormwater system design shall ensure that the quantity and quality of stormwater flows directed to these stream and wetlands are maintained as previous to development. Constructed wetlands (including bio-retention basins) shall be considered subject to these requirements. Existing wetlands shall not be used for stormwater management or stormwater runoff quality treatment.

Pg 10 –
VI (G) – Guidance on stream corridor protection zones (SCPZ) shall be referenced from the City of Columbus "Stormwater Drainage Manual."

PLAIN TOWNSHIP –
http://plaintownship.org
Zoning Map – http://plaintownship.org/index.php?option=com_content&task=view&id=13&Itemid=39
Zoning Code - (http://plaintownship.org/images/stories/zoning_resolution.pdf

Package sewer plants are an option in many of zoning codes

PG 38-39
Submission of Application and Final Development Plan - The applicant shall submit fifteen (15) copies of the final Development Plan to the Zoning Commission with the application to amend the Zoning District Map. The application shall include documentation demonstrating compliance with the standards of the PRCD District.
b. Location of wetlands (and potential wetlands); the floodway boundary and floodway elevation as delineated by the Federal Emergency Management Agency; rivers and streams and their related river or stream bank; ponds, and water courses.
c. Locations of stream channels, watercourses, wooded areas and buffer areas shall be designated. Existing topography and drainage patters shall also be shown. Natural features to be conserved and natural features to be impacted or altered shall be identified on the Plan.

PG 45 –

301.05.3 General Street Design Criteria. Street alignments should follow natural contours and be designed to conserve natural features. Locations of streets should be planned to avoid excessive stormwater runoff and the need for storm sewers. The area of the project devoted to streets and related pavement should be the minimum necessary to provide adequate and safe movement through the development.

PG 46 –

1. Floodway Protection. All buildings, structures or land within a floodplain (but outside the floodway) shall be used, and buildings or structures hereafter shall b erected, altered, enlarged, repaired or rebuilt, moved, or designed to be used, in whole or in part only for a use listed below if approved in the Development Plan:
a. Agriculture.
b. Public or private parks and outdoor recreational facilities including swimming pools, riding academies, playfields, ball fields, courts, trails, etc…
c. Fencing that allows the passage of water.
d. Off-street parking areas accessory to the above uses provided that such areas are improved with pervious pavement materials, such as pervious asphalt or pervious concrete or combinations of geotextiles with sand, gravel and sod.

2. **Wetlands Protection.** Wetlands that are required by the Army Corp of Engineer or the Ohio EPA to be retained shall be protected by the following:
a. A buffer area having a width not less than 20 feet measured from the edge of the designated wetland. The area within this buffer shall not be disturbed and shall be retained in its natural state.

PG 68 –

304.05.8 **Stormwater Drainage.** Drainage and runoff from the proposed development shall not cause property damage. All drainage Improvements shall be designed in conformance with the requirements of the Franklin County Subdivision Regulations.
b. A minimum building and pavement setback of 35 feet, measured from the edge of the designated wetland.
3. **Conservation of Riparian Zones:**
a. A riparian buffer shall be provided along the entire length and on both sides of a river or perennial stream channel. The buffer area shall have a width not less than 100 feet.
b. Walkways shown on the Development Plan may be permitted to be located within riparian buffers when the Zoning Commission determines that such walkways will not materially impact the riparian buffer

PG 106- 111 –

SECTION 510 FLOODPLAIN REGULATIONS
Very extensive. Please visit the site to review (http://plaintownship.org/images/stories/zoning_resolution.pdf)

REYNOLDSBURG *– http://www.ci.reynoldsburg.oh.us/*
(Reynoldsburg zoning map can be found at
http://www.ci.reynoldsburg.oh.us/resources/10/codes_guidelines_maps/zoning_code.pdf)

As of December 2008 the City of Reynoldsburg is nearing the completion of new zoning ordinances that will establish a Stream Corridor Protection Zone.

Reynoldsburg zoning does have a specific designation for flood plain.: (In February 2009 this ordinance was listed in the table of contents but not to be found in the on-line code.)
Chapter 1192 - F-1 FLOOD PLAIN OVERLAY DISTRICT: Special flood hazard areas in the City have been delineated in a flood insurance study. Periodic inundation of these areas may result in loss of life and property,

health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare. For these and other reasons, the City has established the F-1 Flood Plain Overlay District to provide zoning regulations which will reduce these impacts. The standards and requirements of the F-1 Flood Plain Overlay District shall be in addition to, and may be more restrictive than, those of the special district, residential district, commercial district, or industrial district upon which the F-1 District is an overlay.

TRURO TOWNSHIP – *http://www.trurotwp.org/*
Limited information given and Truro Township does not provide zoning services nor issue building permits. Like Madison Township, Truro Township has the "Only Rain Down The Drain" program (http://www.trurotwp.org/Only%20Rain.htm)

VIOLET TOWNSHIP – *http://www.violet.oh.us/departments/zoning.aspx*
Violet Township Land Use Plan – (pages of interest: 14 (watershed map), 15 (Hydric Soils Map), 16 (Flood Plain and Wetlands Map), 18 (Sewer Service Map)
http://www.violet.oh.us/documents/Violet%20Land%20Use%20Plan633100809311406250.pdf

The sewer service districts for the area of Violet Township in the watershed are county systems:

- Sycamore Creek Service Area
- Tussing Road Service Area

Zoning Code –
http://www.violet.oh.us/documents/ZONING%20CODE%20-%20Ammended%202-27-07633124353109843750.pdf

3G F District - Flood Plain
3G1 Uses Permitted in F District
3G1-01: The F District is defined as that area which may be inundated at times of high water and which, for the purpose of this code, shall be at or below the specified elevations (above mean sea level) in each of the sections or quarter sections listed below and approximately as indicated on the zoning map. Those section numbers which include an "R" shall be understood as lying in the Refugee Tract.

3G1-02: It is mandatory that the limitations of the F District shall supersede those of any other district, which may now or hereafter coincide with the F District.

3G1-03: Permit the erection of shelter houses and other structures intended for recreational uses only. In no case shall any structure intended for human habitation, trade or manufacturing uses be permitted in an F District. (Buildings for agricultural uses are not controlled by this code.)

3G1-04: Subject to Conditional Zoning Certificate, which may be granted by the Board of Zoning appeals, accessory facilities, such as pump houses and sewage treatment plants, may be erected within the F District on the condition that engineering requirements dictate such a location.
3G1-05: Any area, now included in the F District, which may be raised above the specified elevations by means of land fill may then be exempted from the F District limitations by means of a variance granted by the Board of Zoning Appeals.

3G1-06: These and no other uses shall be permitted.

3G2 Regulations Pertaining to Buildings and Land Uses in F District
3G2-01: No building or projection thereof, nor any other structure, nor any advertising sign shall be erected closer than eighty-five (85) feet to the center line of any public right-of-way, or in any case no closer than fifty (50) feet to the road side line, nor closer than fifty (50) feet to an F District boundary line.

3G2-02: No set back from district boundaries shall be required where this district's boundaries adjoin the boundaries of a commercial or manufacturing district, a railroad right-of-way, or a limited access highway, except as otherwise restricted by law.

3G2-03: All property within flood hazard areas are subject to the provisions and regulations of the Special Purpose Flood Damage Prevention Regulations for Fairfield County, the Fairfield County Regional Planning Commission, and the Federal Emergency Management Agency (FEMA).

Pg. 65-66 Development Standards-
3V PD District – Planned Residential District
3V3-02 (C)

- (1) For purposes of this calculation, 'public use' shall be those areas devoted to open space designed to provide active or passive recreation, the preservation of natural site amenities, or any combination thereof. The buildings, structures or facilities, if any, built in the open space shall be appropriate for the designed uses of the open space and shall occupy no greater than five percent (5%) of the total gross acreage of the PD. **Public utilities, public easements, rights-of-way for roads, flood plains, flood ways, and rights-of-way or easements for watercourses, ditches or drainage shall not be included in the calculation of open space** unless such land is improved with walking trails, bicycle paths or similar purposes for public enjoyment.

- (2) **A riparian buffer** shall be provided along the entire length and on both sides of a river or perennial stream channel. The buffer area shall have a **width not less than 50 feet**, **measured from the river or stream bank**. **All perennial streams shall be located within areas designated as open space**. This buffer area shall be **restricted from development and managed to promote the growth of vegetation indigenous to the area** and capable of **maintaining the structural integrity of the stream banks**.

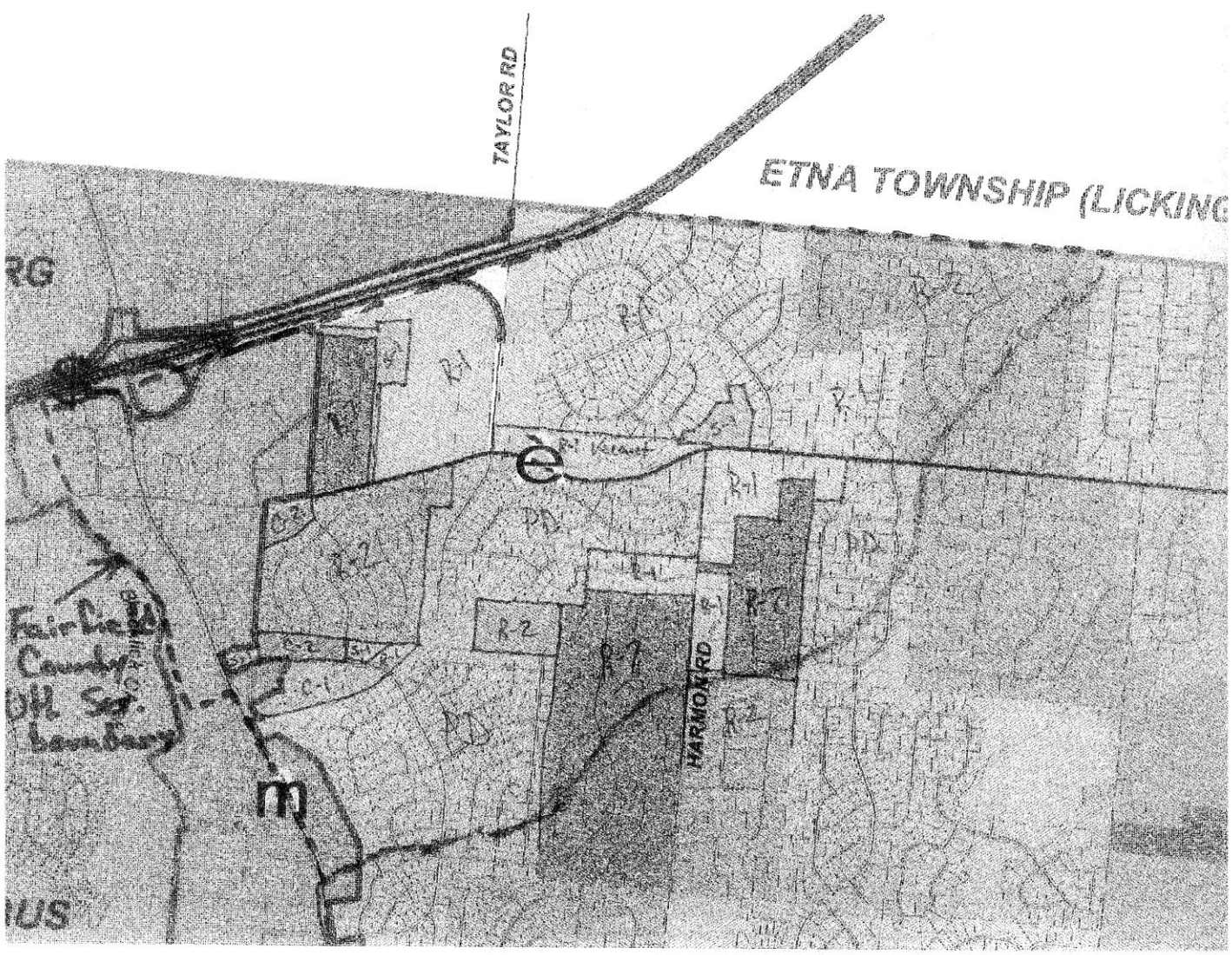
- (3) A **wetlands buffer** shall be provided for all wetlands required to be retained by the Army Corps of Engineers or the Ohio EPA. **The buffer area shall have a width not less than 25 feet**, **measured from the edge of the designated wetland**. The buffer area shall not be disturbed other than as is necessary to establish a natural landscape.

*Pg. 79 Interesting pool regulation (consider seeking change to this ordinance)**

3Y2-05: Provision will be made for the drainage of the pool into a public storm sewer where possible, unless there is a ditch or natural watercourse of sufficient size and gradient adjacent to the pool location to carry off the water satisfactorily, in which case drainage may be into the ditch or watercourse. In no case shall the pool be drained directly or indirectly into any street or road.

*****Chlorine spills have been associated with pools, and therefore should be considered for seeking change to ordinance.

Fairfield County Blacklick Zoning and Sanitary Map



1 - R-1 Residential
2 - R-2 Residential
3 - R-7 Single Family (high density)
4 - S-1 Professional and Community Service
5 - C-1 Local Community
6 - C-2 Limited Commercial
7 - PD Planned Residential District

All of the area inside the dashed line is served by Fairfield County Utilities. Water and sanitary sewer services are already installed in this portion of the watershed. The utilities department does not service anything above I-70 or west of Blacklick Creek. Almost all of Violet Township that is in the Blacklick Watershed is residential. There are a few places that are zoned commercial. There are approximately 6 platted residential lots that have not been built on at this time. There is approximately 20 acres that are zoned R-1 that are still vacant that have not been platted.

Rest of the watershed that is in Fairfield County is either under the jurisdiction of Reynoldsburg, Columbus, or City of Pickerington.

XII. Appendix D: Impervious Cover Estimates for selected Sub-Watersheds

Impervious cover estimates were calculated using runoff coefficients derived from a study by the Center for Watershed Protection, *Impervious Cover and Land Use in the Chesapeake Bay Watershed* by Karen Cappiella and Kenneth Brown. These coefficients were derived by calculating the impervious cover different land uses in four areas around the bay and then taking averages. They include habitat estimates for each land use.

A. Dysar(t) Run

Land Use	Acres	Impervious Coefficient	Impervious Acres
Other	10.7257	0.722	7.7439554
Agriculture	561.012	0.019	10.659228
Community Commercial	87.9324	0.722	63.4871928
Residential High Suburban	460.1858	0.326	150.0205708
Residential High Urban	0.5289	0.444	0.2348316
Light Industrial	212.102	0.534	113.262468
Residential Low Suburban	93.5109	0.143	13.3720587
Res Low Urban	94.4133	0.444	41.9195052
Residential Moderate Suburban	426.9181	0.278	118.6832318
Neighborhood Commercial	10.1243	0.722	7.3097446
Open Space	41.8445	0.086	3.598627
Park	8.9508	0.086	0.7697688
Public Service	38.6567	0.344	13.2979048
Residential Rural Estate	76.8177	0.086	6.6063222
Residential Rural	106.2406	0.106	11.2615036
Residential Suburban	262.6132	0.212	55.6739984
Vacant Commercial	30.4226	0.086	2.6163436
Vacant Industrial	48.5152	0.086	4.1723072
Vacant Public	7.2462	0.086	0.6231732
Vacant Residential	249.7442	0.086	21.4780012
Warehouse	4.9741	0.534	2.6561694
Total	2833.4792		649.4469063
% Impervious		22.92047552	

B. North French Run

Land Use	Acres	Imp Coefficient	Imp Acres
Other	18.525	0.722	13.37505
Agriculture	395.3559	0.019	7.5117621
Community Commercial	48.7163	0.722	35.1731686
Residential High Suburban	15.7905	0.326	5.147703
Light Industrial	82.77	0.534	44.19918
Residential Low Suburban	89.2724	0.143	12.7659532
Res Low Urban	58.3881	0.444	25.9243164
Residential Moderate Suburban	281.7047	0.278	78.3139066
Neighborhood Commercial	2.2572	0.722	1.6296984
Office	8.1609	0.344	2.8073496
Open Space	61.0791	0.086	5.2528026
Park	7.9697	0.086	0.6853942
Public Service	217.8718	0.344	74.9478992
Residential Rural Estate	41.3026	0.086	3.5520236
Residential Rural	48.7926	0.106	5.1720156
Residential Suburban	213.831	0.212	45.332172
Vacant Commercial	95.4597	0.086	8.2095342
Vacant Public	0.0263	0.086	0.0022618
Vacant Residential	27.3143	0.086	2.3490298
Warehouse	327.2536	0.534	174.7534224
Total	2041.8417		547.1046433
% Impervious		26.794665	

C. South French Run

Land Use	Acres	Impervious Coefficient	Impervious Acres
Agriculture	388.2073	0.019	7.3759387
Community Commercial	44.7226	0.722	32.2897172
Residential High Suburban	53.2335	0.326	17.354121
Residential Low Suburban	16.9684	0.143	2.4264812
Res Low Urban	60.4627	0.444	26.8454388
Residential Moderate Suburban	370.8986	0.278	103.1098108
Neighborhood Commercial	22.4792	0.722	16.2299824
Office	7.7318	0.344	2.6597392
Open Space	81.27	0.086	6.98922
Public Service	54.6454	0.344	18.7980176
Residential Rural Estate	32.4077	0.086	2.7870622
Residential Rural	18.3139	0.106	1.9412734
Residential Suburban	85.4826	0.212	18.1223112
Vacant Commercial	14.4985	0.086	1.246871
Vacant Industrial	64.1961	0.086	5.5208646
Vacant Residential	95.4964	0.086	8.2126904
Total	1411.0147		271.9095397
% Impervious		19.27049659	

D. Powell Ditch

Land Use	Acres	Impervious Coefficient	Impervious Acres
Other	2.7241	0.722	1.9668002
Agriculture	36.7133	0.019	0.6975527
Community Commercial	291.7874	0.722	210.6705028
Residential High Suburban	349.7271	0.326	114.0110346
Residential High Urban	6.1946	0.444	2.7504024
Light Industrial	62.1375	0.534	33.181425
Residential Low Suburban	21.3275	0.143	3.0498325
Res Low Urban	198.4796	0.444	88.1249424
Residential Moderate Suburban	234.9433	0.278	65.3142374
Neighborhood Commercial	106.2714	0.722	76.7279508
Office	41.8731	0.344	14.4043464
Open Space	71.1187	0.086	6.1162082
Park	266.481	0.086	22.917366
Public Service	155.0834	0.344	53.3486896
Residential Rural	10.1078	0.106	1.0714268
Residential Suburban	45.0971	0.212	9.5605852
Vacant Commercial	66.8096	0.086	5.7456256
Vacant Industrial	39.3887	0.086	3.3874282
Vacant Public	48.9949	0.086	4.2135614
Vacant Residential	15.5318	0.086	1.3357348
Warehouse	74.1936	0.534	39.6193824
Industrial	2.7	0.722	1.9494
Total	2147.6855		760.1644354
% Impervious		35.39458805	

XIII. Appendix E: Inventory of Watershed Action Items

Blacklick Creek—HUC 05060001 140 050 and 060

Waterbody HUC	Waterbody	Cause #1	Cause #2	Action Item	Target	Unit	Total Costs
050	Headwaters	Pathogens	Phosphorus	Waste Utilization	1	Plan	$1,000
050	Headwaters	Phosphorus	Pathogens	Conservation Tillage	4844	Acres	$43,956
050	Headwaters	Phosphorus	Pathogens	Filter Strips	98	Acres	$13,230
050	Headwaters	Phosphorus	Nutrients	Conservation Crop Rotation	120	Acres	$1,440
050	Headwaters	Phosphorus	Pathogens	Field Border: Warm Season	120	Acres	$24,000
050	Headwaters	Phosphorus	Pathogens	Nutrient Management	85	Acres	$425
050	Headwaters	Pathogens	Phosphorus	Comprehensive Nutrient Mngmt Plan	1	Plan	$500
050	Headwaters	Pathogens	Phosphorus	Waste Storage Facility	1	Facility	$31,0000
050	Mainstem	Pathogens	Nutrients	Repair/Replace failing HSTS	50	HSTS	$400,000
050	Dysar(t) Run	Sediment	Habitat Loss	Stormwater wetlands	8	Ponds	$480,000
050	Dysar(t) Run	Sediment	Nutrients	Rain Gardens	9	Gardens	$1,000
050	Dysar(t) Run	Sediment	Nutrients	Rain Barrels	4	Barrels	$400
050	Dysar(t) Run	Sediment	Habitat Loss	Riffle Installation	3	Riffle Series	$18,000
050	Dysar(t) Run	Sediment	Habitat Loss	Riparian Plants/Bank Stabilization	150	Linear ft.	$160,000
050	Dysar(t) Run	Pathogens	Phosphorus	Repair/Replace failing HSTS	10	HSTS	$80,000
050	Fieldstone Trib	Sediment	Habitat Loss	Natural Channel Design	1100	Linear ft	$500,000
050	Fieldstone Trib	Sediment	Habitat Loss	Riparian Plantings	1100	Linear ft	$28,000
050	North French	Sediment	Nutrients	Stormwater wetlands	2	Ponds	$120,000
050	North French	Sediment	Nutrients	Rain Gardens	9	Gardens	$1,000
050	North French	Sediment	Nutrients	Rain Barrels	4	Barrels	$400
050	South French Run	Sediment	Nutrients	Stormwater wetlands	2	Ponds	$120,000
050	South French Run	Pathogens	Nutrients	Repair/Replace failing HSTS	10	HSTS	$80,000

Waterbody HUC	Waterbody	Cause #1	Cause #2	Action Item	Target	Unit	Total Costs
050	South French Run	Sediment	Nutrients	Rain Gardens	9	Gardens	$1,000
050	South French Run	Sediment	Nutrients	Rain Barrels	4	Barrels	$400
050	Unzinger Ditch	Pathogens	Phosphorus	Repair/Replace failing HSTS	10	HSTS	$80,000
050	Unzinger Ditch	Habitat Loss	Nutrients	Riffle Installation	6	Riffle Series	$36,000
050	Unzinger Ditch	Habitat Loss	Sediment	Riparian Plantings	500	Linear ft.	$8,400
050	Unzinger Ditch	Sediment	Habitat Loss	Natural Channel Design	500	Linear ft.	$300,000
050	Whole Watershed	Habitat Loss	Sediment	Purchase and/or protect land	50	acres	$750,000
060	Mainstem	Pathogens	Phosphorus	Repair/Replace failing HSTS	20	HSTS	$160,000
060	Powell Ditch	Sediment	Habitat Loss	Riparian Plantings	2,739	Linear ft	$76,692
060	Powell Ditch	Sediment	Habitat Loss	Natural Channel Design	1100	Linear ft.	$500,000
060	Powell Ditch	Sediment	Nutrients	Pervious Pavement	116,523	Square ft.	$233,046
060	Powell Ditch	Sediment	Habitat Loss	Stormwater Wetlands/Rain Gardens	58,261	Square ft.	$349,566
060	Powell Ditch	Sediment	Nutrients	Green Roofs	58,261	Square ft.	$524,349
050 and 080	Entire Watershed	Absence of data	Streams not in attainment	Develop and implement Project Monitoring Plan	1	Plan	$25

Total = $5,123,829