NPDES PHASE II
MS4 GENERAL PERMIT
STORM WATER QUALITY MANAGEMENT PLAN
PART B: BASELINE CHARACTERIZATION REPORT UPDATE

Morgan County Partnership for Water Quality

Morgan County

Town of Brooklyn

City of Martinsville

Town of Mooresville

Tri-County Conservancy District

MORGAN CO-PERMITTEES

PERMIT #INR040099

SEPTEMBER 23, 2011

NPDES PHASE II
STORM WATER QUALITY MANAGEMENT PLAN (SWQMP)
PART B: BASLINE CHARACTERIZATION REPORT UPDATE

Prepared for:

Morgan County Co-Permittees

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CBBEL Project Number 08-522

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LIST OF EXHIBITS

1.0 INTRODUCTION

As part of the 1987 amendments to the federal Clean Water Act (CWA), the United States Congress added Section 402(p) to the CWA to address the water quality impacts of stormwater discharges from industrial facilities and large to medium municipal separate storm sewer systems (MS4s). Large to medium MS4s were defined as communities serving populations of 100,000 or more and are regulated by the Environmental Protection Agency (EPA) under the National Pollutant Discharge Elimination System's (NPDES) Storm Water Phase I Program.

In addition to these amendments, Congress directed the Environmental Protection Agency (EPA) to issue further regulations to identify and regulate additional stormwater discharges that were considered to be contributing to national water quality impairments. On December 8, 1999, the EPA issued regulations that expanded the existing NPDES Storm Water Program to include discharges from small MS4s in "urbanized areas" serving populations of less than 100,000 and stormwater discharges from construction activities that disturb more than one acre of land. These regulations are referred to as the NPDES Phase II Storm Water Program. Morgan County, the Town of Brooklyn, the City of Martinsville, the Town of Mooresville, and the Tri-County Conservancy District, met these criteria and were consequently designated as MS4 entities. Originally, these entities were individually permitted. In 2008, the developed the Morgan County Partnership for Water Quality (MCPWQ) and became co-permittees under the Rule 13 program. These communities and schools, herein after referred to as the Co-permittees, are covered under one permit.

In the State of Indiana, the Indiana Department of Environmental Management (IDEM) is responsible for the development and oversight of the NPDES Phase II Program. The IDEM initiated adoption of the Phase II Rules that were ultimately codified as 327 IAC 15-13 (Rule 13). Rule 13 became effective on August 6, 2003 and required designated MS4 entities to apply for permit coverage by submitting a Notice of Intent (NOI) and developing Storm Water Quality Management Plans (SWQMPs) through a phased submittal process.

This report has been prepared to update (where necessary) the SWQMP Part B: Baseline Characterization Report and its corresponding certification form for the Co-permittees, and includes the following information:

- An investigation and assessment of the impacts of existing land uses on stormwater runoff within the MS4 area,
- An identification of sensitive areas within the MS4 area,
- A review of known existing and available water quality monitoring data for the MS4 area,
- *An identification and assessment of structural and non-structural Best Management Practices (BMPs) within the MS4 area,*
- *An identification of priority areas for the implementation of BMPs, and*
- *Structural and Non-structural BMPs for each of the six minimum control measures being considered for meeting the requirements of Rule 13.*

The italicized bulleted items above are briefly mentioned within this report. However, full details regarding these items can be found in the Co-permittees' SWQMP Part C; Program Implementation.

2.0 LAND USE WITHIN MS4 AREA

Rule 13 requires the investigation of land usage and the assessment of structural and non-structural stormwater Best Management Practice (BMP) locations. The following discussion provides an evaluation of land uses within the Co-permittees' MS4 area. Structural and non-structural BMPs are identified and assessed in **Chapter 5** of this report.

2.1 DESCRIPTION OF MS4 AREA AND RECEIVING WATERS

Morgan County is located in central Indiana, south of Hendricks and Marion Counties. The Morgan County Partnership for Water Quality is working under a joint permit to fulfill requirements of Rule 13. The MS4 area covered by this permit (herein referred to as the Morgan Co-Permittee's MS4 Area) is shown in Exhibit 1 and includes the corporate boundaries of Brooklyn, Martinsville, Mooresville, Tri-County Conservancy District, and part of unincorporated Morgan County. Specifically, the parts of the County included in the MS4 are described as the unincorporated portions of:

- T13N, R1E, Sec 1, 4, 5, 12, 13, 23, 24, 25, 26
- T13N, R2E, Sec 2, 3, 4, 5, 6, 7, 8, 9, 13, 24
- T14N, R1E, Sec 25, 26, 27, 28, 32, 33, 35
- T14N, R2E, Sec 27, 28, 29, 30, 31, 32, 33, 34, 35, 36

Exhibit 1 identifies the Co-permittees' MS4 boundary. The Co-permittees' MS4 area receiving streams are listed in **Table 2-1** and illustrated in **Exhibit 2**.

Table 2-1: Receiving Waters

Jurisdiction	Receiving Water
Morgan County	East Fork White Lick Creek
	Echo Lake
	Goose Creek
	Grassy Fork
	McCracken Creek
	Monical Branch
	Silon Creek
	Sinking Creek
	Sycamore Creek
	West Fork Clear Creek
	White Lick Creek
	White River
Town of Brooklyn	White Lick Creek
	Monical Branch
City of Martinsville	Nutter Ditch
	Grassy Fork
	Sartor Ditch – Unnamed Tributary
Town of Mooresville	East Fork White Lick Creek – Silon Creek
	White Lick Creek - Mooresville
	White Lick Creek-Monical Branch
	White Lick Creek-Orchard Creek
Tri County Conservancy District	Silon Creek

2.2 POPULATION DATA

According to STATs Indiana, in 2009, Morgan County was ranked as the 22nd largest County in Indiana with a population of 70,865. The County as a whole experienced a 5.5% population increase from 2000 to 2009. The City of Martinsville is the largest community in Morgan County with 16.9% of the total population or 12,000 people. The population breakdown within the MS4 area is shown in **Table 2-2.**

Table 2-2: Population Statistics

Entity	2009 Population	Percent of MS4 Area
Unincorporated County	41,335	68.5%
Brooklyn	1,496	1.9%
Martinsville	12,000	10.6%
Mooresville	11,679	13.1%
Tri-County Conservancy District	*7,900*	5.9%

(STATS Indiana, 2011)

Population data specific to Tri-County Conservancy District is not available through the Census Bureau or Stats Indiana; however, population estimates provided by the Morgan County Partnership for Water Quality, estimate the population to be 7,900.

2.3 LAND USE DATA

As shown in **Exhibit 3** and **Table 2-3**, approximately 52% of the Co-permittees' MS4 area is in agricultural production and 11.4% is considered to be residential. This data was gathered from the 2001 National Land Cover Dataset. Table 2-3 summarizes the land use data within the MS4 boundaries as determined by the 2001 data.

Table 2-3: Land Uses within MS4 Area

Land use	Land Area (acres)	MS4 Area (%)
Agriculture	13,324.4	51.7%
Forest, undeveloped open space	9,014.6	35.0%
Residential	2,945.8	11.4%
Open water	355.1	1.4%
Commercial	110.6	0.4%
Industrial	25.6	0.1%
Wetland	14.7	0.1%
Total	25,790.8	100.0%

(NLCD, 2001)

2.4 WATERSHEDS WITHIN MS4 AREA

The Co-permittees' MS4 area is located in the West Fork White River Basin (05120201), an 8-digit hydrologic unit code (HUC) watershed. As illustrated in Exhibit 2 and listed in **Table 2-4**, there are 20 sub-watersheds (14-digit HUCs) that drain into or from the Co-permittees' MS4 area.

Table 2-4: 14-Digit Watersheds within MS4 Area

Watershed Name	14-Digit HUC	Size* (ac)
Clear Creek-East/West/Grassy Forks	05120201140140	14,677.6
McCracken Creek (White Lick Creek)	05120201150120	13,430.5
Sycamore Creek	05120201160020	11,977.9
Lambs Creek-Goose Creek	05120201160050	11,137.7
Crooked Creek-Banta Creek	05120201140050	10,186.0
White River-North Bluff/Bluff Creeks	05120201140030	10,147.6
White River-Martinsville	05120201160060	10,080.5
Lambs Creek-Patton Lake	05120201160040	9,676.5
White Lick Creek-Plainfield	05120201150070	9,555.3
East Fork White Lick Creek-Silon Creek	05120201150160	9,199.7
White River-Sinking Creek	05120201140040	8,982.4
West Fork White Lick Creek-Main Stem	05120201150110	8,946.8
White Lick Creek-Orchard Creek	05120201150170	8,553.9
Indian Creek-Sand Creek	05120201170070	7,840.8
Goose Creek-Quack Branch	05120201140020	7,743.2
White Lick Creek-Monical Branch	05120201150180	7,491.9
White River-Highland Creek	05120201160030	5,133.1
White River-North Trib(Centenary Church)	05120201140060	4,537.0
White River-Centerton	05120201160010	4,473.3
White River-Henderson Bridge	05120201140130	3,746.6

***The acreages listed in Table 2-4 represent the entire subwatershed, and are not limited to the portion of the subwatershed within the Co-permittees' MS4 areas.

2.5 SUMMARY OF LAND USE EVALUATIONS

The effects of land use and land use change on surface runoff, streamflow, and groundwater recharge are fundamental considerations in the practice of stormwater management. Expansion of urban areas significantly impacts the environment in terms of groundwater recharge, water pollution, and stormwater drainage. Urbanization can lead to an expansion of impervious surfaces, which can in turn lead to increases in surface runoff volume, downstream flooding, and detrimental impacts to local waterways. Since each land use has a different impact on stormwater runoff, strategic land use planning can help minimize these impacts.

As agricultural land uses account for approximately 52% of land uses within the Co-permittees' MS4 Area, the Co-permittees encourage local agricultural producers to implement agricultural BMPs, including, but not limited to, conservation tillage, nutrient and pesticide management, buffer strips, and wetland restoration. This is partially accomplished by working with the Morgan County Soil and Water Conservation District (SWCD) to target local agricultural producers in the MS4 area.

Further, urban land uses account for 12% of land uses within the Co-permittees' MS4 Area, it will be important for the Co-permittees to manage growth and development in a way that minimizes potential impacts on water quality. As required by Rule 13, the Co-permittees adopted a comprehensive stormwater ordinance designed to minimize the impacts that urbanized areas have on water quality.

3.0 SENSITIVE AREAS

Rule 13 requires the identification of "Sensitive Areas" as locations that should be given the highest priority for the selection of BMPs and the prohibition of new or significantly increased MS4 discharges. The following discussion provides an evaluation of potentially sensitive areas within the Co-permittees' MS4 areas.

3.1 ERODIBLE SOILS

The Natural Resources Conservation Service (NRCS) uses the soil erodibility index (EI) to provide a numerical expression of the potential for a soil to erode considering the physical and chemical properties of the soil and the climatic conditions where it is located. As a result, the basis for identifying highly erodible land (HEL) is the erodibility index of a soil map unit.

The erodibility index of a soil is determined by dividing the potential erodibility for each soil by the soil loss tolerance (T) value established for the soil. The T value represents the maximum "tolerable" annual rate of soil erosion that could take place without causing a decline in long-term productivity. **Table 3-1**, documents the HEL and potentially highly erodible (PHEL) soils within the Co-permittees' MS4 areas.

Table 3-1: Erodible Soils within MS4 Area

Map Unit Symbol	Soil Name	HEL Classification
AFB	Alford	PHEL
AFC2	Alford	PHEL
AVB	Ava	PHEL
BEB	Bedford	PHEL
BEC2	Bedford	HEL
BFG	Berks	HEL
BMC	Bloomfield	PHEL
CHF	Chetwynd	HEL
CNC2	Cincinnati	HEL
CNC3	Cincinnati	HEL
CND2	Cincinnati	HEL
CND3	Cincinnati	HEL
CSB2	Crosby	PHEL
ESC2	Elkinsville	PHEL
FOB2	Fox	PHEL
FXC2	Fox	PHEL
GPC	Gilpin	HEL
GPD	Gilpin	HEL
GPE	Gilpin	HEL
GRC	Grayford	PHEL
GRD3	Grayford	HEL
HKF	Hickory	HEL
MBD2	Markland	HEL
MBE	Markland	HEL
MEB	Martinsville	PHEL
MNB2	Miami	PHEL
MNC2	Miami	PHEL

Map Unit Symbol	Soil Name	HEL Classification
MND2	Miami	HEL
MNE	Miami	HEL
MNF	Miami	HEL
MOC3	Miami	HEL
MOD3	Miami	HEL
OCB2	Ockley	PHEL
PKC2	Parke	PHEL
PKD	Parke	HEL
PNB	Pekin	PHEL
PPB2	Pike	PHEL
PRC	Princeton	PHEL
PRD	Princeton	PHEL
PRE	Princeton	HEL
PS	Pits	PHEL
RUB	Russell	PHEL
WCG	Weikert	HEL
WFC	Wellston	PHEL
XEB2	Xenia	PHEL
ZAB	Zanesville	PHEL
ZAC	Zanesville	HEL

(USDA, 1987)

Recognizing the potential water quality impacts associated with disturbing highly erodible soils, the Co-permittees will consider these soils to be "sensitive areas" and will prioritize new/redevelopment occurring on these areas during the plan review, inspection, and enforcement process.

3.2 SOIL SUITABILITY FOR ONSITE SEWAGE TREATMENT SYSTEMS

The Morgan County Health Department is charged with permitting and inspecting residential onsite sewage treatment systems. Within the MS4 area, when a public sewer becomes available (within 300 feet) to a property served by a private sewage treatment system, a direct connection must be made, to the public sewer, at the owner's expense, if the cost of the connection does not exceed ½ the cost of replacing the old onsite system.

Where sanitary sewer service is unavailable (outside the indicated incorporated cities and towns either within or beyond area served by these systems), on-site sewage disposal systems that meet the standards of Morgan County Health Department Ordinance 1979-4, shall be required.

Sufficient measures are in place to address on-site wastewater treatment in developing and redeveloping areas; however, priority will be given to those areas within the MS4 area with known septic system failures or inadequacies.

3.3 NATURAL HERITAGE DATA

The IDNR's Division of Nature Preserves maintains the Natural Heritage Data for the State of Indiana. National Heritage Data includes general information on endangered, threatened, and rare species for each Indiana County. As of June 2010, there are 8 mollusks, 3 insects, 1 fish, 2

amphibians, 4 reptiles, 13 birds, 10 mammals, and 5 plants as State endangered, threatened, or rare within Morgan County.

3.4 WETLANDS

The 2009 National Wetland Inventory (NWI) Map, as illustrated on Exhibit 2 identifies potential wetlands within the Co-permittees' MS4 areas. The majority of the mapped wetlands are associated with floodplains of receiving waters. It should be noted that the NWI data was generated from infrared photography and has not been field verified. The NWI map should be used only as a reference, not as a definitive answer of whether wetlands are present on a particular site.

Rule 13 requires MS4s to establish a construction program that contains, at a minimum, the requirements of Rule 5. Rule 5 requires all project site owners to develop construction plans that include an existing project site layout describing the location and name of all wetlands, lakes, and water courses on or adjacent to the project site (327 IAC 15-5-6.5(a)(3)).

Since Rules 5 and 13 require the identification of wetlands in conjunction with planning for construction site stormwater runoff controls, wetlands will be considered sensitive areas in the Co-permittees' Stormwater Program. The stormwater ordinance requires developers to meet, at a minimum, the requirements for identifying and protecting wetlands as outlined in 327 IAC 15-5-6.5(a)(3).

3.5 OUTSTANDING AND EXCEPTIONAL USE WATERS

The Co-permittees' MS4 area contains a portion of the West Fork White River, known for its scenic beauty and recreational opportunities. As determined by the Indiana General Assembly, the West Fork White River is an Outstanding River for these reasons:

- It is listed on the Nationwide Rivers Inventory. The 1,524 river segments identified by the National Park Service in its 1982 "Nationwide Rivers Inventory" qualified for consideration for inclusion in the National Wild and Scenic Rivers System.
- It has been identified by the state natural heritage program as having outstanding ecological importance.
- It has state-designated canoe and/or boating routes.

3.6 ESTABLISHED TMDLs

States are required to develop a priority ranking for waters that do not or are not expected to meet applicable water quality standards taking into account the severity of the pollution and the designated uses of the waters. Once this listing and ranking of waters is completed, the states are required to develop Total Maximum Daily Loads (TMDLs) for these waters in order to achieve compliance with water quality standards. These streams are discussed further in Section 4.2.

White River, Middle West Fork: 2005
The Middle West Fork White River Watershed is located in southwest Indiana, draining approximately 361 square miles in Morgan, Owen, and Greene counties. Major streams included in the TMDL report are Middle West Fork White River, East, West and Grassy Forks of Clear Creek, Sycamore Creek, Highland Creek, McCormicks Creek, Stotts Creek, Rattlesnake Creek, East Fork of Fish Creek, Fish Creek, Raccoon Creek-Little Raccoon Creek, Raccoon

Creek-Lick Creek, Lambs Creek, Goose Creek, White Lick Creek, Crooked Creek-Banta Creek, Beanblossom Creek and Indian Creek.

A comprehensive survey of the Middle West Fork White River Watershed was conducted by IDEM from July 2001 to October 2001. The primary cause of impairment, according to IDEM's assessment, is *Escherichia coli* bacteria (*E. coli*). Pollution sources in the watershed include nonpoint sources from agriculture and pastures, land application of manure and urban and rural run-off, as well as point sources from straight pipe discharges, home sewage treatment system disposal and combined sewer overflow outlets.

TMDLs for the Middle West Fork White River Watershed are established for *E. coli* and will address 29 impairments. Some of the recommended solutions to address the impairments include storm water controls, point source controls, manure management and habitat improvements.

Lambs Creek: 2006
The Lambs Creek Watershed is located in central Indiana, draining approximately 32.5 square miles in Morgan County. Major streams included in the TMDL report are Lambs Creek and Goose Creek.

A comprehensive survey of the Lambs Creek watershed was conducted by IDEM from June 1, 2001, to July 2, 2001. The primary cause of impairment, according to IDEM's assessment is *E. coli*. Pollution sources in the watershed include nonpoint sources from agriculture and pastures, land application of manure and urban and rural run-off, as well as point sources from straight pipe discharges, home sewage treatment system disposal and combined sewer overflow outlets.

TMDLs for the Lambs Creek Watershed are established for *E. coli* and will address three impairments. Some of the recommended solutions to address the impairments include storm water controls, point source controls, manure management and habitat improvements.

3.7 RECREATIONAL WATERS

The MS4 area includes only 2 known areas where recreation occurs; Echo Lake Campground and Spring Lake Camping Club. Many of the larger recreational waters, such as the White River, are located outside of the MS4 boundaries.

3.8 PUBLIC DRINKING WATER SOURCES

According to Indiana Administrative Code, a public water supply system is a public water supply for the provision to the public of piped water for human consumption, if such system has at least fifteen (15) service connections, or regularly serves an average of at least twenty-five (25) individuals daily at least sixty (60) days of the year.

Within Morgan County, there are 28 active Public Water Supply Systems, all of which utilize groundwater as their drinking water source.

Each of these communities must develop a Wellhead Protection Plan in accordance with the 1989 Groundwater Protection Act (IC 13-7-7-8) and Indiana Wellhead Protection Rule 327 IAC 8-4.1. The Wellhead Protection Plan is developed by a local planning team (stakeholders) and will include a delineation of protection areas around their drinking water wells, identification of

potential sources of contamination within the protection areas, and development of management plans designed to protect public drinking water supplies.

The Town of Brooklyn, the City of Martinsville, and Indiana American Water (servicing Mooresville) have developed Wellhead Protection Plans outlining the areas to be protected as well as BMPs that are suggested for the area to help protect water quality.

While Wellhead Protection Areas are sensitive in nature, they are not considered to be sensitive areas in the context of the Co-permittees' Stormwater Program, as they are managed through other state regulatory requirements.

There are no surface water intakes within the MS4 area.

3.9 CONCLUSIONS

As discussed in the sections above, several sensitive areas have been identified as having the potential to impact, or be impacted by, stormwater runoff from the Co-permitees' MS4 areas. These areas include highly erodible soils, soils unsuitable for septic systems, wetlands, and watersheds containing waterbodies used for recreation or public water supply.

4.0 SUMMARY OF EXISTING MONITORING DATA

Rule 13 requires a review of known existing and available monitoring data for the MS4 area receiving waters, including, as applicable, data that can be correlated from chemical, biological, physical, land use, and complaint data. The following discussion provides an evaluation of known and available data for the Co-permitees' MS4 area receiving waters.

4.1 INDIANA INTEGRATED WATER MONITORING AND ASSESSMENT REPORT

Section 303(d) of the Clean Water Act requires states to identify waters that do not or are not expected to meet applicable water quality standards with technology based standards alone. States are also required to develop a priority ranking for these waters, taking into account the severity of the pollution and the designated uses of the waters. Once this listing and ranking of waters is completed, the states are required to develop TMDLs for these waters in order to achieve compliance with water quality standards.

Section 305(b) of the Clean Water Act requires the state to assess and report on how well the waters of Indiana support the beneficial uses designated in the Water Quality Standards (WQS). Indiana's Integrated Water Monitoring and Assessment Report (IR) is developed every 2 years to fulfill this requirement and describes the condition of Indiana's lakes and streams, the lake Michigan shoreline, and ground water. All IDEM water quality data is evaluated and interpreted for each 14-digit HUC subwatershed. Each subwatershed is given a water quality ranking relative to its streams status in meeting WQS. WQS are set at levels necessary for protecting a waterway's' designated use(s), such as swimmable, fishable, or drinkable. Each subwatershed is given a rating of fully, partially, or not supportive of its designated uses. **Table 4-1** identifies known impairments for waterbodies within Morgan County according to the IDEM's 2008 IR. These impaired stream segments are also identified on Exhibit 2.

Table 4-1: 2008 IDEM Integrated Report (IR)

Waterbody Name	Impairment(s)
CROOKED CREEK-BANTA CREEK	*E. coli*
EAGLE CREEK RESERVOIR	Algae, PCBs in Fish Tissue, Taste and Odor
EAST FORK WHITE LICK CREEK	*E. coli,* IBC
EAST FORK WHITE LICK CREEK-HEADWATERS AND OTHER TRIBUTARYS	*E. coli*
EAST FORK WHITE LICK CREEK-SILON CREEK	*E. coli*
EAST FORK WHITE LICK CREEK-STERLING RUN	*E. coli*
GEIST RESERVOIR	Algae, PCBs in Fish Tissue, Taste and Odor
MONICAL BRANCH	PCBs in Fish Tissue
MORSE RESERVOIR	Algae, PCBs in Fish Tissue, Taste and Odor
NORTH PRONG STOTTS CREEK	*E. coli*
NORTH PRONG STOTTS CREEK (LMTD USE WATERS)	IBC
SOUTH PRONG STOTTS CREEK	*E. coli*, IBC
STOTTS CREEK-EXCHANGE	*E. coli*
WEST FORK WHITE LICK CREEK-MAIN STEM	*E. coli*
WHITE LICK CREEK	*E. coli,* PCBs in Fish Tissue

Waterbody Name	Impairment(s)
WHITE LICK CREEK-MOORSEVILLE	*E. coli*
WHITE RIVER	Cyanide, Mercury in Fish Tissue, PCBs in Fish Tissue
WHITE RIVER-HENDERSON BRIDGE	Mercury in Fish Tissue, PCBs in Fish Tissue
WHITE RIVER-PARAGON BRIDGE	Mercury in Fish Tissue, PCBs in Fish Tissue

(IDEM, 2008)

4.2 IDEM WATERSHED MANAGEMENT PLANS

A watershed plan is a strategy and a work plan for achieving water resource goals that provides assessment and management information for a geographically defined watershed. It includes the analyses, actions, participants, and resources related to development and implementation of the plan. The watershed planning process uses a series of cooperative, iterative steps to characterize existing conditions, identify and prioritize problems, define management objectives, and develop and implement protection or remediation strategies as necessary. The primary purpose of a watershed management plan is to guide watershed coordinators, resource managers, policy makers, and community organizations to restore and protect the quality of lakes, rivers, streams, and wetlands in a given watershed.

Lower White Lick Creek WMP Water Quality Results

The Lower White Lick Creek WMP presents the overall watershed analysis and inventory conducted by CBBEL, the project Steering Committee, and the public, and offers management recommendations for water quality improvement, preservation, and protection. During the development of this WMP, water quality was assessed using both chemical and biological monitoring.

2003-2005 Chemical Monitoring

- All monitoring locations showed elevated levels of *E. coli* exceeding Indiana Water Quality Standards.
- 3 stream reaches exceeded the Total Organic Carbon “high” classification metric compared to a 1996 IDEM study.
- In 8 of 12 sampling locations, dissolved oxygen levels exceeded Indiana Water Quality Standards.

2003 Biological Monitoring

Commonwealth Biomonitoring, Inc. assessed biotic conditions within the project area at the 12 sampling locations. Results of the macro-invertebrate study showed that the White Lick Creek and the East Fork of White Lick Creek had excellent aquatic habitat. In addition, two tributaries (Monical Branch and Orchard Creek) had relatively good water quality as indicated by macroinvertebrate communities present. However, based on deviations between available habitat and the Index of Biotic Integrity (IBI) scores, results suggest that water quality was degraded at the White Lick Creek and East Fork of White Lick Creek sites. Biological indicators point to the presence of low-level amounts of toxic substances in and excessive nutrient inputs to the White Lick Creek. Additionally, the biological communities showed signs of stress that were indicative of possible excessive sedimentation. The degree of degradation was uniform

throughout the study reaches. Sources of observed water quality impairment are likely to originate from upstream and within in the Lower White Lick Creek Watershed.

White River Lambs Creek

The agreement between the Morgan County SWCD and IDEM was the result of a grant application prepared and submitted by the SWCD under the Section 319 program which focuses on nonpoint source water pollution. The agreement called for 24 months of public coordination, research, and plan writing for a 52,438-acre watershed that ultimately drains to the Upper West Fork of the White River in the north central part of Morgan County. The contract became effective in May of 2001.

2002 Chemical Monitoring

- All monitoring locations showed elevated levels of *E. coli* exceeding Indiana Water Quality Standards.
- Various locations showed periodic spikes of both phosphorus and nitrogen.
- Majority of monitoring locations show below average dissolved oxygen levels throughout the year.

2002 Biological Monitoring

The study showed that 9 of the 10 sites examined on the four streams were impacted, as compared to values from "reference" streams in the same ecoregion. One site, Sycamore Creek at Robb Hill Road, had habitat and a biological community among the best in Indiana.

Although lower aquatic habitat values contributed to biological impacts at some of the other sites (especially an unnamed tributary near Centerton), degraded water quality appeared to be a problem as well. Causes of water quality degradation, as indicated by biological indicators, probably included low dissolved oxygen concentrations (3 sites) and excessive nutrient concentrations (1 site). The sites identified as having the most degraded water quality were all downstream from impoundments. Occasional release of nutrient-rich, anoxic water from these impoundments may be contributing to the problem. Excessive sediment inputs did not appear to be a problem at any site.

5.0 IDENTIFICATION AND ASSESSMENT OF EXISTING BMPs

Rule 13 requires the assessment of structural and nonstructural stormwater Best Management Practices (BMPs) and locations. The following discussion provides an inventory of BMPs identified for the Co-permittees. Structural and non-structural BMPs are identified and discussed according to each of the six required Minimum Control Measures (MCMs). Further details regarding the BMP, measurable goals, timelines, and responsible parties may be found in the Co-permittees' SWQMP Part C update.

5.1 PUBLIC EDUCATION AND OUTREACH

Compliance with this MCM requires MS4s to demonstrate that residents, visitors, public service employees, commercial and industrial facilities, and construction site personnel within the MS4 are educated about the impacts of polluted stormwater runoff on MS4 area receiving streams.

Public Education and Outreach activities performed by the Co-permittees' include:

- Stormwater Assessments
- Morgan the Turtle
- Stormwater Educational Brochures
- Web Site
- Misc. Media
- SWMD Activities
- SWCD Activities
- Storm Drain Marking
- Elementary Education
- Clean-up Events
- Adopt-A-Highway
- Hoosier Riverwatch
- Public Reporting program
- Public Meetings
- Rule 13 Public Participation List
- Fair or Festival Booths
- Rain Barrel & Rain Garden Programs
- Strategic Plan

5.2 PUBLIC PARTICIPATION AND INVOLVEMENT

Compliance with this MCM requires MS4s to demonstrate that opportunities were provided for stakeholders to participate in the development and implementation of the MS4's SWQMP.

Many of the BMPs listed in Section 5.1 include a component for Public Participation and Involvement.

5.3 ILLICIT DISCHARGE DETECTION AND ELIMINATION

Compliance with this MCM requires MS4s to develop and implement a strategy to detect and eliminate illicit discharges to the MS4 conveyance system.

Illicit Discharge Detection and Elimination activities performed by the Co-permittees include:

- Stormwater System Mapping
- IDDE Ordinance

- IDDE Plan
- Public Reporting Program
- Storm Drain Markers
- SWMD Activities
- Annual IDDE, Good Housekeeping & Pollution Prevention Staff Training

5.4 CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Compliance with this MCM requires MS4s to develop, implement, manage, and enforce an erosion and sediment control program for construction activities that disturb one or more acres of land within the MS4 area.

- Stormwater Management Ordinance
- Stormwater Technical Standards
- Operation & Maintenance (O&M) Manuals
- Plan Review, Site Inspection, and Enforcement
- Staff Training
- Training for Construction Professionals
- Public Reporting Program
- Erosion and Sediment Control and Post-Construction Tracking Database
- Inspection and Enforcement Documentation
- Co-Permittee Rule 5 Compliance
- Gasoline Outlets

5.5 POST-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Compliance with this MCM requires MS4s to develop a program for managing post-construction Best Management Practices (BMPs) that will ensure adequate, long-term stormwater quality benefits in new development and redevelopment activities. Once construction is complete, post-construction practices specified by the MS4 must be implemented to ensure adequate stormwater quality is maintained from the developed site via an enforceable ordinance or other regulatory mechanism.

Many of the BMPs listed in Section 5.4 contain a component for Post-Construction Site Stormwater Runoff Control

5.6 POLLUTION PREVENTION AND GOOD HOUSEKEEPING

Compliance with this MCM requires MS4s to develop and implement a program to prevent or reduce pollutant runoff from municipal operations within the MS4 Area. The Co-permittee entities are currently implementing a number of recommended Stormwater Pollution Prevention BMPs.

Pollution Prevention and Good Housekeeping BMPs implemented by the Co-permittees include:

- Annual Good Housekeeping & Pollution Prevention Staff Training
- MS4 Conveyance System Maintenance
- Maintenance Schedules Tracking
- Street Sweeping Program
- Canine Park Location
- Flood Management Projects
- Stormwater Pollution Prevention Plans (SWPPPs)

5.7 STRUCTURAL BMP EFFECTIVENESS

The Co-permittees have structural BMPs already in place. They range from BMPs specifically installed for water quality, such as an oil separator, to BMPs whose water quality benefits are limited, underground stormwater storage tanks. The following is an assessment of the effectiveness of each BMP.

Mooresville Underground Retention – Fire Department

Landsaver Detention System

- Installed: 2008
- Model: Landsaver LS-3051
- Isolator Row with Overflow Weir
- Inspected annually by the Stormwater Department staff

Mooresville Oil Separator – Street Department

Self Manufactured

- Installed in 2006
- 30”W x 60”L x 48”D
- Inspected monthly by Street Department staff and cleaned as needed

Mooreseville Oil Separator – Parks Department

Self Manufactures

- Installed in 2003
- 300 gallon polypropylene tank
- Inspected quarterly by the Park Superintendent and cleaning is contacted as needed to private companies.

TCCD 23 Stormwater Ponds

The TCCD currently maintains 23 detention/retention ponds originally constructed for flood control purposes. Despite the original intent of these structures, they do provide some water quality benefits such as sediment removal. The TCCD staff routinely visit each pond to determine whether maintenance is needed or if there are other pond related issues.

6.0 POTENTIAL AREAS OF CONCERN

Rule 13 requires the identification of areas having reasonable potential for or actually causing stormwater quality problems based upon relevant land use data and identified sensitive areas, as well as existing and available water quality data. These areas are required to be given the highest priority for the selection of BMPs and the prohibition of new or significantly increased MS4 discharges. The following discussion summarizes potential problem areas identified within the MS4 area. BMPs being considered are discussed in Chapter 5 of this report.

6.1 LAND USES

Agricultural land uses account for approximately 52% of land uses within the MS4 area. In order to minimize potential impacts associated with agricultural land uses, the Co-permittees will encourage local agricultural producers to implement agricultural BMPs, including, but not limited to, conservation tillage, nutrient and pesticide management, buffer strips, and wetland restoration. This can be accomplished through the Morgan County SWCD.

Urban land uses account for 11.4% of land uses within the MS4 area. Urban land use is primarily concentrated in the municipal boundaries of Martinsville and Mooresville and within the Tri-County Conservancy District. This trend towards urbanization will likely continue in the near future and it will be important for the Team to manage growth and development in a way that minimizes the potential impacts on water quality. As required by Rule 13, the Co-permittees have adopted a comprehensive stormwater ordinance designed to minimize the impacts of the Co-permittees' urbanized areas on water quality. Additional BMPs listed in Chapter 7 should also minimize the water quality impacts of the urban land uses on receiving waters.

6.2 SENSITIVE AREAS

Highly Erodible Soils

As discussed in Chapter 3, several soil units in the MS4 area are classified as highly erodible or potentially highly erodible. Recognizing the potential water quality impacts associated with disturbing highly erodible soils, the Co-permittees will consider these soils to be "sensitive areas" and will prioritize new/redevelopment occurring on these sites during the plan review, inspection, and enforcement process.

Outstanding Waters and Recreational Use

As discussed in Chapter 3, one receiving water, the West Fork White River, in the MS4 area is either listed as an Outstanding River. Based on this high potential for contact and fish consumption, this receiving waters should be considered as priorities for the Co-permittees' Stormwater Program for pathogens and illicit discharges containing heavy metals or PCBs, which limit contact use and fish consumption.

6.3 WATER QUALITY DATA

Existing water quality data and studies related to the MS4 area receiving streams have identified multiple instances of stormwater related pollutants in the MS4 area receiving streams.

The Co-permittees' intent in the previous permit term was to focus initial stormwater program implementation within prioritized watersheds. However, after further evaluation, the Co-permittees have determined that all watersheds within the MS4 area will be considered priorities. This approach will simplify program implementation and should maximize the overall benefit that the stormwater program has on all local receiving waters.

6.4 SPECIFIC LOCATIONS REQUIRING STRUCTURAL BMPS

Rule 13 requires MS4s to identify areas having reasonable potential for causing stormwater quality problems. A list of BMPs being considered for implementation throughout the MS4 area can be found in the SWQMP Part C update.

7.0 REFERENCES

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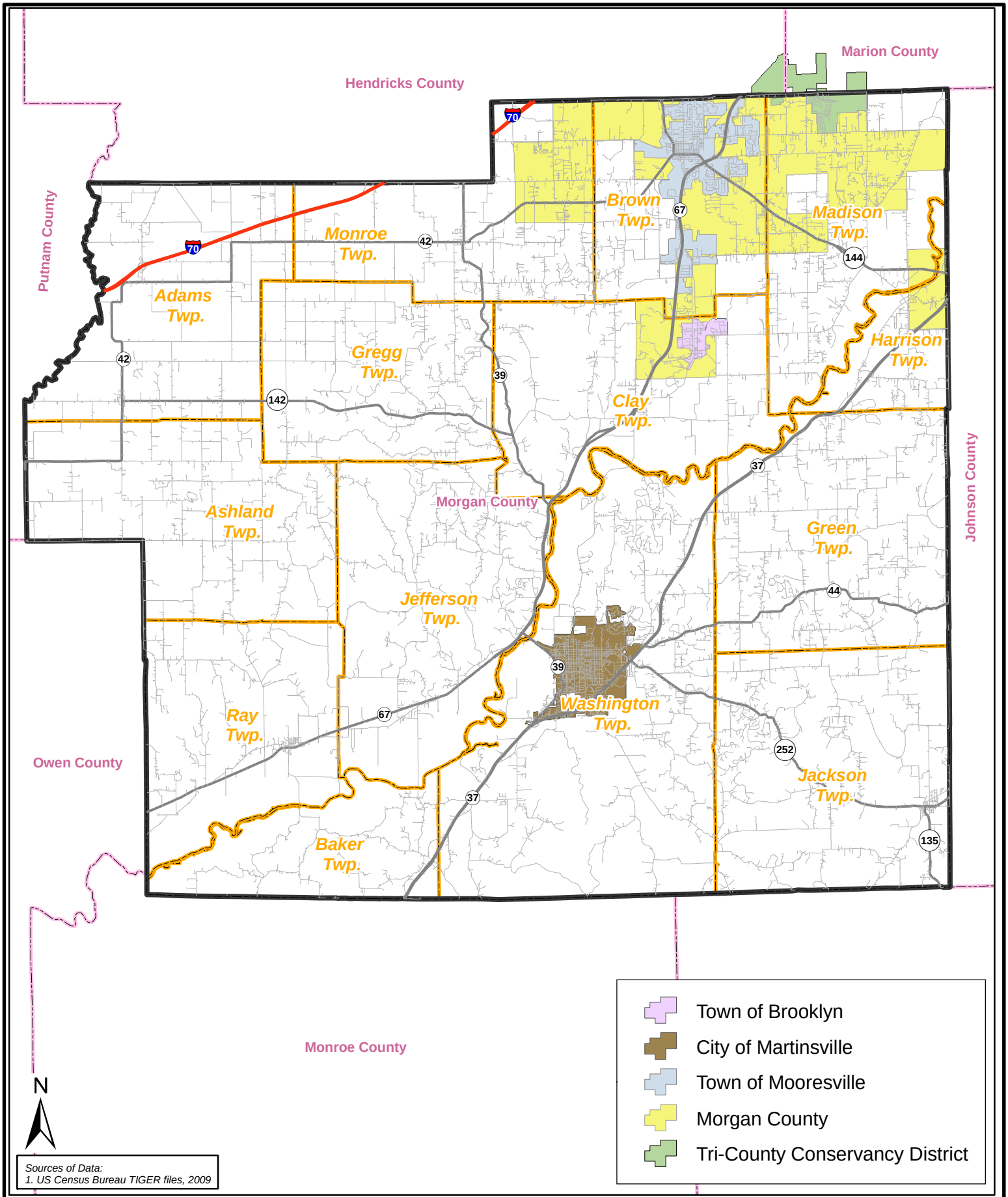
US Department of Agriculture, Natural Resources Conservation Service. *Soil Survey of Morgan County, Indiana.* 1998.

US Fish and Wildlife Service. *National Wetland Inventory Maps.* 2009

Appendix A ACRONYMS

BMP	Best Management Practice
CBBEL	Christopher B. Burke Engineering, Ltd.
CWA	Clean Water Act
EPA	Environmental Protection Agency
GIS	Geographical Information System
GPS	Global Positioning System
HEL	Highly Erodible Land
HUC	Hydrologic Unit Code
IBI	Index of Biotic Integrity
IDDE	Illicit Discharge Detection and Elimination
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
MCM	Minimum Control Measure
MS4	Municipal Separate Storm Sewers
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
PHEL	Potentially Highly Erodible Land
SWCD	Soil and Water Conservation District
SWMD	Solid Waste Management District
SWPPP	Stormwater Pollution Prevention Plan
SWQMP	Storm Water Quality Management Plan
TMDL	Total Maximum Daily Load

WMP	Watershed Management Plan
WQS	Water Quality Standards



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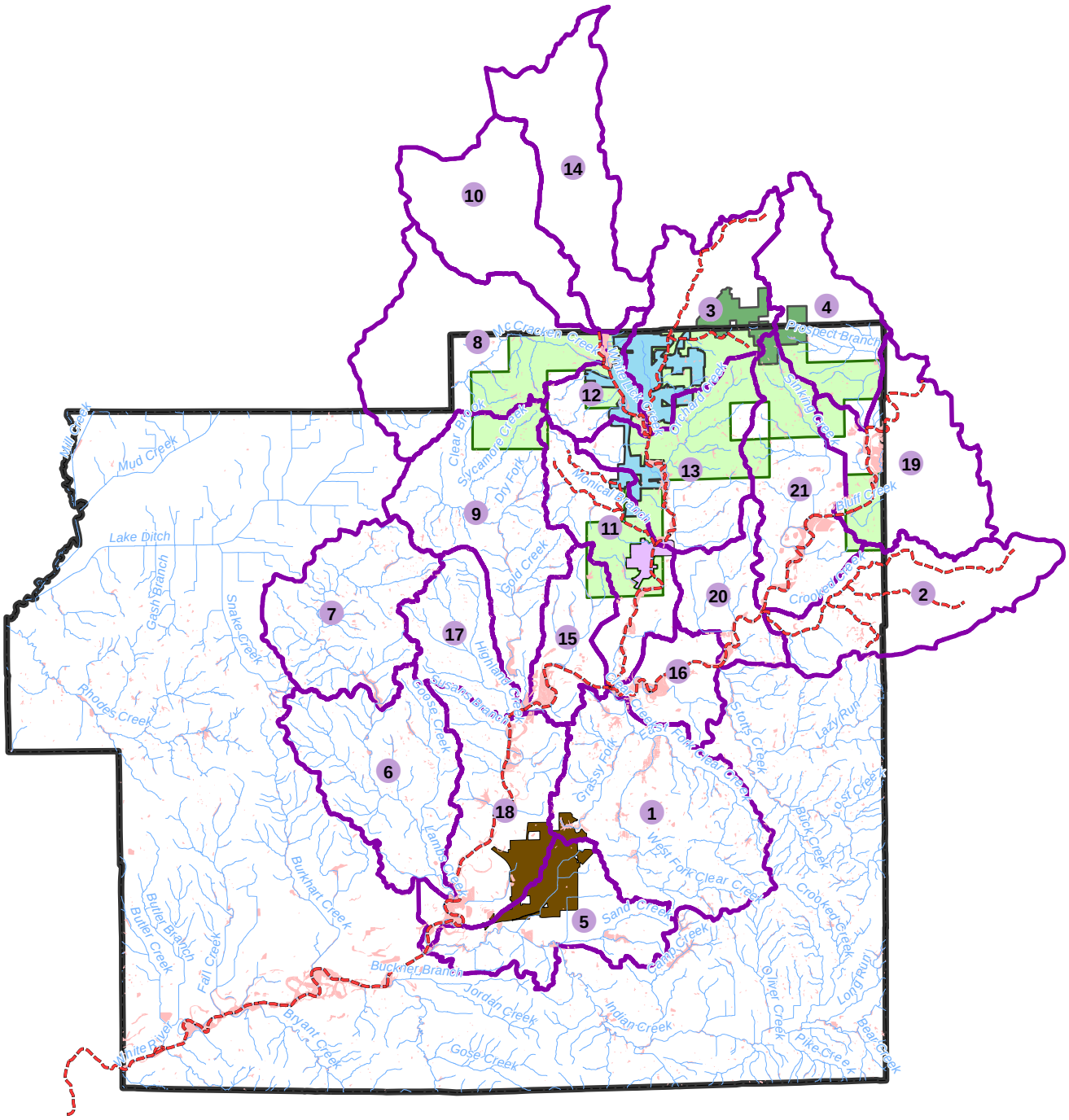
PROJECT: Morgan County SWQMP Part B		PROJECT NO. 08-0522	APPROX. SCALE n.t.s.
TITLE: MS4 Boundaries			DATE: 09/2011
			EXHIBIT 1



Map ID	14-Digit HUC Watershed Name
1	Clear Creek-East/West/Grassy Forks
2	Crooked Creek-Banta Creek
3	East Fork White Lick Creek-Silon Creek
4	Goose Creek-Quack Branch
5	Indian Creek-Sand Creek
6	Lambs Creek-Goose Creek
7	Lambs Creek-Patton Lake
8	McCracken Creek (White Lick Creek)
9	Sycamore Creek
10	West Fork White Lick Creek-Main Stem
11	White Lick Creek-Monical Branch
12	White Lick Creek-Mooresville
13	White Lick Creek-Orchard Creek
14	White Lick Creek-Plainfield
15	White River-Centerton
16	White River-Henderson Bridge
17	White River-Highland Creek
18	White River-Martinsville
19	White River-North Bluff/Bluff Creeks
20	White River-North Trib(Centenary Church)
21	White River-Sinking Creek

303(d) Impaired Streams
Streams
Wetlands
HUC-14 Watersheds
City of Martinsville
Town of Mooresville
Tri-County Conservancy District
Town of Brooklyn
Morgan County MS4 Boundary

Sources of Data:
1. Wetlands: Ducks Unlimited< NWI Update, 2009 (Preliminary)
2. IDEM, 2008

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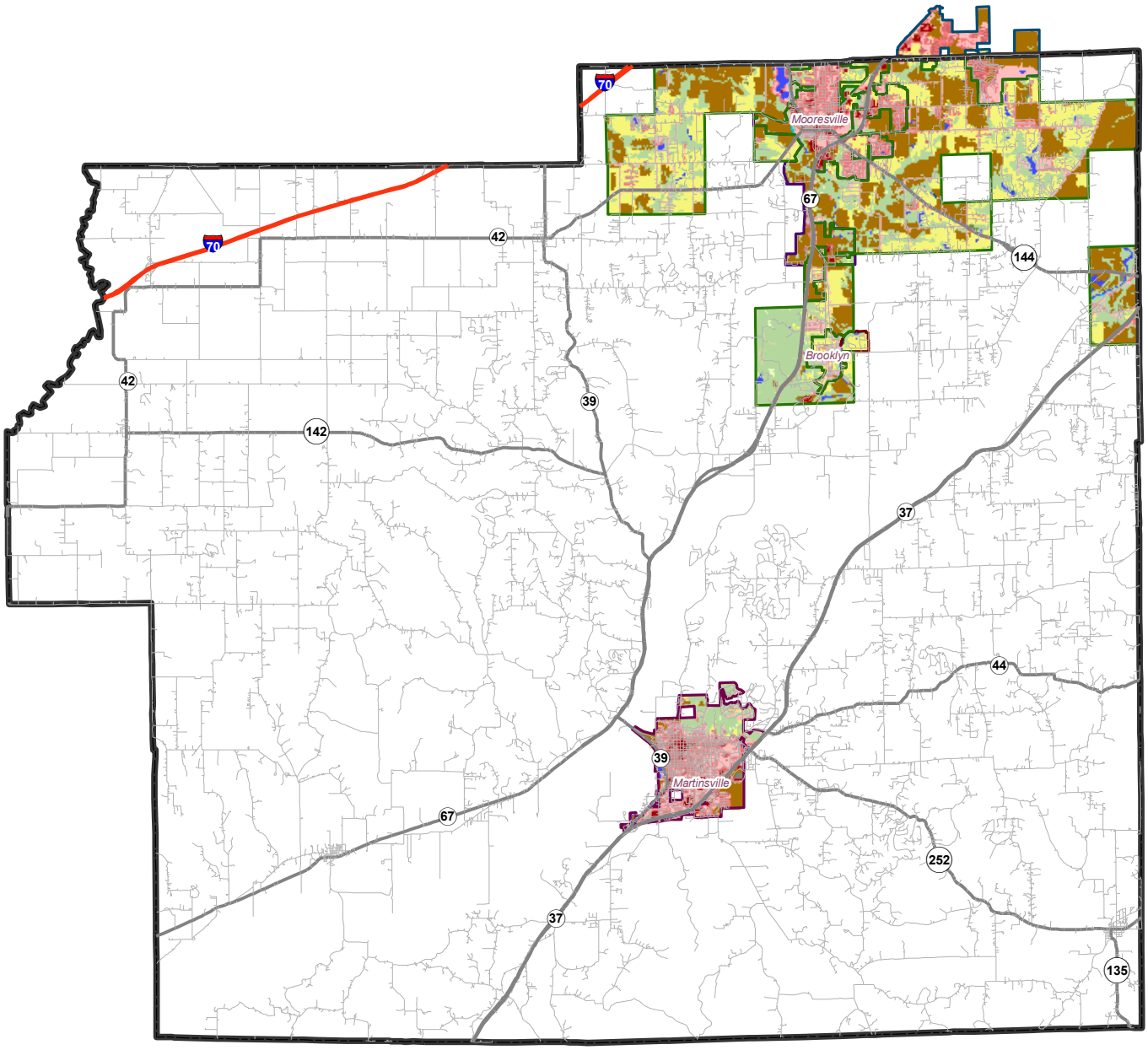
PROJECT: Morgan County SWQMP Part B	PROJECT NO. 08-0522	APPROX. SCALE n.t.s.
TITLE: Streams & Watersheds		DATE: 09/2011
		EXHIBIT 2



Open Water
Developed, Open Space
Developed, Low Intensity
Developed, Medium Intensity
Developed, High Intensity
Barren
Deciduous Forest
Evergreen Forest
Shrub
Grassland
Pasture/Hay
Cultivated Crops
Woody Wetlands
Emergent Wetlands

N

Sources of Data:
1. Land Use: National Land Cover Dataset, 2006

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PROJECT: Morgan County SWQMP Part B		PROJECT NO. 08-0522	APPROX. SCALE n.t.s.
TITLE: Land Use			DATE: 09/2011
			EXHIBIT 3