WATERSHED MANAGEMENT PLAN

CHECKLIST INSTRUCTIONS

Indiana Department of Environmental Management
Office of Water Quality
Watershed Assessment and Planning Branch

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OVERVIEW

1. Nationwide, watershed plans funded through Section 319 of the Clean Water Act must meet nine minimum elements as defined by the United States Environmental Protection Agency (US-EPA). The Indiana Department of Environmental Management (IDEM) believes that requirements above and beyond US-EPA's nine elements are necessary for successful watershed planning. US-EPA's nine elements and IDEM's additional requirements are outlined in IDEM's Watershed Management Plan (WMP) Checklist, which must be satisfied for WMP approval and eligibility for Section 319 implementation funds. This document contains formal instruction on how to satisfy IDEM's checklist. Each item in the IDEM WMP Checklist is essential for a comprehensive and effective WMP and is required for IDEM's approval of the plan.

2. All projects funded by IDEM watershed planning grants, regardless of watershed size, must follow these instructions.

3. All WMPs should include a Table of Contents that lists out the different sections of the WMP in order of the elements presented in the checklist and instructions.

4. All maps, figures, and tables must have a title and number assigned to them. They should be legible and listed in the Table of Contents by title and number.

5. All maps must have a legend, scale, and north arrow. Mapped population centers, major streams, and major roads should be labeled. Maps should not be too busy that it makes it difficult to read. If a map is too busy, it may be broken out in additional maps so it is easy to digest by the reader.

6. It is the responsibility of the project sponsor to edit the WMP for grammar and punctuation. Final drafts submitted with excessive grammar or punctuation errors will not be approved by IDEM.

7. If your project area is within the Little Calumet-Galien watershed (HUC 04040001), you must work with the Indiana Department of Natural Resources (DNR) Coastal Program to ensure that their "6217" requirements are incorporated into the WMP. 6217 requires that the WMP addresses agriculture, silviculture, urban and rural areas, marinas and recreational boating, and hydromodifications. The requirements are designed to improve water quality by strengthening the link between federal and state coastal zone management programs and 319 programs.

8. Any questions about these instructions should be directed to your IDEM Project Manager. Additional resources may be found on the IDEM Nonpoint Source website and the Indiana Watershed Planning Guide.

NINE ELEMENTS OF WATERSHED PLANS

(Source: Handbook for Developing Watershed Plans to Restore and Protect Our Waters)

US-EPA's nine elements include:

1. Identification of causes of impairment and pollutant sources or groups of similar sources that need to be controlled to achieve needed load reductions, and any other goals identified in the watershed plan. Sources that need to be controlled should be identified at the significant subcategory level along with estimates of the extent to which they are present in the watershed (e.g., X number of dairy cattle feedlots needing upgrading, including a rough estimate of the number of cattle per facility; Y acres of row crops needing improved nutrient management or sediment control; or Z linear miles of eroded streambank needing remediation). IDEM elements 1 through 18

2. An estimate of the load reductions expected from management measures. (If a Total Maximum Daily Load (TMDL) for affected waters has been developed, the WMP should be crafted to achieve or exceed the load reductions called for in the TMDL. If a TMDL has not yet been developed, the plan should be designed to attain water quality standards if possible, in addition to other environmental goals). IDEM element 19 and 24

3. A description of the nonpoint source management measures that will need to be implemented to achieve load reductions in item (2) above, and a description of the critical areas in which those measures will be needed to implement this plan. IDEM elements 20 and 23

4. Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement this plan. IDEM element 25 and 26

5. An information and education component used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the nonpoint source management measures that will be implemented. IDEM elements 21, 22, 25 and 26.

6. Schedule for implementing the nonpoint source management measures identified in this plan that is reasonably expeditious. IDEM elements 21, 25, and 26

7. A description of interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented. IDEM elements 21, 25, and 26

8. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards. IDEM element 22, 26, and 27

9. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item (8) above. IDEM element 26 and 27

INSTRUCTIONS

SECTION 1: WATERSHED COMMUNITY INITIATIVE

1. Community Initiative

Include a brief explanation of the initial concerns and reasons that led to the project being initiated. A concern is an issue or topic that a stakeholder believes is relevant to the watershed. It should mention who initiated the effort to develop a WMP and explain who the local groups or individual leaders are.

2. Steering Committee

Briefly describe how the steering committee was formed. If the steering committee created a mission or vision statement, include it in this section. In a table, list the steering committee members and their affiliation to the project. Steering committee members should be involved in the watershed plan development process and can assist with developing concerns, identifying critical issues, and setting goals.

Example steering committee table:

Steering Committee Member	**Affiliation**
John Smith	Indiana State Department of Agriculture
Betty Johnson	Farmer
Shane Miller	Agribusiness
Danielle Weltz	The Nature Conservancy

3. Public outreach and Stakeholder Concerns

In the plan, describe how stakeholder involvement in the project was generated. Briefly describe any public meetings or outreach efforts, along with the dates that they occurred that were used to generate stakeholder involvement. In a table, list all the concerns (regardless of whether the committee decides to focus on them or not) of the steering committee and those collected from stakeholders at public meetings or outreach efforts. Stakeholder concerns should help shape the overall goals of the watershed plan. Stakeholder surveys conducted as part of your project may be discussed here or elsewhere in the WMP as deemed appropriate.

Example Stakeholder Concern Table:

Concern
Livestock Access to Streams/Sensitive Areas
Septic System Failures
Excessive Nutrients entering Streams
Streambank Erosion
Gully Erosion
Sediment entering Streams
Overgrazed Pastures

No Residue/Cover on Fields
Invasive Species invading Areas
Trash/Dumping Sites
Flooding
No Riparian Buffers
Expansion of impervious areas
Increase of stormwater runoff
Algal blooms
Effects of logging
Lack of water quality or conservation education

SECTION 2: OVERALL WATERSHED INVENTORY

The Overall Watershed Inventory should focus on data at the whole watershed project scale and includes geology/topography, hydrology, soils, land use, and planning efforts. These topics are generally broad and may not easily be summarized at the subwatershed scale. Other information to consider adding to this section includes historical, cultural, climate resiliency, and socioeconomic aspects that may influence how the watershed management plan is implemented.

4. Geology/Topography Characteristics

Include a narrative of important geologic and topographic features that define the watershed's drainage patterns. Features to potentially be described include bedrock, past glacial movement, elevation, and karst topography. If there is karst topography, there should be a description of the magnitude and general distribution of features throughout the watershed along with a map showing where karst features are located.

5. Hydrology Characteristics

Include an overview of the hydrology as it pertains to the watershed. Features to discuss would be streams, lakes, wetlands, and subwatersheds. The narrative should include how many stream miles, how many lakes and total acreage of lakes, and total wetland acreage. There should also be a discussion on how these features are used in the watershed (recreation, drinking water, economics, development, etc). If legal drains exist, it should be noted in which counties and the potential impacts it has to the implementation of the watershed management plan. A description of man-made modifications to hydrologic features should be noted and how these modifications impact the hydrology or the use of those features (dams, reservoirs, channelization, tile drains, dredging, beaches, waterfront development, dikes, berms, etc).

There should be map(s) that clearly show where lakes, streams, wetlands, and subwatershed boundaries are located. Prominent lakes and streams should be labeled. Subwatersheds should be labeled with the 12- or 10-digit Hydrologic Unit Code (HUC) and subwatershed names. A list of the subwatersheds by HUC and name that also includes acreage must be included. If

flooding is a concern in the watershed, a floodplain map should be included or any places where flooding is an issue should be highlighted. A map of legal drains may be included if available.

6. Soil Characteristics

Include a narrative of pertinent soil characteristics that apply to the watershed and how they can potentially impact water quality. This should include at a minimum highly erodible soil (HES), hydric soils, and septic system suitability. If failing septic systems are a potential pollutant source, there should be an estimate of the number of septic systems in the watershed and how many are failing. Include map(s) showing HES, hydric soils, and septic system suitability and quantify those three soil characteristics according to acreage and the percentage of total watershed area they cover.

7. Land Use Characteristics

Include a description of general land use in the watershed and an explanation of how current land uses or land use trends can potentially impact water quality in the watershed. Types of land use may include agricultural, development, pasture, forested, open water, etc. Each type of land use should be quantified by acreage and percent area cover throughout the watershed. There should also be a map showing the different land uses in the watershed. Development land use may be broken out into intensity (high, medium, and low intensity). Tillage transect information may be included in the agricultural land use description.

There should also be a narrative of major point and nonpoint source pollutants that are potentially impacting the watershed. Potential point sources may include National Pollutant Discharge Elimination System (NPDES) facilities, Confined Feeding Operations (CFOs), Concentrated Animal Feeding Operations (CAFOs), Combined Sewer Overflows (CSOs), Sanitary Sewer Overflow (SSOs), brownfields, superfund sites, and Leaking Underground Storage Tanks (LUSTs). Potential nonpoint sources may come from runoff of row crop activities, livestock activities, mining activities, forestry activities, and urban development. Each potential point and nonpoint pollutant source should be quantified and magnitude explained.

If applicable, the land use characteristic section should also include information on the fertilizer use on urban and suburban land, manure application or storage, an estimate of the amount of pet and/or wildlife waste, and a description of unsewered areas. If large unsewered areas exist, include a map that displays those communities.

8. Other Planning Efforts

Explain how other past and current planning efforts can potentially impact water quality in the watershed. For each plan, there should be a narrative that includes:

a. how the plan relates to water quality,
b. how it relates to the development or implementation of the watershed management plan,
c. the area of the watershed that the plan affects,
d. the year the plan was or will be completed,
e. and who wrote the plan.

Report and planning efforts may come from local governments (city or county master plans, county Soil and Water Conservation plans), Indiana state agencies (IDEM, DNR, Indiana State Department of Agriculture, Indiana Department of Health), or federal agencies (U.S. EPA, United States Fish and Wildlife Services, United States Department of Agriculture, Natural Resources Conservation Services, United States Geological Survey). Specific types of plans may include IDEM TMDL Reports, CSO long-term control plans, wellhead protection plans or source water protection plans, other watershed management plans, Stormwater Quality Management Plans, and DNR Lake and River Enhancement studies.

9. Threatened and Endangered Species

Include a description of threatened or endangered aquatic species that are known to exist or historically exist in the watershed. The type of habitat they prefer, what is potentially impacting their populations, and any ongoing conservation efforts should be noted. It should not just be a list of all aquatic and terrestrial species from the Indiana Natural Heritage Data Center or county list (those lists can be added as an appendix).

10. Connections and Relationships

Many of the watershed characteristics in Section 2: Overall Watershed Inventory (elements 4-9), when examined together, help provide a clearer picture of the water quality issues. There should be a lengthy narrative that summarizes the relationships between these elements, the main pollutant source(s) for the watershed, impacts to nonpoint source pollution, and how they relate to stakeholder concerns from element 3. Each element (4-9) should be analyzed when completing the narrative.

Examples of characteristics and water quality issues they illustrate include:

- *Population centers and soils unsuitable for septics—their overlap may show the scope of an E. coli source.*
- *Topography and soil type—their overlap may show the most important HES to protect from erosion.*
- *Hydrology, land use, and population centers—their overlap may show specific types of urban pollution sources.*
- *Soils and location of construction—their overlap may show HES that need extra erosion control BMPs during construction or hydric soils that should be protected.*
- *Endangered species and hydrology/soil types—their overlap may show soils that would support needed habitat for an endangered species.*

SECTION 3: SUBWATERSHED INVENTORIES

This section of the Watershed Inventory must have a narrative section for each individual subwatershed (12-digit HUC) within the project area. Projects at the 10-digit HUC scale may combine several subwatersheds' narrative sections into one section if the data is similar across those HUCs. Each narrative section is to include information from elements 13 and 14 and begin with a map of the subwatershed being discussed. Elements 11 and 12 relate to the water quality data that is used in element 13 and may be discussed at the whole watershed level as long as sampling methodology was consistent throughout the entire watershed.

If information discussed in Section 2: Overall Watershed Inventory has specific applicability at the subwatershed scale, those details should be included when the pertinent subwatershed is discussed in Section 3: Subwatershed Inventories, as shown in the examples below.

Example 1: A Regional Sewer District may cover the entire project area and best be summarized within Part One of the Watershed Inventory. However, if the District is installing sewers in subwatershed X, that specific information should be discussed in the section on subwatershed X.

Example 2: In Part One of the Watershed Inventory, data across the entire watershed may show specific land uses where wildlife or pet waste could be a pollution source. Those land uses may dominate certain areas at the subwatershed level, and that distinction should be highlighted in Part Two of the Watershed Inventory.

11. Data Targets

In a table, identify targets for water quality (physical and chemical), biological, and habitat parameters of concern for the purpose of interpreting inventory data and defining problems. A target is the desired measurable level of a water quality or habitat/biological parameter that the stakeholder group has decided streams in the watershed should meet. Reasoning or references of used data targets should also be provided. If an Indiana State Standard exists for a parameter of concern, your target must be at least as stringent as that standard. If a TMDL exists for your watershed, your target must be at least as stringent as the TMDL target. It is acceptable to set a standard that is higher than the Indiana State or TMDL standard. IDEM has an online guidance document with examples of commonly used water quality targets and references.

Example data target table:

Parameter	**Target**	**Reference**
Dissolved oxygen	> 4 mg/L and < 12mg/L	Indiana Administrative Code (327 IAC 2-1-6) & Consolidated Assessment and Listing Methodology (CALM)
E. coli	< 235 CFU/100mL in a single sample. And, < 125 CFU/100mL geometric mean from 5 equally spaced samples over a 30-day period.	Indiana Administative Code (327 IAC 2-1.5-8)
Nitrate-nitrite	< 1.0 mg/L	2001 OH EPA
Turbidity	≤10.4 NTU	U.S. EPA recommendation
Macroinvertebrate Index of Biotic Integrity (mIBI)	>35	IDEM (2012)

12. Data Sources and Methodology

This section should include a description of each data set that is used in the watershed management plan. For each data set, there should be a narrative that includes who conducted

the study, the name and publish date of the report, background, when monitoring was completed, how often monitoring occurred, methodologies, and how the data will be used to develop the watershed management plan. Methodologies for collecting windshield survey, desktop survey, water quality parameters, habitat data, and biological data that was collected as part of the grant should be included in this section. A map of the entire watershed with subwatershed boundaries and sampling locations that occurred during the project should be included.

A desktop survey is a method of collecting watershed field information using desktop tools such as maps, geographic information systems (GIS), online mapping software such as Google Maps and Google Earth, and other geographic data and information sources such as IndianaMap and the Indiana Geographic Information Office. A windshield survey is a method of collecting watershed field information by driving through the watershed (or parts of it) and observing areas or practices of concerns. More information about desktop and windshield surveys may be found in the Watershed Inventory Workbook for Indiana.

The following elements 12a-k is a list of outside data sources to be considered. The age of data should be considered before including it in the WMP. Data older than 5 years can often show trends, but changes in the watershed may affect data's relevance. When deciding to include any data older than 5 years, IDEM recommends careful consideration of watershed changes that have occurred since the data was originally collected. The EPA Handbook for Developing Watershed Plans to Restore and Protect Our Waters has information on summarizing data.

a. IDEM Office of Water Quality Data
    I. 305b and 303d lists. On the appropriate subwatershed map, include impaired waterbodies
    II. TMDL Report data and conclusions
    III. Watershed Assessment and Planning Branch surface water data
b. DNR LARE Diagnostic Studies
c. Other WMPs
d. United States Geologic Survey Reports and Data
e. Flow gauges (data does not have to be discussed, but may be used to calculate loads as appropriate)
f. Local Universities
g. Municipalities
h. Local health departments
i. Local storm water program
j. County Soil and Water Conservation Districts
k. IDEM Hoosier Riverwatch

13. Water Quality Data Analysis

For each subwatershed, analyze the water quality data that was collected during the WMP development process or from other data sets identified in element 12. It may include an analysis of physical water quality, chemical water quality, flow, habitat, and biological data. The characterization and analysis process should help focus management efforts on the most pressing needs in the watershed. The number of samples, minimum measurement, maximum

measurement, mean/median, and number of samples meeting the targets should be discussed for each parameter. There should be a map for each subwatershed that includes the sampling locations for each subwatershed, if relevant, and sampling locations from reports whose data was referenced. 303(d) impaired waters should also be shown on each subwatershed map.

14. Land Use Information

The land use information section is a detailed examination of land use presented at the subwatershed scale. It should examine land use data relevant to all stakeholder concerns as well as other land use concerns discovered during the collection of data. It should include all relevant information from element 7. A desktop survey or windshield survey may be used to gather needed information for this section. The following information must be included (if applicable to the subwatershed being discussed):

a. The following concerns should be described, quantified, and mapped on the appropriate subwatershed map.
   i. Streams needing buffers (mi. or # of locations)
   ii. Stream banks needing stabilization (mi. or # of locations)
   iii. Livestock access areas
   iv. Illegal dump sites
   v. Large unsewered communities
   vi. Combined Sewer Overflow
   vii. Concentrated Animal Feeding Operations, Confined Feeding Operations

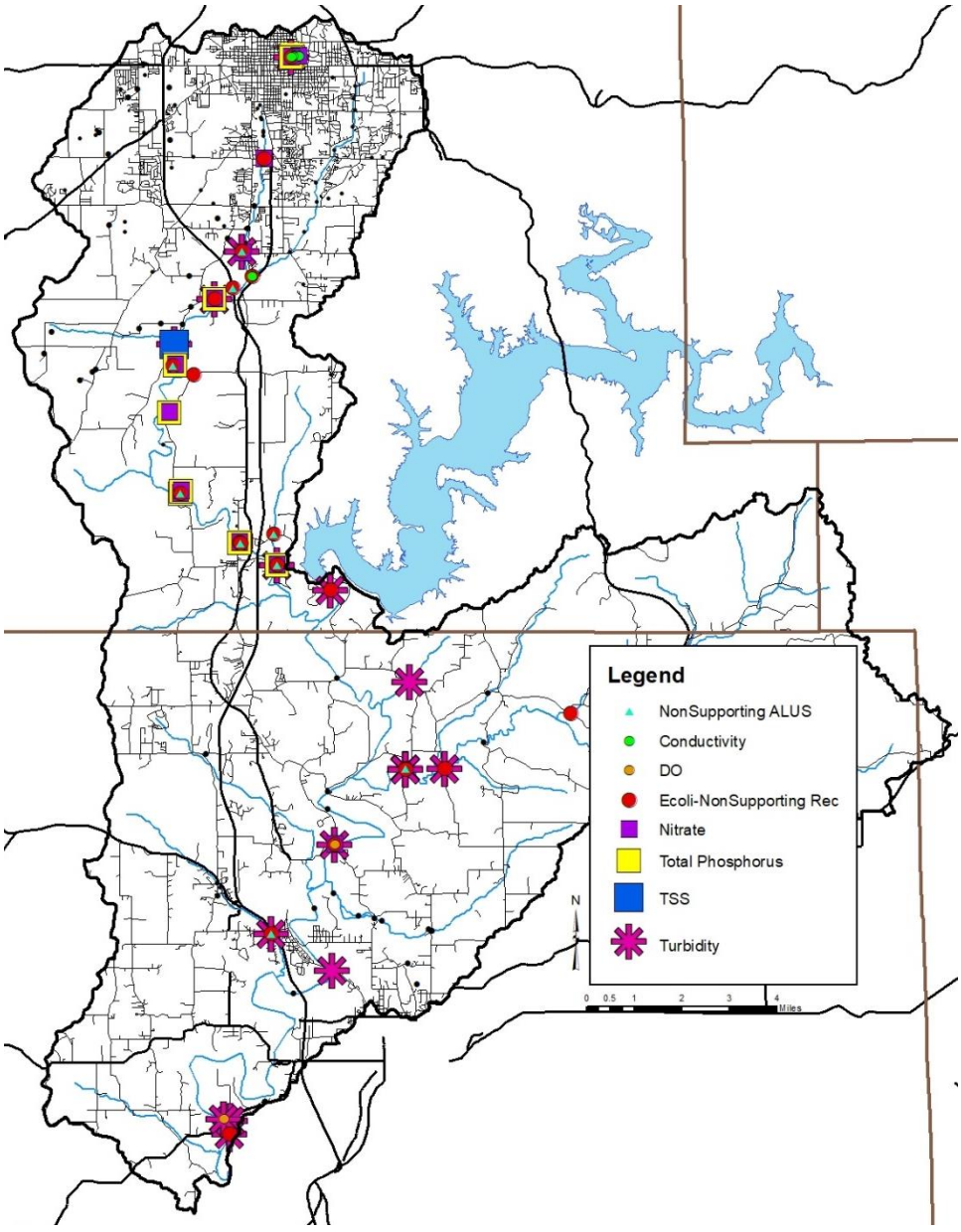
b. The following concerns should be described and quantified if known but do not have to be mapped:
   i. Fertilizer use on all land uses. This would include application of municipal wastewater sludge or manure.
   ii. Unregulated animal farms and non-agricultural animal operations such as fairgrounds and kennels
   iii. Pet and wildlife waste
   iv. NPDES facilities
   v. Brownfields
   vi. Abandoned mines
   vii. Leaking underground storage tanks (LUSTS)
   viii. Other remediation sites

SECTION 4: WATERSHED INVENTORY SUMMARY

15. Watershed Inventory Summary

The watershed inventory summary should be a brief recap of important inventoried data and relationships from Sections 2 and 3. Instead of restating every datum from Sections One and Two, provide a narrative summarizing important findings, relationships, or trends that the data showed. It may include summarized data from physical and natural features, land use and population characteristics, waterbody conditions, pollutant sources, and waterbody monitoring data. This section should explain how that information can be used to better understand the stakeholder concerns and the direction they give to the watershed planning process. As part of

the summary, include map(s) summarizing the important results from water quality and habitat/biology monitoring along with desktop and windshield surveys. The map(s) can be of the entire watershed and include water, habitat, and biology data if the data can be clearly labeled. Every exceedance does not need to be mapped. The purpose of the map(s) is to represent the cumulative data and to highlight the range of results. Subwatershed boundaries should be shown on the map(s).



Example: Figure 1. Lower Salt Creek Watershed historical sampling sites that exceed target values.

IDEM Disclaimer: The sampling locations and data represented on the map above are for educational purposes only and may not accurately represent this specific watershed.

16. Analysis of Stakeholder Concerns

Put every stakeholder concern from element 3 and others that may have been found during the Watershed Inventory in a table. Based on the information collected in the Watershed Inventory, decide which concerns are supported by the collected data, what evidence there is for each concern, and whether the concern is outside the project's scope. The evidence column should include numerical data if available. Finally, identify which concerns the group chose to focus on. This process should be completed by the steering committee. If the group chose to not focus on a concern that is supported by data, that decision needs to be explained in a narrative for each concern that will not be addressed.

Example:

Concern	Supported by our data?	Evidence	Outside Scope?	Group wants to focus on?
Water Quality throughout the Watershed Needs Improved	Yes	2024 303d List of Impairments 398 Stream Miles	No	Yes
Contaminated Runoff entering Streams	Yes	Windshield Survey Results 440 sites	No	Yes
Livestock Access to Streams/Sensitive Areas	Yes	2024 303d List of Impairments for E. coli 382 Stream Miles	No	Yes
		Windshield Survey Results 84 sites		
Septic System Failures	Yes	2024 303d List of Impairments for E. coli 382 Stream Miles	No	Yes
		Septic Suitability Data – 99% of Soils - Very Limited		
		Failing septic systems are listed as a potential source in the TMDL		
Excessive Nutrients entering Streams	Yes	2024 303d List of Impairments for Nutrients 35 Stream Miles	No	Yes
		83% (76/92) of the samples did not meet the target for nitrite-nitrate		
		55% (51/92) of samples did not meet target for phosphorus		
Streambank Erosion	Yes	Windshield Survey Results 108 sites	No	Yes
Gully Erosion	Yes	Windshield Survey Results 58 sites	No	Yes
Sediment entering Streams	Yes	Windshield Survey Results 573 sites	No	Yes
		36% (36/100) of sample did not meet target for TSS		
		48% (137/284) of samples did not meet target for turbidity		
Overgrazed Pastures	Yes	Windshield Survey Results 103 sites	No	Yes
No Residue/Cover on Fields	Yes	Windshield Survey Results 38 sites	No	Yes

		Tillage Transect Data 49% of Corn is Conventional Till		
Invasive Species invading Areas	No	No	Yes	No
Trash/Dumping Sites	Yes	Windshield Survey Results 36 sites	No	Yes
Flooding	Yes	Data from County Highway Depart.	No	Yes
Inadequate Riparian Buffers	Yes	Windshield Survey Results 46 sites 26 Stream Miles Aerial Imagery	No	Yes
Expansion of impervious areas	Yes	GIS imagery, historical land use	Yes	No
Increase of stormwater runoff	Yes	Data from County Highway Depart.	No	Yes
Algal blooms	Yes	2024 303d List of Impairments	No	Yes
Effects of logging	Yes	Windshield Survey Results 18 sites	No	Yes
Lack of water quality or conservation education	Yes	2024 303d List of Impairments 398 Stream Miles	No	Yes

17. Causes

Include a table showing the concerns that the group wants to focus on from element 16 and pair them with the potential causes of the concerns. A cause is an event, agent, or series of actions that produces an effect. Causes may include specific pollutants, social behaviors, etc. Causes of water quality problems must be defined as a specific pollutant parameter, but secondary causes may also be identified. If you cannot identify a concern's potential cause, it may be that your concern is too broad and you should try to narrow it.

Example:

Concerns	**Potential Cause(s)**
Water Quality throughout the Watershed	High Nutrient Levels Sedimentation High E.coli Levels Degraded Habitat & Biodiversity
Contaminated Runoff entering Streams	High Nutrient Levels Sedimentation High E.coli Levels Degraded Habitat & Biodiversity
Livestock Access to Streams/Sensitive Areas	High Nutrient Levels Sedimentation High E.coli Levels Degraded Habitat & Biodiversity
Septic System Failures	High E.coli Levels High Nutrient Levels
Excessive Nutrients entering Streams	High Nutrient Levels
Streambank Erosion	Sedimentation High Nutrient Levels Degraded Habitat & Biodiversity
Gully Erosion	Sedimentation High Nutrient Levels Degraded Habitat & Biodiversity
Sediment entering Streams	Sedimentation High Nutrient Levels

	Degraded Habitat & Biodiversity
Overgrazed Pastures	Sedimentation High Nutrient Levels High E.coli Levels Degraded Habitat & Biodiversity
No Residue/Cover on Fields	Sedimentation High Nutrient Levels Degraded Habitat & Biodiversity
Trash/Dumping Sites	Degraded Habitat & Biodiversity
Flooding	Sedimentation High Nutrient Levels Degraded Habitat & Biodiversity
Inadequate Riparian Buffers	Sedimentation High Nutrient Levels High E.coli Levels Degraded Habitat & Biodiversity
Increase of stormwater runoff	Sedimentation High Nutrient Levels High E.coli Levels Degraded Habitat & Biodiversity
Algal blooms	Degraded Habitat & Biodiversity Reduced Recreation
Effects of logging	Sedimentation
Lack of water quality or conservation education	Poor conservation decisions

18. Sources

In a table, pair causes identified in element 17 with the appropriate source(s) of that cause. A source is an activity, material, or structure that results in a cause of nonpoint source pollution and needs to be controlled. Without knowing where the pollutants are coming from, you cannot effectively control them and restore and protect your watershed. The magnitude of the source(s) across the watershed and which subwatersheds the source(s) are a larger problem should also be listed for each source. Numerical data should be provided to support the magnitude of the sources. Sources are not needed for administrative or social problems.

Example:

Potential Cause(s)	**Potential Source(s)**
- TSS levels exceed the target set by this project	3 developing sites with improper construction practices along the urban fringes in the subwatersheds Christina Creek and Lilly Run. 6 of 8 stream miles along the headwaters of Kettering Ditch are unbuffered. Approximately 3500 acres of row crops in the watershed are conventionally tilled.
- Nutrient levels exceed the target set by this project -Targeted nutrient reduction education does not exist	14 CSOs and urban fertilizer in the headwaters of Christina Creek, Lilly Run, and Kettering Ditch. 35 documented livestock access points and agricultural fertilizer in the subwatersheds Lilly Run,

	Kettering Ditch, and Rockne Run. 14 of 18 stream miles in Rockne Run are unbuffered.
-*E. coli* levels exceed the water quality standard	14 CSOs in the headwaters of Christina Creek, Lilly Run, and Kettering Ditch. 35 documented livestock access points in the subwatersheds Lilly Run, Kettering Ditch, and Rockne Run.

SECTION 5: POLLUTANT LOADS, CRITICAL AREAS, & GOALS

19. Current Pollutant Loads and Needed Reductions

Current pollutant loads along with needed load reductions should be calculated for each main pollutant. There should be a description of how pollutant loads and load reductions were calculated along with a table that lists current loads for each pollutant identified as a concerns' cause, the target loads (based on water quality targets from element 11), and the reductions needed to meet the target loads. Current pollutant loads and needed reductions should be calculated for the entire watershed and may be calculated for each subwatershed if desired. For waters with an approved TMDL, the calculated load reductions should incorporate the findings from the TMDL.

There are several ways to characterize current loads for mass-based pollutants such as nutrients and sediment. There are two general types of techniques for estimating pollutant loads: (1) Estimation based on actual monitoring data taken during the project and (2) Estimation using models to predict simulated pollutant loads. At a minimum, groups should summarize loads as pounds or tons/year on an annual basis. Depending on sampling locations, loads may be able to represent the entire watershed or smaller parts such as subwatersheds or individual sampling sites. Consider what geographic area you want loads to represent when choosing your project's sampling sites.

Escherichia coli (E. coli) has no mass and its "load" is expressed as a concentration of colony forming units (cfu). Unless your watershed has a TMDL with an E. coli load, the easiest way to summarize E. coli is by averaging your samples. Since the E. coli water quality standard is in effect during the recreational season (April through October) it is acceptable to only average E. coli (as cfu/100ml) during those months; although it can be averaged year-round, if desired. No matter the pollutant, it is acceptable for groups to calculate loads over smaller time periods, such as per season, month, or flow condition. Groups may also calculate loads for specific land uses, using L-THIA (see below), if they choose.

Data availability affects which load calculation methods can be used. IDEM encourages watershed groups to consider what geographic region (entire watershed, subwatershed, each sampling site, etc.) the loads should represent, but does not mandate that the loads be calculated for a specific geographic area or using a certain method. Using models to create loads is acceptable. Some of the more common types of these models are:

1. Long-term Hydrologic Impact Assessment (L-THIA) - determines the average impact a land use change will have on annual runoff and average amount of several nonpoint source pollutants including sediment, nutrients, and fecal coliforms.
2. Pollutant Load Estimation Tool (PLET) - calculates nutrient and sediment loads at the watershed level.
3. Load Duration Curve Tool - a tool that provides an interactive process to develop load duration curves, which identify loading capacities relative to a target concentration. The program requires input data for daily mean streamflow (in cfs) and constituent parameter concentration (mg/L, ug/L). It provides a way to characterize water quality concentrations at different flow regimes.
4. Spreadsheet Tool for the Estimation of Pollutant Load (STEPL) – a spreadsheet model that can compute annual runoff, sediment load, nutrient loads, and 5-day biological oxygen demand. The model is designed to estimate annual non-point source pollutant loads.
5. Indiana E. Coli Calculator (IEC): a spreadsheet tool that estimates the E. coli contribution from multiple sources and calculates load reductions of best management practice (BMP) installations.

Example for total phosphorus load and reduction estimate:

Subwatershed Name	**Size (acres)**	**Existing Annual Load (lb/yr)**	**Target Annual Load (lb/yr)**	**Annual Load Reduction Needed (lb/yr)**
Logan Creek	14,887	33,600	20,100	13,500
Duff Ditch	14,694	33,100	19,900	13,200
James River	15,700	35,400	21,200	14,200
Total	45,281	102,100	61,200	40,900

20. Critical Areas

Use inventoried data (element 4-14), current loads (element 19) and potential sources (element 18) to identify critical areas where best management practices or measures will be needed to address the nonpoint source pollution causes and achieve project goals. Critical areas should be where the most pollution is generated and should be given priority to conservation practice implementation. For each critical area, describe the critical water quality pollutants and their sources. The critical areas for each primary pollutant source should be indicated. A map of the critical areas should be included that clearly shows which areas are critical and their priority if applicable. This can be done on one map or several placed in consecutive order in the WMP.

Critical areas are defined areas where WMP implementation can remediate nonpoint pollutant sources in order to improve water quality and/or can mitigate the impact of future sources to protect water quality. The reduction of runoff intensity may be designated as a critical activity because decreasing flow is directly related to a decrease in pollutant load and reduces erosion potential of streambanks. However, this does not mean that Section 319 funds can address flooding concerns but does mean that projects showing a decrease in flow reaching a Water of the State may be considered eligible.

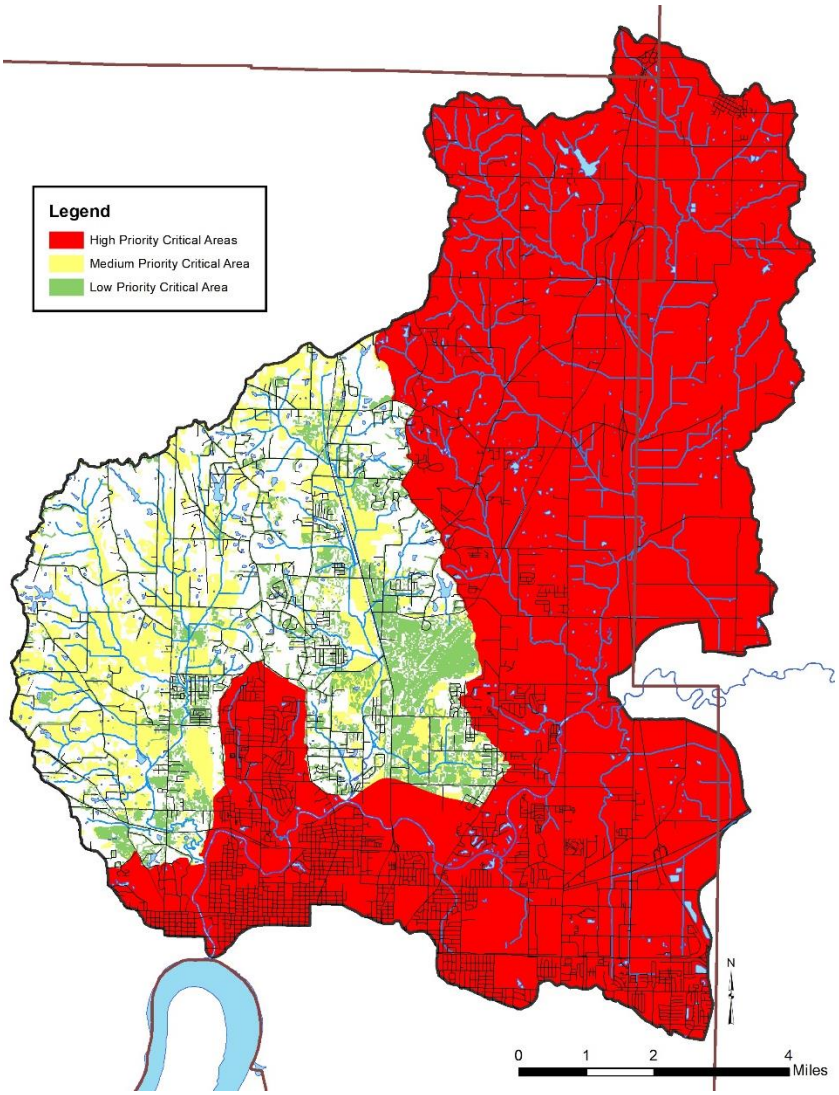
Critical Areas cannot be defined as:

- The entire project area
- A group of geographic areas which when combined make up the entire project area.
- A source or land use that covers 100% of the entire project area (ex: If the entire project area is HES, all HES cannot be designated as critical).
- Every stream and/or every stream buffer (regardless of buffer width) within the entire project area.

For more information on how to identify critical areas, please visit IDEM's website at: https://www.in.gov/idem/nps/files/wmp_critical_area_guidance.pdf

Within a WMP and following the above guidelines, critical areas should be identified as one or a combination of the following descriptions:

1. 12-digit HUCs or smaller geographic areas where a particular pollutant needs to be addressed to meet the water quality goals of the WMP. If the watershed project area is smaller than a 10-digit HUC, an entire 12-digit HUC cannot be designated as a critical area. However, if the project area is one 10-digit HUC or larger, one or several (but not all) entire 12-digit HUCs can be designated as critical areas *(example: Two of the five HUC-12 watersheds in the Project Area Wildcat Creek-Flatrock Creek watersheds are Nutrient Critical Areas [see example figure below]).*
2. Specific region within a 12-digit HUC or smaller geographic area where a particular source(s) is contributing a pollutant of concern and needs to be addressed to meet the water quality goals of the WMP *(example: A municipality that lies within a subwatershed can be a critical water quality improvement area for urban construction, CSOs, and reducing TSS through the reduction of flow).*
3. Specific source(s), anywhere in the project area, that are contributing a pollutant of concern *(example: An entire watershed can be a critical water quality improvement area for cattle crossings. Therefore, the entire watershed can be a critical water quality protection area from future CAFOs).*



Example of Critical Areas: Figure 2. Lower Pigeon Creek critical areas.

21. Goal Statements

Now that you have characterized and quantified the concerns and causes in the watershed, you need to develop goal statements that will help achieve target pollutant loads and improve water quality. Water quality improvement or protection goal statements should be developed based on the calculated loads and load reduction needs from element 19. Education or outreach goal statements should target audiences in the watershed and should promote the adoption of management practices that will help achieve target pollutant loads. Social or administrative goal statements may also be developed and should help ensure the sustainability of the watershed management plan.

Each goal statement needs to include:

a. Concern or pollutant

b. Current pollutant load or current pollutant concentration for water quality goal statements, or current condition of the problem for social/administrative goal statements.
c. The target pollutant load, concentration, or condition of the concern (the target is your goal).
   If water quality standards exist for a pollutant, the goal, at a minimum, must be to meet that standard. If a TMDL has been developed for the watershed, the goal, at a minimum, must be designed to achieve the pollutant load reduction called for in the TMDL.
d. A timeframe for when the group expects the goal to be met. One method of drafting timeframes is to estimate, using the load reductions associated with each BMP, how many BMPs would have to be installed to meet the goal and how long that realistically may take. Consider developing a schedule with milestones to help stay on track for meeting the goal.

Example TSS Goal Statement: Excess TSS has been identified as a problem. We want to reduce the watershed's TSS load from 4,500,000 lbs/yr to 4,050,000 (a 10% reduction) within 20 years.

Example Nitrogen Statement: Reduce the nitrogen load. The load reduction needed to meet the annual load target of 1.6 mg/L is 297,800 lbs/yr.

Decrease the nitrogen load by 20% in 3 years (59,560 lbs)
Decrease the nitrogen load by 40% in 6 years (119,120 lbs)
Decrease the nitrogen load by 60% in 9 years (178,680 lbs)
Decrease the nitrogen load by 80% in 15 years (238,240 lbs)
Decrease the nitrogen load by 100% in 20 years (297,800 lbs)

Example E. Coli Statement: Reduce the E.coli load not only to meet the single sample water quality target of <235 cfu/100 ml, but to have impaired stream segments delisted. We want to reduce the watershed's E.coli load from 5.51E+14 to 4.50E+14 (18%) by 2053.

Decrease the E.coli load from 5.51E+14 to 5.18E+14 (a 6% reduction) within 10 years.
Decrease the E.coli load from 5.18E+14 to 4.84E+14 (a 7% reduction) within 20 years.
Decrease the E.coli load from 4.84E+14 to 4.50E+14 (a 7% reduction) within 30 years.

Example Outreach Statement: Increase public awareness of water quality concerns and how individual choices impact the watershed.

Educate stakeholders on agriculture and urban resource concerns through 2 workshops and/or publications that are representative of the project area per year for 20 years.

22. Goal Indicators

For each goal statement in element 21, develop indicators and numeric targets to quantitatively measure how progress towards meeting the goals will be measured and tracked. For water quality restoration goals, select indicators that will show environmental changes in the aquatic ecosystem (such as benthic macroinvertebrate indices, fish community indices, or habitat evaluations) or water chemistry (such as pollutant concentration or reduced loading) and describe them in the plan. For non-water quality restoration goals, select indicators that will show administrative or education success (such as number of people at meetings, number of field days held) or social change (such as measured change through a social indicators survey). Information on selecting social indicators may be found in The Social Indicator Planning and Evaluation System for Nonpoint Source Management. Programmatic indicators may also be used to help measure progress towards meeting your goals.

Example TSS Goal Indicator:
Water Quality and Social data will be used as indicators to show progress toward attaining this goal. The environmental indicator will be TSS testing conducted at each site on a monthly basis for 30 months after the first implementation phase is complete. The social indicator will be surveys that measure the social changes created through our education program.

Example Nutrient Goal Indicator:

Objective	Time Frame	Indicator
Promote the installation of field tile inlet buffers on 100% of field tile inlets within 5 years	2022-2027	# of publications distributed \# of people attending workshops # of field tile inlet buffers installed Pounds of phosphorus and nitrogen reduced from the calculated load reductions for the buffers installed Water quality improvements based on monitoring for P and N

SECTION 6: ACTION REGISTER AND FUTURE ACTIVITIES

23. Best Management Practices (BMPs) and Measures

List the BMPs and measures identifying which BMPs or measures are appropriate that will achieve load reductions needed from element 19 and the goal statements from element 21. Each listed BMP should be paired with which pollutant(s) it would help reduce and which critical area(s) should be targeted for the implementation of that BMP or measure. Consider right-of-ways, neighborhood association by-laws, zoning requirements, and other ordinances that may impede the ability to implement BMPs or measures in the critical areas established in element 20. Do not list every possible BMP or measure that would be appropriate for every conceivable circumstance in your watershed—only list BMPs or measures you want to focus on during implementation (regardless of Section 319 eligibility). Numerous models are available to determine which BMPs are more appropriate for reducing pollutant loads and to aid in selecting the locations most likely to achieve the greatest load reductions. A brief description for each main BMP or measure that will be used should be included (may be as an Appendix).

Example:

Critical Area	**Reason for being critical**	**BMP or Measure**
Lilly Run, Kettering Ditch, and Rockne Run subwatersheds	*E. coli*	Ordinance Education for Local Planners
		Cattle Exclusion/Alternative Watering
		Septic System Maintenance Workshops
The city of Athens that lies within the Kettering Ditch subwatershed	Increased flow and pollutant loads due to urbanization	Low Impact Development Workshops
		Ordinance Education for Local Planners
		Vegetative Swale
		Rain barrels/Cisterns
Salt Creek Watershed	Cattle crossings	Cattle Exclusion/Alternative Watering
		Nutrient Application Management

24. Expected Load Reductions

Using the PLET, Region 5 Load Estimation Spreadsheet Model (Region 5 Model), or other appropriate methods, calculate estimated load reductions of pollutants for each individual BMP and present the results in a table.

The PLET model calculates nutrient and sediment load reductions for BMPs at the watershed level. The Region 5 Model provides gross estimates of sediment and nutrient load reductions for BMPs at the field level. If a methodology that estimates load reductions does not exist for certain BMPs, state that in the WMP. Estimated load reductions, along with estimated costs, can help you calculate the resources needed to achieve your goals. The table should include, the expected load reduction for each BMP, and the target amount to install for each BMP. Make sure to include the amount of BMP that the load reductions were calculated for. For example, 1 acre of cover crop would reduce sediment by 1 T/yr, phosphorus by 2.6 lb/yr, and nitrogen by 5.1 lb/yr. *E. coli* reductions are not easily modeled. However, BMPs known to reduce *E. coli* should be listed and pollutant reductions from those BMPs, but associated with other pollutants, included in the table. Compare the estimated BMP load reductions to the load reduction needed to meet water quality targets set in element 21 reductions.

Example:

Practices	**Target Amount to Install**	**Sediment Reduction (T/yr)**	**Phosphorus Reduction (lbs./yr)**	**Nitrogen Reduction (lbs./yr)**	**Targeted Subwatersheds**
Alternate Watering Systems	3,750 acres (@75 systems)	11,250	150,000	31,875	Rocky Run, Duff Ditch, Green River
Buffer Strip (Shrub/Tree)	2.3 acres	20.7	20.7	39.1	Rocky Run, Duff Ditch
Conservation Tillage/No till	3,000 acres	33,000	27,000	36,000	Rocky Run, Green River, Miles River
Cover Crop	22,500 acres	38,250	58,500	114,750	Rocky Run, Duff Ditch, Green River, Miles River
Load reduction from target amount of BMPs		82,520	235,520	182,664	
Load reduction needed to meet water quality targets		112,000	242,050	1,112,541	
Load Reduction still needed to meet target		29,480	6,530	929,877	

* All load reductions are examples and do not represent actual Region V or STEPL calculations. Real examples will likely have several more types of BMPs represented.

25. Action Register Table

The action register is a table displaying each goal's scheduled objectives and milestones, estimated financial costs, and possible partners. It should have a timeline of when each phase of the step will be implemented and accomplished, as well as the agency/organization responsible for implementing the activity. The action register table should include the following components:

a. Identify specific objectives designed to achieve the goals determined in element 22. Education and outreach objectives should be part of the action register. An objective is a specific and focused strategy that if achieved, will help meet the goals outlined in element 22. Examples of objectives may include installing BMPs, completing measures, securing funding, passing ordinances, completing education workshops or field days, and organizing a volunteer base. Information/education components should be included in the

objectives. These objectives should directly support the goals and implementation of the WMP.

b. List the management practices needed to meet the objective. These may include the BMPs from element 23 or other measures that will be used to achieve the objective.

c. Identify the target audience(s) that you are trying to reach for each specific objective.

d. Include a timeline of when each objective will be implemented and accomplished. The schedule can be broken down into increments to help reasonably track and review progress. It helps to develop milestones using relevant time scales like the following: short-term (0-5 years), mid-term (5-10 years), and long-term (10+ years). Milestones scheduled during the short-term or mid-term stages of implementation must be specific and focused on clearly outlining how the objective will be achieved. Milestones scheduled during the later stages of implementation may be less specific and focused on maintaining the direction of the project: i.e. monitoring, securing funding, updating data, adapting to new circumstances, and updating the WMP. It is important to include an estimate of when water quality goals will be achieved, even if that date extends beyond the plan period.

e. Identify an estimate of financial cost (in dollar amount) for each objective. Financial cost estimates are necessary to determine the estimated cost of implementing the WMP. Financial cost estimates are expected for BMPs and educational/outreach activities, salary, promotional costs, technical costs, travel, training, etc. The type of funding sources that could potentially be used to cover the cost of each activity can also be listed in this section.

f. Identify potential partners and technical assistance needed to implement the plan. For each objective, list which potential partners would be used to reach the objective and milestones related to that objective. Partners are authorities that will be relied on for implementation, in terms of initial adoption or long-term operation and maintenance. Also explain the specific type of technical assistance needed and who will be relied upon to provide it. Technical assistance is a way for groups to use expert help to assess their current capacity, build on strengths, and address underlying needs.

Complete Action Register Example:

TSS Goal Statement:
Excess TSS has been identified as a problem. We want to reduce the watershed's TSS load from 100 tons/year to 25 tons/year (a 75% reduction) within 20 years.

TSS Goal Indicator:
Water Quality and Social data will be used as indicators to show progress toward attaining this goal. The environmental indicator will be TSS testing conducted at each site on a monthly basis for 30 months once the implementation phase is complete. The social indicator will be surveys that measure the behavior changes created through our education program.

Action Register for TSS Goal

Objective	Target Audience	Milestone	Cost	Possible Partner (PP) and needed Technical Assistance (TA)
Develop Sediment Educational Program for Farmers and Developers	AG Landowners and Operators; Contractors and Developers	Within 6 months of implementation starting, develop a survey that determines barriers to farmers and developers utilizing sediment reduction practices	$1,000	PP=Watershed Group (WG) TA=University to create survey
		By end of year 1, develop two educational programs--one for farmers and one for developers--based on survey results	$2,500	PP=WG
		By end of year 2, find source for donated radio and TV PSA time	Estimate of 2 weeks of staff time= $1,700	PP=WG
		By end of year 4, resurvey watershed	$1,000	PP=Watershed Group (WG) TA=University to create survey
		By end of year 5, reevaluate education program	$3,000	PP=WG
		On a 5 year. cycle, continue to educate and reevaluate	$7,000/5 year cycle	PP=Watershed Group (WG) TA=University to create survey
Implement No-Till on 1,000 Acres	AG Landowners and Operators	By 3rd month of implementation, develop a 319 cost share program	$500	PP=WG
		By 6th month of implementation, be using existing SWCD/NRCS educational materials to inform landowners about no-till	¼ of a full time staff =$10,000/year	PP=WG
		By end of year 1, identify non-319 sources of no-till financial assistance	Volunteer based	PP=WG
		Every year, using all known funding sources, implement 200 acres of no-till	Equipment modification costs $2,500 per planter TSP costs $300	PP=WG TA=steering committee to help discuss program with landowners and TSP to write conservation plans
		Once implementation is complete, monitor TSS to measure possible reductions	$175/sample	PP=city wastewater plant runs samples TA=University monitoring design

SECTION 7: TRACKING EFFECTIVENESS

26. Monitoring and Tracking Strategy

A monitoring program should be developed that can track each goal's indicators and evaluate the effectiveness of the implementation efforts over time in reaching the goal statements and indicators outlined in elements 21 and 22. Water quality indicators need to be tracked through water monitoring, modeling load reductions, or other method(s) that documents environmental change. Water quality indicators could be direct measurements (fecal coliform concentrations, pounds of nitrogen, dissolved oxygen content, etc) or indirect indicators (pounds of trash removed, length of stream corridor revegetated, amount of installed livestock exclusion fencing, etc). Education, social, and administrative indicators can be tracked through databases, surveys, marketing tools, or other methods. A table should be included that lists and explains each method that will be used to track indicators, the tracking schedule, the estimated cost for tracking the method, possible partners, and needed technical assistance to track methods along with who can provide it (different from possible partners). Benchmarks to track progress should be included in the schedule.

Example of Monitoring and Tracking Strategy Table:

Tracking Strategy	**Frequency**	**Estimated Cost**	**Partners**	**Technical Assistance**
BMP Load Reductions	Continuously, as installed	NA	SWCDs, NRCS, Indiana Dept. of Agriculture, Ohio EPA	Staff, IDEM, SWCD
Water Monitoring	Yearly	$50,000	Allen SWCD and partners	Staff, SWCD, City of Fort Wayne, St. Joseph River Watershed Initiative, Purdue University Fort Wayne
Windshield Survey	Every 5 years	N/A	SWCDs	Staff
Attendance at Workshops/Field Days	Yearly	N/A	SWCDs, NRCS, Indiana Dept. of Agriculture, Ohio EPA, TNC	NA

An adaptive management strategy should be included in this section which explains the revisions that may occur if benchmarks are not being met. The adaptive management strategy should not change the plan's goals but rather consider revising outreach efforts, best management practice priority, updating or revaluating critical sources areas, or the time needed to reach benchmarks.

27. Future Activities

A WMP is a living document which requires periodic updates as water quality and land use change and BMPs and measures are implemented. Determine criteria for when the plan will be revised. Provide a short description of when the WMP will be re-evaluated and who will be responsible for the re-evaluating and making the revisions or adaptations of the plan. Include contact information for questions about the WMP. Potential future funding sources for implementation could be discussed along with potential future monitoring programs. Also consider describing how key activities and results will be highlighted to the stakeholders and the larger community.