UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 07 2011

REPLY TO THE ATTENTION OF:
WW-16J

Bonny F. Elifritz
Chief, Watershed Planning & Restoration Section
Indiana Department of Environmental Management
100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015

Dear Ms. Elifritz:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Loads (TMDLs) for the Highland-Pigeon Creek Watershed, including support documentation and follow up information. The Highland-Pigeon Creek Watershed is located in southern Indiana in parts of Gibson, Pike, Posey, Vanderburgh and Warrick Counties. The TMDLs address recreational use impairments due to bacteria (*E. coli*) and aquatic habitat impairments due to nutrients (Total Phosphorus).

EPA has determined that the Highland-Pigeon Creek Watershed TMDLs meet the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations set forth at 40 C.F.R. Part 130. Therefore, EPA approves Indiana's fifty-four bacteria TMDLs and three nutrient TMDLs, addressing recreational use and aquatic habitat impairments. The statutory and regulatory requirements, and EPA's review of Indiana's compliance with each requirement, are described in the enclosed decision document.

We wish to acknowledge Indiana's efforts in submitting these TMDLs and look forward to future TMDL submissions by the State of Indiana. If you have any questions, please contact Mr. Peter Swenson, Chief of the Watersheds and Wetlands Branch, at 312-886-0236.

Sincerely,

Tinka G. Hyde
Director, Water Division

Enclosure

cc: Staci Goodwin, IDEM
Ernie Johnson, IDEM

**TMDL:** Highland-Pigeon Creek Watershed TMDL, Gibson, Pike, Posey, Vanderburgh and Warrick Counties, Indiana
**Date:** September 7, 2011

# DECISION DOCUMENT FOR THE HIGHLAND-PIGEON CREEK WATERSHED, INDIANA BACTERIA (*E. COLI*) AND NUTRIENT TMDLS

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. Part 130 describe the statutory and regulatory requirements for approvable TMDLs. Additional information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for EPA to determine if a submitted TMDL is approvable. These TMDL review guidelines are not themselves regulations. They are an attempt to summarize and provide guidance regarding currently effective statutory and regulatory requirements relating to TMDLs. Any differences between these guidelines and EPA's TMDL regulations should be resolved in favor of the regulations themselves.

## 1. Identification of Waterbody, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the waterbody as it appears on the State's/Tribe's 303(d) list. The waterbody should be identified/georeferenced using the National Hydrography Dataset (NHD), and the TMDL should clearly identify the pollutant for which the TMDL is being established. In addition, the TMDL should identify the priority ranking of the waterbody and specify the link between the pollutant of concern and the water quality standard (see section 2 below).

The TMDL submittal should include an identification of the point and nonpoint sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the NPDES permits within the waterbody. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of the natural background. This information is necessary for EPA's review of the load and wasteload allocations, which are required by regulation.

The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as:

(1) The spatial extent of the watershed in which the impaired waterbody is located;
(2) The assumed distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) Population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources;

(4) Present and future growth trends, if taken into consideration in preparing the TMDL (e.g., the TMDL could include the design capacity of a wastewater treatment facility); and
(5) An explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment impairments; chlorophyll a and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

**Comment:**

**Location Description/Spatial Extent:**

The Highland-Pigeon Creek (HPC) watershed is located in southwestern Indiana in the counties of Gibson, Pike, Posey, Vanderburgh and Warrick. The watershed is approximately 516 square miles in size (HUC-8, 05140202). Water in the HPC watershed flows in a south to southwesterly direction to multiple outlet points along the Ohio River. There are 1,156 stream miles in the HPC watershed, the TMDLs address approximately 399 stream miles which are impaired for recreational use by bacteria (*E. coli*) and aquatic habitat use by total phosphorus (TP).

**Land Use:**

Land use information was compiled by the Indiana Department of Environmental Management (IDEM) from the United States Geological Survey (USGS) Gap Analysis Program (GAP). The data source for the land use information was a 1992 GAP data set that identified and mapped different land use categories within the watershed. In 1992, the HPC watershed was composed of 67.3% agriculture, 15.3% forest, 9.4% urban, 6.1% wetland, and 1.9% water (See Table 1 of this Decision Document). During the water quality sample collection in the HPC watershed in 2007-2010, IDEM reported that land use within the watershed was still primarily agricultural with mixtures of forest and wetland uses and some additional suburban growth near cities in the watershed.

**Table 1: Land use approximations in Highland-Pigeon Creek watershed (percentage of total watershed area)**

| Highland-Pigeon Creek Watershed | | |
|---|---|---|
| | ***Percentage of total watershed area*** | ***Total watershed area = approx. 516 square miles*** |
| | *( % )* | *(square miles)* |
| **Agriculture** | 67.3 | 347.27 |
| **Forest** | 15.3 | 78.95 |
| **Urban** | 9.4 | 48.50 |
| **Wetland** | 6.1 | 31.48 |
| **Open Water** | 1.9 | 9.80 |

**Problem Identification:**

In 2007, IDEM completed water quality sampling in the HPC watershed to reassess areas within the watershed for bacteria exceedances. In 2009 and 2010, IDEM completed additional water quality sampling in the HPC watershed to assess for nutrient exceedances. The water quality sampling results from 2007-2010 found reaches which showed bacteria exceedances (*E. coli*) and TP exceedances. Indiana's 2008 303(d) list included impaired waters within the HPC watershed which were assessed via the 2007 water quality sampling event. The 2009 and 2010 water quality sampling results, which found nutrient impaired reaches within the HPC watershed, will be included in the Indiana 2012 303(d) list. All reaches identified in the HPC watershed TMDL (See Table 2 of this Decision Document, "Assessment Unit" column) will be included in the 2012 Indiana 303(d) list.

In preparation for the HPC watershed TMDL, IDEM completed a reassessment of water quality data collected in the HPC watershed between 2007-2010. This reassessment was completed in March of 2011 in order to determine the extent of the impairment and to identify potential water quality impacts to stream segments. IDEM believes that understanding the potential impacts to surface water segments helps to identify similarities between stream reaches and the tributaries that feed into the stream reach. From this understanding IDEM was able to ascertain whether there were additional stream reaches, normally tributaries upstream of the water quality sampling point, which may be contributing to the water quality degradation of that particular reach. IDEM explained their reassessment approach to EPA in Attachment #1 of this Decision Document.

IDEM based their reassessment on the 2007-2010 water quality data collected within the HPC watershed. Each impaired reach was reassessed on a case by case basis and the representativeness of water quality sampling points in or near those reaches was examined. In addition to considering the water quality data, IDEM examined:

- The magnitude of the impairment
- Whether or not other TMDLs have been completed in nearby reaches
- Hydrology and topography of the subwatershed
- Land uses within the subwatershed
- National Pollutant Discharge Elimination System (NPDES) facility locations and outfalls
- Concentrated Animal Feeding Operations (CAFOs) and Confined Feeding Operations (CFOs) locations within an 5-mile radius of the sampling location
- Aerial photography of the sampling location

IDEM documented its resegmentation approach in a table in Attachment H of the final TMDL submittal.

**Table 2: Summary of Impairments in the Highland-Pigeon Creek watershed**

| Assessment Unit | Description | County | Impairment | Impaired Beneficial Use |
|---|---|---|---|---|
| INE0211_02 | Hurricane Creek | Gibson | Bacteria (*E. coli*), TP | Recreational Use, & *Aquatic Habitat* |
| INE0211_T1001 | Hurricane Creek | Gibson | Bacteria (*E. coli*), TP | Recreational Use, & *Aquatic Habitat* |
| INE0211_T1003 | Hurricane Creek | Gibson | Bacteria (*E. coli*), TP | Recreational Use, & *Aquatic Habitat* |
| INE0214_02 | Pigeon Creek | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0216_01 | Pigeon Creek | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0212_01 | Sand Creek | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0212_01A | Sand Creek | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0212_02 | Sand Creek | Gibson | Bacteria (*E. coli*) | Recreational Use |

| | | | | |
|---|---|---|---|---|
| INE0212_02A | Sand Creek | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0212_T1001 | Sand Creek | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0212_T1002 | Sand Creek | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0217_01 | Smith Fork | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0217_02 | Smith Fork | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0217_T1001 | Smith Fork | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0217_T1002 | Smith Fork | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0217_T1005 | Smith Fork | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0222_T1002 | Unnamed Trib to Big Creek | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0213_01 | West Fork of Pigeon Creek | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0213_02 | West Fork of Pigeon Creek | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0213_T1001 | West Fork of Pigeon Creek | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0213_T1002 | West Fork of Pigeon Creek | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0213_T1003 | West Fork of Pigeon Creek | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0213_T1004 | West Fork of Pigeon Creek | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0213_T1005 | West Fork of Pigeon Creek | Gibson | Bacteria (*E. coli*) | Recreational Use |
| INE0263_01 | Cypress Slough | Posey | Bacteria (*E. coli*) | Recreational Use |
| INE0263_02 | Cypress Slough | Posey | Bacteria (*E. coli*) | Recreational Use |
| INE0263_T1001 | Cypress Slough | Posey | Bacteria (*E. coli*) | Recreational Use |
| INE0263_T1002 | Cypress Slough | Posey | Bacteria (*E. coli*) | Recreational Use |
| INE0263_T1005 | McFadden Creek | Posey | Bacteria (*E. coli*) | Recreational Use |
| INE0264_01 | McFadden Creek | Posey | Bacteria (*E. coli*) | Recreational Use |
| INE0261_01 | Bayou Creek | Vanderburgh | Bacteria (*E. coli*) | Recreational Use |
| INE0265_T1008 | Bayou Creek | Vanderburgh | Bacteria (*E. coli*) | Recreational Use |
| INE0241_T1003 | Carptentier Creek | Vanderburgh | Bacteria (*E. coli*) | Recreational Use |
| INE0241_T1004 | Carptentier Creek | Vanderburgh | Bacteria (*E. coli*) | Recreational Use |
| INE0233_01 | Locust Creek | Vanderburgh | Bacteria (*E. coli*) | Recreational Use |
| INE0235_01 | Locust Creek | Vanderburgh | Bacteria (*E. coli*) | Recreational Use |
| INE0234_01 | Locust Creek | Vanderburgh | Bacteria (*E. coli*) | Recreational Use |
| INE0234_T1001 | Locust Creek | Vanderburgh | Bacteria (*E. coli*) | Recreational Use |
| INE0234_T1002 | Locust Creek | Vanderburgh | Bacteria (*E. coli*) | Recreational Use |
| INE0234_T1003 | Locust Creek | Vanderburgh | Bacteria (*E. coli*) | Recreational Use |
| INE0234_T1004 | Locust Creek | Vanderburgh | Bacteria (*E. coli*) | Recreational Use |
| INE0234_T1005 | Locust Creek | Vanderburgh | Bacteria (*E. coli*) | Recreational Use |
| INE0234_T1006 | Locust Creek | Vanderburgh | Bacteria (*E. coli*) | Recreational Use |
| INE0234_T1007 | Locust Creek | Vanderburgh | Bacteria (*E. coli*) | Recreational Use |
| INE0231_02 | Pigeon Creek-Kleymeyer Park | Vanderburgh | Bacteria (*E. coli*) | Recreational Use |
| INE0236_02 | Pigeon Creek-Kleymeyer Park | Vanderburgh | Bacteria (*E. coli*) | Recreational Use |
| INE0261_T1003 | Unnamed Trib to Bayou Creek | Vanderburgh | Bacteria (*E. coli*) | Recreational Use |
| INE0233_T1001 | Bluegrass Creek | Warrick | Bacteria (*E. coli*) | Recreational Use |
| INE0231_T1001 | Bluegrass Creek | Warrick | Bacteria (*E. coli*) | Recreational Use |
| INE0232_01 | Bluegrass Creek | Warrick | Bacteria (*E. coli*) | Recreational Use |
| INE0223_01 | Pigeon Creek | Warrick | Bacteria (*E. coli*) | Recreational Use |
| INE0223_02 | Pigeon Creek | Warrick | Bacteria (*E. coli*) | Recreational Use |
| INE0224_01 | Pigeon Creek | Warrick | Bacteria (*E. coli*) | Recreational Use |
| INE0224_T1002 | Pigeon Creek | Warrick | Bacteria (*E. coli*) | Recreational Use |

Overall, 54 segments in the HPC watershed were identified as impaired for recreational use by bacteria and 3 segments were identified as impaired for aquatic habitat by TP. The 54 segments identified in the HPC TMDL address approximately 399 miles of impaired streams. IDEM communicated that the 54 segments in Table 2 of this Decision Document will be included in the 2012 Indiana 303(d) list.

Three segments were listed for nutrient impairments, INE0211_02, INE0211_T1001 and INE0211_T1003. These reaches showed exceedances of nutrient water quality targets (0.30 mg/L for TP). IDEM used the water quality monitoring concentrations of dissolved oxygen (DO), phosphorus (TP) and nitrogen (N) to determine whether or not segments in the HPC watershed were impaired due to nutrients. Segments INE0211_02, INE0211_T1001 and INE0211_T1003 showed exceedances for phosphorus during water quality monitoring completed in 2007-2010.

**Priority Ranking:**
The HPC watershed TMDL was prioritized to be completed at this time based on the IDEM's rotating basin approach. In this approach, available assessment resources are concentrated or targeted in defined watersheds for a specified period of time, thus allowing for water quality data to be collected and assessed in a spatially and temporally "focused" manner. Over time, all areas of the state are targeted for monitoring and assessment.

IDEM utilizes a rotating basin approach to monitor water quality unless there is a significant reason to deviate from the rotating basin schedule. Deviations can lead to water bodies being upgraded or downgraded in priority depending on: the specified designated use and whether water quality standards are being met, the magnitude of the impairment, deviations to allow an appropriate amount of time for implementation practices to take hold, and instances where there is no water quality guidance available or guidance is currently being developed. The Vanderburgh County Soil and Water Conservation District (SWCD) submitted a request to IDEM for TMDLs to be developed in the HPC watershed. The TMDL efforts will be incorporated into a watershed management plan being updated by the Vanderburgh County SWCD.

**Pollutants of Concern:**
The pollutants of concern are bacteria (*E. coli*) and total phosphorus. In this TMDL, IDEM identified 54 segments of the HPC watershed for violations of *E. coli* water quality standards and 3 segments for violations of TP water quality targets.

**Source Identification (point and nonpoint sources):**
***Point Source Identification:*** The potential point sources to the HPC watershed are:

***E. coli:***
*Wastewater Treatment Plants (WWTPs):* Wastewater treatment facilities may contribute bacteria loads to surface waters through facility discharges of treated wastewater. Permitted facilities must discharge treated wastewater according to their National Pollutant Discharge Elimination System (NPDES) permit. The WWTPs in the HPC watershed which received a portion of the wasteload allocation (WLA) were:

- Chandler Municipal WWTP (IN0020435)
- Elberfield Municipal WWTP (IN0020788)
- Haubstadt Municipal WWTP (IN0021482)
- Town of Fort Branch WWTP (IN0022896)

*Municipal Separate Storm Sewer Systems (MS4):* Stormwater may transport bacteria to surface water bodies during or shortly after storm events. IDEM recognized seven MS4 communities in the HPC watershed. The MS4 communities in the HPC watershed which received a portion of the WLA were:
- City of Evansville (INR040057)
- Ivy Tech State College-SW (INR040060)
- Town of Chandler (INR040053)
- University of Evansville (INR040058)
- University of Southern Indiana (INR050028)
- Vanderburgh County (INR040030)
- Warrick County (INR040065)

*Combined Sewer Overflows (CSO):* CSOs may transport bacteria to surface waters during overflow events brought on by stormwater inputs during or shortly after storm events. There are three CSO communities in the HPC watershed. The CSOs in the HPC watershed are:
- Town of Fort Branch: 1 CSO
- City of Evansville: 9 CSOs
- Mount Vernon: 2 CSOs

*Concentration Animal Feeding Operations (CAFO):* CAFO facilities may transport bacteria to surface waters during storm events (via stormwater runoff). CAFO facilities are generally not allowed any pollutant discharges from their facilities. Illegal discharges from CAFO sites may transport bacteria to surface waters. CAFO feedlots in the HPC watershed are required to operate under the conditions of their NPDES permit. There are three CAFO facilities in the HPC watershed.

*Stormwater contributions from NPDES permitted facilities with E. coli discharge limits:* Runoff from urban areas (urban, residential, commercial or industrial land uses) may contribute *E. coli* to local water bodies. Stormwater from urban areas, which drain impervious surfaces, may introduce bacteria to surface waters. Urban bacteria sources can include wildlife or pet wastes. IDEM identified six NPDES permitted facilities in the HPC watershed which have *E. coli* discharge limits and *E. coli* monitoring plans included in their current permits. These six permitted facilities received a portion of the WLA. These facilities are:
- MARRS Elementary School (IN0055255)
- Twin Lakes Mobile Home Park (IN0044491)
- AC Ranch Mobile Home Park (IN0039608)
- Creekside Court Mobile Home Park (IN0039616)
- Harbortown Subdivision Sanitary (IN01009924)
- KOA Kampground (IN0029963)

***Total phosphorus:***

*Wastewater Treatment Plants (WWTPs):* Wastewater treatment facilities may contribute phosphorus loads to surface waters through facility discharges of treated wastewater. Permitted facilities must discharge treated wastewater according to their NPDES permit. The Haubstadt Municipal WWTP (IN0021482) received a portion of the WLA for phosphorus (see Table 3a of this Decision Document).

*Stormwater contributions from NPDES permitted facilities:* Runoff from urban areas (urban, residential, commercial or industrial land uses) may contribute phosphorus to local water bodies via stormwater runoff. Stormwater from impervious surfaces, may contribute phosphorus from decaying vegetation (leaves, grass clippings, etc.), domestic and wild animal wastes, soil particles, phosphorus containing fertilizers, and other anthropogenic derived nutrients. IDEM identified one NPDES permitted facility in the HPC watershed which was allocated a WLA for phosphorus. This facility was the KOA Kampground (IN0029963) in the Hurricane Creek subwatershed (HUC-12 #051402020101).

***Nonpoint Source Identification:*** The potential nonpoint sources to the HPC watershed are:

***E. coli:***

*Septic systems:* Septic systems generally do not discharge directly into a waterbody, but their effluents may leach into groundwater or pond at the surface where they can be washed into surface waters via stormwater runoff events. Failing septic systems are a potential source of *E. coli* in the watershed. All the counties in the watershed follow the state IAC 16-1-4-9 and IAC 36-1-6-2 rules regarding septic systems. Failures are typically identified through public complaints and through the sale of older properties that have not passed inspection.

*Confined Feeding Operations (CFO) and small livestock operations:* CFO and smaller facilities may transport bacteria to surface waters during storm events (via stormwater runoff). CFO facilities do not have discharge permits, but are not allowed any pollutant discharges from their facilities. Illegal discharges from CFO sites may transport bacteria to surface waters. There are five CFOs in the HPC watershed. The State of Indiana is responsible for monitoring CFO facilities. Smaller animal facilities which fall beneath the animal threshold limits for a CFO designation (non-CAFO small animal facilities), may add *E. coli* to surface waters via wastewater from the facilities, near-stream pastures, manure spreading onto fields, and livestock with access to stream environments.

*Stormwater runoff from agricultural land use practices:* Runoff from agricultural lands (feedlots, pastures and fields) can contain significant amounts of bacteria. Manure spread onto fields is often a source, and may be exacerbated by field-tile drainage lines, which channelize the stormwater flows and reduce the time available for bacteria to die-off. Land applied manure may also reach surface waters via overland runoff and via macropore/preferential flow pathways. Stormwater runoff related to manure stockpiles and manure storage facilities may also contribute *E. coli* to stream environments in the HPC watershed.

*Unrestricted livestock access to streams:* Livestock with access to stream environments may add bacteria directly to the surfaces waters or resuspend particles which had settled on the stream bottom. Direct deposit of animal wastes may result in very high localized bacteria counts and may also contribute to downstream impairments. Smaller animal facilities may add bacteria to surface waters via wastewater from these facilities or stormwater runoff from near-stream pastures.

*Urban runoff:* Runoff from urban areas (urban, residential, commercial or industrial land uses) may contribute bacteria to local water bodies. Stormwater from urban areas, which drain impervious surfaces, may introduce bacteria to surface waters. Urban bacteria sources can include wildlife or pet wastes.

*Wildlife:* Deer, geese, ducks, raccoons, turkeys, and other animals may contribute bacteria loads to the HPC watershed.

***Total phosphorus:***

*Internal loading:* The release of phosphorus from stream bottom sediments, the release of phosphorus via physical disturbance from benthic fish (rough fish, ex. carp), and the release of phosphorus from decaying pondweeds, may all contribute internal phosphorus loading to surface waters in the HPC watershed.

*Agricultural sources (Pasture and Open Lands):* Phosphorus may be added via surface runoff from upland areas which are being used for agricultural purposes (ex. grasslands, croplands etc.). Other potential agricultural sources may be related to stormwater runoff which can mobilize nutrients to surface waters from sources such as: livestock manure, fertilizers, decaying vegetation and organic soil particles.

*Livestock Sources:* Phosphorus may be added from livestock sources via the mobilization and transportation of phosphorus laden materials from feeding, holding and manure storage areas.

*Non-regulated stormwater runoff:* Non-regulated stormwater runoff may add phosphorus to the watershed. The sources of phosphorus in stormwater may include: decaying vegetation (leaves, grass clippings, etc.), domestic and wild animal wastes, soil particles, phosphorus containing fertilizers, and other anthropogenic derived nutrients.

*Inadequate Septic Systems:* Phosphorus may be added to the surface waters in the HPC watershed from failing septic systems. Age, construction and use of septic systems can vary throughout a watershed and influence the nutrient contribution from these systems. It is likely that those systems that are sited closer to the surface waters are more likely to contribute nutrients than those systems sited further away from the lake.

*Wetland sources:* Phosphorus may be added to surface waters by stormwater flows through wetland areas in the HPC watershed. Degradation of wetland environments via ditching and draining of wetlands may liberate phosphorus from wetland soils (peat). These nutrients may be transported via storm event derived flows through the transport of suspended solids and other organic debris.

*Stream channel erosion:* Phosphorus may be added to surface waters by soil erosion from stream bottoms and streambanks. Phosphorus may be attached to eroded streambank materials and may be mobilized through the transport of sediment and suspended solids.

**Future Growth:**
IDEM provided information on future growth potential in the HPC watershed. IDEM compiled U.S. census data for each of the counties within the HPC watershed. Overall, the majority of the counties exhibited a slight increase in population from 2000 to 2010. IDEM did not choose to incorporate this information into the calculation of the TMDLs for the HPC watershed. No portion of the loading capacity for *E. coli* nor for TP was assigned to a future growth/reserve capacity value.

The U.S. EPA finds that the TMDL document submitted by IDEM satisfies the requirements of the first criterion.

## 2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. (40 C.F.R. §130.7(c)(1)). EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

The TMDL submittal must identify a numeric water quality target(s) – a quantitative value used to measure whether or not the applicable water quality standard is attained. Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. The TMDL expresses the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target. Occasionally, the pollutant of concern is different from the pollutant that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as Dissolved Oxygen (DO) criteria). In such cases, the TMDL submittal should explain the linkage between the pollutant of concern and the chosen numeric water quality target.

**Comment:**
**Designated Uses:**
The designated uses for the waterbodies within the HPC watershed are for total body contact recreational use and aquatic habitat use. Total body contact recreational use is confined to the recreation season, April 1$^{st}$ through October 31$^{st}$ of the calendar year, pursuant to 327 IAC 2-1.5-8(e). Aquatic habitat use is applicable year round.

**Standards & Targets:**
The total body contact recreational use *E. coli* water quality standards for all waters in the non-Great Lakes system are as follows:

(3) For full body contact recreational uses, *E. coli* bacteria shall not exceed the following:
(A) One hundred twenty-five (125) per one hundred (100) milliliters as a geometric mean based on not less than five (5) samples equally spaced over a thirty (30) day period.
(B) Two hundred thirty-five (235) per one hundred (100) milliliters in any one (1) sample in a thirty (30) day period, except that in cases where there are at least ten (10) samples at a given site, up to ten percent (10%) of the samples may exceed two hundred thirty-five (235) cfu or MPN per one hundred (100) milliliters where:

> (i) the *E. coli* exceedances are incidental and attributable solely to *E. coli* resulting from the discharge of treated wastewater from a wastewater treatment plant as defined at IC 13-11-2-258; and
> (ii) the criterion in clause (A) is met. However, a single sample shall be used for making beach notification and closure decisions.

(Indiana Administrative Code 327 IAC 2-1.5-8(e)(3))

The HPC watershed TMDL *E. coli* target is, from April 1$^{st}$ through October 31$^{st}$ *E. coli* shall not exceed **125 cfu/100 mL** (cfu = colony forming units) as a geometric mean based on not less than 5 samples equally spaced over a 30-day period.

The State of Indiana has a numeric target of **0.30 mg/L** for TP, which is an interpretation of the narrative nutrient criteria (327 IAC 2-1-6). For the purposes of the HPC watershed TMDL, the TP concentrations should not exceed 0.30 mg/L within the watershed.

The U.S. EPA finds that the TMDL document submitted by IDEM satisfies the requirements of the second criterion.

### 3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a waterbody for the applicable pollutant. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

The pollutant loadings may be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. §130.2(i)). If the TMDL is expressed in terms other than a daily load, e.g., an annual load, the submittal should explain why it is appropriate to express the TMDL in the unit of measurement chosen. The TMDL submittal should describe the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.

The TMDL submittal should contain documentation supporting the TMDL analysis, including the basis for any assumptions; a discussion of strengths and weaknesses in the analytical process; and results from any water quality modeling. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

TMDLs must take into account *critical conditions* for steam flow, loading, and water quality parameters as part of the analysis of loading capacity (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable *critical conditions* and describe their approach to estimating both point and nonpoint source loadings under such *critical conditions*. In particular, the TMDL should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

**Comment:**
IDEM determined loading capacities for the impaired waterbodies in the HPC watershed based on the *E. coli* water quality standards (WQS) and the TP water quality target. The *E. coli* WQS is **125 cfu/100 ml** (geometric mean of 5 samples equally spaced over a 30-day period) and the TP water quality target is **0.30 mg/L**. IDEM believes the geometric mean portion of the WQS provides the best overall characterization of the status of the watershed. The U.S. EPA agrees with this assertion, as stated in the preamble of "The Water Quality Standards for Coastal and Great Lakes Recreation Waters Final Rule" (69 FR 67218-67243, November 16, 2004) on page 67224, "…the geometric mean is the more relevant value for ensuring that appropriate actions are taken to protect and improve water quality because it is a more reliable measure, being less subject to random variation, and more directly linked to the underlying studies on which the 1986 bacteria criteria were based." IDEM will be relying on the geometric mean portion of the WQS to track implementation activity and results.

Typically loading capacities are expressed as a mass per time (e.g. pounds per day). The loading capacities assigned to the TP TMDLs were expressed as mass per time (pounds per day). For *E. coli* loading capacity calculations, however, mass is not always an appropriate measure because E. *coli* is expressed in terms of organism counts. IDEM chose to use a concentration as the target. This approach is consistent with the U.S. EPA's regulations which define "load" as "an amount of matter that is introduced into a receiving water" (40 CFR §130.2). To establish the loading capacities for the HPC watershed, IDEM used Indiana's water quality standards for *E. coli* (125 cfu/100 mL). Thus, the loading capacity is expressed as a concentration, i.e. the amount of bacteria colonies per volume of water. A loading capacity is, "the greatest amount of loading that a water can receive without violating water quality standards." (40 CFR §130.2). Therefore, a loading capacity set at the WQS will assure that the water does not violate WQS. IDEM's *E. coli* TMDL approach is based upon the premise that all discharges (point and non-point) must meet the WQS when entering the waterbody. If all sources meet the WQS at discharge, then the waterbody should meet the WQS and the designated use.

IDEM uses the load duration curve (LDC) approach to help analyze loadings at selected sites within the HPC watershed. IDEM includes an explanation for their approach on pages 13-15 in the "Linkage Analysis and *E. coli* and Phosphorus Load Duration Curves" section. A summary of their efforts is provided below.

Continuous flow data was collected from a nearby USGS gage on Big Creek near Wadesville, Indiana (USGS #03378550). The USGS gage is located in a watershed adjacent to the HPC watershed. The Big Creek gage drains a watershed similar in size, yet smaller than the HPC watershed. The size of the Big Creek watershed is similar to an individual HUC-12 sized subwatershed in the HPC watershed. IDEM determined that the flow data collected on Big Creek were appropriate to use as a proxy for flow in the HPC watershed. The flow data utilized in the formulation of the LDCs for the HPC TMDLs focused on dates within the recreation season (April 1 – October 31).

Flow duration curves (FDC) were created for each of the impaired reaches in the HPC watershed. The FDC were developed from flow frequency tables based on recorded and scaled flow volumes measured at the USGS gage in Wadesville, IN. FDC graphs have flow duration interval (percentage of time flow exceeded) on the X-axis and discharge (flow per unit time) on the Y-axis. The FDC were transformed into LDC by multiplying individual flow values by the WQS of 125 cfu/ 100 mL for *E. coli* and the water quality target 0.30 mg/L for TP, and then by a conversion factor. The resulting points are plotted onto a load duration curve graph. LDC graphs, for the HPC watershed TMDLs, have flow duration interval (percentage of time flow exceeded) on the X-axis and *E. coli* or TP concentrations on the Y-axis. The HPC watershed LDC used *E. coli* measurements in billions of bacteria per day. The curved line on a LDC graph represents the TMDL of the respective flow location and the flow conditions observed at that location.

IDEM completed water quality monitoring in the HPC watershed basin in 2007-2010 and measured *E. coli* and TP concentrations at specific sampling points within the watershed. *E. coli* and TP values from these efforts were converted to individual sampling loads by multiplying the sample concentration by the instantaneous flow measurement observed/estimated at the time of sample collection. The individual sampling loads were plotted on the same figure with the created LDC.

The LDC plots were subdivided into five flow regimes; high flows, wet weather flows, normal range flows, dry weather flows, and low flows. High flows are exceeded 0 – 10 % of the time, wet weather flows are exceeded 10 – 40 % of the time, normal range flows are exceeded 40 – 60 % of the time, dry weather flows are exceeded 60 – 90 % of the time and low flows are exceeded 90 – 100 % of the time. The LDC plots, showing the individual sampling loads and the LDC, display under what flow conditions water quality exceedances occur. Individual sampling loads which plot above the LDC represent violations of the WQS. The difference between individual sampling loads plotting above the LDC and the LDC, measured at the same flow, is the amount of reduction necessary to meet WQS (see Attachments C & D of the final TMDL document).

The strengths of using the LDC method are that critical conditions and seasonal variation are considered in the creation of the FDC by plotting hydrologic conditions over the flows measured during the recreation season. Additionally, the LDC methodology is relatively easy to use and cost-effective. The weaknesses of the LDC method are that nonpoint source allocations cannot be assigned to specific sources, and specific source reductions are not quantified. Overall, IDEM believes and EPA concurs that the strengths outweigh the weaknesses for the LDC method.

Implementing the results shown by the LDC requires watershed managers to understand the sources contributing to the water quality impairment and which Best Management Practices (BMPs) may be the most effective for reducing bacteria loads based on flow magnitudes. Different sources will contribute bacteria loads under varying flow conditions. For example, if loads are significant during storm events, implementation efforts can target BMP that will reduce stormwater runoff and consequently bacteria loading into surface waters. This allows for a more efficient implementation effort. The targets for TMDLs addressing *E. coli* exceedances are based on the *E. coli* water quality standard and the TMDLs addressing TP exceedances are based on the TP water quality target. IDEM believes that meeting the loading capacities related to these concentrations should result in attainment of water quality standards.

TMDLs were calculated for each subwatershed in the HPC watershed. WLA were assigned to the various NPDES permitted facilities within the HPC watershed. Load allocations were calculated after the determination of the WLA, and the Margin of Safety (10% of the loading capacity). The load allocation (LA) was not split amongst potential nonpoint contributors (ex. stormwater runoff from agricultural land use practices, failing septic systems, livestock in stream environments etc.). The LA was represented as one value for each TMDL. Tables 3 through 19 show the TMDL values over the various flow regimes for the subwatersheds impaired for bacteria and TP in the HPC watershed.

**Table 3: Hurricane Creek TMDL summary (HUC-12 051402020101)**

Listed Segments: INE0211_02, INE0211_T1001, INE0211_T1003

| NPDES Facilities | KOA Kampground (IN0029963) & Haubstadt Municipal WWTP (IN0021482) | | | | |
|---|---|---|---|---|---|
| MS4 Communities | None | | | | |
| CSO Communities | None | | | | |
| CAFOs | None | | | | |
| CFOs | None | | | | |
| **Flow Regime TMDL analysis *E. coli* (billion bacteria/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 1715.60 | 218.70 | 57.20 | 8.10 | 4.90 |
| LA | 1540.18 | 192.97 | 47.62 | 3.43 | 0.55 |
| WLA | 3.86 | 3.86 | 3.86 | 3.86 | 3.86 |
| Margin Of Safety: 10% | 171.56 | 21.87 | 5.72 | 0.81 | 0.49 |

* Values were adjusted for rounding

**Table 3a: Hurricane Creek TMDL summary (HUC-12 051402020101)**
Listed Segments: INE0211_02, INE0211_T1001, INE0211_T1003

| | | | | | |
|---|---|---|---|---|---|
| NPDES Facilities | KOA Kampground (IN0029963) & Haubstadt Municipal WWTP (IN0021482) | | | | |
| MS4 Communities | None | | | | |
| CSO Communities | None | | | | |
| CAFOs | None | | | | |
| CFOs | None | | | | |
| **Flow Regime TMDL analysis *Total phosphorus* (lbs/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 827.40 | 107.23 | 29.58 | 5.92 | 2.56 |
| LA | 742.66 | 94.49 | 24.64 | 3.29 | 0.27 |
| WLA | 2.04 | 2.04 | 2.04 | 2.04 | 2.04 |
| Margin Of Safety: 10% | 82.70 | 10.70 | 2.90 | 0.59 | 0.25 |

* Values were adjusted for rounding

**Table 4: Sandy Creek TMDL summary (HUC-12 051402020102)**
Listed Segments: INE0212_01, INE0212_01A, INE0212_02, INE0212_02A, INE0212_T1001, INE0212_T1002

| | | | | | |
|---|---|---|---|---|---|
| NPDES Facilities | None | | | | |
| MS4 Communities | None | | | | |
| CSO Communities | None | | | | |
| CAFOs | None | | | | |
| CFOs | None | | | | |
| **Flow Regime TMDL analysis *E. coli* (billion bacteria/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 1715.60 | 218.60 | 57.10 | 8.00 | 1.00 |
| LA | 1544.04 | 196.74 | 51.39 | 7.20 | 0.90 |
| WLA | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Margin Of Safety: 10% | 171.56 | 21.86 | 5.71 | 0.80 | 0.10 |

* Values were adjusted for rounding

**Table 5: West Fork Creek TMDL summary (HUC-12 051402020103)**

Listed Segments: INE0213_01, INE0213_02, INE0213_T1001, INE0213_T1002, INE0213_T1003, INE0213_T1004, INE0213_T1005

| | | | | | |
|---|---|---|---|---|---|
| NPDES Facilities | Town of Fort Branch WWTP (IN0022896) | | | | |
| MS4 Communities | None | | | | |
| CSO Communities | Town of Fort Branch (1 CSO) | | | | |
| CAFOs | None | | | | |
| CFOs | Clay Hill Turkey Farm ID #4522 (22,000 Turkeys) | | | | |
| **Flow Regime TMDL analysis *E. coli* (billion bacteria/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 1719.00 | 222.00 | 60.50 | 11.40 | 4.40 |
| LA | 1544.10 | 196.80 | 51.50 | 7.26 | 0.96 |
| WLA | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| Margin Of Safety: 10% | 171.90 | 22.20 | 6.00 | 1.14 | 0.44 |

* Values were adjusted for rounding

**Table 6: Clear Fork Ditch-Pigeon Creek TMDL summary (HUC-12 051402020104)**

Listed Segments: INE0214_02

| | | | | | |
|---|---|---|---|---|---|
| NPDES Facilities | None | | | | |
| MS4 Communities | None | | | | |
| CSO Communities | None | | | | |
| CAFOs | None | | | | |
| CFOs | M&D Michel Turkeys ID#4524 (52,000 Turkeys) | | | | |
| **Flow Regime TMDL analysis *E. coli* (billion bacteria/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 1715.80 | 218.80 | 57.40 | 8.20 | 1.20 |
| LA | 1544.22 | 196.92 | 51.66 | 7.38 | 1.08 |
| WLA | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Margin Of Safety: 10% | 171.58 | 21.88 | 5.74 | 0.82 | 0.12 |

* Values were adjusted for rounding

**Table 7: Snake Run-Pigeon Creek TMDL summary (HUC-12 051402020106)**

Listed Segments: INE0216_01

| | | | | | |
|---|---|---|---|---|---|
| NPDES Facilities | None | | | | |
| MS4 Communities | None | | | | |
| CSO Communities | None | | | | |
| CAFOs | Obert Legacy Dairy ID #6654 (900 Dairy Cattle, 80 Dairy Calves) | | | | |
| CFOs | Stanley Michel ID #3981 (1,800 Nursery Pigs, 480 Finishers, 94 Sows, 11 Beef Cattle) | | | | |
| **Flow Regime TMDL analysis *E. coli* (billion bacteria/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 1715.60 | 218.60 | 57.10 | 8.00 | 1.00 |
| LA | 1544.04 | 196.74 | 51.39 | 7.20 | 0.90 |
| WLA | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Margin Of Safety: 10% | 171.56 | 21.86 | 5.71 | 0.80 | 0.10 |

* Values were adjusted for rounding

**Table 8: Smith Fork-Pigeon Creek TMDL summary (HUC-12 051402020107)**

Listed Segments: INE0217_01, INE0217_02, INE0217_T1001, INE0217_T1002, INE0217_T1003, INE0217_T1004, INE0217_T1005

| | | | | | |
|---|---|---|---|---|---|
| NPDES Facilities | None | | | | |
| MS4 Communities | None | | | | |
| CSO Communities | None | | | | |
| CAFOs | Schoonover Farms ID #3719 (Finishers 8,000) | | | | |
| CFOs | Jeff Sevier Hog Farm ID #175 (200 Nursery Pigs, 800 Finishers, 106 Sows) & Schurmeier Farms Inc. ID #912 (360 Nursery Pigs, 1,600 Finishers, 16 Sows) | | | | |
| **Flow Regime TMDL analysis *E. coli* (billion bacteria/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 1715.60 | 218.60 | 57.10 | 8.00 | 1.00 |
| LA | 1544.04 | 196.74 | 51.39 | 7.20 | 0.90 |
| WLA | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Margin Of Safety: 10% | 171.56 | 21.86 | 5.71 | 0.80 | 0.10 |

* Values were adjusted for rounding

**Table 9: Big Creek TMDL summary (HUC-12  051402020202)**

Listed Segments: INE0222_T1002

| | | | | | |
|---|---|---|---|---|---|
| NPDES Facilities | None | | | | |
| MS4 Communities | None | | | | |
| CSO Communities | None | | | | |
| CAFOs | None | | | | |
| CFOs | None | | | | |
| **Flow Regime TMDL analysis *E. coli* (billion bacteria/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 1715.60 | 218.60 | 57.10 | 8.00 | 1.00 |
| LA | 1544.04 | 196.74 | 51.39 | 7.20 | 0.90 |
| WLA | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Margin Of Safety: 10% | 171.56 | 21.86 | 5.71 | 0.80 | 0.10 |

* Values were adjusted for rounding

**Table 10: Clear Branch-Pigeon Creek TMDL summary (HUC-12  051402020203)**

Listed Segments: INE0223_01, INE0223_T1009

| | | | | | |
|---|---|---|---|---|---|
| NPDES Facilities | None | | | | |
| MS4 Communities | None | | | | |
| CSO Communities | None | | | | |
| CAFOs | None | | | | |
| CFOs | None | | | | |
| **Flow Regime TMDL analysis *E. coli* (billion bacteria/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 1715.60 | 218.60 | 57.10 | 8.00 | 1.00 |
| LA | 1544.04 | 196.74 | 51.39 | 7.20 | 0.90 |
| WLA | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Margin Of Safety: 10% | 171.56 | 21.86 | 5.71 | 0.80 | 0.10 |

* Values were adjusted for rounding

**Table 11: Barnes Ditch-Pigeon Creek TMDL summary (HUC-12 051402020204)**
Listed Segments: INE0224_01, INE0224_T1002

| NPDES Facilities | Chandler Municipal WWTP (IN0020435) | | | | |
|---|---|---|---|---|---|
| MS4 Communities | Warrick County | | | | |
| CSO Communities | None | | | | |
| CAFOs | None | | | | |
| CFOs | None | | | | |
| **Flow Regime TMDL analysis *E. coli* (billion bacteria/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 1725.30 | 228.30 | 66.90 | 17.70 | 10.70 |
| LA | 1544.27 | 196.97 | 51.71 | 7.43 | 1.13 |
| WLA | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 |
| Margin Of Safety: 10% | 172.53 | 22.83 | 6.69 | 1.77 | 1.07 |

* Values were adjusted for rounding

**Table 12: Headwaters Bluegrass Creek TMDL summary (HUC-12 051402020301)**
Listed Segments: INE0231_01, INE0231_T1001

| NPDES Facilities | Elberfield Municipal WWTP (IN0020788) | | | | |
|---|---|---|---|---|---|
| MS4 Communities | None | | | | |
| CSO Communities | None | | | | |
| CAFOs | None | | | | |
| CFOs | None | | | | |
| **Flow Regime TMDL analysis *E. coli* (billion bacteria/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 1716.40 | 219.40 | 57.90 | 8.80 | 1.88 |
| LA | 1544.06 | 196.76 | 51.41 | 7.22 | 1.00 |
| WLA | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 |
| Margin Of Safety: 10% | 171.64 | 21.94 | 5.79 | 0.88 | 0.18 |

* Values were adjusted for rounding

**Table 13: Headwaters Locust Creek TMDL summary (HUC-12 051402020304)**

Listed Segments: INE0234_01, INE0234_T1001, INE0234_T1002, INE0234_T1003, INE0234_T1004, INE0234_T1005, INE0234_T1006, INE0234_T1007

| | | | | | |
|---|---|---|---|---|---|
| NPDES Facilities | None | | | | |
| MS4 Communities | None | | | | |
| CSO Communities | None | | | | |
| CAFOs | None | | | | |
| CFOs | None | | | | |
| **Flow Regime TMDL analysis *E. coli* (billion bacteria/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 1715.60 | 218.60 | 57.10 | 8.00 | 1.00 |
| LA | 1544.04 | 196.74 | 51.39 | 7.20 | 0.90 |
| WLA | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Margin Of Safety: 10% | 171.56 | 21.86 | 5.71 | 0.80 | 0.10 |

* Values were adjusted for rounding

**Table 14: Locust Creek TMDL summary (HUC-12 051402020305)**

Listed Segments: INE0235_01

| | | | | | |
|---|---|---|---|---|---|
| NPDES Facilities | AC Ranch Mobile Home Park (IN0039608) | | | | |
| MS4 Communities | City of Evansville MS4 (0.655 square miles within MS4, 8.56%)** | | | | |
| CSO Communities | None | | | | |
| CAFOs | None | | | | |
| CFOs | None | | | | |
| **Flow Regime TMDL analysis *E. coli* (billion bacteria/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 1715.60 | 218.60 | 57.20 | 7.43 | 1.00 |
| LA | 1411.853 | 179.882 | 47.056 | 6.567 | 0.806 |
| WLA | 132.187 | 16.858 | 4.424 | 0.063 | 0.094 |
| Margin Of Safety: 10% | 171.56 | 21.86 | 5.72 | 0.80 | 0.10 |

* Values were adjusted for rounding

** 8.56% WLA estimated on percent of MS4 in watershed

**Table 15: Kleymeyer Park-Pigeon Creek TMDL summary (HUC-12 051402020306)**
Listed Segments: INE0236_01, INE0236_02

| | | | | | |
|---|---|---|---|---|---|
| NPDES Facilities | NA | | | | |
| MS4 Communities | City of Evansville MS4 (18.28 square miles within MS4, 65.24%)** | | | | |
| CSO Communities | Evansville (9 CSOs) | | | | |
| CAFOs | None | | | | |
| CFOs | None | | | | |
| **Flow Regime TMDL analysis *E. coli* (billion bacteria/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 1715.60 | 218.60 | 57.11 | 8.00 | 1.00 |
| LA | 536.708 | 68.387 | 17.863 | 2.503 | 0.313 |
| WLA | 1007.332 | 128.353 | 33.527 | 4.697 | 0.587 |
| Margin Of Safety: 10% | 171.56 | 21.86 | 5.72 | 0.80 | 0.10 |

* Values were adjusted for rounding
** 65.24% WLA estimated on percent of MS4 in watershed

**Table 16: East Creek-Ohio River TMDL summary (HUC-12 051402020401)**
Listed Segments: INE0421_02, INE0241_T1003, INE0241_T1004

| | | | | | |
|---|---|---|---|---|---|
| NPDES Facilities | NA | | | | |
| MS4 Communities | City of Evansville MS4 (14.24 square miles within MS4, 44.94%)** | | | | |
| CSO Communities | None | | | | |
| CAFOs | None | | | | |
| CFOs | None | | | | |
| **Flow Regime TMDL analysis *E. coli* (billion bacteria/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 1715.60 | 218.60 | 57.10 | 8.00 | 1.00 |
| LA | 850.148 | 108.325 | 28.295 | 3.964 | 0.496 |
| WLA | 693.892 | 88.415 | 23.095 | 3.236 | 0.404 |
| Margin Of Safety: 10% | 171.56 | 21.86 | 5.71 | 0.80 | 0.10 |

* Values were adjusted for rounding
** 44.94% WLA estimated on percent of MS4 in watershed

**Table 17: Bayou Creek TMDL summary (HUC-12 051402020601)**
Listed Segments: INE0261_01, INE0261_T1003

| NPDES Facilities | Twin Lakes Mobile Home Park (IN0044491) | | | | |
|---|---|---|---|---|---|
| MS4 Communities | City of Evansville MS4 (0.5879 square miles within MS4, 2.79%)** | | | | |
| CSO Communities | None | | | | |
| CAFOs | None | | | | |
| CFOs | None | | | | |
| **Flow Regime TMDL analysis *E. coli* (billion bacteria/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 1715.90 | 218.80 | 57.40 | 8.30 | 1.30 |
| LA | 1501.014 | 191.216 | 50.009 | 7.052 | 0.927 |
| WLA | 43.296 | 5.704 | 1.651 | 0.418 | 0.243 |
| Margin Of Safety: 10% | 171.59 | 21.88 | 5.74 | 0.83 | 0.13 |

* Values were adjusted for rounding
** 2.79% WLA estimated on percent of MS4 in watershed

**Table 18: Cypress Slough TMDL summary (HUC-12 051402020603)**
Listed Segments: INE0263_01, INE0263_02, INE0263_T1001, INE0263_T1002

| NPDES Facilities | Marrs Elementary School (IN0055255) | | | | |
|---|---|---|---|---|---|
| MS4 Communities | None | | | | |
| CSO Communities | None | | | | |
| CAFOs | None | | | | |
| CFOs | None | | | | |
| **Flow Regime TMDL analysis *E. coli* (billion bacteria/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 1715.70 | 218.70 | 57.20 | 8.14 | 1.10 |
| LA | 1544.088 | 196.788 | 51.438 | 7.290 | 0.948 |
| WLA | 0.042 | 0.042 | 0.042 | 0.042 | 0.042 |
| Margin Of Safety: 10% | 171.57 | 21.87 | 5.72 | 0.81 | 0.11 |

* Values were adjusted for rounding

**Table 19: McFaddens Creek TMDL summary (HUC-12 051402020604)**
Listed Segments: INE0264_01

| NPDES Facilities | Harbortown Subdivision Sanitary (IN0109924), Creekside Court Mobile Home Park WWTP (IN0039616) | | | | |
|---|---|---|---|---|---|
| MS4 Communities | None | | | | |
| CSO Communities | None | | | | |
| CAFOs | None | | | | |
| CFOs | None | | | | |
| **Flow Regime TMDL analysis *E. coli* (billion bacteria/day)*** | **Very High Flows** | **Higher Flow Conditions** | **"Normal" Flows** | **Lower Flow Conditions** | **Low Flows** |
| Duration Interval | 0 - 10 % | 10 - 40 % | 40 - 60 % | 60 - 90 % | 90 - 100 % |
| TMDL = LA + WLA + MOS | 1715.80 | 218.80 | 57.30 | 8.20 | 1.20 |
| LA | 1544.093 | 196.793 | 51.443 | 7.250 | 0.953 |
| WLA | 0.127 | 0.127 | 0.127 | 0.127 | 0.127 |
| Margin Of Safety: 10% | 171.58 | 21.88 | 5.73 | 0.82 | 0.12 |

* Values were adjusted for rounding

The U.S. EPA finds that the TMDL document submitted by IDEM satisfies the requirements of the third criterion.

## 4. Load Allocations (LAs)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Where possible, load allocations should be described separately for natural background and nonpoint sources.

**<u>Comment:</u>**
The load allocation section is found on page 26 of the final TMDL document. IDEM based the load allocation calculations for the *E. coli* TMDLs on the WQS of 125 cfu/100 mL. IDEM identified several nonpoint *E. coli* sources in this TMDL report. These nonpoint sources include: wildlife (deer, geese, ducks, raccoons, turkeys and other animals), failing septic systems, run-off from non-regulated small-scale livestock operations, livestock with access to stream areas, and agricultural runoff (via manure spreading and tile drains). IDEM did not determine individual load allocation values for each of these potential nonpoint source considerations, but allocated the nonpoint sources into one LA value.

IDEM based the load allocation calculations for the TP TMDLs on the water quality target of 0.30 mg/L. Nonpoint source contributions for TP were: internal loading, agricultural surface runoff, failing septic systems, wetland sources, stream channel erosion and non-regulated stormwater runoff. IDEM did not determine individual load allocation values for each of these potential nonpoint source considerations, but allocated the nonpoint TP sources into one LA value.

IDEM explained that there are efforts underway by local SWCDs to improve water quality and reduce nonpoint source inputs. These efforts involve identifying nonpoint sources and the appropriate mitigation strategies to lessen the impact of these inputs.

The U.S. EPA finds that the TMDL document submitted by IDEM satisfies the requirements of the fourth criterion.

## 5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit.

The individual WLAs may take the form of uniform percentage reductions or individual mass based limitations for dischargers where it can be shown that this solution meets WQSs and does not result in localized impairments. These individual WLAs may be adjusted during the NPDES permitting process. If the WLAs are adjusted, the individual effluent limits for each permit issued to a discharger on the impaired water must be consistent with the assumptions and requirements of the adjusted WLAs in the TMDL. If the WLAs are not adjusted, effluent limits contained in the permit must be consistent with the individual WLAs specified in the TMDL. If a draft permit provides for a higher load for a discharger than the corresponding individual WLA in the TMDL, the State/Tribe must demonstrate that the total WLA in the TMDL will be achieved through reductions in the remaining individual WLAs and that localized impairments will not result. All permittees should be notified of any deviations from the initial individual WLAs contained in the TMDL. EPA does not require the establishment of a new TMDL to reflect these revised allocations as long as the total WLA, as expressed in the TMDL, remains the same or decreases, and there is no reallocation between the total WLA and the total LA.

**Comment:**
Wasteload allocations are addressed on page 25 of the final TMDL document. IDEM identified various NPDES permit holders in the HPC watershed. IDEM assigned a WLA of 125 cfu/100 mL for *E. coli* to four WWTPs within the HPC watershed.
- Chandler Municipal WWTP (IN0020435)
- Elberfield Municipal WWTP (IN0020788)
- Haubstadt Municipal WWTP (IN0021482)
- Town of Fort Branch WWTP (IN0022896)

All of the MS4 communities within the HPC watershed are assigned a WLA of 125 cfu/100 mL. IDEM explained that some of the MS4 communities fall within the boundaries of larger MS4 communities (example Ivy Tech State College-SW and the University of Evansville are within the City of Evansville). EPA determined that all NPDES permitted MS4 communities, regardless of their location within the HPC watershed, are assigned a WLA of 125 cfu/100 mL. The NPDES permitted MS4 communities which are assigned a WLA of 125 cfu/100 mL are:
- City of Evansville (INR040057)

- Ivy Tech State College-SW (INR040060)
- Town of Chandler (INR040053)
- University of Evansville (INR040058)
- University of Southern Indiana (INR050028)
- Vanderburgh County (INR040030)
- Warrick County (INR040065)

IDEM identified six non-municipal NPDES permitted facilities which have *E. coli* discharge limits in their permits. IDEM assigned a WLA of 125 cfu/100 mL for *E. coli* to the following NPDES permitted facilities within the HPC watershed.

- MARRS Elementary School (IN0055255)
- Twin Lakes Mobile Home Park (IN0044491)
- AC Ranch Mobile Home Park (IN0039608)
- Creekside Court Mobile Home Park (IN0039616)
- Harbortown Subdivision Sanitary (IN01009924)
- KOA Kampground (IN0029963)

There are three CSO communities (Town of Fort Branch, City of Evansville and Mount Vernon) in the HPC watershed. WLAs from CSO inputs were set to the water quality standard for *E. coli* (WLA = 125 cfu/100 mL) across all flow conditions. There are three CAFO facilities in the HPC watershed. CAFO feedlots in the HPC watershed are required to operate under the conditions of their NPDES permit. CAFO facilities are generally not allowed any pollutant discharges from their animal housing facilities or other associated sites. WLAs from CAFO facilities were set at zero (WLA = 0 per 100 mL).

IDEM identified two NPDES permit holders within the subwatershed (HUC-12 #051402020102) which contains the reaches which showed phosphorus exceedances (INE0211_02, INE0211_T1001 and INE0211_T1003). These permitted facilities received a WLA for TP based on the 0.30 mg/L water quality target for phosphorus. The Haubstadt Municipal WWTP (IN0021482) and the KOA Kampground (IN0029963) facilities were assigned a WLA for TP based on 0.30 mg/L for TP.

The U.S. EPA finds that the TMDL document submitted by IDEM satisfies the requirements of the fifth criterion.

### 6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1) ). EPA's 1991 TMDL Guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

**Comment:**
The determination of the Margin of Safety (MOS) is addressed on page 26 of the final TMDL document. The HPC watershed TMDLs utilized explicit and implicit MOS due to the consideration of conservative assumptions. The explicit portion of the MOS included a 10% reduction of the loading capacity value across all flow regimes for the *E. coli* and TP TMDLs. Utilizing an explicit MOS accounts for natural fluctuations of *E. coli* and TP measurements and the relatively small sample size of field data collected by IDEM in 2007-2010.

An implicit approach, relying on conservative assumptions, was also incorporated into the HPC *E. coli* watershed TMDLs. One of the conservative assumptions made during the development of the *E. coli* TMDLs was that rate of decay, or die-off rate of pathogen species, was not used in the TMDL calculations or in the creation of load duration curves for *E. coli*. Bacteria have a limited capability of surviving outside their hosts, and normally a rate of decay would be incorporated. IDEM determined that it is more conservative and appropriate to use the WQS (125 cfu/100 mL) and not apply a rate of decay, which could result in a discharge limit greater than the WQS.

As stated in *EPA's Protocol for Developing Pathogen TMDLs* (EPA 841-R-00-002), many different factors affect the survival of pathogens, including the physical condition of the water. These factors include, but are not limited to sunlight, temperature, salinity, and nutrient deficiencies. These factors vary depending on the environmental condition/circumstances of the water, and therefore it would be difficult to assert that the rate of decay caused by any given combination of these environmental variables was sufficient enough to meet the WQS of 125 cfu/100 mL and 235 cfu/100ml. Thus, it is more conservative to apply the State's WQS as the MOS, because this standard must be met at all times under all environmental conditions.

The U.S. EPA finds that the TMDL document submitted by IDEM contains an appropriate MOS satisfying the requirements of the sixth criterion.

### 7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variations. (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)).

**Comment:**
Seasonal variation in the HPC watershed TMDLs was addressed by calculating the TMDL using the *E. coli* water quality standard for the recreation season (April 1 through October 31). The development of the LDCs utilized flow measurements from a USGS gage in Wadesville, IN which were collected over a variety of flow conditions observed during the recreation season. The LDCs developed from these flow records represented a range of flow conditions and thereby accounted for seasonal variability over the recreation season.

The HPC watershed TMDLs for *E. coli* were developed as concentration based TMDLs (measured in billions of bacteria per day), which require WQS to be met regardless of flow condition within the recreation season. The State of Indiana does not have an applicable full body contact *E. coli* water quality standard for the remainder of the calendar year (November 1 through March 31). By meeting the WQS during the summer recreation season, it was assumed that the loading capacity values would be protective of water quality during the remainder of the calendar year (November through March).

IDEM explained that seasonal variation was not explicitly addressed for TP. IDEM stated that the TP nutrient criteria is applicable year round and therefore does not have a seasonal variation component.

The U.S. EPA finds that the TMDL document submitted by IDEM satisfies the requirements of the seventh criterion.

**8. Reasonable Assurance**

When a TMDL is developed for waters impaired by point sources only, the issuance of a National Pollutant Discharge Elimination System (NPDES) permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with "the assumptions and requirements of any available wasteload allocation" in an approved TMDL.

When a TMDL is developed for waters impaired by both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur, EPA's 1991 TMDL Guidance states that the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

EPA's August 1997 TMDL Guidance also directs Regions to work with States to achieve TMDL load allocations in waters impaired only by nonpoint sources. However, EPA cannot disapprove a TMDL for nonpoint source-only impaired waters, which do not have a demonstration of reasonable assurance that LAs will be achieved, because such a showing is not required by current regulations.

**Comment:**

The HPC watershed TMDL outlines reasonable assurance activities in pages 26-32 of the final TMDL document. The reasonable assurance practices discussed in the final TMDL document are structured toward meeting the bacteria and nutrient water quality standards and targets. Mitigation practices, which generally fall outside of regulatory authority, will require commitment from state agencies and local stakeholders to carry out the suggested actions. The recommendations made by IDEM will be successful at improving water quality if the appropriate local groups work to implement these recommendations.

The Vanderburgh County SWCD is already very active in implementation activities within the HPC watershed. IDEM anticipates that the Vanderburgh County SWCD will continue to lead the local efforts in the watershed. A Pigeon-Highland Watershed Steering Committee has also been active within the watershed and developed a watershed management plan. The HPC watershed management plan outlined various BMPs designed to reduce bacteria inputs to surface waters. Some of these strategies included: vegetated filter strips in riparian areas, riparian streambank stability efforts, integrated crop management, grade stabilization structures, grazing management, and efforts to educate local stakeholders on stormwater mitigation practices and stormwater pollution issues. The efforts of the HPC watershed TMDL will enhance the watershed management plan.

Other state led efforts will include: the enforcement of NPDES discharge permits, working with MS4 communities to ensure that these entities meet water quality standards, and other land and water resource protection efforts sponsored by state agencies. All permitted dischargers with a sanitary component (*E. coli* limit) will be required to attain WQS and reduce the bacteria inputs to surface waters of the HPC watershed.

Continued water quality monitoring within the basin is supported by IDEM. Additional water quality monitoring results would provide insight into the success or failure of BMP systems designed to reduce bacteria and nutrient loading to the surface waters of the HPC watershed. Local watershed managers, using water quality monitoring data, would be able to reflect on the progress or lack of progress of the various pollutant removal strategies and would have the opportunity to change course if observed progress is unsatisfactory.

Implementation efforts can be achieved through federal, state and local action. Federal funding, via the Section 319 grants program, can provide money to implement voluntary nonpoint source programs within the HPC watershed. State efforts can be funded via Clean Water Indiana grant money, monetary support from Lakes and River Enhancement program (LARE), monetary support from the Conservation Reserve Program (CRP) (via the USDA-NRCS), monetary support from the Indiana Wetlands Reserve Program (via the USDA-NRCS), monetary support from the Environmental Quality Incentives Program (USDA-NRCS), and other sources of local funding.

The U.S. EPA finds that this criterion has been adequately addressed.

### 9. Monitoring Plan to Track TMDL Effectiveness

EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA 440/4-91-001), recommends a monitoring plan to track the effectiveness of a TMDL, particularly when a TMDL involves both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur. Such a TMDL should provide assurances that nonpoint source controls will achieve expected load reductions and, such TMDL should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring and leading to attainment of water quality standards.

**Comment:**
Water quality monitoring in the HPC watershed will occur on IDEM's nine-year rotating basin schedule or once TMDL implementation BMPs are incorporated in the watershed. The IDEM monitoring efforts are designed to assess water quality improvements with respect to *E. coli* and to TP/nutrient concentrations. Water quality monitoring will also test the efficiency of pollution reduction strategies.

During the monitoring period, watershed managers will determine the appropriate monitoring cycle for the HPC watershed. The monitoring schedule will be adjusted, as needed, to improve source identification and source elimination efforts. IDEM will monitor whether *E. coli* and TP targets are being achieved and adjust the HPC watershed BMP strategy accordingly to meet these water quality targets.

The U.S. EPA finds that the TMDL document submitted by IDEM satisfies the requirements of the ninth criterion.

## 10. Implementation

EPA policy encourages Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired by nonpoint sources. Regions may assist States/Tribes in developing implementation plans that include reasonable assurances that nonpoint source LAs established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. In addition, EPA policy recognizes that other relevant watershed management processes may be used in the TMDL process. EPA is not required to and does not approve TMDL implementation plans.

**Comment:**
Implementation strategies are outlined in the "Potential Future Activities" Section (pages 32-33 of the final TMDL document). Local partners will bear the responsibility for assisting in the management of public lands and waters within the HPC watershed. These partners will also be tasked with finding creative adaptive management strategies to meet changing water quality conditions within the watershed. The focus of all of the implementation strategies will be to reduce bacterial and nutrient inputs to the surface waters in the HPC watershed. The main bacteria and nutrient reduction strategies include:

*Septic System Improvements:* Local septic management programs and educational opportunities can aid in the reduction of septic pollution. Educating the public on proper septic maintenance, finding and eliminating illicit discharges and repairing failing systems will lessen the impacts of septic derived bacterial inputs to the HPC watershed.

*Reducing Livestock Access to Stream Environments:* The installation of exclusion fencing near stream and river environments to prevent direct access for livestock, installing alternative water supplies, and installing stream crossings between pastures, will work to reduce the influxes of bacteria and nutrients and improve water quality within the watershed.

*Manure Collection and Storage Practices:* Manure has been identified as a source of bacteria. Bacteria can be transported to surface water bodies via stormwater runoff. Bacteria laden water can also leach into groundwater resources. Improved strategies in the collection, storage and management of manure can minimize the bacterial impacts on surface and groundwater systems. Repairing manure storage facilities or building roofs over manure storage areas may also aid in decreasing the amount of bacteria in stormwater runoff.

*Riparian Area Management Practices:* Protection of stream and river banks within the watershed through planting of vegetated/buffer areas with grasses, legumes, shrubs or trees. These areas will filter stormwater runoff before the runoff enters the main stem or tributaries of the HPC watershed.

*Agricultural Land Management Practices:* Runoff from cropland and pastures combined with the application of manure to fields in the late summer are a likely source of bacteria found in stormwater runoff from agricultural areas. Planting vegetation along riparian areas (riparian buffers) will aid to slow down water and allow it to filter through the vegetation before entering surface water environments. IDEM also advocated employing agricultural BMP strategies such as: contour row cropping, no-till farming and integrated crop management.

*Urban/Residential Nutrient Reduction Strategies:* These strategies involve reducing stormwater runoff within the HPC watershed. These nutrient reduction practices could include the installation of rain gardens, stormwater settling basins, lake shore buffer strips, permeable pavement, biofiltration basins, and other low impact practices. Other nutrient reduction strategies involve vegetation management and lawn fertilizer reduction practices. Public outreach programs, encouraging owners to clean up after their pets will educate the public on local water quality issues and reduce bacterial inputs to surface waters.

*Internal Loading Reduction Strategies:* The main strategy for improving internal phosphorus loads requires reducing external sources to the surface waters of the HPC watershed. Once the external sources have been eliminated, mitigation efforts can be focused on managing the internal phosphorus sources (i.e. phosphorus found in lake sediments).

*Agricultural Nutrient Reduction Strategies:* These strategies involve reducing nutrient transport from fields, via manure and fertilizers, and minimizing soil loss. Specific practices would include: stream buffer strips, lake shore buffer strips, streambank stabilization practices (gully stabilization), wetland restoration, and nutrient management planning.

*Public Education Efforts:* Public programs should be developed to provide guidance to the general public on bacteria and nutrient reduction efforts and their impact on water quality. These educational efforts could also be used to inform the general public on what they can do to protect the overall health of the water resources in the HPC watershed.

The U.S. EPA finds that this criterion has been adequately addressed. The U.S. EPA reviews but does not approve implementation plans.

## 11. Public Participation

EPA policy is that there should be full and meaningful public participation in the TMDL development process. The TMDL regulations require that each State/Tribe must subject calculations to establish TMDLs to public review consistent with its own continuing planning process (40 C.F.R. §130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval should describe the State's/Tribe's public participation process, including a summary of significant comments and the State's/Tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require EPA to publish a notice seeking public comment (40 C.F.R. §130.7(d)(2)).

Provision of inadequate public participation may be a basis for disapproving a TMDL. If EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by EPA.

**Comment:**
IDEM held a TMDL kickoff meeting on October 13, 2010 at the Vanderburgh Country Public Library in Evansville, Indiana. During the kickoff meeting, IDEM communicated the goals of the TMDL efforts within the HPC watershed, explained the TMDL development process, and solicited contact information from stakeholders in attendance.

In May 2011, IDEM held a second meeting at the Vanderburgh County Public Library where they provided an overview of the draft HPC watershed TMDL and provided members of the audience the opportunity to provide public comment. The draft TDML was posted online by IDEM at (http://www.in.gov/idem/nps/3857.htm). The 30-day public comment period was started on May 19, 2011 and ended on June 20, 2011. IDEM received 14 public comments and adequately addressed each of these comments. IDEM submitted the final TMDL and submittal letter to the U.S. EPA on August 9, 2011.

The U.S. EPA finds that the TMDL document submitted for the Highland-Pigeon Creek watershed by IDEM satisfies the requirements of this eleventh element.

## 12. Submittal Letter

A submittal letter should be included with the TMDL submittal, and should specify whether the TMDL is being submitted for a *technical review* or *final review and approval*. Each final TMDL submitted to EPA should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final review and approval, should contain such identifying information as the name and location of the waterbody, and the pollutant(s) of concern.

**Comment:**
The U.S. EPA received the final Highland-Pigeon Creek watershed TMDL document, submittal letter, and public meeting documentation from IDEM on August 9, 2011. The transmittal letter explicitly stated that the final TMDLs for the Highland-Pigeon Creek watershed for bacteria (*E. coli*) and excess nutrients (total phosphorus), were being submitted to the U.S. EPA pursuant to Section 303(d) of the Clean Water Act for U.S. EPA review and approval. The letter clearly stated that this was a final TMDL submittal under Section 303(d) of CWA. The letter also contained the name of the watershed as it appears on Indiana's 303(d) list, and the causes/pollutants of concern. This TMDL was submitted per the requirements under Section 303(d) of the Clean Water Act and 40 CFR 130. The HPC watershed TMDL addresses 54 impaired segments. Fifty-four of those segments are impaired for bacteria (*E. coli*) and three segments are impaired for excessive nutrients (total phosphorus). Table 2 of this Decision Document outlines the pollutant and impaired segments.

The U.S. EPA finds that the TMDL transmittal letter submitted for the Highland-Pigeon Creek watershed by IDEM satisfies the requirements of this twelfth element.

### 13. Conclusion

After a full and complete review, the U.S. EPA finds that the 54 *E. coli* and 3 total phosphorus TMDLs for the Highland-Pigeon Creek watershed in Gibson, Pike, Posey, Vanderburgh and Warrick counties, satisfy all of the elements of approvable TMDLs. This approval is for 57 TMDLs addressing 54 waterbodies/impairments identified in Table 2 of this Decision Document. These TMDLs address recreational use and aquatic habitat use impairments.

The U.S. EPA's approval of these TMDLs extends to the water bodies which are identified in Table 2 of this Decision Document, with the exception of any portions of the water bodies that are within Indian Country, as defined in 18 U.S.C. Section 1151. The U.S. EPA is taking no action to approve or disapprove TMDLs for those waters at this time. The U.S. EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under the CWA Section 303(d) for those waters.