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

JUN 1 9 2019

REPLY TO THE ATTENTION OF

WW-16J

Angela Brown
Chief, Watershed Planning & Restoration Section
Office of Water Quality, Indiana Department of Environmental Management
MC 65-42 Shadeland
100 North Senate Avenue
Indianapolis, Indiana 46204-2251

Dear Ms. Brown:

The U.S. Environmental Protection Agency approved the Indiana Department of Environmental Management (IDEM) Deep River-Portage Burns Watershed (DRPBW) Total Maximum Daily Load (TMDL) report on September 26, 2014. In December 2017, IDEM informed EPA that it had found inaccuracies in IDEM's final DRPBW TMDL report submitted to EPA in the summer of 2014. More specifically, IDEM explained that it had mischaracterized how it calculated bacteria TMDLs in its final DRPBW TMDL report. IDEM confirmed that these inaccuracies were solely in the main body of the final DRPBW TMDL report and that the bacteria TMDL calculations presented in the final DRPBW TMDL report were correct.

EPA is revising its September 26, 2014 Decision Document in response to IDEM's December 2017 update on information included in the final DRPBW TMDL report. EPA's amendment to the Decision Document is explained in Attachment #1 to the June 2019 revision to the DRPBW TMDLs Decision Document.

EPA is enclosing the June 2019 revised Decision Document and Attachment #1 for IDEM's records. If you have any questions, please contact Mr. David Werbach, TMDL Coordinator, at 312-886-4242.

Sincerely,

David Pfeifer
Acting Branch Chief
Watersheds & Wetlands Branch

TMDL: Deep River – Portage Burns Watershed, Lake and Porter Counties, Indiana
Date: June 19, 2019 (revised)

DECISION DOCUMENT
FOR THE DEEP RIVER-PORTAGE BURNS WATERSHED TMDL, INDIANA

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 Deep River–Portage Burns Watershed (DRPBW) is located in northern Indiana in Lake and Portage Counties. The DRPBW is approximately 180 square miles in size (approx. 115,200 acres). The headwaters of the Deep River originate near Crown Point, Indiana in Lake County and flow eastward before heading northward through parts of Merrillville and Hobart, Indiana. The Deep River then flows into the West Branch of the Little Calumet River near Gary, Indiana, which flows eastward into Porter County. The West Branch of the Little Calumet River merges with the East Branch of the Little Calumet River and becomes Burns Ditch. Burns Ditch ultimately empties into Lake Michigan near Portage, Indiana.

The DRPBW TMDLs address impaired reaches on approximately 233 miles of streams within the DRPBW and target impaired waters exceeding numeric water quality standards (WQS) for bacteria (*Escherichia coli* (*E. coli*)) and narrative water quality criteria for nutrients, sediment and biological indicators. IDEM identified twenty-nine (29) impaired segments in the DRPBW on its draft 2012 303(d) list. The 29 impaired segments included impairments for bacteria (*E. coli*), nutrients, dissolved oxygen, impaired biotic communities, and siltation.

For the purposes of the DRPBW TMDL, the project area was subdivided into nine Hydrologic Unit Code (HUC) twelve (HUC-12) subwatersheds;

- Headwaters of Main Beaver Dam Ditch (04040001-05-01);
- Main Beaver Dam Ditch (04040001-05-02);
- Headwaters of Turkey Creek (04040001-05-03);
- Deer Creek-Deep River (04040001-05-04);
- City of Merrillville-Turkey Creek (04040001-05-05);
- Duck Creek (04040001-05-06);
- Lake George-Deep River (04040001-05-07);
- Little Calumet River-Deep River (04040001-05-08); and
- Willow Creek-Burns Ditch (04040001-05-09).

Water quality within the DRPBW was monitored via efforts from the Indiana Department of Environmental Management (IDEM) in 2013-2014. Water quality sampling efforts involved measuring the health of the stream environments by collected field data in order to monitor the quality of aquatic biological communities, sediment, and the chemical, physical and habitat characteristics within each stream environment. IDEM determined that in the DRPBW there are;

- 26 segments which exceed the bacteria WQS and are addressed via bacteria TMDLs;
- 10 segments which exceed the nutrient water quality target (WQT) and are addressed via total phosphorus TMDLs; and
- 30 segments which exceed the total suspended solids (TSS) WQT and are addressed via TSS TMDLs.

IDEM explained that impaired segments due to depleted oxygen in the water column (i.e., dissolved oxygen (DO)) and those which exhibited impaired biology (i.e., impaired biotic communities (IBC)) were addressed in the DRPBW TMDLs via total phosphorus TMDLs or by total suspended solid

TMDLs. IDEM described the water column conditions which result in the determination of DO and IBC impairments and linked the cause of those conditions to nutrient and sediment inputs. IDEM communicated that by reducing nutrient and sediment inputs via TMDL implementation efforts, the water column conditions leading to the DO and IBC impairments would be addressed and mitigated.

IDEM collected water quality data and biological sampling information at various locations in all twelve HUC-12 subwatersheds of the DRPBW during its sampling efforts in 2013-2014. Based on this information, IDEM assessed individual waters within each HUC-12 subwatershed and made its determinations of which individual water bodies were impaired according to WQS and WQT values (Table 1 of this Decision Document).

Table 1: Summary of Impairments in the Deep River-Portage Burns Watershed

2014 AUID	AU Name	Impaired Beneficial Use	Impairment address	TMDL
Headwaters of Main Beaver Dam Ditch (04040001-05-01)				
INC0151_01	Main Beaver Dam Ditch	Recreational Use	bacteria	*E. coli*
INC0151_01	Main Beaver Dam Ditch	Aquatic Life Use	DO, IBC & nutrients	TSS
INC0151_T1001	Main Beaver Dam Ditch Tributary	Recreational Use	bacteria	*E. coli*
INC0151_T1001	Main Beaver Dam Ditch Tributary	Aquatic Life Use	DO & IBC	TSS
INC0151_T1003	Main Beaver Dam Ditch Tributary	Recreational Use	bacteria	*E. coli*
INC0151_T1003	Main Beaver Dam Ditch Tributary	Aquatic Life Use	DO, IBC & nutrients	TSS
Main Beaver Dam Ditch (04040001-05-02)				
INC0152_04	Main Beaver Dam Ditch	Recreational Use	bacteria	*E. coli*
INC0152_04	Main Beaver Dam Ditch	Aquatic Life Use	IBC & nutrients	TP & TSS
INC0152_T1008	Smith Ditch	Recreational Use	bacteria	*E. coli*
INC0152_T1008	Smith Ditch	Aquatic Life Use	DO	TP & TSS
INC0152_T1009	Niles Ditch	Recreational Use	bacteria	*E. coli*
INC0152_T1009	Niles Ditch	Aquatic Life Use	DO, IBC & nutrients	TP & TSS
Headwaters of Turkey Creek (04040001-05-03)				
INC0153_01	Turkey Creek	Recreational Use	bacteria	*E. coli*
INC0153_01	Turkey Creek	Aquatic Life Use	IBC	TSS
INC0153_T1001	Turkey Creek Tributary	Aquatic Life Use	DO, IBC & nutrients	TSS
INC0153_T1003	Johnson Ditch	Recreational Use	bacteria	*E. coli*
INC0153_T1003	Johnson Ditch	Aquatic Life Use	DO & IBC	TSS
INC0153_T1004	Turkey Creek Tributary	Aquatic Life Use (IBC)	IBC	TSS
INC0153_T1005	Turkey Creek Tributary	Recreational Use	bacteria	*E. coli*
INC0153_T1005	Turkey Creek Tributary	Aquatic Life Use	DO & IBC	TSS
Deer Creek-Deep River (04040001-05-04)				
INC0154_01	Deep River	Recreational Use	bacteria	*E. coli*
INC0154_01	Deep River	Aquatic Life Use	IBC	TP & TSS
INC0154_T1001	Deep River	Recreational Use	bacteria	*E. coli*
INC0154_T1001	Deep River	Aquatic Life Use	DO, IBC & nutrients	TP & TSS
INC0154_T1003	Deep River Tributary Merrillville	Recreational Use	bacteria	*E. coli*
INC0154_T1003	Deep River Tributary Merrillville	Aquatic Life Use	IBC & siltation	TP & TSS
INC0154_T1004	Deep River Tributary Merrillville	Recreational Use	bacteria	*E. coli*

Table 1: Summary of Impairments in the Deep River-Portage Burns Watershed

2014 AUID	AU Name	Impaired Beneficial Use	Impairment address	TMDL
INC0154_T1004	Deep River Tributary Merrillville	Aquatic Life Use	IBC	TP & TSS
INC0154_T1005	Deep River Tributary Merrillville	Recreational Use	bacteria	*E. coli*
INC0154_T1005	Deep River Tributary Merrillville	Aquatic Life Use	IBC	TP & TSS
City of Merrillville-Turkey Creek (04040001-05-05)				
INC0155_01	Turkey Creek	Recreational Use	bacteria	*E. coli*
INC0155_01	Turkey Creek	Aquatic Life Use	DO & IBC	TSS
INC0155_T1002	Turkey Creek Tributary	Recreational Use	bacteria	*E. coli*
INC0155_T1002	Turkey Creek Tributary	Aquatic Life Use	IBC	TSS
INC0155_T1003	Turkey Creek Tributary	Recreational Use	bacteria	*E. coli*
INC0155_T1003	Turkey Creek Tributary	Aquatic Life Use	DO, IBC & nutrients	TSS
Duck Creek (04040001-05-06)				
INC0156_01	Duck Creek	Recreational Use	bacteria	*E. coli*
INC0156_01	Duck Creek	Aquatic Life Use	DO, IBC & nutrients	TP & TSS
INC0156_T1003	Duck Creek Tributary	Recreational Use	bacteria	*E. coli*
INC0156_T1003	Duck Creek Tributary	Aquatic Life Use	IBC	TP & TSS
Lake George-Deep River (04040001-05-07)				
INC0157_01	Deep River	Recreational Use	bacteria	*E. coli*
INC0157_01	Deep River	Aquatic Life Use	IBC	TSS
INC0157_P1001	Deep River	Recreational Use	bacteria	*E. coli*
INC0157_P1001	Deep River	Aquatic Life Use	DO & IBC	TSS
INC0157_T1002	Sprout Ditch	Recreational Use	bacteria	*E. coli*
INC0157_T1002	Sprout Ditch	Aquatic Life Use	IBC	TSS
Little Calumet River- Deep River (04040001-05-08)				
INC0158_01	Deep River	Aquatic Life Use	IBC	TSS
INC0158_T1002	Deep River Tributary	Recreational Use	bacteria	*E. coli*
INC0158_T1002	Deep River Tributary	Aquatic Life Use	IBC	TSS
INC0158_T1005	Little Calumet River	Aquatic Life Use	IBC	TSS
Willow Creek-Burns Ditch (04040001-05-09)				
INC0159_01	Little Calumet River	Recreational Use	bacteria	*E. coli*
INC0159_01	Little Calumet River	Aquatic Life Use	DO & IBC	TSS
INC0159_02	Little Calumet River	Recreational Use	bacteria	*E. coli*
INC0159_02	Little Calumet River	Aquatic Life Use	IBC	TSS
INC0159_T1001	Willow Creek	Recreational Use	bacteria	*E. coli*
INC0159_T1001	Willow Creek	Aquatic Life Use	IBC	TSS
		TOTAL Impairments Addressed	78	
			TOTAL TMDLs	66

Land Use:

The DRPBW watershed encompasses approximately 115,200 acres in northern Indiana. Land use in the DRPBW is comprised of cultivated crop lands (agricultural), developed lands, grassland and shrub lands, forested lands, wetlands, pasture lands and open water. Land use coverage from the Multi-Resolution Land Characteristics Consortium (MRLCC) was utilized to calculate percentages of land cover within the DRPBW. Although agricultural land use (24.1%) accounts for the single greatest percentage of land use in the DRPBW, developed land is the predominant land use in the watershed (Table 2 of this Decision Document). The high percentage of developed land in the watershed is an indicator of high levels of impervious surfaces that can be significant sources of *E. coli*, nutrients, and

TSS. Impervious cover directs stormwater runoff into stormwater infrastructure and does not allow for water to infiltrate into the landscape. Stormwater infrastructure provides a direct route for the pollutants to enter local water bodies. The other main land use categories in the DRPBW are agriculture and shrub and herbaceous land. Agricultural lands can be significant sources of TSS, nutrients, and *E. coli*.

Table 2: Land use in the Deep River-Portage Burns Watershed (IN)

Land Use Category Description	Acreage	Square Miles	Distribution (% of the total area in the Deep River-Portage Burns Watershed)
Agriculture	27,795.35	43.43	24.2%
Developed, Low Intensity	25,931.24	40.52	22.5%
Shrub/Herbaceous	12,230.60	19.11	10.6%
Developed, Open Space	10,359.15	16.19	9.0%
Forest	10,049.36	15.7	8.7%
Developed, Medium Intensity	9,947.94	15.54	8.6%
Wetlands	8,753.91	13.68	7.6%
Hay/Pasture	6,391.63	9.99	5.6%
Developed, High Intensity	2551.536	3.99	2.2%
Open Water	1,036.14	1.62	0.9%
TOTAL	**115,046.85**	**179.77**	**100%**

Problem Identification:

IDEM identified the water body segments of the DRPBW on the 2012 303(d) list of impaired waters.

Bacteria: Bacteria exceedances can negatively impact recreational uses (fishing, swimming, wading, boating, etc.) and public health. At elevated levels, bacteria may cause illness within humans who have contact with or ingest bacteria laden water. Recreation-based contact can lead to ear, nose, and throat infections, and stomach illness. *E. coli* is used as an indicator of the presence of bacteria.

Nutrients/dissolved oxygen/impaired biotic communities: While total phosphorus (TP) is an essential nutrient for aquatic life, elevated concentrations of TP can lead to nuisance algal blooms that negatively impact aquatic life and recreation (swimming, boating, fishing, etc.). Algal decomposition depletes oxygen levels which stresses benthic macroinvertebrates and fish. Excess algae can shade the water column which limits the distribution of aquatic vegetation. Aquatic vegetation stabilizes bottom sediments, and also is an important habitat for macroinvertebrates and fish. Further, depletion of oxygen can cause phosphorus release from bottom sediments (i.e. internal loading).

Degradations in aquatic habitats or water quality (ex. low dissolved oxygen) can negatively impact aquatic life use. Increased turbidity, brought on by elevated levels of nutrients within the water column, can reduce dissolved oxygen in the water column, and cause large shifts in dissolved oxygen and pH throughout the day. Shifting chemical conditions within the water column may stress aquatic biota (fish and macroinvertebrate species). In some instances, degradations in aquatic habitats or water quality have reduced fish populations or altered fish communities from those communities supporting sport fish species to communities which support more tolerant rough fish species.

Sediment/dissolved oxygen/impaired biotic communities: Excess siltation and flow alteration in streams may impact aquatic life by altering habitats. Excess sediment can fill pools, embed substrates, and reduce connectivity between different stream habitats. The result is a decline in habitat types that in healthy streams support diverse macroinvertebrate communities. Excess sediment can also reduce spawning and rearing habitats for certain fish species. In addition, excess suspended sediment can clog the gills of fish and thus reduce fish health. Flow alterations within the DRPBW due to drainage improvements on or near agricultural lands, have in some instances resulted in increased peak flows. Higher peak flows in stream environments, which typically occur during storm events, can carry increased sediment loads to streams and erode streambanks. Deposited fine sediments may embed substrates leading to habitat loss. Similar to the nutrient effects discussed above, this may result in reduced fish populations or altered fish communities from those communities supporting sport fish species to communities which support rough fish species.

Priority Ranking:
The DRPBW TMDL was prioritized to be completed based on local interest in addressing water quality deficiencies within the watershed, IDEM's interest in conducting baseline water quality monitoring for local planning, and the willingness of local partners to develop a Section 319 application and a watershed management plan (WMP). The development and adoption of the local WMP will lead to the implementation of best management practices (BMPs) and other mitigation strategies to improve water quality within the DRPBW.

Pollutants of Concern:
Recreational Use: The pollutant of concern for total body contact recreational use impairment is *E. coli* which is an indicator for pathogenic bacteria.

Aquatic Community Support: 327 IAC 2-1-3(a)(2)(A) states that all surface waters should be capable of supporting a well-balanced, warm water aquatic community. The pollutants of concern for aquatic life use impairment are excess sediment (TSS) and excess nutrients (TP).

Source Identification (point and nonpoint sources):
Point Source Identification: The potential point sources to the DRPBW are:

National Pollutant Discharge Elimination System (NPDES) permit holders: NPDES permitted facilities may contribute pollutant loads (bacteria, nutrients or sediment) to surface waters through facility discharges of treated wastewater. Permitted facilities discharge treated wastewater according to their NPDES permit. IDEM identified seven NPDES permit holders in the DRPBW which were assigned a portion of the wasteload allocation (WLA) (Table 3 in this Decision Document).

Table 3: Permitted NPDES dischargers in the Deep River-Portage Burns Watershed

Facility Name	Permit Number	AUID	Receiving Stream	Maximum Design Flow (MGD)
Crown Point WWTP	IN0025763	INC0151_01	Main Beaver Dam Ditch	8.1
Winfield WWTP	IN0058343	INC0154_T1001	Unnamed Tributary to Deer Creek	0.4
Deep River Water Park WWTP	IN0058378	INC0154_01	Deep River	0.03

Chicagoland Christian Village	IN0054470	INC0154_T1001	Unnamed Tributary to Deer Creek	0.05
Falling Waters Conservancy District	IN0062090	INC0154_T1004	Unnamed Tributary to Deep River	0.124
Hobart WWTP	IN0061344	INC0157_P1001	Deep River	4.8
Portage Utility Service Facility WWTP	IN0024368	INC0159_01	Burns Ditch	4.95

Municipal Separate Storm Sewer Systems (MS4): There are twelve (12) MS4 permitted entities (Table 4 of this Decision Document) within the boundaries of the DRPBW. Stormwater from MS4s can transport bacteria, nutrients and sediment to surface water bodies during or shortly after storm events. Each of the MS4 entities within Table 4 of this Decision Document was assigned a portion of the WLA based on the percentage of developed land relative to the area of the entire AUID.

Table 4: Permitted MS4 communities in the Deep River-Portage Burns Watershed

MS4 Community	Permit ID
Crown Point	INR040054
Gary	INR040101
Griffith	INR040108
Lake County	INR040124
Lake Station	INR040087
Lakes of the Four Seasons	INR040007
Merrillville	INR040049
New Chicago	INR040031
Portage	INR040090
Porter County	INR040140
Schererville	INR040112
St John	INR040047

Construction stormwater: Construction sites and other areas under construction may contribute phosphorus and sediment during stormwater runoff events. The DRPBW TP and TSS TMDLs assume that there will be phosphorus and sediment inputs from construction activities and therefore a portion of the WLA was assigned to construction stormwater. Construction areas in the DRPBW must comply with the requirements of IDEM's Stormwater Program.

Combined Sewer Overflows (CSOs): The Crown Point WWTP (IN0025763) and the Gary Sanitary District WWTP (IN0022977) facilities contain CSO outfalls which discharge into waters of the DRPBW (Table 19 of the final TMDL document). During periods of heavy rainfall or snowmelt, the wastewater volume in a combined sewer system can exceed the capacity of the sewer system or treatment plant. It is during these times when the CSOs from the Crown Point WWTP or the Gary Sanitary District WWTP may discharge into Main Beaver Dam Ditch (Crown Point WWTP) or the Little Calumet River (Gary Sanitary District WWTP).

CSOs may deliver bacteria, nutrients and sediment to waterways during or shortly after storm events. IAC Article 15, Industrial Wastewater Pretreatment Programs and NPDES includes regulations specific to communities experiencing CSOs and/or sanitary sewer overflows (SSOs). Combined sewers are defined (327 IAC 5-1.5-7) as sewers designed and employed to receive both (1) water-carried or liquid wastes; and, (2) storm or surface water.

Sanitary Sewer Overflows (SSOs): SSOs may deliver pollutants to waterways during or shortly after storm events. IAC Article 15, Industrial Wastewater Pretreatment Programs and NPDES includes regulations specific to communities experiencing sanitary sewer overflows. There are two entities with SSOs within the DRPBW, the Merrillville Conservancy District (INJ0355548) and the Portage Utility Service Facility (IN0024368) (Table 21 of the final TMDL document).

The Merrillville Conservancy District operates a sewer collection system which transports wastewater to the Gary Sanitary District WWTP. This wastewater collection system is 100% separate sanitary sewers by design with no bypass points and one SSO location in the City of Merrillville-Turkey Creek (04040001-05-05) subwatershed. The Portage Utility Service Facility is comprised of 100% sanitary sewers with one SSO discharge location point. The SSO discharge point is into Burns Ditch of the Willow Creek (04040001-05-09) subwatershed. The Portage Utility Service Facility accepts industrial flow from several industries within the Willow Creek subwatershed (ex. Advanced Waste Services, Indiana Pickling and Processing Co., Meritex, Inc., MonoSol, Rx Melton, Monosol, Rx Ameriplex, NEO industries Inc., and Precoat Metals Division- Sequa Coatings Division).

Nonpoint Source Identification: The potential nonpoint sources to the DRPBW are:

Non-regulated urban runoff: Runoff from urban areas (urban, residential, commercial or industrial land uses) can contribute various pollutants (bacteria, nutrients and sediments) to local water bodies. Stormwater from urban areas, which drain impervious surfaces, may introduce pollutants to surface waters. Potential urban sources of bacteria and nutrients can also include wildlife or pet wastes.

Septic systems: Failing septic systems are a potential source of bacteria and nutrients within the DRPBW. Septic systems generally do not discharge directly into a water body, but their effluents may leach into groundwater or pond at the surface where they can be washed into surface waters via stormwater runoff events. All the counties in the watershed follow the state rules IAC 6-8.3-52 (general sewage disposal requirements) and IAC 6-8.3-55 (violations; permit denial and revocation) regarding septic systems. Failures are typically identified through public complaints and the sale of older properties which have not passed inspection.

Stream channelization and stream erosion: Eroding streambanks and channelization efforts may add sediment and nutrients to local surface waters. Nutrients may be added if there is particulate phosphorus bound with eroding soils. Eroding riparian areas may be linked to soil inputs within the water column and potentially to changes in flow patterns. Changes in flow patterns may also encourage down-cutting of the streambed and streambanks. Stream channelization efforts can increase the velocity of flow (via the removal of the sinuosity of a natural channel) and disturb the natural sedimentation processes of the streambed.

Stormwater runoff from agricultural land use practices: Runoff from agricultural lands may contain significant amounts of pollutants (bacteria, nutrients and sediments) which may lead to impairments in the DRPBW. Manure spread onto fields is often a source of pollutants, and can be exacerbated by tile drainage lines, which channelize the stormwater flows and reduce the time available for bacteria to die-off. Sediment and nutrients can be mobilized in a similar fashion to bacteria. Tile lined fields and channelized ditches enable particles to move more efficiently into surface waters.

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

Wildlife: Deer, geese, ducks, raccoons, turkeys, and other animals are recognized as potential contributors of bacteria and nutrients to the DRPBW.

Future Growth:
IDEM determined that population numbers in Lake and Porter Counties in northern Indiana have been increasing over the past 25 years (Table 7 of the final TMDL document). IDEM anticipates that land uses within the DRPBW will also be changing in response to increases in population. Undeveloped lands or agricultural land uses may be transformed into low, medium or high intensity developments. IDEM allocated a portion of the final loading capacity for each TMDL to account for this anticipated growth. This portion is captured in the future growth allocation (approximately 5% of the loading capacity) of TMDLs in the DRPBW (Tables 6, 8 and 9 of this Decision Document). The WLA and the load allocation (LA) were calculated for all current sources. Any expansion of point or nonpoint sources will need to comply with the respective WLA and LA values in the TMDL.

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 Targets

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 criteria). In such cases, the TMDL submittal should explain the linkage between the pollutant of concern and the chosen numeric water quality target.

<u>Comment:</u>
Designated Uses:
The designated uses for water bodies identified in the DRPBW TMDL are for total body contact recreation use and aquatic life use.

<u>*Recreational use:*</u> The total body contact recreational use *E. coli* WQS for all waters in the Great Lakes system are as follows: (from Indiana Administrative Code 327 IAC 2-1.5-8(e)(3))

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

The DRPBW TMDL *E. coli* target is: from April 1 through October 31, *E. coli* shall not exceed **125 cfu per 100 mL** (125 cfu/100 mL), as a geometric mean based on not less than five samples equally spaced over a 30-day period. The DRPBW bacteria TMDL target is the 125 cfu/100 mL as stated above. IDEM believes that using the 125 cfu/100 mL portion of the water quality standard will result in the greatest bacteria reductions within the DRPBW as well as attainment of the daily maximum of 235 cfu/100 mL. IDEM stated that while the TMDL will focus on the geometric mean portion of the water quality standard (125 cfu/100 mL), attainment of both parts of the water quality standard (125 cfu/100 mL and 235 cfu/100 mL) is required.

Water bodies are held to recreation use criteria during the time of the year when people are most likely to be engaged in activities such as swimming, wading or boating. The recreation use criteria were established to protect against disease carrying organisms that may be ingested or introduced to the eyes, skin or other body parts during water recreation activities.

<u>*Aquatic Life Use:*</u> 327 IAC 2-1-3(a)(2)(A) states that all surface waters, except as described in subdivision (5), will be capable of supporting a well-balanced, warm water aquatic community. Furthermore, at all times, all surface waters outside of mixing zones shall be free of substances in concentrations that on the basis of available scientific data are believed to be sufficient to injure, be chronically toxic to, or be carcinogenic, mutagenic, or teratogenic to humans, animals, aquatic life, or plants (327 IAC 2-1-6(a)(2)).

Currently IDEM has not developed numeric criteria for TSS and TP. Water quality target values were applied to improve water quality within water bodies related to sediment and nutrient inputs, to improve dissolved oxygen concentrations and to improve conditions to support well balanced aquatic communities. In several tributaries to Deep River-Portage Burns watershed, DO and biological communities demonstrated conditions indicating that their respective water quality targets were not being met. Low DO is often the result of elevated nutrient levels (TP), while biological community deficiencies can be generally associated with higher sediment or nutrient concentrations. The basis for the TP and TSS targets are discussed in Sections 2.1 and 2.2 of the final TMDL document.

The state of Indiana strives to achieve waters free from substances that, "contribute to the growth of nuisance plants or algae" within the water column. IDEM believes that exceedances of TSS and/or TP targets impact the overall health of biological communities and levels of DO within the water column. IDEM identified segments with low DO and areas with impaired biological communities during its water quality assessment activities in 2013-2014. IDEM indicated that the DO and IBC impaired areas were thought to be influenced by increased concentrations of TSS and or TP.

IDEM used the numeric WQS and water quality targets cited in Table 5 of this Decision Document during its assessment of water quality conditions in the DRPBW.

Table 5: Water quality standards and targets* utilized within the Deep River-Portage Burns Watershed TMDL

Parameter	Units	TMDL Targets
Numeric Water Quality Standards for addressing the Bacteria (*E. coli*) impaired segments within the DRPBW		
E. Coli [1]	# cfu / 100 mL	235 single sample maximum
		Geometric mean < 125 [2]
Numeric Water Quality Target [3] for addressing the Nutrient impaired segments within the DRPBW		
Total Phosphorus (TP)	mg/L	No value should be greater than 0.30 mg/L
Numeric Water Quality Target [4] for addressing the Sediment impaired segments within the DRPBW		
Total Suspended Solids (TSS)	mg/L	No value should be greater than 30.0 mg/L
Numeric Water Quality criteria and targets for addressing the Dissolved Oxygen and Biotic Community impaired segments within the DRPBW		
Dissolved Oxygen (DO)	mg/L	No value should be less than 4.0 mg/L [5]
Fish community Index of Biotic Integrity (IBI)	Score	Fully supporting IBI ≥ 36
Benthic aquatic macroinvertebrate community index (mIBI)	Score	Fully supporting mIBI ≥ 36

* = Section 2.2 of the final TMDL document

1 = *E. coli* standards are for the recreation season only (April 1 through October 31).

2 = Geometric mean based on minimum of 5 evenly spaced samples taken over not more than a 30-day period.

3 = IDEM anticipates that by meeting the TP target the water quality in the water body will be able to support a well-balanced aquatic community.

4 = IDEM anticipates that by meeting the TSS target the water quality in the water body will be able to support a well-balanced aquatic community

5 = Indiana Administrative Code Title 327 Water Pollution Control Board. Article 2. Section 1-6(a)

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 the loading capacities for the impaired waterbodies in the DRPBW based on the water quality standards and water quality target values. The Load Duration Curve (LDC) approach was selected by IDEM to calculate TMDLs for bacteria, TP and TSS. The LDC approach assigns loadings based on flow.

Bacteria (E. coli) TMDLs: For all *E. coli* TMDLs addressed by the DRPBW TMDL, a geometric mean of **125 cfu/100 mL** for five samples equally spaced over a 30-day period, was used to set the loading capacity of the TMDL. IDEM believes the geometric mean portion of the WQS provides the best overall characterization of the status of the watershed. The 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 believes that by setting the bacteria TMDLs to the geometric mean (125 cfu/100 mL) portion of the full body contact recreational use WQS the impaired waterbody will attain its designated full body contact recreational use (Section 2 of this Decision Document). EPA finds this assumption to be reasonable since the allocations of the bacteria TMDLs addressed in the DRPBW TMDLs are calculated to meet the WQS of 125 cfu/100 mL on any given day, across all flow conditions within the DRPBW. Thus, when the TMDL is implemented and achieved, *E. coli* concentrations in the impaired segments should not exceed 125 cfu/100 mL. Therefore, implicitly the *E. coli* concentrations in the impaired segments should not exceed the single sample maximum WQS of 235 cfu/100 mL.

Typically loading capacities are expressed as a mass per time (e.g. pounds per day). However, for *E. coli* loading capacity calculations, mass is not always an appropriate measure because *E. coli* is expressed in terms of organism counts. This approach is consistent with the 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 DRPBW TMDLs, IDEM used the water quality standard for *E. coli* (125 cfu/100 mL). 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 point and nonpoint source discharges must meet the WQS when entering the water body. If all sources meet the WQS at discharge, then the water body should meet the WQS and its designated use.

IDEM approached the DRPBW TMDLs by calculating loading capacity values for individual HUC-12 subwatersheds. Flow duration curves (FDC) were created for each of the subwatersheds within the DRPBW. The FDC were developed from flow frequency tables based on recorded and scaled flow volumes measured at a USGS gage on the Deep River at the Lake George outlet near Hobart, Indiana (USGS gage ID #04093000). The flow data focused on dates within the recreation season (April 1 to October 31). Dates outside of the recreation season were excluded from the flow record. Flows at USGS gage #04093000 were employed to characterize the flows within the HUC-12 subwatersheds in the DRPBW. Daily stream flows were necessary to implement the load duration curve approach. These were estimated using the observed flows available at the USGS gage on the Deep River and drainage area weighting using the following equation:

$$Q_{ungaged} = (A_{ungaged} / A_{gaged}) * Q_{gaged}$$

where,

$Q_{ungaged}$ = Flow at the ungaged location
Q_{gaged} = Flow at USGS gage station (#04093000)
$A_{ungaged}$ = Drainage area of the ungaged location
A_{gaged} = Drainage area of the USGS gage location (#04093000)

In this procedure, the drainage area of each monitoring station (or impaired segment) was divided by the drainage area of USGS gage #04093000. The flows for each of the stations were then calculated by multiplying the USGS gage #04093000 flows by the drainage area ratios. Additional flows were added to certain locations to account for wastewater treatment plants (WWTP) that discharge upstream and are not directly accounted for using the drainage area weighting method.

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 (125 cfu/100 mL) and then by a conversion factor. The resulting points are plotted onto a load duration curve graph. LDC graphs, for the DRPBW bacteria TMDLs, have flow duration interval (percentage of time flow exceeded) on the X-axis and *E. coli* loads (number of bacteria per unit time) on the Y-axis. The DRPBW 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 DRPBW basin in 2013-2014 and measured *E. coli* concentrations at specific sampling points within the watershed. *E. coli* 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; very high flows (exceeded 0–10% of the time), higher flow conditions (exceeded 10–40% of the time), 'normal' flows (exceeded 40–60% of the time), lower flow conditions (exceeded 60–90% of the time), and low flows (exceeded 90–100% of the time). LDC plots can be organized to display individual sampling loads and the calculated LDC. Watershed managers can interpret these plots (individual sampling points plotted with the LDC) to understand the relationship between flow conditions and water quality exceedances within the watershed. Individual sampling loads which plot above the LDC represent violations of the WQS and the allowable load under those flow conditions at those locations. 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.

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 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 exceedances are significant during high flow events this would suggest storm events are the cause and implementation efforts can target BMPs that will reduce stormwater runoff and consequently bacteria loading into surface waters. This allows for a more efficient implementation effort.

IDEM approached the DRPBW TMDLs by calculating a single loading capacity for the outlet point of each HUC-12 subwatershed. All of the subwatersheds contain multiple segments above the outlet point which IDEM determined were impaired based on its water quality monitoring in the DRPBW. IDEM indicated that assigning one loading capacity value to the outlet point of the subwatershed would apply that loading capacity to all of the impaired segments upstream of that outlet point. IDEM determined that assigning one load, which applies to multiple impaired reaches upstream of that outlet point, instead of calculating individual loads for each reach, was appropriate because land use characteristics were consistent within the HUC-12 subwatershed. The consistency in land use and therefore the sources of bacteria within the watershed provided assurance that implementation efforts within the watershed would meet the TMDL loads assigned at the HUC-12 subwatershed outlet point.

TMDLs were calculated for each HUC-12 subwatershed in the DRPBW with bacteria impairments. WLA were assigned to NPDES permitted facilities, MS4 communities and CSOs where appropriate in each individual subwatershed. Load allocations were calculated after the determination of the WLA, the Margin of Safety (5% of the loading capacity) and the allocation for future growth (approximately 5 % of the loading capacity). Load allocations were not split amongst individual nonpoint contributors (ex. stormwater runoff from agricultural land use practices, failing septic systems, non-regulated urban stormwater runoff etc.). Instead, load allocations were represented as one value for each TMDL.

Table 6 of this Decision Document reports five points (the midpoints of the designated flow regime) on the loading capacity curve. However, it should be understood that the components of the TMDL equation could be illustrated for any point on the entire loading capacity curve. The load duration curve method can be used to display collected bacteria monitoring data and allows for the estimation of load reductions necessary for attainment of the bacteria water quality standard. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for the segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Table 6 of this Decision Document identifies the loading capacity for the water body at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

IDEM included the LDCs for each individual subwatershed in Section 7.3 of the final TMDL document. IDEM explained that, for most of the subwatersheds, measured bacteria concentration measurements exceed the bacteria WQS within the higher flow condition flow regime and the lower flow condition flow regime. IDEM concluded that bacteria inputs to waters of the DRPBW likely occur across all flow conditions. Therefore, the bacteria implementation efforts should aim to reduce bacteria contributions during times of high flows and times of lower flows within the DRPBW.

Table 6: Bacteria (*E. coli*) TMDLs for the Deep River-Portage Burns Watershed

Flow Regime TMDL analysis *E. coli* (billions of 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 %
Headwaters of Main Beaver Dam Ditch (04040001-05-01)					
<u>3 Segments:</u> INC0151_01, INC0151_T1001 & INC0151_T1003					
Bacteria TMDL (billions of bacteria/day)	**495.84**	**175.44**	**116.12**	**92.38**	**81.36**
Wasteload Allocation (WLA): Total	246.83	134.10	72.04	72.04	72.04
Crown Point WTTP (IN0025763)	72.04	72.04	72.04	72.04	72.04
CSO - Crown Point WTTP (IN0025763)	0.33	0.33	--	--	--
MS4: St John (INR040047)	12.63	4.47	--	--	--
MS4: City of Schererville (INR040112)	0.52	0.18	--	--	--
MS4: City of Merrillville (INR040049)	5.15	1.82	--	--	--
MS4: City of Crown Point (INR040054)	99.72	35.29	--	--	--
MS4: City of Cedar Lake (INR040075)	3.87	1.37	--	--	--
MS4: Lake County (INR040124)	52.57	18.6	--	--	--
Load Allocation (LA)	200.67	24.24	32.75	11.33	1.39
Margin Of Safety (MOS) (5%)	24.79	8.77	5.81	4.62	4.07
Future Growth	23.55	8.33	5.52	4.39	3.86

Main Beaver Dam Ditch (04040001-05-02)					
<u>3 Segments:</u> INC0152_04, INC0152_T1008 & INC0152_T1009					
Bacteria TMDL (billions of bacteria/day)	**608.99**	**148.64**	**63.30**	**29.20**	**13.40**
Wasteload Allocation (WLA): Total	170.32	41.62	0.00	0.00	0.00
CSO - Crown Point WTTP (IN0025763)	0.08	0.08	--	--	--
MS4: City of Merrillville (INR040049)	21.36	5.21	--	--	--
MS4: City of Crown Point (INR040054)	121.79	29.72	--	--	--
MS4: Lake County (INR040124)	27.09	6.61	--	--	--
Load Allocation (LA)	379.32	92.49	57.13	26.34	12.13
Margin Of Safety (MOS) (5%)	30.45	7.43	3.17	1.46	0.67
Future Growth	28.90	7.10	3.00	1.40	0.60
Headwaters of Turkey Creek (04040001-05-03)					
<u>3 Segments:</u> INC0153_01, INC0153_T1003 & INC0153_T1005					
Bacteria TMDL (billions of bacteria/day)	**492.19**	**120.09**	**51.19**	**23.62**	**10.82**
Wasteload Allocation (WLA): Total	254.16	62.02	0.00	0.00	0.00
MS4: St John (INR040047)	21.58	5.27	--	--	--
MS4: City of Schererville (INR040112)	91.84	22.41	--	--	--
MS4: City of Merrillville (INR040049)	71.14	17.36	--	--	--
MS4: City of Crown Point (INR040054)	0.66	0.16	--	--	--
MS4: Lake County (INR040124)	53.08	12.95	--	--	--
MS4: City of Griffith (INR040108)	15.86	3.87	--	--	--
Load Allocation (LA)	190.04	46.37	46.20	21.32	9.77
Margin Of Safety (MOS) (5%)	24.61	6.00	2.56	1.18	0.54
Future Growth	23.38	5.70	2.43	1.12	0.51
Deer Creek-Deep River (04040001-05-04)					
<u>5 Segments:</u> INC-0154_01, INC-0154_T1001, INC-0154_T1003, INC-0154_T1004 & INC-0154_T1005					
Bacteria TMDL (billions of bacteria/day)	**502.65**	**126.70**	**57.08**	**29.24**	**16.31**
Wasteload Allocation (WLA): Total	80.39	24.27	5.37	5.37	5.37
Winfield WWTP (IN058343)	3.56	3.56	3.56	3.56	3.56
Deep River Water Park WWTP (IN0058378)	0.27	0.27	0.27	0.27	0.27
Chicagoland Christian Village (IN0054470)	0.44	0.44	0.44	0.44	0.44
Falling Waters Conservancy District (IN0062090)	1.10	1.10	1.10	1.10	1.10
MS4: City of Hobart (INR040130)	0.89	0.22	--	--	--
MS4: Lakes of the Four Seasons (INR040007)	12.02	3.03	--	--	--
MS4: City of Merrillville (INR040049)	10.91	2.75	--	--	--
MS4: Porter County (INR040140)	11.8	2.97	--	--	--
MS4: Lake County (INR040124)	39.4	9.93	--	--	--
Load Allocation (LA)	373.25	90.07	46.15	21.02	9.35
Margin Of Safety (MOS) (5%)	25.13	6.34	2.85	1.46	0.82
Future Growth	23.88	6.02	2.71	1.39	0.77
City of Merrillville-Turkey Creek (04040001-05-05)					
<u>3 Segments:</u> INC0155_01, INC0155_T1002 & INC0155_T1003					
Bacteria TMDL (billions of bacteria/day)	**452.30**	**110.36**	**47.03**	**21.71**	**9.95**
Wasteload Allocation (WLA): Total	270.67	66.04	0.00	0.00	0.00
MS4: City of Hobart (INR040130)	28.19	6.88	--	--	--
MS4: City of Gary (INR040101)	40.3	9.83	--	--	--
MS4: City of Merrillville (INR040049)	190.51	46.48	--	--	--

MS4: Lake County (INR040124)	11.67	2.85	--	--	--
Load Allocation (LA)	137.53	33.56	42.45	19.59	8.98
Margin Of Safety (MOS) (5%)	22.62	5.52	2.35	1.09	0.50
Future Growth	21.48	5.24	2.23	1.03	0.47
Duck Creek (04040001-05-06)					
2 Segments: INC0156_01 & INC0156_T1003					
Bacteria TMDL (billions of bacteria/day)	**366.99**	**89.55**	**38.17**	**17.62**	**8.07**
Wasteload Allocation (WLA): Total	65.19	15.91	0.00	0.00	0.00
MS4: City of Hobart (INR040130)	42.73	10.43	--	--	--
MS4: City of Portage (INR040090)	0.88	0.21	--	--	--
MS4: Porter County (INR040140)	17.62	4.3	--	--	--
MS4: Lake County (INR040124)	3.96	0.97	--	--	--
Load Allocation (LA)	266.02	64.91	34.45	15.90	7.29
Margin Of Safety (MOS) (5%)	18.35	4.48	1.91	0.88	0.40
Future Growth	17.43	4.25	1.81	0.84	0.38
Lake George-Deep River (04040001-05-07)					
3 Segments: INC0157_01, INC0157_P1001 & INC0157_T1002					
Bacteria TMDL (billions of bacteria/day)	**401.06**	**97.86**	**41.71**	**19.24**	**8.82**
Wasteload Allocation (WLA): Total	121.13	29.56	0.00	0.00	0.00
MS4: City of Hobart (INR040130)	104.17	25.42	--	--	--
MS4: City of Merrillville (INR040049)	11.01	2.69	--	--	--
MS4: Porter County (INR040140)	0.66	0.16	--	--	--
MS4: Lake County (INR040124)	5.29	1.29	--	--	--
Load Allocation (LA)	240.83	58.76	37.64	17.37	7.96
Margin Of Safety (MOS) (5%)	20.05	4.89	2.09	0.96	0.44
Future Growth	19.05	4.65	1.98	0.91	0.42
Little Calumet River-Deep River (04040001-05-08)					
1 Segment: INC0158_T1002					
Bacteria TMDL (billions of bacteria/day)	**482.47**	**150.01**	**88.43**	**63.80**	**52.37**
Wasteload Allocation (WLA): Total	359.88	129.95	22.71	22.71	22.71
Hobart WWTP (IN061344)	22.71	22.71	22.71	22.71	22.71
CSO - Gary WTTP (IN0022977)	3.49	3.49	--	--	--
MS4: City of Gary (INR040101)	132.41	41.17	--	--	--
MS4: City of Hobart (INR040130)	73.45	22.84	--	--	--
MS4: City of Portage (INR040090)	44.22	13.75	--	--	--
MS4: City of Lake Station (INR040087)	63.3	19.68	--	--	--
MS4: City of New Chicago (INR040031)	13.53	4.21	--	--	--
MS4: Porter County (INR040140)	2.42	0.75	--	--	--
MS4: Lake County (INR040124)	4.35	1.35	--	--	--
Load Allocation (LA)	75.55	5.43	57.10	34.87	24.55
Margin Of Safety (MOS) (5%)	24.12	7.50	4.42	3.19	2.62
Future Growth	22.92	7.13	4.20	3.03	2.49
Willow Creek-Burns Ditch (04040001-05-09)					
3 Segments: INC0159_01, INC0159_02 & INC0159_T1001					
Bacteria TMDL (billions of bacteria/day)	**529.25**	**162.43**	**94.49**	**67.32**	**54.70**
Wasteload Allocation (WLA): Total	325.33	130.36	44.03	44.03	44.03
Portage Utility Service Facility WWTP (IN0024368)	44.03	44.03	44.03	44.03	44.03

MS4: City of Gary (INR040101)	28.11	8.63	--	--	--
MS4: City of Portage (INR040090)	192.42	59.05	--	--	--
MS4: City of Lake Station (INR040087)	57.41	17.62	--	--	--
MS4: Porter County (INR040140)	3.36	1.03	--	--	--
Load Allocation (LA)	152.32	16.23	41.25	16.72	5.33
Margin Of Safety (MOS) (5%)	26.46	8.12	4.72	3.37	2.74
Future Growth	25.14	7.72	4.49	3.20	2.60

Table 7 of the Decision Document discusses IDEM's estimates of loading reductions for each subwatershed in the DRPBW. These loading reductions (i.e., the percent reduction column) were calculated from field sampling data collected in the DRPBW by IDEM in 2013-2014 (Table 33 of the final TMDL document). IDEM has communicated the loading reductions in Table 7 of this Decision Document are conservative load reduction estimates based on a limited water quality data set. IDEM would need to collect a more robust water quality data set over a variety of flow conditions for IDEM to characterize, with greater confidence, expected load reductions in the DRPBW when the TMDLs are achieved.

Table 7: *E. coli* Load Reductions for the Deep River-Portage Burns Watershed

Subwatershed	Percent Load Reduction Needed
Headwaters of Main Beaver Dam Ditch (04040001-05-01)	81.90%
Main Beaver Dam Ditch (04040001-05-02)	70.10%
Headwaters of Turkey Creek (04040001-05-03)	71.00%
Deer Creek-Deep River (04040001-05-04)	67.40%
City of Merrillville-Turkey Creek (04040001-05-05)	81.90%
Duck Creek (04040001-05-06)	80.70%
Lake George-Deep River (04040001-05-07)	75.50%
Little Calumet River- Deep River (04040001-05-08)	64.20%
Willow Creek-Burns Ditch (04040001-05-09)	82.50%

EPA concurs with the data analysis and LDC approach utilized by IDEM in their calculation of wasteload allocations, load allocations, the margin of safety and the future growth calculation for the DRPBW TMDLs. The methods used for determining the TMDL are consistent with U.S. EPA technical memos.[1]

<u>Total Phosphorus and Total Suspended Solid TMDLs:</u> TMDLs for TP and TSS were developed in a similar fashion to the bacteria TMDLs. IDEM used TP and TSS TMDLs as surrogate TMDLs for DO and IBC impaired segments in the DRPBW. The WQT of 0.3 mg/L was used to set the loading capacity of the TP TMDLs. The WQT of 30 mg/L was used to set the loading capacity of the TSS TMDLs. IDEM incorporated the LDC approach to calculate pollutant loadings for each of these parameters at the outlet points of subwatersheds (HUC-12 scale) within the DRPBW. Impaired reaches were assigned to their respective subwatershed based on the location of the reach within the DRPBW.

[1] U.S. Environmental Protection Agency. August 2007. *An Approach for Using Load Duration Curves in the Development of TMDLs*. Office of Water. EPA-841-B-07-006. Washington, D.C.

IDEM approached the DRPBW TMDLs by calculating a single loading capacity for the outlet point of each HUC-12 subwatershed. All of the subwatersheds contain multiple segments above the outlet point which IDEM determined were impaired based on its water quality monitoring in the DRPBW. IDEM indicated that assigning one loading capacity value to the outlet point of the subwatershed would apply that loading capacity to all of the impaired segments upstream of that outlet point. IDEM determined that assigning one load, which applies to multiple impaired reaches upstream of that outlet point, instead of calculating individual loads for each reach, was appropriate because land use characteristics were consistent within the HUC-12 subwatershed. The consistency in land use and therefore most of the sources of TP and TSS within the watershed provided assurance that implementation efforts within the watershed would meet the TMDL loads assigned at the HUC-12 subwatershed outlet point.

Flow measurements from the Deep River USGS gage were incorporated to develop FDC and the Drainage Area Weighting Equation was utilized to estimate flows in ungaged subwatersheds. IDEM completed water quality monitoring in the DRPBW basin in 2013-2014 and measured TP and TSS concentrations at specific sampling points within the watershed. TP and TSS 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; very high flows, moist conditions, “normal” range flows, dry conditions, and low flows. LDC plots can be organized to display individual sampling loads and the calculated LDC. Watershed managers can interpret these plots (individual sampling points plotted with the LDC) to understand the relationship between flow conditions and water quality exceedances within the watershed. Individual sampling loads which plot above the LDC represent violations of the WQT and the allowable load under those flow conditions at those locations. 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 WQT.

TMDLs were calculated for each subwatershed in the DRPBW. WLA were assigned to NPDES permitted facilities, MS4 communities, CSOs and construction stormwater where appropriate in each individual subwatershed. Load allocations were calculated after the determination of the WLA, the Margin of Safety (5% of the loading capacity) and the allocation for future growth (approximately 5 %). Load allocations were not split amongst individual nonpoint contributors (ex. stormwater runoff from agricultural land use practices, failing septic systems, urban stormwater runoff etc.). Instead, load allocations were represented as one value for each TMDL. EPA is approving the load(s) expressed in the current TMDLs.

IDEM included the LDCs for each individual subwatershed in Section 7.3 of the final TMDL document. IDEM explained that, for most of the subwatersheds, measured TP and TSS concentration measurements exceed the TP and TSS water quality targets within the very high flow conditions, the higher flow condition flow regime and the lower flow condition flow regime. IDEM concluded that the TP and TSS inputs to waters of the DRPBW likely occur across all flow conditions. Therefore, the nutrient and sediment implementation efforts should aim to reduce nutrient and sediment contributions during times of high flows and times of lower flows within the DRPBW.

Table 8: Total Phosphorus TMDLs for the Deep River-Portage Burns Watershed

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 %
Main Beaver Dam Ditch (04040001-05-02)					
3 Segments: INC0152_04, INC0152_T1008 & INC0152_T1009					
Nutrient TMDL (lbs/day)	**171.39**	**41.82**	**17.82**	**8.23**	**3.77**
Wasteload Allocation (WLA): Total	48.26	11.79	0.00	0.00	0.00
CSO - Crown Point WTTP (IN0025763)	0.02	0.02	--	--	--
MS4: City of Merrillville (INR040049)	6.01	1.47	--	--	--
MS4: City of Crown Point (INR040054)	34.28	8.36	--	--	--
MS4: Lake County (INR040124)	7.62	1.86	--	--	--
Construction Stormwater	0.33	0.08	--	--	--
Load Allocation (LA)	106.42	25.95	16.08	7.43	3.40
Margin Of Safety (MOS) (5%)	8.57	2.09	0.89	0.41	0.19
Future Growth	8.14	1.99	0.85	0.39	0.18
Deer Creek-Deep River (04040001-05-04)					
5 Segments: INC0154_01, INC0154_T1001, INC0154_T1003, INC0154_T1004 & INC0154_T1005					
Nutrient TMDL (lbs/day)	**140.07**	**34.27**	**14.68**	**6.84**	**3.20**
Wasteload Allocation (WLA): Total	22.26	6.30	1.13	1.13	1.13
Winfield WWTP (IN058343)	1.00	1.00	1.00	1.00	1.00
Chicagoland Christian Village (IN0054470)	0.13	0.13	0.13	0.13	0.13
MS4: City of Hobart (INR040130)	0.25	0.06	--	--	--
MS4: Lakes of the Four Seasons (INR040007)	3.35	0.82	--	--	--
MS4: City of Merrillville (INR040049)	3.04	0.74	--	--	--
MS4: Porter County (INR040140)	3.29	0.80	--	--	--
MS4: Lake County (INR040124)	10.98	2.69	--	--	--
Construction Stormwater	0.22	0.06	--	--	--
Load Allocation (LA)	104.16	24.63	12.12	5.04	1.76
Margin Of Safety (MOS) (5%)	7.00	1.71	0.73	0.34	0.16
Future Growth	6.65	1.63	0.70	0.33	0.15
Duck Creek (04040001-05-06)					
2 Segments: INC0156_01, INC0156_T1003					
Nutrient TMDL (lbs/day)	**103.28**	**25.20**	**10.74**	**4.96**	**2.27**
Wasteload Allocation (WLA): Total	18.47	4.50	0.00	0.00	0.00
MS4: City of Hobart (INR040130)	12.02	2.93	--	--	--
MS4: City of Portage (INR040090)	0.25	0.06	--	--	--
MS4: Porter County (INR040140)	4.96	1.21	--	--	--
MS4: Lake County (INR040124)	1.12	0.27	--	--	--
Construction Stormwater	0.12	0.03	--	--	--
Load Allocation (LA)	74.74	18.24	9.69	4.47	2.05
Margin Of Safety (MOS) (5%)	5.16	1.26	0.54	0.25	0.11
Future Growth	4.91	1.20	0.51	0.24	0.11

Table 9: Total Suspended Solid (TSS) TMDLs for the Deep River-Portage Burns Watershed

Flow Regime TMDL analysis TSS (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 %
Headwaters of Main Beaver Dam Ditch (04040001-05-01)					
3 Segments: INC0151_01, INC0151_T1001 & INC0151_T1003					
TSS TMDL (lbs/day)	**13953.83**	**4877.51**	**3267.83**	**2599.95**	**2289.87**
Wasteload Allocation (WLA): Total	6972.71	3723.30	2027.49	2027.49	2027.49
Crown Point WTTP (IN0025763)	2027.49	2027.49	2027.49	2027.49	2027.49
CSO - Crown Point WTTP (IN0025763)	9.23	9.23	--	--	--
MS4: St John (INR040047)	355.33	125.73	--	--	--
MS4: City of Schererville (INR040112)	14.50	5.13	--	--	--
MS4: City of Merrillville (INR040049)	145.03	51.32	--	--	--
MS4: City of Crown Point (INR040054)	2806.42	933.04	--	--	--
MS4: City of Cedar Lake (INR040075)	108.78	38.49	--	--	--
MS4: Lake County (INR040124)	1479.35	523.46	--	--	--
Construction Stormwater	26.58	9.41	--	--	--
Load Allocation (LA)	5620.62	672.80	921.73	318.96	39.12
Margin Of Safety (MOS) (5%)	697.69	246.88	163.39	130.00	114.49
Future Growth	662.81	234.53	155.22	123.50	108.77
Main Beaver Dam Ditch (04040001-05-02)					
3 Segments: INC0152_04, INC0152_T1008 & INC0152_T1009					
TSS TMDL (lbs/day)	**17139.23**	**4181.97**	**1782.48**	**822.68**	**377.06**
Wasteload Allocation (WLA): Total	4826.04	1179.30	0.00	0.00	0.00
CSO - Crown Point WTTP (IN0025763)	2.31	2.31	--	--	--
MS4: City of Merrillville (INR040049)	601.21	146.70	--	--	--
MS4: City of Crown Point (INR040054)	3427.52	836.31	--	--	--
MS4: Lake County (INR040124)	762.36	186.02	--	--	--
Construction Stormwater	32.64	7.96	--	--	--
Load Allocation (LA)	10642.12	2594.93	1608.69	742.47	340.30
Margin Of Safety (MOS) (5%)	856.96	209.10	89.12	41.13	18.85
Future Growth	814.11	198.64	84.67	39.08	17.91
Headwaters of Turkey Creek (04040001-05-03)					
5 Segments: INC0153_01, INC0153_T1001, INC0153_T1003, INC0153_T1004 & INC0153_T1005					
TSS TMDL (lbs/day)	**13851.01**	**3379.65**	**1440.51**	**664.85**	**304.72**
Wasteload Allocation (WLA): Total	7178.94	1751.67	0.00	0.00	0.00
MS4: St John (INR040047)	607.41	148.21	--	--	--
MS4: City of Schererville (INR040112)	2584.59	630.64	--	--	--
MS4: City of Merrillville (INR040049)	2001.97	488.48	--	--	--
MS4: City of Crown Point (INR040054)	18.59	4.54	--	--	--
MS4: Lake County (INR040124)	1493.73	364.47	--	--	--
MS4: City of Griffith (INR040108)	446.26	108.89	--	--	--
Construction Stormwater	26.39	6.44	--	--	--
Load Allocation (LA)	5321.60	1298.47	1300.06	600.03	275.01
Margin Of Safety (MOS) (5%)	692.55	168.98	72.03	33.24	15.24

Future Growth	657.92	160.53	68.42	31.58	14.47
Deer Creek-Deep River (04040001-05-04)					
<u>5 Segments:</u> INC0154_01, INC0154_T1001, INC0154_T1003, INC0154_T1004 & INC0154_T1005					
TSS TMDL (lbs/day)	**14094.75**	**3514.87**	**1555.55**	**771.86**	**408.00**
Wasteload Allocation (WLA): Total	2190.86	595.15	64.95	64.95	64.95
Winfield WWTP (IN058343)	40.05	40.05	40.05	40.05	40.05
Deep River Water Park WWTP (IN0058378)	7.50	7.50	7.50	7.50	7.50
Chicagoland Christian Village (IN0054470)	5.00	5.00	5.00	5.00	5.00
Falling Waters Conservancy District (IN0062090)	12.40	12.40	12.40	12.40	12.40
MS4: City of Hobart (INR040130)	24.97	6.23	--	--	--
MS4: Lakes of the Four Seasons (INR040007)	337.09	84.06	--	--	--
MS4: City of Merrillville (INR040049)	305.88	76.28	--	--	--
MS4: Porter County (INR040140)	330.85	82.50	--	--	--
MS4: Lake County (INR040124)	1104.90	275.53	--	--	--
Construction Stormwater	22.22	5.60	--	--	--
Load Allocation (LA)	10529.66	2577.03	1338.93	631.66	303.27
Margin Of Safety (MOS) (5%)	704.73	175.74	77.78	38.59	20.40
Future Growth	669.50	166.95	73.89	36.66	19.38
City of Merrillville-Turkey Creek (04040001-05-05)					
<u>3 Segments:</u> INC0155_01, INC0155_T1002 & INC0155_T1003					
TSS TMDL (lbs/day)	**12728.83**	**3105.84**	**1323.80**	**610.98**	**280.03**
Wasteload Allocation (WLA): Total	7640.12	1864.19	0.00	0.00	0.00
MS4: City of Hobart (INR040130)	793.35	193.58	--	--	--
MS4: City of Gary (INR040101)	1134.24	276.76	--	--	--
MS4: City of Merrillville (INR040049)	5361.31	1308.16	--	--	--
MS4: Lake County (INR040124)	328.50	80.15	--	--	--
Construction Stormwater	22.72	5.54	--	--	--
Load Allocation (LA)	3847.65	938.83	1194.73	551.41	252.73
Margin Of Safety (MOS) (5%)	636.44	155.29	66.19	30.55	14.00
Future Growth	604.62	147.53	62.88	29.02	13.30
Duck Creek (04040001-05-06)					
<u>2 Segments:</u> INC0156_01 & INC0156_T1003					
TSS TMDL (lbs/day)	**10327.90**	**2520.01**	**1074.11**	**495.74**	**227.21**
Wasteload Allocation (WLA): Total	1846.69	450.60	0.00	0.00	0.00
MS4: City of Hobart (INR040130)	1202.42	293.39	--	--	--
MS4: City of Portage (INR040090)	24.79	6.05	--	--	--
MS4: Porter County (INR040140)	495.84	120.99	--	--	--
MS4: Lake County (INR040124)	111.56	27.22	--	--	--
Construction Stormwater	12.08	2.95	--	--	--
Load Allocation (LA)	7474.23	1823.71	969.38	447.40	205.06
Margin Of Safety (MOS) (5%)	516.40	126.00	53.71	24.79	11.36
Future Growth	490.58	119.70	51.02	23.55	10.79
Lake George-Deep River (04040001-05-07)					
<u>3 Segments:</u> INC0157_01, INC0157_P1001 & INC0157_T1002					
TSS TMDL (lbs/day)	**11286.97**	**2754.04**	**1173.85**	**541.77**	**248.31**
Wasteload Allocation (WLA): Total	3430.01	836.94	0.00	0.00	0.00
MS4: City of Hobart (INR040130)	2931.68	715.33	--	--	--

MS4: City of Merrillville (INR040049)	309.90	75.62	--	--	--
MS4: Porter County (INR040140)	18.59	4.54	--	--	--
MS4: Lake County (INR040124)	148.75	36.30	--	--	--
Construction Stormwater	21.09	5.15	--	--	--
Load Allocation (LA)	6756.48	1648.58	1059.40	488.95	224.10
Margin Of Safety (MOS) (5%)	564.35	137.70	58.69	27.09	12.42
Future Growth	536.13	130.82	55.76	25.73	11.79
Little Calumet River-Deep River (04040001-05-08)					
3 Segments: INC0158_01, INC0158_T1002 & INC0158_T1005					
TSS TMDL (lbs/day)	**13578.00**	**4221.33**	**2488.63**	**1795.55**	**1473.76**
Wasteload Allocation (WLA): Total	9916.80	3433.71	400.49	400.49	400.49
Hobart WWTP (IN061344)	400.49	400.49	400.49	400.49	400.49
CSO - Gary WWTP (IN0022977)	108.33	108.33	--	--	--
MS4: City of Gary (INR040101)	3726.25	1158.48	--	--	--
MS4: City of Hobart (INR040130)	2067.12	642.66	--	--	--
MS4: City of Portage (INR040090)	1244.35	386.86	--	--	--
MS4: City of Lake Station (INR040087)	1781.53	553.87	--	--	--
MS4: City of New Chicago (INR040031)	380.79	118.38	--	--	--
MS4: Porter County (INR040140)	68.00	21.14	--	--	--
MS4: Lake County (INR040124)	122.40	38.05	--	--	--
Construction Stormwater	17.54	5.45	--	--	--
Load Allocation (LA)	2337.35	376.04	1845.50	1219.99	929.58
Margin Of Safety (MOS) (5%)	678.90	211.07	124.43	89.78	73.69
Future Growth	644.95	200.51	118.21	85.29	70.00
Willow Creek-Burns Ditch (04040001-05-09)					
3 Segments: INC0159_01, INC0159_02 & INC0159_T1001					
TSS TMDL (lbs/day)	**14894.29**	**4570.92**	**2659.17**	**1894.47**	**1539.44**
Wasteload Allocation (WLA): Total	8346.91	2847.85	413.01	413.01	413.01
Portage Utility Service Facility WWTP (IN0024368)	413.01	413.01	413.01	413.01	413.01
MS4: City of Gary (INR040101)	790.97	242.74	--	--	--
MS4: City of Portage (INR040090)	5415.11	1661.84	--	--	--
MS4: City of Lake Station (INR040087)	1615.74	495.86	--	--	--
MS4: Porter County (INR040140)	94.65	29.05	--	--	--
Construction Stormwater	17.43	5.35	--	--	--
Load Allocation (LA)	5095.19	1277.40	1986.89	1296.75	976.34
Margin Of Safety (MOS) (5%)	744.71	228.55	132.96	94.72	76.97
Future Growth	707.48	217.12	126.31	89.99	73.12

Table 10 of the Decision Document discusses IDEM's estimates of loading reductions for each subwatershed in the DRPBW. These loading reductions (i.e., the percent reduction column) were calculated from field sampling data collected in the DRPBW by IDEM in 2013-2014 (Table 32 of the final TMDL document). IDEM has communicated the loading reductions in Table 10 of this Decision Document are conservative load reduction estimates based on a limited water quality data set. IDEM would need to collect a more robust water quality data set over a variety of flow conditions for IDEM to characterize, with greater confidence, expected load reductions in the DRPBW when the TMDLs are achieved.

Table 10: Nutrient (TP) and Sediment (TSS) Load Reductions for the Deep River-Portage Burns Watershed

Subwatershed	Total Phosphorus Percent Load Reduction Needed	Total Suspended Solid Percent Load Reduction Needed
Headwaters of Main Beaver Dam Ditch (04040001-05-01)	59.00%	66.00%
Main Beaver Dam Ditch (04040001-05-02)	82.00%	89.00%
Headwaters of Turkey Creek (04040001-05-03)	89.00%	77.00%
Deer Creek-Deep River (04040001-05-04)	35.00%	73.00%
City of Merrillville-Turkey Creek (04040001-05-05)	23.00%	80.00%
Duck Creek (04040001-05-06)	65.00%	69.00%
Lake George-Deep River (04040001-05-07)	57.00%	89.00%
Little Calumet River- Deep River (04040001-05-08)	0.00%	9.00%
Willow Creek-Burns Ditch (04040001-05-09)	0.00%	62.00%

EPA concurs with the data analysis and LDC approach utilized by IDEM in their calculation of wasteload allocations, load allocations, the margin of safety and the future growth calculation for the DRPBW TMDLs. The methods used for determining the TMDL are consistent with U.S. EPA technical memos.[2]

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

4. Load Allocations (LA)

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>
LAs for nonpoint sources were calculated in the TMDL development process, along with the calculations for the load assigned to the WLA and the margin of safety. IDEM determined the load allocation calculations for each of the subwatershed TMDLs based on the *E. coli* WQS (125 cfu/100 mL) and the WQT for TP (0.3 mg/L) and TSS (30 mg/L). The WQS and WQT were applicable across all flow conditions in the subwatershed (Tables 6, 8 and 9 of this Decision Document).

IDEM identified several nonpoint sources in this TMDL report. Loadings for the three pollutants were recognized as originating from many diverse nonpoint sources including; urban stormwater runoff, failing septic systems, stormwater runoff from agricultural land use practices, livestock with access to stream areas, stream channelization and stream erosion, and wildlife (deer, geese, ducks, raccoons,

[2] U.S. Environmental Protection Agency. August 2007. *An Approach for Using Load Duration Curves in the Development of TMDLs*. Office of Water. EPA-841-B-07-006. Washington, D.C.

turkeys and other animals). IDEM did not determine individual load allocation values for each of these potential nonpoint source considerations.

The implementation strategies outlined by IDEM in the DRPBW TMDL will aid local partners in determining appropriate mitigation strategies for these nonpoint source inputs. Additional sources of information which may be called upon by IDEM to aid in setting mitigation strategies are field observations made during the collection of water quality monitoring data in 2013-2014. These observations (ex. land use, housing density, location of livestock facilities and proximity to sampling locations) may assist watershed managers in identifying potential nonpoint sources of bacteria, TP and TSS. EPA finds the IDEM's approach for calculating the LA to be reasonable.

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:

NPDES permit holders:

EPA's November 15, 2006 memorandum states that 40 CFR. § 122.44(d)(1)(vii) requires the permitting authority to ensure that "*...effluent limitations developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with the assumptions and requirements of any available waste load allocation for the discharge prepared by the State and approved by EPA pursuant to 40 CFR. 130.7. This provision does not require that effluent limits in NPDES permits by expressed in a form that is identical to the form in which an available waste load allocation for the discharge is* *expressed in a TMDL. Rather, permit limits need only be consistent with the assumptions and requirements of a TMDL's waste load allocation*." [3]

IDEM identified seven NPDES permit holders (Table 3 of this Decision Document) within the DRPBW which received a portion of the WLA assigned to mitigate bacteria, nutrient (TP) and sediment (TSS) inputs. Individual WLAs were developed as part of the TMDL development process for those permittees discharging to waters in the DRPBW.

Bacteria (*E. coli*) TMDLs: WLAs for NPDES facilities were calculated based on each facility's design flow and the TMDL target value for bacteria. The TMDL target value for bacteria is the *E. coli* WQS of 125 cfu/100 mL. IDEM expects each NPDES permitted facility to meet the concentration targets assigned in the WLA across all flow conditions.

Total Phosphorus TMDLs: Facilities discharging nutrients to waters within the DRPBW were assigned a WLA based on the design flow of the facility and a TP concentration value of 0.30 mg/L (Section 4.2.1 and Section 8.1 of the final TMDL document). IDEM explained that TP limits, based on the WLA, will be interpreted as monthly average values in NPDES permits (Section 8.1 of the final TMDL document). EPA, in its approval of the Deep River-Portage Burns TMDLs, is approving the WLA, LA, MOS and loading capacity values. EPA's approval of the WLA assigned to TP TMDLs does not apply to NPDES permit effluent limits or NPDES permit implementation or compliance schedules. EPA expects that TP permit limits will be consistent with the assumptions and requirements of the DRPBW WLA.

Total Suspended Solid TMDLs: Facilities identified as discharging sediment to the DRPBW were assigned a WLA based on the design flow and the TSS water quality target of 30 mg/L (Section 4.2.1 and Section 8.1 of the final TMDL document). IDEM explained that TSS limits, based on the WLA, will be interpreted as monthly average values in NPDES permits (Section 8.1 of the final TMDL document). EPA, in its approval of the Deep River-Portage Burns TMDLs, is approving the WLA, LA, MOS and loading capacity values. EPA's approval of the WLA assigned to TSS TMDLs does not apply to NPDES permit effluent limits or NPDES permit implementation or compliance schedules. EPA expects that TSS permit limits will be consistent with the assumptions and requirements of the DRPBW WLA.

MS4s:
MS4s within the DRPBW (Table 4 of this Decision Document) were assigned a portion of the WLA in the very high flow regime and the higher flow conditions flow regime (Tables 8 and 9). MS4 WLA were not assigned to the normal flow regime, the lower flow condition flow regime and the low flow regime. The WLAs assigned to MS4 communities were calculated based on the proportional area of the MS4 community within the selected subwatershed, upstream of the outlet point of the subwatershed, multiplied by the WLA assigned to MS4s in that subwatershed (Section 8.1 of the final TMDL document and Table 48 of the final TMDL document). For example, in the HUC-12 subwatershed Headwaters of Main Beaver Dam Ditch (04040001-05-01) there are six MS4 communities with MS4 jurisdictional land upstream of the outlet point of HUC-12, 04040001-05-01. Each MS4 community was assigned a portion of the WLA based on the proportional area of each MS4's jurisdictional land area upstream of the outlet point of the subwatershed.

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[3] EPA Memorandum 'Establishing TMDL "Daily" Loads in Light of the Decision by the U.S. Court of Appeals for the D.C. Circuit *in Friends of the Earth Inc. v. EPA, et al.*, No. 05-5015, (April 25, 2006) and implications for NPDES permits (November 15, 2006)

Construction stormwater:
IDEM calculated a construction stormwater contribution for total phosphorus and total suspended solid TMDLs (Tables 8 and 9 of this Decision Document). The WLA assigned to construction stormwater was based on construction permitted acreage in Porter and Lake Counties (Table 17 and Table 49 of the final TMDL document). IDEM estimated this acreage and applied that percentage to the overall loading capacity to determine a load to assign to construction stormwater.

Combined Sewer Overflows:
There are two CSOs within the DRPBW, the Crown Point WWTP (IN0025763) and Gary Sanitary District WWTP (IN0022977). Both of these CSOs were assigned a portion of the WLA based on the bacteria WQS (235 cfu/100 mL) and the TP (0.30 mg/L) and TSS (30 mg/L) water quality targets and flows measured in the two highest flow regimes (very high flows and higher flow conditions) of the LDCs (Section 8.1 of the final TMDL document). IDEM assumed that CSOs would likely occur during the two highest flow regimes of the flow duration curve and that the remaining flow regimes of the LDC (i.e., the normal flow regime, the lower flow conditions regime and the low flow regime) were not allocated a portion of WLA assigned to CSOs because CSO flows are more likely to occur during higher flow conditions. EPA is approving the WLA assigned to CSOs under the assumption that all CSO discharges into the waters of the DRPBW will meet the bacteria water quality standard (235 cfu/100 mL) and the TP (0.30 mg/L) and TSS (30 mg/L) water quality targets.

Sanitary Sewer Overflows:
There are two SSOs within the DRPBW, the Merrillville Conservancy District (INJ0355548) and the Portage Utility Service Facility (IN0024368). IDEM did not assign these two facilities a portion of the WLA (WLA = 0 cfu per 100 mL or WLA = 0 lbs/day).

EPA finds the IDEM's approach for calculating the WLA to be reasonable.

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 bacteria (*E. coli*), nutrient (TP) and sediment (TSS) TMDLs incorporated an explicit Margin of Safety (MOS) into the development of the DRPBW TMDLs. The explicit MOS was applied by reserving approximately 5% of the total loading capacity, and then allocating the remaining loads to

point (WLA) and nonpoint sources (Tables 6, 8 and 9 of this Decision Document). The use of the LDC approach minimized variability associated with the development of the DRPBW TMDLs because the calculation of the loading capacity was a function of flow multiplied by the target value. The MOS was set at 5% to account for uncertainty due to field sampling error, basing assumptions on water quality monitoring with low sample sizes, and imperfect WQT. A 5% MOS was considered appropriate, because the target values used in this TMDL had a firm technical basis and the estimated flows are believed to be relatively accurate because they were estimated based on a USGS gage located within the watershed.

The MOS for the DRPBW bacteria TMDLs also incorporated certain conservative assumptions in the calculation of the TMDLs. No rate of decay, or die-off rate of pathogen species, was used in the DRPBW bacteria 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 was more conservative to use the WQS (125 cfu/100 mL) and not to apply a rate of decay, which could result in a loading capacity 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 in determining bacteria TMDLs, 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:

The bacteria (*E. coli*), nutrient (TP) and sediment (TSS) TMDLs incorporated seasonal variation into the development of the DRPBW TMDLs via the following methods:

Bacteria (E. coli) TMDLs: Bacterial loads vary by season, typically reaching higher numbers in the dry summer months when low flows and bacterial growth rates contribute to their abundance, and reaching relatively lower values in colder months when bacterial growth rates attenuate and loading reduces as agricultural activity slows. Bacterial WQS need to be met during the recreational season (April 1st to October 31st), regardless of the flow condition. The development of the LDCs utilized flow measurements from a local USGS gage. These flow measurements were collected over a variety of flow conditions observed during the recreation season. LDCs developed from these flow records represented a range of flow conditions within the DRPBW and thereby accounted for seasonal variability over the recreation season. TMDL loads were based on sampling that occurred during the recreational season in 2013-2014. Seasonal variability was accounted for by taking multiple samples per month during the recreational season.

Critical conditions for *E. coli* loading occur in the dry summer months. This is typically when stream flows are lowest, and bacterial growth rates can be high. 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 can reasonably be assumed that the loading capacity values would be protective of water quality during the remainder of the calendar year (November through March).

Total Phosphorus and Total Suspended Solid TMDLs: Nutrient and sediment influxes to waters in the DRPBW typically occur during wet weather events. Critical conditions that impact the response of surface waters in the DRPBW to nutrient and sediment inputs occur during periods of low flow. Nutrient and sediment inputs to surface waters typically occur primarily through wet weather events. Critical conditions that impact the response of DRPBW water bodies to nutrients and sediments occur in periods of low flow. During low flow periods, nutrients and sediment can accumulate, there is less assimilative capacity within the water body, and generally nutrients and sediment are not transported through the water body at the same rate they are under normal flow conditions.

Increased algal growth during low flow periods can deplete dissolved oxygen within the water column. Critical conditions that impact loading, or the rate that nutrients are delivered to the water body, were identified as those periods where large precipitation events coincide with periods of minimal vegetative cover on fields. Large precipitation events and minimally covered land surfaces can lead to large runoff volumes, especially to those areas which drain agricultural fields. The conditions generally occur in the spring and early summer seasons.

The two most significant land uses in the DRPBW are agricultural/pasture lands and developed lands (low, medium and high density) (Table 2 of this Decision Document). Nutrient and sediment loadings from agricultural and pasture lands will vary depending on the agricultural activities on site and the presence or absence of BMPs to minimize stormwater runoff from these areas. In the DRPBW there is also a significant amount of developed land. Developed land typically has greater coverage of impervious surfaces (e.g., roads, parking lots, roofs, etc.) which channelize and direct stormwater to stormwater conveyance systems. Similar to agricultural and pasture lands, nutrient and sediment inputs from developed lands will depend on presence or absence of BMPs to minimize stormwater runoff from these areas.

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

8. Reasonable Assurances

When a TMDL is developed for waters impaired by point sources only, the issuance of a 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 DRPBW TMDL provides a discussion of reasonable assurance in Section 9 of the final TMDL document. Many of the activities and actions identified in the implementation strategy will be applied to attain the loading capacities and allocations calculated for the impaired reaches within the DRPBW. The recommendations made by IDEM will be successful at improving water quality if appropriate groups work to implement these recommendations. Those mitigation suggestions, which fall outside of regulatory authority, will require commitment from state agencies and local stakeholders to carry out the suggested actions.

IDEM has identified several local partners which have expressed interest in working to improve water quality within the DRPBW. These partners are the: the Northwestern Indiana Regional Planning Commission (NIRPC), US Department of Agriculture Natural Resources Conservation Service (USDA-NRCS), the Lake County Soil and Water Conservation District (SWCD), Porter County SWCD, Portage Parks Department, Lake County Parks, the Cities of Crown Point, Gary, Hobart, Lake Station and Merrillville, the Indiana Department of Natural Resource (IDNR) Lake Michigan Coastal Program and the Illinois/Indiana Sea Grant program. There are other entities in the northwest Indiana area who have also expressed interest in working with NIRPC on information and education opportunities.

Continued water quality monitoring within the basin is supported by IDEM. NIRPC has indicated that it would conduct a volunteer water quality monitoring program which is based on Hoosier Riverwatch methodologies. Additional water quality monitoring results will provide understanding of the success or failure of BMP systems designed to reduce bacteria, nutrient, and sediment loading into the surface waters of the watershed. Local watershed managers will be able to reflect on the progress or lack of progress of the various pollutant removal strategies and will have the opportunity to change course if observed progress is unsatisfactory.

Reasonable assurance that the WLA set forth will be implemented is provided by regulatory actions. According to 40 CFR 122.44(d)(1)(vii)(B), NPDES permit effluent limits must be consistent with assumptions and requirements of all WLAs in an approved TMDL. IDEM's stormwater program, NPDES permit program, and CSO program are the main implementing programs for ensuring WLA are consistent with the TMDL. Stormwater runoff associated with MS4 conveyances are regulated by 327 IAC 15-13-1 (Rule 13). Local stormwater efforts can also provide reasonable assurance that stormwater inputs are being targeted by local MS4 partners. Local cities and towns will need to work with NIRPC and IDEM's stormwater program to advance the goals outlined in the Watershed Management Plan related to stormwater BMPs in the DRPBW.

Reasonable assurances that nonpoint source reductions will be achieved for bacteria (*E. coli*), TP, and sediment are described in Section 9 of the TMDL. The DRPBW TMDL implementation efforts will 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 watershed. NIRPC has been awarded Indiana State 319 funding to develop a comprehensive WMP. It is anticipated that the NIRPC developed WMP will focus on developing and installing BMPs (e.g., low impact development (LID), stormwater retrofits, two-stage ditches, wetland restoration, etc.), working with local partners to identify potential partners and sites for BMP demonstration projects, and education and outreach efforts (e.g., e-newsletters, press releases, public service announcements, newspaper articles, watershed brochures, watershed signage, etc.).

The NIRPC WMP will outline practices designed to reduce pollutant inputs through the implementation of BMPs. The main efforts of the WMP will include; the identification and mitigation of riparian erosional areas within the urban/suburban areas in the DRPBW, reducing soil erosion from agricultural areas, stormwater peak flow reduction, and wetland restoration or construction. The WMP should focus on reducing sediment, nutrient and bacteria loads, while aiming to decrease flow volumes to local surface water bodies during storm events. IDEM provided recommendations of which subwatersheds should be targeted by local stakeholder efforts based on different prioritization factors (Sections 8 and 9 of the final TMDL document).

Other state led efforts will be via NPDES permit enforcement, the IDEM Stormwater Program, the IDEM Nonpoint Source program, the use of Long Term Control Plans (LTCPs) as the implementing mechanism for CSO inputs, and various other land and water resource protection efforts sponsored by state agencies.

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:
IDEM completed a comprehensive biological, physical and chemical survey of streams within the DRPBW in 2013-2014 as part of its basin monitoring schedule. Water quality data were collected at various locations within the DRPBW and those assessments were utilized to develop the TMDLs in this report. Water quality monitoring in the DRPBW is anticipated to continue by voluntary monitoring efforts organized by NIRPC. Future monitoring in the DRPBW will also 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 bacteria (*E. coli*), nutrient and sediment concentrations. Monitoring will be adjusted as needed to assist in continued source identification and elimination and will also test the efficiency of pollution reduction strategies.

During the monitoring period, watershed managers will determine the appropriate monitoring cycle for the DRPBW. The monitoring schedule will be adjusted, as needed, to improve source identification and source elimination efforts. IDEM will monitor whether bacteria (*E. coli*), nutrient and sediment targets are being achieved and adjust the DRPBW BMP strategy accordingly to meet these water quality targets. When results indicate that the water body is meeting the appropriate WQS and targets, the water body will be removed from Indiana's List of Impaired Waters.

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

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:
The focus of implementation strategies will be the reduction of bacterial, nutrient, and sediment inputs to the surface waters in the DRPBW. Local partners, such as NIRPC, county partners (i.e., Lake and Porter SWCDs) and City partners in Crown Point, Gary, Hobart, Lake Station and Merrillville, will bear the responsibility for assisting in the management of lands and waters within the DRPBW. 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, nutrient, and sediment inputs to the surface waters in the DRPBW The main bacterial, nutrient and sediment reduction strategies include:

Bacteria (E. coli TMDLs):
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 could lessen the impacts of septic derived bacterial inputs to the DRPBW.

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, would reduce the influxes of bacteria 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 for the collection, storage and management of manure can minimize impacts of bacteria entering the surface and groundwater system. Repairing manure storage facilities or building roofs over manure storage areas may decrease the amount of bacteria in stormwater runoff.

Riparian Area Management Practices: Protection of streambanks within the watershed through planting of vegetated/buffer areas with grasses, legumes, shrubs or trees will mitigate bacteria inputs into surface waters. These areas will filter stormwater runoff before the runoff enters the main stem or tributaries of the DRPBW.

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.

Total Phosphorus TMDLs:

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 could lessen the impacts of septic derived nutrient inputs to the DRPBW.

Urban/Residential Nutrient Reduction Strategies: These strategies involve reducing stormwater runoff from urban areas and single family residences within the DRPBW. These practices could include; rain gardens, lawn fertilizer reduction, planting buffer strips near water bodies, vegetation management and replacement of failing septic systems. Water quality educational programs could also be utilized to inform the general public on nutrient reduction efforts and their impact on water quality.

Agricultural Reduction Strategies: These strategies involve reducing nutrient transport from fields and minimizing soil loss. Specific practices would include; planting buffer strips near streams and lakes, streambank stabilization practices (gully stabilization and installation of fencing near streams), wetland restoration, and nutrient management planning.

Public Education Efforts: Public programs will be developed to provide guidance to the general public on 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 DRPBW. Local watershed partners (ex. NIRPC, along with others) could assume additional responsibilities in communicating nutrient reduction strategies to stakeholders, via mailing annual newsletters or updating their website with nutrient reduction strategies.

Total Suspended Solid (TSS) TMDLs:
Reducing stormwater peak flows within surface water bodies in the DRPBW is the primary recommendation for reducing sediment loads in the watershed. Streamside buffering, particularly via wetland restoration or construction, is a recommended practice that would reduce both sediment and other related pollutant loads, and in some cases may help mitigate flow alteration by maximizing infiltration rates.

Urban-suburban Stormwater Mitigation Efforts: Reducing peak flow stormwater inputs within the DRPBW would aid in reducing erosion and streambank losses within the watershed. This practice may be accomplished via reducing impervious cover or employing other low impact development/ green technologies which allow stormwater to infiltrate, evaporate or evapotranspire before reaching the stormwater conveyance system.

Identification of Stream, River, and Lakeshore Erosional Areas: An assessment of stream channel, river channel, and lakeshore erosional areas should be completed to evaluate areas where erosion control strategies could be implemented in the DRPBW. Implementation actions (ex. planting deep-rooted vegetation near water bodies to stabilize streambanks) could be prioritized to target areas which are actively eroding. This strategy could prevent additional sediment inputs into surface waters of the DRPBW and minimize or eliminate degradation of habitat.

Improved Agricultural Drainage Practices: A review of local agricultural drainage networks should be completed to examine how improving drainage ditches and drainage channels could be reorganized to reduce the influx of sediments to the surface waters in the DRPBW. The reorganization of the drainage network could include the installation of drainage ditches or sediment traps to encourage particle settling during high flow events. Additionally, cover cropping and residue management is recommended to reduce erosion and thus siltation and runoff into streams.

Reducing Livestock Access to Stream Environments: Livestock managers should be encouraged to implement measures to protect riparian areas. Managers should install exclusion fencing near stream environments to prevent direct access to these areas by livestock. Additionally, installing alternative watering locations and stream crossings between pastures may aid in reducing sediments to surface waters.

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:
The public's participation in the TMDL development process is outlined within Section 10 of the final TMDL document. The IDEM has been in contact with local groups and municipal officials throughout the development of these TMDLs. TMDL kickoff meetings were held on March 13, 2013 in Crown Point, Indiana and Portage, Indiana. The public was invited to submit any additional water quality data and information toward the development of the DRPBW TMDL during the kickoff meeting in 2013. IDEM, USGS and Hoosier Riverwatch staff hosted a Deep River Monitoring Field Day on October 23, 2013 at Deep River County Park. IDEM, USGS and Hoosier Riverwatch members demonstrated water quality sample collection methods, field procedures for fish and macroinvertebrate collection, and habitat assessment.

IDEM held an interim TMDL public meeting in December 2013 in Crown Point, Indiana. During this meeting IDEM discussed its 2013 field sampling results and addressed questions from those in attendance related to the TMDL process to date. A draft TMDL meeting was held at the Hobart Community Center in Hobart, Indiana on July 14, 2014. IDEM described the results of the draft TMDL. The public was invited to submit formal comments on the draft document and informed of the findings of the document.

The draft TMDL report was available for public comment from July 14, 2014 to August 15, 2014. IDEM posted the draft report online at (http://www.in.gov/idem/nps/3893.htm). IDEM did not receive any public comments on the draft DRPBW TMDL during the public comment period. IDEM submitted the final TMDL and submittal letter to the U.S. EPA on September 2, 2014.

The U.S. EPA finds that the TMDL document submitted 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 water body, and the pollutant(s) of concern.

Comment:

The U.S. EPA received the final DRPBW TMDL document and submittal letter from the IDEM on September 2, 2014. The transmittal letter explicitly stated that enclosed was the final TMDL report detailing the DRPBW TMDLs which address recreational use and aquatic life use impairments. The DRPBW TMDLs include impaired reaches within the following HUC-12 subwatersheds;

- Headwaters of Main Beaver Dam Ditch (04040001-05-01);
- Main Beaver Dam Ditch (04040001-05-02);
- Headwaters of Turkey Creek (04040001-05-03);
- Deer Creek-Deep River (04040001-05-04);
- City of Merrillville-Turkey Creek (04040001-05-05);
- Duck Creek (04040001-05-06);
- Lake George-Deep River (04040001-05-07);
- Little Calumet River-Deep River (04040001-05-08); and
- Willow Creek-Burns Ditch (04040001-05-09).

TMDLs within these subwatersheds were being submitted to 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 U.S. EPA finds that the TMDL transmittal letter submitted for Deep River-Portage Burns 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 TMDLs submitted for the DRPBW satisfy all of the elements of approvable TMDLs. This approval is for **26 bacteria TMDLs**, **10 nutrient TMDLs**, and **30 TSS TMDLs**. These **66 TMDLs** address impaired water bodies in nine HUC-12 subwatersheds for recreational use and aquatic life use impairments. Refer to Table 1 of this Decision Document for subwatershed and AUID details.

The U.S. EPA's approval of these TMDLs extend to the waterbodies which are identified within the DRPBW, with the exception of any portions of the waterbodies 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.

ATTACHMENT 1: Revisions to EPA's Decision Document for the Deep River-Portage Burns Watershed TMDL

TOPIC: Revision to bacteria TMDL documentation for IDEM submitted bacteria TMDLs from 2013-2015

ISSUE:

In December 2017, Indiana Department of Environmental Management (IDEM) explained that it had found inaccuracies in some of its TMDL documentation dating back to TMDLs submitted in 2013. More specifically, IDEM identified that it had mischaracterized how it calculated bacteria TMDLs in IDEM TMDL reports. IDEM confirmed that these inaccuracies were solely in the main body of the TMDL report and that the actual bacteria TMDL calculations were correct. Therefore, IDEM did not need to revise/change any TMDL calculations or TMDL tables in these TMDL reports.

BACKGROUND:

After an internal review of its TMDL process in 2016, IDEM found that five bacteria TMDLs submitted between 2013-2015 (i.e., the Big Raccoon Creek TMDL (2013), the Otter Creek TMDL (2013), the Deep River-Portage Burns TMDL (2014), the Lower Big Blue River TMDL (2014) & the Whitewater River TMDL (2015)) included language within the main body of the TMDL documents which was inaccurate. This incorrect language involved IDEM's discussion of the bacteria water quality standard (WQS) and how the bacteria WQS were used to calculate bacteria TMDLs.

IDEM's bacteria WQS have a single sample maximum criteria (SSMC) of 235 counts per 100 mL and a geometric mean criteria (GMC) of 125 counts per 100 mL. IDEM calculates bacteria TMDLs (i.e., the loading capacity values for the load duration curve (LDC)) using the SSMC (235). In the main body of the final TMDL report for the five bacteria TMDLs of 2013-2015, IDEM described its process for estimating bacteria TMDLs as using the GMC (125) portion of the bacteria WQS. This explanation was incorrect, as IDEM actually used the SSMC (235) portion of the bacteria WQS and not the GMC (125) for its bacteria TMDL calculations. IDEM identified this error within its final TMDL reports and requested EPA's assistance to retroactively update its bacteria TMDL documentation for bacteria TMDLs submitted 2013-2015.

Upon identifying this issue, IDEM has updated its language used in bacteria TMDL reports to reflect the correct SSMC value. All TMDLs submitted after this issue was discovered include the correct discussion of bacteria WQS which factor into TMDL calculations.

NOTE:

- No TMDL calculations are being updated or changed via this action. EPA is solely updated language used in EPA Decision Documents regarding IDEM's approach to calculating bacteria TMDLs.
- Regardless of the portion of the bacteria WQS (i.e., SSMC vs. GMC) which IDEM has selected to calculate bacteria TMDLs, EPA notes that both the SSMC and the GMC

portions of the WQS apply to bacteria TMDLs as explained by IDEM in Section 2 of their final TMDL document.

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Revisions to EPA's Decision Document:

Section 2 of the Decision Document – **Description of the Applicable Water Quality Standards and Numeric Water Quality Targets**

Original Decision Document language: The DRPBW TMDL *E. coli* target is: from April 1 through October 31, *E. coli* shall not exceed **125 cfu per 100 mL** (125 cfu/100 mL), as a geometric mean based on not less than five samples equally spaced over a 30-day period. Water bodies are held to recreation use criteria during the time of the year when people are most likely to be engaged in activities such as swimming, wading or boating. The recreation use criteria were established to protect against disease carrying organisms that may be ingested or introduced to the eyes, skin or other body parts during water recreation activities.

Revised Decision Document language: The DRPBW TMDL *E. coli* target is: from April 1 through October 31, *E. coli* shall not exceed **235 cfu per 100 mL** (235 cfu/100 mL). For *E. coli* TMDLs, allocations were calculated based upon the 235 cfu/100 mL portion of the criteria. EPA believes this is protective of both portions of the criteria. The EPA report, "*An Approach for Using Load Duration Curves in the Development of TMDLs*" (EPA, 2007) describes how the monthly geometric mean (in this case, 125 cfu/100 mL for *E. coli*) is likely to be met when the single sample maximum value (in this case, 235 cfu/100 mL for *E. coli*) is used to develop the loading capacity. The process calculates the daily maximum bacteria value that is possible to observe and still attain the monthly geometric mean. If the single sample maximum is set as a never-to-be surpassed value then it becomes the maximum value that can be observed, and all other bacteria values would have to be less than the maximum, i.e., 235 cfu/100 mL. EPA notes that whichever portion of the criteria is used to determine the allocations, both the monthly geometric mean and single sample maximum will be used to assess the extent of implementation by point and nonpoint sources.

Section 3 of the Decision Document – **Loading Capacity – Linking Water Quality and Pollutant Sources**

Original Decision Document language: ***Bacteria (E. coli) TMDLs:*** For all *E. coli* TMDLs addressed by the DRPBW TMDL, a geometric mean of **125 cfu/100 ml** for five samples equally spaced over a 30-day period, was utilized to set the loading capacity of the TMDL. IDEM believes the geometric mean portion of the WQS provides the best overall characterization of the status of the watershed. The 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 believes that by setting the bacteria TMDLs to the geometric mean (125 cfu/100 mL) portion of the full body contact recreational use WQS the impaired water body will attain its designated fully body contact recreational use (Section 2 of this Decision Document). EPA finds this assumption to be reasonable since the allocations of the bacteria TMDLs addressed in the BRCW TMDLs are calculated to meet the WQS of 125 cfu/100 ml on any given day across all flow conditions within the BRCW. Thus, when the TMDL is implemented and achieved, *E. coli* concentrations in the impaired segments should not exceed 125 cfu/100 ml. Therefore, implicitly the *E. coli* concentrations in the impaired segments should not exceed the single sample maximum WQS of 235 cfu/100 ml.

Revised Decision Document language: ***Bacteria (E. coli) TMDLs:*** For all *E. coli* TMDLs addressed by the DRPBW TMDL, the *E. coli* WQS of **235 cfu/100 mL**, was used to set the loading capacity of the TMDL. IDEM believes that the single sample maximum component of the *E. coli* WQS provides the best overall characterization of the status of the watershed. IDEM believes that by setting the bacteria TMDLs to meet the single sample maximum (235 cfu/100 mL) portion of the full body contact recreational use WQS the impaired waterbody will attain its designated full body contact recreational use (Section 2 of this Decision Document). EPA finds this assumption to be reasonable since the allocations of the bacteria TMDLs addressed in the DRPBW TMDLs are calculated to meet the WQS of 235 cfu/100 mL on any given day, across all flow conditions within the DRPBW.

Typically loading capacities are expressed as a mass per time (e.g. pounds per day). However, for *E. coli* loading capacity calculations, mass is not always an appropriate measure because *E. coli* is expressed in terms of organism counts. This approach is consistent with the 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 DRPBW TMDLs, IDEM used the water quality standard for *E. coli* (235 cfu/100 mL). 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 point and nonpoint source discharges must meet the WQS when entering the water body. If all sources meet the WQS at discharge, then the water body should meet the WQS and its designated use.

Section 5 – **Wasteload Allocations **

Original Decision Document language: IDEM identified four NPDES permit holders (Table 3 of this Decision Document) within the DRPBW which received a portion of the WLA assigned to mitigate bacteria inputs. Individual WLAs were developed as part of the TMDL development process for those permittees discharging directly to impaired reaches. WLAs for individual facilities were calculated based on each facility's design flow and the permit limit (ex. *E. coli* permit limits are set at the WQS of 125 cfu/100 mL). IDEM expects each NPDES permitted facility to meet the concentration targets assigned in the WLA across all flow conditions.

Revised Decision Document language: IDEM identified four NPDES permit holders (Table 3 of this Decision Document) within the DRPBW which received a portion of the WLA assigned to mitigate bacteria inputs. Individual WLAs were developed as part of the TMDL development process for those permittees discharging directly to impaired reaches. WLAs for individual facilities were calculated based on each facility's design flow and the permit limit (e.g., *E. coli* permit limits are set at the WQS of 235 cfu/100 mL). IDEM expects each NPDES permitted facility to meet the concentration targets assigned in the WLA across all flow conditions.

Section 6 – **Margin of Safety (MOS) **

Original Decision Document language: 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.

Revised Decision Document language: 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 235 cfu/100mL and 125 cfu/100 mL. Thus, it is more conservative to apply the State's WQS in determining bacteria TMDLs, because this standard must be met at all times under all environmental conditions.