UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

SEP 28 2016

Mr. Mark Klotz, Director
Division of Water, 4th Floor
New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233-3500

Dear Mr. Klotz:

On September 20, 2016, the U.S. Environmental Protection Agency, Region 2, received for review and approval, the New York State Department of Environmental Conservation's document, dated September 2016: "Total Maximum Daily Load (TMDL) for Phosphorus in Engleville Pond, Schoharie County, New York."

The EPA approves this TMDL pursuant to Section 303(d)(2) of the Clean Water Act (CWA) and the EPA's implementing regulations at 40 CFR 130.7(d)(2). The rationale for this approval is provided in the enclosure entitled "Review of Total Maximum Daily Load (TMDL) for Total Phosphorus for Engleville Pond, New York."

The TMDL addresses the total phosphorus loading and impairment in this waterbody and is established at a level sufficient to attain the NYSDEC's narrative water quality standard for nutrients. NYSDEC established a site-specific numeric translation of the narrative water quality standard to protect the drinking water use of Engleville Pond. The TMDL target of 6 µg/L chlorophyll-*a*, and corresponding total phosphorus concentration of 12 µg/L, will ensure that the drinking water use is protected.

The EPA expects this approved TMDL will be incorporated in the New York State Water Quality Management Plan.

Sincerely,

Javier Laureano, Ph.D., Director
Clean Water Division

Enclosure

Review of Total Maximum Daily Load (TMDL) for Total Phosphorus for Engleville Pond, New York

This document contains EPA's review of the above-referenced TMDL. This TMDL review document includes TMDL review guidelines that summarize and provide guidance regarding currently effective statutory and regulatory requirements relating to TMDLs. These TMDL review guidelines are not themselves regulations. Any differences between these guidelines and EPA's TMDL regulations should be resolved in favor of the regulations themselves. The italicized sections of this document describe EPA's statutory and regulatory requirements for approvable TMDLs. The sections in regular type reflect EPA's analysis of New York's compliance with these requirements.

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.

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.

A. Identification of Waterbodies and Background Information

EPA received for review and approval the New York State Department of Environmental Conservation (NYSDEC) document: "Total Maximum Daily Load (TMDL) for Phosphorus in Engleville Pond, Schoharie County, New York" (TMDL document) on September 20, 2016.

Along with the TMDL document, a copy of the notice seeking public comment was submitted. No comments were received during the public comment period.

Engleville Pond (waterbody ID: 1202-0009), located in the Town of Sharon, Schoharie County, is identified on the New York 2014 303(d) list as impaired due to phosphorus. Engleville Pond consists of two ponds, however, the 303(d) listing refers to Pond 1. Engleville Pond 1 (Engleville Pond or the Pond) is the larger of the two ponds and serves as the Sharon Springs emergency or auxiliary water supply that is accessible via a groundwater well. Engleville Pond (shown as Surface Reservoir 1 in Figure 1 of the TMDL document) has a surface area of 29.5 acres, a capacity of approximately 43 million gallons, and a watershed area of 576 acres. The un-named pond (Pond 2 or Surface Reservoir 2), which leads to a sub-tributary of West Creek, has a watershed area of about 43 acres and a capacity of approximately 3 million gallons. Ponds 1 and 2 are currently not hydraulically connected. Based on 2014 data for total phosphorus, Pond 2 is currently not impaired or listed on NY's Section 303(d) list.

Figures 6 and 7 and Table 1 of the Engleville Pond TMDL document show the land uses, in both acres and percent, within the reservoir's drainage basin. The existing land use and land cover was determined from geographical information system (GIS) datasets. Digital land use/land cover data were obtained from the 2001 and 2011 National Land Cover Data Set. The land use and cover map based on 2001 data is shown in Figure 6 of the TMDL document. Differences in land use delineation between the 2001 and 2011 data sets are summarized in Table 1 of the TMDL document. These changes include a slightly larger watershed area, the inclusion of open land use, and the redefinition of a small percentage of forested land to wetland. The predominant land use in the watershed is forest and agricultural land use is more significant on the western side of the watershed.

B. Pollutant of Concern

The pollutant of concern in Engleville Pond is total phosphorus. Data collected in the summer of 1997 indicated that the mean phosphorus concentration was 54 µg/L. The summer mean of data collected in 2014 was 30 µg/L. Both the 1997 and 2014 data indicate that the total phosphorus concentrations in Engleville Pond exceed the state guidance value of 20 µg/L of total phosphorus. Excessive concentrations of total phosphorus increase primary productivity (algal

biomass) which leads to eutrophication. Phosphorus data are shown in Figure 8 of the TMDL document. In addition, measured and modeled data indicate high levels of chlorophyll -*a* concentrations (see Figure 15 of the TMDL document).

C. Pollutant Sources

There are no permitted sources in Engleville Pond.

The nonpoint sources of total phosphorus to Engleville Pond include: runoff from agricultural land (hay/pasture), forest, open and developed land; wetland, groundwater, natural background and internal loading.

D. Priority Ranking

Engleville Pond is ranked as low priority for TMDL development on the New York State 2014 Section 303(d) List of Impaired Waters.

EPA finds that the TMDL meets the requirements for describing the waterbody, the pollutant of concern, pollutant sources, and priority ranking.

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

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

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

Engleville Pond is designated by NYSDEC as a "Class A" water. The best usages of Class A waters are: a source of water supply for drinking, culinary or food processing purposes; primary and secondary contact recreation; and fishing. The waters shall be suitable for fish, shellfish, and wildlife propagation and survival (6 NYCRR Part 701.6 (a)). This classification may be given to those waters that, if subjected to approved treatment equal to coagulation, sedimentation,

filtration and disinfection, with additional treatment if necessary to reduce naturally present impurities, meet or will meet New York State Department of Health drinking water standards and are or will be considered safe and satisfactory for drinking water purposes (6 NYCRR Part 701.6 (b)). The Pond serves as the Sharon Springs emergency or auxiliary water supply that is accessible via a groundwater well.

Total phosphorus in waters designated as Class A and B waters are addressed under New York's narrative surface water quality standards for nutrients, found at Part 703 of New York State Code, Rules and Regulations (NYSCRR). The narrative criterion for total phosphorus and nitrogen found at Part 703.2 is: "None in amounts that will result in growths of algae, weeds and slimes that will impair the water for their best usages." While a guidance value of 20 μg/L (0.020 mg/L) total phosphorus has been developed for ponded waters, this value was developed to be protective of aesthetics and the primary and secondary contact recreation best uses. This guidance value was not specifically derived to protect the drinking water use of waterbodies such as Engleville Pond. A site-specific numeric translation of the state's narrative standard for the protection of the drinking water use was, therefore, developed for Engleville Pond.

As required under 40 CFR §131.11(a), in waterbodies with multiple uses, the applicable criterion shall protect the most sensitive use. The most sensitive use of Engleville Pond is drinking water. The development of the site-specific numeric translation of the state's narrative standard for Engleville Pond is based on the relationship between increased phosphorus concentrations and increased primary productivity (algal biomass) and the increase in the generation of total trihalomethanes (TTHMs), which are formed during the disinfection process of drinking water. Specifically, nutrient (P) enrichment leads to increases in algae (measured as chlorophyll-*a*), which results in increases in natural organic matter (NOM), which when combined with chlorination (Cl_2) during the disinfection process of drinking water, forms disinfection by-products, including TTHMs. TTHMs are regulated in drinking water supplies through the Safe Drinking Water Act Maximum Contaminant Levels (MCL). Drinking water containing TTHMs in excess of the MCL could cause liver, kidney, or central nervous system problems and increased risk of cancer due to long-term exposure. The site-specific numeric translation of the state's narrative standard developed for Engleville Pond is based on protecting the drinking water use of Engleville Pond by achieving the MCL for TTHMs.

EPA initiated a National Nutrient Strategy in 1998 with the goal of assisting all states in the development of numeric nutrient criteria. To further the process of developing numeric nutrient criteria protective of potable water use, NYSDEC, in collaboration with investigators from the New York State Department of Health, Upstate Freshwater Institute, State University of New York College of Environmental Science and Forestry, and Morgan State University, conducted a study, funded by the EPA as part of the agency's National Nutrient Criteria Strategy, to investigate the relationship between nutrient-related indices and certain human health-related indices. The study involved the monthly collection of paired water column samples from 21 lakes and reservoirs during the growing season (May to October, 2004 and/or 2007). The study systems were distributed throughout New York State, and spanned a relatively broad range of trophic conditions ranging from oligotrophic systems (low primary productivity) to eutrophic systems (high primary productivity). NYSDEC developed a draft Fact Sheet based on that

research, "New York State Human Health Fact Sheet Ambient Water Quality Nutrient Values for Protection of Sources of Potable Waters *(Ponded Waters)*," (August 16, 2010). Both the site-specific numeric translation of the state's narrative standard and the approach for deriving the numeric translation are consistent with this fact sheet, which has been previously reviewed by EPA and found to be acceptable.

The TMDL establishes a target for Engleville Pond, based on the site-specific numeric translation of the state's narrative standard, of 6 µg/L chl-*a*, which corresponds to a total phosphorus concentration of 12µg/L (refer to Section 3 below on linking TP to chl-*a* using the BATHTUB model). Meeting a target of 6 µg/L chl-*a* and the corresponding phosphorus concentration of 12µg/L, will achieve the MCL for TTHMs and in turn, protect the drinking water use for Engleville Pond. Additional information on the study and details of the derivation of the chl-*a* target of 6 µg/L can be found in Section 3.0 and Appendix A of the TMDL document.

EPA has previously approved the Bear Lake TP TMDL using the same approach as in Engleville Pond. In addition, EPA has previously approved phosphorus TMDLs using a site-specific numeric translation of the state's narrative standard for nutrients in the New York City drinking watershed reservoir TMDLs. The site-specific numeric translation of the state's narrative standard was developed using a weight-of-evidence approach that examined several eutrophication parameters such as chl-*a* to derive the endpoint for the protection of source drinking water reservoirs.

EPA finds that the TMDL meets the requirements for identifying the applicable water quality standard and numeric water quality target.

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)). 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.

A. Loading Capacity

The MAPSHED[1] watershed model was used in conjunction with the BATHUB reservoir response model to develop the TMDL for Engleville Pond. MAPSHED is used to determine the seasonal phosphorus loading to the waterbody, and BATHTUB is used to determine the extent to which the total load must be reduced to meet the water quality target. The total phosphorus loading capacity is calculated by running BATHTUB iteratively, and reducing the concentration of total phosphorus within the drainage basin until the model results demonstrate attainment of the water quality target. The maximum concentration that results in compliance with the TMDL target for total phosphorus is used as the basis for determining the loading capacity. This concentration is then converted into a loading rate for each nonpoint source by using simulated flow from MAPSHED.

The BATHTUB[2] model simulates the fate and transport of nutrients and water quality conditions in response to nutrient loads to a lake, pond or reservoir. BATHTUB performs steady-state water and nutrient balance calculations in a spatially segmented hydraulic network that accounts for advective and diffusive transport and nutrient sedimentation. Eutrophication–related water quality conditions (total phosphorus, total nitrogen, chlorophyll a, transparency, and hypolimnetic oxygen depletion) are predicted by the model using empirical relationships previously developed and tested for reservoir applications. The BATHTUB model has been previously applied to north temperate lakes with characteristics similar to those of Engleville Pond. Appendix B of the TMDL document discusses the setup, calibration, and use of the BATHTUB model.

The MAPSHED model is used to calculate the current nonpoint source loads of total phosphorus to Engleville Pond. Using simulated flow from MAPSHED, the maximum total phosphorus concentration calculated by BATHTUB for the Pond was converted into loading rates. The MAPSHED model was developed under EPA's contract with Cadmus Inc. in response to NY's need for a version of AVGWLF (Arc View Generalized Watershed Loading Function) that would operate in a non-proprietary geographic information system (GIS) package called MapWindow. MAPSHED incorporates an enhanced version of the AVGWLF model developed by Haith and Shoemaker (1987)[3] and the RUNQUAL model developed by Haith (1993)[4]. RUNQUAL was developed to refine the urban runoff component by differentiating among three levels of imperviousness for residential and mixed commercial land uses. The AVGWLF model

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1 http://www.MAPSHED.psu.edu/Downloads/RUNQUALManual.pdf

2 Flux, Profile, and BATHTUB: Simplified Procedure for Eutrophication Assessment and Prediction. January 2004. The United States Army Corps of Engineers, Engineer Research and Development Center. http://el.erdc.usace.army.mil/elmodels/emiinfo.html.

3 Haith, D.A. and L.L. Shoemaker, 1987. Generalized Watershed Loading Functions for Stream Flow Nutrients. Water Resources Bulletin, 23(3), pp.471-478.

4 Haith, D.A. 1993. RUNQUAL, Runoff Quality from Development Sites.

was initially calibrated and validated for 22 watersheds throughout New York and New England for the period of 1997- 2004. The model was fine-tuned by including additional calibration sites in New York to supplement data from the original northeast model calibration and verification sites. Two models were developed based on the Eastern Great Lakes/Hudson Lowlands area and the Northeastern Highlands area and calibrated to better reflect local conditions and ecological and hydrological processes. The model was used to develop TMDLs for a number of lakes in NY.

The MAPSHED model was applied to Engleville Pond to calculate mean seasonal phosphorus loads for the period 1990-2014. Using these loads as inputs to BATHTUB, water quality was modeled in the Pond and compared to available data for 1997 and 2014 (refer to Figure 14 of the TMDL document). Although ambient data are limited to two years, the BATHTUB model reasonably predicts total phosphorus concentrations in the Pond. The 1997 simulation under-predicted the observed concentration while the 2014 simulation over-predicted the observed phosphorus concentration. Similar modeling projections were conducted for chl-*a* (refer to Figure 15 of the TMDL document). Error statistics, which were performed to evaluate model performance (refer to Appendix C of the TMDL document), indicate that the model calibration is "good" and acceptable for TMDL calculations.

The calibrated BATHTUB model was then used to derive the total phosphorus load reduction needed to meet the chl-*a* target of 6 μg/L as a seasonal average and the corresponding total phosphorus growing season average of 12 μg/L. Using the modeling framework, the calculated load capacity (TMDL) of total phosphorus for Engleville Pond is 0.142 lbs/day which will result in meeting the water quality target of 6 μg/L chl-*a*.

The TMDL, load allocations (LA) and margin of safety (MOS) for Engleville Pond are identified in Table 1 in Appendix A of this document.

B. Cause-and-Effect Relationship between Numeric Target and Pollutant

In lakes and ponds, total phosphorus is typically the limiting nutrient. Excess inputs of total phosphorus result in eutrophication, which is mainly associated with increased primary productivity (algal blooms). Eutrophication related impacts affect a variety of water uses such as water supply, recreation, and also have adverse impacts on aquatic life. Because Engleville Pond is designated as a source of drinking water, a site-specific numeric translation of the narrative standard for nutrients of 6 μg/L chl-*a* was developed to protect this use. Chl-*a* is a more direct measurement of primary productivity, which when combined with chlorination (Cl_2) during the disinfection process of drinking water, forms disinfection by-products, including TTHMs which are harmful to human health. Chl-*a*, therefore, can be used to establish acceptable levels of nutrients necessary to protect designated uses, including waters designated as a drinking water supply. By reducing the input of total phosphorus, the impacts associated with eutrophication are reduced, thereby also reducing TTHMs.

The TMDL target of 6 μg/L chl-*a* (corresponding to 12 μg/L total phosphorus, mean summer

growing season concentration) is applied as a summer mean concentration that will attain the standard and protect the best use of Engleville Pond.

C. Critical Conditions

The critical condition for Engleville Pond is the summer growing season (May through September). While MAPSHED takes into account loadings from all periods throughout the year, including spring loads, the BATHTUB model simulations were compared against observed data during the critical growing season. Meeting the TMDL target of 6 µg/L chl-*a* during the critical summer growing period ensures that the standard is achieved throughout the year.

EPA concludes that the loading capacity has been adequately identified and critical conditions have been considered.

4. Load Allocations (LAs)

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

The TMDL for Engleville Pond provides LAs for surface runoff from agriculture, developed land, and open land, a combined LA for forest, wetland, stream bank and natural background and internal loading. Agriculture is assigned a 95% reduction; developed landand forest/wetland/streambank/natural background are each assigned a 12% reduction and open land was assigned a 22% reduction. Internal loading is assigned a zero loading (100% reduction from existing load) under the assumption that as excess external phosphorus loadings are removed, internal loading will attenuate over time.

Table 1 in Appendix A of this document lists the current loading for each source, and the load allocations needed to meet the TMDL for Engleville Pond.

EPA concludes that the TMDL has identified load allocations for nonpoint sources of total phosphorus.

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 permitees 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.

There are no point sources discharging to Engleville Pond, therefore, no WLAs are required.

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.

The TMDL for Engleville Pond incorporates an explicit MOS of 10% of the loading capacity.

The 10% MOS applied to the Pond is considered appropriate to address the uncertainty in the TMDL. As shown in Figures 14 and 15 of the Engleville Pond TMDL document, the observed and modeled data (TP, chl-*a*) for combined years of 1997 and 2014 show reasonable agreement.

Although there is a limited data set for the TMDL, previous applications of the model to lakes with similar characteristics as the Pond have shown generally good agreement between the loading model (MAPSHED and previous historical TMDLs using the AVGWLF model) and the observed loading and flow data, and good agreement between the BATHTUB water quality model and the observed water quality data for the lakes. As indicated in the TMDL document, the MOS can be reviewed as new data and modeling become available in the future.

EPA concludes that the TMDL incorporates an adequate margin of safety.

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)).

The BATHTUB model addresses seasonal variation by incorporating total phosphorus as a seasonal average for the summer growing season, when conditions are optimal for the available total phosphorus to produce nuisance algal growth. This is supported in EPA guidance (EPA 440/4-90-006, p. 71, 73), specifically, "Eutrophication models are geared to predicting average water quality conditions over a growing season or year".

Seasonal variation is also represented in this TMDL by taking 25 years of daily precipitation data when calculating runoff through MAPSHED.

EPA concludes that the TMDL has adequately considered seasonal variation to ensure that the water quality standard is achieved throughout the year.

8. Reasonable Assurances

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

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

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

The TMDL for Engleville Pond is a nonpoint source-only TMDL, thus a demonstration of reasonable assurance is not necessary.

NYSDEC, however, provided an implementation plan to address the nonpoint source loading reductions. Measures to address reductions in nonpoint source loadings of total phosphorus from these sources are described in the Implementation Section below. A 79% total LA reduction in total phosphorus distributed among the nonpoint sources must be achieved to meet the water quality target.

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.

A monitoring program is included in the Engleville Pond TMDL document (see Section 7.2 of the TMDL document). The purpose of the monitoring program is to track the effectiveness of the implementation plan controls and to develop baseline and trend information for waterbodies. The monitoring sampling plan will be coordinated with the existing Lake Classification and Inventory (LCI) program and includes sample analysis for:

- total phosphorus;
- nitrogen (nitrate, ammonia, and total nitrogen);
- sample analysis for chloride;
- chlorophyll *a*;
- color; and
- calcium.

In addition, field measurements will include water depth, temperature and secchi disc transparency.

Sampling in Engleville Pond is scheduled to begin in 2020 and then every five years thereafter. This schedule may be adjusted based on the loading reduction strategies that are selected and/or needs identified by stakeholders.

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.

The TMDL submittal identifies several actions designed to address reductions in total phosphorus from a variety of sources. The agricultural reductions required for Engleville Pond

will be addressed through the Agricultural Environmental Management (AEM) program. AEM uses a voluntary approach to meeting water quality objectives and serves as the umbrella for integrating and coordinating all local, state and federal agricultural programs. AEM provides a locally-led, coordinated and confidential planning and assessment method that addresses watershed needs. The AEM relies on a five-tiered process which includes: (1) survey of current activities and future plans; (2) documentation of current land stewardship and identification of areas of concern; (3) development of a conservation plan; (4) implementation of the plan using available financial, educational and technical assistance; and (5) conducting evaluations to ensure the protection of the environment and farm viability.

Tier 1 could be used to identify farmers that, for economic or personal reasons, may be changing or scaling back operations, or contemplating selling land. These farms would be candidates for conservation easements, or conversion of cropland to hay, as would farms identified in Tier 2 with highly-erodible soils and/or needing stream management. Tier 3 should include a Comprehensive Nutrient Management Plan with phosphorus indexing. Additional practices could be fully implemented in Tier 4 to reduce phosphorus loads, such as conservation tillage, stream fencing, rotational grazing and cover crops. Also, riparian buffers reduce loads from upland fields and stabilize stream banks in addition to reducing loads by taking land out of production.

Internal loading is a significant source of phosphorus to Engleville Pond and sampling conducted in 2014 indicated that phosphorus concentrations in the hypolimnion are nearly double the concentrations in the epilimnion. In addition, stratification was also documented and this condition can lead to oxygen depletion and release of phosphorus from the bottom sediments to the water column. To address the condition of hypolimnetic oxygen depletion and release of phosphorus, the TMDL outlines options including: artificial circulation; hypolimnetic aeration; and hypolimnetic withdrawal.

The TMDL document provides additional measures that will achieve reductions, including: chemical addition to control algal blooms; biological manipulation (addition or removal of specific organisms to shift ecological conditions); erosion control at nearby tributaries; and stream stabilization measures within the Engleville Pond watershed.

While developed lands are a minor source of phosphorus loadings to Engleville Pond, areas of active erosion, such as road ditches on steep grades, can be significant sources of sediment and phosphorus and should be stabilized. Additional measures to reduce phosphorus loads from developed lands are also provided in the Implementation Plan of the TMDL document (Section 7.1.3).

Other measures to further protect water quality and limit growth resulting in increased loads of total phosphorus that would otherwise offset load reduction efforts should be considered. The basic protections afforded by local zoning ordinances could be enhanced to limit non-compatible development, preserve natural vegetation along shorelines and promote smart growth. Identification of wildlife habitats, sensitive environmental areas, and key open spaces within the watershed could lead to their preservation or protection by way of conservation easements or

other voluntary controls.

Further information on implementation can be viewed in Section 7 in the TMDL document.

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.

On August 3, 2016, the proposed Engleville Pond TMDL was published in the state's Environmental Notice Bulletin (ENB) and a 30-day public comment period was provided. In addition, the proposed TMDL was made available to local government representatives and interested parties. NYSDEC also made the proposed TMDL document available through the Environmental Bulletin Listserve and the Division of Water "Making Waves" email list.

No comments were received during the public comment period.

EPA has concluded that the State provided an adequate opportunity for public participation.

12. Submittal Letter

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

The Engleville Pond TMDL was received by EPA Region 2 on September 26, 2016, and was accompanied by a letter dated September 26, 2016, requesting EPA's review and approval of the TMDL.

13. Administrative Record

While not a necessary part of the submittal to EPA, the State/Tribe should also prepare an administrative record containing documents that support the establishment of and calculations/allocations in the TMDL. Components of the record should include all materials relied upon by the State/Tribe to develop and support the calculations/allocations in the TMDL, including any data, analyses, or scientific/technical references that were used, records of correspondence with stakeholders and EPA, responses to public comments, and other supporting materials. This record is needed to facilitate public and/or EPA review of the TMDL.

NYSDEC has prepared an administrative record to support these TMDLs; it is available at NYSDEC's offices in Albany, New York.

Table 1. Total Daily Phosphorus Load Allocations for Engleville Pond[1]

Source	Total Phosphorus Load lbs/day		Total Phosphorus Reduction	
	Current	TMDL	lbs/day	%
Load Allocation (LA)				
Agriculture*	0.3789	0.0189	0.3600	95
Developed Land*	0.0071	0.0063	0.0008	12
Forest, Wetland, and Natural Background*	0.0866	0.0762	0.0104	12
Open Land	0.0268	0.0208	0.0060	22
Internal Load	0.1074	0.0055	0.1019	95
Subtotal	**0.6068**	**0.1277**	**0.4792**	**79**
Wasteload Allocation (WLA)	0	0	0	0
Margin of Safety (MOS)		0.0142		
TOTAL	**0.6068**	**0.1419**	**0.4792**	**79**

[1]The values reported in Table 1 are the daily integrated values. The annually equivalent values are provided in the TMDL document. In calculating the daily values, numbers were rounded and may not necessarily add up exactly to the sums shown in the table.
*Includes total phosphorus transported through surface runoff and subsurface (groundwater).