



Monitoring/Water Quality Improvements Committee Agenda
6/12/2025 12:30-1:30 p.m.
Lake County Division of Transportation
600 W. Winchester Rd.
Libertyville IL 60048

Discussion and Possible Approval of the Following:

1. Call to Order

Steve Waters, Monitoring Committee Chair, called the meeting to order at 12:31.

2. Roll Call

Anna Niedzinski, DRWW Coordinator performed roll call. Members present: Chair **Steve Waters**, North Shore Water Reclamation District (NSWRD); **James Fitzgerald**, Lake County Health Department (LCHD); **Chris Johnson**, Sierra Club; and **Jim Bland**, EPS Inc. A quorum was present.

Others present: Anna Niedzinski, Lake County Stormwater Management Commission (SMC); Chuck Bodden, NSWRD; Rob Flood, NSWRD; Don Wilson, EPS Inc.; Tom Morthorst, Village of Third Lake; Mike Prusila, SMC, and Ashley Strelcheck, SMC. With Adreienne Nemura, Geosyntec Consultants, attending virtually.

3. Public Comment

There was no public comment.

4. Approval of Meeting Minutes

a. *05/15/25 Monitoring/Water Quality Improvements Committee Meeting Minutes

Motion by Fitzgerald, seconded by Johnson to approve the 05/15/25 Monitoring/Water Quality Improvements Committee Meeting Minutes. Motion passed with a unanimous vote.

5. Old Business

a. Discussion of the 2026 DRWW Monitoring Plan

Niedzinski provided an overview of the previous meetings discussion of the 2026 DRWW Monitoring Plan and highlighted the updates to the document. The Monitoring Committee indicated that a copy of the monitoring requirements for the Municipal Separate Storm Sewer System (MS4) Permit should be included. Niedzinski asked if a copy of the Publicly Owned Treatment Works (POTW) requirements should be included. Waters stated that the POTW permit are up for renewal this year and the monitoring requirements may change so to not include them into the monitoring plan. Bland suggested adding bi-monthly sampling with stormwater sampling for nutrients, sediment, and chlorophyll-a. Niedzinski asked for the purpose of this increased monitoring, Bland responded that this would be for incorporation into the NARP model. Fitzgerald had a correction on the chlorophyll-a monitoring, LCHD monitors 18 sites. The Monitoring Committee agreed that further review of the document is needed before approval.

6. New Business

a. *Approval of Geosyntec's Response to Address Dr. Burkholder's Comments to the DRWW Nutrient Assessment Reduction Plan (NARP)

Geosyntec provided to the Committee the final version of Geosyntec's Response to Address Dr. Burkholder's Comments to the DRWW. Adrienne Nemura, Geosyntec, was present virtually to answer any questions. Geosyntec incorporated comments received from the Committee until May 30, 2025. Fitzgerald had a correction on page 24 the date reads September 22, 2025 which should be corrected to September 22, 2020.

* = DRWW Action Item

Bland provided an overview of his comments on Geosyntec's response and criticized their response that Dr. Burkholder does not have the local knowledge to assess the NARP. Bland stated that Dr. Burkholder has experience, as she has substantial credentials, teaches water quality modeling assessments and has a well-developed Curriculum Vitae in water quality modeling and water science. Bland conceded that the Nutrient Science Advisory Committee (NSAC) did not find a linear relationship for total phosphorus, however a lot of the data was drawn from outside Illinois due to the lack of water quality data in Illinois at the time. Bland stated that his memo is available for the rest of the committee to read. Johnson agrees with Bland's comments. Waters responded that Geosyntec was contracted to respond to comments received on their work on the DRWW NARP, and that the DRWW is required to respond to the Illinois EPA.

Nemura, Geosyntec, provided additional information on the phosphorus in stream reaches. Ohio is going through a similar process that Illinois is going through. It was found that a "one size fits all" approach does not work within certain portions. Areas that do show a linear relationship in stream reaches that have been denuded of vegetation and low flow, that with levels of 0.1 mg/L of phosphorus algae is increased. Dr. Burkholder's presumptions work if light, flow and other factors are ignored. The other factor is to monitor and to have an adaptive monitoring strategy.

Fitzgerald motioned to approve Geosyntec's Response to Address Dr. Burkholder's Comments to the DRWW NARP, with the amended date on page 24 from September 22, 2025 to September 22, 2020, to submit to the Illinois EPA. Bland seconded the motion. Motion passed with a unanimous vote.

b. *Approval of the DRWW Response to Sierra Club Comments to the DRWW NARP

The Monitoring Committee reviewed DRWW Response to Sierra Club Comments to the DRWW NARP. There were several definitions that need to be cleared up concerning target levels and a suggestion to include a statement that Dr. Burkholder's comments were received after the public comment period and were unable to be incorporated into the final document. The Committee agreed that more time was needed to review the document to provide comments and edits. Johnson motioned to table the approval of the DRWW Response to Sierra Club Comments to the DRWW NARP until next month, seconded by Fitzgerald. Motion passed with a unanimous vote.

c. *Recommendation to Approve Geosyntec Consultants Contract Amendment #1

Niedzinski provided an overview of Geosyntec Consultants Contract Amendment #1, which is a compensation increase request. To complete the Professional Services Agreement tasks. Bland motioned to recommend to the Executive Board to approve Geosyntec Consultants Contract Amendment #1, seconded by Fitzgerald. Motion passed with a unanimous vote.

d. LCHD Monitoring Update – May Sampling

Fitzgerald provided an update on LCHD's May sampling efforts. All sites sampled with no issues in the field. There was a slight discrepancy between the duplicates for the total suspended solids which were outside the ranges.

7. Member Comments

Bodden, expressed frustration at the excessive time and funds that have been invested into the DRWW NARP. And that one and a half years after submittal of the report the DRWW is still spending membership dues, which are mostly derived from tax-payer funds, in responding to a document whose obligation has been fulfilled, because certain groups were dissatisfied with the result the consultant received. The DRWW developed the NARP with intentions to preserve water quality.

Niedzinski, provided an update on the Pollution Prevention Workshop that DRWW sponsored. 188 participants attended in-person and virtually, with 48 of the participants representing 32 DRWW member agencies.

8. Next Meeting(s)

a. Monitoring/Water Quality Improvements Committee Meeting July 17, 2025 at 12:30pm (LCDOT Conference Room A)

9. Adjournment

Motion by Fitzgerald, seconded by Johnson to adjourn. Motion passed with unanimous vote. Waters adjourned the meeting at 1:17pm.

MEMO

From: J.K. Bland, Director EPS Inc

To: Brant Fleming Illinois Environmental Protection Agency

CC: DesPlaines River Watershed Workgroup, Chris Johnston (Sierra Club)

Concerning: Review of Geosyntec NARP

Date: May 30,2025

The following is a response to a draft memorandum prepared by Geosyntec concerning the review documents prepared by Dr. JoAnn Burkholder for the Nutrient Assessment Reduction Plan (NARP) prepared by Geosyntec. The Geosyntec response is over 40 pages in length and thus I will not do a point-by-point rejoinder to their memorandum. My review comments and those of Dr. Burkholder are presented in blue type, Geosyntec in green, and independent technical data in black.

Response to Geosyntec Draft Memorandum on the Nutrient Assessment Reduction Plan for the Upper DesPlaines River Watershed

I. Geosyntec Critique General

Geosyntec claims that Dr. Burkholder's opinions are not well informed because of

- a. A lack of local knowledge
- b. A lack of expertise in watershed and water quality modeling for riverine systems
- c. A predetermined target for total phosphorus based on studies outside of Illinois

Dr. Burkholder's curriculum vitae is 40 pages long. Dr. Burkholder has done work all over the country and internationally. She is one of the most decorated aquatic biologists in the United States including awards for "...lifetime achievement for leadership in research to advance water quality protection". The claim that she would be unable to interpret regional water quality data is specious and lacks credibility. Her work, education and testimony have been done in Michigan, Iowa, Illinois, Minnesota, Oregon, North and South Carolina, Georgia, Florida, Alabama, California and internationally. She has also done at least one technical paper on biogeographical biases impacting water quality interpretation.

Per Dr. Burkholder :

*I have taught evaluation of model performance based on performance indices, underlying assumptions used, and available data for the specific system being modeled (the latter, with emphasis on upstream boundary conditions and their influence on downstream stations).
c) I have formally evaluated the construction and use of watershed and/or water quality models, including those used in the draft NARP, for various U.S. rivers in the Pacific Northwest, the West, the Midwest, New England, and the Southeast. Analyses have included assessment of the quality and appropriate/inappropriate selection of coefficient values for the specific systems being modeled*

Geosyntec has responded to these credentials by saying it is not like actually doing modeling.

Substantial portions of her technical work (over 30 papers) have dealt with the physiology of algal populations and the physical response to nutrient drivers. This includes the dynamics (physical and chemical drivers) of watershed contributions which get incorporated into modeling. It's my understanding that algae of a specific taxa might respond to phosphorus and nitrogen in the same way no matter which state it resides in (cf. *Algal*

Indicators in Streams: A Review of Their Application in Water Quality Management of Nutrient Pollution). While water quality modeling is a unique specialty it is still dependent on a secure database and defensible monitoring. USEPA guidance on pollution load estimation exists but were not alluded to by Geosyntec for the NARP (cf. *Pollutant Load Estimation for Water Quality Monitoring Projects; Technotes 8;*).

II. Interpretation of NSAC Recommendations for Illinois Streams

The following is a major study in Illinois that substantiates algal and nutrient concentrations suggested by Dr. Burkholder.

Non-Wadable

According to Geosyntec, the Nutrient Science Advisory Committee NSAC did not find a linear relationship for total phosphorus (TP) at the target of .1 to .15 mg/L. Thats true, they found a “useful” non-linear relationship....According to NSAC:

Across all stream sizes, bivariate relationships among stressors (TN or TP) and response variables had very low predictive power, even in the few instances where a relationship was supported statistically. In general, the data were too variable to derive defensible numeric criteria from empirical stressor-response relationships.

In order to do their analysis NSAC sought to do a stressor /response analysis. To establish those relationships they limited data to a seasonal time period, organized data by modified Ecoregions, and distinguished wadable and non-wadable streams. Thus in the same document they state:

Analyses indicated the presence of a potentially useful non-linear relationship between water column (sestonic) chlorophyll-a and TP in the non-wadeable streams and rivers at a statewide scale. Because Illinois does not currently have a numeric criterion for water column chlorophyll-a in streams and rivers, and none could be identified from analysis of Illinois EPA data, an alternative set of candidate water column chlorophyll-a criteria were compiled from literature and agency reports. The potential criteria for acceptable water column chlorophyll-a were 17, 25, and 35 µg/L. For each of these values, sensitivity was set at 75, 80, 85, 90, and 95% and the corresponding TP values were determined via ROC. The total phosphorus values are presented below for the three water column chlorophyll-a targets and the five sensitivity values.

Table ES.1			
Water column chlorophyll-a target:			
17 µg/L 25 µg/L 35 µg/L			
Sensitivity:	17ug/L	25 ug/L	35 ug/L
75 %	148 µg/L total P	153 µg/L total P	154 µg/L total P
80 %	136 µg/L total P	140 µg/L total P	137 µg/L total P
85 %	123 µg/L total P	129 µg/L total P	124 µg/L total P
90 %	107 µg/L total P	115 µg/L total P	108 µg/L total P
95 %	84 µg/L total P	96 µg/L total P	87 µg/L total P

There is strong evidence within the data from Illinois EPA that exceeding these TP values is not, by itself, a reliable predictor of exceeding the chlorophyll-a target. NSAC recommends that for non-wadeable streams and rivers, both TP and water column

chlorophyll-a be considered in an integrated eutrophication water quality standard (sometimes referred to as a ‘combined criterion’ approach) in which an exceedance of total phosphorus alone would not result in waterbody being deemed impaired by eutrophication.

Wadable Streams

To derive numeric criteria for wadeable streams, NSAC compiled lines of evidence from the peer-reviewed literature, U.S. EPA guidance documents, and statistical distributions of Illinois EPA data. Data from Illinois were weighted more heavily than other sources.

Total P and Total N values based on the NSAC analysis for the North Ecoregion were 113 ug/L Total P and 3979 ug/L Total N. They noted that benthic chlorophyll a values were probably a better measure of eutrophication than sestonic chlorophyll a for wadable streams. In both cases there was not well-developed data in Illinois.

NSAC recommends integrating causal and response variables in a eutrophication water quality standard (sometimes referred to as a ‘combined criterion’ approach). For wadeable streams, the numeric nutrient criteria identified in Table ES.3 preferably would be combined with criteria on benthic chlorophyll-a. Because benthic chlorophyll-a data were not available from Illinois, NSAC compiled data from Indiana, Iowa, and Ohio and used these lines of evidence to derive recommendations for Illinois.

III. Inadequate Data and Interpolation

At the outset of the DRWW NARP review I was unaware of the nutrient monitoring detail for the Upper DesPlaines. Substantial portions of Dr. Burkholder’s review relate to the lack of monitoring data to support the claims of the modeling. Descriptions by Dr. Burkholder of what the monitoring program should look like agree closely with USEPA guidance and my personal experience.

Per Dr. Burkholder:

Characterization of water quality conditions requires sampling an average flow year, a dry year, and a wet year, thus at least three years. It usually takes at least five years to capture those conditions. As resource managers usually want to track changes over time, statistical trend analysis is needed, and that requires at least seven years of data (see Lettenmaier et al. 1982, Smith et al.

Technical Note Number 8 summarizes USEPA guidance concerning pollutant load estimation for nonpoint source monitoring. It makes substantial distinction between monthly, weekly and daily monitoring. It specifically addresses issues of variability and addresses how many samples to take and when to take them to account for load variability...” sampling frequency has a major influence on the accuracy of load estimation”

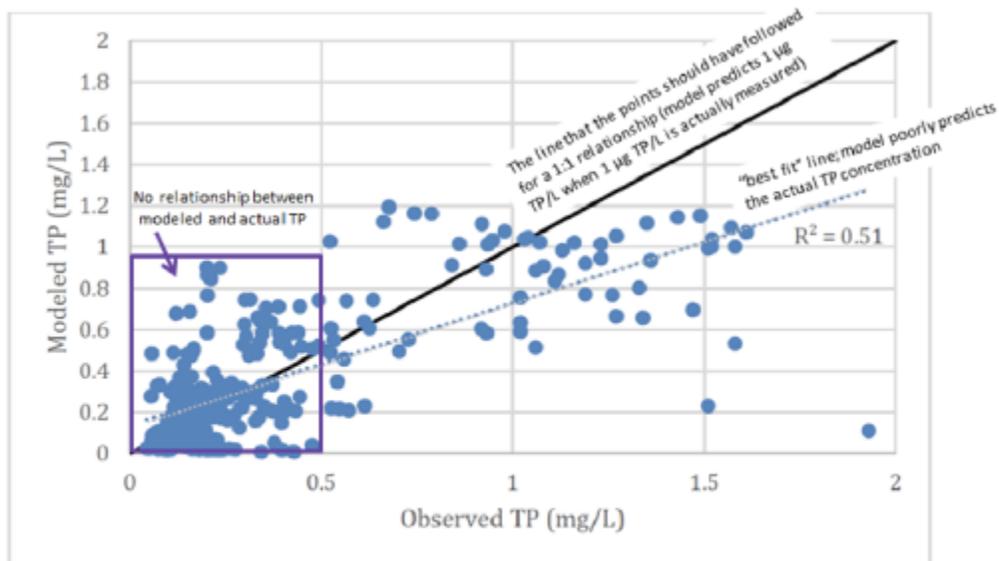


Figure 2. Overall modeled stream TP concentrations versus actual data, showing **no correlation at all** between modeled versus actual concentrations in the critical concentration range (≤ 0.45 mg TP/L). Geosyntec’s model, in simple terms, does not work. It is completely unreliable in predicting TP concentrations in that range, and not very good at predicting TP concentrations above 0.5 mg/L either—note how poorly the dots approximate a straight line, which would indicate strong predictive capability.

Fig. 2 (as presented in Burkholder NARP evaluation) is a comparison of the relationship between modeled Total P and Observed Total P. The line demonstrating a perfect 1:1 fit is charted and compared to the “modeled” best fit. An “acceptable” R-squared value is subjective and depends heavily on the field of study, the research question, and the specific goals of the analysis. Generally, R-squared values can range from 0 to 1, where 0 indicates the model explains none of the data’s variability and 1 indicates a perfect fit. Doing an AI inquiry for R squared in water quality assessment:

- **0.7 to 0.9:** Indicates a good fit, meaning the model explains a considerable amount of the variation in the water quality data.
- **Above 0.9:** May suggest overfitting, where the model is fitting noise rather than the underlying relationship.
- **Below 0.7:** Might indicate a weaker relationship between the variables, and the model may not accurately predict water quality.

Many of the other Geosyntec comments relate back to calibration. Dr. Burkholder’s comments point out that the calibration process will be dependent on a successful relationship between modeled and measured Total P. Given the $.5$ R squared calls into question the validity of the calibration process.

IV. Fluorimetry and Chlorophyll a Concentrations

*Per Dr. Burkholder: Geosyntec used mostly provisional USGS data that (following USGS 2014, 2022) had been inadequately “converted” from relative fluorescence units (RFUs) to actual concentration units ($\mu\text{g/L}$). RFU data are a relative, semi-quantitative measure that includes pheopigments (chlorophyll breakdown substances from dead algae). Estimation of *chl a* concentrations from total chlorophyll in RFU requires calibration for each date/location by “dedicated field sampling, at the same time, for actual *chl a* concentrations from analysis*

using standardized laboratory methods" (Reed et al. 2010, p.4). As stated by the USGS (2014), chlorophyll sensor data in RFUs:

Geosyntec response to Dr. Burkholder's critique is essentially "fluorimetry values for chlorophyll a without site specific chemical validation is OK". The argument is that fluorimetry involves probe calibration with chemicals that emulate chlorophyll a concentration "generically"and that is sufficient.

Dr. Burkholder identified multiple site-specific variables that can modify the probe response, and she cross referenced USGS protocols that call for site specific corroboration with chemical chlorophyll a analysis. As we are currently working with YSI fluorimeter we have identified the RFU units as "provisional" until we can get corroboration with chemical analysis. This significantly impacts the NARP process as it directly affects evaluation of stream eutrophication.

V. Predetermined Target for Total Phosphorus

According to Geosyntec": Dr. Burkholder recommends a predetermined total phosphorus (TP) target of 0.1 to 0.15 milligrams per liter (mg/L) or below for the Upper DesPlaines River. This target is based on several non-Illinois-specific studies that determined a linear relationship between TP and sestonic algae. However, research conducted by the Illinois Nutrient Science Advisory Committee did not find such a linear relationship, even at low TP concentrations (NSAC, 2018). The Royer et al. 2008 study, cited by Dr. Burkholder for relationship between TP and algae, demonstrated that relationship for a limited number of qualified sites which did not include the sites from Upper DesPlaines River (See detailed response to Comment VIII).

The title of Royer's paper is:

Assessment of Chlorophyll-a as a Criterion for Establishing Nutrient Standards in the Streams and Rivers of Illinois. Royer et.al. looked at over 100 stream and river surveys statewide in Illinois. The purpose of the study was to determine the '...applicability of chl-a as a criterion for establishing nutrient standards for Illinois. According to Royer : "Results suggest sestonic chl-a may be an appropriate criterion for the larger rivers in Illinois but is inappropriate for small rivers and streams." Additionally... During low discharge there was a significant correlation between sestonic chl-a and total P for those sites that had canopy cover $\leq 25\%$ and total P of $\leq 0.2 \text{ mg L}^{-1}$.

We should remember that total P is measured by doing a digestion of the water sample. The digestion is intended to break down particulate material including algae and render all forms of P as soluble. While Royer did not do the Upper DesPlaines he did do multiple streams in northeastern Illinois within the boundary of the same ecoregion as the DesPlaines. Royer's work reinforces the relationships found by NSAC.

Both Illinois and Wisconsin used ecoregion data to organize their in-stream criteria analysis. Wisconsin used the USEPA level III ecoregions and phosphorus zones defined based on information from 240 streams. For statewide criteria development they [Wisconsin] determined that geographic regions were not warranted. Rather they used USGS statistical techniques and analyzed data from wadeable and non-wadeable streams and rivers. For non-wadable streams they determined a breakpoint of 0.064 mg/L total phosphorus (r squared =0.79) and for wadeable streams a breakpoint of 0.07 mg/L total phosphorus. The Spearman's correlation coefficient between total phosphorus and

and suspended chlorophyll a was 0.89 indicating a strong correlation. These data fall well within the values suggested by Dr. Burkholder.

VI. Conclusion

We believe we have addressed the three main claims of Geosyntec concerning Dr. Burkholder's review.