



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
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ATLANTA, GEORGIA 30303-8960

APR 03 2014

Ms. Kathy Stecker
Supervisor, Modeling and Assessment Branch
Division of Water Resources
North Carolina Department of Environment
and Natural Resources
1617 Mail Service Center
Raleigh, North Carolina 27699-1617

Dear Ms. Stecker:

The U.S. Environmental Protection Agency has completed its review of the Addendum to the Jordan Lake Total Maximum Daily Load (TMDL) for High pH and Turbidity located in the Cape Fear Basin, North Carolina, that was submitted to the EPA on March 6, 2014. Based upon our review, we have determined that the statutory requirements of the Clean Water Act, Section 303(d) have been met and hereby approve this TMDL.

The enclosed Decision Document summarizes the elements of the review which were found to support the EPA's approval of the TMDL. If you have any questions or comments, please feel free to contact Mrs. Alya Singh-White of my staff at (404) 562-9339.

Sincerely,

A handwritten signature in blue ink, appearing to read "J. Giattina".

James D. Giattina
Director
Water Protection Division

Enclosure

TMDL Review Checklist

Final TMDL

TMDL Document Name: Addendum to B. Everett Jordan Reservoir TMDL for High pH and Turbidity Impairments	County/State: Alamance, Orange and Chatham Counties, North Carolina
Reviewer: Alya Singh-White	HUC: 030300020300, 030300020500 and 030300020600
Date of Submittal: March 6, 2014	Use Classification: NSW – Nutrient Sensitive Waters
Pollutant(s): Total Phosphorus and Total Nitrogen	ESA / EJ Issues? No
Type of TMDL(Point / Nonpoint /Both): Both	
Waters Addressed By TMDL:	

Waterbody	Assessment Unit (AU)	Impairments
Haw River	16-(37.3), 16-(37.5)a, 16-(37.5)b	pH and Turbidity
Morgan Creek	16-41-2-(9.5)	pH and Turbidity
New Hope Creek	16-41-1-(14)	Turbidity

Additional National TMDL Tracking System Entry Parameters

TMDL doc ID: to be created	EPA Developed? No	TMDL Target: The TMDL target was based on the NC freshwater quality criteria for pH, turbidity and chlorophyll-a in Class C waters.
303(d) List ID: (See Above)	Lead State: NC	
303(d) List Cycle (Yr): 2012	Pollutant ID: 511 & 515	

Impacted PCS NPDES Permit IDs:

Below are the permit IDs listed in the 2007 Jordan Lake TMDL for chlorophyll-a.

NC0047597, NC0025241, NC0026051, NC0056413, NC0051314, NC0043257, NC0042803, NC007446, NC0048429, NC0025305, NC0081591, NC0082210, NC0084093, NC0086827, NC0047384, NC0024325, NC0023868, NC0023876, NC0024881, NC0021211, NC0021474, NC0020354, NC0066966, NC0022691, NC0022675, NC0042285, NC0046043, NC0077968, NC0042528, NC0038156, NC0073571, NC0035866, NC0029726, NC0065412, NC0046809, NC0060259, NC0031607, NC0046019, NC0045161, NC0045144, NC0038172, NC0022098, NC0045152, NC0055271, NC0038164, NC0036994, NC0066010, NC0045128, NC0003671, NC0071463, NC0003913, NC0001210, NC0001384, NC0048241, NCS000248, NCS000401A, NCS000402, NCS000403, NCS000404, NCS000405, NCS000408, NCS000428, NCS000463, NCS000477, NCS000483, NCS000508, NCS000446, NCS000250, NCS000427, NCS000433A, NCS000249, NCS000414, NCS000450, NCS000465

Impacted Non-PCS Permit IDs:

None.

TMDL Review Checklist

Review Element	Required	Included (<i>check if yes</i>)
Submittal Letter	Yes	X
Scope of TMDL	Yes	X
Applicable Water Quality Standards and Numeric Targets*	Yes	X
Loading Capacity*	Yes	X
Wasteload Allocations (WLAs)*	Yes	X
Load Allocations (LAs)*	Yes	X
Margin of Safety (MOS)*	Yes	X
Seasonal Variation*	Yes	X
Public Participation	Yes	X
Other Considerations	As necessary	X
Recommended Action	APPROVAL	X

*These elements are required by statute and implementing regulations.

TMDL Review Checklist Supporting Rationale and Comments

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 CFR §130 describe the statutory and regulatory requirements for approvable TMDLs. The following information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under §303(d) and EPA regulations. When the information listed below uses the verb "must" or "require," this denotes information that is needed by EPA to review elements of the TMDL required by the CWA and by regulation.

Submittal Letter

Considerations:

- 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 §303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute.

Conclusions:

This final TMDL document was received by EPA for review and approval by email on March 6, 2014 and signed by Kathy Stecker, Modeling and Assessment Branch Supervisor.

Considerations:

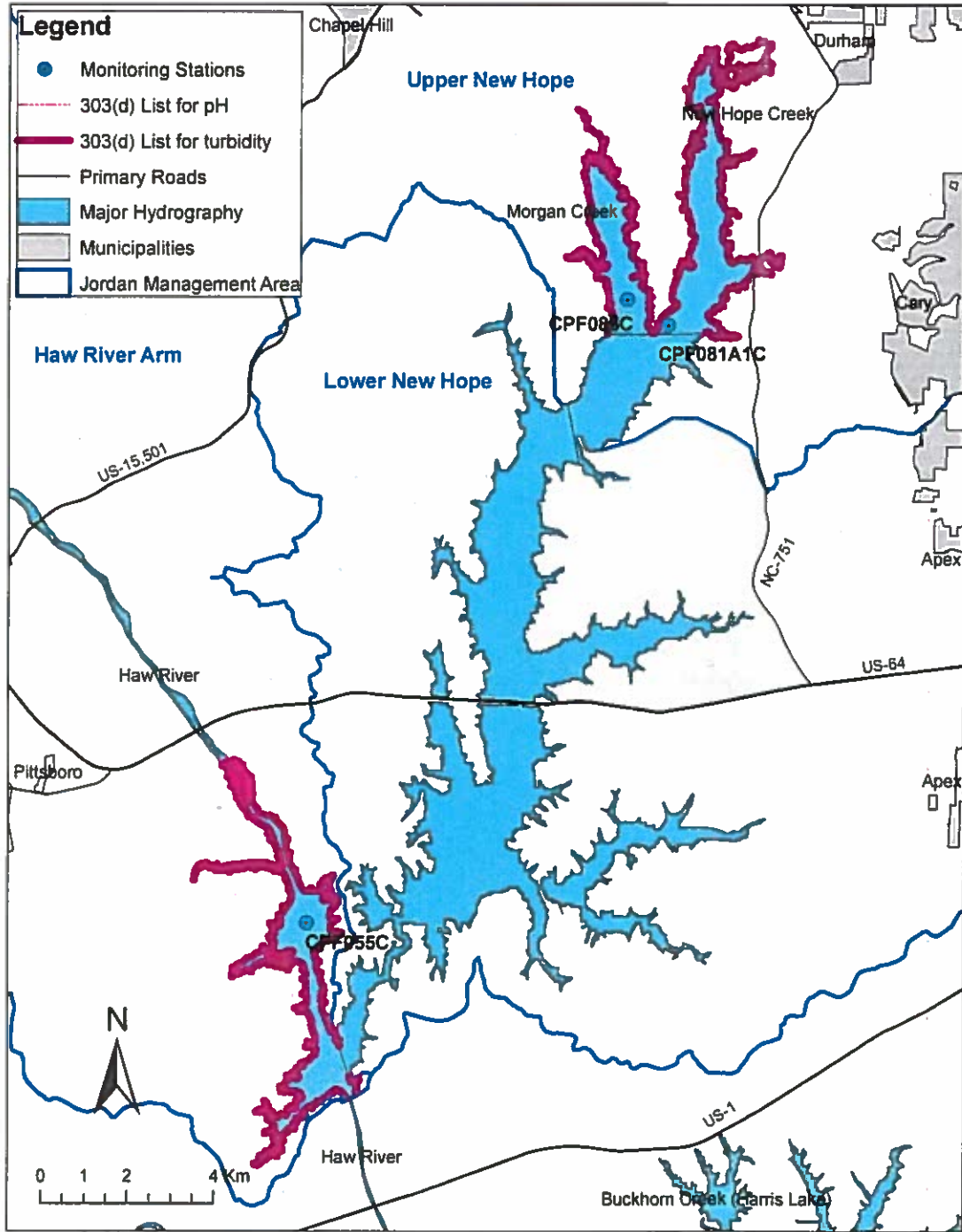
- The TMDL should describe the waterbody as it is identified on the State/Tribe's §303(d) list, the pollutant(s) of concern, and the applicable water quality criteria that led to impairment listing. The waters addressed by the TMDL must be identified and consistent with the 303(d) list.
- The TMDL should include a statistical evaluation of all readily available data that was used to place the waterbody on the 303(d) list.
- The TMDL submittal must include a description of the point, nonpoint, and natural background (where possible) sources of the pollutant of concern. Such 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 factors, such as: (1) the assumed distribution of land use in the watershed; (2) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation, as applicable; and (3) present and future growth trends, if this is a factor that was taken into consideration in preparing the TMDL.

Conclusions:

Waterbody IDs (WBID) 16-(37.3), 16-(37.5)a, 16-(37.5)b, 16-41-2-(9.5) and 16-41-1-(14) are listed as impaired for chlorophyll-a on the State's 2012 §303(d) list. Depth profiles of pH and photic zone data of turbidity and chlorophyll a were obtained at three stations in the watershed. The data used are from 1990 through August 2013, which covers the baseline period of 1997 to 2001 in the original Jordan Lake TMDL.

Sources include both point (NCDOT MS4) and nonpoint sources and are outlined in the 2007 Jordan Lake TMDL. There are no additional sources mentioned in the addendum to the TMDL.

Map of Jordan Lake showing the 3 lake segments and impairment



Considerations:

- EPA regulations define loading capacity as the greatest amount of loading that a water can receive without violating water quality standards [40 CFR §130.2(f)]. The loadings are required to be expressed as either mass-per-time, toxicity or other appropriate measure [40 CFR § 130.2(i)]. The TMDL submittal must identify the waterbody's loading capacity for the applicable pollutant. To the degree it is known, it should also describe the cause and effect relationship between the identified pollutant sources, the numeric target (narrative target if appropriate), and achievement of water quality standards.
- Supporting documentation for the TMDL analysis must also be contained in the submittal. This should include a description of the analytical process used, results from water quality modeling, assumptions, etc. The TMDL submittal should also contain a description of other important factors, such as an explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable.
- Critical conditions must be considered as part of the analysis of loading capacity [40 CFR § 130.7(c)(1)]. Critical conditions are the combination of environmental factors (e.g., flow, temperature, etc.) that result in attaining and maintaining the water quality criterion and have an acceptably low frequency of occurrence. Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards.

Conclusions:

Tetra Tech assisted DWQ in enhancing the Jordan Reservoir model for use in TMDL development and lake management, and developing additional watershed nutrient loading analysis tools. Data from an extensive modeling study conducted by DWQ was used for additional validation testing and calibration of the Jordan Reservoir Nutrient Response Model. A spreadsheet based model was developed that combines Generalized Watershed Loading Function (GWLF) model simulation of seasonal nutrient loads coupled with a stream transport and delivery model that can estimate both the point and nonpoint source component nutrient delivery to the lake.

Nutrient controls are the most common focus of management schemes for reducing excessive algal growth and chlorophyll-a concentrations. Therefore, the Jordan Lake TMDL was written for total nitrogen (TN) and total phosphorus (TP) loads to the lake.

The daily load calculations of the TMDL are as follows:

Upper New Hope Arm	Haw River Arm	Lower New Hope Arm
TN: 175.4 lbs/day	TN: 7032.88 lbs/day	TN: 608.02 lbs/day
TP: 227 lbs/day	TP: 3985.32 lbs/day	TP: 72.81 lbs/day

This addendum addresses turbidity and high pH and discusses the intricate relationship between the two and nutrients. "The required watershed reductions specified in the Jordan Lake TMDL are expected to reduce nutrient loading as well as sediment runoff to the lake. As a result, the chlorophyll a standard in the lake is expected to be met after full implementation. Due to close relationships between pH and chlorophyll a at all three stations in Jordan Lake, the pH standard is expected to be met as well. High turbidity in the Morgan Creek and Upper New Hope arms of the lake is at least partially caused by in-situ algal growth. High turbidity in the lower portion of Jordan Lake below the conjunction of Haw River is closely associated with runoff and phosphorus. As sediment and phosphorus runoff, and in-situ algal growth are reduced, the turbidity standard in Jordan Lake is expected to be met."

Seasonality was considered in determining the critical conditions. The years on which the model is developed are somewhat biased toward drier conditions, which tend to promote algal growth by increasing residence time. The TMDL is based on an annual LA necessary to achieve the chlorophyll-a target during the critical conditions, which are determined to be May through September.

Considerations:

- EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to existing and future point sources [40 CFR §130.2(h)].
- Wasteload allocations must be assigned to each point source discharging the pollutant of concern [40 CFR 130.2(i)]. WLAs can be expressed as lumped or aggregate allocations if appropriate.
- If no point sources are present or if the TMDL recommends a zero WLA for point sources, the WLA must be expressed as zero.
- The wasteload allocations should be sufficient, in consideration of nonpoint source loads, to ensure that the point sources will not cause or contribute to excursions of water quality standards [40 CFR §122.44(d)(1)].

Conclusions:

The table below provides the total poundage of nitrogen and phosphorous that continuous point sources may contribute. This loading is the load delivered to the lake, versus the load generated at the wastewater treatment facility. The load generated at the wastewater treatment facility naturally attenuates and a reduced load is delivered to Jordan Lake. Non-nutrient bearing loads are not included in the allocations.

	% Point Source Load	WLA (lbs/yr)	TMDL Reduction
Upper New Hope Arm			
Total Nitrogen	52%	336,079	35%
Total Phosphorus	28%	23,106	5%
Lower New Hope Arm			
Total Nitrogen	3%	6,836	0%
Total Phosphorus	2%	498	0%
HaW River Arm			
Total Nitrogen	35%	895,127	8%
Total Phosphorus	29%	106,001	5%

**From the 2007 Jordan Lake TMDL

Load Allocations (LAs)

Considerations:

- EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity allocated to existing and future nonpoint sources and to natural background [40 CFR §130.2(g)]. Load allocations may range from reasonably accurate estimates to gross allotments [40 CFR §130.2(g)]. Where it is possible to separate natural background from nonpoint sources, load allocations should be described separately for background and for nonpoint sources.
- If the TMDL concludes that there are no nonpoint sources and/or natural background, or the TMDL recommends a zero load allocation, the LA must be expressed as zero.

Conclusions:

The load allocations for Jordan Lake is in the table below.

	LA (lbs/yr)	TMDL Reduction
Upper New Hope Arm		
Total Nitrogen	304,942	35%
Total Phosphorus	59,777	5%
Lower New Hope Arm		
Total Nitrogen	215,093	0%
Total Phosphorus	26,076	0%
HaW River Arm		
Total Nitrogen	1,671,873	8%
Total Phosphorus	253,640	5%

**From the 2007 Jordan Lake TMDL

Margin of Safety (MOS)

Considerations:

- The statute and regulations require that a TMDL include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality [CWA §303(d)(1)(C), 40 CFR § 130.7(c)(1)]. EPA 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.

Conclusions:

The TMDL incorporates an explicit MOS used to account for uncertainty in the relationship between pollutant loads and receiving water quality. The MOS was incorporated by reducing the maximum chlorophyll-a exceedances from 10% to 8% when evaluating nutrient load reduction scenarios.

Seasonal Variation

Considerations:

- The statute and regulations require that a TMDL be established with consideration of seasonal variations. The method chosen for considering seasonal variations in the TMDL must be described [CWA §303(d)(1)(C), 40 CFR §130.7(c)(1)].

Conclusions:

The variability in this TMDL is accounted for by the use of a continuous flow gage and the use of all water quality data collected in the watershed, which includes data collected from all seasons.

Public Participation

Considerations:

- EPA regulations require public review [40 CFR §130.7(c)(1)(ii), 40 CFR §25] consistent with State or Tribe's own continuing planning process and public participation requirements. In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval must describe the State/Tribe's public participation process, including a summary of significant comments and the State/Tribe's responses to those comments.

Conclusions:

The addendum to the TMDL was made available to the public for review and comment on April 1, 2007. The TMDL addendum was made available to the public for review and comment on January 16, 2014. Copies of comments received and response to those comments are included in the submittal package. All comments were appropriately addressed by NCDENR.

Other Considerations

Considerations:

- This section may be needed in the TMDL review in order to describe unique factors or information specific to the TMDL under review, which help explain the basis for EPA's decision.

Conclusions:

None.

Final Recommendation/Comments

The Pollution Control and Implementation Branch recommends that the TMDL be APPROVED.