Missouri Department of Natural Resources

DRAFT STINSON CREEK TMDL PUBLIC COMMENTS

Public Notice
September 28, 2009 – October 28, 2009

Stinson Creek
WBID # 0710

Callaway County, Mo.

Missouri Department of Natural Resources
Water Protection Program
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MPUA
Missouri Public Utility Alliance

November 10, 2009

Mr. John Hoke
Department of Natural Resources
Water Protection Program
Water Quality Monitoring and Assessment Section
P.O. Box 176
Jefferson City, MO 65102

Re: Draft Stinson Creek Total Maximum Daily Load Report

Dear Mr. Hoke:

The Missouri Public Utility Alliance (MPUA) and Geosyntec Consultants (commonly known as MEC Water Resources and hereafter referred to as Geosyntec) appreciate the opportunity to submit comments regarding the issuance of draft permits for our member municipalities. MPUA serves over 120 municipal utilities in Missouri, representing over 1.2 million ratepayers. This comment letter addresses concerns we have regarding development of the draft Stinson Creek Total Maximum Daily Load (TMDL) report and its impacts on the City of Fulton's (City) Wastewater Treatment Facility (WWTF) and municipal separate storm sewer system (MS4) permits.

The TMDL seeks to place extremely stringent limits on the City's WWTF and MS4 based on limited demonstration of cause and effect and a limited dataset. It seems the uncertainty associated with the TMDL effort significantly outweighs the implications represented by proposed wasteload allocations (WLAs). MPUA and Geosyntec have reviewed the TMDL. We request that the Department of Natural Resources (Department) consider the following specific comments before formulating the final TMDL for Stinson Creek.

1. ***Water quality data and sampling protocols are not representative for developing appropriate wasteload allocations.*** The purpose of a dissolved oxygen (DO) TMDL is to determine the maximum pollutant loading which protects water quality standards under critical stream conditions. In Missouri, DO is typically lowest during summer low-flow conditions when water temperatures are greatest. These summer low-flow conditions are usually considered the critical conditions for DO attainment. Because TMDL DO models are intended to reflect critical flows, data used to calibrate the model should be collected under similar conditions[1]. Generally, stream surveys should not be

[1] U.S. Environmental Protection Agency (EPA). 1986a. Stream Sampling for Waste Load Allocation Applications. Office of Research and Development, Washington, DC. EPA/625/6-86/013.

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made when significant precipitation has recently occurred as these data can result in poor model calibrations[2].

The United States Environmental Protection Agency (EPA) contractors collected two sets of data for the TMDL modeling analysis. The first data set was collected May 20, 2008 and the second on September 10, 2008. MPUA and Geosyntec note that significant rainfall events which occurred in the three weeks prior to each of the surveys. Between May 1 and May 20, 4.21 inches of rainfall was measured in Fulton and in September (August 22 to September 10) 5.46 inches were measured[3]. These rainfall totals are corroborated by higher than expected stream discharge measurements reported in TMDL Tables 5 and 6 and accompanying spreadsheets. Furthermore, potential water quality impacts from nonpoint sources during the May sampling event were noted by the EPA contractors. We are concerned that rainfall and runoff from nearby agricultural areas may have had considerable impacts on Stinson Creek's water quality and may not adequate for developing a low-flow DO model.

The sampling approach employed during the May 20, 2008 survey generally featured collection of a single grab sample collected in the afternoon at six (6) locations. This approach significantly deviates from the MDNR's Wasteload Allocation Project Procedure document that specifies two (2) surveys, each survey consisting of four (4) samples per site; two (2) in the morning and two (2) in the afternoon. It is questionable if the sampling data used to calibrate the Stinson Creek model are representative or adequately capture the central tendency behavior of the modeled system.

In addition, we note that all available datasets were not used to calibrate and/or verify model predictions. Unless documented data quality criteria were violated, MPUA and Geosyntec request that September 2008 data be used to verify the model. In general, we are disappointed that such a limited data collection and modeling effort is being used to justify a significant reduction in effluent limits and large capital investments.

2. ***Model calibration, parameterization, and allocation approaches should be refined.*** MPUA and Geosyntec note the following concerns regarding calibration, parameterization, and allocation processes using the Qual2K model:

    - <u>Source and magnitude of sestonic chlorophyll-a (Chl-a) is unclear</u> – MPUA and Geosyntec note that a blind duplicate Chl-a sample collected at site ST6 in May 2008 was reported as 4 ug/L. The sample Chl-a value for ST6 included in the TMDL (Table 5) and within the data spreadsheet is 299 ug/L. MPUA and Geosyntec suggest that this discrepancy be explained and appropriate corrective action initiated.

      In addition, the source of the high Chl-a values is not clear. The City operates a 2.9 MGD oxidation ditch treatment facility, which should not produce algal biomass due to the biologic community used in this activated sludge process. Additionally, it is unclear why an effluent Chl-a concentration of 300 ug/L was assumed in the model but effluent Chl-a values were not reported in Tables 5 and 6 of the TMDL. The rapid increase in algal biomass within the relatively short travel times to ST-4 (first sampling station downstream of Fulton WWTP) suggests algal sources other than growth attributed to nutrient loading from the wastewater discharge. Given that water quality data used to calibrate the model were collected under elevated flow conditions (see discussion of

[2] MDNR. 2003. Project Procedure for Wasteload Allocation/Special Stream Studies. Environmental Services Program. Jefferson City, MO.

[3] Precipitation data measured at Fulton weather station #233079. Retrieved from Midwest Regional Climate Center 11/6/09.

rainfall in Item 1), MPUA and Geosyntec are concerned that high Chl-a (and nutrient) values may have resulted from drainage from nearby agricultural areas and not the City's effluent.

- Dissolved oxygen calibration does not adequately capture diel variability in Stinson Creek - The Qual2K model calibration did not incorporate all data collected during the May 20, 2008 water quality survey. For example, a dissolved oxygen (DO) concentration of 20.1 mg/L was measured at ST6 at 13:40 on May 20, 2008. While the discrete nature of this sample limits estimation of daily minimum, average, or maximum concentration at ST6, we do know that at 13:40 concentrations reached 20.1 mg/L. Model calibration plots suggest the maximum DO concentration downstream of the Fulton WWTF never exceeds 16.7 mg/L. This discrepancy may be the result of an underestimate of benthic algal biomass in the model or longitudinal changes in reaeration rate. MPUA and Geosyntec request the Department re-calibrate the model to reflect the entire May 20, 2008 dataset.

- CBOD may not be parameterized correctly in the model – It is not clear how 'CBOD' data were used to calibrate the model. 'Fast-CBOD' in the Qual2K framework is *soluble CBOD ultimate* that is relatively labile in the water column. The point-source 'Fast-CBOD' value in the calibration model is listed as 7 mg/L. The data spreadsheet provided does not list a parameter value of 7 mg/L at the Fulton WWTF for the May 20, 2008 sampling event. Furthermore, we note that observed 'Fast-CBOD' listed in the 'WQ Data' tab used for calibration are $CBOD_5$ data values. Given the reported high level of Chl-a, it is likely that much of the CBOD reported from a BOD test is the result of algal decomposition and respiration in the BOD bottle. Both Qual2K (calculation via stoichiometry) and WASP[4] offer approaches in correcting algal –influenced bottle tests. We request the Department clarify the CBOD data assumptions and recalibrate if the assumptions are not consistent with the Qual2K framework and Users Manual.

- Effluent characterization within wasteload allocation model runs may be unrealistic – Effluent characteristics listed in the allocation model run that yield a diel minimum DO concentration of 5 mg/L in Stinson Creek may be unrealistic. For example, the effluent DO concentration of 8.4 mg/L exceeds the saturation value (~7.8 mg/L) for the simulated temperature and elevation (pressure). Even with costly and energy-intensive post-treatment aeration, it is unlikely that best available and demonstrated technology can consistently and effectively supersaturate the effluent with oxygen. Also, the wasteload allocation model includes Chl-a input from the effluent, which is not appropriate for an activated sludge process. MPUA and Geosyntec request that the Department reevaluate the model input assumptions and re-run the allocation model.

3. ***Wasteload allocations for Biochemical Oxygen Demand are not clear.*** Included within Table 10 of the draft TMDL is a 'BOD' wasteload allocation of 220 lbs/day (9 mg/L). MPUA and Geosyntec offer the following technical, regulatory, and socioeconomic comments related to BOD values referenced in the draft TMDL:

[4] Water Quality Analysis Simulation Program. See Wool et. al (2001), Version 6, page 8-9 for compensation formula.

- Nomenclature Clarification – Is the WLA for 'CBOD' in Table 10 expressed as CBOD Ultimate, BOD Ultimate, or a 5-day value? We note the Qual2K model used to develop the WLA lists a 9 mg/L value in the 'Fast-CBOD' input cell. Fast –CBOD in the Qual2K framework is soluble CBOD Ultimate that is relatively labile in the water column. The TMDL is not clear how this value is converted into a typically permitted parameter.

- Stinson Creek DO balances do not seem sensitive to $CBOD_5$. Discrete samples collected since 1991 downstream of the Fulton WWTF having DO concentrations less than 5 mg/L also feature several non-detectable $CBOD_5$ concentrations. It is not clear why the Department is seeking restrictive and potentially unachievable CBOD wasteload allocations when DO values less than 5 mg/L have historically resulted from un-measurable CBOD in the water column.

4. ***Wasteload allocations for total nutrients and total phosphorus are not supported by water quality criteria approved by the Missouri Clean Water Commission.*** Included within Table 10 of the draft TMDL are wasteload allocations of 2.25 lbs/day (0.092 mg/L) for total phosphorus and 21.56 lbs/day (0.88 mg/L) for total nitrogen. It is not clear what regulatory basis supports the prescribed nutrient WLAs. The TMDL qualitatively ties nutrients to the DO impairment; however, no quantitative analysis was performed to demonstrate that nutrient WLAs are needed to address the DO impairment. MPUA and Geosyntec also note that Stinson Creek is not identified by the Department as being impaired by unacceptably high nutrient concentrations, and that the State of Missouri has not adopted numeric (304(a)) nutrient criteria for flowing waters. As discussed later, the nutrient WLAs are beyond the limits of conventional wastewater treatment technology and represent an unachievable target for wastewater utilities.

5. ***Fulton WWTP wasteload allocations are likely unachievable and unmerited.*** Several of the wastewater treatment plant wasteload allocations may be unachievable, particularly after conversion to permit limitations. Depending upon translation of wasteload allocations to permit limitations, installation of tertiary filtration or membrane filtration may not meet the BOD and total suspended solids reduction requirements. In addition, the nutrient limitations are beyond the state of the practice. The limit of technology[5] for removing total nitrogen from a municipal effluent is likely greater than the wasteload allocation listed in Table 9. Case studies listed in EPA's nutrient removal technology document[6] do not include a case example, that we can find, that consistently meets a total nitrogen concentration comparable to the TMDL Table 10 value.

   The draft TMDL does not demonstrate that nutrient limits are necessary to meet a DO concentration of 5 mg/L. Stinson Creek is listed for a low DO impairment, not excessive nutrients. Therefore, the TMDL should demonstrate that reductions in total phosphorus and total nitrogen are necessary to achieve a DO concentration of 5 mg/L. The TMDL does not clearly provide this linkage. A sensitivity analysis using Qual2K should be performed, and documented within the TMDL, that demonstrates improvements in DO concentrations with concomitant reductions in total nitrogen and total phosphorus. Given the considerable capital outlay represented by proposed nutrient wasteload allocations, MPUA and Geosyntec believe the Department should clearly demonstrate DO benefits achieved through proposed nutrient removal requirements.

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[5] See WERF Nutrient Removal Workshop Document 05-CTS-1W. Bott et al. (2007) "How Low Can We Go & What is Stopping us From Going Lower.

[6] See Municipal Nutrient Removal Technology Reference Document (Kang et al. 2008). EPA-823-R-08.

6. ***Documentation of Control Site is unclear.*** MPUA and Geosyntec request the Department further clarify the intent and potential use of 'Control Site' data discussed in the draft TMDL. We note that summer DO concentrations within some Missouri reference streams do not achieve a 5 mg/L diel minimum. We question why control site data were not collected during the warmest months of the year (July, August) as specified in MDNR's Wasteload Allocation Project Procedure. MPUA and Geosyntec look forward to further discussing control site and reference stream issues with the Department in the near future.

7. ***Influences of physical factors may prevent attainment of the DO criterion.*** The TMDL discusses the influence of physical factors (stream morphology) that result in low reaeration rates and low DO concentrations. MPUA and Geosyntec note that several of Missouri's biocriteria reference streams fail to meet an instantaneous minimum concentration of 5 mg/L during warm-weather low-flow conditions. Given the low predicted reaeration rate in Stinson Creek, background loads of BOD may result in diel minima less than 5 mg/L. Historical low DO concentrations measured upstream of the Fulton WWTF have occurred while the water column exhibited total phosphorus, total nitrogen, and $CBOD_5$ concentrations comparable to Table 10 values. We are concerned that even if attained, Table 10 values will not result in a diel DO profile that achieves 5 mg/L at all times during all seasons.

   MPUA and Geosyntec suggest that these physical limitations should be evaluated in context of use attainability analyses, site-specific criteria, or a variance to address what may be an unattainable criterion during certain periods and flow regimes. Furthermore, the Department is currently evaluating the need for developing revised DO criteria for some of Missouri's ecoregions. The Department should reference this direction within the TMDL and state that the TMDL should be revisited if the applicable criteria change in future rulemakings.

8. ***Turbidity is not a pollutant.*** Page 20 lists turbidity as a pollutant potentially reducing DO concentration in the water column. Turbidity is not a pollutant and therefore we request that references to turbidity be removed from the TMDL. Depending on the material generating turbidity values, DO may increase or decrease, on a site-specific basis.

   Furthermore, Section 5.2 fails to provide a clear and quantitative linkage between the listed cause of impairment (organic sediment), the beneficial use, fine particle size, turbidity, and total suspended solids. We request the reference condition approach for determining TSS criteria and wasteload allocations be removed from the TMDL as no quantitative linkage between TSS, organic sediment, beneficial use, or narrative criteria violation has been demonstrated.

9. ***Continuous DO data do not indicate a significant impairment.*** Figures 5 and 7 in the TMDL suggest that DO concentrations do not fall below 5 mg/L for a significant period of time. During the May 2008 sampling event, only 23 of 610 (~4%) continuous data collected at ST-2 and ST-4 were below 5 mg/L. During the September 2008 survey, DO concentrations below 5 mg/L were not measured by either continuous or grab sampling approaches. In fact, when the continuous DO data are combined with historical data that were used to support 303(d) listing decisions, results indicate the 10th percentile of DO data are well above 5.0 mg/L and therefore not impaired based upon Missouri's 303(d) Listing Methodologies. Despite limited excursions from the DO standard, the Department is asking the City to disproportionally reduce their permit limits.

10. ***The TMDL does not establish a quantitative linkage between MS4 sources, non-point sources, and listed cause of impairment.*** Stinson Creek is listed for low DO and organic sediment based on data collected during low or baseflow conditions. The stream model (Qual2K) was calibrated and applied to predict DO concentrations during steady-state low-flows. Despite these limitations, the TMDL

stipulates wasteload allocations for nutrients and suspended solids as part of the City's MS4 permit. Discharge from MS4 sources will occur in response to rain events. To quantify the impact (if any) from MS4 discharges to Stinson Creek during runoff events, a dynamic modeling effort (WASP, HSPF) is needed. The TMDL does not document any wet-weather impairments or employ dynamic modeling techniques to simulate MS4 effects on the DO balance. In addition, the load duration curves presented in the TMDL do not provide a linkage between nutrients and DO or the aquatic life beneficial use. Therefore, the applicability of this technique is questionable at best.

Despite these technical uncertainties, the TMDL sets MS4 WLAs that translate to TSS, nitrogen, and phosphorus concentrations of < 5mg/L, 0.9 mg/L, and 0.1 mg/L, respectively. MPUA and Geosyntec believe that these WLAs developed for the City's MS4 permit are unachievable and unwarranted. Therefore, MPUA and Geosyntec strongly urge the Department to remove these wasteload allocations from the TMDL.

11. ***Adaptive management strategies should be used for Stinson Creek***. As discussed earlier, there are serious technical issues with the water quality data and modeling performed to prepare this TMDL. These issues coupled with the likely unachievable wasteload allocations justify the use of adaptive management for TMDL implementation. Additional water quality data and modeling efforts are needed to set technically defensible wasteload allocation targets. In addition, the Department is considering revisions to the DO criteria within the next few years. Therefore, we recommend that the implementation plan within the TMDL includes an adaptive management approach and reopener provisions so that the load and wasteload allocations are reevaluated within the near-term.

Given the complexity of this issue and potential ramifications, we and the City of Fulton would appreciate the opportunity to discuss this directly with the Department. As always, the Missouri Public Utility Alliance and Geosyntec Consultants appreciate the opportunity to express Missouri's municipal utility concerns to the Department.

Sincerely,

Philip K. Walsack

Philip K. Walsack

Manager of Environmental Services

cc: Bill Johnson, City of Fulton

Darrell Dunlap, City of Fulton

Trent Stober, Geosyntec Consultants

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February 4, 2010

Mr. Philip Walsack
Manager of Environmental Services
Missouri Public Utility Alliance
1808 I-70 Drive SW
Columbia, MO 65203

RE: Response to Comments on the Stinson Creek Total Maximum Daily Load

Dear Mr. Walsack:

The Missouri Department of Natural Resources (Department) appreciates the comments provided by the Missouri Public Utility Alliance (MPUA) and Geosyntec on the draft Stinson Creek Total Maximum Daily Load (TMDL). This letter responds to comments (some paraphrased here in the interest of brevity) received from MPUA and Geosyntec during the public notice period for this TMDL. Please find herein the Department's response to each comment and the location of the revision (if applicable) within the final document as it will be submitted to the U.S. Environmental Protection Agency.

Comment #1: *Water quality data and sampling protocols are not representative for developing appropriate wasteload allocations. MPUA and Geosyntec note that significant rainfall events occurred in the three weeks prior to each of these surveys. These rainfall totals are corroborated by higher than expected stream discharge measurements reported in TMDL tables 5 and 6 and accompanying spreadsheets. We are concerned that rainfall and runoff from nearby agricultural areas may have had considerable impacts on Stinson Creek's water quality. It is questionable if the sampling data used to calibrate the Stinson Creek model are representative or adequately capture the central tendency behavior of the modeled system. In addition, we note that all available datasets were not used to calibrate and/or verify model predictions. Unless documented data criteria were violated, MPUA and Geosyntec request that September 2008 data be used to verify the model.*

The Department believes the water quality data collected for the Stinson Creek TMDL are of sufficient quality and quantity to develop appropriate wasteload allocations. The stream sampling and survey guidance documents referred to in MPUA's comments were used and resulted in representative data being collected for TMDL wasteload allocation development.

While it is accurate that 4.21 inches of rainfall were measured in Fulton between May 1 and May 20, only 0.44 inches of this amount fell between May 12 and May 20, the nine days leading up to and including the sampling event. Although MPUA is concerned that the May sampling was not representative of low-flow conditions typically found during the drier summer months, data from the National Weather Service (NWS) indicates that

this amount of rainfall is below normal levels for what would be expected for the month of September in central Missouri. According to the NWS, normal rainfall in this region is 3.42 inches for the month of September[1]. This averages out to 0.11 inches per day. Therefore, 0.44 inches over the nine days preceding the sampling is well below what could be expected to normally be seen even during the driest months of the summer, and is well within the sampling guidelines for low flow conditions. Since streams in this region are notable for responding quickly to precipitation events (flashy) and are dominated by surface water inputs (as opposed to groundwater inputs), it is unlikely that Stinson Creek was experiencing high flows during low-flow conditions far removed from any significant precipitation event.

Average stream flow during the May sampling event – which was used to set hydraulic geometry relations and to calibrate the model – was 2 cubic feet per second (cfs), or 0.057 cubic meters per second (cms). This average stream flow value was obtained from flow measurements taken both upstream and downstream of the Fulton Wastewater Treatment Plant (WWTP). The downstream measurements include discharge from the WWTP of 0.084 cms. Figure C-2 of Appendix C in the TMDL shows that stream flow without the influence of the WWTP is actually very low – below 0.01 cms (or 0.353 cfs).

A review of the field data sheets shows that at site 1 (ST-1) the field personnel checked a box describing watershed features that notes "obvious sources" of "local watershed nonpoint source pollution". The Department understands this to mean that there may be potential nonpoint sources of pollution in the area that may impact water quality under high precipitation and high stream flow conditions. The Department does not believe that the field personnel intended this to mean that they were actually witnessing water quality impacts from nonpoint sources at the time of the May 2008 sampling event. It should be noted that the only place where this box was checked is upstream of the WWTP in an area noted as predominantly forested, and that at all other sampling locations the EPA contractor noted "no evidence" of potential nonpoint source pollution.

As previously noted, the Department believes the water quality data collected for the Stinson Creek TMDL are of sufficient quality and quantity to develop appropriate wasteload allocations. The data from the September 2008 sampling event were not used for model validation because the data collected at that time indicated higher precipitation than normal, high stream flow and cool temperatures, all of which violated critical conditions necessary for model validation. However, as noted in Appendix C of the TMDL, since temperatures at the time of the May sampling event were not representative of critical conditions, the calibrated model was modified using temperature data from a hot, clear day in August 2008.

Comment #2: *Model calibration, parameterization, and allocation approaches should be refined. MPUA and Geosyntec note the following concerns regarding calibration, parameterization and allocation processes using the QUAL2K model: Source and magnitude of sestonic chlorophyll-a (Chl-a) is unclear; Dissolved oxygen calibration does not adequately capture diel variability in Stinson Creek; CBOD may not be*

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[1] http://www.crh.noaa.gov/lsx/?n=climate_data_wx_record or http://www.weather.gov/climate/index.php?wfo=lsx

parameterized correctly in the model; Effluent characterization within wasteload allocation model runs may be unrealistic.

A review of the daily Discharge Monitoring Reports (DMR) submitted to the Department by the Fulton WWTP shows that the system's lagoon overflowed through outfall 002 directly into Stinson Creek from May 12, 2008 through May 27, 2008 (see Table 1 below). Water quality sampling conducted for this TMDL took place on May 20, 2008. The average overflow from May 12 through May 19 was 0.544 MGD with an average BOD_5 of 45 mg/l and average TSS of 48 mg/l.

Table 1.

Date	Flow, mgd	BOD_5 mg/l	TSS mg/l
5/12/2008	1.0656	35.0	58
5/13/2008	1.0656	38.5	52
5/14/2008	0.5121	42.7	44
5/15/2008	0.6390	45.6	64.5
5/16/2008	0.5103	45.9	30
5/17/2008	0.1869		
5/18/2008	0.1869		
5/19/2008	0.1869	59.2	38
Avg 5/12-5/19	**0.5442**	**44.5**	**47.8**
5/20/2008	0.0143	47.7	38
5/21/2008	0.0143	51.7	34
5/22/2008	0.1019	47.4	34
5/23/2008	0.1019		
5/24/2008	0.1020		
5/25/2008	0.1020	41.7	48
5/26/2008	0.1020	21.9	58
5/27/2008	0.0510		

Site 4 (ST-4) is 160 m (0.1 mi) downstream of the Fulton WWTP. The high Chl-a values at ST-4 are most likely the result of the lagoon overflow and not likely due to drainage from nearby agricultural areas. The aerial photograph attached to the end of this letter (Figure 1) and taken in early June, 2009 shows the greenish color of the lagoon compared to the darker color of nearby ponds. The aerial photo also does not seem to indicate the presence of nearby agricultural areas or the presence of tributaries draining to the reach between ST-2 and ST-4.

The Department notes that the 299 μg/L Chl-a value for sampling site 6 (ST-6) is consistent with other Chl-a measurements taken downstream of the WWTP. This suggests that the measurement of 4 μg/L Chl-a obtained for the blind duplicate is in error.

Regarding dissolved oxygen calibration of the QUAL2K model, the focus of the calibration was to match the diel dissolved oxygen measurements at sampling site 4 (ST-4) where continuous 15 minute data were available. ST-6 is 2.2 miles downstream of the WWTP and, as the comment references; the discrete nature of the sample limits its

usefulness in estimating daily minimum, average, or maximum concentrations. Therefore, the continuous diel dissolved oxygen measurements at the immediately downstream site were used for model calibration.

For the Fulton WWTP, measured $CBOD_5$ was extrapolated to $CBOD_u$ and assumed as fast-CBOD. A conversion ratio of 2.33 was assumed and used (Leo et. al, 1984 data indicated mean ratio of 2.84 with standard deviation of 1.17). If a ratio of 2.84 is used, the predicted average hourly dissolved oxygen at ST-4 would be 0.2 mg/l lower. The measured in-stream $CBOD_5$ data was adjusted to account for algal decomposition and respiration. Similarly, the predicted fast-CBOD was extrapolated to $CBOD_5$. Table 2 below shows the comparison between predicted, measured, and adjusted $CBOD_5$. The results of the analyses do not change the calibration or require the model be recalibrated.

Table 2.

	Predicted $CBOD_{fu}$ mg/l	Predicted $CBOD_5$ mg/l	Measured $CBOD_5$ mg/l	Adjusted for Chl-A $CBOD_5$ mg/l
ST 1	1.0	0.35	<2*	0.02
ST 2	0.64	0.23	<2	0.31
ST 4	6.09	2.15	6.1	<0**
ST 5	4.18	1.47	5.6	<0
ST 6	3.81	1.34	4.7	<0

* detection limit is 2 mg/l, all predicted $CBOD_5$ are below detection limit
** calculated O_2 equivalent of Chl-A is more than measured $CBOD_5$

At the request of MPUA and Geosyntec, the allocation model was re-run with the revised assumptions listed below. The result of the revised model allocation run did not change the $CBOD_5$ wasteload allocation for the Fulton WWTP.

- Headwater and nonpoint source DO set at 5.0 mg/l
- Nonpoint source chl-A set at 1.0 mg/l
- Point source chl-A set at 0 mg/L
- Nonpoint source CBODfast set at 1.0 mg/l, POM set at 1 mg/l
- Effluent water temperature is average of 2008 measurements

Comment #3: *Wasteload allocations for Biochemical Oxygen Demand are not clear. Is the wasteload allocation for CBOD in Table 10 expressed as CBOD Ultimate, BOD Ultimate, or a 5-day value? Stinson Creek DO balances do not seem sensitive to $CBOD_5$.*

The wasteload allocation for BOD in Table 10 should be identified as $CBOD_5$, which represents a 5-day CBOD. Table 10 has been revised to reflect this change. Please note that the conversion of wasteload allocations to permit limits is the purview of the Permits and Engineering Section of the Water Pollution Control Branch. Should you have questions regarding the determination of permit effluent limits, please contact the Permits and Engineering section chief, Refaat Mefrakis at (573) 526-2928 or by email at refaat.mefrakis@dnr.mo.gov.

The QUAL2K model used for the Stinson Creek TMDL recognizes that $CBOD_5$ can cause or contribute to low DO problems in the receiving stream. While $CBOD_5$ may not be the predominant driver for low DO in Stinson Creek, because it is addressed in the

QUAL2K model a wasteload allocation is required for the City of Fulton wastewater treatment plant. Based on DMR data submitted by the Fulton WWTP, it appears that in almost all cases BOD concentrations measured in the effluent from Outfall #001 already meet or are below the $CBOD_5$ concentration of 9 mg/L outlined in Table 10 of the TMDL. With continued proper operation and maintenance, and the elimination of Outfall #002 planned in the next permit renewal, additional upgrades to the facility may not be necessary to meet the $CBOD_5$ wasteload allocations in the TMDL.

Comment #4: *Wasteload allocations for total nutrients and total phosphorus are not supported by water quality criteria approved by the Missouri Clean Water Commission.*

The QUAL2K model used for the Stinson Creek TMDL recognizes that total nitrogen and total phosphorus can cause or contribute to low DO issues in the stream through algal growth, respiration, and decomposition. Because total nitrogen and total phosphorous are addressed in the model, wasteload allocations are required for the City of Fulton wastewater treatment plant. Water quality data from the May 2008 sampling event recorded total phosphorus concentrations of 3.1 mg/L in the effluent of the WWTP, which caused instream concentrations to be elevated for several miles downstream. Nitrite plus nitrate concentrations of 17 mg/L were recorded in the effluent, which also caused instream concentrations of this parameter to be elevated for several miles downstream. It is recognized by EPA in their National Nutrient Strategy[2], and widely understood in general, that excessive nutrients in a water body can lead to potentially harmful algal blooms which can in turn contribute to low dissolved oxygen conditions.

It is within the authority of the Department to set wasteload allocations for pollutants that cause or contribute to the impairment of a water body. According to 40 CFR 122.44(d)(1)(i), "Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." Furthermore, this TMDL was developed to comply with Sections 303(d) and 302(a) of the Clean Water Act which dictates that when technology-based effluent limitations result in impaired water quality and non-attainment of designated uses, water quality-based effluent limitations shall be established. Domestic wastewater treatment facility effluent contains nutrient concentrations at levels that can cause or contribute to algal growth, respiration, and decomposition in the receiving stream. These conditions in turn can cause or contribute to violations of the state minimum water quality criterion for dissolved oxygen.

Development of TMDL wasteload allocations must ensure attainment and compliance with applicable water quality standards per 40 CFR 130.7(c). As a result, TMDL wasteload allocation development is conducted without consideration of wastewater treatment technology or cost. However, the implementation section of the TMDL outlines a phased implementation approach to pollutant reduction. This phased approach stipulates that initial reductions to limits for $CBOD_5$ and total suspended solids (TSS) should result in attainment of numeric and narrative water quality criteria. In the event that post-TMDL monitoring indicates that reductions in $CBOD_5$ and TSS from the

[2] National Strategy for the Development of Regional Nutrient Criteria (June 1998). EPA 822-R-98-002.

wastewater treatment plant are not achieving the desired improvements to water quality, additional conditions, including effluent limits for nutrients, may be placed in the operating permit for the Fulton WWTP. The Department typically waits at least three years from the end of a permit compliance schedule or facility upgrade before assessing the impact of facility improvements on instream water quality.

Comment #5: *Fulton WWTP wasteload allocations are likely unachievable and unmerited. The draft TMDL does not demonstrate that nutrient limits are necessary to meet a DO concentration of 5 mg/L.*

As noted in the response to Comment #4, the Department is required to develop wasteload allocations that are protective of water quality without regard to cost or available treatment technology. Should wasteload allocations result in effluent limitations that are beyond the limits of current treatment technology, the Department may develop a phased approach to implementation of effluent limitations through the use of the best available treatment technology. This approach can be implemented either within the operating permit or through a settlement agreement. As noted above, the conversion of wasteload allocations to permit limits is the purview of the Permits and Engineering Section of the Water Pollution Control Branch. Should you have questions regarding the determination of permit effluent limits, please contact the Permits and Engineering Section chief, Refaat Mefrakis.

As also noted in the response to Comment #4, it is well recognized and understood that excessive nutrients in a water body can lead to harmful algal blooms which can in turn contribute to low instream dissolved oxygen concentrations. The QUAL2K model recognizes that total nitrogen and total phosphorus can cause or contribute to low dissolved oxygen in the receiving stream and demonstrates that a dissolved oxygen concentration of 5 mg/L can be achieved by lowering nutrient inputs into the system. Because nutrients are addressed in the model, wasteload allocations are required to be developed. However, the TMDL recommends a phased approach to the implementation of pollutant reduction that delays any potential implementation of nutrient limits. In the event nutrient limits do become necessary, the Department may support a phased implementation approach to effluent limitations through the use of the best available treatment technology.

The Department understands that resources are limited and that communities are sometimes hard pressed to meet the demands of water and wastewater system improvements. I invite you to contact the Department's Financial Assistance Center to discuss grant and low-interest loan options that may be available to the city should wastewater system improvements be necessary. To reach the Financial Assistance Center, you can call (573) 751-1192 and ask for either Doug Garrett or Traci Newberry, or email Mr. Garrett at doug.garrett@dnr.mo.gov. You can also find them on the web at http://www.dnr.mo.gov/env/wpp/srf/index.html.

Comment #6: *Documentation of Control Site is unclear.*

TMDL nutrient targets were established using an ecoregion reference concentration approach, rather than a reference stream approach. As noted in footnote #6 on page 20 of

the TMDL document, data from the control site was not used in TMDL nutrient modeling and therefore subsequently not included in the TMDL.

Comment #7: *Influences of physical factors may prevent attainment of the DO criterion. MPUA and Geosyntec suggest that these physical limitations should be evaluated in context of use attainability analyses, site-specific criteria, or a variance to address what may be an unattainable criterion during certain periods and flow regimes. We are concerned that even if attained, Table 10 values will not result in a diel DO profile that achieves 5 mg/L at all times during all seasons.*

In reviewing the available historical water quality data for Stinson Creek, the Department found only two water quality samples (August 8, 2002) above the Fulton WWTP with dissolved oxygen concentrations below the minimum criterion that also reported concentrations of total nitrogen, total phosphorus, and CBOD. In both cases, total phosphorus and CBOD were at nondetectable levels and total nitrogen was slightly above the concentration limits given in Table 10. While this may mean that wasteload allocations in the TMDL might not result in consistent attainment of the dissolved oxygen criterion, it may just as likely indicate that nitrogen is the driving factor behind low dissolved oxygen concentrations in Stinson Creek.

The final TMDL has been revised to include amended implementation language acknowledging that low dissolved oxygen is an issue in Stinson Creek both upstream and downstream of the wastewater treatment plant. The new language also acknowledges issues regarding low dissolved oxygen as a natural background condition in prairie streams in this ecological region. The Department may develop revised dissolved oxygen criteria for Stinson Creek and similar streams during future triennial reviews of the Water Quality Standards if resources are available. Additional monitoring and analysis will determine whether the dissolved oxygen minimum criterion of 5 mg/L is appropriate, or if a new site-specific dissolved oxygen criterion is required. The Department acknowledges that should revised criteria be developed, a revised Stinson Creek TMDL may be necessary. It also acknowledges, however, that the revised criteria may result in no impact for Stinson Creek and that new loading calculations may not differ or offer relief from what is currently contained in this TMDL.

Language has also been included in the TMDL to indicate that allocations of pollutant loading will be implemented only partially through permit action, acknowledging the potential importance of nonpoint source controls. In addition, as referenced previously the TMDL recommends a phased and iterative approach to implementation of the wasteload allocations.

Comment #8: *Turbidity is not a pollutant. Furthermore, Section 5.2 fails to provide a clear and quantitative linkage between the listed cause of impairment (organic sediment), the beneficial use, fine particle size, turbidity, and total suspended solids.*

The inclusion of turbidity as a pollutant was an oversight carried over from a previous draft. References to turbidity in the TMDL have been changed to refer to "suspended particles of organic matter" which more closely describes the organic sediment impairment.

Stinson Creek is included on the EPA-approved 2008 303(d) List as impaired by organic sediment from the Fulton WWTP. The TMDL must therefore include wasteload

allocations to address the organic sediment impairment. Although Missouri's water quality standards do not include applicable numeric criteria to address organic sediment, the general, or narrative, criteria that apply can be found in the standards at 10 CSR 20-7.031(3)(A) and (C). Wastewater treatment plants have the potential to discharge high levels of organic sediment into the receiving stream. Organic sediment can settle onto the bottom of a stream and smother natural substrates, aquatic invertebrate animals and fish eggs. High amounts of organic sediment may also contribute to sludge on the stream bottom, which may be unsightly and have an offensive odor. Total suspended solids are composed of organic sediment and inorganic sediment. Any reduction in total suspended solids from the facility discharge will therefore result in a reduction of organic sediment loading to the receiving stream.

Comment #9: *Continuous DO data do not indicate a significant impairment.*

The Department concurs that Figures 5 and 6 indicate that dissolved oxygen concentrations did not fall below 5 mg/L for a significant amount of time during the continuous dissolved oxygen monitoring. Nevertheless, the dissolved oxygen criterion is a minimum criterion and the data does show that Stinson Creek does violate this criterion at least part of the time.

During the next 303(d) listing cycle, the Department will review all readily available data, including data collected as part of this TMDL, in order to assess the water quality impairment. In the event that a reassessment of the data results in Stinson Creek attaining applicable water quality standards, the Department will reassess the current TMDL and any wasteload allocations or permit effluent limits that are associated with the TMDL.

Comment #10: *The TMDL does not establish a quantitative linkage between MS4 sources, non-point sources, and listed causes of impairment. This TMDL does not document any wet-weather impairments or employ dynamic modeling techniques to simulate MS4 effects on the DO balance. In addition, the load duration curves presented in the TMDL do not provide a linkage between nutrients and DO or the aquatic life beneficial use. Therefore, the applicability of this technique is questionable at best. Despite these technical uncertainties, the TMDL sets MS4 WLAs that translate to TSS, nitrogen, and phosphorus concentrations of <5 mg/L, 0.9 mg/L and 0.1 mg/L, respectively. MPUA and Geosyntec believe that these WLAs developed for the City's MS4 permit are unachievable and unwarranted.*

To control nutrient loads from MS4s using the load duration curve method, the load duration curves do not need to establish a linkage between nutrients, total suspended solids, and low dissolved oxygen. This linkage has already been established by the QUAL2K model. The load duration curves provide a mechanism to establish nutrient loadings to water bodies at higher flows not simulated by the QUAL2K model. The effect of pollutant reductions at all flows should be nutrient and total suspended solids concentrations instream that do not cause or contribute to the low dissolved oxygen or organic sediment impairments.

An important part of the TMDL process is to inventory all potential sources of the pollutants of concern. It is well documented that storm water originating from urban areas contains total nitrogen, total phosphorus and total suspended solids in concentrations that may cause or contribute to water quality impairments. As a source of these pollutants, the city of Fulton MS4 must have wasteload allocations (WLAs)

developed for nutrients and total suspended solids and the WLAs included in the TMDL. Those wasteload allocations will be implemented through the MS4 permit process. MS4 permit requirements may include effluent limitations as well as monitoring of both the impairment and the effectiveness of any pollutant control strategies that may be implemented.

Comment #11: *Adaptive management strategies should be used for Stinson Creek. We recommend that the implementation plan within the TMDL includes an adaptive management approach and reopener provisions so that the load and wasteload allocations are reevaluated within the near term.*

As noted in the Department's response to comment number 5, the TMDL recommends a phased approach to the implementation of pollutant reduction that delays any potential implementation of nutrient limits. In the event that nutrient limits do become necessary, the Department may support a phased implementation approach to effluent limitations through the use of the best available treatment technology.

In addition, the Department may develop revised dissolved oxygen criteria for Stinson Creek and similar streams during future triennial reviews of the Water Quality Standards if resources are available. Additional monitoring and analysis will determine whether the dissolved oxygen minimum criterion of 5 mg/L is appropriate, or if a new site-specific dissolved oxygen criterion is required. The Department acknowledges that should revised criteria be developed, a revised Stinson Creek TMDL may be necessary. It also acknowledges, however, that the revised criteria may result in no impact for Stinson Creek and that new loading calculations may not differ or offer relief from what is currently contained in this TMDL.

Thank you again for your comments. The Department is committed to working with the city of Fulton toward implementing this TMDL once it is approved by EPA. If you should have questions or would like to discuss this TMDL further, please contact me at (573) 526-1446, john.hoke@dnr.mo.gov or by mail at the Missouri Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, Missouri 65102.

Sincerely,

WATER PROTECTION PROGRAM

John Hoke, Chief
TMDL Unit
Water Quality Monitoring and Assessment Section

JH/lsm

c: Mr. Bill Johnson, City of Fulton
Mr. Darrell Dunlap, City of Fulton
Mr. Trent Stober, Geosyntec Consultant

Figure 1. Aerial for NAIP 2009 showing Fulton WWTP lagoon.

CITY OF FULTON, MISSOURI

CHARLES M. LATHAM
Mayor

18 EAST 4TH STREET, P.O. BOX 130, FULTON, MISSOURI 65251-0130
Telephone: (573) 592-3111 FAX: (573) 592-3119

November 11, 2009

Mr. John Hoke
Department of Natural Resources
Water Protection Program
Water Quality Monitoring and Assessment Section
P.O. Box 176
Jefferson City, Missouri 65102

Re: Draft Total Maximum Daily Load for Stinson Creek

Dear Mr. Hoke,

The City of Fulton, Missouri operates the Fulton Wastewater Treatment Plant (WWTP) that discharges to Stinson Creek in Callaway County, Missouri. The Draft TMDL for Stinson Creek seeks to impose strict regulations on the City of Fulton's permitted discharge to Stinson Creek which will significantly impact its ratepayers. Therefore, we offer the following comments on the Draft TMDL for Stinson Creek in response to the Missouri Department of Natural Resources request for public comment.

A discussion of historical dissolved oxygen data for Stinson Creek is included in Section 2.5. We concur that low dissolved oxygen has been measured in Stinson Creek, but the summary data presented in this section fails to adequately characterize the historical data because it does not address the spatial distribution of the samples. The data provided in Appendix A frequently shows low dissolved oxygen at locations along the entire stream (above and below the Fulton WWTP). We believe this data is further evidence that this stream has naturally occurring low dissolved oxygen. Further, the August 2007 data included in Table 2 is misleading since it was clearly taken during a low flow study which is not representative of the stream during times the other data was taken.

Section 5.1 includes a discussion of additional sampling performed in May 2008 and September 2008. Of the six locations sampled, continuous monitoring was conducted at two sites, ST-2 (0.74 miles above Fulton WWTP) and ST-4 (0.1 miles below Fulton WWTP). Grab samples were taken at all other locations. Grab sample results shown in Tables 5 and 6 fail to show samples with dissolved oxygen below 5 mg/L, and of the continuous monitoring samples, only 4% of the samples collected in May fell below 5 mg/L dissolved oxygen. The continuous monitoring data from May 2008 taken at ST-4 was used to calibrate the QUAL2K model. As stated in Appendix C, the calibrated model was run at various levels of BOD originating from the WWTP until the minimum concentration of dissolved oxygen downstream of the WWTP was no less than 5 mg/L. The minimum DO concentration shown in the model occurs approximately 0.5 miles

downstream of the WWTP. However, no continuous sampling was performed near this point, and the grab sampling near this point does not reflect the levels shown in the model calibration.

The closest sampling site upstream of Fulton WWTP is ST-2, 0.74 miles upstream of the WWTP. It is possible that agricultural or urban discharges from other sources could be present in this area and would have an impact on reference concentrations. As shown in Table 5, unusually high Chlorophyll *a* was measured during May sampling and would have originated between site ST-2 and ST-4. WWTP effluent would not have high Chlorophyll *a* values and no other explanation for the elevated values is offered. The source of elevated Chlorophyll *a* should be investigated as it would have an impact of dissolved oxygen levels in the stream.

Stinson Creek is listed on the Missouri 303(d) List for low dissolved oxygen and organic sediment. Section 4.2 includes a discussion of numeric criteria which is clear for dissolved oxygen, but only narrative criteria are provided for organic sediment. The discussion in this section attributes organic sediment to the Fulton WWTP and concludes that the treatment technology required to reduce BOD from the Fulton WWTP will also reduce organic sediment. However, the wasteload allocation for Fulton WWTP shown in Table 10, places a numeric criteria for total suspended solids (TSS) from Fulton WWTP's discharge at 5.0 mg/L. Section 5.2.1 indicates that this TSS limit was based on load duration curves developed from historical data for reference streams in Stinson Creek's larger watershed. However, no correlation between organic sediment and TSS is presented. Without a clear link between TSS and organic sediment, the goal of the TMDL to reduce organic sediment may not be achieved simply by reducing TSS from Fulton's WWTP.

Stinson Creek is not listed on the Missouri 303(d) List for nitrogen or phosphorus, however the result of this TMDL are wasteload allocations that include nutrients. References to nutrient wasteload allocations should be removed from the TMDL.

The outcome of this TMDL will not only place new, more restrictive discharge limitations on the Fulton WWTP, but wasteload allocations are presented in Tables 7 to 9 for Fulton's municipal separate storm sewer system (MS4). Modeling performed for this TMDL was for low flow steady state conditions and is not applicable to the entire watershed during rainfall events. Fulton's MS4 would be permitted at 25% of the nonpoint source load for the watershed, which is based solely on its size relative to the rest of the watershed. Because no modeling of the watershed was actually performed discharge limitations proposed in the TMDL for Fulton's MS4 and other nonpoint sources should be removed from the TMDL.

Waste load allocations for Fulton WWTP are presented in Table 10. Existing NPDES effluent limits for BOD and TSS are 45 mg/L weekly and 30 mg/L monthly. There are no limits for nutrients. This TMDL would reduce BOD and TSS limits for Fulton WWTP by over 70% to 9 mg/L BOD and 5 mg/L TSS. It would also establish nutrient limits of 0.88 mg/L total nitrogen and 0.092 mg/L total phosphorus. These new effluent limits drastically decrease limits and may not be achievable. Certainly tertiary treatment would be required at the Fulton WWTP at a great financial burden to Fulton's ratepayers, and as previously discussed, may not be able to achieve the levels required in the TMDL.

Fulton MS4 limits shown in Tables 7 to 9 would correspond to 5 mg/L TSS, 0.1 mg/L phosphorus and 0.9 mg/L nitrogen. Stormwater discharges to Stinson Creek at multiple points. To achieve these limits will require consolidation of discharges and treatment facilities. With the confined urban character of Stinson Creek, the space required is extremely limited and will be tremendously expensive.

In summary, we request MDNR rescind the Draft Stinson Creek TMDL due to:

A. Lack of historical data indicating that the Fulton WWTP is cause of low dissolved oxygen in Stinson Creek,
B. Sampling data and modeling used to establish limits is inadequate and may not properly identify all sources of low dissolved oxygen,
C. Failure to prove that Fulton WWTP BOD wasteload allocations would overcome the stream's natural low dissolved oxygen,
D. Relationship between organic sediment and TSS not established, and
E. Wasteload allocations place unreasonable discharge limits on Fulton WWTP and Fulton MS4.

The City of Fulton pledges its resources to achieving a healthy Stinson Creek but the limitations proposed by the TMDL are unreasonable and would create financial burden on the City and its residents.

Sincerely,

William R. Johnson

Date 11-10-2009

Director of Administration
City of Fulton

STATE OF MISSOURI
Jeremiah W. (Jay) Nixon, Governor • Mark N. Templeton, Director
DEPARTMENT OF NATURAL RESOURCES
www.dnr.mo.gov

February 8, 2010

Mr. William R. Johnson
Director of Administration
City of Fulton
18 East 4th Street, P.O. Box 130
Fulton, MO 65251-0130

RE: Response to Comments on the Stinson Creek Total Maximum Daily Load

Dear Mr. Johnson:

The Missouri Department of Natural Resources (Department) appreciates the comments provided by the City of Fulton on the draft Stinson Creek Total Maximum Daily Load (TMDL). This letter responds to comments (some paraphrased here in the interest of brevity) received from the city during the public notice period for this TMDL. Please find herein the Department's response to each comment and the location of the revision (if applicable) within the final document as it will be submitted to the U.S. Environmental Protection Agency.

Comment #1: *A discussion of historical DO data for Stinson Creek is included in Section 2.5. The data provided in Appendix A frequently shows low DO at locations along the entire stream (above and below the Fulton WWTP). We believe this data is further evidence that this stream has naturally occurring low DO. Further, the August 2007 data included in Table 2 is misleading since it was clearly taken during a low flow study which is not representative of the stream during times the other data was taken.*

The Department concurs that dissolved oxygen (DO) concentrations below the minimum criterion of 5 mg/L have been measured both upstream and downstream of the Fulton Wastewater Treatment Plant (WWTP) discharge. The purpose of Table 2 in the TMDL is not to show that the WWTP is the source of the impairment, but rather to provide a summary of the available DO data for Stinson Creek and how these data are distributed statistically. In order to clarify the contents of Table 2, a note has been added below the table indicating that the data spatially represent DO data both above and below the WWTP. All of the data shown in Appendix A of the TMDL were collected under similar low-flow conditions and in accordance with state and federal guidance for stream survey sampling and data collection. There is no indication in the Department's administrative record that the August 2007 data were collected during flow conditions other than low-flow.

The final TMDL has been revised to include amended implementation language acknowledging that low DO is an issue in Stinson Creek both upstream and downstream of the WWTP. The new language also acknowledges issues regarding low DO as a natural background condition in prairie streams in this ecological region. The Department may develop revised DO criteria for Stinson Creek and similar streams during future Triennial Reviews of the Water Quality Standards (WQS) if resources are available.

Additional monitoring and analysis will determine whether the DO minimum criterion of 5 mg/L is appropriate, or if a new site-specific DO criterion is required. The Department acknowledges that should revised criteria be developed, a revised Stinson Creek TMDL may be necessary. It also acknowledges, however, that the revised criteria may result in no impact for Stinson Creek and those new loading calculations may not differ or offer relief from what is currently contained in this TMDL.

Comment #2: *Section 5.1 includes a discussion of additional sampling performed in May 2008 and September 2008. Of the six locations sampled, continuous monitoring was conducted at two sites, ST-2 (0.74 miles above Fulton WWTP) and ST-4 (0.1 miles below Fulton WWTP). Grab samples were taken at all other locations. Grab sample results shown in Tables 5 and 6 fail to show samples with DO below 5 mg/L, and of the continuous monitoring samples, only 4% of the samples collected in May fell below 5 mg/L DO. The minimum DO concentration shown in the model occurs approximately 0.5 miles downstream of the WWTP. However, no continuous sampling was performed near this point, and the grab sampling near this point does not reflect the levels shown in the model calibration.*

The Department concurs that Figures 5 and 6 indicate that DO concentrations did not fall below 5 mg/L for a significant amount of time during the continuous DO monitoring. Nevertheless, the DO criterion is a minimum criterion and the data does show that Stinson Creek does violate this criterion at least part of the time.

When calibrating DO for the QUAL2K model, the focus of the calibration was to match the diel DO measurements at sampling site 4 (ST-4) where continuous 15-minute data were available. When modeling $CBOD_5$, the QUAL2K model was set to achieve compliance at the end of the regulatory mixing zone. For the Fulton WWTP discharge to Stinson Creek, this distance is one-quarter mile downstream of the facility per 10 CSR 20-7.031(4)(A)4.B.(II)(a). Because the QUAL2K model was calibrated using the available continuous DO data 0.1 miles below the facility, no additional monitoring was deemed necessary for the short distance further downstream to the point of compliance.

Comment #3: *The closest sampling site upstream of the Fulton WWTP is ST-2, 0.74 miles upstream of the WWTP. It is possible that agricultural or urban discharges from other sources could be present in this area and would have an impact on reference concentrations. As shown in Table 5, unusually high Chlorophyll-a was measured during May sampling and would have originated between site ST-2 and ST-4. WWTP effluent would not have high Chlorophyll-a values and no other explanation for the elevated values is offered. The source of elevated Chlorophyll-a should be investigated as it would have an impact of DO levels in the stream.*

A review of the daily Discharge Monitoring Reports (DMRs) submitted to the Department by the Fulton WWTP shows that Outfall #002, originating from the system's lagoon, overflowed directly into Stinson Creek from May 12, 2008 through May 27, 2008. Water quality sampling conducted for this TMDL took place on May 20, 2008. Given the abundance of bright green algae on the lagoon visible from aerial photographs, it is likely that the Chlorophyll-a (Chl-a) measured at ST-4 downstream of the WWTP is a result of this lagoon overflow. When the operating permit for the Fulton WWTP is renewed in August 2010, a condition will be placed in the permit requiring the facility to eliminate Outfall #002 and redirect overflow from the lagoon into the mechanical treatment plant. This should eliminate future discharges of Chl-a directly to Stinson Creek.

Analysis of aerial photos and land use/land cover data does not indicate the presence of nearby agricultural (cropland) areas which could be sources of nutrients and Chl-a in the area between ST- 2 and ST-4. The predominant land covers in this area appear to be urban impervious, forest, and grassland. All of this area is within the boundaries served by the City of Fulton's Municipal Separate Storm Sewer System (MS4) which can be a source of nutrients and Total Suspended Solids (TSS) to the Stinson Creek downstream of ST-2.

Comment #4: *Stinson Creek is listed on the Missouri 303(d) List for low DO and organic sediment. Section 4.2 includes a discussion of numeric criteria which is clear for DO, but only narrative criteria are provided for organic sediment. However, the wasteload allocation for Fulton WWTP shown in Table 10 places a numeric criteria for TSS (TSS) from Fulton WWTP's discharge at 5 mg/L. Without a clear link between TSS and organic sediment, the goal of the TMDL to reduce organic sediment may not be achieved simply by reducing TSS from Fulton's WWTP.*

Stinson Creek is included on the EPA-approved 2008 303(d) List as impaired by organic sediment from the Fulton WWTP. The TMDL must therefore include wasteload allocations (WLAs) to address the organic sediment impairment. Although Missouri's WQS do not include applicable numeric criteria to address organic sediment, the general, or narrative, criteria that apply can be found at 10 CSR 20-7.031(3)(A) and (C). WWTPs have the potential to discharge high levels of organic sediment into the receiving stream. Organic sediment can settle onto the bottom of a stream and smother natural substrates, aquatic invertebrate animals and fish eggs. High amounts of organic sediment may also contribute to sludge on the stream bottom, which may be unsightly and have an offensive odor. TSS are composed of organic sediment and inorganic sediment. Any reduction in TSS from the facility discharge will therefore result in a reduction of organic sediment loading to the receiving stream.

Comment #5: *Stinson Creek is not listed on the Missouri 303(d) List for nitrogen or phosphorus, however the result of this TMDL are WLAs that include nutrients. References to nutrient WLAs should be removed from the TMDL.*

The QUAL2K model used for the Stinson Creek TMDL recognizes that total nitrogen and total phosphorus can cause or contribute to low DO issues in the stream through algal growth, respiration, and decomposition. Because total nitrogen and total phosphorous are addressed in the model, WLAs are required for the City of Fulton's WWTP. Water quality data from the May 2008 sampling event recorded total phosphorus concentrations of 3.1 mg/L in the effluent of the WWTP, which caused instream concentrations to be elevated for several miles downstream. Nitrite plus nitrate concentrations of 17 mg/L were recorded in the effluent, which also caused instream concentrations of this parameter to be elevated for several miles downstream. It is recognized by EPA in their National Nutrient Strategy[1], and widely understood in general, that excessive nutrients in a water body can lead to potentially harmful algal blooms which can in turn contribute to low DO conditions.

It is within the authority of the Department to set WLAs for pollutants that cause or contribute to the impairment of a water body. According to 40 CFR 122.44(d)(1)(i), "Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an

[1] National Strategy for the Development of Regional Nutrient Criteria (June 1998). EPA 822-R-98-002.

excursion above any state WQS, including state narrative criteria for water quality." Furthermore, this TMDL was developed to comply with Sections 303(d) and 302(a) of the Clean Water Act which dictates that when technology-based effluent limitations result in impaired water quality and non-attainment of designated uses, water quality-based effluent limitations shall be established. Domestic wastewater treatment facility effluent contains nutrient concentrations at levels that can cause or contribute to algal growth, respiration, and decomposition in the receiving stream. These conditions in turn can cause or contribute to violations of the state minimum water quality criterion for DO. Reduction in nutrient concentrations will also reduce the amount of algal organic sediment currently available to cause impairment of the narrative criteria.

Comment #6: *The outcome of this TMDL will not only place new, more restrictive discharge limitations on the Fulton WWTP, but WLAs are presented in Tables 7 and 9 for Fulton's municipal separate storm sewer system (MS4). Modeling performed for this TMDL was for low steady state conditions and is not applicable to the entire watershed during rainfall events. Fulton's MS4 would be permitted at 25% of the nonpoint source load for the watershed, which is based solely on its size relative to the rest of the watershed. Because no modeling of the watershed was actually performed discharge limitations proposed in the TMDL for Fulton's MS4 and other nonpoint sources should be removed from the TMDL.*

An important part of the TMDL process is to inventory all potential sources of the pollutants of concern. It is well documented that storm water originating from urban areas contains total nitrogen, total phosphorus, and TSS in concentrations that may cause or contribute to water quality impairments. The linkage between nutrients, TSS and low DO has been established by the QUAL2K model. The load duration curves provide a mechanism to establish nutrient loadings to water bodies at higher flows not simulated by the QUAL2K model. The effect of pollutant reductions at all flows should be nutrient and TSS concentrations instream that do not cause or contribute to the low DO or organic sediment impairments.

As a source of nutrients and TSS, the City of Fulton's MS4 must have WLAs developed for these pollutants and the WLAs included in the TMDL. Those WLAs will be implemented through the MS4 permit process. MS4 permit requirements may include effluent limitations as well as monitoring of both the impairment and the effectiveness of any pollutant control strategies that may be implemented.

Comment #7: *WLAs for Fulton WWTP are presented in Table 10. This TMDL would reduce BOD and TSS limits for Fulton WWTP by over 70% to 9 mg/L BOD and 5 mg/L TSS. It would also establish nutrient limits of 0.88 mg/L total nitrogen and 0.092 mg/L total phosphorus. These new effluent limits drastically decrease limits and may not be achievable. Certainly tertiary treatment would be required at the Fulton WWTP at a great financial burden to Fulton's ratepayers, and as previously discussed, may not be able to achieve the levels required in the TMDL.*

The Department is required to develop WLAs that are protective of water quality without regard to cost or available treatment technology. Should WLAs result in effluent limitations that are beyond the limits of current treatment technology, the Department may develop a phased approach to implementation of effluent limitations through the use of the best available treatment technology. This approach can be implemented either within the operating permit or through a settlement agreement. The conversion of WLAs to permit limits is the purview of the Water Protection Program's NPDES Permits and Engineering

Section. Should you have questions regarding the determination of permit effluent limits, please contact Mr. Refaat Mefrakis, Chief, NPDES Permits and Engineering Section at (573) 526-2928 or via email at refaat.mefrakis@dnr.mo.gov.

The Department understands that resources are limited and that communities are sometimes hard pressed to meet the demands of water and wastewater system improvements. I invite you to contact the Department's Financial Assistance Center to discuss grant and low-interest loan options that may be available to the city should wastewater system improvements be necessary. To reach the Financial Assistance Center, you can call (573) 751-1192 and ask for either Mr. Doug Garrett or Ms. Traci Newberry, or email Mr. Garrett at doug.garrett@dnr.mo.gov. You can also find them on the web at http://www.dnr.mo.gov/env/wpp/srf/index.html.

Comment #8: *Fulton MS4 limits shown in Tables 7 to 9 would correspond to 5 mg/L TSS, 0.1 mg/L phosphorus and 0.9 mg/L nitrogen. Storm water discharges to Stinson Creek at multiple points. To achieve these limits will require consolidation of discharges and treatment facilities. With the confined urban character of Stinson Creek, the space required is extremely limited and will be tremendously expensive.*

As previously noted, an important part of the TMDL process is to inventory all potential sources of the pollutants of concern. Since urban storm water can contain total nitrogen, total phosphorus, and TSS in concentrations that may cause or contribute to water quality impairments, the City of Fulton's MS4 permit must have WLAs for these pollutants included in the TMDL.

The implementation section of the TMDL outlines a phased implementation approach to pollutant reduction. This phased approach stipulates that initial pollutant reductions from the Fulton WWTP should result in attainment of numeric and narrative water quality criteria. In the event that post-TMDL monitoring (typically conducted three years from the end of a permit compliance schedule or facility upgrade) indicates that reductions from the WWTP are not achieving the desired improvements to water quality, additional actions may be taken, including reevaluation of the Fulton MS4 permit. If necessary, WLAs will be implemented through the MS4 permit process which may include effluent limitations, as well as monitoring of both the impairment and the effectiveness of any pollutant control strategies that may be implemented.

There are numerous resources available to assist municipalities in the development, implementation, and funding of urban storm water management programs. More information can be found by visiting the Department's storm water information clearinghouse at http://www.dnr.mo.gov/env/wpp/stormwater/index.html, or by calling the Water Protection Program at (573) 751-1300. In addition, storm water improvement funding may be available through the Financial Assistance Center's State Revolving Fund program at (573) 751-1192 or http://www.dnr.mo.gov/env/wpp/srf/index.html.

Comment #9: *In summary, we request MDNR rescind the Draft Stinson Creek TMDL due to:*

A. *Lack of historical data indicating that the Fulton WWTP is cause of low DO in Stinson Creek,*
B. *Sampling data and modeling used to establish limits is inadequate and may not properly identify all sources of low DO,*

C. *Failure to proves that Fulton WWTP BOD WLAs would overcome the stream's natural low DO,*
D. *Relationship between organic sediment and TSS not established, and*
E. *WLAs place unreasonable discharge limits on Fulton WWTP and Fulton MS4.*

The EPA-approved 2008 303(d) List of impaired waters identifies the Fulton WWTP as the source of the organic sediment impairment of Stinson Creek. The Fulton WWTP also contributes oxygen demanding substances to Stinson Creek that cause or contribute to the low DO impairment. For these reasons, the draft Stinson Creek TMDL was developed to identify and assign pollutant loading to sources of the pollutants of concern, including nutrients. The draft TMDL and modeling contained within establish and provide linkages between the Fulton WWTP, Fulton's MS4, and nonpoint sources to the instream impairment. The Department believes each of the points contained in Comment #9 above have been addressed in previous comment responses contained within this letter.

Stinson Creek (Water Body ID: 0710) is a TMDL Consent Decree[2] water that must have a TMDL submitted to and approved by EPA by December 31, 2010. However, the Department is committed to working with the City of Fulton toward implementing the requirements contained in this TMDL once it is approved by EPA.

Thank you again for your comments. If you should have questions or would like to discuss this TMDL further, please contact me at (573) 526-1446, john.hoke@dnr.mo.gov or by mail at the Missouri Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, Missouri 65102.

Sincerely,

WATER PROTECTION PROGRAM

John Hoke, Chief
TMDL Unit
Water Quality Monitoring and Assessment Section

JH:bwl

[2] Consent Decree refers to the 2001 Consent Decree entered in the case of American Canoe Association, et al. v. Carol M. Browner, et al., No. 98-1195-CV-W in consolidation with No. 98-4282-CV-W, February 27, 2001.

Whipps, Bill

From: Hoke, John
Sent: Wednesday, March 24, 2010 2:00 PM
To: Whipps, Bill
Subject: FW: Comments on Stinson Creek

John Hoke
Env. Specialist IV, TMDL Unit Chief
Water Quality Monitoring & Assessment
Missouri Department of Natural Resources
Phone: (573) 526-1446 Fax: (573) 522-9920

-----Original Message-----
From: Adkins.Tabatha@epamail.epa.gov [mailto:Adkins.Tabatha@epamail.epa.gov]
Sent: Wednesday, March 24, 2010 1:41 PM
To: Hoke, John
Subject: Comments on Stinson Creek

John,

Listed are EPA comments for Stinson Creek. Thanks.

TJ

Explain implicit MOS. Need to elaborate on what those conservative assumptions/targets were.

Ecoregion target for TN is 0.855 mg/l. TMDL indicates an adjusted number and then lists in Table 10, 0.88 mg/l. Section 5.2 on pg 20 indicates the target is 0.855 mg/l. No discussion is made within section 5.2 or 5.2.1 why the number was adjusted to 0.88 mg/l. Email traffic on 3/8-3/9 discussed.

Revise TMDL to include the 2008 listing

Table 1 - Land use percentages - percent column totals 100.01...but it looks like it may have been calculated wrong: Grassland - 44.07%, wetland - 1.02%, Open Water - 2.35%. New total is 100.00%. Please verify

Table 2 - DO data:
September 1993, August 2001, and August 2002 include sampling data are from the Fulton WWTP outfall and Smith Branch. Neither of these sampling points will give an accurate representation of Stinson Creek's average WQ conditions. In addition, the table notes that the data represents DO upstream and downstream of the Fulton WWTP for Stinson Creek. When these data are removed, the calculated results are the following values:
9/93, 18 samples, 4.8 min, 8.0 avg, 12.3 max, 6% 8/01, 6 samples, 4.4 min, 7.4 avg, 12.8 max, 50% 8/02, 6 samples, 3.9 min, 6.1 avg, 12.9 max, 67%

No mention of CAFOs was made in the TMDL. Please document similar to Buffalo Ditch if there are none: "By law, the term “point source” also includes concentrated animal feeding operations (which are places where animals are confined and fed). There are no concentrated animal feeding operations located in the Buffalo Ditch watershed."

If there are CAFOs, please provide the language and the permit information (name, permit, number, etc)

Discussion of Fulton's MS4 needs to occur in the point source section of sourcing. Total area, percent of watershed, number of outfalls, etc.
Section 3.1 PS - Clarify how and the extent that general storm water permits and general permits contribute nutrients, oxygen-consuming substances, and organic sediment to Stinson Creek.

Discussion of difference between MS4 area and other urban run off needs to occur in nonpoint section.

No clear connection in the TMDL between organic sediment, VSS, and the allocated TSS. Need to make the translations clear.
Section 3.2 NPS - This TMDL is different than Buffalo Ditch in that it needs to address dissolved oxygen and organic sediment impairments. The Buffalo Ditch TMDL write-up only had to address DO. Therefore, additional discussion addressing organic sediment needs to be included in the sourcing discussion.

3.2.1 on pg 10 indicates that cropland is 7% but the Table 1 on pg 4 indicates cropland is 14%.
Section 3.2.3, Onsite WW Trt Systems: States rural population is about 1,230. Section 2.2 Population estimates at 1,488.

3.1 language on pg 7 indicates there are 3 general permits but Table 3 lists 4.
3.1 language on pg 7 indicates there are 14 site specific permits but Table 3 lists 13.
Section 3.1, page 8 - Clarify whether the modeling of WLAs in this TMDL "do not" or will not in the future" incorporate a mixing zone. The current language of "will not" implies a future action rather than explaining the current TMDL calculations.

Section 5.2.1, LDC - The TMDL mentions the method for developing TSS LDC. Please add a reference to Appendix B which clarifies how the TSS LDC was developed.

Section 5.1, Table 5 - It may be helpful in making the connection between organic sediment and TSS WLAs to point out the elevated TSS levels below the Fulton WWTP reflected in May 2008 sampling data.

Tables 7, 8, 9 - The values listed are for the specific percent exceedance values of 20, 40, 60, 80 and 100 and not a range. Please correct the percent exceedance values listed.

Section 7, LA - Please clarify whether the specified LAs will also meet the narrative criteria for organic sediment.

Table 8, WLA Fulton MS4 - As described in the text that the MS4 receives "25% of the diffuse load to the stream", this results in the following Fulton MS4 WLA TP values: 80% - 0.14 , 60% - 0.36, 40% - 0.91, 20% - 3.19. This will result in a change to the LAs also. Please double-check calculations and Figure 8 LDC.

Table 9 - There is one slight error that needs to be fixed. At 21-40 Percent Exceedance, the total of WLAs and LA equals 246.44. A reduction of 0.01 lb/day needs to be removed from a WLA or LA. At 0-20 Percent Exceedance, the total of WLAs and LA equals 407.25. MDNR can choose to add 0.01 lb/day to a WLA or LA.

Sections 6 and 8 - Section 8 argues that no WLA is given to small dischargers because they are unlikely to discharge during critical low flow periods. This argument supports no WLA for DO levels as defined in Section 6. Section 8 also needs to clearly address the organic sediment impairment with Section 6 defining the critical period for the organic sediment impairment.

Appendix A:
A.1 - It is not clear which data is MDNR or EPA. It reads that perhaps all data from 1991 through 2007 were collected by EPA. Please clarify by adding the sampling years /time periods behind each agency in the title or in a footnote.
A.1 - The QA information for the various data excludes EPA data collected in years other than 1993. Please provide clarification for all years of EPA data, e.g., 2007.
A.3 - Include the source of this data.

Provide reference information for "additional low-flow study of upper Stinson Creek watershed" as given in Section 2.5, page 6. I assume it's an EPA contractor product, but it still needs to be cited for full documentation of the TMDL background.

In the response to comments from Mr. Phillip Walsack, as reference is made to Leo et. al. 1984 data. Please provide the complete reference information.

Tabatha Adkins, TMDL Coordinator
Water Quality Management Branch-WWPD,
USEPA Region 7
901 North 5th Street
Kansas City, KS 66101
913.551.7128
adkins.tabatha@epa.gov

Whipps, Bill

From: Hoke, John
Sent: Thursday, April 29, 2010 8:41 AM
To: 'Adkins.Tabatha@epamail.epa.gov'
Cc: Whipps, Bill
Subject: RE: Comments on Stinson Creek

TJ,

Please see the Department's responses to EPA's comments on the Stinson Creek TMDL in blue below. I've also placed the draft final TMDL on the Department's FTP site in the Outgoing\TMDL folder at the link below. If you have questions or need additional information, please let me know. Thanks!

John Hoke
Env. Specialist IV, TMDL Unit Chief
Water Quality Monitoring & Assessment
Missouri Department of Natural Resources
Phone: (573) 526-1446 Fax: (573) 522-9920

-----Original Message-----
From: Adkins.Tabatha@epamail.epa.gov [mailto:Adkins.Tabatha@epamail.epa.gov]
Sent: Wednesday, March 24, 2010 1:41 PM
To: Hoke, John
Subject: Comments on Stinson Creek

John,

Listed are EPA comments for Stinson Creek. Thanks.

TJ

Explain implicit MOS. Need to elaborate on what those conservative assumptions/targets were.

Language added to Section 9.

Ecoregion target for TN is 0.855 mg/l. TMDL indicates an adjusted number and then lists in Table 10, 0.88 mg/l. Section 5.2 on pg 20 indicates the target is 0.855 mg/l. No discussion is made within section 5.2 or 5.2.1 why the number was adjusted to 0.88 mg/l. Email traffic on 3/8-3/9 discussed.

LDC spreadsheet corrected to use LDC concentration value of 0.855 mg/L. Tables 7 and 10 in the TMDL updated to reflect changes.

Revise TMDL to include the 2008 listing

This change has been made to Section 1 and Section 14.

Table 1 - Land use percentages - percent column totals 100.01...but it looks like it may have been calculated wrong: Grassland - 44.07%, wetland - 1.02%, Open Water - 2.35%. New total is 100.00%. Please verify

Table 1 verified and corrected.

Table 2 - DO data:
September 1993, August 2001, and August 2002 include sampling data are from the Fulton WWTP outfall and Smith Branch. Neither of these sampling points will give an accurate representation of Stinson Creek's average WQ conditions. In addition, the table notes that the data represents DO upstream and downstream of the Fulton WWTP for Stinson Creek. When these data are removed, the calculated results are the following values:
9/93, 18 samples, 4.8 min, 8.0 avg, 12.3 max, 6% 8/01, 6 samples, 4.4 min, 7.4 avg, 12.8 max, 50% 8/02, 6 samples, 3.9

min, 6.1 avg, 12.9 max, 67%

Table 2 has been corrected to reflect these changes.

No mention of CAFOs was made in the TMDL. Please document similar to Buffalo Ditch if there are none: "By law, the term “point source” also includes concentrated animal feeding operations (which are places where animals are confined and fed). There are no concentrated animal feeding operations located in the Buffalo Ditch watershed."

See additional language, Section 3.1.

If there are CAFOs, please provide the language and the permit information (name, permit, number, etc)

See additional language, Section 3.1.

Discussion of Fulton's MS4 needs to occur in the point source section of sourcing. Total area, percent of watershed, number of outfalls, etc.

See additional language, Section 3.1.

Section 3.1 PS - Clarify how and the extent that general storm water permits and general permits contribute nutrients, oxygen-consuming substances, and organic sediment to Stinson Creek.

See additional language, Section 3.1.

Discussion of difference between MS4 area and other urban run off needs to occur in nonpoint section.

See additional language, Section 3.2.2.

No clear connection in the TMDL between organic sediment, VSS, and the allocated TSS. Need to make the translations clear.

Revised language added to Sections 4.2, 5.2 and 12.1.

Section 3.2 NPS - This TMDL is different than Buffalo Ditch in that it needs to address dissolved oxygen and organic sediment impairments. The Buffalo Ditch TMDL write-up only had to address DO. Therefore, additional discussion addressing organic sediment needs to be included in the sourcing discussion.

Additional language added to Sections 3.2.1, 3.2.2 and 3.2.4.

3.2.1 on pg 10 indicates that cropland is 7% but the Table 1 on pg 4 indicates cropland is 14%.

Correction made to Section 3.2.1.

Section 3.2.3, Onsite WW Trt Systems: States rural population is about 1,230. Section 2.2 Population estimates at 1,488.

Correction made to Section 3.2.3.

3.1 language on pg 7 indicates there are 3 general permits but Table 3 lists 4.

Correction made to Section 3.1.

3.1 language on pg 7 indicates there are 14 site specific permits but Table 3 lists 13.

Correction made to Section 3.1.

Section 3.1, page 8 - Clarify whether the modeling of WLAs in this TMDL "do not" or will not in the future" incorporate a mixing zone. The current language of "will not" implies a future action rather than explaining the current TMDL calculations.

Section 3.1 language corrected to “does not”.

Section 5.2.1, LDC - The TMDL mentions the method for developing TSS LDC. Please add a reference to Appendix B which clarifies how the TSS LDC was developed.

Reference to Appendix B added to Section 5.2.1.

Section 5.1, Table 5 - It may be helpful in making the connection between organic sediment and TSS WLAs to point out the elevated TSS levels below the Fulton WWTP reflected in May 2008 sampling data.

Language added to Section 5.1.

Tables 7, 8, 9 - The values listed are for the specific percent exceedance values of 20, 40, 60, 80 and 100 and not a range. Please correct the percent exceedance values listed.

Tables 7, 8 and 9 corrected.

Section 7, LA - Please clarify whether the specified LAs will also meet the narrative criteria for organic sediment.

Language added to Section 7.

Table 8, WLA Fulton MS4 - As described in the text that the MS4 receives "25% of the diffuse load to the stream", this results in the following Fulton MS4 WLA TP values: 80% - 0.14 , 60% - 0.36, 40% - 0.91, 20% - 3.19. This will result in a change to the LAs also. Please double-check calculations and Figure 8 LDC.

I have double-checked my MS4 WLA numbers in Table 8 several times and have determined that the numbers that are currently there appear to be correct – the formulas used are the same formulas that were originally provided by EPA and that are used for TN and TSS. No changes have been made to the table. I have been unable to determine how EPA reviewers arrived at the alternative numbers listed above, but if they provide their methodology, I'd be happy to look at it again.

Table 9 - There is one slight error that needs to be fixed. At 21-40 Percent Exceedance, the total of WLAs and LA equals 246.44. A reduction of 0.01 lb/day needs to be removed from a WLA or LA. At 0-20 Percent Exceedance, the total of WLAs and LA equals 407.25. MDNR can choose to add 0.01 lb/day to a WLA or LA.

Table 9 corrected.

Sections 6 and 8 - Section 8 argues that no WLA is given to small dischargers because they are unlikely to discharge during critical low flow periods. This argument supports no WLA for DO levels as defined in Section 6. Section 8 also needs to clearly address the organic sediment impairment with Section 6 defining the critical period for the organic sediment impairment.

Language added to Sections 6 and 8.

Appendix A:
A.1 - It is not clear which data is MDNR or EPA. It reads that perhaps all data from 1991 through 2007 were collected by EPA. Please clarify by adding the sampling years /time periods behind each agency in the title or in a footnote.

Comment added to Appendix A.1 "Notes".

A.1 - The QA information for the various data excludes EPA data collected in years other than 1993. Please provide clarification for all years of EPA data, e.g., 2007.

Comment added to Appendix A.1 "Notes" clarifies that only the 1993 data was collected by EPA and that all other data in Appendix A.1 was collected by MDNR.

A.3 - Include the source of this data.

Title to Appendix A.3 changed to include source.

Provide reference information for "additional low-flow study of upper Stinson Creek watershed" as given in Section 2.5, page 6. I assume it's an EPA contractor product, but it still needs to be cited for full documentation of the TMDL background.

Reference added to Section 2.5 and the References section.

In the response to comments from Mr. Phillip Walsack, as reference is made to Leo et. al. 1984 data. Please provide the complete reference information.

The following references were provided by Glenn Fernandez:

1. Leo et. al, 1984 as cited in USEPA (1997).

2. USEPA. 1997. Technical guidance manual for developing Total Maximum Daily Loads. Book II, Streams and Rivers, Part 1, Biochemical oxygen demand/dissolved oxygen and nutrients/eutrophication. EPA 823-B-97-002. U.S. Environmental Protection Agency, Washington, D.C.

3. Leo, W.M., R.V. Thomann, and T.W. Gallagher. 1984. Before and after case studies: Comparisons of water quality following municipal treatment plant improvements. Report no. 430/9-007. Technical report prepared by HydroQual, Inc. for U.S. Environmental Protection Agency, Office of Water Programs, Facility Requirements Div., Washington, DC.

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