Missouri
Department of
Natural Resources

DRAFT HINKSON CREEK TMDL
PUBLIC COMMENTS

Public Notice
March 8 – April 22, 2010

Hinkson Creek
WBIDs # 1007 and 1008

Boone County, Mo.

Missouri Department of Natural Resources
Water Protection Program
PO Box 176
Jefferson City, MO 65102-0176
800-361-4827 / 573-751-1300

Hoke, John

From: Jessica Sapp [JSapp@boonecountymo.org]
Sent: Thursday, April 22, 2010 1:27 PM
To: Hoke, John
Cc: DNRContact, bflorea@boonecountymo.org; Georganne Bowman; John Glascock; Steve Hunt; DNRContact, houtst@missouri.edu
Subject: Hinkson Creek TMDL in Columbia, Boone County

Attachments: Hinkson TMDL Letter 2010.pdf; appendex B.doc; Hinkson TMDL Review Memo_final.docx


Hinkson TMDL Letter 2010.pdf (...


appendex B.doc (28 KB)


Hinkson TMDL Review Memo_final..

Mr. Hoke,

Please find attached Boone County's comment letter along with supporting documentation on the Hinkson Creek TMDL.
Originals will be put into the mail to you today.

Sincerely,

Jessica Sapp
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Boone County Commission

April 22, 2010

Mr. John Hoke
Water Quality Monitoring and Assessment Section
Water Protection Program
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176

Re: Hinkson Creek TMDL in Columbia, Boone County

Dear Mr. Hoke,

Thank you for the opportunity to comment on the Draft Hinkson Creek Total Daily Maximum Load. States and local governments across the nation are struggling with ways to manage waterbodies that are impaired by stormwater. Hinkson Creek is no different. This relatively large watershed is a cultural and economic asset for the citizens of Columbia, and Boone County. Each year, hundreds of citizens volunteer their time to the "Hinkson Clean-Sweep." The Katy Trail system that runs along Hinkson Creek and the refurbished Flat Branch Park are popular tourist locations and the site for local environmental events and activities. Most residents are familiar with the watershed and can even point out the sub-watershed in which they reside.

In 2001, the City and County partnered to develop the Joint Stormwater Task Force. This citizen based advisory board developed the framework of our current stormwater strategy. Those recommendations have been incorporated into both the City and County ordinances. Local pressure has altered business practices and waste storage facilities.

With the NPDES Phase II program, the University of Missouri - Columbia, City and County joined forces to provide a program that meets the extensive requirements of the MS4 permit. Some of the programs included "Show Me Yards and Neighborhoods" and the Hinkson Creek Watershed Restoration Project, Phase II.

Now, almost 10 years later, the community is well educated on the effects of stormwater and some of the methods to reduce pollution from homes, businesses, and facilities. The community of design engineers is engaged and vocal about the pros and cons of local ordinances and requirements. Scientists are examining the watershed in ways that have not previously been explored in an urban setting. All of these groups, seemingly unrelated, have partnered to find solutions and address stormwater problems throughout the community, and beyond.

With that being said, Boone County would like to offer the following comments on the proposed Hinkson Creek TMDL.

Main points:

1. The TMDL is a mandatory requirement for the MS4.
2. We do not support the conclusions in the TMDL. A different approach is warranted to define the water quality impairment.
3. DNR should incorporate the current ordinances and work with the locally developed SW management approach to set the requirements of the TMDL.
4. Suggested approaches.
5. Potential consequences of implementing this TMDL.

The TMDL is a Mandatory Requirement of the MS4 Permit

It was stated during the open meeting held on September 22, 2009, that the TMDL was a target, not a mandate. We respectfully disagree. The MS4 permit is tied to the TMDL and the waste load allocations (WLA), which makes this TMDL a mandate for the permitted facilities in the watershed. Please reference the permit language below:

Section 3 of the MS4 permit (MO-R0400) states the requirements if an MS4 is discharging to Water Quality Impaired Waters....

> If a TMDL has been finalized and approved by EPA for any waterbody into which the permittee discharges, the permittee, shall:
>
> - Determine whether the approved TMDL is for a pollutant likely to be found in stormwater discharges from the permittee's MS4 system;
> - Determine whether the TMDL includes a pollutant waste load allocation or other performance requirements specifically for stormwater discharge from the permittee's MS4;
> - Determine whether the TMDL addresses a flow regime likely to occur during periods of stormwater discharge;
>
> After the determinations above have been made ....assess whether the WLA are being met through implementation of existing storm water control measures or if additional measures are necessary;
>
> - Document all control measures currently being implemented or planned to be implemented. The permittee shall also include a schedule of implementation for all planned controls and shall document the calculations or other evidence that shows that the WLA will be met;
> - Describe a monitoring program to determine whether the stormwater controls are adequate to meet the WLA; and
> - If the evaluation shows that additional or modified controls are necessary, describe the measurements to be taken and the schedule for their implementation. The permittee shall continue meeting the requirements of

[this section] for this permit duration until the department determines WLAs are being met or that water quality standards are being met.

Section 6 of the Draft TMDL addresses the WLA requirements for the MS4. "*These values represent the weighted proportion of storm water runoff volume that* ***must*** *be reduced...through regulated activities*"

It is, therefore, our conclusion that the MS4s would be required to reduce the volume/or flow of runoff flowing into Hinkson Creek in the urbanized area, or be at risk of violating the Missouri Clean Water Law. If that is not the intention, please clarify that in the WLA, implementation and monitoring sections of the TMDL. If a phased approach is to be done for this TMDL, please provide a roadmap and timeline in the WLA portion of the document.

Boone County does not support the conclusions in the TMDL. A different approach is warranted to define the water quality impairment and set the TMDL.

This TMDL is based on the questionable conclusion that the aquatic invertebrate community has been negatively effected by the increase in urbanization (imperviousness) which has increased either the amount of water in the creek; or the amount of water at the extreme event (Q.03%). The purpose of the TMDL is to determine the pollutant loading a water body can assimilate without exceeding the water quality standards for that pollutant. This Draft TMDL uses flow (or volume) as a surrogate for any pollutant that may be found in stormwater runoff. Is there any data to support that a reduction in flow or volume would achieve water quality standards and restore the designated uses?

It is still unclear from the language in the Draft TMDL if a reduction in flow or volume is the target. These are two very different requirements. If a reduction in flow was the target, then the community could use detention basins to capture and slowly release the volume of water over a longer period of time. (See potential consequences below) If however, a volume reduction is required, then the community has to remove that amount of water from the watershed. So, once the required volume is captured, what can be done with it? The TMDL states reduction by either infiltration or evapotranspiration.

Ninety percent of the soils in this watershed have slow to very slow permeability. That's less than an half an inch per hour, under ponded conditions. Evapotranspiration rates are difficult to calculate, but by the Pan Method, we could expect about ½ inch per day. At that rate, it would take weeks to evaporate and infiltrate the water from a 0.5 inch storm. Remember, that is just from one event. The average rainfall for Boone County is 38 inches per year. For the last two years, this area received over 50 inches of precipitation. Even through detention and slow release, the same volume or amount of water is flowing through the channel, just spread out over a longer time period. A **volume** reduction of that magnitude is scientifically impossible. Clarification on this point is essential.

Appendix A of this comment letter is the report prepared by Geosyntec Consultants. That report identifies additional questions, comments and concerns with the current approach in the Hinkson Creek Draft TMDL.

DNR should incorporate the current ordinances and work with the locally developed SW management approach to set the requirements of the TMDL.

Hinkson Creek is a unique urban stream in Missouri. Throughout the City, the riparian corridor is mainly intact. This is due to Columbia's Flood Plain Ordinances. These protections have recently been increased to include the entire stream network with the new City/County Stream Buffer Regulations. The riparian corridors protect and stabilize stream banks, reduce stream temperatures, as well as add important nutrients and habitat for aquatic organisms. Although there are some sections of Hinkson that have been channalized, most of the stream system retains some sinuosity. These features may explain why the DNR studies find the aquatic invertebrates in Hinkson are partially to fully supporting over time.

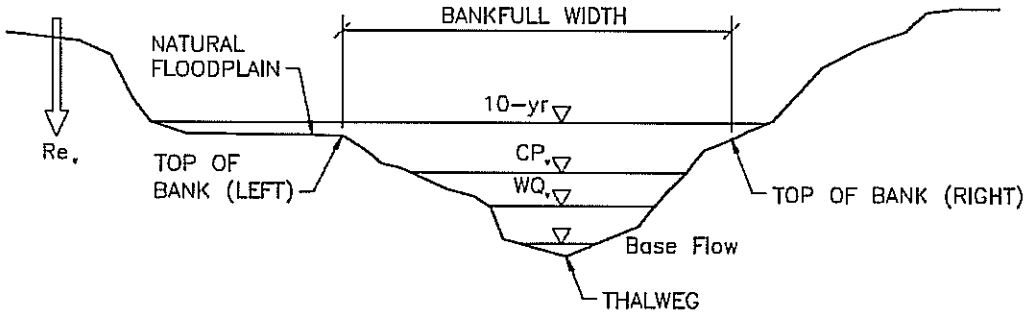
The community has worked since the early 2000's to develop our stormwater approach through engaged stakeholders and endless debates. Through that process the City and County have modified their approach; and finally have something the community can support. The enacted protective ordinances address water quality and flow reductions throughout the watershed. Both of the Stormwater ordinances for the City and the County require that the water quality volume (1.3 inches) be treated through a filtration BMP. This storm is frequently called the first flush, as it contains the majority of contaminants. The Draft TMDL should, at a minimum, incorporate the current City and County standards.

Suggested Approach

- More monitoring data is needed to correctly assess the health of the invertebrate community.
- Divide the watershed into subwatersheds
    - Determine if the problems are occurring from new development or previous development. If new, then recognize that the Phase II NPDES permit is addressing these. If previous, then set requirements for retrofitting in select areas of the watershed.
    - Determine the % impervious in each subwatershed; determine base flow needs; work with current ordinances to set Water Quality (WQ) storm and channel protection requirements.
- Use the Center for Watershed Protection (CWP) approach to segment and **treat** different runoff volumes.
    1. Runoff reduction – this is your recharge volume (Re). The center of watershed protection suggests 10% reduction. But with our heavy clay

soils, that is almost impossible to achieve. The Boone County ordinance requires 10% of the water quality amount or 0.14 inches.

2. Treat the Water Quality (WQ) storm. 90% of the rainfall events in Boone County are 1.3 inches or less. By requiring that this volume be run through a filtration BMP, we can capture the majority of pollutants in the runoff.
3. Provide channel protection. The two-year storm (3.5 inches in Boone County) will fill the creek channel. These bankfull events have the ability to modify the channel – often incising and eroding the banks. By capturing these flows and releasing them below the bankfull level, we reduce the amount of work that the water can do, thereby reducing channel erosion and degradation.
4. **Just doing those three levels of protection should treat and detain 96% of the rainfall events from new development.**



STREAM SECTION

Potential Consequences of this TMDL

- Detention Basins – to be the most effective, stormwater detention basins would have to be constructed low in the watershed. This would remove the riparian corridor, and established hardwood forest. DNR just developed nutrient criteria for reservoirs. During that process it was determined that impounded water needed a retention time of 6 months or more to achieve pollutant reduction. (Jones, 2008). Most stormwater detention basins drain in 48 hours or less.

  If the residents of Boone chose regional detention, it would be difficult to design a regional basin large enough to hold 6 months of flow. Therefore, this TMDL could create additional water quality impairments in those detention basins. Slow release of the stormwater, and fluctuating stream flow may increase the amount of time that the channel is full, destabilizing banks, and cause more erosion.

- Starve the stream – As stated during the public meeting on April 20, 2010, Engineers will design facilities to capture the runoff from a specific storm event. Runoff from storms under that threshold are also detained. Therefore, we could

potentially remove so much water that we actually starve the stream during drought times.

- Increase in the level of pollutants – This TMDL suggests that the community should capture the relatively clean water from rooftops, and lawns. This would mean that a larger percentage of the water that reaches the creek is from high polluting sources such as parking lots and streets. This could in fact increase the concentration of contaminants that enters the stream.

- Movement towards sensitive areas – The Grindstone Creek area has recently been connected to City sewer. It is now able to handle more growth than un-sewered watersheds like the Bonne Femme, Bear Creek or Perche Creek. If we increase the requirements of land-disturbance permits in the Hinkson Creek watershed, we may force development away from those areas. Our primary concern would be the Bonne Femme which is a sensitive area due to sinkholes, losing streams, cave recharge areas. Currently the majority of this watershed is unconnected to City infrastructure, such as sewer. On-sites in that area have a much greater potential to leak to the cave system.

- Loss of funding - unlike Waste Water Treatment Plants that receive billions of dollars in financial aid, grants and loans, there is very little federal or state money available for Stormwater programs. Municipalities must either fund activities out of general revenue, utility fees or taxes. Nonpoint source funding is only available if the activity is not covered in either the permit, or the Stormwater Management Plan (SWMP). Retrofits are currently not a requirement of the permit, or spelled out in the SWMP. By placing the volume reduction requirements in the WLA section of the TMDL, they become part of the MS4 permit. Therefore, any activities that would reduce the volume or move us toward that goal cannot be funded through nonpoint source funding (319).

- Cost to implement this TMDL. Cost estimates range up to $500,000,000 dollars to implement the TMDL in Hinkson Creek. The Potash Brook TMDL is in a similar situation, although Hinkson Creek watershed is 13 times larger. In January 2010, the VTDEC found the cost to implement that TMDL would be $25 million for the 7 m^2 watershed. Therefore, they have chosen not to implement until funding is available.

- Loss of public trust – Currently the Hinkson Creek Restoration Project and the clean sweep events help to tie the community to the watershed. The magnitude of the requirements in this TMDL, the inadequately proven science and the cost could unite the community against doing anything to help the creek.

In conclusion, we understand the problem of urbanization and we want to do the right thing. But to do that, we need a scientifically defensible TMDL. A TMDL that identifies a specific pollutant, or suite of pollutants, and sets a load requirement that is proportional to the problem. If the Department is requiring a volume reduction in the TMDL that amount needs to be clarified. A watershed wide volume reduction is impossible to meet, will cause environmental damage, and cost the MS4 millions of dollars to implement. We would suggest that the Department look at subwatersheds to determine the percent imperviousness, and set base flow and channel protection flow requirements per subwatershed. We highly recommend that the state work with the local community and the stakeholder developed stormwater approach to address the water quality problems in Hinkson Creek. Since flow (velocity) is only one aspect of the water quality concerns in Hinkson Creek, we would also suggest that DNR develop requirements to remove pollutants from the water quality volume (1.3 inches).

Whatever direction is decided, the Department needs to realize that the TMDL is tied to the MS4 permit. The statements in the TMDL can, and will, be used as a requirement for the permitted facilities, and NPS grant funding would then be unavailable for the community to use to implement stormwater retrofits.

Sincerely,

Karen M. Miller

Karen M. Miller
Boone County District II Commissioner

Cc: Todd Houts
John Glascock
Bill Florea
Georganne Bowman
Steve Hunt

Enclosures: Appendix A – Geosyntec Report
Appendix B - Specific comments and questions

Appendix B

Specific comments on the Hinkson Creek TMDL issued March 8, 2010.

1. Please provide more detail on the MSCI scores, and data quality objectives. How are the scores determined? What is considered fully supporting? Do the scores in reference streams ever drop to below fully supporting? What percentage of time does the stream have to remain fully supporting in order to achieve its designated use? How many temporal and spatial samples are needed? How does DNR determine the baseline? The end goals of this TMDL need to be clarified. At what point does the department consider the invertebrate population to be fully supporting? (75% of the sites for 2 sampling seasons?) Please clarify this in the TMDL.

2. Use of precipitation and flow data to develop flow duration curves. Figures 5, 6, 8 and 9 use flow and precipitation data from 2008 and 2009. Although a t-test was preformed, it is highly unlikely that the flow regimes are comparable. Please define flow regimes, and the methodology used. Both 2008 and 2009 were unusually high precipitation years (54 and 56 inches in part of the watershed, as opposed to 38 inches in a normal water year). The antecedent soil moisture conditions and frequency of rainfall would likely affect interception rates for summer runoff values, and flooding. How were these situations taken into consideration in these figures? What significance did previous rainfall events have on flow? The rainfall events surrounding the 5 highest flows (1-5 days before the high flow event) contain extreme rainfall amounts (up to 7 inches) preceding these “normalized” flows?

3. What flow regimes are being compared? In some sections of the document, we are looking at 1967, and 2007. In other areas we are looking at 1974 – 82, and 1986- 1991, and 2007-09. In other areas all of the data 1974-1991 is lumped together and compared to 2007-09. We argue that precipitation for 2007 – 09 were outliers and should not be used to set flow reductions. Additionally, none of the flow analysis periods used for the Hinkson correspond to the same time period in the “reference” streams, and only Big Creek overlaps.

4. How are the watersheds an order of magnitude larger than Hinkson Creek comparable?

5. The flow/volume reduction requirements are still not clear. Is this a 1-yr event, the runoff from a 1-yr event? The high flow event. Are we trying to reduce the cfs? If so, to what level? Can DNR put this into terminology that the engineers, developers, local MS4, and regulators can all understand?

6. In Section 2.5, the TMDL states that Stormwater runoff is nonpoint source pollution. That is partially true. However with the modification of the CWA in 1989 to include stormwater in the NPDES permit, and development of Phase I and Phase II, stormwater became a point source. Please clarify for the reader that although, SW has a diffuse component, it is now classified and treated as a point source, under management of the MS4.

7. Several statements are unsupported in the Draft TMDL. Please provide references or more information for the following:

    a. Section 2.4 defining the problem. DNR has received citizen reports regarding all five of the water quality problems mentioned above. Please provide dates and documentation.

    b. Section 2.6. "Specifically, this TMDL is aimed at restoring the stream's natural peak and base flow dynamics. Creating more natural stream flows will restore habitat and reduce the release of toxic pollutants into Hinkson Creek." How do the authors know which flows are needed for aquatic life? Flow does not control the release of toxic pollutants; it is only the transport mechanism. Please substantiate this second sentence. This TMDL only sets a reduction of the Q0.3 flow (I think) It does not require an increase in base flow. Please define the historic flow we are trying to achieve with this TMDL, and provide a hydrograph of historic flows.

    c. Which facility is referred to in the last sentence of section 3.1.2?

    d. Section 4.5 Water Quality Targets: Please substantiate the statement "reducing stormwater runoff volume to Hinkson Creek will address the vast majority of issues associated with the impairment and restore the aquatic life designated use …"

    e. Section 5. Load Capacity. Provide documentation to correlate volume, pollution, and fully supporting aquatic life.

    f. Section 7. Load Allocation – references table 13, but I think 14 is the correct table. However the information is not included in that table either, (allocation for different precipitation intensities). Also, is there more to that paragraph? It just seems to stop.

    g. Same section. Please detail how the Load allocation goals will be met through the implementation of the Hinkson Creek Watershed Management Plan? That plan mainly addresses urban nonpoint stormwater, while more than half the watershed is fringe, or agriculture. How will the nonpoint source load allocation be addressed for that portion of the watershed?

    h. Section 11. Implementation – The statement that the MS4 permittees have agreed to reassess the Hinkson Creek bio-community is incorrect. This monitoring was offered by the Central Missouri Development Council, not the MS4s.

8. There are at least three items in this TMDL that damage the credibility of the document, and may need to be evaluated to determine if they actually contribute to goals of the TMDL.

    a. The first is Tables 6 and 7. The statement in Section 3.1.5 is that "Based on data collected during the Hinkson Creek water quality studies, Table 6 and 7 were constructed to list stressors and conditions found in Hinkson Creek main stem and

selected stormwater outfalls." If that is the case, then provide the data and examples to support those stressors and conditions. The table states that pollutants such as caffeine discarded by drinks in parking lots are a major pollutant in stormwater. Does DNR have data to back that up? Is it more likely that this pollutant is mainly found in Combined Sewer Overflows, or septic waste? There are several items in table 7 that have an asterisk, but there is not a note or reference, which may lead the reader to believe that these tables were not constructed by DNR, but may come from another source, if that is the case, remove the previously mentioned statement, and cite the source.

b. The second is Figure 4. Under the section titled "5.1 Trend in Stormwater Runoff" The flow duration curves for April – July 1967 and 2007. Flow duration curves can be a useful tool in generalizing hydrologic condition. However, the curve should contain 10 – 30 years of daily average flow data. The use of a 4 month window to compare two years is not applicable, and does not illustrate a trend. The authors are drawing conclusions from two snapshots in time. The 1967 low flows may be due to sewage discharges, while the 2007 flows were during the 2nd of a two year drought, which may have depleted base flows. Without additional data and information, any number of conclusions could be drawn about these flow characteristics.

c. Finally, section 11.1 Green Infrastructure. Who is the target audience for this TMDL? Is it the intent of this document is to educate the reader on all of the ways to address stormwater, or just the DNR preferred way? The inclusion of this section slants the document and should be removed.

9. Define terms used in this document such as flow, volume, discharge, flow regime, stage, etc.

10. Grammar and technical writing.

    a. 3.1.3 Third paragraph, first sentence. Subject/verb agreement - two permits **were** issued.

    b. Section 4.4, is the use of bullets and numbers needed?

    c. 7. Load allocation. Is there additional information on the last sentence? Or is that the end? There should be a period somewhere.

    d. Check your tables and figures. There are several places within the document where the table and figure referenced is not the correct item.

Hoke, John

From: Tom Wellman [TEWELLMA@GoColumbiaMO.com]
Sent: Tuesday, April 20, 2010 9:21 AM
To: Hoke, John
Subject: Re: Pre-Public Notice Draft Hinkson Creek TMDL

Attachments: Signed 4_20_10 comments.pdf

Signed 4_20_10 comments.pdf (3...

Mr. Hoke,

Attached are the City of Columbia comments regarding the current draft of the Hinkson Creek TMDL.

Tom Wellman
Engineering Specialist I
Public Works Engineering
Columbia, Missouri
573-874-7250

CITY OF COLUMBIA, MISSOURI
PUBLIC WORKS DEPARTMENT

March 20, 2010

Mr. John Hoke
Water Quality Monitoring and Assessment Section
Water Protection Program
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176

Re: Hinkson Creek TMDL in Columbia, Boone County

Dear Mr. Hoke,

Thank you for the opportunity to comment on the draft of the Hinkson Creek Total Maximum Daily Load (TMDL).

In general, as noted in previous comments, the City of Columbia is very concerned about the proposed TMDL because the study to support it appears weak while the costs of implementing it will be very large. The present draft, while better than the first, is still plagued by the appearance of starting with an answer and reasoning backwards rather than using scientific study to clearly identify the problem(s) and reason forward to determine the solution(s).

The remedy in the second draft remains far out of proportion to what the studies of Hinkson Creek have found. According to the studies, the creek appears to be very close to the biological activity required for the stream—many places sampled achieved a score of sixteen, which DNR recognizes as fully supporting, and none received a score of less than twelve. Every location but one was fully supporting at some point during your study. Judging by the study done for Potash Brook in Vermont (a TMDL cited as a precedence for the Hinkson TMDL), Hinkson could be considered a high quality urban reference stream to which other streams in Missouri cities should be compared for attainment.

It is our belief that the stream is improving. Farming practices of the early 20th century removed most of the forest in the watershed which caused damage to the stream that it is still recovering from today. Many of the harmful effects said to stem from urban development today also came from farming practices then, including low baseflow as forests and prairies were replaced with pastures and row crops. The baseflow that is noted in the study to have been present in the late 1960's certainly contained a high percentage of effluent from water treatment operations effluent. Most of this effluent baseflow resulted from the delivery of piped, potable water to households in the watershed as opposed to rain water falling on the watershed. This effluent was known to be of poor quality which is why the City of Columbia has tried so hard to remove those facilities over the years. Since the middle of the last century, the City of Columbia, has eliminated approximately

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10 million gallons per day of poor quality treated effluent from Hinkson Creek. (This estimate is based upon the actual or design flows for 54 wastewater treatment plants that were eliminated.)

The City of Columbia wants to further the improvement of Hinkson Creek and make it as healthy as possible, but we want to be assured that what we do will make the stream healthier; and we want to do it as efficiently as possible. For instance, the removal of sewage treatment plant effluent "baseflow" has certainly improved the quality of water for aquatic life. By contrast, there remains the possibility that too much control of volume and flow, called for by this TMDL, can be as damaging as not enough control, and spending so much effort and money to reach an inordinately high target will take money away from the numerous other water quality concerns we have to manage.

This is particularly troubling when a method for approaching this TMDL exists which would ensure that we do more precisely what is needed; a phased approach. It has never been adequately explained to us why a phased approach is off the table when it makes so much sense to use it in this situation. The studies that have already been done, while not identifying a pollutant of concern, make it easier to target a phased approach so that Hinkson Creek gets the help it needs in a timely manner.

We are heartened to see something of a phased approach in the implementation, but it appears to us that only the Wasteload Allocation part of the TMDL has the force of law. This being the case, the implementation could potentially be thrown out by a permitting authority (whether EPA or DNR), or by a lawsuit brought against the City, the MS4 or DNR. Therefore, a phased approach needs to be in the regulatory portion of the TMDL.

To expend a great deal of time, effort and money to reach a goal that is so poorly supported by scientific study seems to us unwise, not to say irresponsible.

A more detailed list of comments follows:

Section 2.1

Impaired section described here does not match that shown in the drawing on page 2.

Section 2.2

Areas that have been urban for some time in Flat Branch and County House Branch are shown as Grassland or Forest in the 1993 graphic. Those watersheds were essentially built out by 1993 and very little development has occurred in them since.

Much of the development noted on page 2 in the second paragraph (inset) was in Bear Creek. Therefore this overstates the case.

Section 2.3

The assertion in the first paragraph that soils become more permeable in the lower third of the watershed is not supported by the following paragraphs. In those paragraphs it is noted that most of the land in the lower third, though well-drained has slow infiltration. It is more true to say that the soils become a little more permeable as one moves from the ridge of the watershed to the

floodplain. And, in fact, the more permeable floodplains remain remarkably untouched and open through Columbia.

Most soils in the watershed provide less than the recommended ½" per hour for infiltration which is the minimum generally recommended for infiltration type practices. This will limit the effectiveness of vegetated infiltration practices like rain gardens.

Section 2.5.1

The sample size of the biological assessments is small. Some of the poor scores were explained by things that were immediately addressed such as salt laden runoff from a road maintenance facility and poorly stored insecticides. The limited number of assessments done reveal a stream that is hovering near attainment so that the costs of the proposed rule are enormous compared to the problem being addressed.

Section 2.5.2

Most of the runoff from the area noted now runs through water quality BMPs, and the road salt storage facility is no longer there.

Section 2.6

Last clause in the last sentence of the second paragraph: there is no assurance that attainment of water quality standards will follow from this TMDL because the studies that are said to support it are inconclusive.

The regulations do not seem to support the use of a surrogate for an unidentified pollutant. They support the use of a surrogate for a pollutant that has been identified but is difficult to measure or regulate, and for which a clear relationship between the surrogate and the pollutant(s) can be established.

The regulations do support the use of a phased approach to TMDLs. The ability to use a phased approach appears to have been included in Federal regulations for just this situation; an inconclusive study coupled with the need to begin addressing the situation as soon as possible.

Section 5

In this section runoff volume is said to be the surrogate, but later in the document the target given is flow. The two are related, but there are situations in which flow can be reduced although volume stays the same. This is the case with traditional dry detention, for instance. This inconsistency should be rectified.

With respect to what this section says about volume, volume is not the only concern, timing is important, too. We can envision a situation in which we do an excellent job of volume control and leave stream life starved for water during critical times of its life cycle.

Section 5.1

First paragraph: the comparison given does not really show anything except that there was more flow during four months in 2007 than the same four months in 1967. There are many reasons why this could be true. A much longer study time is needed to show a relationship.

Second paragraph: as noted near the beginning of this comment letter, another reason that base flow has decreased is that numerous small waste water treatment facilities have been removed by diverting this often-polluted flow to the City's waste water treatment plant. The ultimate origin of this baseflow was well water from much lower in the watershed and/or the Missouri river floodplain, not infiltration of rainwater

Section 5.2

Last sentence: see other comments above regarding base flow.

Section 5.3

First paragraph: here the target is said to be runoff reduction whereas later in this section it is said to be flow.

Second paragraph: why was the flow value of 0.3 percent chosen? In the Potash Brook TMDL, it was chosen because studies of the stream showed that was the flow that tended to move the sediment which was impairing the use. This was a clear link between the impaired use, the pollutant, and the TMDL. No such link is presented here.

Section 7

This section is speaking of runoff volume as the load allocation whereas Section 5 largely speaks of flow as the target.

The reference to Table 13 is incorrect.

Section 11

Sixth paragraph (inset): the one year average annual storm is not the Water Quality Storm. The Water Quality Storm for the Columbia area is 1.3 inches, which approximately represents the depth of 90% of all 24-hour rain events and thus a little more than 90% of the rainfall volume. The MS4 intended to say that focusing on the water quality storm for volume reduction could result in the modest volume reductions proposed for the one-year average annual stream flow at the official stream gauge.

A basis of comparison still needs to be established for the one-year average annual flow measured at the stream gauge near Providence Road if this approach is used.

Section 11.3.1

The second sentence makes it seem as if grassy and/or vegetative swales are the only low impact development practice.

In summary, the proposed TMDL is not supported by the studies done on the creek. The work required by the proposed TMDL is far out of proportion to the impairment found by studies. Judging from what we know of what was happening in the watershed in the early-to-mid twentieth century, the stream is likely improving. Columbia wants to further the improvement with what the stream actually needs rather than an expensive approach which is only assumed to work. Federal guidelines support the use of a phased approach to TMDLs in situations such as this. We propose that a phased approach be used; that the approach given in the implementation section be used as a starting point and that it be brought into the regulatory part of the TMDL.

Again, thank you for the opportunity to comment on this regulation which will have such a great impact on our City.

Respectfully,
Columbia Public Works

John Glascock, P.E., Director

c: Todd A. Houts, University of Missouri Asst. Director of Environmental Health and Safety, City-County-University Joint MS4, University Representative

Bill Florea, Boone County Senior Planner, City-County-University Joint MS4, County Representative

Hoke, John

From: Tom Wellman [TEWELLMA@GoColumbiaMO.com]
Sent: Thursday, April 22, 2010 2:30 PM
To: Hoke, John
Subject: Additional TMDL Comments

Attachments: Signed Convey Geosyntec Comms.pdf

Signed Convey Geosyntec Comms...

Mr. Hoke,

Attached are additional comments that Columbia Public Works wished to be included in the record of public comments.

Thank you, and thank you for coming to speak with us Tuesday. We have to run contentious meetings, too, from time to time. I and, I'm sure, others in the room admired the composure you showed.

Respectfully

Tom Wellman
Engineering Specialist I
Public Works Engineering
Columbia, Missouri
573-874-7250

CITY OF COLUMBIA, MISSOURI
PUBLIC WORKS DEPARTMENT

April 22, 2010

Mr. John Hoke
Water Quality Monitoring and Assessment Section
Water Protection Program
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176

Re: Hinkson Creek TMDL in Columbia, Boone County

Dear Mr. Hoke,

Enclosed, please find comments from a technical review performed by Geosyntec Consultants at the request of the City's joint MS4. We wish these to be made part of the record of public comments on the proposed Hinkson Creek TMDL

Again, thank you for the opportunity to comment on the proposed TMDL.

Respectfully,
Columbia Public Works

John Glascock, P.E., Director

Enc.

c: Todd A. Houts, University of Missouri Asst. Director of Environmental Health and Safety, City-County-University Joint MS4, University Representative

Bill Florea, AICP, Senior Planner, Boone County Planning and Building Inspection, City-County-University Joint MS4, County Representative

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Final Memorandum

Date:	21 April 2010
To:	Georganne Bowman, Boone County Public Works
	Tom Wellman, Public Works Department, City of Columbia, MO
	Todd Houts, University of Missouri
Copies to:	Eric Strecker, P.E., Geosyntec Portland, OR
From:	Trent Stober, P.E., Geosyntec Columbia, MO
Subject:	Technical Evaluation of Draft Hinkson Creek Total Maximum Daily Load (TMDL)

1. BACKGROUND

Hinkson Creek is a perennial Ozark-border stream draining a 90 mi^2 catchment in Boone County, Missouri. In 2004, Hinkson Creek was placed on Missouri's list of impaired waters ('303(d) list') as some monitored reaches did not fully attain applicable biocriteria metrics at frequencies specified by regulatory guidance. The pollutant initially listed as causing the aquatic life impairment was 'unknown'. Bioassessment and ecotoxicology evaluations performed by the Missouri Department of Natural Resources (MDNR) through 2006 did not conclusively identify a causative agent. A draft Total Maximum Daily Load (TMDL) document for Hinkson Creek included for Public Notice on March 8th, 2010 targets reductions in stormwater runoff as a surrogate for a cumulative, but unidentified mixture, of pollutants that may occur in urban and agricultural environments.

A Municipal Separate Storm Sewer System (MS4) permit is jointly held by the City of Columbia, MO, Boone County, and the University of Missouri. At the request of MS4 co-permittees ('permittees'), Geosyntec conducted a third-party technical review of the methods and approaches used in developing the TMDL. This memorandum conveys conclusions and specific comments identified during our review. Where possible, we have suggested approaches that may improve the usefulness or defensibility of TMDL elements. Section 2 summarizes the major findings of our review. Specific technical comments related to hydrologic, landuse, and biologic data interpretations are included in Section 3.

2. SUMMARY OF FINDINGS

Aquatic communities inhabiting streams and rivers flowing through urban areas are exposed to a variety of stressors that are either not present in undeveloped landscapes, or occur less frequently. Measures of aquatic community health and biologic integrity have been negatively correlated with impervious area metrics (Miltner et al. 2003, Schuler 1994, Klein 1979). However, as Adams (2003) points out, statistically significant correlation does not establish causation.

In order to meet mandated TMDL development timelines, MDNR and the U.S. Environmental Protection Agency (USEPA) are required to move forward with establishing a TMDL for Hinkson Creek. The draft TMDL currently on Public Notice prescribes a significant catchment-wide reduction in runoff as a surrogate for a stressor-effect relationship that MDNR has been unable to establish or quantify. In general, our review finds that runoff reduction targets cited in the TMDL are not well supported and are ambitious, given the uncertainty of key technical linkages. Uncertainties identified in our review include but are not limited to:

- Stressor-Effect Relationship. The draft TMDL does not establish causality between runoff and beneficial use attainment in either Hinkson Creek or 'attainment' streams. Information presented in the TMDL does not provide any assurance that benthic macroinvertebrate metrics will respond to changes in stormwater runoff.

- Runoff and Baseflow Time Trends. Information contained in the TMDL does not demonstrate that runoff volume has increased or that baseflow has decreased in the Hinkson Creek watershed over time.

- Comparability of Attainment Streams. It is not clear what methodology grounded in peer-reviewed literature, or agency guidance, supports the process used to select 'attainment' streams set forth in the TMDL.

- Current and Historical Impervious Landuse. Landuse data and analysis cited in the TMDL are inconclusive. While impervious area has likely increased in the Hinkson catchment to some degree, GIS coverages used in the TMDL are not well suited for demonstrating urban landuse changes at the scale of interest.

Given the documented increases in population and residential development in the Columbia area, there is little doubt that runoff into Hinkson Creek has increased compared to the 1960s. However, information presented in the draft TMDL does not demonstrate or quantify temporal changes in Hinkson Creek hydrographs. Little tangible evidence is offered in the TMDL that supports changes in runoff volume are responsible in whole, or in part, for periodic depressions in benthic macroinvertebrate scores.

We believe that additional stressor-response data and a more refined hydrologic analysis approach are necessary to assure that compliance with TMDL targets will yield consistent attainment of Hinkson Creek aquatic life uses. In addition, we suggest that attainment of biocriteria at frequencies prescribed by Missouri's 303(d) listing methodology and biocriteria documents serve as the primary TMDL target as (1) bioassessment scores served as the rationale for listing Hinkson Creek as impaired and (2) site-specific causal relationships between runoff and ecological health have not been established in the TMDL.

3. SPECIFIC COMMENTS

3.A. HYDROLOGIC ANALYSIS AND INTERPRETATION

Comment 3.A.1. Periods of record for comparative analyses appear to be inconsistent.

Comparison of landuses from 1993 and 2005 are presented to support the claim of increased imperviousness. However, the flow-duration curves presented in Section 5.1 are compared for 1967 and 2007. Because the time periods of comparative analysis differ, potential changes to *the flow-duration curve are not clearly the result of unquantified changes in urbanization.* Is it possible that changes in farming practices or climatic patterns have influenced hydrograph and flow-duration characteristics?

We also request explanation of the following period-of-record related comments and observations:

- In Table 8, precipitation and flow statistics for 1967 and 2007 are compared for the April 1 – July 31 period. Why are only 4 out of 12 months of available data being used to describe precipitation and runoff? Should MDNR believe that conclusions drawn from fall biological surveys are relevant in assessing use attainment in Hinkson Creek, it would seem appropriate that flow data collected in the late summer/ fall season also be incorporated into hydrologic analyses and comparisons. How do we know that antecedent precipitation regimes did not influence the results a 4-month comparison? Furthermore, as precipitation and streamflow data generally do not follow a normal statistical distribution, we question the use of the arithmetic means to describe central tendencies. If the period of record is expanded to all available and comparable months for 1967 and 2007 (March 11 – December 31, n=296), we note that the median, geometric mean, and cumulative Period of Record (POR) streamflow values for 1967 (median=5.75 cfs) are greater than values for 2007 (median= 3.05 cfs). Side-by-side boxplots of the two data sets (Exhibit 1) indicate both years have very skewed daily average flows, *which suggests that the arithmetic mean is a biased estimator* and the median is a more appropriate metric of the central tendency of data. More importantly, the medians are not statistically different from each other based on the non-parametric Mann-Whitney test (p=0.95).

The lack of statistical difference between the median daily average flow for 1967 and 2007 indicates that *the data do not support the claim that the flow regime in the creek has been significantly changed.* It is not clear why a truncated period of record was selected.

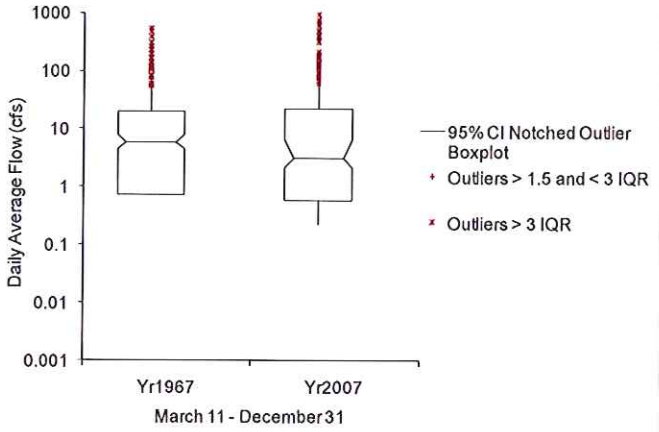

Exhibit 1. Side-by-side boxplots of daily average flows for 1967 and 2007 (USGS 06910230 Hinkson Creek in Columbia, MO)

- In reference to Figure 4 and based on the arguments presented above, the full available and comparable period of record (April 1 – December 31) should be presented to capture seasonal patterns in rainfall and runoff. In addition, we note that higher baseflows in 1967 (referenced in relation to Figure 4, Page 21) could be attributed to wastewater treatment facilities (WWTFs) that historically discharged to Hinkson Creek. Approximately fifty-three (53) WWTFs that discharged historically within the Hinkson Creek basin have been eliminated. *It is not clear that presumed reductions in baseflow can be wholly attributed to unquantified infiltration reductions in the catchment.*

  We also point out that Figure 8 suggests that Hinkson Creek has a relatively high normalized base or low-flow compared to reference streams. We suggest that MDNR conduct a baseflow separation and trend analysis on the entire period of record at the Hinkson gage to determine if baseflows from discharging groundwater have significantly decreased over time and whether any changes are due to other causes.

- Flow duration curves inherently require long-term continuous flow records to adequately capture the large variation in rainfall and runoff characteristics. *The selection of only four months (April 1 – July 31) for only two individual years (1967 and 2007, Figure 4) is not adequate for identifying differences in precipitation-runoff responses.* Presumed differences in the flow-duration curves could be attributed to differences in precipitation characteristics alone. A comparison of the intensity-duration curves should supplement the flow-duration curve analysis to ensure differences in precipitation characteristics are not the cause of the presumed differences in the flow-duration relationship. Also, the trend analysis uses precipitation data from two different rainfall gages without evaluating whether the observed trends are simply due to differences in rainfall characteristics at the two gages. The Columbia Regional Airport weather station (COOP ID 231791) includes hourly data from 1970 through 2010. *A single gage should be used or the differences between the gages should be quantified and accounted for in the analysis.*

Comment 3.A.2. Runoff volume trend analysis appears to be incomplete and may be inconclusive.

Long-term flow data from the USGS gauge in Hinkson Creek was used with rainfall records from two separate weather stations to develop a multivariate regression stormwater runoff model for the watershed. In addition to rainfall, the other independent variables included the year and month. There are several technical shortcomings present in this analysis. These concerns are discussed below.

- Figure 5 is a linear regression of rainfall versus storm event runoff volume, but there is no discussion of how rainfall events were defined (e.g., 24-hour totals, 6-hour hour minimum inter-event times etc.) or how storm event runoff volumes were computed (i.e., baseflow separation methods). Methods, models, or algorithms used to calculate runoff and baseflow volumes (Appendix C) from USGS streamflow records are not documented or described in the TMDL. A fundamental premise of the TMDL is that runoff volume has increased over time, yet there is no means of being able to determine how runoff volume was calculated or derived in the TMDL. MDNR should provide additional documentation that describes the methods and assumptions used in developing runoff and baseflow volumes, listed in TMDL appendices. All runoff calculations should be based on streamflow data averaged over the same time period. Runoff volumes computed from daily average flows are not comparable to volumes derived from hourly average flow values.

- The multivariate regression model shown on Page 22 that relates runoff volume to precipitation, year, and month has a low coefficient of determination (R^2). Pearson's coefficient of determination (R^2) describes the fraction of the variance in the dependent variable that is explained by one or more of the independent variables. An R^2 of 0.37 indicates that only 37% of the variation in runoff volume can be explained by precipitation and time. In other words, the majority (1-0.37=63%) of the runoff volume record is explained by factors and variables other than time and precipitation. While the regression model as a whole may be statistically significant ($p<0.05$), the model is not particularly meaningful with such high unexplained variability. Also, the significance of the individual linear coefficients was not documented. A fundamental component of multivariate regression analyses is to evaluate the relative importance of the independent variables and ensure the residuals are independent and identically distributed. Most importantly, the statistical significance of the stated 3.4% increase in the logarithm of runoff volume must be provided to verify the validity of the model. *We recommend MDNR include p-values for each coefficient included in the model and then only include variables with $p<0.05$.*

  Other factors that may influence changes in streamflow include precipitation type (rain or snow), changes in watershed characteristics, and rainfall intensity. Much of these data are likely available for the Columbia area and it is not clear why these other factors (independent variables) were not included in the multiple regression analysis. As currently presented, the multivariate regression does not add any substantive technical value to the TMDL.

- The t-test (Table 9) describing differences for the two periods, 1974-1991 and 2007-2009, was performed on runoff volumes adjusted for precipitation and season. It is not clear how these adjustments were made. If the multivariate regression model was used to predict the runoff volumes, the t-test is not valid because the differences would be a direct result of the presumed 3.4% increase in the logarithm of the runoff volume. MDNR should clearly describe the method for adjusting the runoff volumes so the analyses can be duplicated and independently verified. Also, the appropriateness of using the t-test on the logarithms of the runoff volumes should be demonstrated. The t-test is only valid on normally-distributed data. Therefore, the distribution of the logarithms of the volumes should be documented. For the purposes of transparency during re-analysis, it is recommended that MDNR use distribution-free methods (non-parametric) for evaluating statistical differences, unless normality is clearly demonstrated.

- It is not clear what rationale supports purposeful selection of unequal sample sizes in the t-test included as Table 9. *The period for 1974-1991 (n=87) has nearly twice the number of samples compared to 2007-2009 (n=45).* Furthermore, why was the period of 1974-1991 selected? We note that Figure 4 and Table 8 use 1967 as a reference for a less-impacted hydrograph.

Comment 3.A.3. Rationale for modeling approach and TMDL attainment stream analyses are unclear.

Four streams within the same ecoregion of Hinkson Creek that are achieving their biological metrics were selected for flow-duration comparisons. Flow-duration curves for these watersheds were adjusted based on watershed size and annual precipitation. However, the rationale for, and the details of, these adjustments are not provided. All of the attainment streams have larger watersheds with different landuse areas compared to Hinkson Creek. Dividing each flow rate by the watershed size and annual precipitation does not adequately account for differences in runoff volumes, flow rates, or rainfall characteristics (e.g. intensity, timing etc.). Many other watershed factors must be considered including imperviousness, soil types, and time-of-concentration. Time-of-concentration can have a significant impact on the flow duration curve and is affected by slope, degree of channelization, stream order, surface roughness, etc. *Because of these many factors, rainfall-runoff relationships are very non-linear and very watershed specific.* As such, the validity of the simple linear adjustment that was made to flow duration curves is highly questionable. Also, the selection of the 1-year return flow for the target flow appears arbitrary and is not supported by monitoring data or analysis that would suggest this return period is biologically or geomorphologically significant. The selection of a slightly different return period, such as 2 times per year or 2/365=0.5% instead of the 0.3% value, the target flow rate reductions would be nearly 50% less (i.e., target reductions would be approximately 25% instead of 50%).

Comment 3.A.4. TMDL requirements are unclear.

Throughout the TMDL, flow is used interchangeably with volume, but these are two distinctly different hydrologic metrics that have very different control strategies. Flow rate reductions may be achieved using detention storage with controlled release to shave peaks, while volume reductions require increased infiltration, evapotranspiration, and/or harvest and use. Because the target reductions are based on a comparison of flow duration curves at the 1-year return period, one may surmise that flow rate reductions are required such that the 1-year peak flow in Hinkson Creek must match the target 1-year peak flow of the attainment streams. The applicability of these reductions for any other flow return period is not supportable because the differences between Hinkson Creek and the attainment streams vary with the frequency of occurrence.

If the intent is to require volume reductions, then flow-duration analyses are inappropriate. *Instead, a comparison of average annual runoff volumes or a comparison of design storm runoff volumes should have been conducted.* MDNR should clarify the proposed metric for this TMDL and at what temporal scale it applies. If flow-duration curves are determined to be the parameter of interest, then flow-duration matching should be the TMDL goal vs. volume reduction, with specified parts of the flow-duration curve based upon geomorphic analyses supporting the beneficial use.

Comment 3.A.5. Volume reductions may cause increases of in-stream concentrations.

Without understanding the sources of pollutants and delivery pathways from certain landuses, basin-wide reductions may actually increase in-stream concentrations due to less dilution. Lumping of all urban landuses for the landuse-based TMDL allocations may cause increases in concentrations. Commercial and industrial areas will have fewer opportunities for reducing runoff volumes than residential areas and infiltration may even be prohibited for some types of industries. However, commercial and industrial landuses generally produce higher concentrations for several pollutants. *If residential areas reduce runoff volumes more than commercial and industrial areas, then in-stream concentrations could increase.*

Comment 3.A.6. Reductions in runoff may not proportionally reduce unidentified pollutant loading.

Understanding pollutant generation, transport, and delivery processes are necessary in developing effective control and restoration measures. Application of a catchment-wide surrogate for a pollutant is likely to yield unintended consequences. Reducing runoff volume (transport medium) on a basin-wide basis infers that beneficial uses as measured by macroinvertebrate scores respond in a continuous, linear, and negative manner to pollutant load. However, toxicological responses are frequently concentration-driven, often threshold in nature (not continuous), and may be non-linear (sigmoid).

If periodically lower biological metrics are the result of discrete activities that have been remediated or abated, such as chloride wash-off from road salt storage facilities, how will basin-wide runoff reductions improve ecological health? Furthermore, if impacts were related to chloride or other 'urban' contaminants, how will reducing runoff from agricultural land benefit biological scores?

Many contaminants may be transported by fine sediment in the adsorbed phase. Although not documented, contaminated sediments could be a critical exposure pathway for macroinvertebrate communities in Hinkson Creek. Adsorbed pollutants are subject to sediment transport and delivery phenomena that can operate at timescales much slower than the Hinkson Creek study period (2001 – 2006). It is possible, but uncertain, that biological scores may have been affected by contaminated sediment generated several years ago that is now being released from storage

and delivered to the Hinkson Creek channel. *We note that MDNR survey reports suggest that evaluating the effects of sediment should be considered in subsequent investigations.* Where contaminated sediment may represent a significant exposure pathway, the role of sediment budgeting techniques (Walling and Owens 2003, Walling 1999) may be useful during TMDL re-analysis.

Comment 3.A.7. The runoff reduction approach does not adequately consider groundwater delivery processes or alterations in the water balance.

The runoff reduction approach posed by the TMDL does not adequately consider fate and transport of pollutants that may contaminate groundwater in urban areas. For example, if the unidentified pollutant(s) are discharged from groundwater sources during baseflow conditions then reducing runoff volumes could potentially increase overall in-stream concentrations. In addition, increasing infiltration in areas where soils are contaminated, or where known up-gradient plumes occur, could in fact cause an increase in pollutant(s) reaching Hinkson Creek.

Targeting runoff volumes calculated from the 1960s is an incomplete approach and does not consider the water balance as a whole. To achieve streamflow characteristics from the 1960's, we may actually have to infiltrate volumes of water that exceed historic rates due to potential reductions in evapotranspiration (Grimmond and Oke 1999). *The TMDL should consider propagated effects on the urban water balance if a runoff-reduction approach continues to be pursued.*

3.B. LANDUSE ANALYSIS AND INTERPRETATION

Comment 3.B.1. Landuse categories in the draft TMDL do not reflect underlying MORAP datasets.

Based on our analysis of the 1993 and 2005 Missouri Resource Assessment Program (MORAP) datasets, we note that there is no strictly "urban" landuse category as presented in the draft TMDL (Exhibit 2). Additionally, the landuse categories differ between the 1993 and 2005 MORAP data and are therefore not directly comparable.

Exhibit 2. Hinkson Creek landuse based on 1993 and 2005 MORAP landuse/land cover data

1993 Land Use Categories	Acres	2005 Land Use Categories	Acres
Urban Impervious	3,819	Impervious	2,758
Urban Vegetated	747	High Intensity Urban	1,288
Barren or Sparsely Vegetated	0	Low Intensity Urban	7,843
Row and Close-Grown Crop	7,462	Barren or Sparsely Vegetated	79
Cool-season Grassland	27,892	Cropland	6,641
Warm-season Grassland	11	Grassland	21,950
Glade Complex	0	Deciduous Forest	14,259
Eastern Redcedar and Redcedar -Deciduous Forest and Woodland	4,348	Evergreen Forest	366
Deciduous Woodland	874	Mixed Forest	0
Deciduous Forest	11,817	Deciduous Woody/Herbaceous	195
Shortleaf Pine-Oak Forest and Woodland	0	Evergreen Woody/Herbaceous	0
Shortleaf Pine Forest and Woodland	0	Mixed Woody/Herbaceous	0
Bottomland Hardwood Forest	59	Woody-Dominated Wetland	634
Swamp	0	Herbaceous-Dominated Wetland	49
March and Wet Herbaceous Vegetation	21	Open Water	1,389
Open Water	401		
Total	**57,451**		**57,451**

Note: Acreage values are based on the Hinkson Creek watershed boundary GIS shapefile provided by MDNR. Acreage values provided above may differ slightly than those found in Tables 1 and 2 in the draft TMDL. It appears that MDNR may have used different versions of the Hinkson Creek watershed boundary GIS shapefile to calculate acreage values in the draft TMDL.

Despite dataset differences, MDNR appears to have grouped the following landuse categories into a single "urban" category:

- 1993 MORAP landuse categories grouped as "urban" by MDNR:
  - Urban impervious
  - Urban vegetated
- 2005 MORAP landuse categories grouped as "urban" by MDNR:
  - Impervious
  - High intensity urban
  - Low intensity urban

By grouping 1993 and 2005 data in this manner, the draft TMDL infers that all urban landuses contribute equally to stormwater runoff. However, not all urban uses are equal and their impacts to stormwater runoff differ substantially. We also note that increases to "urban" area referenced in the TMDL are due to the definition of "low intensity urban" landuses. The 2005 MORAP metadata defines "low intensity urban" as "vegetated urban environments with a low density of buildings". It is highly unlikely that "low intensity urban" landuses contribute to stormwater runoff with the same magnitude as "impervious" landuses.

Comment 3.B.2. The assertion that percent "urban" land cover increased approximately 160% from 1993 to 2005 is not supported by the underlying MORAP datasets.

The 2005 landuse category "low intensity urban" has no "urban" landuse counterpart in the 1993 dataset. We note that comparison of the 2005 MORAP dataset with aerial imagery indicates that "low intensity urban" is primarily residential land. Based on our aerial imagery analysis, we also note that residential land is generally *excluded* from any "urban" landuse category in the 1993 MORAP dataset. As further evidence, we performed a GIS spatial analysis of the MORAP datasets and found that the 2005 "low intensity urban" landuse was identified by any one of 10 different categories in 1993 (Exhibit 3). Of the 7,843 acres categorized as "low intensity urban" in 2005, non-"urban" landuses, as identified by the 1993 dataset, accounted for 6,450 acres (i.e., 82.2%). However, this does not indicate an actual increase in "urban" landuse as suggested in the draft TMDL. *Neighborhoods established well before 1993 are generally categorized as "cool-season grassland" or "deciduous forest" in the 1993 dataset.* Again, as noted above, few if any residential neighborhoods are identified under any "urban" category in the 1993 dataset. Therefore, it may not be appropriate to draw any conclusions regarding urban area increases attributed to the 2005 "low intensity urban" landuse category.

Exhibit 3. Distribution of 2005 "Low Intensity Urban" acreage within landuse categories established in 1993 for the Hinkson Creek watershed.

1993 MORAP Land Use Category	2005 "Low Intensity Urban" Acres
Urban Impervious	1,279
Urban Vegetated	114
Row and Close-Grown Crop	178
Cool-season Grassland	3,949
Warm-season Grassland	2
Eastern Redcedar and Redcedar -Deciduous Forest and Woodland	635
Deciduous Woodland	44
Deciduous Forest	1,627
March and Wet Herbaceous Vegetation	0
Open Water	15
Total	7,843

Note: Acres do not represent the total number of acres within the Hinkson Creek watershed, but rather the number of acres within the 2005 "low intensity urban" landuse category. This analysis was performed using the intersect tool in ArcGIS .

A more appropriate comparison between the 1993 and 2005 MORAP datasets might be between the following categories:

- "Urban impervious" (1993 dataset) and "impervious" (2005 dataset), and
- "Urban vegetated" (1993 dataset) and "high intensity urban" (2005 dataset).

However, this would suggest a decrease of approximately 1,061 acres in impervious urban area from 1993 to 2005. Comparing "urban vegetated" to "high intensity urban" suggests a nominal increase of only 541 acres from 1993 to 2005 (Exhibit 2). We also note that our spatial analysis presented in Exhibit 3 suggests that 1,279 acres of "urban impervious" land was converted to "low intensity urban" from 1993 to 2005. Given the cited differences between 1993 and 2005 datasets, it is unlikely that definitive time-trend conclusions regarding urban landuse in Hinkson Creek may be determined from MORAP datasets.

Comment 3.B.3. Landuse data from 1976 was not presented or discussed.

We note that MDNR did not consider 1976 landuse GIS data as part of the TMDL. Landuse data provided by MDNR suggests there were approximately 6,978 urban acres within the Hinkson Creek watershed in 1976, whereas the draft TMDL suggests there were approximately 4,527 urban acres in 1993. There was likely no such decrease in urban landuse, but further underscores the questionable validity of available landuse datasets in establishing meaningful time-trends.

Comment 3.B.4. Inconsistencies between the MORAP datasets suggests inaccuracies and lack of comparability.

We note that Tables 1 and 2 in the draft TMDL suggest that open water acreage within the Hinkson Creek TMDL increased from 422 to 1,439 acres from 1993 to 2005. Closer inspection of the data and associated metadata suggests this does not represent an actual increase in open water acreage, but rather improved techniques for classifying waters between 1993 and 2005. Although the datasets suggest an increase of approximately 240% in open waters, in actuality there was likely no change. *This illustrates that landuse data digitized under different methodologies are not comparable.*

Although MDNR's series of stream evaluations did include elements of USEPA's Stressor Identification Guidance (Cormier et al. 2003), it appears as if MDNR's approach did not support the structured assessment methods recommended by USEPA and the technical literature. As a result of MDNR's approach, some important data (e.g., biological samples in Hinkson Creek and flow attainment streams) were collected inconsistently or, as MDNR itself admits, not collected at all. For example, on page 11 of the draft document, MDNR states the following:

"Sediment, a pollutant which could explain the low level of impairment, was not studied. Sediment has been established as the primary source of impairment in numerous TMDLs throughout the country."

MDNR should consider re-evaluating stressors in Hinkson Creek and attainment streams according to a structured watershed monitoring plan which adheres to stressor identification guidance and the technical literature. Adams (2003) offers several criteria useful in establishing causation between stressors and observed effects.

Comment 3.C.3. Biomonitoring endpoints should serve as the primary TMDL target.

The TMDL document suggests that a 50.5% reduction in stormwater runoff is required to attain acceptable protection of the biological community (Page 27, Table 12). If a linkage between stormwater runoff and the biological community does exist we question whether a 50.5% reduction or some other value would be required to achieve a fully supporting biological community based on macroinvertebrate data collected since 2001. *This further suggests that achieving a fully supporting biological community should be the primary water quality target rather than a reduction of stormwater input, since aquatic life impairment is the driver for placement of Hinkson Creek on the impaired waters list.* On Page 11, Section 2.6, 2nd paragraph of the Hinkson Creek TMDL it says that "Federal regulation also states that TMDLs may be established using a biomonitoring approach as an alternative to the pollutant-by-pollutant approach [40 CFR 130.7 (c)(1)])." Again, it is unclear to us why biomonitoring is not the primary water quality target instead of a technically unsupported runoff reduction.

Comment 3.C.4. The biological community in Hinkson Creek may not be currently impaired.

With the exception of the spring of 2002 assessment, macroinvertebrate samples collected by MDNR have shown the urban portion of Hinkson Creek to be *fully supporting or very nearly so each time the biological community has been evaluated* (MDNR 2002, 2004, and 2006). The last comprehensive investigation of the macroinvertebrate community was conducted by MDNR in the fall of 2001 and spring of 2002. To our knowledge the last macroinvertebrate sampling of any kind was performed by MDNR in the spring of 2006, nearly 4 years ago. We believe that a more methodical investigation into the biological community is warranted to better understand the biological health of Hinkson Creek.

"attainment" streams selected for the Hinkson Creek comparison were primarily based on the availability of macroinvertebrate data and the presence of a USGS gauging station in order to supply flow information.

It is our opinion that the selection process of attainment streams for this TMDL is inadequate and not sound. Two of the four "attainment" streams are actually "reference" streams for their particular Ecological Drainage Units, a comparison that we believe is not appropriate. On page 14 of the Potash Brook TMDL the authors state "However, haphazard matching of attainment streams, and thus flow targets, to Potash Brook could lead to targets with a high degree of uncertainty as to whether standards would be met." This is certainly the case with the attainment streams selected for the Hinkson Creek comparison. It is our opinion that either other urban streams that are attaining their beneficial uses, or other similar streams within the Ozark/Moreau/Loutre Ecological Drainage Unit be used for comparisons to Hinkson Creek.

Comment 3.C.7. Biomonitoring scores cited in the TMDL should be corrected

The Missouri Stream Condition Index (MSCI) scores in the TMDL (Page 8, Table 3) contains some errors and inconsistencies with previously published aquatic macroinvertebrate data in addition to those in italics that were recalculated based on more recent reference stream sampling. The largest error is the fall 2001 Rogers Road site (#8) which was changed from an MSCI score of 12 in the original report MDNR (2002) to a 16 in the TMDL report based on the recalculation using more current reference stream data. This analysis appears to be an error. The Rogers Road site remains a 12 even when compared to the new data. It is interesting to note that during the fall of 2001, the Walnut Street site (#6) scored better in 3 of the 4 individual metrics than the Rogers Road site (#8) even though its MSCI score is listed as 12 as opposed to the 16 listed for Rogers Road in this TMDL.

Another example is the Scott Road site (#1) of the fall 2001 survey. The recalculated MSCI score is 14 when it should correctly be scored as a 16 given in the original MDNR report (MDNR 2002). As noted in Table 3 (page 8) some of these changes were made due to rescoring, but at least some of the errors are a result of Metric Value assignment (5, 3, 1) based on the 25th percent quartile value and the bisection value. We therefore recommend that these scores be reevaluated to ensure their correctness.

Comment 3.C.8. Rescoring historic biomonitoring data is not appropriate.

Rescoring of historic data based on more recent sampling of reference streams (TMDL Table 3, italics) is not appropriate in our opinion. It makes it extremely difficult, if not impossible, to make impairment decisions that could change based on data that will be collected in the future. Study streams should be evaluated based upon the scoring criteria that are in effect at the time of sampling. For example, MSCI scores determined in the fall of 2001 should be assessed based on the reference stream criteria that were available and in effect in 2001. Changing or updating

3.C. BIOLOGICAL ANALYSIS AND IMPLEMENTATION

Comment 3.C.1 Historical biological community health is not documented in the TMDL.

Throughout this TMDL document, an assumption has been made that the biological community was attaining the beneficial use prior to increased urbanization and that restoring hydrology to historical levels will restore biological health. There is really not much evidence that this was the case in the 1960-1990 period. The biological health of Hinkson Creek has not been adequately documented for this time period and anecdotal evidence suggests that the water quality and biological health of Hinkson Creek was poor and has improved considerably since the 1960's. MDNR should investigate their own records for water quality and biological data collected during this time period. We note that approximately 53 WWTFs historically discharged within the Hinkson Creek watershed and that agricultural practices may have changed in the past 50 years.

Comment 3.C.2. The return interval targeted by the TMDL does not establish a linkage with the beneficial use.

Although the use of a surrogate measure (stormwater runoff volume) for "pollutants" has merit in specific and targeted situations where multiple stressors exist, we believe that a TMDL must ultimately be linked to the protection of a beneficial use. For example, in the Potash Brook TMDL (VTDEC 2006) performed by the Vermont Department of Environmental Conservation, such a link was established. A stream geomorphic data assessment of Potash Brook performed in 2005 documented "less than stable" in-stream sediment conditions that provide the link to the impaired biotic community. The Potash Brook TMDL has been cited by MDNR as an example of a TMDL that has successfully used stormflow as a surrogate for multiple impairments. *We note that a link between Missouri attainment stream return intervals and biological endpoints has not been established.*

In the TMDL, MDNR appears to have assumed that higher biological scores in the four "flow attainment" streams are due solely to the differences between the upper 0.3% of the flow hydrographs. While the literature (Hughes et al. 1986) and USEPA guidance (Barbour et al. 1996) support the reference approach when evaluating regional stream differences, MDNR has not provided sufficient data to quantify the assumed cause-effect relationship between storm flow and biological health in any of the study streams. No information is presented in the TMDL to suggest that the higher biological scores were directly linked to stormwater runoff or impervious area. At a minimum, a statistically significant ($p<0.05$) correlation relating biological scores and impervious area is needed to justify future studies capable of detecting and quantifying causation.

Although MDNR's series of stream evaluations did include elements of USEPA's Stressor Identification Guidance (Cormier et al. 2003), it appears as if MDNR's approach did not support the structured assessment methods recommended by USEPA and the technical literature. As a result of MDNR's approach, some important data (e.g., biological samples in Hinkson Creek and flow attainment streams) were collected inconsistently or, as MDNR itself admits, not collected at all. For example, on page 11 of the draft document, MDNR states the following:

"Sediment, a pollutant which could explain the low level of impairment, was not studied. Sediment has been established as the primary source of impairment in numerous TMDLs throughout the country."

MDNR should consider re-evaluating stressors in Hinkson Creek and attainment streams according to a structured watershed monitoring plan which adheres to stressor identification guidance and the technical literature. Adams (2003) offers several criteria useful in establishing causation between stressors and observed effects.

Comment 3.C.3. Biomonitoring endpoints should serve as the primary TMDL target.

The TMDL document suggests that a 50.5% reduction in stormwater runoff is required to attain acceptable protection of the biological community (Page 27, Table 12). If a linkage between stormwater runoff and the biological community does exist we question whether a 50.5% reduction or some other value would be required to achieve a fully supporting biological community based on macroinvertebrate data collected since 2001. *This further suggests that achieving a fully supporting biological community should be the primary water quality target rather than a reduction of stormwater input, since aquatic life impairment is the driver for placement of Hinkson Creek on the impaired waters list.* On Page 11, Section 2.6, 2nd paragraph of the Hinkson Creek TMDL it says that "Federal regulation also states that TMDLs may be established using a biomonitoring approach as an alternative to the pollutant-by-pollutant approach [40 CFR 130.7 (c)(1)])." Again, it is unclear to us why biomonitoring is not the primary water quality target instead of a technically unsupported runoff reduction.

Comment 3.C.4. The biological community in Hinkson Creek may not be currently impaired.

With the exception of the spring of 2002 assessment, macroinvertebrate samples collected by MDNR have shown the urban portion of Hinkson Creek to be *fully supporting or very nearly so each time the biological community has been evaluated* (MDNR 2002, 2004, and 2006). The last comprehensive investigation of the macroinvertebrate community was conducted by MDNR in the fall of 2001 and spring of 2002. To our knowledge the last macroinvertebrate sampling of any kind was performed by MDNR in the spring of 2006, nearly 4 years ago. We believe that a more methodical investigation into the biological community is warranted to better understand the biological health of Hinkson Creek.

Comment 3.C.5. Several significant differences exist between the Hinkson Creek TMDL and the Potash Brook template.

The Potash Brook TMDL has been cited as an example of a TMDL that has successfully used storm flow as a surrogate for multiple impairments. As such, this approach is being used as a template for the Hinkson Creek TMDL. However, there are several major differences between the two watersheds that must be recognized. Potash Brook is a 7.1 mi^2 watershed compared to Hinkson Creek which is approximately 90 mi^2. Potash Brook has a heavily impaired aquatic community as opposed to Hinkson Creek, which regularly is found to be between fully supporting and partially supporting. Are there lessons to be learned in the Potash Brook TMDL? Have the runoff reduction targets been achieved, and if so, has the biological community been restored as a result?

Comment 3.C.6. The attainment stream selection process cited in the TMDL is questionable.

The second paragraph of Section 4.5 in the TMDL ('Water Quality Targets') states that the linkage between "aquatic life impairment, and stormwater will be accomplished using streams that are physiographically similar to Hinkson Creek and where the biological community is attaining the aquatic life designated use." This is the framework that was used in the Potash Brook TMDL.

The Potash Brook TMDL also states that the use of "attainment" streams as opposed to "reference" streams is used "because reference tends to imply that the ultimate goal for the impaired steam approaches pristine. Instead, the attainment watershed(s), while meeting or exceeding the Vermont water quality standards criteria for aquatic life, should contain some level of development in order to better approximate the true ecological potential of the impaired stream." This use of "attainment streams" gave recognition to the fact that highly developed watersheds would not be expected to attain reference conditions.

A fairly rigorous approach was used for the selection of attainment streams by the Vermont Department of Environmental Conservation using an analysis described in Foley and Dowden (2005). These attainment watersheds were evaluated for similar size, slope, soils, climatic patterns, channel type and landuse/cover and were all in relatively close geographical proximity to Potash Brook. In addition, they all contained some level of development in order to approximate what the true ecological potential might be.

Unfortunately, the streams selected for the Hinkson Creek TMDL are not physiographically similar to Hinkson Creek. To be physiographically similar, the "attainment" streams selected for the Hinkson Creek TMDL should be of similar size and should have similar levels of urbanization. The selected attainment streams are 3-7 times larger (313 – 620 mi^2) than the Hinkson Creek watershed area of ~90 mi^2 and all contain very low levels of urbanization. The

"attainment" streams selected for the Hinkson Creek comparison were primarily based on the availability of macroinvertebrate data and the presence of a USGS gauging station in order to supply flow information.

It is our opinion that the selection process of attainment streams for this TMDL is inadequate and not sound. Two of the four "attainment" streams are actually "reference" streams for their particular Ecological Drainage Units, a comparison that we believe is not appropriate. On page 14 of the Potash Brook TMDL the authors state "However, haphazard matching of attainment streams, and thus flow targets, to Potash Brook could lead to targets with a high degree of uncertainty as to whether standards would be met." This is certainly the case with the attainment streams selected for the Hinkson Creek comparison. It is our opinion that either other urban streams that are attaining their beneficial uses, or other similar streams within the Ozark/Moreau/Loutre Ecological Drainage Unit be used for comparisons to Hinkson Creek.

Comment 3.C.7. Biomonitoring scores cited in the TMDL should be corrected

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scores increases the likelihood of circular use attainment decision. For example, Rogers Road, (site #8) was not impaired in Fall 2001, but could be interpreted at impaired based on re-scoring the information collected in the Spring of 2002. This would clearly make impairment determinations difficult at best, especially of streams that regularly hover near the border between partially and fully supporting (14-16).

We strongly recommend that any given stream be scored based on the reference stream scoring criteria that is available at the time of sampling, and as scoring criteria for reference streams changes as a result of the collection of additional data, then only new data collected on study streams be appropriately compared to the new scoring criteria. Included below as Exhibit 4 is a table containing MSCI scores that we believe to be correct and consistent with previous reported results.

Exhibit 4. Corrected Missouri Stream Condition Indices for Hinkson Creek.

Missouri Stream Condition Index Scores for Hinkson Creek

Site #	Site	Fall 2001		Spring 2002		Fall 2003	Spring 2004	Spring 2005	Fall 2005		Spring 2006	
8	Rogers Rd.	16	12	16	18							
7	Hinkson Creek Rd.	12		18		18	18	18	18			
6.5	Hwy 63 Connector						*17*					
6	Walnut St.	12		12		16	14	18	16	18		
5.5	Broadway St.					16	16	16	12	14		
5	Capen Park	16		14	12							
4	Rock Quarry Rd.	*17*		12	14							
3.5	Recreation Dr.							14	14			
3	Forum Blvd.	18		14							16	
2	Twin Lakes	16	18	14							12	14
1	Scott Rd.	14	16	14							16	
			Correct Values									

Based on our interpretation of the above MSCI scores, the upstream sites (sites 7 and 8) score as fully supporting 78% (7 of 9) of the time. The lower Hinkson sites (sites 1-6) scored as fully supporting 52 % (13 of 25) of the time. It should be noted, however, that following the spring 2002 sampling event the MSCI scores within the urbanized portion of Hinkson Creek have been fully supporting nearly 70% of the time. This is *quite comparable* to MDNR's TMDL web page (http://www.dnr.mo.gov/env/wpp/waterquality/303d.htm) that indicate that reference streams in this Ecological Drainage Unit score as fully supporting approximately *75-80%* of the time.

In addition, it is not clear why MDNR is targeting a higher biocriteria attainment frequency (100%, see TMDL, Page 20) than what is typically achieved in reference streams. *A 100% attainment frequency for Hinkson Creek is unrealistic and not supported by MDNR biocriteria guidance.*

Comment 3.C.9. The spring 2002 biomonitoring dataset may be an anomaly.

The spring 2002 sampling of macroinvertebrates seems to be the driver for the determination of impairment in the urban portion of Hinkson Creek. When compared to all of the other macroinvertebrate sampling events, the spring 2002 was the only sampling event that consistently showed MSCI scores below 16. It is possible that the 2002 sampling event was an anomaly. We recommend that a comprehensive bioassessment of Hinkson Creek similar to that conducted in 2001-2002 be performed to better assess the current status of the aquatic community.

Comment 3.C.10. Little data are presented to support the claim that reducing peak storm flow volume (Q = 0.3%) will increase baseflows, improve dissolved oxygen, and ultimately enhance the biological health of Hinkson Creek.

Several times throughout the draft TMDL document (e.g., Section 2.6, Section 4.5, Section 11), MDNR suggests that peak storm flow runoff volume reductions will result in increased baseflows and higher dissolved oxygen concentrations during baseflow periods. On page 11, MDNR states the following:

> "water quality studies did reveal, however, that a large percentage of the problems noted above, including increased sediment and low dissolved oxygen at low flows, can be attributed to urban runoff conditions which result in excessive stormwater runoff and lower than normal baseflow conditions."

MDNR has offered no data to support the claim that "lower than normal" baseflows are directly caused by urban runoff conditions. In fact Schuler (1994, page 2), a paper which is cited in the draft TMDL, states that actual data have demonstrated that this is rarely the case. Furthermore, MDNR's assumption that low dissolved oxygen concentrations indirectly result from urban runoff conditions is unsubstantiated. As MDNR is aware, recently collected continuous data demonstrated that prolonged periods of low dissolved oxygen (below 5.0 mg/L) occur in several Missouri reference stream reaches during baseflow conditions. As reference stream reaches represent the "best available representatives of ecoregion waters in a natural condition with respect to habitat, water quality, biological integrity and diversity, watershed landuse, and riparian conditions" (10 CSR 20-7.031(1) (U)), *it is unclear why MDNR believes that baseflow dissolved oxygen concentrations in Hinkson Creek can improve to acceptable levels when it has been demonstrated that baseflow dissolved oxygen conditions in reference streams cannot.*

Comment 3.C.11. Physical habitat limitation should be explored as a causal variable.

Habitat quality limits the biological potential for streams and rivers (Rabeni 2000). Reduced habitat quality within urban stream reaches is well documented in literature (Booth and Jackson 1997, among others). According to MDNR standard operating procedures (SOPs), habitat quality is measured during bioassessments. Furthermore, SOPs stipulate that habitat quality scores for study streams (e.g. Hinkson Creek) must be within a specified percentage of reference stream habitat scores, otherwise application of biocriteria to study streams is unjustified (i.e. habitat limited). Habitat limitation appears to offer a plausible explanation of periodically lowered macroinvertebrate scores in Hinkson Creek. *However available habitat data do not appear to be evaluated to any substantive degree in the TMDL.* Restoration strategies leading to improved habitat quality may differ from the volume reduction approach recommended in the TMDL.

3.D. IMPLEMENTATION FEASIBILITY

Comment 3.D.1. TMDL implementation targets are ill-defined.

As mentioned previously, the TMDL does not clearly define whether runoff volumes or flow rates must be reduced. The approximately 50% reduction target is based on a comparison of 1-year return flows in Hinkson Creek as compared to the median 1-year return flow from the four attainment streams. Therefore, one would assume that flow rates are being regulated not runoff volumes. However, Section 11 of the TMDL states that "stormwater runoff volume reductions can be accomplished by stormwater retention and enhanced infiltration and evapotranspiration." Therefore, it appears the TMDL is regulating runoff volumes, but it is not clear when or where these volume reduction requirements apply. On page 33 of Section 11, the TMDL references the one-year average annual storm as measured at the USGS stream gage near Providence Road and then describes how TMDL reductions shall be implemented if new monitoring data indicate water quality standards are not being met. However, the one-year average annual storm is not defined in terms of flow rate, volume, rainfall depth, intensity, duration, or any other metric that would allow one to quantify the reduction target.

Comment 3.D.2. TMDL implementation feasibility is uncertain.

Without a clearly defined target, it is difficult to assess the feasibility and cost implications associated with meeting the TMDL. Assuming the 1-year average annual storm is equal to the volume associated with the 0.3% normalized daily flow in Hinkson Creek as defined in the TMDL (53.6 cfs/mi^2), such that the volume would be:

$$V = \left(53.6\frac{cfs}{mi^2}\right) \times (69.8\ mi^2) \times (24\ hrs) \times \left(3600\frac{s}{hr}\right) = 323 \times 10^6 cf = 7421\ ac \cdot ft$$

A 50.5% volume reduction requirement would then result in a target volume loss of 3,748 ac ft. This volume is equivalent to requiring the complete retention and infiltration/evapotranspiration of approximately 1-inch of rainfall over the entire watershed, *which is significantly greater than the current volume reduction requirements of the Boone County Stormwater Ordinance*. The Ordinance requires that the runoff from 10% of the 1.3-inch water quality volume must be permanently reduced. However, the Ordinance allows for a waiver of this requirement if there is a risk for groundwater contamination or site constraints make infiltration infeasible. *The TMDL does not provide any consideration for site constraints that may inhibit volume reductions.*

For many parts of the watershed and during many times of year the retention of large runoff volumes may not be feasible due to:

- High groundwater table
- Permeability of soils
- Limited pervious space availability
- Limited areas for evapotranspiration in dense developed areas
- Desirability of dense development vs. sprawl
- Potential for water balance issues and un-natural baseflow impacts
- Lack of non-potable demand for harvested stormwater

For areas that are conducive to achieving volume losses, other site constraints may impact the practicability of implementing infiltration facilities due to the presence of existing infrastructure and location of available space relative to the tributary drainage area. The Mid-America Regional Council Manual of Best Management Practices for Stormwater Quality (MARC, 2009) recommends that infiltration basins have a maximum depth of 2 feet for an infiltration basin and 1 foot for a bioretention area. Therefore, when considering side slopes and pre-treatment requirements, between 2000 and 4000 square feet of land would likely be required per impervious acre. For the purposes of calculation, if we assume that the Hinkson Creek watershed is 20% urban and infiltration is feasible everywhere then 500 to 1000 acres of land would be needed to achieve the required volume reductions. This land would also need to be strategically located such that surface runoff could be routed by gravity; otherwise pump stations would be needed. According to the User's Guide to the BMP and LID Whole Life Cost Models (WERF, 2009), curb-contained bioretention systems without underdrains cost approximately $13 per square foot. Therefore, the capital costs associated with retrofitting the entire watershed with bioretention facilities could be as high as $500M. Additional costs could be incurred if pump stations or larger storage facilities are needed or if significant infrastructure conflicts arise.

For agricultural areas, infiltration facilities may be more attractable than bioretention facilities. However, the feasibility of achieving volume reductions in the agricultural areas is even more uncertain than it is for urban areas. Agricultural lands generally have very low imperviousness such that runoff and shallow subsurface interflow typically only occurs when the soils become saturated.

During these conditions infiltration rates would be expected to be reduced and infiltration basins would need to be sized to retain stormwater for longer periods of time in order to reduce volumes.

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Hoke, John

From: John Glascock [JDGLASCO@GoColumbiaMO.com]
Sent: Friday, July 09, 2010 9:52 AM
To: DNRContact, delashmit.john@epa.gov; flournoy.karen@epa.gov
Cc: DNRContact, bflorea@boonecountymo.org; Georganne Bowman; Hoke, John; Totten, Scott; Karen Miller; Steve Hunt; William Watkins; DNRContact, dshorr@lathropgage.com
Subject: Fwd: Midkiff quote from Five

John & Karen,

Yesterday KOMU the local NBC station ran a story about our meeting with EPA and MDNR. I have attached Mr. Midkiff's statement about what is being proposed. This is a public statement which reinforces Mr. Shorr's statement to you about we believe he would not be opposed to an extension to try to find the pollutant.

Thank you for meeting with us.

John Glascock, P.E.
Director of Public Works
P.O. Box 6015
Columbia, MO
Phone - 573.874.7253
Fax - 573.874.7132
jdglasco@gocolumbiamo.com

>>> Jill Stedem 7/9/2010 9:25 AM >>>
He sent the text version.....

>>> "Woelfel, Stacey W." WoelfelS@missouri.edu> 7/9/2010 9:14 AM >> (mailto:WoelfelS@missouri.edu>)

A COALITION OF COLUMBIA, BOONE COUNTY, AND UNIVERSITY OFFICIALS HAVE GONE TO THE FEDERAL EPA TO ASK FOR RELIEF IN REGULATIONS REGARDING HINKSON CREEK.

THE AGENCY IS WORKING ON A LIMIT ON POLLUTANTS THAT CAN GO INTO THE CREEK.

THE LOCAL COALITION WANTS THAT LIMIT TO BE MORE LENIENT THAN THE EPA PROPOSES.

THE MAIN SOURCE OF POLLUTION IN THE CREEK IS RUN-OFF FROM RAIN STORMS.

BUT NO ONE KNOWS WHAT THE MAIN POLLUTANTS ARE, AND THAT LEAVES LOCAL GOVERNMENTS AND ENVIRONMENTALISTS WAITING TO DETERMINE THE BEST REMEDY.

Ken Midkiff: "But at this point the pollutant is unknown and I do agree with the county of Boone and the City of Columbia and the University of Missouri representives to one extent it would be much easier and much handier if a polluant that caused the fish kills were indentified."

THE LOCAL COALITION IS WAITING FOR THE EPA'S DECISION ON THEIR PLEA.

Hoke, John

From: Hoke, John
Sent: Friday, July 09, 2010 10:33 AM
To: 'John Glascock'; DNRContact, delashmit.john@epa.gov; flournoy.karen@epa.gov
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Subject: RE: Midkiff quote from Five

Attachments: Hinkson-Comment-SierraClub.pdf; Email-Comment-Midkiff.pdf


Hinkson-Comment-SierraClub.pdf...


Email-Comment-Midkiff.pdf (66 ...

Thanks, John. We appreciate the quote and will make sure it is added to the TMDL administrative record.

From the many meetings we've had, its clear there is a desire by many stakeholders involved with this TMDL that there be an identifiable pollutant. However, as the TMDL documents, the biological impairment of Hinkson Creek is much more complicated. The Department believes the approach presented in the TMDL establishes the appropriate path forward for restoring the biological community in Hinkson Creek.

With regard to the quote below, it appears to reflect only part of Mr. Midkiff's position on the issue. The other part, which may get lost in the sound bites or at public meetings, is that the 2001 TMDL Consent Decree has obligatory deadlines and the Sierra Club is very much interested in those deadlines being met. To this end, I've attached comments from Mr. Midkiff and the Sierra Club to corroborate their concern that a TMDL be established on time, as required. You'll also see in the April 22, 2010 comment that the Sierra Club is not opposed to further studies, just that they follow implementation of the TMDL.

Thank you again for the news piece. If you have questions or would like additional details, 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

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Fax - 573.874.7132
jdglasco@gocolumbiamo.com

>>> Jill Stedem 7/9/2010 9:25 AM >>>
He sent the text version.....

>>> "Woelfel, Stacey W." WoelfelS@missouri.edu> 7/9/2010 9:14 AM >> (mailto:WoelfelS@missouri.edu>)

A COALITION OF COLUMBIA, BOONE COUNTY, AND UNIVERSITY OFFICIALS HAVE GONE TO THE FEDERAL EPA TO ASK FOR RELIEF IN REGULATIONS REGARDING HINKSON CREEK.

THE AGENCY IS WORKING ON A LIMIT ON POLLUTANTS THAT CAN GO INTO THE CREEK.

THE LOCAL COALITION WANTS THAT LIMIT TO BE MORE LENIENT THAN THE EPA PROPOSES.

THE MAIN SOURCE OF POLLUTION IN THE CREEK IS RUN-OFF FROM RAIN STORMS.

BUT NO ONE KNOWS WHAT THE MAIN POLLUTANTS ARE, AND THAT LEAVES LOCAL GOVERNMENTS AND ENVIRONMENTALISTS WAITING TO DETERMINE THE BEST REMEDY.

Ken Midkiff: "But at this point the pollutant is unknown and I do agree with the county of Boone and the City of Columbia and the University of Missouri representives to one extent it would be much easier and much handier if a polluant that caused the fish kills were indentified."

THE LOCAL COALITION IS WAITING FOR THE EPA'S DECISION ON THEIR PLEA.

Hoke, John

From: Ken Midkiff [12midkiff@centurylink.net]
Sent: Tuesday, July 06, 2010 3:47 PM
To: DNRContact, delashmit.john@epamail.epa.gov; John Simpson; Bagley.Melissa@epamail.epa.gov; Hoke, John
Cc: 'Scott Dye'; David Bookbinder
Subject: Hinkson Creek TMDL

Attachments: "AVG certification"

AVG certification (222 B)

According to the litigation we (Sierra Club and American Canoe Association) filed long ago, EPA has until Dec. 31, 2010, to complete a TMDL on Hinkson Creek. It is hoped that the recent opposition by, and today's meeting with, Boone County, City of Columbia, University of Missouri-Columbia, and MDNR elected and appointed officials does not cause EPA to violate a court order and cause the litigants to take further action.

At this point, EPA/DNR has had 10 1/2 years to draft and complete a TMDL on Hinkson Creek.. At the end of this year (the court-ordered deadline), it will have been 11 years. That's enough.

Ken Midkiff

Hoke, John

From: Shorr, David [DShorr@LathropGage.com]
Sent: Friday, July 09, 2010 2:00 PM
To: Hoke, John
Cc: DNRContact, bflorea@boonecountymo.org; Georganne Bowman; Totten, Scott; Karen Miller; Steve Hunt; William Watkins; John Glascock; DNRContact, delashmit.john@epa.gov; flournoy.karen@epa.gov
Subject: RE: Midkiff quote from Five

JH,

While I appreciate your response, I will cut to the chase.

If a public comment means anything at all you have a unified position on behalf of the MS4 participants that has commented, with documentation, their objections to this TMDLs proposed methodology, the creeks actual status, the ability to triage and isolate pollutants in a reasonable public health approach, and significant expenditures in support of water quality for Hinkson Creek. They have indicated their concerns regarding the cost of this approach and the prospect that the approach may cause sprawl and growth in other watersheds that are currently non-impaired contrary to the public planning process of the community. The position is presented by the elected and administrative representatives of the County and the City, and the appointed representative from the University of Missouri.

These representatives represent the interests, both social and financial of in excess of 140,000 persons, entrusted to them by the laws of the State of Missouri and in many cases, their election. Mr. Midkiff represents, by his public testimony, 10,000 members statewide. Giving him the complete benefit of every proportional adjustment less than 900 of his flock reside in this county whose citizens will be expected to bear the financial consequences of this documents sole alternative.

You have received comment from this community. It is my personal expectation that MDNR and EPA will follow that commentary, not the commentary of a select minority, when both have indicated their goals and objectives for Hinkson Creek are the same.

As always, I appreciate your professionalism in working through this difficult dialog with many masters.

You may post this to the administrative record.

David A. Shorr
Lathrop & Gage
314 E. High St.
Jefferson City, MO 65101
573-893-4336
573-893-5398 fax
dshorr@lathropgage.com
www.lathropgage.com

prohibited. If you are not the intended recipient, please contact the sender and delete all copies.

-----Original Message-----
From: Hoke, John [mailto:john.hoke@dnr.mo.gov]
Sent: Friday, July 09, 2010 10:33 AM
To: 'John Glascock'; DNRContact, delashmit.john@epa.gov; flournoy.karen@epa.gov
Cc: DNRContact, bflorea@boonecountymo.org; Georganne Bowman; Totten, Scott; Karen Miller; Steve Hunt; William Watkins; Shorr, David
Subject: RE: Midkiff quote from Five

Thanks, John. We appreciate the quote and will make sure it is added to the TMDL administrative record.

From the many meetings we've had, its clear there is a desire by many stakeholders involved with this TMDL that there be an identifiable pollutant. However, as the TMDL documents, the biological impairment of Hinkson Creek is much more complicated. The Department believes the approach presented in the TMDL establishes the appropriate path forward for restoring the biological community in Hinkson Creek.

With regard to the quote below, it appears to reflect only part of Mr. Midkiff's position on the issue. The other part, which may get lost in the sound bites or at public meetings, is that the 2001 TMDL Consent Decree has obligatory deadlines and the Sierra Club is very much interested in those deadlines being met. To this end, I've attached comments from Mr. Midkiff and the Sierra Club to corroborate their concern that a TMDL be established on time, as required. You'll also see in the April 22, 2010 comment that the Sierra Club is not opposed to further studies, just that they follow implementation of the TMDL.

Thank you again for the news piece. If you have questions or would like additional details, 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: John Glascock [mailto:JDGLASCO@GoColumbiaMO.com]
Sent: Friday, July 09, 2010 9:52 AM
To: DNRContact, delashmit.john@epa.gov; flournoy.karen@epa.gov
Cc: DNRContact, bflorea@boonecountymo.org; Georganne Bowman; Hoke, John; Totten, Scott; Karen Miller; Steve Hunt; William Watkins; DNRContact, dshorr@lathropgage.com
Subject: Fwd: Midkiff quote from Five

John & Karen,

Yesterday KOMU the local NBC station ran a story about our meeting with EPA and MDNR. I have attached Mr. Midkiff's statement about what is being proposed. This is a public statement which reinforces Mr. Shorr's statement to you about we believe he would not be opposed to an extension to try to find the pollutant.

Thank you for meeting with us.

John Glascock, P.E.
Director of Public Works
P.O. Box 6015
Columbia, MO
Phone - 573.874.7253
Fax - 573.874.7132
jdglasco@gocolumbiamo.com

>>> Jill Stedem 7/9/2010 9:25 AM >>>
He sent the text version.....

>>> "Woelfel, Stacey W." WoelfelS@missouri.edu> 7/9/2010 9:14 AM >> (mailto:WoelfelS@missouri.edu>)

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Hink
RCrawford to: john.hoke 10/22/2009 08:20 AM
Cc: anne.peery

History: This message has been replied to.

John and Anne,

I'm sorry that I couldn't make it to the meeting the other day and the TMDL was pulled before I submitted my comments.

One thing that you need to know is that the spring 2005 macroinvertebrate data was inadvertently left out of Table 2. During this event, presented in the Phase 2 MDNR report, the sites sampled scored as follows: Hinkson Creek Road = 18; Walnut Street = 18; Broadway = 16; and Recreation Drive = 14. This data is also absent from the TMDL website.

Some of the scores in Table 2 don't correlate with the narrative in Section 4.5 (page 17) nor with the data sheet provided on the department's web page.

I just wanted to make sure that all of the data is correctly presented for everyone evaluating the TMDL. Please feel free to give me a call if you have any questions about the above. Thanks and good luck!

Randy Crawford
Senior Water Quality Scientist

MEC Water Resources, Inc.
A Geosyntec Company
1123 Wilkes Blvd., Suite 400
Columbia, Missouri 65201
Phone: 573.443.4100
Fax: 573.443.4140
Mobile: 573.239.4183
www.geosyntec.com

Hoke, John

From: james fairchild [james.fairchild@yahoo.com]
Sent: Wednesday, April 21, 2010 9:16 PM
To: Hoke, John
Subject: TMDL for Hinkson Creek

Dear Mr. Hoke:

My name is James Fairchild. I live at 9603 E. Vemer's Ford Rd, Columbia, MO (phone 573-443-2004).

I strongly support the DNR's listing of Hinkson Creek as an impaired waterbody. While there has been much criticism of the listing process, it is necessary to meet the requirements of the USEPA under the mandates of the Clean Water Act.

Your agency has done a commendable job in the past 8 years in seeking to identify a single pollutant. However, as a stream ecologist I am very familiar with the concept of multiple stressors and their impacts on the health of stream macroinvertebrate communities.

I have no reason to doubt that the intensity and duration of storm events is not only delivering quantifiable amounts of nutrients, metals, and E. coli to the stream but that the frequency of disturbance is in itself a major factor limiting aquatic communities. Listing the stream for a 50% reduction in stormwater runoff is a prudent measure that will reduce the myriad list of possible pollutants. It also will serve as a basis for the Columbia and Boone County to begin an aggressive permitting process for future development projects that requires the mitigation of runoff using best management practices.

In addition, this listing forces the City and County to acknowledge the value of this stream resource. Our children deserve the right to wade in a stream that exhibits healthy fish and invertebrate communities while protecting human health as well due to exposure to bacteria and viruses. Ongoing studies by Dr. Jason Hubbert is currently gathering data to support the listing. In addition, Columbia is a land-grant university community, and we have myriad expertise at the local level (City of Columbia; Boone County; Missouri Dept. of Conservation; University of Missouri; and the U.S. Geological Survey) that can merge resources to try to identify the pollutant of concern. This may require additional, directed studies to determine the causes of impairment. That is what your 319 program is for.

Stay the course, and follow the USEPA mandate for establishing this TMDL for Hinkson Creek. To ignore the law will decrease our ability to protect the stream due to the wording of the Clean Water Act.

Sincerely,

James F. Fairchild

Hoke, John

From: Jake Hanselman [JHanselm@columbia.k12.mo.us]
Sent: Monday, April 26, 2010 8:26 AM
To: Hoke, John
Subject: Resident -- I live on Hinkson...

I know it is passed the deadline to register public comments, but with the recent flooding over the weekend, I feel I must say something. My address is 1703 Canyon Dr., Columbia, MO 65201. I live on the upper section of Hinkson creek (before it merges with Grindstone Creek), essentially across from Grindstone Park. I have lived on this section for 12 years now and 5 years ago, was fortunate enough to buy my dream house - right on Hinkson Creek. I loved the location; it was peaceful, serene, yet in the city limits. I used to catch smallmouth and largemouth bass, blue gill, and the stream was very deep in parts. I bought the house (complete with flood insurance) and was comforted by the fact that even in the flood of 1993, no water got to the house.
In the last ten years, however, myself and my immediate upstream neighbor have noticed some pretty drastic changes. The stream has widened, making water depth more shallow, the fishing is in serious decline, and the amount of sediment is ***horrendous***. In addition, in the last 5 years (in conjunction with the building of upstream superstores, parking lots, etc.), the levels during storms have increased to those I've never seen. My neighbor upstream states that even in the flood of '93, the creek didn't threaten his property like it does now. Needless to say, I'm nervous.
WE MUST REDUCE STORMWATER RUNOFF - ***Please let me know how I can help!*** Your current proposal calls for a 50% reduction. This is CRITICAL - not only for my property and those who also live on the creek, but more importantly, for the health of the stream.

Sincerely,
Jake Hanselman
1703 Canyon Dr.
Columbia, MO 65201
(573)864-2588

Hoke, John

From: Bill Florea [BFlorea@boonecountymo.org]
Sent: Thursday, April 22, 2010 2:13 PM
To: Hoke, John
Subject: Hinkson TMDL Comments
Attachments: Hinkson TMDL Comment Letter.pdf

John,

Attached please find comments on the TMDL from the Hinkson Creek Watershed Restoration Project Steering Committee. The original will go out with today's mail.

Thanks

Bill Florea, AICP
Boone County Planning and Building Inspection
801 E. Walnut, Suite 210
Columbia, MO 65201

bflorea@boonecountymo.org

Hinkson Creek Watershed
Restoration Project Phase II Steering
Committee

April 21, 2010

Mr. John Hoke
Water Quality Monitoring and Assessment Section
Water Protection Program
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, Missouri 65102-0176

Dear Mr. Hoke,

Thank you for the opportunity to comment on the proposed TMDL for Hinkson Creek. On behalf of the Hinkson Creek Watershed Restoration Project Phase II (HCWRP II) Steering Committee I offer the following comment.

The TMDL mischaracterizes the role of the Hinkson Creek Watershed Restoration Project Phase II (HCWRP II). Section 7 *Load Allocation* states: "It is anticipated the load allocation storm water volume reduction goals will be met through implementation of the *Hinkson Creek Watershed Management Plan.*" However, the focus of the Plan is on urbanized areas, within the watershed, that are served by the MS4.

HCWRP II will likely have an impact on regulated and non-regulated discharges originating from the urbanized area. But, the TMDL includes both types of discharges in the Wasteload Allocation. Therefore, the effect of the *Hinkson Creek Watershed Management Plan* should be directed solely toward wasteload allocation. The existing language in Section 6 *Wasteload Allocation*, "Rather, these discharges will be encouraged to comply with design and best management practices outlined by the *Hinkson creek Watershed Management Plan*" is sufficient to address the limited authority and scope of the HCWRP II.

The Steering Committee is concerned that the mischaracterization in Section 7 will lead to false expectations for the HCWRP II. The Committee also questions whether DNR staff may have a different perception of the project goals than those of the Steering Committee and the approved Financial Assistance Agreement.

Thank you for your consideration.

Sincerely,

Bill Florea, AICP
Project Manager

801 E. Walnut, Suite 210 • Columbia, MO 65201-7730
Phone: 573-886-4330 • Fax: 573-886-4340

Hoke, John

From: John Holmes [JHolmes@allstateconsultants.net]
Sent: Thursday, April 22, 2010 9:00 AM
To: Hoke, John
Subject: Comments on Hinkson Creek Draft TMDL
Attachments: hinkson TMDL round 2 holmes comments.doc

Hi John,

My comments on the Hinkson TMDL are attached. Please feel free to contact me if I can clarify anything.

Thanks.

John Holmes, P.E.
Allstate Consultants, LLC
3312 LeMone Industrial Blvd.
Columbia, MO 65201
573-875-8799

Comments on the March 2010 version of the Hinkson Creek TMDL

John Holmes, P.E., Allstate Consultants, LLC.

April 22, 2010

General

As I interpret this and the previous version of the TMDL, the requirement for a reduction in volume of runoff has switched from being based on a single large design storm to an annual runoff volume reduction. I applaud this switch as it will result in both a cost savings and a better solution for our streams.

It would be clearer if instead of saying the surrogate is "storm water runoff volume", the TMDL said "annual storm water runoff volume".

Page 4 – This page talks about how much more development has occurred, but it doesn't discuss how many more people are served by the new development. If the people who will be served by the added development don't live and conduct business in the Hinkson Creek basin, they will do so elsewhere and have negative impacts on other basins where there is relatively little regulation. Wouldn't it make more sense to look at allowable impact per person than maximum impact per area? This would result in some streams that don't meet their beneficial uses, but these would be offset by less impact to other streams that are closer to pristine.

Page 6, section 2.4 first paragraph – Why is the problem no longer listed as "unspecified pollution due to urban non-point runoff"? How was the unspecified pollution originally detected? Were there earlier biological assessments and if so, why aren't they discussed in this TMDL and compared to the more recent ones?

Page 9, fourth bullet – How many water samples were collected in total?

Page 11, section 2.6, third paragraph, third sentence – Should this say that the surrogate is annual volume of flow instead of peak flow following storm events?

Page 19, section 4.4 – The title says "Specific Criteria" but the section seems to talk about general criteria. Is this a typo?

Page 20, Section 4.5, third paragraph – If only 93% of the reference stream samples are supporting, why are you requiring 100% for Hinkson. Maybe 100% isn't possible.

Page 21 section 5.1 – Why does the TMDL show flow duration curves from only two four month periods of time? Given all the variables that go into determining the volume of runoff that occurs from a given depth of rainfall, it doesn't seem that 4 months of data would be statistically significant. What were the

rainfall distributions during the storms? What were the antecedent moisture conditions? Appendix C doesn't list the rainfall events during the April-July 1967 time period so I can't look at the relative durations of the storms in the two periods or how much rain occurred in the month prior. However, the average duration of the storms listed in Appendix C for April-July 2007 is 53.3 hours whereas the average duration of all storms listed in Appendix C is 99.7 hours. So, it seems possible that the storms were more intense in the 2007 time period.

Page 24, Section 5.3 – What were the SCI scores for the attainment streams?

USGS Water Resources Investigation Report 95-4231 lists average main channel slopes for 4 of these 5 streams (see table below). Hinkson Creek is significantly steeper than at least 3 of the four attainment streams. Likewise, when USGS rural peak flow regression equations are applied to these watersheds they predict that Hinkson, if it wasn't urbanized, would produce twice the peak flow rate per square mile for the 2 year storm that the other basins would. My point is that a rural Hinkson Creek would be expected to be naturally flashier than any of these three reference streams. I suspect that if someone were to calculate the Main Channel Slope for the Middle Fork of the Salt River and apply the USGS regression equations they would find that it is not predicted to be as naturally flashy as Hinkson either.

Stream	Size (mi^2)	Main Channel Slope	Hydrologic Region	Predicted 2 Year Peak Flow, USGS 1995 Regression Equations*
Hinkson	69.8	11.1	2	47.4
Big Creek	414	3.3	2	21.4
Middle Fk. Salt River	313	Not published.	1	
North River	354	5	1	22.1
S. Fabius River	620	3.4	1	16.2

* USGS Water Resources Investigation Report 95-4231, Techniques for Estimating the 2-to 500-Year Flood Discharges on Unregulated Streams.

Page 27, Table 12. The percent reduction in flow that would be required to match the Middle Fork Salt River is only 31.9%. So a 50.5% reduction is likely to be at least 19.6% more reduction than is needed to fully support. We are not sure that the Middle Fork Salt River represents the threshold of impairment. For all we know, it could possibly handle more runoff and still fully support the use. But the other rivers are likely to exceed the threshold since they have significantly less volume of runoff. So, by using the

median of these rivers we would be clearly exceeding what is needed to match another stream that is supporting.

Page 30, Table 15 – Should this table be clarified by adding a heading to the last column stating that the percentages are of the total runoff from the entire basin? These percentages could be incorrectly interpreted as being a 24% reduction of the water from the individual land use. It would probably be clearer if you added another column listing what percentage of the current runoff from each land use category must be reduced (about 50.5% from each).

Page 30, third paragraph under "6.", first sentence – Is the listed table number correct?

Page 30, first sentence under "7." – There appears to be an error with regards to which table is being referenced, however, none of the tables provide "precipitation intensities". Should this be "precipitation depths"?

Page 30, section "7." – It is hard to imagine how the Hinkson Creek Watershed Management Plan is going to significantly reduce the runoff from predominantly agricultural areas when agricultural areas are exempt from the CWA. Even if all the water from "open areas" was captured, it wouldn't make much of a dent in the volume of runoff from agricultural areas.

Page 30, last sentence – This appears to require that new developments can't produce any additional runoff. If that is the intent, it needs to be clear for what storms this applies. The way this is worded it seems as if the community can do some calculations that will prevent added runoff. It will really be the developers who will have to physically prevent added runoff.

Page 31, Section 8. Do we really need to provide a 20% margin of safety?

Page 33, Third paragraph –The water quality storm is 1.3" and represents the depth of rainfall for which 90% of storms are smaller. I think the TMDL should include a definition of the "one-year average annual storm"? It doesn't sound like the sort of thing that would be equivalent to the water quality storm. The 24 hour 1 year return period storm in this area is 3". The 1 hour 1 year return period storm in this area is about 1.2". The water quality storm doesn't have a duration or rainfall distribution associated with it. Different durations and distributions of 1.3" storms will produce different volumes of runoff. So, it is not clear how we will measure the runoff from the water quality storm at the USGS gage. I can imagine how we might measure the runoff of some particular 1.3" storm with a given duration and distribution if we can get it to happen but what would we compare it to to see if we've achieved the reduction? The equation presented on page 22 might be used, but it has an R-squared value of only 0.37 so I don't think it is appropriate.

What happens after the five year period? How do the 1% and 4% reductions mentioned in this paragraph relate to the 50.5% reduction discussed earlier?

Hoke, John

From: Farley, Judie [JFarley@LathropGage.com]
Sent: Thursday, April 22, 2010 11:59 AM
To: Hoke, John
Cc: DNRContact, dshorr@lathropgage.com
Subject: Comments on Draft Hinkson Creek Total Maximum Daily Load (TMDL)
Importance: High
Attachments: Hinkson comment letter.PDF

Attached please find the *Comments of the Central Missouri Development Council Regarding the Draft Hinkson Creek Total Maximum Daily Load* conveyed to you at the request of David Shorr. The original will be mailed. Contact information for the sender is:

David A. Shorr
Lathrop & Gage LLP
314 East High Street
Jefferson City, MO 65101
(573) 893-4336
dshorr@lathropgage.com

Please let me know if you have any difficulty with the attachment.
Judie Farley, Assistant to David Shorr
Lathrop & Gage LLP
314 East High Street
Jefferson City, MO 65101
Direct: (573) 761-5003
FAX: (573) 893-5398

<<Hinkson comment letter.PDF>>

LATHROP & GAGE LLP

DAVID A. SHORR
DIRECT LINE: (573) 761-5005
EMAIL: DSHORR@LATHROPGAGE.COM
WWW.LATHROPGAGE.COM

314 EAST HIGH STREET
JEFFERSON CITY, MISSOURI 65101
PHONE: (573) 893-4336
FAX: (573) 893-5398

April 22, 2010

VIA E-MAIL TRANSMISSION
john.hoke@dnr.mo.gov
AND U.S. MAIL

Missouri Department of Natural Resources
Water Pollution Control Program
Water Quality Monitoring Assessment Section
PO Box 176
Jefferson City, MO 65102-0176

Re: Comments of the Central Missouri Development Council Regarding the Draft Hinkson Creek Total Maximum Daily Load

Gentlemen:

The undersigned represents the Central Missouri Development Council ("CMDC") and its individual members. The CMDC is a community organization which:

> Exists to improve communication between local and state government, citizens, and the development community, and to promote quality growth that results in thriving, vibrant communities that provide quality neighborhoods, economic stability, and opportunities for our citizens.

The majority of the CMDC members live, work, and operate their trades in the City of Columbia and Boone County. Hinkson Creek is the dominant watershed in our members' region. Many of our members live in the Hinkson Creek watershed.

The CMDC has been working since its inception with the City of Columbia ("City" or "Columbia"), Boone County ("County"), the University of Missouri ("University"), and the Boone County Regional Sewer District ("BCRSD") to improve development processes and impacts on the Hinkson Creek watershed from construction-related activities. They are active participants in local discussions relating to sewerage and storm water.

The CMDC has been involved in issues relating to Hinkson Creek and has, when necessary, challenged the authority and actions of the Missouri Department of Natural Resources ("MDNR") where it believes they are excessive and unnecessary either under the law or, from a practical standpoint, are incapable of success. The CMDC believes that the proposals presented in the draft Total Maximum Daily Load ("TMDL") for Hinkson Creek exceed the legal authority of the MDNR under Missouri statutes, represent a failure of meeting non-discretionary duties under the Clean Water Act by the United States Environmental Protection Agency ("USEPA") and, as a general matter, will not result in success to the detriment of the future of Columbia and Boone County.

The CMDC recognizes its role in supporting improvement to the Hinkson Creek, especially with regard to construction-related activities. To that end, the CMDC has worked with the City and the County on storm water ordinances in support of the joint requirements of the Columbia/Boone County/University of Missouri MS4 permit. While we have not agreed on all aspects of those local ordinances for storm water improvements, we acknowledge and continue to support the efforts of the City, the County, and the University and appreciate their efforts at communicating with the CMDC members. We believe many of the concerns of the CMDC members regarding the strategy and methods in this TMDL are shared by the representatives of the City, the County, the University, and the BCRSD.

Our comments are divided into two sections, general and specific.

GENERAL COMMENTS AND ISSUES

The TMDL calls for an approach that is unique. It first bases its priorities on the premise that Hinkson Creek is impaired. We believe that is not accurate. *We believe sufficient data exists to demonstrate that Hinkson Creek adequately supports aquatic populations and meets threshold requirements.*

The premise then relies on "unknown" pollutants as the focal point toward resolution of the impairment problem. *We believe there is no such thing as an "unknown" pollutant and that the law requires both the MDNR and the USEPA to designate pollutants so our community can properly address, with the most aggressive effort and least cost, the greatest prospects of success.*

In pursuit of these "unknown" pollutants in this "impaired waterway," the TMDL attempts to utilize a surrogate of restricting volume, flow or quantity in pursuit of the problem. In pursuit of such an unspecific problem, the MDNR uses the broadest approach humanly possible. A technique of triage employed by most public health officials is more appropriate. Rather than target the problems and find the solutions, the TMDL proposes a solution based on a presumption that has the most expensive cost. The

TMDL ignores the very activities provided at extensive public expense to improve Hinkson Creek listed in the appendix of their own document.

This TMDL can be best described as a midguided effort to undermine the success of the community and punish its citizens by diverting resources away from community demands that would have a greater beneficial impact upon the environment.

1. The TMDL and its methodology will result in the unintended consequence of increased sprawl by limiting the ability to develop in the Hinkson Creek watershed.

The proposal calls for a substantial reduction in volume, flow or quantity. To achieve such a reduction, significant structures at significant costs will be required.

Structures will be required to be constructed in the existing footprint of the City and County to meet the reduction objective. This will come at considerable public expense.

New development will seek to maximize cost benefit ratios. New projects will seek other watersheds with less restrictions, all of which are outside the core of the central Columbia area. This will result in an expansion of infrastructure and increase the footprint of the current City further into the County, placing adjacent watersheds under stress.

While Boone County storm water ordinances will provide some protection, the outward expansion of the urbanized area will be the unintended consequence of the Hinkson Creek TMDL.

The CMDC supports the ability to maximize the use of existing infrastructure and believes the surrogate approach has unintended consequences for the period of this experiment. Our specific comments address the flaws within the document itself in greater detail, but the unintended consequences are obvious and require general commentary.

2. The MDNR does not have the legal authority to make this recommendation.

The MDNR lacks the statutory authority to regulate volume, flow or quantity. The Missouri Clean Water Law does not provide authority to the MDNR to control, create or establish the volume, flow or quantity of any given watercourse in the State of Missouri. No statutory reference is provided in the TMDL establishing the direct authority to achieve such an objective. If one accepts the MDNR's rationale, the MDNR

could essentially order the damming of the Missouri River to address impairment on that watercourse. No such authority exists.

Assuming such authority exists in Missouri statutes, for which the CMDC does not concur, the MDNR has no rule to address the control of volume, flow or quantity as it applies to the control of pollutants. As such, the failure to have such a rule violates Chapter 536 as it would be a policy of general applicability over which independent parties would have the ability to challenge and the Missouri General Assembly would and the right to evaluate under the Joint Committee on Administrative Rules. No such rule exists because the MDNR is well aware that no such authority would be granted by the Missouri General Assembly.

3. The TMDL inhibits the legal rights of downstream riparian landowners with regard to both their legal ownership interests in their land and their legal rights with regard to volume, flow or quantity on their property.

> Clean Water Law ... did not explicitly or impliedly grant Commission power to determine riparian rights; thus, Commission had no authority to determine whether riparian rights were violated by flow of wastewater from utility's water purification lagoon into pond on adjoining landowner's property. *Curdt v. Mo. Clean Water Comm'n*, 586 S.W.2d 58 (Mo. Ct. App. E.D. 1979).

As stated above, the Missouri Clean Water Law does not empower the Missouri Clean Water Commission ("CWC") and therefore the MDNR to modify riparian interests of landowners.

The confiscation and/or modification of the riparian landowners' property and water-related rights represent independent takings by administrative actions. As landowners in the watershed, members of the CMDC object to the manner and action of this TMDL and place the MDNR and the USEPA on notice that their actions result in a regulatory taking of both riparian property and rights to water and encourage a change in direction.

The CWC and the MDNR do not have the legal authority to implement the surrogate approach presented in the TMDL as it impacts the rights of riparian landowners and is not authorized by law. No rule has been developed to implement such authority, if such should exist.

The members of the CMDC advise the MDNR of their belief that their actions to do a surrogate-based control of volume, flow or quantity and the failure to have proper legal authority and to properly establish a rule of general applicability are contrary to Missouri law and recommend reconsideration of the approach.

4. The MDNR and the USEPA fail to fulfill their non-discretionary duties under the Clean Water Act to properly identify specific pollutants as required by law. This failure to exercise non-discretionary duties is enforceable by citizen suit.

The USEPA administrator, and by delegation the CWC, is required to:

> ... estimate for such waters the total maximum daily load with seasonal variation and margins of safety, for those pollutants which the administrator identifies under Section 1314(a)(2) of this title as suitable for such calculation and for thermal discharges, at a level that would ensure protection and propagation of a balanced indigenous population of fish, shellfish, and wildlife. (Emphasis added.)

As such, the administrator, and thereby the CWC, has the non-discretionary task of identifying pollutants in setting the goals and objectives of a TMDL.

The pollutants designated for Hinkson Creek are, by admission of the agencies, "unknown."

Webster's Dictionary defines "unknown" as:

> (1) not known;
> (2) (a) not disclosed or identified; (b) not determine or verified.
> (Emphasis added.)

As a matter of fact, these two statements do not reconcile as "unknown" cannot be a "pollutant." The English language does not allow this fact to occur.

The data provided in the TMDL document ,which the CMDC contends is outdated, demonstrates, as a matter of law, a specified pollutant that exceeds the MDNR's standards. That pollutant is chlorides. As further discussed in our specific section, the standard for chlorides is 230 m/l. The Flat Branch, the major tributary to Hinkson Creek, was sampled at 285 m/l. Hinkson Creek was sampled at 333 m/l. Levels of chlorides in the impaired sections coincide with spring and winter thaws. Chlorides are known to sensitize invertebrates and fish to other pollutants. A reasonable starting point would be to address specific pollutants which have a likelihood of impact and are identified as required by law.

The failure of the administrator and the CWC to address their non-discretionary duty to specifically identify pollutants under Sections 303 and 304 of the Federal Water Pollution Control Act are required to be addressed. It is a failure that the citizens have a right to enforce under citizen suit provisions of the Federal Clean Water Act.

5. The TMDL fails to address downstream impacts of the endangered pallid sturgeon at the confluence of Perche Creek and the Missouri River.

The TMDL fails to address downstream impacts upon the pallid sturgeon at the Missouri River. The biological opinion provided by the U.S. Fish and Wildlife Service for the operation of the Missouri River establishes an increased need for sediment in the River. Specifically, the biological opinion indicates a need for increased sediment to support pallid sturgeon reproduction. Known populations of pallid sturgeon exist downstream at the mouth of Perche Creek. Perche Creek receives the sediment contributions of Hinkson Creek. Removal of sediment contribution from the Hinkson Creek watershed at the mouth of Perche Creek will be detrimental to the pallid sturgeon. The TMDL implies that contributions of sediment into Hinkson Creek should be removed. Yet, the very same "habitat improvements" are being created by the U. S. Army Corps of Engineers with the blessing of USEPA and the U. S. Fish and Wildlife Service in the Missouri River to enhance populations of pallid sturgeon in the reaches of the Missouri River impacted by Hinkson Creek.

There is no evidence of consultation. There is no evidence of any shared information between any federal agencies other than the USEPA.

When comparing the biological index numbers on Hinkson Creek and the fact that they are near performing, the removal of sediment from the Perche Creek watershed may be detrimental and result in a take of potential pallid sturgeon yearlings. The failure to properly protect and address the impact on the pallid sturgeon by this specific TMDL results in a potential violation of the Endangered Species Act which may be supported by members of the public through their right to sue for the failure of any agency involving a federal action from properly addressing its impact. The TMDL as proffered may impact the pallid sturgeon with no attempt to address the consequences.

6. The implementation of the TMDL will fall to the City of Columbia, Boone County, and the University of Missouri through their MS4.

The cost to the public to implement this shotgun approach is substantial. The economic costs to implement this surrogate approach are not evaluated or displayed for the public in their analysis of this TMDL. The increased cost on individuals through rate increases and rate creation for storm water utilities, structural construction, and the uncertainty of success demand this TMDL include an economic analysis. The CMDC believes that the scope and dollar value of this approach may rival the cost for improvements to the wastewater systems in the Hinkson Creek watershed. As such, the imposition of this action may violate the Hancock Amendment and result in the burden being placed upon the State of Missouri. Challenges under the Hancock Amendment may be brought by both the governments involved and the citizens of this state. Increases in rates and costs through the MS4 permit may result in Hancock impacts. The State

should be prepared to meet the appropriate economic tests and present the appropriate economic data in response to the State Constitution's requirements.

7. The Hinkson Creek TMDL is a federal action of sufficient and unique impact to require a basin specific NEPA analysis versus acceptance of a programmatic authorization.

By admission of the MDNR at public meetings, the Hinkson Creek TMDL and its surrogate of volume, flow or quantity is unique. By admission of the MDNR to implement this TMDL to control volume, flow or quantity will require structural alternatives of consequence not normally required in a TMDL. By the MDNR's admission, it relies upon an example from a small watershed in Vermont in developing the surrogate strategy.

The MDNR cannot determine whether concentrations of "unknown" pollutants will increase or decrease as a result of this strategy. The MDNR cannot confirm that improvements required as a result of this strategy may not limit base flow and thereby create stress upon biological indicators.

The unique and special character of the solution provided in this TMDL mandates a specific evaluation under the National Environmental Policy Act ("NEPA") for this federal action. There is no denial that this TMDL will not be incorporated into the USEPA's overall TMDL action strategy for the State of Missouri. There is no denial that this is a federal action.

By virtue of the unique character, unknown consequences on the overall environment, and impact on the human environment, a site specific NEPA analysis is necessary.

Again, the CMDC recommends reconsideration of the surrogate approach and adoption of a more traditional triage-based theory to place this TMDL in a consistent position for any programmatic NEPA-related review which may have been previously conducted.

For the reasons so stated, the members of the CMDC request the MDNR to reconsider the methodologies, designations, and implementation of this TMDL to place it in comport with the law and support the efforts of these communities to improve water quality.

SPECIFIC COMMENTS

Attached as Exhibit 1 to this letter are specific technical comments regarding failures and problems with the TMDL. These are addressed by section. The members of

the CMDC request the MDNR and the USEPA to reconsider the recent request of the City of Columbia, Boone County, and the University of Missouri to

A. Resample and reevaluate data to determine that a problem still exists.

B. Provide specific references for assertions and presumptions in the report which cannot be demonstrated or proven with the information provided.

C. Utilize a triage approach instead of the surrogate proposal.

D. Evaluate economic costs and unintended consequences.

CONCLUSION

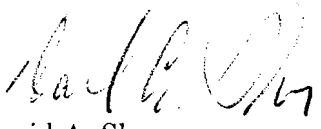
The CMDC believes that the TMDL is unnecessarily overreaching and is attempting to control land use and human activity at a level unprecedented in the State of Missouri. The TMDL violates numerous Missouri and federal laws, and potentially violates the Missouri Constitution. The TMDL and its surrogate create the question of takings not necessary in this discussion.

For the reasons so stated, we request the MDNR and the USEPA to reconsider the surrogate approach in favor of a methodical triage approach to determine specific pollutants and their likelihood of impact.

On behalf of the members of the Central Missouri Development Council, I am

Very truly yours,

LATHROP & GAGE LLP

By: 
David A. Shorr

DAS/jf
Attachment

Hoke, John

From: Susan Myers [SMYERS@stlmsd.com]
Sent: Thursday, April 22, 2010 4:36 PM
To: Hoke, John
Cc: DNRContact, jrlodd@stlmsd.com; Bruce Litzsinger
Subject: MSD's Comments on Draft TMDL for Hinkson Creek
Attachments: SKMBT_C65010042216320.pdf

John, please accept the attached comments. A hardcopy will follow in the mail.

Thanks

Susan M. Myers
Office of General Counsel
Metropolitan St. Louis Sewer District
2350 Market Street
St. Louis, MO 63103
(314) 768-6366
(314) 768-6279 (FAX)

From: bizhub-treasury@stlmsd.com [mailto:bizhub-treasury@stlmsd.com]
Sent: Thursday, April 22, 2010 5:33 PM
To: Susan Myers
Subject: Message from KMBT_C650

Metropolitan
St. Louis Sewer
District

2350 Market Street
St. Louis, MO 63103-2555
(314) 768-6200

April 22, 2010

Department of Natural Resources
Water Protection Program
Water Quality Monitoring and Assessment Section
P.O. Box 176
Jefferson City, MO 65102-0176

Re: Comments on Draft Total Maximum Daily Load (TMDL) for Hinkson Creek

To Whom It May Concern:

The Metropolitan St. Louis Sewer District (MSD) is writing to provide comments on the draft TMDL for Hinkson Creek in Boone County, Missouri. As an MS4 permittee, coordinating authority for nearly 40 percent of the regulated MS4s in Missouri, and serving a highly urbanized area of Missouri, MSD has an interest in the development and implementation of any TMDL focused on stormwater volume reduction. MSD sees this TMDL, the first of its kind in Missouri, as a precedent setting endeavor.

MSD concurs that hydrology and its affect on stream modification is a significant driver of urban stream impairment. However, using runoff volume as a surrogate for other pollutants in the TMDL process is a relatively new approach. Granted, similar TMDLs have been approved in Vermont (EPA Region 1) and elsewhere on a limited number of watersheds, but its application is not widespread throughout the nation. EPA regulations [40 CFR 130.2(i)] allow for the use of "other appropriate measures", and the Federal Advisory Committee on the Total Maximum Daily Load (TMDL) Program recommended that in some instances EPA and the States use surrogate measures in TMDL development.[1] However, some members of that Committee believed the TMDL program should be limited to pollutant loading because TMDLs are best suited to addressing those issues. Additionally, the Committee Report placed flow (i.e., hydrology) modifications in a special category of "extremely difficult problems" warranting special consideration. MSD echoes these sentiments and respectfully recommends proceeding carefully.

The proposed TMDL states, "A reduction in storm water runoff can be accomplished by storm water retention and enhanced infiltration and evapotranspiration." Implied is that the TMDL only addresses post-construction runoff impacts because these fate and transport

[1] Report of the Federal Advisory Committee on the TMDL Program. EPA 100-R-98-006.

process are not typically applied to construction stormwater runoff controls. Issues with this approach in the context of meeting the overall goal of removal from the impaired stream list are further described below.

Page 11, section 2.6, the stated intent of the TMDL is to restore the stream's natural peak and base flow dynamics, and that the TMDL will restore habitat and reduce the release of toxic pollutants into Hinkson Creek. The relationship between urbanized areas and impervious area, and stream health is well established; however, the reasons and mechanisms related to water quality are not entirely understood. Accordingly, we have concerns that the statements in this section may not be accurate. For example, some stressors and pollutants listed in tables 6 and 7 represent materials used or disposed into the environment irregardless of rainfall volume reduction, and will eventually enter waters of the state. One such example includes chloride, which is an environmental pollutant in runoff as well as in groundwater (via, infiltration). Chloride is better addressed by other source reduction best management practices unrelated to reducing runoff volume. Granted, volume reducing solutions may provide a detention effect that reduces the concentrated of chloride that discharges into the stream. However, employing volume reduction BMPs may be not be the most effective or least costly way to addressing pollutants like chloride. Additionally, post-construction volume reduction does not address all nonpoint source pollution issues, including control of erosion and sediment from land disturbance sites, which also significantly contribute to sedimentation and stream impairment. The TMDL discusses the impacts of sediment and sedimentation related to urbanization and runoff; however, sediment as a pollutant from construction sites was not evaluated, and this is concerning. With so many unknowns related to whether post-construction runoff alone is the problem, it seems a tremendous burden has been placed on the MS4s to reduce runoff from already developed areas without knowing with certainty the problem.

Page 23, Figure 5 and 6 show considerable variation in flow. Developing a resultant TMDL with legal implications for specific flow reductions to the tenth of a percent based on this data appears statistically unsupportable given the apparent variability of data.

Page 26, Figure 8 seems to indicate that the flow duration curve for Hinkson creek is in the range of the reference streams. As the TMDL document references, streams impaired by modifying the flow regime of urban runoff exhibit long periods of smaller baseflows, with short periods of larger peak flows. However, the flow duration curve suggests that Hickson Creek's baseflow is typical of the reference streams. Thus, while Figure 4 indicates that baseflow has decreased, it doesn't appear that baseflow levels are unacceptable. This again seems to indicate that hydrologic changes resulting from post-construction urban runoff are not the only cause of the impairment.

Page 27, the basis for selecting volume reduction goals (Figure 9 and Table 12) at the Q 0.3% flow occurrence is unclear, and MDNR should explain why Q 0.3% will return the stream to attainment. (Methods for assessing and developing ecological stream flows are available.) The TMDL states, "This (Q 0.3%) value approximates the one year return flow, based on the rank of the flow rate above which the probability of occurrence is ~1/365." It isn't clear what MDNR intends by this statement: specifically, does Q 0.3% correlate to the 1-year 24-hour

storm? If MDNR intends to apply the TMDL to BMP design using a 1-year 24-hour design storm (P=2.5"), then this is concerning.

- As the TMDL indicates on Page 33, precipitation events less than 1.5" are responsible for about 75 percent of runoff pollutant discharges and are key events when addressing mass pollutant discharges into urban streams. If a 1-year 24-hour design storm (P=2.5") rainfall is used to size BMPs, then roughly half of the BMP volume will have minimal impact on pollutant loads carried by stormwater runoff. On the other hand, this would double BMP size (and construction costs). For many typical urban redevelopment sites, this will increase the development costs by $40,000-$100,000/acre.
- Because application of volume reduction BMPs is best applied at the micro-scale (not regional scale), the use of distributing infiltrating BMPs of this size (P=2.5") in an urban setting will be a limiting factor due to space constraints. The use of larger, more economical regional infiltration BMP approaches is not desirable (maintainable or effective) in our experience.
- Redevelopment of sites and the accompanying controls that are put in place to limit stormwater load are an important component to long-term improvement of water quality in urban areas. If the rate of control implementation is slowed because of lack of redevelopment projects, then attainment may not be observed for a very long time (and/or the MS4 forced to spend valuable public dollars to subsidize redevelopment).

Because of the tremendous burden designing for Q 0.3% (and the 1-year 24-hour storm) could place on the MS4 and development community, it is critically important that MDNR have a vision for how the TMDL will be implemented through BMP design. MSD supports a reasonable, balanced, scientifically defensible, iterative approach to setting goal and implementing actions to achieve results (emphasis added). As proposed, this TMDL implementation could lead to several unintended consequences, including technical and cost impracticability that ultimately drives development further from the urban core (generating other environmental and pollution problems). Additionally, a reality of this rule is that permittees must either raise revenues or cut services in other areas to cover the costs of carrying out these stormwater rules (as part of their small MS4 permit).

Conclusion –

This 303d listing and TMDL is concerning as it would appear to apply to many areas across the State that have over 10% impervious areas, shopping center parking lots, and other situations common with urbanized areas. It is not appropriate to evaluate and declare all urban streams as impaired based on impervious area alone, nor feasible to assess or even address all such streams Statewide through the TMDL process.

Another concern MSD has about the TMDL process relates to the broader perspective of storm water quality strategies. If watersheds with over 10% impervious area begin to degrade stream water quality, then waiting until the stream is included in the 303d list and then retrofitting controls provides a disincentive to development through the better site design practices like large conservation efforts that provide enhanced storm water management

performance. Possibly a more appropriate approach for MDNR is to lower the applicability threshold to the MS4 permit, to ensure new development in high growth areas will be protective of the water environment. Efforts to expand regulation to currently unregulated sources of pollution, like agriculture, should also be considered. In summary, prevention is a more prudent approach than the difficult, costly efforts to restore a watershed through retrofitting. This approach would also level the playing field with regard to eliminating circumstances that promote sprawl.

MSD applauds the efforts of the citizens, government leaders and MDNR in addressing the negative impacts of urbanization, however, we have concerns with how the TMDL will be applied, particularly where no pollutant can be identified. We further recommend that the effort to address non-point source pollution within the entire State rests with the MS4 general permit.

Thank you for the opportunity to comment. If you have any questions, please contact Bruce Litzsinger at 314-436-8757 or Jay Hoskins at 314-768-2709.

Sincerely,

for Randy E. Hayman
General Counsel

Susan M. Myers
Environmental Attorney
Office of General Counsel

CC: John Lodderhose, MSD
Bruce Litzsinger, MSD

Hoke, John

From: Obrecht, Daniel V. [ObrechtD@missouri.edu]
Sent: Thursday, April 22, 2010 3:10 PM
To: Hoke, John
Subject: comments on the Hinkson Creek TMDL
Attachments: Hinkson Creek TMDL comments.doc

John,
The attached Word file contains my questions and comments concerning the Hinkson TMDL. While I work in the limnology laboratory at MU, the comments/questions being submitted are mine, and do not reflect in any way the opinions or views of my employer.

Sincerely, Dan Obrecht

P.O. Box 7641
Columbia, MO 65205
Phone 573-823-0132

[Received from Dan Obrecht, 4/22/10, via e-mail]

Comments and Questions concerning the Hinkson Creek TMDL

USE OF THE 0.3% HIGH FLOW VALUE TO SET TARGET REDUCTIONS

The major technical concern with the draft Hinkson Creek TMDL is use of the 0.3% high flow value (HFV) to compare Hinkson to four attainment streams/rivers. This comparison is the cornerstone in setting the target reduction of flow by 50.5%, a flow reduction that seems excessive relative to the level of impairment measured in Hinkson Creek. More importantly, use of the 0.3%HFV renders the attempted comparison of stream systems moot, as it fails to evaluate the relation between stream flow and watershed characteristics.

The flow duration curves (Figure 8 in the TMDL), when taken as a whole, represent discharge over the range of conditions and allow for comparisons of how discharge is influenced by watershed characteristics. The ends of the curves reflecting extreme discharge values relating to unusually intense storm events (left side of curve) or extended dry periods (right side of curve). Comparisons made at the ends of the curves are greatly influenced by out of the ordinary meteorological events, and thus do a poor job of reflecting the differences in discharge that actually relate to watershed characteristics. The 0.3%HFV may relate to channel forming events, but that is a separate issue from nonpoint pollution. Because the TMDL is using discharge as a surrogate for nonpoint source pollution (Table 7 of TMDL), habitat loss and sedimentation (factors influenced by any runoff event), the comparison of flow duration curves should not be strictly tied to the 0.3%HFV.

Table 1 contains information concerning the four highest discharge values from Hinkson Creek during the period represented in Figures 8 & 9 of the TMDL. If the whole of the stated period of March 2007 to October 2009 (Table 10 in TMDL) were included in the analysis, the Hinkson data shown in Figure 8 represent discharge values from 975 days. The vertical line in Figure 9 of the TMDL that represents the 0.3%HFV would therefore be placed along the curve at a point between the second and third highest normalized discharge values.

As shown in Table 1, the precipitation events that relate to the most extreme discharge values in Hinkson Creek are well above what would be considered normal. There is no doubt that the impervious surfaces within Columbia had an influence on how much runoff reached Hinkson Creek during these events, but the influence of urbanization is obscured by the extremity of the precipitation events.

Table 1. The four highest discharge values for Hinkson Creek during March 2007 – October 2009. Precipitation data are from Sanborn Field weather station.

Mean Daily Discharge (cfs)	Date	Rain Event
5150	10/8/09	5.32" of rain fell on this day
5320	7/28/08	7" of rain during preceding week
6280	4/30/09	4.5" of rain during April 28-30
7810	9/14/08	6.3" of rain during Sept. 12-14

*I do not use normalized discharge values in this table because the TMDL fails to mention how the data were normalized, other than to say that watershed and annual precipitation were taken into consideration.

Table 2. Highest discharge values for four attainment streams/rivers during the time frames listed in Table 10 of the Hinkson Creek TMDL. Precipitation data are from the Paris, Kingsville, Steffenville and Palmyra weather stations.

Stream	Mean Daily Discharge (cfs)	Date	Rain Event
Middle Fork Salt River	17400	7/25/08	Rainfall of 6.1" on the 25th, with an additional 2.2" falling on the 28th
	22900	7/26/08	
	10300	7/27/08	
	10500	7/28/08	
Big Creek	12700	6/30/07	A total of 9.65" of rain fell at the Kingsville weather station during June 27-30
	15300	7/1/07	
	11300	7/2/07	
South Fabius River	11000	6/26/08	4.9" of rain on 25th, with 1.26" additional rain on 26th & 27th
	12500	6/27/08	
	12500	6/28/08	
	11000	9/14/08	Rainfall of 2.9" on 14th, after 6.9" of rain had fallen during previous 11 days
	10500	9/15/08	
	12000	9/16/08	
	10700	9/17/08	
North River	10400	3/31/98	Rainfall of 1.2" on 31st
	5650	11/3/98	Rain of 1.4" on 3rd, after 1.7" the previous 2 days
	8260	1/22/99	Rainfall of 1.2" on 22nd
	6450	4/16/99	Rained 1.4" on 15th and 1.3" of 16th

The highest discharge values for the four attainment streams/rivers are shown in Table 2. Again, the very highest of discharges were related to above normal precipitation events or extended periods of rain. The exceptions would be the high discharge values for the North River on March 31, 1998 and January 22, 1999. Both of these peak discharges occurred with only 1.2" of rainfall. It is possible that the ground was frozen during both of these events, which would greatly reduce, if not eliminate, infiltration into the soil.

Use of the 0.3%HFV does not truly compare the systems in a way that provides any measure of how the watersheds influence discharge. Instead, the comparison in the TMDL is, in essence, a comparison of individual rain events (i.e. how did discharge in Hinkson Creek after 7" of rain in a week's time compare to discharge in Big Creek after 9.65" of rain in a four day period). Unless DNR feels that the failure of Hinkson Creek to meet water quality standards is related only to the most extreme of flows (which would suggest that nonpoint source pollution is not an issue 99.7% of the time) this comparison is seriously flawed and does not achieve what it sets out to do.

Figure 8 in the TMDL represents around 4260 daily discharge values from the five streams. Collectively, the data provide a "big picture" comparison that could be useful in setting target reductions in Hinkson Creek. Choice of the 0.3%HFV as the only point of comparison effectively ignores 99.7% of the data in Figure 8. To make a useful comparison using the flow duration curves would require, at a minimum, for the comparison to be made at a point on the curve that represents discharge relating to more typical precipitation events. It may be worth considering comparisons at multiple points along the curves to better encompass the relationship between discharge and watershed characteristics.

The four attainment streams/rivers are all bigger than Hinkson Creek (based on average discharge) and have substantially larger watersheds (4.5 to 8.9 times larger). Smaller streams tend to be flashy compared to larger systems, with water levels coming up and going back down faster than observed in larger rivers. This difference in response can be observed when comparing Table 1 and 2 (above). Hinkson Creek and the North River are the only two streams that had peak discharge values that related to individual precipitation events. The other three rivers had multiple high discharge values on consecutive days, indicating that the peak flows were spread out over time after a substantial precipitation event. The differences in stream and watershed size among these systems needs to be considered when comparisons of flow duration curves are made.

OTHER CONCERNS AND QUESTIONS

Out of the 34 SCI scores recorded for Hinkson Creek (Table 3 in TMDL), 20 resulted in values that indicate the creek is fully supporting aquatic life (score of 16-20), with the remainder registering scores indicative of partially supporting aquatic life (10-14). Even if the two most up-stream sites are excluded from the analysis, 50% of the SCI scores are still at or above a value of 16. An average of the 26 scores from these sites results in a value of 14.8 (15.3 when up-stream scores are included). It would seem that Hinkson Creek is not meeting criteria, but is missing it by a fairly small margin. Does DNR truly feel that the suggested reduction of discharge by 50.5% is a fitting fix to what would seem to be a minor problem?

Figure 4 in the TMDL compares flow duration curves from four month periods in 1967 and 2007. According to the USGS website containing data from the Hinkson Creek gauging station, there are a total of 23 years in which discharge data is available for the April-July period (and 19 years in which the full year of data are available). Given the abundance of information, why does the TMDL only compare data from two four month periods?

Figure 6 in the TMDL seems to indicate that discharge has only increased minimally during the fall, winter and spring seasons, and substantially during the summer season when data from the 1970s, 1980s and 2000s were compared. Given that urbanization and its impacts on watershed runoff are year-round phenomena, what is the explanation for the differences among seasons? Does this graph suggest that the city only really needs to focus on runoff during the summer because changes in discharge have been nominal during the other seasons?

In section 5.3 of the TMDL it is stated that the attainment streams are in watersheds that are within an order of magnitude of the size of the Hinkson Creek watershed. Given that these streams/rivers have watersheds that are between 4.5 and 8.9 times larger than the Hinkson Creek watershed, are there any assumptions that DNR is making about how these systems compare? If so, what are they? Were there any streams that are more similar to the Hinkson in size that have both discharge and invertebrate data?

What were the SCI scores for the attainment streams?

In section 5.5 of the TMDL it is stated that forest and wetland land use is not expected to generate significant runoff. Given that these land covers account for 29.4% of the watershed (Table 13 in TMDL), and the measure of success for the TMDL is a reduction in stream discharge, shouldn't the runoff from these land uses be taken into account? I realize that the reduction in runoff will be made on the other

land cover types, but discounting the contribution of 29% of the watershed to the creek's flow seems inappropriate. This would seem especially true given that the target reduction was based on discharges that occurred in conjunction with extreme rain events. For example, a total of 5.32" of rain fell within a 24 hour period on October 8, 2009. Does the DNR truly feel that there was no runoff from this precipitation event from the forested areas in the watershed?

If the city is capable of meeting the goal of a 50% reduction in discharge during extreme rain events (5" in a 24 hour period; 7" within a week) it will take a substantial amount of capacity in terms of rain barrels, rain gardens, detention ponds, etc. If these infrastructures are in place to catch this large amount of runoff from making it to the creek, what is going to happen when a normal rains occurs? If we have the capacity to hold the runoff from 2-3" of rain, will the water from a ½" rain ever make it to the creek?

In section 5.1 of the TMDL it is noted that the average daily flow during April-July 2007 was 80% higher than the average flow April-July 1967. Were daily flow values normally distributed during the four month periods in each of these two years? Would geometric mean values be a better descriptive statistic than arithmetic means in this situation? What was the difference in geometric mean daily flow values for these two periods?

Flow data in Figure 8 were normalized for watershed size and yearly precipitation. Could DNR expand on how these data transformations were conducted?

You've got my support !

Petersen, Kevin J. (MU-Student) to: john.hoke@dnr.mo.gov 09/21/2009 05:02 PM

I just wanted to let you know that DNR has my full-hearted support for cutting storm run-off into the Hinkson. Thank you.

Kevin

Hoke, John

From: Ken Midkiff [12midkiff@centurylink.net]
Sent: Thursday, April 22, 2010 9:32 AM
To: Hoke, John
Cc: Ozark Osage Group Forum; hank ottinger; linda green; Dee Dokken; Mitch Skov; Julie Sears; Marion Mace
Subject: Sierra Club Comments on Hinkson Creek TMDL

Attachments: Hinkson Ck TMDL comments.doc; "AVG certification"


Hinkson Ck TMDL comments.doc (...


AVG certification (222 B)

Attached as MSWord file. These will also be sent via US Mail.

Ken Midkiff
Conservation Chair, Osage Group Sierra Club

SIERRA CLUB
FOUNDED 1892
OSAGE GROUP

Osage Group
Conservation Committee
573-881-0553 (Cell) 573-442-5570 (Landline)
http://missouri.sierraclub.org/osage/index.htm

April 22, 2010

RE: Hinkson Creek TMDL

John Hoke
Water Protection Program
Missouri Department of Natural Resources
Lewis and Clark State Office Building
Jefferson City, Missouri 65102

Mr. Hoke,

The Osage Group of the Sierra Club, with approximately 450 members in the City of Columbia and Boone County, submits these comments on the draft Total Maximum Daily Load (TMDL) study for Hinkson Creek:

Minor suggestions and minor errors noted:

1. Page 1, first paragraph: Hinkson is on the 2008 303(d) List as well as preceding years (dating back to 1998).

2. Page 4: Population is increasing by about 4% per year.

3. Page 5, 2nd paragraph: Add "In 2005" to last sentence.

4. Page 6: Need to briefly explain difference between "acute" and "chronic".

5. Page 11, 3rd full paragraph: Need to emphasize that "peak flow following storm events" is being used as a surrogate.

6. Page 14, 3.1.4: Add after sanitary sewage overflows "as recently as October, 2009".

7. The suggested (or recommended) solutions are quite good, but these need to be emphasized perhaps by the utilization of "bullet points" or similar highlights.

Substantive comments:

There should be more than one bioassessment to ascertain whether or not the TMDL recommendations are "working". It is suggested that, after the recommendations are fully implemented, there should be at least one bioassessment per year for five years. It is recognized that MDNR may not have the resources to do this and the results of other agencies' credible bioassessments should be accepted.

We find the documentation presented to be overwhelmingly persuasive that a reduction of 50.5% of "peak flow following a storm event" will restore Hinkson Creek to a healthy condition. While it would be preferable to ascribe the impairment to a specific pollutant (or, more likely, several pollutants), we find that the "surrogate" (peak flow after a rain event) to be appropriate, acceptable and, according to EPA, legal. It is expected that stormwater runoff does contain many contaminants, one or more of which may be the cause of impairment. By limiting the amount of runoff, the contamination would also be limited.

The recommendations or suggestions to reduce stormwater flow are appropriate and should be helpful to the County of Boone, the City of Columbia, and private landholders in the Hinkson Creek watershed.

Most of the suggestions are not expensive, but do represent a change from the way things are done now. No change would counter no resistance, but it is clear that "keeping on keeping on" will only result in a greater degree of impairment. Hinkson Creek did not become impaired overnight and it may take years – decades – to clean it up. The time to begin is now.

Sincerely,

Ken Midkiff
Conservation Chair, Osage Group Sierra Club

Hoke, John

From: Houts, Todd A. [houtst@missouri.edu]
Sent: Thursday, April 22, 2010 3:23 PM
To: Hoke, John
Cc: Georganne Bowman; John Glascock; Hunt, Steve; Tom Wellman; DNRContact, bflorea@boonecountymo.org; Miller, Karen; DNRContact, ashbrookp@missouri.edu
Subject: MU Comments on Hinkson Creek second draft Total Maximum Daily Load (TMDL),
Attachments: 2010April21-TMDL-Comments-complete.pdf

Dear Mr. Hoke,

The University of Missouri (MU) wishes to thank you for the opportunity to comment on the Hinkson Creek second draft TMDL placed on public notice March 8, 2010. Attached you will find a PDF of our comment letter including attachments. Please let me know if there are any problems with this document. A hard copy will follow via US Mail.

Todd Houts

Todd A. Houts
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UNIVERSITY *of* MISSOURI

ENVIRONMENTAL HEALTH AND SAFETY

April 21, 2010

Department of Natural Resources
Water Protection Program
Water Quality Monitoring and Assessment Section
P.O. Box 176
Jefferson City, MO 65102-0176

Re: Hinkson Creek second draft Total Maximum Daily Load (TMDL), Boone County, Missouri

Dear Mr. Hoke,

The University of Missouri (MU) wishes to thank you for the opportunity to comment on the Hinkson Creek second draft TMDL placed on public notice March 8, 2010.

As has been noted in previous correspondence on this subject, as well as at public and informational meetings held on October 20, 2009; December 16, 2009; and April 20, 2010, MU has grave concerns regarding the draft TMDL in its current state. This second draft, while making marginal improvements on the first draft that was withdrawn prior to MU having an opportunity to submit official written comments, still suffers from many of the faults MU has identified in the aforementioned meetings.

Our major concerns are:

1. The failure of the Department to identify a pollutant causing the occasional impairment, which in reviewing the history of the TMDL program, is key to the process.
2. The failure of the Department to link the observed fluctuations of the aquatic invertebrate community to urbanization of the watershed.
3. The methodology used to reach the conclusions contains many unsupportable assumptions and compares and simplifies data that is fundamentally different – particularly troubling considering the magnitude of the solution presented.
4. The failure of the Department to consider the potential permit implications of the draft Waste Load Allocation (WLA) in spite of repeated communication of this concern by the affected permit holders.
5. The lack of clarity in the document as to the Department's expectations of affected parties including the inappropriate use of flow and volume interchangeably, and the disconnect between the reported impairment and the point where the TMDL process ends.
6. The failure of the Department to craft the TMDL as a phased approach as clearly applicable in these specific circumstances based on EPA documents provided to the Department by MU.
7. The failure of the department to coordinate companion programs working toward the same goal in the Water Pollution Control Branch instead of allowing each program to craft isolated solutions to the same problem.
8. The failure of the Department to have estimated the cost for implantation of the TMDL as written.

9. The stated driving force of the Department being the lawsuit against EPA that consequently compelled the Department to craft a document by December 31, 2009 instead of being driven to find a sound, workable solution for the people of Missouri.

Concern 1: The failure of the Department to identify a pollutant causing the occasional impairment, which in reviewing the history of the TMDL program, is key to the process.

In referring to the Clean Water Act, it was initially clear a pollutant was necessary to initiate listing of an impaired waterbody under Section 319. However in EPA guidance specific to the 1998 listing (where Hinkson Creek was ultimately added) http://www.epa.gov/owow/tmdl/lisgid.html [emphasis MU's]:

> **Waterbodies Impaired by an Unknown Source or an Unidentified Pollutant**
>
> 40 CFR section 130.7(b)(1) provides that waterbodies included on State section 303(d) lists are those waterbodies for which pollution controls required by local, State, or Federal authority, including technology-based or more stringent point source effluent limitations or nonpoint source best management practices, are not stringent enough to implement any water quality standard applicable to such waters. In addition, 40 CFR section 130.7(b)(4) requires States to identify, in each section 303(d) list submitted to EPA, the "pollutants causing or expected to cause violations of the applicable water quality standards."
>
> These regulatory provisions apply even if the source of the pollutant cannot be identified at the time of listing. Therefore, for the 1998 listing cycle, waterbodies impaired by an unknown source should be included on 1998 State section 303(d) lists, as long as there is a pollutant associated with the impairment. Listing may be based on pollutant loadings from unknown point and nonpoint sources, and includes situations where a pollutant is found in fish tissue such that there is an exceedance of applicable water quality standards, but the pollutant is not traceable to a particular source.
>
> In addition, 40 CFR section 130.7(b)(4) requires States to include on their lists an identification of the *specific* pollutant(s) causing or expected to cause exceedances of applicable water quality standards. In some situations, however, **a *specific* pollutant has not been identified at the time of listing.** Therefore, for the 1998 listing cycle, where a water is impaired but a specific pollutant has not been identified, **States should, if possible, indicate** on the 1998 State section 303(d) lists **the class of pollutants** (e.g., metals or nutrients) **causing, or believed to be causing, the impairment.** Moreover, for the 1998 listing cycle, States should indicate whether the water is impaired for one or more pollutants.

While EPA did allow the listing of a creek without a specific identified pollutant, it does not change the requirement of identifying a pollutant for the TMDL process. At the April 20, 2010 meeting, John Hoke attempted to address this lack of identifying a pollutant of concern by stating, "We found lots of pollutants so we can say we found a pollutant." The identification of intermittent pollutants, many of which were attributable to direct sources which were subsequently eliminated, without the establishment between a specific pollutant of concern and the observed impairment, fails the criteria of identifying a pollutant. In fact, Section 2.6 of the draft TMDL contradicts Hoke's statement by stating, the conclusion of the study is that "no particular pollutant, or suite of pollutants, appears to be the main cause of the impairment observed in Hinkson Creek."

Concern 2: The failure of the Department to link the observed fluctuations of the aquatic invertebrate community to urbanization of the watershed.

In the introduction to this draft TMDL (Section 1) DNR states, "Because the pollutants of concern impairing Hinkson Creek are unknown, this TMDL calculates a reduction in storm water runoff as a surrogate for any pollutants of concern. This approach has been used and approved by EPA in other states and is supported in federal rule at 40 CFR 130.2(i) for TMDL development as an 'other appropriate measure'." DNR has verbally referred to the Vermont Potash Brook TMDL as an example of when a surrogate has been used: "Flexibility in federal rules, where you can't identify a pollutant, you can use a surrogate. This is what they did out east [Potash Brook]." (John Hoke, April 20, 2010, Boone County Commission Chambers.) The Department, however, is incorrect in comparing this TMDL to the Vermont one in that Vermont has, as required, identified a pollutant of concern – sediment. A supplementary document to that TMDL (Expanded Technical Analysis: Utilizing Hydrological Targets as Surrogates for TMDL Development in Vermont's Stormwater Impaired Streams) draws a direct link between the pollutant and the appropriate use of a surrogate. The Department does not draw such a link; instead the methodology of the Vermont TMDL is used virtually step-by-step without clearly showing that link. Additional, it appears from the MSCI data that the creek was already improving from 2001 to 2006 further undermining the department's conclusions.

See Attachment A (Geosyntec report) comments 3.B.2, 3.C.1, and 3.C.4 s for additional support for this concern.

Concern 3: The methodology used to reach the conclusions contains many unsupportable assumptions and compares and simplifies data that is fundamentally different – particularly troubling considering the magnitude of the solution presented.

The Vermont Expanded Technical Analysis also references the "Report of the Federal Advisory Committee on the Total Maximum Daily Load (TMDL) Program" (FACA Report, July 1998), which says, "…the state should try to identify another (surrogate) environmental indicator that can be used to develop a quantified TMDL using numerical analytical techniques where they are available, and best professional judgment (BPJ) where they are not…The use of BPJ does not imply the lack of rigor; it should make use of the 'best' scientific information available, and should be conducted by 'professionals.' When BPJ is used, care should be taken to document all assumptions, and BPJ-based decisions should be clearly explained to the public at the earliest possible stage." The department has not clearly identified all assumptions made, as evidenced by the many questions at the most recent public meeting, nor have these BPJ-based decisions been explained at the earliest possible stage. A specific example of a statement by the Department that illustrates the failure to meet these criteria came in response to how the Department can say Hinkson Creek was in attainment in 1967, "It is assumed there was attainment." (John Hoke, April 20, 2010, Boone County Commission Chambers.) The magnitude of the final result (50.5%) also doesn't support the Department's answer to the question, "Do any urban streams in Missouri consistently achieve a fully supporting aquatic invertebrate community?" The response, "We haven't looked at very many places but they may not be supporting either. Hinkson Creek is right on the edge so it just needs this little extra bit." (John Hoke, April 20, 2010, Boone County Commission Chambers.) A 50% reduction will do more than change the hydrology of the creek "a little bit." In response to "Is it reasonable to expect that urban streams can consistently achieve a fully supporting aquatic invertebrate community?" those in attendance were told, "I'm an optimist. I

think so." (John Hoke, April 20, 2010, Boone County Commission Chambers.) Basing a TMDL approach on what one thinks will happen versus defensible scientific data illustrates the disconnect between the Department's theoretical approach, and the real world knowledge of those working in Boone County toward healthy creeks and streams.

See Attachment A (Geosyntec report) comments 3.A.1, 3.A.2, 3.A.3, 3.A.5, 3.A.6, 3.A.7, 3.B.1, 3.B.2, 3.B.3, 3.B.4, 3.C.1, 3.C.6, 3.C.8, 3.C.10, and 3.D.2 for additional support for this concern.

Concern 4: The failure of the Department to consider the potential permit implications of the draft Waste Load Allocation (WLA) in spite of repeated communication of this concern by the affected permit holders.

MU has clearly communicated at every opportunity that the Joint City/County/University NPDES MS4 Permit (http://dnr.mo.gov/env/wpp/permits/issued/R040000.pdf), referenced by the TMDL, contains language that only the WLA will be considered for imposing implementation of the TMDL. Yet even at the last meeting, the audience was told, "While that number [50.5%] looks like a big number, it doesn't have to be done all at once." (John Hoke, April 20, 2010, Boone County Commission Chambers.) The NPDES General Small MS4 permit says otherwise (in particular section 3.1.3) :

3. Special Conditions

3.1 Discharges to Water Quality Impaired Waters

3.1.1 If discharges from the MS4 are upstream from a 303(d) listed (impaired) waterbody, the permittee shall, in consultation with the department:

3.1.1.1 Determine whether storm water discharges from any part of the MS4 significantly contribute pollutants directly or indirectly to a 303(d) listed (i.e., impaired) waterbody. If the permittee has discharges meeting this criteria, the permittee shall comply with Section 3.1.2. If the permittee does not, Section 3.1 does not apply to the permittee.

3.1.1.2 Determine whether a Total Maximum Daily Load (TMDL) has been developed and approved by EPA for the listed waterbody. If there is such a TMDL, the permittee shall comply with both Sections 3.1.2 and 3.1.3. If no TMDL has been finalized, Section 3.1.3 will apply when the TMDL is finalized and approved by EPA.

3.1.2 *Water Quality Controls for Discharges to Impaired Waterbodies*. The permittee's SWMP document required under Section 4 shall include a description of how the permittee's program will control the discharge of measurable pollutants of concern and ensure the permittee's discharges will not cause or contribute to instream exceedances of the water quality standards. This discussion shall specifically identify measures and BMPs that will collectively control the discharge of the pollutants of concern.

3.1.3 *Consistency with TMDL Allocations*. If a TMDL has been finalized and approved by EPA for any waterbody into which the permittee discharges, the permittee, shall:

3.1.3.1 Determine whether the approved TMDL is for a pollutant likely to be found in storm water discharges from the permittee's MS4;

3.1.3.2 Determine whether the TMDL includes a pollutant wasteload allocation (WLA) or other performance requirements specifically for storm water discharge from the permittee's MS4;

3.1.3.3 Determine whether the TMDL addresses a flow regime likely to occur during periods of storm water discharge;

3.1.3.4 After the determinations above have been made and if it is found that the permittee's MS4 shall implement specific WLA provisions of the TMDL, assess whether the WLAs are being met through implementation of existing storm water control measures or if additional control measures are necessary;

3.1.3.5 Document all control measures currently being implemented or planned to be implemented. The permittee shall also include a schedule of implementation for all planned controls and shall document the calculations or other evidence that shows that the WLA will be met;

3.1.3.6 Describe a monitoring program to determine whether the storm water controls are adequate to meet the WLA; and

3.1.3.7 If the evaluation shows that additional or modified controls are necessary, describe the measures to be taken and the schedule for their implementation. The permittee shall continue meeting the requirements of 3.1.3.4 through 3.1.3.7 for this permit duration until the department determines WLAs are being met or that water quality standards are being met.

In spite of the Department's attempt to reduce the impact of the WLA through language in the implementation section, EPA does not approve that optional section, nor does it have legal standing. Instead, the permit section must compare the NPDES permittee's program solely with the WLA, in this case 50.5% reduction in flow (or volume, depending on written clarification of the Department's intent).

Concern 5: The lack of clarity in the document as to the Department's expectations of the affected parties, including the inappropriate use of flow and volume interchangeably, and the disconnect between the reported impairment and the point where the TMDL process ends.

Throughout the document the Department interchanges the terms "volume" and "flow", most notably in Section 6 (WLA) and 7 (Load Allocation). Table 15 (referred to as Table 13 in the text) states the percentages noted are for "flow reduction" while in the corresponding text "target runoff volume". Table and figure numbering frequently does not match in-text references: Table 3 referenced in 3.1.1 appears to refer to Table 4; Figure 2 referenced in 3.1.1 appears to refer to Figure 3; Table 2 referenced in 4.5 appears to refer to Table 3; Table 13 referenced in 6 and 7 appears to refer to Table 15; and Table 11 referenced in 3.1.1 appears to refer to Table 12. The data first used to verify some impairment of Hinkson Creek, aquatic invertebrate community testing, is only mentioned as a secondary goal of the TMDL; reduction of the recorded flow from the single USGS gage is sited as the primary target. But in spite of the Department's attempts to use a surrogate of flow in this TMDL, restoring the aquatic invertebrate community should be the primary target. Furthermore the document should be specific as to what percentage of sampling sites for what period of time will be considered supporting. It appears the TMDL is targeting 100% attainment, while the reference streams do not achieve that goal.

See Attachment A (Geosyntec report) comments 3.A.1, 3.A.2, 3.A.3, 3.A.5, 3.A.6, 3.A.7, 3.B.1, 3.B.2, 3.B.3, 3.B.4, 3.C.1, 3.C.6, 3.C.8, 3.C.10, and 3.D.2 for additional support for this concern.

Concern 6: The failure of the Department to craft the TMDL as a phased approach as clearly applicable in these specific circumstances based on EPA documents provided to the Department by MU.

In email correspondence on October 21, 2009, following the first public meeting on the initial TMDL, research at MU discovered the EPA document "Clarification Regarding 'Phases' Total Maximum Daily Loads" (http://www.epa.gov/owow/tmdl/tmdl_clarification_letter.html). The essence of the document is that EPA supports phased approaches to the TMDL when: (1) significant data uncertainty is present; or (2) when using a surrogate to interpret a narrative standard; or (3) when uncertainty about the

effectiveness of implementation activities exists. These cases clearly represent the situation with the Hinkson Creek. The heart of this document reads (emphasis MU):

> ***Phased TMDLs***
>
> We recommend the use of the term "phased TMDLs" be limited to **TMDLs that for scheduling reasons need to be established despite significant data uncertainty** and where the State expects that the loading capacity and allocation scheme will be revised in the near future as additional information is collected. In other words, phased TMDLs would be reserved for the second scenario described in the 1991 Guidance. [Second scenario = Guidance recommends the phased approach for situations where available data only allow for "estimates" of necessary load reductions or for "non-traditional problems" where predictive tools may not be adequate to characterize the problem with a sufficient level of certainty.]
>
> The phased TMDL approach would be used in situations where limited existing data are used to develop a TMDL and the State believes that the use of additional data or data based on better analytical techniques would likely increase the accuracy of the TMDL load calculation and merit development of a second phase TMDL. **Such significant uncertainty may arise, for example, because the State is using a surrogate to interpret a narrative standard,** or because there is little information regarding the loading capacity of a complex system such as an estuary and it is difficult to predict how the a water body will react to the planned load reductions. An example of a phased TMDL could be a TMDL for phosphorus in a lake watershed where there are uncertain loadings from the major land uses and/or limited knowledge of in-lake processes. In such a case, the loading capacity of the water body may be difficult to establish and the State may decide to include a schedule for establishing a revised TMDL based on follow-up monitoring. Phased TMDLs may also occur when a revision of the applicable standard is underway and will necessitate development of a second phase, revised TMDL to comply with the new standard.
>
> All phased TMDLs must include all elements of a regular TMDL, including load allocations, wasteload allocations and a margin of safety. As with any TMDL, each phase must be established to attain and maintain the applicable water quality standard. In addition, EPA recommends that a phased TMDL document or its implementation plan include a monitoring plan and a scheduled timeframe for revision of the TMDL. (These elements would not be an intrinsic part of the TMDL and would not be approved by EPA, but may support a rationale for approving the TMDL. See also "Nonpoint Source Program and Grants Guidelines for states and Territories, Federal Register Vol. 68, pp 60653-74.)
>
> Since phased TMDLs will in all likelihood need to be revised and therefore require more overall effort, **States should carefully consider the necessity of such TMDLs, for example to meet consent decree deadlines or other mandatory schedules.** Upon revision of the loading capacity, wasteload, or load allocations, the TMDL would require re-approval by EPA.
>
> ***TMDLs with Adaptive Implementation and Trading Provisions***
>
> Adaptive implementation is an iterative implementation process that makes progress toward achieving water quality goals while using any new data and information to reduce uncertainty and adjust implementation activities. The National Research Council report suggests that adaptive implementation include "immediate actions, an array of possible long-term actions, success monitoring, and experimentation for model refinement". By using the adaptive implementation approach, one can utilize the new information available from monitoring following initial TMDL implementation efforts to appropriately target the next suite of implementation activities.

> Phased TMDLs are an example of the adaptive implementation approach because each new phase utilizes new information to reevaluate the original TMDL. However, even for TMDLs where there is little uncertainty regarding the loading capacity of the water body and the necessary load reductions, an adaptive implementation approach can be a useful tool. Implementation of TMDLs can take many years and **when uncertainty about the effectiveness of implementation activities exists, TMDLs would benefit from containing elements that would facilitate adaptive implementation such as, for example, provisions for a flexible load allocation/waste load allocation scheme.** EPA is currently working to clarify how TMDLs can be written to provide for adjustments in the load and wasteload allocations in approved TMDLs.
>
> EPA understands that not all TMDLs can be implemented using adaptive implementation methods due to the more intensive monitoring and added administrative steps associated with this iterative approach. Nonetheless, EPA believes that in appropriate cases it should be feasible for States to develop TMDLs that facilitate implementation of practicable controls while additional data collection and analysis are conducted to guide implementation actions. **Follow-up monitoring is integral to the adaptive implementation approach.** Monitoring addresses uncertainty in the efficacy of implementation actions and can provide assurance that implementation measures are succeeding in attaining water quality standards, as well as inform the ongoing TMDL implementation strategy. If adaptive implementation activities reveal that a TMDL loading capacity needs to be changed, the revision would require EPA approval. In most cases adaptive implementation is not anticipated to lead to the re-opening of a TMDL. Instead, it is a tool used to improve implementation strategies.

It is unclear to MU why this applicable EPA recommended approach was dismissed while considerable effort was made to fit the existing limited data to another approach, namely the use of reference streams. MU continues to believe this phased approach is the most workable solution, which would allow the city, county and university to continue improvements to the health of Hinkson Creek, while addressing the Department's now-imminent deadline of compliance with the EPA's consent decree. This approach does not require leaps of faith, broad guesses or assumptions, nor the need to fit inadequate data the Department presently has into another ill-fitting model.

See Attachment A (Geosyntec report) comments 3.A.3, and 3.C.6 for additional support for this concern.

Concern 7: The failure of the department to coordinate companion programs working toward the same goal in the Water Pollution Control Branch instead of allowing each program to craft isolated solutions to the same problem.

While Hinkson Creek was first listed on the 303(d) list in 1998, no draft compliance document for the TMDL was available until September 2009. In the meantime, the NPDES Phase II Small MS4 regulations came into effect, prompting Boone County/City of Columbia/University of Missouri to obtain a joint permit in 2003. While that permit is not limited to the Hinkson Creek watershed, the intent of the Phase II program is to elicit change in nonpoint source pollution with the ultimate goal of creating cleaner waters of the state. The regulation requires the use of education, public participation, illicit discharge elimination and better practices during and after construction to achieve the performance based goals. Change in human behavior does not happen overnight, but considering the changes in regulations, stream buffers, storm water utilities, stream cleanups, etc. it is clear that the program, now in its seventh year is making a difference. Yet the TMDL program, while referencing the MS4 permit, does not attempt to account for the improvements that would have occurred, most likely after 2006 due to the establishment of these Phase II programs. Further, the TMDL continues to reference specific problems found during the Stream Survey Sampling Report, Phase I (Section 2.5.2.). The joint MS4 was notified in

writing by the Department it was the duty of those permittees to address the items with specific sources (i.e., pesticides from a shopping center parking lot and salts from a road salt storage and handling facility) under the NPDES permit. Six years later, another Water Pollution Control Branch (WPCB) program (the TMDL program) cites these same problems already tasked for correction by DNR under a fellow WPCB program (the Small MS4 program) as examples to justify this document. It is clear communication, even between programs within the same branch, are failing to coordinate efforts. Instead affected permittees receive multiple directions from the Department to address the same program, often with wildly different approaches and costs. At a minimum, since the Small MS4 program has been in place for seven years, the Department should verify that the cited aquatic invertebrate community problem has not already been addressed by this companion DNR program.

See Attachment A (Geosyntec report) comments 3.C.1, and 3.C.4 for additional support for this concern.

Concern 8: The failure of the Department to have estimated the cost for implementation of the TMDL as written.

As was communicated to the Department following the first draft, a reduction in storm water flow or volume of this magnitude would be extremely expensive. As noted in communication from Boone County: "Cost estimates range up to $500,000,000 dollars to implement the TMDL in Hinkson Creek. The Potash Brook TMDL is in a similar situation, although Hinkson Creek watershed is 13 times larger. In January 2010, the [Vermont Department of Environmental Conservation] found the cost to implement that TMDL would be $25 million for the seven square mile watershed. Therefore, they have chosen not to implement until funding is available."

See Attachment A (Geosyntec report) comment 3.D.2 for additional support for this concern.

Concern 9: The stated driving force of the Department being the lawsuit against EPA that consequently compelled the Department to craft a document by December 31, 2009 instead of being drive to find a sound, workable solution for the People of Missouri.

MU is significantly troubled by the Department's apparent greater concern for their relationship with EPA rather than their relationship with the citizens of Missouri. Only releasing the first public version of this TMDL slightly more than three months before the court ordered deadline has done the citizens of Boone County a great disservice. It is not the fault of the permittees and citizens that they were given no seat at the table during DNR's development of the first document, yet the passing of the initial deadline for EPA's needs of December 31, 2009 is the mantra the Department continues to repeat as a response to any criticism, effectively using that deadline as an excuse to not address the comments and concerns of the people of Boone County.

Concluding Remarks

The report prepared by Geosyntec for the city/county/university (Appendix A) has been referenced several times throughout this document, including references to specific comments within that document. However MU wishes to stress our support for the entire document, not just the portions referenced above. One final reference to that attachment is from section 2, the summary of findings:

In general, our review finds that runoff reduction targets cited in the TMDL are not well supported and are ambitious, given the uncertainty of key technical linkages. Uncertainties identified in our review include but are not limited to:

- Stressor-Effect Relationship. The draft TMDL does not establish causality between runoff and beneficial use attainment in either Hinkson Creek or 'attainment' streams. Information presented in the TMDL does not provide any assurance that benthic macroinvertebrate metrics will respond to changes in stormwater runoff.

- Runoff and Baseflow Time Trends. Information contained in the TMDL does not demonstrate that runoff volume has increased or that baseflow has decreased in the Hinkson Creek watershed over time.

- Comparability of Attainment Streams. It is not clear what methodology grounded in peer-reviewed literature, or agency guidance, supports the process used to select 'attainment' streams set forth in the TMDL.

- Current and Historical Impervious Landuse. Landuse data and analysis cited in the TMDL are inconclusive. While impervious area has likely increased in the Hinkson catchment to some degree, GIS coverages used in the TMDL are not well suited for demonstrating urban landuse changes at the scale of interest.

The proposed TMDL tries to impose an out-of-proportion solution as a remedy for a creek that is fully supporting part of the time and marginally supporting almost all of the remaining time. This has the potential to cost the community hundreds of millions of dollars for a solution that may or may not address the situation. It is the opinion of MU this document is so seriously flawed the only option is for the Department to step back, notify EPA a completely different approach using the aforementioned phased approach will be drafted and submitted to EPA as soon as possible. EPA has until December 31, 2010 to approve a final document. By creating a working group of members of DNR, EPA, impacted permittees, developers and concerned citizens, all working toward a rapid but reasonable approach, will allow the TMDL to gain the acceptance it needs so that Boone County can put efforts toward a solution instead of wasting efforts having to explain the unworkable nature of this document to the Department.

Sincerely,

Todd Houts
Assistant Director, Environmental Health & Safety, University of Missouri

cc: Peter Ashbrook, University of Missouri
Georganne Bowman, Boone County
Bill Florea, Boone County
John Glascock, City of Columbia
Steven Hunt, City of Columbia
Karen Miller, Boone County

Attachment: Geosyntec Report

Fw: MU south farm

John Hoke to: Anne Peery 02/11/2010 02:01 PM

As requested. If you need additional info, let me know. Thanks

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

-----Forwarded by John Hoke/WPCP/DEQ/MODNR on 02/11/2010 02:01PM -----

To: Diane Reinhardt/WPCP/DEQ/MODNR@MODNR, John Hoke/WPCP/DEQ/MODNR@MODNR
From: Darrick Steen/WPCP/DEQ/MODNR
Date: 10/02/2009 02:41PM
cc: Barbara Li/WPCP/DEQ/MODNR@MODNR
Subject: MU south farm

RE: renewal of the MU south farm permit

MU will be sending in a lagoon closure document in the coming days for their sheep lagoon and they would like to get their permit reissued ASAP after we review it.

They also mentioned that they believe the old permit has a mistake on it. The old permit stated that the confinement operation drains to the Grindstone Creek, which is wrong. It drains to Little Bonne Femme. They would like this changed in the permit.

John, The MU South Farm AFO is referenced in the draft Hinkson Creek TMDL, they may send comments on their own, however they asked me to let you know that they would also like for this to be corrected on the draft TMDL. There believe is that they have no sources that would contribute to Grindstone/Hinkson.

Darrick H. Steen, P.E.
Agriculture Unit Chief
Water Protection Program
Missouri Department of Natural Resources
Phone: (573) 751-1403

Comment - Hinkson Creek TMDL

Scott Wilson to: john.hoke 09/25/2009 09:42 AM

John,

I agree with the Hinkson Creek TMDL and the Missouri Department of Natural Resources recommendation to reduce storm-water runoff into Hinkson Creek by 68 percent.

Thank you,

Scott Wilson
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65201

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