Response to Comments Document

Mossy Creek, Long Glade Run and Naked Creek TMDL Implementation Plan
Comment Period: June 15 – July 15, 2009

Comments in Email from Ed Craun, landowner in Long Glade Run

Comment 1
Regarding the Implementation Actions for the pasture area of these watersheds several practices are recommended for improved management to achieve the recommended reduction in bacteria runoff. Those practices sighted in the report include rotational grazing, vegetated buffers, upland buffers, grassed filter strips and wooded buffer strips.

Please provide a description and explanation of these suggested management practices and the research which shows the bacteria reduction from implementing such practices.

Response 1
The following is an excerpt from the Technical Document of the Water Quality Improvement Plan that describes in more detail the practices mentioned.

Improved Pasture Management: *Through applying improved pasture management techniques, a producer can significantly reduce the amount of sediment and bacteria that runs off of their pasture and into the stream, while increasing their economic gains at a very low investment cost. Four components of this practice were identified: 1) Maintenance of an adequate forage height (suggested 3-inch minimum height) during growing season 2) Implementation of a nutrient management plan including application of lime and fertilizer according to soil test results 3) Mowing of pastures to control woody vegetation 4) Distribution of manure through managed rotational grazing or mechnically (e.g., chain harrow).*

Rotational Grazing: *This program promotes a controlled grazing system that maximizes the efficient utilization of standing forage by livestock. Animals are rotated through different paddocks on a pasture allowing the producer to control the grazing pressure on a given paddock at a particular point in time. Rotational grazing produces more uniform stands of forage and helps to prevent the exposure of bare soils to rainfall. It also allows for a more uniform distribution of manure on pasture, encouraging vigorous plant growth through efficient utilization of nutrients by grasses, while also reducing the load of fecal bacteria entering the stream during runoff producing events.*

Buffers: *Vegetated buffers were also included in the implementation strategy to treat runoff from pasture and cropland. These buffers will act as filters, trapping bacteria and sediment before it runs in to the stream. When considering the effectiveness of a vegetated buffer in trapping pollutants, it is important to consider the area that will be draining to the buffer. For modeling purposes, it was assumed that a typical buffer would be capable of receiving and treating runoff from an area four times its width. For example, a buffer that was 35 feet wide and 1,000 feet long would treat runoff from an*

area that was 140 feet wide and 1,000 feet long. Once you move beyond four times the buffer width, it was assumed that the runoff would be in the form of channelized flow rather than the sheet flow that a buffer can trap. Consequently, it was necessary to consider both riparian buffers and upland buffers in order to treat runoff from pasture. A combination of grassed filter strips and wooded buffer strips could be used in upland areas (50:50).

Table: Best management practices and associated pollutant reductions

BMP Type	Description	Bacteria Reduction Efficiency	Sediment Reduction Efficiency	Reference
Res	Septic tank pumpout	5%	------	2
Res	Septic system repair	100%	------	1
Res	Septic system replacement	100%	------	1
Res	Alternative waste treatment	100%	------	1
Res	Pet waste digester	100%	------	4
Res	Rain garden	40%	85%	2,6
Res	Pet waste education program	50%	------	3
Ag	Improved pasture management	50%	50%	5,8
Ag	Riparian buffer	50%	50%	2
Ag	Woodland buffer filter strip	60%	50%	2
Ag	Grassed buffer filter strip	50%	50%	2
Ag	Livestock exclusion	100%	50%	1
Ag	Poultry litter storage	99%	------	7
Ag	Manure storage	80%	------	7
Ag	Loafing lot management system	75%	40%	6,7
Ag	Sod waterway	50%	77%	9
Ag	Conservation tillage	------	LU conversion	6
Ag	Continuous no-till	------	70%	
Ag	Cover crop	N/A	20%	2
Ag	Contour farming	N/A	41%	10
Ag	Permanent veg. cover on cropland	N/A	50%	11

1. Removal efficiency is defined by the practice

2. VADCR and VADEQ TMDL Implementation Plan Development Guidance Manual

3. Modified from Swann, C. 1999. A survey of residential nutrient behaviors in the Chesapeake Bay. Widener Burrows, Inc. Chesapeake Bay Research Consortium. Center for Watershed Protection. Ellicott City, MD. 112pp.

4. Mill and Hawksbill TMDL IP, MapTech, September 13, 2007

5. Commonwealth of Virginia. 2005. Chesapeake Bay Nutrient and Sediment Reduction Tributary Strategy. www.naturalresources.virginia.gov/Initiatives/TributaryStrategies/

6. Chesapeake Bay Model version 4.3 BMP efficiencies

7. North River TMDL IP, MapTech, July 5, 2001

8. Bacteria efficiency estimated based on sediment and nutrient efficiency

9. Fiener, P., Auerswald, K. Effectiveness of grassed waterways in reducing runoff and sediment delivery from agricultural watersheds. J. Environ. Qual. 32:927-936 (2003).

10. Borisova, T., D'Souza, G., Khandelwal, N., Benham, B., and M.L. Wolfe. Analysis of sediment reduction strategies for Abrams Creek Benthic TMDL using PredICT software. http://www.cafcs.wvu.edu/RESM/PDF/RESMWP-05-06.pdf. Accessed December 17, 2008.

11. Practice efficiency estimated based on grassed buffer filter strip efficiency based on establishment of vegetative cover using perennial grasses

Comment 2

Also in a previous meeting the percentage of bacteria from pasture runoff and the percentage of bacteria from direct deposit was stated. Can you provide this analysis also.

Response 2

This information was detailed in the Total Maximum Daily Load (TMDL) Reports for Mossy Creek, Long Glade Run and Naked Creek. In Mossy Creek and Naked Creek, bacteria source tracking (BST) was used to determine the identification of sources of fecal bacteria. In both cases, livestock was found to be the largest contributor to the bacteria in the streams. In order for these streams to achieve water quality standards again, it was determined that the following reductions must be made to cattle direct deposit and pasture runoff in each waterbody (this is summarized in the Mossy Creek, Long Glade Run and Naked Creek Water Quality Improvement Plan in Table 1):

Table 1. Goals for bacteria reductions in Mossy Creek, Long Glade Run and Naked Creek. Note: DD=direct deposit, PLS=pervious land surface)

	Fecal Coliform Reduction from Source Category (%)	
	Cattle DD	Pasture
Mossy Creek	94%	98%
Long Glade Run	99%	95%
Naked Creek	100%	97%

Greater detail on bacteria source tracking and the modeling scenarios used in each watershed is provided in the TMDL Reports for each stream. These are available at the DEQ Website: https://www.deq.virginia.gov/TMDLDataSearch/ReportSearch.jspx

Comment 3
Also would it be possible to provide the historical data of the amount of bacteria of these watersheds for the past 100 years?

Response 3
Please find an attachment to this letter detailing the historical bacteria data for all three watersheds sorted by date and station. Please note that the water quality standard that DEQ uses to assess whether a stream is safe was changed in 2003 to be more stringent; also note that DEQ has moved from a fecal coliform standard to an e. coli standard to better reflect human health risks.

Second Comments Email from Ed Craun, Landowner

Comment 1
The report states on page 1 the standards are based on five beneficial uses of the waterways and watersheds. The beneficial uses are fishing, swimming, shellfish, aquatic life, and drinking which I will refer to as the "**Five Exclusive Beneficial Uses**". These are worthy benefits, but many other beneficial uses of the watersheds are not identified in this report. The watersheds provide two additional health benefits to the residents of the watershed that are not indentified in this report. These benefits are **Health Benefit #1) community based food production** and **Health Benefit #2) the protective buffer for residents from wildlife habitat health risks (Wildlife Protection Buffer)** hereinafter referred to as the "**omitted beneficial uses**".
The water standards are apparently established to **maximize the five exclusive beneficial uses** rather than to **optimize all of the beneficial uses** including the omitted beneficial uses.

Response 1
*Please keep in mind that this Plan is designed to help the streams achieve water quality standards once again. As was stated in the Plan and in the June 18 Public Meeting presentation, currently, the streams do not meet water quality standards for bacteria and aquatic life. The Plan is designed to help the waterways be safe (with a lower bacteria levels) and healthy (with rich and diverse aquatic life) again. The only difference between the "Five Exclusive Beneficial Uses" as you labeled the beneficial uses of streams and rivers outlined in the Water Quality Improvement Plan, cited from the federal Clean Water Act, and the "Omitted Beneficial Uses," is that the first applies strictly to **waterways**, and the other is land-use based criteria. The waterway uses do **not** exclude the use of land in any way. Water quality standards are applied only to the waterway to allow it to meet its uses, regardless of the surrounding land-use. To use your terminology, the "Exclusive Beneficial Uses" and the "Omitted Beneficial Uses" are not mutually exclusive.*

Comment #2
This improvement plan has been prepared by the Virginia Department of Conservation and Recreation and the Virginia Department of Environmental Quality based on the objectives that maximize the five exclusive beneficial uses. My question is which agency

of the Commonwealth of Virginia will represent the omitted beneficial uses? Before any standards are adopted the beneficial uses need to be amended and the state should designate an agency to represent all of the beneficial uses. At this time the Commonwealth of Virginia has not provided an agency to protect the omitted beneficial uses which are the primary benefits of the owners and residents that reside within these watersheds.

Response #2

All Commonwealth of Virginia agencies exist to benefit and serve the people of Virginia. The Departments of Conservation and Recreation (DCR) and Environmental Quality (DEQ) are explicitly charged with protecting and conserving Virginia's land and streams and work together on a large number of projects, including TMDLs and TMDL Implementation Plans to do just that.

Comment #3

Pasture land is identified as the majority of the acreage within these three watersheds as shown on Table 7. The report does not evaluate the interdependency of the microorganisms, the grassland (forages and soil), the domestic livestock and the people that reside within the watersheds. I would label the above described ecosystem as the grassland/domestic livestock ecosystem. The grassland/domestic livestock ecosystem is the primary ecosystem by acreage within these watersheds.

An assessment from a qualified state agency or the Virginia Cooperative Extension Service/College of Agriculture and Life Sciences of Virginia Tech should be completed in order to guarantee the water quality standards are sustainable for the grassland/domestic livestock ecosystem. I did not find any assessment of the affect that a **95-98% bacteria reduction** would have on the grassland/domestic livestock ecosystem which is the primary ecosystem in these three watersheds. This review should provide an assessment of the amount of microorganisms that are needed to sustain the grassland/domestic livestock ecosystem. Using this assessment the water quality standards and goals of these watersheds should then be reevaluated. Failure to determine microorganisms needed to sustain the present ecosystem may result in the drastic reduction or elimination of the grassland/domestic livestock ecosystem. In addition other ecosystem threats should be identified and recommendations provided for conserving the grassland/domestic livestock ecosystem.

Response #3

The "grassland/domestic livestock ecosystem" mentioned is taken into account in the land-use entitled Pasture in the TMDL and the Water Quality Improvement Plan. The land uses included in the implementation plan such as pasture are based upon the land use categories included in the National Land Cover Database (NLCD), a national spatial dataset used for a wide array of planning and mapping activities by Federal, State and Local governments. These land use categories are used in TMDL implementation plans in order to remain consistent with the NLCD, which has prescribed specific attributes to the land use categories included in the dataset.

The Virginia Cooperative Extension and Virginia Tech are both highly involved in the TMDL process. In fact, the original TMDL Studies for all three streams were completed by Virginia Tech's Department of Biological Systems Engineering (BSE). The lead Professor for these studies is the Director of the Center for Watershed Studies and is also an Extension Agent. VT and Cooperative Extension are active in many water quality research projects and maintain a well respected presence in the agricultural community.

The bacteria reduction targets mentioned are not a reduction of bacteria in the soil or on the land, but instead a reduction of bacteria ***in the stream****. There are many ways of preventing bacteria which falls on the land from getting to the stream, and DEQ and DCR outlined these in the Water Quality Improvement Plan as "Best Management Practices". These practices do not prohibit the use of land, but instead recommend methods to put into place to reduce the bacteria and sediment from getting to the stream and levels of these pollutants will be lower in the stream.*

Comment #4

According to Table 7 the plan recommends the conversion of approximately 10% of existing pasture land to forest land. The plan does not assess the increased health risks to the residents of the watersheds if 10% of the pasture was converted to forest land. The wildlife health risks include **1) Lyme Disease, 2) rabies, 3) wildlife/vehicle Collision and the 4) enhanced residential wildfire risk.**

In Virginia the incidence of Lyme Disease has increased from 95 in 1993 to 959 in 2007 (Source: Centers for Disease Control and Prevention). Public health policies should be assessed to reverse this alarming trend that can be prevented by reducing the deer population. Reducing the deer population to a lower density per square mile will reduce deer tick numbers to levels too low to spread Lyme Disease (Source: Wikipedia.org/wiki/Lyme _disease).

On July 11, 2009 the Daily News Record reported an **8 year old boy was bitten 8 times by a rabid raccoon while sleeping in his grandparents' home in Rockingham County.**

Increased deer habitat and subsequent deer population would expose the watershed residents to increased risk of vehicular accidents with deer which are constantly crossing public highways in the morning and evening.

During extended drought conditions increased woodland tracts adjacent to home sites would increase fire risks to homes and buildings located within the watershed.

The plan states a 0% reduction of bacteria from wildlife in the Mossy Creek watershed and an increase in wildlife habitat (Reforestation of Pasture). Does that mean that the plan is recommending an increase in wildlife population and bacteria runoff from wildlife? An assessment by a qualified state agency should provide an explanation of how this could be achieved.

Response #4

The Upland Buffers were included in the report because they efficiently remove bacteria (as detailed in Table 3 from the Plan below). After discussions with the Headwaters District, it was recognized that many farmers would not participate in this practice, so its implementation was minimized. In fact, half the Upland Buffers would be grassed and

half would be wooded, which has a greater potential to reduce bacteria but is more expensive to put into place.

According to the VA Department of Game and Inland Fisheries (DGIF) Fact Sheet on white-tailed deer, this species can thrive in any habitat. The best deer habitat is "a mixture of many habitat types" (www.dgif.virginia.gov/wildlife/deer). Because these habitats (woods, crops, fields, pastures, brush, etc.) already exist in the Mossy Creek, Long Glade Run and Naked Creek watersheds, DEQ and DCR do not expect that the population of deer will markedly increase because of the recommendations of the Water Quality Improvement Plan. It is not the Commonwealth of Virginia's policy to eradicate wildlife or advocate for its removal. Therefore, the Water Quality Improvement Plan focuses on anthropogenic sources of bacteria, which are much easier to remove and many times have a greater influence on bacteria levels. In fact, research has been done that assert that one beef cow produces as much bacteria as 95 deer or 41 geese (this was presented in the June 18th Public Meeting). It is much easier and effective to fence one beef cow out of the creek than try to eliminate 95 deer or 41 geese from the watershed. Several creative wildlife removal methods by citizens was brainstormed by the Headwaters District (such as a 2 for 1 deer stamp in the Mossy, Long Glade and Naked Creeks area) and these will be listed in the Final Water Quality Improvement Plan document. However, these are only recommendations and it will depend on the DGIF to whether these methods are approved.

Comment #5

As stated in the plan the goal for reducing bacteria in pastures ranges from 95-98% reduction from current bacteria runoff. This reduction in bacteria runoff would be achieved by 1) rotational grazing systems 2) vegetated buffers 3) grass filter strips and 4) wooded buffer strips.

My concern regarding these goals and actions is that there is **no site specific research** that is referenced in this plan which demonstrates that a 95-98% bacteria reduction in runoff from pastures can be achieved without reducing the number of livestock.

Response #5

Numerous studies have been done by Virginia Tech and other leading research institutions which show a dramatic decrease of bacteria runoff with the application of these Best Management Practices. These were detailed in Table 3 of the Water Quality Improvement Plan, a copy of which is provided below.

Table 3. Best management practices and associated pollutant reductions.

Practice	Bacteria reduction	Sediment reduction	Reference
Septic tank pumpout	5%	N/A	2
Septic system repair	100%	N/A	1
Septic system	100%	N/A	1

replacement			
Alternative waste treatment system	100%	N/A	1
Pet waste digester	100%	N/A	4
Rain garden	40%	85%	2,6
Pet waste education program	50%	N/A	3
Improved pasture management	50%	50%	5,8
Riparian buffer	50%	50%	2
Wooded buffer filter strip	60%	50%	2
Grassed buffer filter strip	50%	50%	2
Livestock exclusion	100%	50%	1
Poultry litter storage	99%	N/A	7
Manure storage	80%	N/A	7
Loafing lot management system	75%	40%	6,7
Sod waterway	50%	77%	9
Conservation tillage	N/A	Land use conversion	6
Continuous no-till	N/A	70%	
Cover crop	N/A	20%	2
Contour farming	N/A	41%	10
Permanent vegetative cover on cropland	N/A	50%	11

References (Table 3)

1) Removal efficiency is defined by the practice
2) VADCR and VADEQ TMDL Implementation Plan Development Guidance Manual
3) Modified from Swann, C. 1999. A survey of residential nutrient behaviors in the Chesapeake Bay. Widener Burrows, Inc. Chesapeake Bay Research Consortium. Center for Watershed Protection. Ellicott City, MD. 112pp.
4) Mill and Hawksbill TMDL IP, MapTech, September 13, 2007
5) Commonwealth of Virginia. 2005. Chesapeake Bay Nutrient and Sediment Reduction Tributary Strategy. www.naturalresources.virginia.gov/Initiatives/TributaryStrategies/
6) Chesapeake Bay Model version 4.3 BMP efficiencies
7) North River TMDL IP, MapTech, July 5, 2001
8) Bacteria efficiency estimated based on sediment and nutrient efficiency
9) Fiener, P., Auerswald, K. Effectiveness of grassed waterways in reducing runoff and sediment delivery from agricultural watersheds. J. Environ. Qual. 32:927-936 (2003).
10) Borisova, T., D'Souza, G., Khandelwal, N., Benham, B., and M.L. Wolfe. Analysis of sediment reduction strategies for Abrams Creek Benthic TMDL using PredICT software. http://www. cafcs.wvu.edu/RESM/PDF/RESMWP-05-06.pdf. Accessed December 17, 2008.
11) Practice efficiency estimated based on grassed buffer filter strip efficiency based on establishment of vegetative cover using perennial grasses

Comment #6
The major sources of sediment are stated as agricultural and urban land. The most obvious sediment runoff I have observed is the sediment from the State unpaved highways which are constantly being graded and graveled due to runoff caused by heavy rainfall. An assessment of this source of sediment needs to be included with this report.

Response #6
Another comment was made with regards to State Road maintenance. DEQ and DCR are following up with VDOT as to their practices. However, it should be noted that state roads constitute a very small percentage of land in the watersheds (less than 3%) and the Water Quality Improvement Plan makes great effort to be as practicable and efficient in its recommendations as possible.

Comment #7
I am requesting that these concerns that I have outlined be considered and evaluated before any standards are adopted. Also please advise me as to **which state agency is going to represent the omitted health benefits** that are not considered in the preparation of this water improvement plan.

Response #7
DEQ and DCR greatly appreciate your comments and input to the Mossy Creek, Long Glade Run and Naked Creek Water Quality Improvement Plan. Please note that no new standards are being adopted; this is merely a series of recommendations to help the streams be safe and healthy again.

Email Comments from Cindy Smith, Landowner in Naked Creek

Comment 1
The present CREP program has some serious problems in our area: A large land owner can acquire the CREP advantages on the up-stream side of a bridge (on a Naked Creek tributary) and then the same owner does not have the CREP program on the down-stream side of the bridge! The same herd of cattle, owned by the same rancher, stand in the creek (in a muddy hole) downstream of a very expensive fencing and tree program. What good does that do?

Response
The USDA Natural Resources Conservation Service (NRCS) and Headwaters Soil and Water Conservation District, who manage the CREP program locally, do not control how landowners use the system in the context of their entire land holding. NRCS and Headwaters do, however, work with the landowner to find a program that will work for them. Once a landowner is an official participant in the program and has implemented the program on his/her land, they are subject to random, unannounced spot checks to ensure the program is being followed as agreed upon. These enforcement measures are designed to restrict the misuse of cost-share funds. Also, many landowners lack the

financial resources to implement an entire cost-share program at once, and so work in phases; this allows the incremental expenditure of money while focusing on a broader goal of enrolling a larger piece of land in a cost-share program. This could explain the fencing you are seeing in Naked Creek. Also, at least some water quality benefit can be gained from restricting cattle access to one segment of the creek.

Comment 2
Occupants along the creek system need to be checked for gray water dumping.

Response
You are correct; gray water discharge is illegal. However, this is difficult to detect from public access points and many homeowners are adverse to unrequested government investigations. That being said, the Virginia Department of Health may have some programs available to help with homeowners who are interested in connecting their gray water discharge to their septic system.

Comment 3
Many trees along Naked Creek Hollow Rd. have died since the road has been paved - I spoke to a forest specialist that came out to the property and said she believed it was probably the result of salt poisoning that contaminates the trees lining the road (these trees should be re-planted).

Response
I have contacted VDOT and they are looking into the matter. I will follow up with them and email you with more details as they appear.

Comment 4
Much of the run-off from cattle farms is coming from farther away than the flood plain areas. We can see manure waste water (from farms on the opposite side of the road) go into culverts that still flow into the Naked Creek.

Response
The Water Quality Improvement Plan includes the entire watershed (or area draining to Naked Creek – as well as Mossy Creek and Long Glade Run). The practices mentioned in the plan may focus on the flood plain and riparian landowners because this will affect water quality most quickly and make the most drastic improvements. However, the practices mentioned are recommended to make a difference for the entire watershed; for instance, upland buffers, where steep, erodible pasture land is converted into woodland is recommended on hilltops or upstream portions of the watershed.
Discharges to State waters are illegal, as mentioned previously. If direct disharges from agricultural operations are witnessed, the Agricultural Stewardship Program (administered by the Virginia Department of Agriculture and Consumer Services) should be contacted. The contact person is Darryl Marshall (cell: 804.305.8702).