Comment Response Document
Regarding the Total Maximum Daily Load of Sediment in the Catoctin Creek Watershed, Frederick County, Maryland

The Maryland Department of the Environment (MDE) has conducted a public review of the proposed Total Maximum Daily Load (TMDL) of Sediment in the Catoctin Creek Watershed. The public comment period was open from August 17, 2007 through September 17, 2007. MDE received 1 set of written comments.

Below is a list of commentors, their affiliation, the date comments were submitted, and the numbered references to the comments submitted. In the pages that follow, comments are summarized and listed with MDE's response.

Author	Affiliation	Date	Comment Number
Jennifer Schaafsma	Maryland Department of Agriculture	September 12, 2007	1- 9

Comments and Responses

1. The commentor states that the Maryland Department of Agriculture (MDA) is generally concerned that calculating average watershed sediment loads does not indicate where remediation work needs to be done because sediment is a very local problem.

   Response: In Maryland, sediment impairments are listed and addressed based on the original 303(d) listing scale, which is the Maryland 8-digit watershed. However, information is provided in the TMDL that indicates where probable sediment impacts could be present throughout the watershed. This information includes monitoring stations (typically at least 10 stations), with both biological and physical habitat information, as well as detailed land use information with categories (e.g. urban, agricultural) consistent with sediment budgets. The combination of these two data sources can help to identify areas for potential sediment reductions and/or to develop a more spatially refined monitoring strategy for implementation.

   Neither the Clean Water Act (CWA) nor current U.S. Environmental Protection Agency (EPA) regulations obligate states to develop detailed implementation plans as part of the TMDL development or approval process. Instead, the goal of a TMDL is to determine the maximum amount of a given pollutant that a water body can assimilate and still maintain its designated uses. Therefore, specific remediation plans are beyond the scope of this TMDL. Deciding what types of remedial activities or best management practices (BMPs) should be implemented and where these activities should be concentrated will need to be addressed during the implementation phase of the TMDL process. For information regarding

TMDL implementation in Maryland, please refer to *Maryland's 2006 TMDL Implementation Guidance for Local Governments* (MDE 2006).

2. The commentor asks for an explanation as to why the *edge of field* (EOF) erosion rates used in the Catoctin Creek and Double Pipe Creek TMDLs as well as the erosion rates between Frederick and Carroll counties, within the Double Pipe Creek TMDL, are not the same. The commentor also asks the Department to explain why the same erosion rates for urban pervious, extractive, barren, and impervious urban land uses are used in both watersheds, when the soils in these watersheds are different.

   Response: In the development of the Maryland sediment TMDLs, MDE applied the U.S. EPA Chesapeake Bay Program Phase 5 (CBP P5) watershed modeling tools. MDE chose this approach for the following reasons: (1) the geographic coverage of the model, (2) the consistency of model input information, and (3) the consistency with future analyses of downstream conditions (*i.e.*, Chesapeake Bay water clarity goals).

   Agricultural and forest erosion factors applied in the CBP P5 model were based on National Resources Inventory (NRI) values. NRI uses a random survey design to select sites within a county to estimate soil erosion. According to NRI, the individual sample sites present a privacy issue, and these data cannot be released at this scale. Instead, the sample results are averaged to a county reporting scale. The county reporting scale was then disaggregated to the watershed scale for use by the CBP P5 model and this TMDL. The land use erosion factors vary by county because of the differences in physical conditions (slope and soil erodibility), climatic conditions (rainfall erosivity), and local management practices that include soil conservation plans and water quality plans.

   Erosion factors for impervious, pervious urban, extractive, and barren land uses are the same from county to county. These factors were not calculated by NRI and instead were estimated based on regression analyses, literature surveys, and best professional judgment. Based on the amount of information gathered, there was not sufficient data to vary the urban erosion rates based on county. Thus, these erosion rates were kept constant throughout the state.

   Additionally, it is noted that the Frederick County EOF erosion rates presented in Table 3 of the Catoctin Creek Sediment TMDL document were incorrect. They should be the same values as presented in Table 2 of the Double Pipe Creek Sediment TMDL document. This error has been corrected.

3. The commentor asks why erosion rates from 1982 and 1987 are used in the model when the EPA considers data more than 5 years old to be too old for consideration.

   Response: To estimate the nonpoint sediment source contributions, decisions were made based on two objectives – using best available data and maintaining consistency with the CBP P5.

   As reported in US EPA (2008), cropland EOF sediment loading rates vary over the four available NRI sampling periods of 1982, 1987, 1992, and 1997 and trend toward lower estimated erosion rates in the more recent sampling periods. The decrease in estimated erosion rates between 1982 and 1997 is attributed to an increased rate of BMP application, newer BMP approaches such as integrated farm plans, other agricultural factors such as changing management practices or crop type, or, in some cases, sampling differences between the 4 study years. This observed decrease in estimated erosion rates between 1982 and 1997 would be double counted if represented in the CBP P5 model first by the use of the most recent NRI data and then by the application of sediment BMPs. To avoid the double counting of BMP reductions in sediment loads, and for operational simplicity, a two-year NRI average (1982 and 1987) was used for each agricultural land use. The two-year average was thought to best represent the sediment EOF baseline loading, subsequently modified via the application of BMPs, as reported in the State BMP implementation database (US EPA 2007).

   Although not explicitly stated in the TMDL report, a BMP factor was included in the loading estimates using best available “draft” information from the CBP. The effect of the factors related to sediment were minimal as most of the reductions are expected to result from land use changes (e.g. high till to low till). Recall that the most recent land use conditions (2000) were used in the loading estimates.

4. The commentor states that the calculation from the *edge of field* rate to the *edge of stream* (EOS) sediment load seems to take into consideration area and distance but not intervening land use.

   Response: Intervening land use is not considered in the edge of stream sediment load calculation, instead the EOS sediment load is based on the specific land use sediment yield and a sediment delivery ratio, which is a function of the average distance of the land use to the mainstem of the stream. This method is an improvement over the typical sediment delivery method that considers only the watershed area. Given the original scale of the input data (county based EOF yields and land use disaggregated from Agricultural Census data), MDE believes that adding this level of spatial complexity to the model would not improve the overall accuracy of the results, since there would likely be insufficient information to calibrate the input parameters. More typically, these two-dimensional spatially varying watershed models are used at the catchment scale and field scale.

5. The commentor states that the sediment stressor conceptual model describes how a change in hydrology leads to instream scour and bank channel erosion, but this does not appear to be included in the model calculations of the sediment load. The commentor continues by explaining that the sediment effects could be occurring because of sediment that is scoured out of the stream rather than being washed into the stream by terrestrial land uses.

   Response: Current research is continuing to sort out the contribution from instream sediment sources compared to terrestrial sources in rural areas (see Merritts et. al. 2004). Due to the complexity of sediment transport from the EOF to the main channel, the amount of sediment transported at various stages is still difficult to accurately quantify. For example, there could be an increase from the EOF rate as the sediment enters the headwater streams and then a subsequent decrease as the sediment moves downstream. Given this uncertainty, MDE has used the more fundamental approach of considering the sediment delivered to the mainstem. This typically results in a reduction of the EOF loading rates. However, for urban or developed land, where the sediment yield increases as the impervious area increases, this concept does not apply. The rationale is as follows: in urban or developed land use areas, the sediment yield is estimated from the combination of impervious and pervious areas, where the total yield increases with increasing imperviousness. However, because the terrestrial sediment source decreases with a growing impervious area, it is assumed that the additional sediment yield is driven by increased flow, which results in channel erosion.

   It is expected that during the implementation planning process, additional site specific information (e.g. bank stability, erosion extent, etc.) will be used to determine the appropriate type of best management practices. This information will determine whether upland or in-stream practices are expected to be most effective in reducing the sediment loads and subsequently impact the stream's aquatic health.

6. The commentor identifies how the TMDL document states that the sediment load calculations do not take into consideration any agricultural BMPs. Then, the commentor points out that MDA has data showing the tons per year of soil that has been saved from BMPs installed in these watersheds since 1984. As a result, the commentor claims that this data indicates that the TMDL has been more than met in the Double Pipe Creek watershed, but a TMDL may be needed in the Catoctin Creek watershed.

8-digit code	02140304	02140305
Watershed name	Double Pipe Creek	Catoctin Creek
Total Initial Ag Load Tons/yr	27,337.7	23,786.3
-Ag soil saved with BMPs	-30, 827.8	-6,068.7
Remainder (Tons/yr)	-3,490.1	17,717.6
NPS LA crop + pasture	18,124.2	10,569.4
Reductions to meet TMDL		7,148.2

Response: MDE disagrees with the commentor's conclusion that a TMDL is not required in the Double Pipe Creek watershed. As stated in the Response to Comment 3, cropland EOF sediment loading rates vary over the four available NRI sampling periods of 1982, 1987, 1992, and 1997 and trend toward lower estimated erosion rates in the more recent sampling periods. This trend is attributed to an increased rate of BMP applications, newer BMP approaches such as integrated farm plans, other agricultural factors such as changing management practices or crop type, or, in some cases, sampling differences between the 4 study years. This observed decrease in estimated erosion rates between 1982 and 1997 would be double counted if represented in the CBP P5 model; first by the use of the four-year NRI data and then by the application of sediment BMPs. To avoid the double counting of BMP reductions in sediment loads, and for operational simplicity, a two-year NRI average (1982 and 1987) was used for each agricultural land use.

Therefore, based on best available information from the CBP, the estimates of the tons per year of soil saved from the BMP installations in the Double Pipe Creek and Catoctin Creek watersheds are in fact already captured in the CBP P5 model and inherently included in the respective agricultural baseline loads.

Additionally, the effect of the BMP factors (Comment 3) related to sediment was minimal as most of the reductions are expected to result from land use changes (e.g. high till to low till). Also, recall that the most recent land use conditions (2000) were used in the loading estimates.

7. The commentor states that the model needs to be run with BMPs installed.

   Response: Please see the Response to Comments 3 and 6.

8. The commentor identifies that the Maryland Biological Stream Survey (MBSS) data presented by the TMDL indicate that the Double Pipe Creek watershed has a greater number of sites that could be rated as good than does the Catoctin Creek watershed, yet Double Pipe Creek supposedly shows degradation while Catoctin Creek shows improvement.

   Response: MDE uses both Fish Index of Biologic Integrity (FIBI) and Benthic Index of Biotic Integrity (BIBI) scores to evaluate the biological integrity of a nontidal watershed. While one watershed may have a greater number of good sites, the information presented in the TMDL indicates that Double Pipe Creek has better watershed average FIBI scores and Catoctin Creek has better watershed average BIBI scores. Therefore, it is not concluded that one watershed is better than the other.

Additionally, the information referenced by the commentor comes from two independent data sources – the Maryland Department of Natural Resources (DNR) Core station monitoring program and the MBSS monitoring program. The DNR Core data indicates benthic community degradation or improvement, and reflects mainstem conditions only. The MBSS stations are primarily located in the smaller order tributaries draining to the mainstem. MDE has noted that, in general, the water quality in the mainstem of a stream system is better than the water quality found in the smaller order tributaries. In the case of Double Pipe Creek, the DNR Core data indicate a slight degradation of mainstem conditions over time. However, both watersheds are rated as having Good/Very Good water quality by the DNR Core program.

9. The commentor says that the sediment problems in the watershed are likely to be specific isolated locations rather than a general condition and they should probably be addressed as such.

Response: Please see the response to Comment 1.

References:

MDE (Maryland Department of the Environment. 2006. *Maryland's 2006 TMDL Implementation Guidance for Local Governments*. Baltimore, MD: Maryland Department of the Environment. Also Available at http://www.mde.state.md.us/assets/document/final_TMDL_Implementation_Guidance_for_LG.pdf.

Merritts, D., R. Walter, C. Lippincott, S. Siddiqui. 2004. High Suspended Sediment Yields of the Conestoga River Watershed to the Susquehanna River and Chesapeake Bay are the Result of Ubiquitous Post-Settlement Mill Dams. *American Geophysical Union*. Fall Meeting 2004, abstract #H51F-06.

US EPA (U.S. Environmental Protection Agency). 2007. In Preparation. *Chesapeake Bay Phase V Community Watershed Model: Tracking Nutrient and Sediment Loads on a Regional and Local Scale*. Annapolis, MD: U.S. Environmental protection Agency, Chesapeake Bay Program.

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