Comment Response Document
Regarding the Total Maximum Daily Load (TMDL) of Nutrients (Phosphorus) for the Rock Creek Watershed, Montgomery County, Maryland

The Maryland Department of the Environment (MDE) has conducted a public review of the proposed Total Maximum Daily Load (TMDL) of Nutrients (Phosphorus) in the Rock Creek Watershed. The public comment period was open from July 16, 2012 through August 15, 2012. MDE received two sets of written comments from Mr. Robert Hoyt of Montgomery County and Ms. Marian Norris of the National Park Service.

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

Author	Affiliation	Date	Comment Number
Mr. Robert Hoyt	**Montgomery County Dept. of Environmental Protection**	**8/15/2012**	**1 – 3**
Ms. Marian Norris	**National Park Service**	**8/16/2012**	**4 – 5**

Comments and Responses

Comment 1: We did not see listed in Table 2a of the Rock Creek Nutrient Point Source Technical Memorandum the MNCCPC Parks MS4 Phase II General Permit. We did see listed the MNCPPC facilities covered under the Industrial General Permit but those are not the only Parks properties covered under the NPDES Permit program. We wonder how the loads from the areas covered under the MNCPPC Parks MS4 Phase II General Permit were assigned when establishing the wasteload allocations shown in Table 2B.

> **Response**:
> Areas covered under the MCCPC Parks MS4 Phase II General Permit are assigned to the "Other Regulated Stormwater" category. Table 2a has been revised to include the MNCCPC Parks MS4 Phase II General Permit. We thank the commentors for pointing out the omission.

Comment 2: Re: Section 2.3.1. Biological Stressor Identification (BSID) Analysis

The BSID analysis does not provide a specific causal relationship for excess total phosphorus and resulting biological impairment in Rock Creek streams. Management actions to reduce total phosphorus may not address the true source of the impairment.

The TMDL Document asserts that the BSID analysis specifically identified total phosphorus as contributing to biological impairment in Rock Creek streams. However, that does not match what is provided in the BSID document. Note the italicized elements in the paragraph below [added by us] taken from page 19 of the BSID Report. The lack of certainty about total phosphorus as the impairing factor is repeated on page 20 of the BSID Report, also shown below.

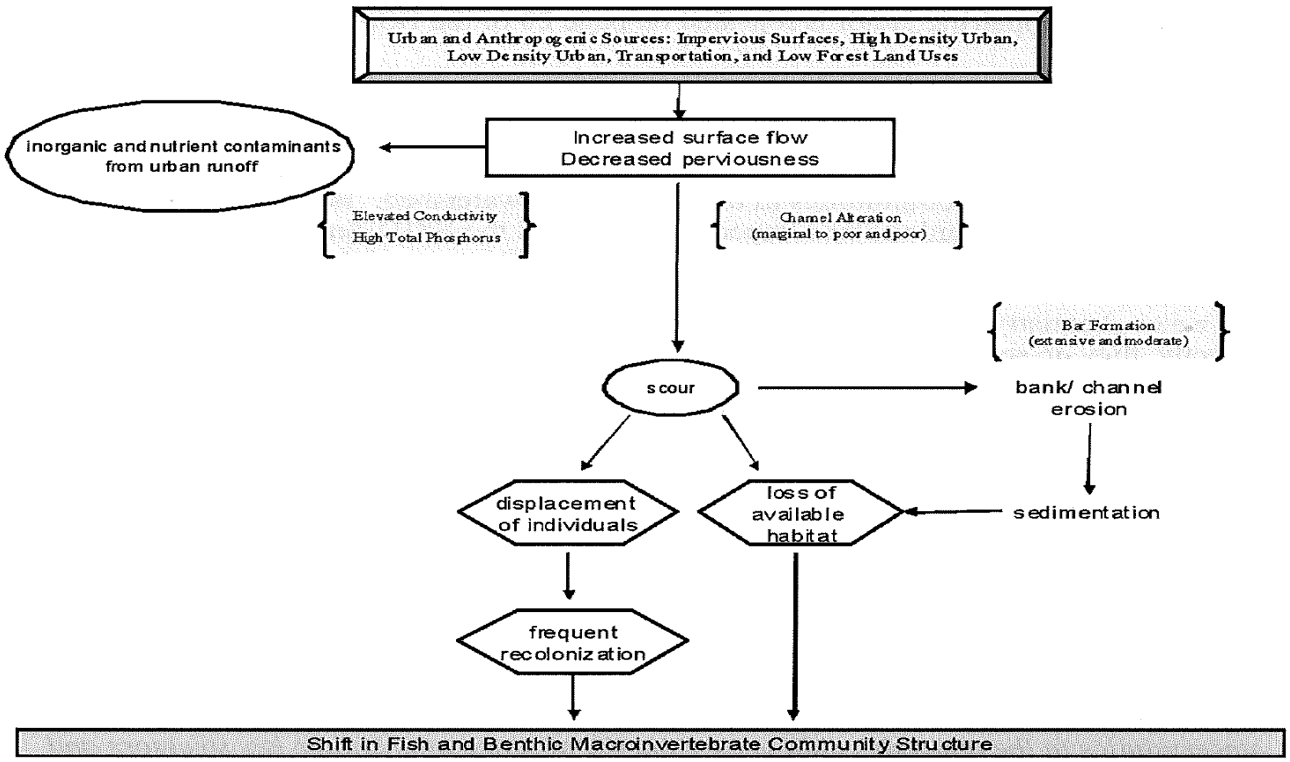
From the BSID Document p. 19-20

> The results of the BSID analysis also suggest that water chemistry parameters are degrading biological communities in the Rock Creek watershed. Based on the high percentage of urban land use and imperviousness, and the BSID determination that urban sources impact a substantial proportion of the degraded stream miles in the watershed, it is likely that water chemistry stressors are impacting the Rock Creek watershed. While the water chemistry parameters identified do not typically impact aquatic communities directly, they do serve as indicators of conditions, such as eutrophication and the presence of toxic inorganic pollutants that may lead to biological impairment. *Since the BSID analysis did not reveal key supporting water chemistry parameters that would support these conditions at this time; further analysis of additional water chemistry data, as well as additional monitoring of phosphorus, conductivity, and other supporting water chemistry parameters is warranted.*

From the BSID Document p. 20

> The BSID analysis evaluates numerous key stressors using the most comprehensive data sets available that meet the requirements outlined in the methodology report. *It is important to recognize that stressors could act independently or act as part of a complex causal scenarios (e.g., eutrophication, urbanization, habitat modification). Also, uncertainties in the analysis could arise from the absence of unknown key stressors and other limitations of the principal data set. The results are based on the best available data at the time of evaluation*

The figure shown below is extracted from page 21 of the BSID document. This model shows a direct relationship between scour and sedimentation on the fish and benthic macro invertebrate community. There is no such certain relationship shown for the water chemistry contaminants from urban runoff (oval on the left of the figure). It may likely be that implementing management actions to focus on total phosphorus will not address the actual stressors that happen to be found in association with elevated total phosphorus and conductivity concentrations.



Response: After sediments, phosphorus and phosphorus-related stressors are the second dominant water quality stressors identified in the Rock Creek watershed. The BSID analysis identified 27 % of stream miles in the watershed associated with poor to very poor fish or benthic Indices of Biological Integrity (IBI) impacted by high levels of phosphorus. High conductivity was also identified as significantly associated with degraded biological conditions and found in 27% of the stream miles with poor to very poor biological conditions in the watershed. Conductivity is directly related to the total dissolved salt content of the water including orthophosphate, a form of total phosphorus, among other ions. Further analysis of the TN:TP ratio in observed monitoring data from the watershed identified phosphorus as the limiting nutrient. The TMDL was developed for total phosphorus because the BSID analysis identified nutrients as impacting the waters and the limiting nutrient was identified as phosphorus.

In addition, the TMDL report shows that phosphorus loading rates in the Rock Creek are larger than the median loading rate of unimpaired watersheds in the Piedmont and Highlands providing further evidence and corroboration that nutrients in the Rock Creek watershed exceed levels associated with healthy biological communities. Moreover, field observations of algal blooms and periphyton abundance confirm that excess nutrients are impacting the biological community in the streams of the Rock Creek watershed. The combination of this information was used for the determination that a TMDL for total phosphorus is thus required to address the nutrient-related impacts in the stream.

MDE recognizes that there are multiple stressors affecting the biological community in the Rock Creek watershed. The BSID analysis identified sediment, and water quality parameters as stressors. Sediment impacts 78% of the impaired stream miles and water quality parameters impact 44% of the impaired stream miles. MDE (2011) has already developed a TMDL for sediment for the Rock Creek watershed and it has been approved by the EPA. MDE also recognizes that multiple stressors will have to be addressed before the streams in the watershed are fully supporting healthy biological communities. It is not the position of this TMDL that "phosphorus by itself is the stressor most responsible for the impaired stream conditions." Addressing the negative impacts of phosphorus is a necessary, but not sufficient, condition for restoring the biological health of the watershed. That is, nutrient impacts must be addressed for the watershed to support its Aquatic Life Use, but because of the impacts of other stressors, addressing nutrient impacts alone will not restore the health of the aquatic community. As stated in Section 3.0 of the TMDL document: "*Because the BSID watershed analysis identifies other possible stressors (i.e., conductivity, sediment, in-stream habitat, and riparian habitat) as impacting the biological conditions, this impairment remains to be fully addressed through the Integrated Report listing process and the TMDL development process, such that all impairing substances identified as impacting biological communities in the watershed are reduced to levels that will meet water quality standards…*"

MDE is encouraging localities to target their phosphorus reductions under their Chesapeake Bay TMDL implementation efforts, which constitute the first phase of implementation of this TMDL, where nutrient reduction will have local benefits. MDE also encourages implementing BMPs which address multiple pollutants, such as nutrients and sediment, simultaneously. This will benefit both local and downstream water quality.

Finally, Figure 6 of the Rock Creek BSID analysis report has been revised to include the linkage between high total phosphorus and elevated conductivity and the biological conditions of the streams. Relationships between biological conditions and other water chemistry parameters are not included in the graph because they were not specifically identified as stressors in the watershed.

Comment 3: We do not disagree with the analysis presented in section 2.3.4 (Nutrient Limitation) concluding that phosphorus is the limiting nutrient for algae growth in Rock Creek. This is to be expected since these are freshwater streams. We wonder though how the N:P ratio is related to biological impairment in Rock Creek. No data is presented that shows excessive algal growth (eutrophication) that could be contributing to impairment of fish and benthic macro invertebrate communities.

Response: The N:P ratio analysis shown in Section 2.3.4 was presented to support the change of the 1996 303(d) nutrient impairment listing to a phosphorus impairment listing in the 2008 Integrated Report. The impact of excess

phosphorus on the biological communities of Rock Creek as determined by the BSID analysis, and explained in the report, applies a case-control, risk-based approach that uses water quality data and fish and benthic data to identify probable or unlikely causes of poor biological conditions within a watershed. The BSID analysis then links potential causes/stressors with general causal scenarios and concludes with a review for ecological plausibility. Although the BSID analysis does not include chlorophyll *a* data showing excessive algal growth, the analysis showed a high correlation of high levels of phosphorus in the watershed and poor biology. See also response to Comment #2.

Comment 4: Regarding the assumption that septic systems contribute insignificant amounts of phosphorus: While this may be true now, with the implementation of requirements for nitrogen reducing septic tanks to meet the Chesapeake Bay TMDL requirements will presumably lead to the quantity of phosphorus flowing from septic systems to exceed that of nitrogen, potentially tipping the TN:TP ratio to a point where phosphorus is no longer the limiting factor. Would the amounts of phosphorus from septic systems still be insignificant in such a situation? Assuming all other sources as described in the report are successfully controlled.

Response: TP loads from septic systems are negligible because phosphorus tends to strongly adsorb to soil particles. Nutrient limitation applies to a water body as whole, not individual sources. Even if nitrogen exported from septic systems is significantly reduced, it is unlikely to make nitrogen the limiting nutrient in 1st to 4th order streams. Because the median TN:TP ratio is considerably higher in this watershed, it would require significant nitrogen reductions, beyond the reductions required by the Bay TMDL, to lower the ratio to the 5:1 level indicative of nitrogen limitation.

Comment 5: The TN:TP ratio is used as the rationale for addressing phosphorus primarily in this report to reduce the biological impairments which may be due to BOD and eutrophication effects, but could the quantity of nitrogen be directly affecting the biota in some instances? A blue aquatics syndrome?

Response: As the commentor suggests, this TMDL primarily addresses the adverse impacts that excess phosphorus associated with eutrophication can have on stream aquatic life. Related to the direct impacts of nitrogen on biota, Maryland has adopted water quality criteria to protect aquatic life from the toxic effects of excess nitrogen, specifically ammonia. These criteria for ammonia have been incorporated in the BSID analysis, which did not identify ammonia as a stressor in this watershed. Other than ammonia toxicity, the toxic effects of other forms of nitrogen like nitrate have not been scientifically established. MDE is prepared to adopt criteria should future scientific research establish, for example, that nitrate concentrations above a threshold induce methemoglobinemia or “blue baby syndrome” in fish or other aquatic life.