Chesapeake Bay Program
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DATE: September 23, 2015

FROM: Karl Berger, Chair
Land Use Workgroup

TO: Norm Goulet, Chair
Urban Stormwater Workgroup

RE: USWG Questions on Phase 6 Tree Canopy Land Use

This memo addresses questions raised at the Sept. 15, 2015, meeting of the Urban Stormwater Workgroup (USWG) about the Bay Program's ability to accurately map and quantify tree canopy – both in the present and back in time -- as separate land uses in the Phase 6 model. The Bay Program's modeling team has made provision for the inclusion of three type of tree canopy should the Program partners decide to approve these new tree canopy land uses for Phase 6. The three land uses are: tree canopy over impervious surfaces, tree canopy over turf grass, and tree canopy over open space.

These three classes are based on data collected by the Forestry Workgroup and Urban Tree Canopy Expert Panel that indicate that tree canopy modifies nutrient loads from the understory. To date, the three tree canopy land uses have been mapped throughout the watershed using nationally available data developed by the Bay Program's Land Use Data Team, which is managed by Peter Claggett, who also serves as the Land Use Workgroup (LUWG) Coordinator. Further technical questions should be addressed to him.

This memo reflects the workgroup's understanding of how tree canopy land uses will be documented in the model should the decision be made to include them.

The main points are as follows:

- The extent of tree canopy for the initial fall 2015 calibration of the new model will be estimated primarily using the 2011 National Land Cover Database (NLCD) at a 10-meter resolution. Based on these data, approximately 4 percent (1.6 million acres) of the watershed is covered by tree canopy, excluding forests. The LUWG has made a focused effort to obtain land use information from state and local governments throughout the watershed. Some of this more localized information will inform the initial calibration land use, but its incorporation has been limited by time constraints and other factors. Use of the NLCD dataset will result in some over- and under-estimation biases, but the same thing will be true for some of the other land uses classes at this stage of model development.

  A far more accurate mapping of tree canopy land use can be accomplished for the final Phase 6 land use, which is due by September 2016, based on the use of high resolution (one meter) imagery currently being analyzed by several contractors hired by the Bay Program. The use of

high resolution leaf-on and leaf-off imagery (and further incorporation of local land use information) will improve the accuracy of the majority of Phase 6 land uses in addition to tree canopy and correct over- and under-estimates resulting from the use of the NLCD database. The accuracy of the tree canopy land use at this point is comparable to that for many of the other Phase 6 land uses, such as non-road impervious, turf grass, and open space.

- A question was raised about the ability to accurately map tree canopy in Virginia, because state officials there are employing a slightly different methodology utilizing leaf-off imagery compared to the methods and leaf-on imagery used in all other Bay watershed jurisdictions. The LUWG has not been directly involved in this process, but it is our understanding that Bay Program staff will meet with Virginia representatives to discuss options for creating the most accurate estimate of tree canopy land uses should the partnership as a whole decide to include it in the Phase 6 land uses.

- Another question concerned the accuracy of the process by which the Land Use Data team estimates the acreage and location of land uses throughout the entire Phase 6 calibration period, which extends from 1985 to 2013. The final baseline Phase 6 land use database will be derived from 2013 and 2014 imagery. Hindcasting, as the process of estimating land uses backward in time is known, from 2013 to 1985 presents a challenge due to data limitations affecting all Phase 6 land uses. The proposed tree canopy land uses would be hindcast using the same procedures that the Land Use Data team will employ for estimating the past extent of all major land uses. The accuracy of its estimation throughout the calibration period would be comparable to the accuracy for all other classes.

As noted previously, further technical details on these issues are available from LUWG Coordinator Peter Claggett.