Phase III WIP Isolation Scenarios

Scenarios were designed to determine the best management practices (BMPs) in the Phase III WIPs that have the greatest impact on lowering pollutant loads. The scenarios isolate the effect of each BMP in the WIP from the others. This analysis was conducted using CAST (cast.chespeakebay.net).

These results should not be used to inform future planning. The WIPs do not include all the BMPs that are available so are not representative of the potential universe of implementation. BMPs can function as a treatment train and effectiveness varies depending on the other BMPs in the scenario. As such, these results may not be generalized to other scenarios. The actual load reductions depend on the specific BMPs in a scenario, the base conditions for land use, and year.

Determining the pounds reduced per BMP

Scenarios were run with each BMP in the Phase III Final WIP removed, one at a time. That is, the entire WIP scenario was run. The WIP scenario then was run with one BMP removed. That BMP was put back in and another was removed. There were as many scenarios run as there are BMPs. The difference between the expected load with and without the BMP is the pounds reduced per BMP.

Data show the total expected amount of nitrogen and phosphorus reduced for each BMP within the context of this WIP scenario. The scenarios use the WIP initial conditions of the year of 2025, Current Zoning land use, WIP3 wastewater, planning BMPs, and the cost profile used by the states in their WIPs.

As with all CAST data, the expected loads are the amount generated in an average hydrologic year. The nitrogen, phosphorus or sediment load reduced is the expected pounds per year delivered to the edge-of-tide (EOT) in the Chesapeake Bay watershed portion of the states.

Graphs and Methods

BMP Effectiveness

The effectiveness of each BMP as measured by percent of total reduction is shown in pie charts. Data may be viewed by specific geographies for nitrogen or phosphorus. There are two methods used to calculate the percent of reduction, described below.

Percent of Total Implementation

This method shows the nitrogen, phosphorus, or sediment load reduced for a BMP across all sectors. It is calculated as the difference in load between the WIP scenario and a scenario with all the WIP BMPs except one. Any resulting negative loads are changed to zero. The amount is the reduction of the BMP in the WIP scenario. The amount can be shown as a percent by summing the total load reductions from all the isolation scenarios and dividing the individual load reduction by that total.

Percent of 2018 to WIP3 Implementation

This method shows the percent of nitrogen, phosphorus, or sediment load reduced for each BMP within each state and sector between 2018 and the 2025 WIP. In this case, the percent represents the amount

of load that needs to be reduced between 2018 and 2025 to meet the WIP. This percent is a function of the amount of the BMP implemented and the change in load between 2018 and 2025. Where the load increased for a BMP, it was set to zero. The steps are:

1) Run CAST loads reports for 2018 Progress and WIP 3 Final for State-Area in CBWS only geographic scale with Major Source - All Agencies aggregation

2) Copy resulting NLoadEOT and PLoadEOT by Jurisdiction-Sector for both scenarios and calculate load reductions (i.e., Ag 2018 Progress load - Ag WIP 3 Final load) per sector and total for each jurisdiction

3) Change any resulting negative loads to 0

4) Sum total load reductions for all sectors (i.e., Ag + Developed + Wastewater + Septic + Natural)

5) Divide sector load reduction by total load reduction for each jurisdiction-sector (e.g., Ag reduction / Total reduction). Show as percent. This percent is the fraction of a jurisdiction's total reduction.

Wastewater is not included since that sector does not include nonpoint source BMPs.

BMP Cost Effectiveness

This graph shows the cost-effectiveness of BMP implementation to reduce a pound of nitrogen and phosphorus in the 2025 final Phase III WIP. Where the pounds reduced are zero, then the cost per pound is also shown as zero. Costs are estimated in 2018 dollars. Costs represent a single year of cost rather than the cost over the entire lifespan of the practice. Costs are annualized average costs per unit of BMP (e.g.: $/acre treated/year). Capital and opportunity costs are amortized over the BMP lifespan and added to annual operations and maintenance (O&M) costs for a total annualized cost. Costs are those incurred by both public and provide entities. Default costs were prepared for EPA using existing data. The cost per BMP may differ for each state. The cost data may be downloaded from CAST under the Public Reports > Cost Profiles.

Most Implemented BMPs

The BMPs that have the highest amount of implementation in the Phase III WIPs. Within each BMP unit, the BMP groups are sorted by the most units credited. Without considering the public will to implement or other local constraints, the most cost-effective BMPs are also the most implemented BMPs.

Overall Costs

The costs of all BMPs for 2018 and WIP3 are presented both graphically and as a table. These data are presented in terms of an acre of BMP, or the appropriate unit for the BMP like animal units, feet or acres treated.