

Technology Transfer of Chesapeake Bay TMDL Watershed Best Management Practices (Task N.0790)

Statement of Need

Executive Order 13508, Chesapeake Bay Protection and Restoration (May 2009), calls for Federal leadership and development of storm water pollution control strategies that establish a clear path to meeting water quality and restoration goals for the Chesapeake Bay (the Bay). In December 2010, the United States (U.S.) Environmental Protection Agency (EPA) finalized the Bay Total Maximum Daily Load (TMDL). A TMDL is the calculation of the maximum amount of pollution a body of water can receive on a daily basis and still meet state water quality standards designed to ensure waterways are safe, swimmable, and fishable. The April 2011 "Guide for Federal Lands and Facilities' Role in Chesapeake Bay Jurisdictions' Phase II Watershed Implementation Plans" directs federal facility managers to work with their state partners in developing strategies to reduce their nutrient and sediment loads. Federal facilities within the Bay watershed are expected to comply with the Bay TMDL by implementing storm water best management practices (BMPs) to reduce total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS) loads to the Bay. U.S. Department of Defense (DoD) installations in the Bay watershed need a methodology to evaluate their point and nonpoint source nutrient and sediment loads and determine what BMPs they can implement to reduce their loads. Further, Army installations that have already determined their nutrient and sediment loads to the Bay need specific concept BMPs in order to evaluate BMPs for implementation, thereby reducing their loads in the future.

Technical Approach

The NDCEE developed 10 to 20 concept BMPs, including low-impact development (LID) practices, across four Army installations that participated in previous NDCEE Task 0715 "Army Chesapeake Bay Total Maximum Daily Load Pilots" (Task 0715) and had previously determined their pollutant loads to the Bay. This activity first included a review of Geographic Information Systems (GIS) data to identify areas already treated by existing storm water BMPs as well as areas suitable for future BMP installation, particularly those areas with high loading rates for sediments and nutrients. Site visits were conducted to evaluate each BMP opportunity area to evaluate site characteristics and determine optimal BMP concepts for development. BMP concept plans were developed for each of the four Army installations and included a detailed description and map of the proposed BMP concepts and the potential load reductions expected upon implementation.

In addition, methodologies developed under Task 0715 were transferred to other branches of the DoD under this task. Eight Air Force, Navy, Marine, and other DoD installations selected by the government were included in this task. For each of these sites, a Gap Analysis was first completed, in which all information and data relevant to completing a TMDL Baseline Assessment, particularly geospatial data, were gathered and missing data identified. After closure of identified data gaps, a TMDL Baseline Assessment was then completed to evaluate all point and nonpoint sources to the Bay and to calculate the baseline loads of TN, TP, and TSS from each installation to the Bay without incorporating any load reductions from storm

water BMPs. In order to do this, the EPA Chesapeake Bay Program Phase 5.3.2 Watershed Model (Phase 5.3.2 Model) output were utilized, using a spreadsheet modeling procedure developed by the NDCEE for Task 0715. The Baseline Assessment was completed for two modeling scenarios to compare results from land use data for each installation available from the Phase 5.3.2 Model (based on satellite imagery) versus land use data collected from each installation. For DoD installations included in this evaluation and located in the state of Maryland, Baseline Loads already established by the Maryland Department of the Environment (MDE) for the installations were compared against those calculated by the NDCEE using land use data from the installations. An Existing BMP Evaluation was then performed by creating an inventory of BMPs at each installation, determining their treatment areas, applying the EPA-approved reduction efficiencies, and totaling BMP load reductions to calculate the Current Condition Loads, which again was determined for both modeling scenarios. Finally, a Future BMP Evaluation was conducted, in which general areas for BMP opportunities were identified, budgetary construction and operation and maintenance costs determined, and cost-effectiveness calculated. For DoD installations included in this evaluation and located in the state of Maryland, existing BMPs and future BMP opportunities were also evaluated for progress toward installation goals already established by MDE for the installations.

Results and Benefits

This project directly benefited twelve DoD installations in the Bay watershed. Four Army installations had BMP concepts developed to a pre-design phase, along with their implementation costs and load reduction potential, to assist them in planning for TMDL compliance. Eight Air Force, Navy, Marine, and other DoD installations made major strides toward their TMDL compliance efforts following completion of TN, TP, and TSS Baseline and Current Condition load calculations; BMP inventories development; and general BMP opportunity evaluations. The project thus applied the Army-developed TMDL methodology to the other branches of the military where installation operations, land use, and geographic settings are varied.

Technology Transition and Outreach

Technology transition is an integral purpose of this task. The BMP concepts developed for the four Army installations are expected to have widespread applicability to all military branches. The Gap Analysis, TMDL Baseline Assessment, Existing BMP Evaluation, and Future BMP Evaluation implementation at eight DoD installations was a direct transfer of an Army-developed methodology to assist all branches of the military. Any DoD installation in the Chesapeake Bay watershed can apply these methods to their installation to aid in their efforts toward compliance with the EPA Chesapeake Bay TMDL.

Government POC
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