Chesapeake Bay Total Maximum Daily Load Pilots

National Defense Center for Energy and Environment

The NDCEE is supporting the Army as it addresses water quality compliance in the Chesapeake Bay Watershed.

Problem Statement

The U.S. Environmental Protection Agency (EPA) is leading a major initiative to establish and oversee achievement of a strict "pollution diet" to restore the Chesapeake Bay. EPA is working with its state partners – Maryland, Virginia, Pennsylvania, Delaware, New York, and West Virginia as well as the District of Columbia (DC) – to set restrictions on nitrogen, phosphorus, and sediment pollution through a Total Maximum Daily Load (TMDL), a regulatory tool of the federal Clean Water Act (CWA), and to develop individual Watershed Implementation Plans (WIPs) and an overall TMDL implementation framework. The TMDL has been divided by major basins among the states and DC, which will further divide the pollution loadings among local point and nonpoint sources to improve their ability to target and achieve reductions.

In response to the EPA's Chesapeake Bay TMDL initiative, Army facilities will need to establish their nutrient and sediment loads, evaluate existing storm water Best Management Practices (BMPs) to calculate load reductions, and work with regulators to determine their individual allocations. These allocations will be used to set maximum pollutant loads associated with existing and future permits for point sources, including wastewater treatment plants and septic systems, and nonpoint sources, including urban storm water runoff, construction projects, fertilizer applications, and deposition of air emissions.

Technology Description

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 CWA requires that a TMDL be written for all segments of a waterway that fail to meet water quality standards. Most of the Chesapeake Bay and its tidal waters do not meet these standards and are listed as impaired.

The NDCEE has developed a transferable process and guidance document that uses Geographic Information Systems (GIS) to compile land use data in coordination with current EPA TMDL modeling to establish facility loads, evaluate existing BMPs, and prioritize compliance opportunities for Army point and nonpoint sources. Data collection tools were developed and utilized for the TMDL Gap Analysis, TMDL Baseline Assessments, and BMP Evaluations. In addition, modeling methodologies and spreadsheets for calculating nutrient and sediment loads and reductions resulting from BMP implementation have been developed and implemented for the TMDL Baseline Assessments and BMP Evaluations. Lastly, a Guidebook, a Training Curriculum, and training materials were developed and training was provided to DoD and Federal facilities and agencies on conducting similar TMDL evaluations.

Environmental, Safety, Occupational Health, and Energy (ESOHE) and Cost Benefits

- **ESOHE Benefit**. Using TMDLs to reduce pollution within the Chesapeake Bay Watershed will improve water quality for residents and for sensitive ecosystems.
- **Cost Benefit**. By accurately establishing its loads to the Bay Watershed, including load reductions from existing BMPs, the Army may be able to reduce its cost of compliance with TMDLs by refining the number of additional BMPs needed to meet target allocations.

Technology Benefits and Advantages

Conducting site visits using a checklist and questionnaire standardizes the data collection process and ensures that the appropriate data are requested and the relevant questions are asked. The Data Collection Tools can also be used to track available data, documents, and ongoing storm water assessments to identify components necessary for conducting TMDL evaluations.

Conducting the TMDL Baseline Assessments and BMP Evaluations using consistent modeling methodologies also maintains a standardized process. It helps to ensure that the modeling methodologies are consistent with the EPA modeling processes. It also allows the nutrient and sediment acreage and loading data provided to the Army installations to be altered to reflect changes in land use at the installations over time.

Limitations

The following limitations were noted at Army installations surveyed during the evaluation:
- All sub-watersheds and storm water discharge locations have not been identified at the facilities, which require additional effort in order to evaluate storm water flows.
- If facility mapping data are maintained in a format that is not compatible with the GIS format, then they must be converted to a GIS format in order to conduct spatial land use evaluations.
- Complete BMP inventories of storm water pollution controls are not available, which are necessary in order to evaluate reductions in nutrient and sediment loads.
- Gathering data pertaining to the TMDL requires coordination with a variety of Army facility personnel, which can take significant time.

Accomplishments

The NDCEE completed a TMDL gap analysis for eight Army facilities to identify gaps in their data and to determine what additional data would be needed to prepare a TMDL Baseline Assessment and BMP Evaluation. The gap analysis was completed using the Gap Analysis Data Collection Tool, developed by the NDCEE to maintain consistency in the gap analysis process and to increase efficiency during the installation site visits. Results of the gap analysis were summarized in a cumulative report and were used to support the Army in deciding which facilities would complete a TMDL baseline assessment and BMP evaluation.

The NDCEE then completed a TMDL baseline assessment for five Army facilities to evaluate the nutrient and sediment loads for each facility, based on point and nonpoint sources. The NDCEE also completed existing and future BMP evaluations for the same five Army facilities in order to assess existing BMPs for calculation of associated load reductions and to identify opportunities for installation of additional BMPs for future load reductions. For the TMDL baseline assessments and BMP evaluations, the NDCEE developed data collection tools to maintain consistency in the process as well as various modeling spreadsheets to calculate total loads and load reductions in accordance with EPA TMDL modeling methodologies. Results of the TMDL baseline assessments and BMP evaluations were summarized in a series of reports to assist facilities in working with their regulatory community during the development of their target allocations.

Lastly, the NDCEE developed a Chesapeake Bay TMDL Compliance Guidebook, Training Curriculum, and training materials that documented the processes and methodologies used during implementation of the pilot process. Four training sessions were also conducted throughout the Chesapeake Bay Watershed in order to train Army, DoD, and Federal facilities in the use of the guidebook for conducting similar TMDL evaluations.

Technology Implementation Opportunities

The methodology developed for the Army facilities can be applied to other DoD and Federal facilities in the Chesapeake Bay Watershed and to facilities in other watersheds where TMDLs are being implemented.

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Wetlands are an important resource to the Chesapeake Bay. Some Army facilities have conducted projects where they have restored pre-existing wetlands or established new wetlands on their properties. These are two examples of BMPs that would help to reduce nitrogen, phosphorus, and sediment loads from the Army facilities.

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