

**MARYLAND DEPARTMENT OF THE ENVIRONMENT
WATER MANAGEMENT ADMINISTRATION**

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
MUNICIPAL SEPARATE STORM SEWER SYSTEM DISCHARGE PERMIT
MD0068357**

REVIEW OF FREDERICK COUNTY'S 2008 ANNUAL REPORT

Frederick County was reissued a National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer discharge permit on March 11, 2002. NPDES regulations require permit conditions that effectively prohibit non-stormwater discharges and reduce the discharge of pollutants to the "maximum extent practicable." For each year of the County's permit, an annual report is required to help assess the County's stormwater program. The following is a review of Frederick County's annual report that was submitted to the Maryland Department of Environment (MDE) on March 10, 2009.

Permit Administration:

Frederick County is required to identify key administrative and technical personnel responsible for permit compliance. The County submitted an updated contact list and organizational chart with its annual report. The chart indicates two additional staff positions were budgeted for but not filled during fiscal year (FY) 2008. Any additional or future changes should be promptly reported to MDE.

Legal Authority:

Frederick County is required to maintain legal authority to perform the activities described in 40 Code of Federal Regulations (CFR) 122.26(d)(2)(i) and the permit. The required certification was submitted on January 28, 2003. In the event that any provision of its legal authority is found to be invalid, the County will need to make the necessary changes to maintain adequate legal authority.

Source Identification:

Frederick County is required to identify sources of stormwater pollutants and link these sources to specific water quality impacts on a watershed-by-watershed basis. This involves continued development of its geographic information system (GIS) for storing, maintaining, and analyzing source identification data. Activities during the reporting period included continuing to upgrade pavement management software to incorporate a GIS component, uploading of the County's storm drain system to the main server, and making available the 2007 orthographic and planimetric data as well as the Countywide Roadway Imaging Data and Vector Parcel Data. The orthographic data will be used to digitize impervious area during the next reporting period. Impervious areas are currently estimates based on the Center for Watershed Protection calculations employing land use classifications. A needs report for additional GIS services

identified NPDES projects for pollutant loading analysis estimation, impervious area calculation by watershed catchment, terrain modeling, and the online entry of conservation partnership data through secure access. All 649 stormwater management facilities in the County are included in the urban best management practices (BMP) database, including the 50 completed this reporting period. Frederick County continues to enhance its GIS capabilities, allowing for the collection of data on a watershed basis, making the information more accessible and enabling better decision making.

Discharge Characterization:

Frederick County is required to conduct chemical, physical, and biological monitoring at a land use-specific outfall and an associated in-stream station within the Bush Creek watershed. Monitoring commenced at Peter Pan Run, a tributary to Bush Creek, in May 1999. This station is below a 3,500 unit planned urban development in Urbana, MD. The drainage area to the in-stream station is approximately 1,607 acres of mixed land use. There are currently fourteen structural stormwater management facilities (eleven dry extended detention ponds, two sand filters, and one infiltration trench), along with several facilities functioning as sediment basins. Currently, there are no structural BMPs in the drainage areas. The outfall at "Pond R" was the approved sampling location, equipment was installed in December 2002, and monitoring commenced in February 2003. "Pond R" was initially used as a sediment basin and converted to stormwater management in July 2004. The pond receives drainage from 30 acres of medium-density residential land use. To better assess the impacts of development, physical and biological monitoring are also conducted at three monitoring sites on Peter Pan Run. Components of the long-term monitoring program are being used to assess conditions in other Frederick County watersheds.

Continuous flow monitoring is required at the in-stream station to develop stage to discharge relationships and estimate seasonal and annual pollutant loads. For chemical monitoring, at least three samples determined to be representative of each storm event are to be collected and analyzed for 12 specified parameters. Temperature and pH are also to be recorded. Twelve storm events are to be sampled annually, three during each quarter with quarters based on the calendar year. For periods of extended dry weather, baseflow samples are to be taken once per month.

The County reported that thirteen storm events were monitored at the Peter Pan in-stream station and eleven at the "Pond R" outfall station for the 2008 water year (WY), running from October 2007 through September 2008. Grab samples were obtained for seven of the storms at the in-stream station and four at the outfall, a decrease from the nine obtained the prior year. Reasons given for not collecting the grab samples included hazardous conditions due to Winter weather, the storm event beginning overnight, and limited holding time (explained as the lag time between the collection of the in-stream sample and the commencement of a discharge from the outfall station). Event mean concentrations (EMCs) were calculated and reported on MDE's Chemical Monitoring Storm Event Database as required. Monthly baseflow monitoring occurred at both stations, thirteen at the in-stream station and three at the outfall. The annual rainfall at both stations was slightly below normal (41.02" vs. 43.07"), although the annual amount at a nearby

National Oceanic Atmospheric Administration's rain gauge was higher than normal at 48.35". The monthly average was also higher for five months of the year at both stations.

In WY 2007, average annual EMCs for all parameters sampled at the in-stream station increased. This annual report however, shows all constituent EMCs decreasing to 2006 levels except for TKN and phosphorous. Baseflow concentrations also declined compared to WY 2007, except for TSS. Additionally, both average annual baseflow and storm runoff of metal concentrations decreased. For example, baseflow zinc dropped to its lowest concentration since the inception of the monitoring program and the storm runoff concentration of zinc decreased by 42.4%. Storm EMC and baseflow mean concentration (MC) of copper dropped to near historic lows and neither lead nor cadmium was detected in baseflow samples, although they were found in the storm runoff samples.

The outfall sampling also indicated some decreases from the previous year. For instance, phenols were not detected in any samples, and oil and grease and TPH were found in only one. However, copper and zinc average storm EMCs increased 108% and 12.4% respectively, to their highest levels of the monitoring program. Storm EMCs also increased considerably for TSS and phosphorous and were the highest since 2003 for nitrate and nitrite. Some of these increases are attributed to increased suspended solids transport caused by Tropical Storm Hanna.

In addition to chemical monitoring, the County is required to conduct biological and physical assessments in the stream segment between the outfall and in-stream stations. Biological monitoring includes benthic macroinvertebrate and fish sampling. Physical monitoring includes basic habitat assessment parameters (e.g., epifaunal and channel substrate condition, embeddedness, riffle/pool variability, etc.), bank or erosion pins, velocity, cross-section and profile, and riparian measurements. Maryland Biological Stream Survey (MBSS) sampling methods are used for biological and physical habitat assessment. Multiple metrics are used to analyze the biological data. The Benthic Index of Biotic Integrity (BIBI) improved from poor to fair in sections 2 and 3 of the stream and remained poor in sections 1 and 4. The Fish IBI (FIBI) dropped in sections 1 and 2 from good to fair and remained fair and poor in sections 3 and 4 respectively. While an increased number of taxa (14) was found in sections 1 and 2, the quantity of fish captured decreased. In sections 3 and 4, the variety remained the same with an increase in the number captured. *In situ* water quality monitoring was performed during the Spring and Summer visits of 2008. Values for temperature, pH, conductivity, and dissolved oxygen (DO) were all within normal range, although DO concentrations dipped below 9.0 mg/l in the Summer due to higher water temperatures.

Physical stream conditions in Peter Pan Run have remained fairly constant in recent years, although incremental changes to certain parameters appear to be occurring. Embeddedness in section 4 increased from 2002 to 2005, decreased in 2006, and increased again in 2007 and 2008. This is likely due to a cycle of fine sediments accumulating on the stream bottom over several years which are then washed out in a very heavy storm. Cross-sectional surveys show that the overall stream channel continues to widen.

Frederick County is also required to select a watershed to monitor in order to evaluate the effectiveness of stormwater management system implementation on stream channel protection.

The County identified a 215-acre drainage area for monitoring where a proposed section of the “Villages of Urbana” development is to be built. MDE approved this watershed in December 2002. The stream segment to be monitored is an unnamed tributary to Peter Pan Run. Design build out of the development in the watershed will result in the construction of 254 single-family dwellings and 216 townhomes. Versar, Inc. conducted initial survey work and hydrological modeling during late September and early October 2003. Field activities included establishing permanently monumented channel cross-sections and longitudinal profiles, conducting Rosgen Level I-III surveys, capturing global positioning system (GPS) coordinates for monument locations, and documenting site conditions with photographs. A longitudinal survey, totaling approximately 3,100 linear feet, is conducted annually to monitor changes in bed profile along the stream. Eleven cross-sections were selected at riffle locations to monitor changes in channel shape. Three additional cross-sections were selected at outside bends to measure lateral bank erosion rates.

Data from the initial baseline survey indicate that three individual stream channel types are represented within the study area. One of the channel types is considered to be relatively stable, while the other two are considered unstable with high erosion potential. For the most part, these streams have cut downward, become entrenched, and have steep and undercut banks. This process serves as a source of excess sediment as the stream channels become more stable through channel adjustments in plan form pattern, cross-sectional dimension, and longitudinal profile.

The final two sediment basins in the drainage area were constructed during the reporting period and four existing basins were converted to permanent stormwater management facilities, for a total of fourteen facilities (8 stormwater management facilities and 6 sediment basins) treating forty-seven percent of the drainage area. Profile and cross-section changes have shown minimal changes at most locations from 2003-2008, but with continued downstream migration of features and more rapid changes at a few locations. Continued modeling results still indicate lower post development peak flows than the current construction peak flows, although higher than the original agricultural flows.

Frederick County continues to conduct extensive stream monitoring and assessment as required by its NPDES stormwater permit. This monitoring, along with the completion of more permanent stormwater facilities in the studied drainage areas, is beginning to yield information toward long-term trends and quantify the impacts of development on water quality. Better adherence to sampling requirements, particularly the number of grab samples collected, is needed.

Management Program:

Frederick County is required to conduct preventative maintenance inspections of all stormwater management facilities on at least a triennial basis. The County reported that its Division of Permitting and Development Review, Environmental Compliance Section (DPW/ECS) staff conducted preventative maintenance inspections at 156 (approximately one-third) of the County’s stormwater management facilities during 2008. Initial inspections found 34 in need of

maintenance and 14 in continued need of correction upon reinspection. This is an improvement over the previous two years regarding the timeliness of completing corrective actions.

The County is also required to implement the stormwater management design policies, principles, methods, and practices found in the *2000 Maryland Stormwater Design Manual* (Design Manual). The County has previously modified its ordinances, regulations, and administrative procedures to meet State stormwater requirements. Since July 2001, any new development proposal in Frederick County has been required to meet or exceed the Design Manual criteria. The County is currently working toward establishing the necessary law and design guideline changes to meet the requirements of the Stormwater Act of 2007.

The permit requires the County to implement an inspection and enforcement program to ensure that all discharges to and from the municipal separate storm sewer system that are not composed entirely of stormwater are either permitted by MDE or eliminated. At a minimum, 150 outfalls are to be field screened annually. Dry and wet-weather field screening for illicit connections has primarily occurred as part of the triennial stormwater facility maintenance inspections. Therefore, the outfalls of the 156 stormwater facilities inspected as part of the County's maintenance program were also inspected for compliance with the required illicit connection detection and elimination (ICDE) program. As in the past, the County reported finding no illicit connections during its inspections. Based on these findings over the years, it appears that the County's ICDE program needs to develop additional strategies and procedures to better ensure that no illicit discharges are occurring throughout the year. At a minimum, the inflow points to the stormwater facilities should be inspected during triennial inspections in addition to the outflows. The Department of Highway and Transportation could become a partner in the ICDE program by reporting problems observed, such as dry weather flows, while performing ditch cleaning and other maintenance work.

The County is also required to identify all County-owned facilities that require NPDES stormwater discharge permit coverage, submit documentation that permits have been obtained, and report the status of pollution prevention implementation. From an initial database of 266 County-owned properties, it was determined that eight facilities required permitting. All have received coverage and the County reports that pollution prevention plans have been developed.

The County reported no illegal dumping or spill investigations for 2008. As part of its requirement to maintain a program, the County has first responders trained to handle hazardous spill incidents and refers non-hazardous incidents to MDE. Procedures for reporting an event are apparently on the County website, but were not found during a navigation through the website and a search on "reporting hazardous spills" turned up a link to an Environmental Protection Agency (EPA) webpage. This information should be made more readily accessible to help ensure that information is timely reported.

Frederick County is required to maintain an acceptable erosion and sediment control program. This program is assessed through MDE's delegation process with a review every one to two years. Based on improvements last year to the amount of field presence at active construction sites and a stronger commitment to take appropriate actions to obtain and maintain compliance, the County was approved for continued delegation through June 2010. Additionally, three

“Responsible Personnel” certification classes for erosion and sediment control were conducted during 2008. However, a total of only five people were trained. Better notification is needed about upcoming classes, including contacting MDE, so that the classes can be included on the statewide list of class dates and locations given out to interested persons. Information regarding earth disturbances of one acre or more is to be reported quarterly and should be specific to the permitting activity for the three months preceding submittal. These reports were received for 2008, an improvement over past years.

A public outreach program focusing on pollution prevention is also required by the permit. Frederick County continues to conduct extensive outreach, especially as part of its watershed assessment and restoration process and through activities associated with numerous school and community organizations. The County is an active member of the Monocacy and Catoctin Watershed Alliance, coordinates community clean-up days and recycling initiatives, participates in a septic system replacement program targeting failing systems, and actively promotes its public transportation (TransIT) services. The outreach efforts by the County are commendable, especially in regards to the general public. Additional outreach efforts, geared toward other activities, such as the promotion of good housekeeping practices at commercial and industrial facilities should be considered to expand the program’s educational reach and perhaps aid in the detection of illicit connections.

As part of its permit requirement to develop and implement a plan to reduce pollutants associated with road maintenance, the County continues to implement recommendations from a 2002 study conducted by Versar entitled *Assessment of Road Maintenance Activities and Their Impacts on Runoff*. The study evaluated activities such as chemical usage for snow removal, herbicide spraying for vegetative controls, street sweeping, and inlet cleaning. The County reported that 1,059 miles of roadways were swept and 1,455 inlets were cleaned this past year and is continuing to experiment with alternatives to road salt such as a combination of 30% magnesium chloride, salt, and cinders. A total of 967 tires and over 48 tons of trash were removed along County roads and dump sites during the reporting period. A large percentage of this was collected in one day during the annual countywide Big Sweep Cleanup. In addition to reporting miles of roadway swept and the number of inlets cleaned, the County should track the pounds of material collected from both activities which might better correlate to other impervious restoration activities.

The County is also required to examine the use, control, and reduction of pesticides, herbicides, and fertilizers throughout all its departments. The County sponsored a study entitled “*Recommendations for Alternatives to Pesticide/Herbicide/Fertilizer Use for Frederick County*” (Versar, Inc. December 2003) to characterize their use by various agencies and identify potential reduction strategies. The study found that most departments were already applying pesticides and herbicides on an “as-needed” basis and fertilizers applied 1-3 times per year at specific locations and application rates based on soil tests. Few recommendations were given for further reductions in application practices, although the use of the herbicide Pendulum, which is toxic to aquatic life, has been discontinued along County roads. Frederick County Public Schools continues to use Integrated Pest Management to minimize its use of pesticides.

Frederick County continues to implement various components of the management programs outlined in its NPDES permit. Outreach and partnership efforts are particularly successful, along with the management programs for road maintenance and herbicide and pesticide applications. Additional attention has been paid this past year to the County's erosion and sediment control program although better outreach is needed to promote the "Responsible Personnel" training. More attention is needed to the ICDE program, with the County using a variety of approaches and resources to find illicit discharges that often contribute to water quality impairment.

Watershed Restoration:

Frederick County is required to conduct a systematic assessment of water quality within its watersheds. Stream Corridor Assessments (SCAs) have been conducted and Watershed Restoration Action Strategies (WRASs) developed for the Lower and Upper Monocacy watersheds (approximately 299,653 acres or 468 square miles). WRASs are the end product of Maryland's Unified Watershed Assessment process that was developed by the Maryland Department of Natural Resources (MDNR) in 1998 as a result of the federal Clean Water Action Plan initiative. The information from MDNR's technical watershed assessment, local knowledge from stakeholder involvement, and leadership from local government is combined to provide a consensus-based strategy for watershed restoration. The strategy identifies priorities, opportunities, concerns, and challenges as well as potential mitigation, restoration, and protection sites. These two watersheds account for approximately 70% of the land area in Frederick County and contain sixteen of the County's twenty-one subwatersheds. Numerous restoration opportunities have been identified for these areas.

From 1999 to 2007 quantitative and qualitative assessments of water chemistry, physical habitat, and biology have been conducted on a rotating basis in three priority watersheds, Lower Bush Creek, Ballenger, and Lower Linganore Creek. Beginning in 2008, monitoring efforts will be focused on two separate projects, one being targeted monitoring in Ballenger, Bennett, and Linganore Creeks due to ongoing and future restoration and community outreach efforts. The other was the completion of the first full year of countywide stream sampling for the Frederick County Stream Survey (FCSS). Nine locations have been selected for sampling, four at existing locations associated with restoration projects, a newly established site in Linganore Creek in preparation for a restoration project, and four in Bennett Creek in anticipation of a culvert replacement.

Sampling conducted this past year found water quality parameters generally in the normal range. Embeddedness was high at most sites and BIBI ratings generally fair to poor, while FIBIs were generally good due to large pools, woody debris, and slow deep runs in the stream channels. The FCSS consists of the random selection of 200 sampling sites spread out across 20 watershed management units. Fifty sites will be sampled per year, resulting in a four year cycle period. This period may be extended if additional special studies are conducted between cycles. MBSS methods will be used to collect rapid benthic macroinvertebrate, physical habitat, and water quality data. Fish community surveys will not be conducted due to resource constraints, but the County will continue to use fish assessment surveys. Sampling data for 2008 were provided in the annual report and included an average BIBI score of poor for all 50 sites (6% very poor, 32%

poor, 48% fair, and 6% good), an average total nitrogen of 3.82 mg/l and average total phosphorous of 0.031 mg/l.

The County is also required to track progress and evaluate the effectiveness of implementing programs and projects to treat 10% of its impervious area that has not been treated to the maximum extent practicable. The County's estimate of imperviousness is based on values assigned to various land uses. The total of these values minus the area treated by stormwater management facilities represents the untreated area. The County has estimated that it has 6,725 acres of untreated impervious area. As noted in previous annual report reviews, an assessment should be made regarding the extent to which existing facilities built prior to 2001 are treating stormwater runoff to the maximum extent practicable. There may be a good opportunity for retrofitting these facilities to enhance water quality benefits.

Watershed restoration projects in the County are generally either capital improvement projects (CIPs), community restoration projects (CRPs) or Monocacy and Catoctin watershed partnership projects (MCWPPs). The 2008 Annual Report indicates 56 projects as either completed, active, or proposed, resulting in the ultimate treatment of 1683.69 acres of impervious area and a reduction of 1341 lbs/yr of nitrogen, 115 lbs/yr of phosphorous, and 52,517 lbs/yr of sediment. Three of the five CIPs are still in the planning phase with none completed this year. The County reported the completion of six CRPs and no MCWPPs for the year, with only a few remaining to be completed. Several on-going projects, including the backyard buffer program, septic upgrades, and street sweeping account for a significant portion of the impervious area treated.

While the number and variety of restoration projects is commendable, more information is needed regarding the accounting methodology of the three on-going programs noted. The report indicates a high mortality rate of the trees planted through the backyard buffers and it is unclear how the septic upgrades result in the treatment of 62 acres of imperviousness and the street sweeping credit is currently a 1:1 ratio. Properly accounting for restoration activities may be even more important in the next permit term as additional impervious restoration will likely be required.

Program Funding:

Funding is provided through general funds for both general operating expenses and CIPs. Additionally, the County through its partnerships with outside groups, (e.g., Potomac Watershed Partnership, Canaan Valley Institute, Chesapeake Bay Trust, MCWA, etc.) has secured funds and grants for both operating and capital projects. The FY 2009 operating budget was \$643,237, an increase of \$74,914 over the previous year. The CIP budget has decreased over the last several years, with funds allocated for only two projects in FY 2009 for a total expenditure of \$246,680. Limiting factors for CIPs may be that they must cost more than \$100,000 and must impact County property or infrastructure. Frederick County has been able to maintain adequate funding to carry out the requirements of its current NPDES permit. The renewal process for the permit is underway and the County should consider additional funding sources to meet future and potentially more expensive permit conditions, such as more extensive restoration requirements.

Assessment of Controls:

Annually, the County is required to submit estimates of expected pollutant load reductions as a result of implementation of its management programs. The County submitted estimates of pollutant load reductions as a result of existing structural stormwater controls. The “simple method” (Schueler, 1987) was used to estimate loads based upon the pollutant removal efficiency of various BMPs. Total pollutant load reduction associated with BMP implementation has been estimated to be 45% for total suspended solids, 29% for total phosphorus, 16% for dissolved phosphorus, 25% for total nitrogen, and 21% of carbon (biological and chemical oxygen demand). Removal of metals ranged from 26% to 43%.

Summary:

Frederick County continues to do work toward compliance with all NPDES municipal stormwater permit requirements. Additional enhancements have been made to GIS capabilities, enabling the County to conduct basic analyses for effective watershed planning. Requirements for discharge characterization continue to be met. The County continues to have many effective management programs, notably in its outreach efforts and road maintenance pollution prevention, and has made improvements to the erosion and sediment control program. Additional effort is needed in the detection of illicit connections and problem discharges that contribute to water quality impairment. Improved methods, in conjunction with further discussions with MDE, are needed to better account for the treatment of impervious areas and pollutant load reductions for structural and nonstructural practice implementation.