



EXECUTIVE SUMMARY

The submission of this annual progress report to the Maryland Department of the Environment (MDE) fulfills requirements specified under the Frederick County National Pollutant Discharge Elimination System (NPDES) Permit No. MD0068357. This second-generation permit is effective from March 11, 2002 through March 11, 2007 and covers stormwater discharges from the municipal separate storm sewer system (MS4) in Frederick County. Continuing progress has been made in developing the stormwater management program since the 2003 Annual Report was submitted in March 2004. NPDES funding remains adequate to meet the conditions of the permit. The sections in this annual report follow specific sections presented under Part III, Standard Permit Conditions, of the County's NPDES Permit to document how required elements of the County's stormwater program are being implemented.

Permit Administration/Legal Authority

The report identifies contact information for key Frederick County personnel responsible for the various program components that support compliance with the County's NPDES permit. This report also documents certification from the County Attorney that Frederick County possesses the authority to directly perform the activities described in 40 CFR 122.26(d)(2)(i) and this permit.

Source Identification

In 2004, Frederick County finished mapping all of the stormwater drainage systems in its Digital Plan Storage System (DPSS) and continued work on the QA/QC process. Frederick County Government awarded a GIS digitizing contract to Spatial Systems in the beginning of 2004 to digitize "storm drain systems, including major outfalls, inlets, appurtenant conveyances, and associated drainage areas; [and] stormwater management facilities."

County Planning staff continued to make extensive improvements to the County's GIS system in 2004. Developable areas and comprehensive planning analyses for New Market and Urbana regions were completed in 2004 to accompany regional plan updates. Staff has also been working on a proposed ordinance for a development setback along the Monocacy River, including GIS buffer calculations. Staff also completed digitizing of agricultural preservation properties and districts in 2004. Water and Sewer planning areas were completed in 2004 but the official data will not be released to the public until the ordinance changes and parcels are available. The pilot parcel project was awarded in 2004; parcels are being digitized by planning region as funding becomes available. Frederick County road centerlines are now complete and undergo periodic updates when new plans arrive.

With this report, Frederick County met the NPDES Storm Sewer System Permit requirement that it "submit an example of its GIS capabilities that includes the identification of all data layers available; the stage of development (complete, incomplete, in progress); and a description of

how data are stored, accessed, and used. The example shall be for the Ballenger Creek Watershed.” In 2004, the County’s GIS Coordinator created a web-enabled list of all GIS data holdings called a “GIS Data Dictionary” with basic metadata. In 2004, Frederick County employed GIS data to begin identifying stormwater retrofit and stream restoration opportunities in the Ballenger Creek Watershed. Mapping spatial data in a GIS was critical to this effort, helping to integrate existing data and identify potential opportunities for improving stormwater controls and stream conditions.

At present, all stormwater management (SWM) facilities have been entered into Frederick County’s urban Best Management Practice (BMP) database. There are 531 entries in the database, including 30 new facilities completed on or after January 1, 2004. New facilities are entered into the database upon approval of the as-built survey. During the past year, the County continued to improve the entire database by updating and editing where necessary to ensure database integrity.

Discharge Characterization

The MDE-approved study area for the County’s long-term monitoring plan is Peter Pan Run, which is located within the Bush Creek watershed, a tributary to the Monocacy River and the County’s top-priority watershed. Peter Pan Run was selected for monitoring because construction of The Villages of Urbana, a 3,500-unit Planned Unit Development (PUD) in the watershed’s headwaters, poses one of the County’s most immediate development pressures. The timing of the Urbana PUD construction coincided with the study needs, with the initial monitoring in 1999 providing baseline data for the catchment, and subsequent annual monitoring events occurring during the current major development phase. In 2004, conditions within the PUD were fairly similar to those observed in 2003. Substantial portions of the original development have been completed and are occupied by residents. Houses in other areas are nearing completion and construction also continues in new areas within the PUD (and Peter Pan Run watershed), yet large areas remain under their pre-development land use (primarily agricultural or forested).

As specified in the permit, the County has established, and maintains, two long-term chemical storm monitoring stations within the Urbana PUD to characterize stormwater discharges from both a stormwater outfall draining a specific land use and an associated instream station. Long-term chemical monitoring has continued at the Peter Pan Run instream monitoring station (located at PPAN-01) since May 1999. Within the Urbana PUD, the outfall at Pond R is monitored as a land use-specific stormwater management structure. Installation of water chemistry monitoring and automated sampling equipment at Pond R was completed on December 24, 2002; the station initially characterized water quality at the outfall of the basin during residential construction. During 2004, Pond R was converted from a sediment basin to a stormwater management facility. Baseflow and storm samples are analyzed for five-day biochemical oxygen demand (BOD), total Kjeldahl nitrogen (TKN), nitrate and nitrite, total phosphorus, total suspended solids (TSS), zinc, cadmium, copper, lead, phenols, total petroleum hydrocarbons (TPH), oil and grease, and fecal coliform.

Between October 1, 2003 and September 30, 2004 (Water Year [WY] 2004), nine storm events were monitored. Baseflow monitoring was carried out monthly for the entire year at the instream site and until March 2004 at the outfall site. Annual average event mean concentrations (EMCs) for TSS were 54% lower than WY 2003 but continued to be elevated in relation to State averages. Possible factors contributing to high TSS measurements include continued construction disturbances within the PUD upstream of the monitoring station and bank erosion during high flow events. The annual average TSS EMC during WY 2004 was the lowest since monitoring began in WY 1999, including the drought year of WY 2002 (27% lower). During the current monitoring year, annual average EMCs for all metals were reduced by between 3% (copper) and 89% (cadmium). Lead was reduced by 53%, falling below Maryland freshwater chronic criteria for the first time since the WY 1999 reporting year. Copper and zinc concentrations were below Maryland freshwater acute criteria.

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Total annual loadings of all analytes in Peter Pan Run were less during the current monitoring year than in WY 2003, except for TKN (increased 40%), TPH (increased 131%), and oil and grease (increased 51%). Loadings of TPH in Peter Pan Run were the highest since monitoring in Peter Pan Run began in WY 1999, possibly due to the increasing presence of automobiles in the completed and near-completed portions of the PUD. Loadings of pollutants at Pond R outfall were between 0.3% (oil and grease) and 42.0% (BOD) of the levels estimated at the instream site. Annual loadings of all pollutants were higher in WY 2004 than in WY 2003 except for cadmium (92% less), lead (30% less), and oil and grease (92% less). Of the remaining analytes, BOD was 6.9 times higher, TKN was 4.7 times higher, phosphorus was 2.5 times higher, and copper was 5.2 times higher.

In 2004, Benthic Index of Biotic Integrity (IBI) scores ranged from fair to very poor. For three stations, Benthic IBI scores rose one to two categories in comparison to 2003 scores, but at PPAN-04 benthic IBI dropped from the poor to the very poor category. The general improvement of Benthic IBI scores may be due to the re-establishment of benthic populations dislodged from their habitats by increased flows from snowmelt after record amounts of snowfall in early 2003. Data from summer electrofishing surveys were used to calculate Fish IBI scores for each Peter Pan Run station. PPAN-01's Fish IBI score, which had spiked in 2003, returned to the Poor category. The score for PPAN-02 increased slightly, although it remained in the Fair category, while the score for PPAN-03 remained identical to those of years past. While the total number of taxa remained stable, the total number of individuals increased at every site. These numbers were at their highest level since sampling began in 1999.

Physical stream conditions within Peter Pan Run were generally similar to those in years past, though certain stream parameters are beginning to show a pattern of slow change over time. The cross sectional survey at PPAN-01 shows that the channel is continuing to widen (by approximately 1.8 feet more to the left since 2003) as a large gravel bar continues to develop in the center of the channel.

Data were collected in a second year survey for the County's study evaluating the effectiveness of the *2000 Maryland Stormwater Design Manual* in protecting stream channels. Data indicate that streams within the study area (tributary to Peter Pan Run) continue to be represented by three individual stream channel types: relatively stable C4 streams as well as G4c and F4 stream types, considered relatively unstable with high erosion potential. In general, these streams have cut downward, becoming entrenched within the valley floor, and have steep, and sometimes undercut banks. The downcutting process and eroded/undercut banks serve as a source of excess sediment as the stream channels strive to achieve a more stable form through channel adjustments in plan form pattern, cross-sectional dimension, and longitudinal profile. Much of this instability is likely associated with the agricultural history of the catchment rather than the recent land use change associated with the active and on-going residential development, but continued monitoring over additional years will help characterize the rate of change during development. Overall, conditions observed during the second year of the study were fairly similar to those observed in the baseline survey and reported in the County's 2003 Annual NPDES Report.

As previously reported, TR-20 and TR-55 hydrologic model results, in terms of peak flows near the downstream end of Tributary 1, indicate the expected lower peak discharges for the undisturbed forested watershed, as compared with the pre-development agricultural land use, mass grading, or build-out scenarios, the latter two with SWM ponds. There is a much greater percentage increase in peak flows for all scenarios as compared with pre-settlement conditions, since a greater proportion of the smaller storms would be expected to infiltrate into the soils in the wooded scenario than for the larger storms. The build-out scenario shows a proportionately smaller increase in peak discharge for the smaller storms (less than 10-year storm events) than for the pre-development and mass-grading scenarios, since the SWM ponds generally can control a greater proportion of the flow rate for these smaller storms as compared with the larger storms.

Management Programs

Frederick County maintains its current Stormwater Management Program in compliance with Environmental Article, Title 4, Subtitle 2, Annotated Code of Maryland. The County will continue to do so through plan review and inspection of all developer projects and through implementation of the *2000 Maryland Stormwater Design Manual*.

The Environmental Compliance Section (ECS) of the Frederick County Division of Public Works (DPW) continues to conduct a regular program of preventative maintenance inspections of all stormwater management facilities built, approved, and operating within the County. Required triennial inspections of all facilities Countywide are completed on a rotating basis. Frederick County continues to maintain an acceptable stormwater management program in accordance with State stormwater management laws. This includes implementation of

appropriate County ordinances. The County remains committed to implementing the latest stormwater management technologies while addressing the concerns of the development community.

Frederick County has now implemented the stormwater management design policies, principles, methods and practices of the *2000 Maryland Stormwater Design Manual* and subsequent changes to the Code of Maryland Regulations through the County's Stormwater Management Ordinance and its Design Manual, both of which were revised during 2001. Frederick County continues to work with the development community to better understand the goals of the 2000 Design Manual. Enhancements will be made for some of the design concepts in order to achieve the ultimate goal of the manual. The County will also continue to work with both the development community and the general public to educate them as to the proper type of design for site-specific areas as well as timing of installation of the facility and maintenance issues.

Over the past three years, all SWM structures were inspected for illicit connections or discharges through the County's ongoing maintenance inspection program. During 2004, the County conducted inspection at 190 sites, meeting the required minimum sites per year. Field screening results are recorded in the County's facilities database to ensure proper tracking and followup when potential problems are detected. Chemical results from wet/dry screenings did not indicate any illicit discharges, largely because many outfalls were dry due to frozen conditions. Any new inspection staff will be trained in emergency management and with the Center for Watershed Protection's training manual for illicit connection detection.

Frederick County DPW conducted a thorough review of County-owned properties and requirements for NPDES industrial stormwater permits and pollution prevention plans. MDE's review of the 2003 Annual Report stated that the County needed to complete its assessment of all County-owned properties and assist in the development/implementation of pollution prevention plans for those properties requiring coverage. A review of County properties was done to compile information on property management and uses. Twenty-four County-owned properties were investigated to determine what course of action was required based on on-site practices. Permit applications were sent to the contact person for each property with a request for them to complete the application and submit it to MDE by the end of January 2005; copies of permit applications will also be sent to the DPW office to be kept on file. Frederick County has now fulfilled its requirements for County property inventory and permit applications.

Frederick County has maintained an active program to respond to illegal dumping and spills, including expanding its procedures for public reporting and responding to citizen complaints. In addition, DPW's coordination with the Office of Emergency Response to develop procedures for addressing spills, provide HAZ-MAT training, and recent progress in tracking permit information will further augment the County's capabilities for spill response. The County responded to one spill event in 2004.

During 2004, the ECS, along with the Catoctin and Frederick Soil Conservation Districts (SCD), jointly focused on improving sediment and erosion control for single-family lot construction as well as townhouse and condominium projects. ECS staff is closely monitoring activities of contiguous lot grading to insure compliance with Frederick County Code 1-10-16 (e) and

comparable SCD requirements as well as overall sediment and erosion laws. Both ECS and SCD are enforcing the requirements for sediment and erosion plan submittal for contiguous lot construction and prior to issuance of a grading permit for building construction. Once plans are submitted and approved by the local SCD, they are forwarded to ECS for use in implementation, inspection and enforcement.

In 2004, NPDES Program staff made diverse and far-reaching impacts through its public outreach and education program. Frederick County addressed permit-suggested outreach topics and met its own goals and objectives from its *Strategic Plan to Improve Water Quality Through Public Outreach in Frederick County, Maryland*, published in November 2003. Extensive outreach was conducted through the Watershed Restoration Action Strategy (WRAS) processes for the Lower and Upper Monocacy Watersheds. This type of outreach also helped to build partnerships between steering committee members and relied on relative strengths of each group. The Monocacy and Catoctin Watershed Alliance (MCWA), born of the two WRAS steering committees, developed a logo and public outreach materials and participated in outreach events to support water quality and habitat initiatives. NPDES staff coordinated internally with various County divisions to enhance and track their outreach products. Outreach activities not only addressed specific NPDES outreach topics, but also contributed to watershed plans and helped identify landowners for potential restoration activities.

During 2004, Frederick County continued to implement recommendations from its 2002 assessment of road maintenance practices. The objective of this study was to assess the effects of road maintenance activities on stormwater runoff, and resulting impacts on surface water quality. The assessment evaluated current practices, analyzed alternative practices, and presented a plan to incorporate alternative practices into the County's road maintenance programs. Frederick County's Office of Highways and Transportation continues to implement the recommendations of the Road Maintenance Report and experiment with new technology to reduce its impact on water quality. Significant improvements were made in reporting practices in 2004.

Because of concern for environmental health, the MDE, through the requirements of NPDES MS4 Permits, requires local jurisdictions to evaluate their current uses of pesticides, herbicides, and fertilizers and to seek opportunities to reduce use of these materials. In 2003, Frederick County completed a study to characterize current uses of pesticides, herbicides, and fertilizers by County agencies and to identify potential reduction strategies. Study results indicated that pesticide/herbicide/fertilizer use by Frederick County did not require any drastic reduction in application practices because County agencies have, in general, already minimized use of these chemicals, or are using more environmentally acceptable substitutes. In most cases, the overall recommendation was to continue current chemical control practices, while considering possible biological and mechanical controls that could be used in place of, or in combination with current practices. A number of current practices are already employed by those surveyed to control the application of chemicals and, where possible, to use minimal amounts. Most Frederick County departments apply pesticides on an "as needed" basis, while fertilizer applications are performed 1-3 times per year at specific locations. Departments indicated that application rates are based on label instructions, and are made at the lowest rate required for effectiveness.

Frederick County continues to build upon and strengthen the various components of its stormwater management programs. As detailed throughout this report, the past year brought progress in many areas. Future directions for the County's management programs were considered, particularly with a look ahead to anticipated program needs throughout the remaining years of the present NPDES permit. Frederick County government has been particularly effective in leading well-coordinated efforts involving multiple agencies and organizations. The County has also capitalized on opportunities to leverage funding and gain participation of outside groups in working toward common goals for water quality improvements and better management in the County's freshwater resources. This has allowed the County to accomplish program goals most cost-effectively, despite having a small in-house staff.

Watershed Restoration

During the last year, Frederick County continued to build upon its previous efforts to identify and evaluate water quality problems in its priority watersheds and subwatersheds by conducting, on a rotating basis, stream monitoring using both biological and physical habitat methods. Currently, monitoring is being conducted approximately every two to three years in the County's three highest priority watersheds: Lower Bush Creek, Ballenger Creek, and Lower Linganore Creek. In 2004, the County also continued its annual stream monitoring program in the Peter Pan Run tributary to Bush Creek. In addition, monitoring took place at ten locations identified through previous watershed planning studies and the WRAS process as being potential restoration and community outreach opportunities.

In 2004, The County continued its coordination of the Lower Monocacy WRAS process. This process was established by the Maryland Department of Natural Resources (DNR) using EPA Section 319 Clean Water Act funds. The purpose of the WRAS program is to protect water quality and habitat in priority watersheds within the State of Maryland, particularly those with listed impairments and Total Maximum Daily Load (TMDL) pollution reduction requirements. The WRAS is intended to be a working document with goals that will change as priorities within the watershed change.

A separate but partly overlapping Steering Committee met bimonthly beginning in 2004 to conduct the Upper Monocacy WRAS. Meetings were used to broaden the group's knowledge and also focused on upstream activities in Adams County, PA and Carroll County, MD; the status and health of the fisheries on the six subwatersheds; and watershed and water quality issues of the Towns of Emmitsburg and Thurmont. Additionally, the Steering Committee selected 125 miles of stream reaches to be assessed during the Stream Corridor Assessment and staff assisted with identifying the names and addresses of all owners along the selected stream reaches and contacting them to request permission to access stream locations.

The Stream Corridor Assessment (SCA) survey is a method designed by Maryland DNR to rapidly assess the general physical conditions of the stream corridor as well as assist in identifying and prioritizing environmental problems within the stream corridor for restoration opportunities. There are approximately 1,433 miles of stream within Frederick County. Through a variety of efforts, the County has walked approximately 466 of those miles using SCA methods. The County contracted DNR to walk approximately 222 miles of stream to help

support NPDES watershed restoration requirements. The stream reaches included Ballenger Creek (approximately 36.5 miles), Lower Linganore (approximately 107.5 miles), and Upper Linganore Creek (approximately 78 miles). For the Upper Monocacy WRAS, approximately 130 miles of stream were walked within the six Upper Monocacy subwatersheds: Toms Creek, Owens Creek, Hunting Creek, Fishing Creek, Tuscarora Creek, and Glade Creek. Other stream miles that have been walked in past years were portions of Bennett Creek and Upper Linganore Creek (approximately 85 miles) and Rock and Carroll Creek (approximately 19 miles).

Via the WRAS process and other watershed planning initiatives, the County has identified a number of potential watershed restoration opportunities that are being pursued, either directly by the County or community partners. In support of these potential restoration efforts, which are in the planning and funding acquisition phases, in 2004 the County collected baseline pre-restoration data on stream conditions at ten locations in Ballenger Creek, Linganore Creek, and Bennett Creek. Sampling consisted of the collection of water quality data, benthic macroinvertebrate and fish sampling and quantitative physical habitat assessments.

Previously, Frederick County completed a baseline watershed assessment for Lower Bush Creek in 2001. A number of recommendations to improve water quality were made in this report, and the County continues its efforts to implement these recommendations, and other initiatives, to improve watershed conditions in Lower Bush Creek. As watershed restoration improvements at Urbana High School and other sites are made, the County intends to monitor the effectiveness of these improvements. Project objectives will contain custom designed monitoring components as one measure of project success, requiring a comparison of baseline conditions to those observed during construction and after project completion. The County will also ensure that monitoring efforts at these project sites remain consistent with methods used in the County's current long-term stream monitoring program.

Frederick County continues to implement recommendations from the previously completed Watershed Assessment of Ballenger Creek. The County has initiated a number of efforts to improve watershed conditions within Ballenger Creek. These efforts include: a stream restoration project at the Ballenger Creek Elementary; and conceptual plans for improvements to urban stormwater management, particularly to address problems on County lands or that originate on private property and impact County-controlled infrastructure. In 2004, the County began a Stormwater Retrofit and Stream Restoration (R/R) Assessment in Ballenger Creek watershed to identify and detail additional project opportunities.

Frederick County completed an assessment of Lower Linganore Creek watershed in June 2002. Maryland DNR conducted SCAs in portions of Lower Linganore Creek during 2003, and is anticipated to complete SCAs in the remainder of the watershed during 2005. The County plans to use these SCA data to identify and evaluate specific opportunities for stream restoration and stormwater management controls in the Lower and Upper portions of the watershed. Data will be used in the R/R assessment planned for Linganore Creek watershed, to begin in mid-2005.

Current stormwater retrofit and stream restoration projects are in the conceptual design stage at the Urbana High School in Lower Bush Creek (*i.e.*, stormwater retrofits using LID) and Ballenger Creek Elementary School in Ballenger Creek (*i.e.*, stream restoration). In addition, the

County is using its stream monitoring program to collect baseline data on pre-restoration stream conditions at locations in Ballenger, Linganore, and Bennett Creeks.

The County's 2003 estimate of impervious area remains unchanged, with 6,725 acres of untreated impervious acres in Frederick County; hence, the County's 10 percent untreated goal is 672 acres. However, the number of treated acres may be a conservative estimate because the amount of treated area included in the calculation included only those SWM facilities for which as-built plans have been approved by the County. Therefore, areas currently being developed would be considered "untreated" until their SWM facilities are approved.

Program Funding

The NPDES program has consistently maintained adequate funding to support the requirements of the program. The current budget (Fiscal Year 2005) includes \$380,255 for the NPDES program operating funds, plus \$90,735 in salary and fringe funds for the program manager and part-time staff, for a total of \$470,990 (\$71,230 less than FY 2004). As stated in the 2003 Annual Report, the budget was reduced in 2005 by 5%, but did not impact NPDES-related activities due to early and below-budget completion of GIS projects and the availability of grant funding.

Frederick County received its second \$40,000 in grant funds in July 2004 (in FY 2005) to create a WRAS in the Upper Monocacy Watershed. This work is currently underway and is scheduled for completion at the end of June 2005. EPA provided the funds through the Clean Water Act Section 319 program. The ability to obtain future funds from DNR, EPA, and other agencies is enhanced by participation in this project.

Pollutant Loadings and Removals

Annual stormwater loadings from municipal outfalls in Frederick County were calculated using the Simple Method for each pollutant of interest. An overall summary of pollutant removals at outfalls in Frederick County, by associated management practices, shows that 40% of total suspended solids are removed by these facilities, with only 27% to 24% of total phosphorus and nitrogen being removed, respectively, and about 20% of carbon (BOD and COD) being removed. Removal of metals ranged from 27% to 42%.

Special Programmatic Conditions

Frederick County continues to work toward meeting the Chesapeake Bay 2000 Agreement and updates. The Chesapeake Bay Program's Local Government Advisory Committee recognized Frederick County in 2004 as a Gold Chesapeake Bay Partner Community. The County completed an application for a Silver Award, but was recognized beyond expectations. Frederick County was noted for its "Community Concept" planning, stormwater management facility inspections, promotion of rain barrels, outdoor school activities, and Watershed Restoration Action Strategies. NPDES Program Manager Shannon Moore received a Governor's Citation on March 13, 2004 in recognition of her commitment to the Upper Potomac Tributary Team and for the County's efforts to support the Chesapeake Bay Program.

