EXECUTIVE SUMMARY

The submission of this annual progress report to the Maryland Department of Environment (MDE) fulfills requirements specified under the Frederick County National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. MD0068357. The permit took effect March 11, 2002 and remains in effect until a new NPDES MS4 permit is issued to Frederick County. Continuing progress has been made in the County's NPDES programs since the 2006 Annual Report was submitted in March 2007. 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 perform the activities described in 40 CFR 122.26(d)(2)(i) and the County's NPDES permit.

Source Identification

County staff continued to make extensive improvements to the County's geographic information system (GIS) in 2007. Frederick County has collected source identification data on all permit-required topics. The Division of Public Works (DPW) continued to update GIS data on the County's storm drain system, including the review and georeferencing of plans for two watersheds, Bennett Creek and Ballenger Creek, and the addition of stormwater pipe data. DPW is upgrading its pavement management software, including a GIS module, to provide a more accurate accounting of roadway pavement conditions and required maintenance.

The County's Enterprise GIS Section made progress in several initiatives that enhance GIS capabilities. A roadway imaging system allows users to "virtually drive" county roadways from the desktop and access information such as stormwater inlets, signing, and guardrails. The 2005 orthophotography and planimetric data are now in use by the County. March 2007 aerial photography (six-inch resolution) was produced as part of a Maryland State cooperative contract. The Planimetric data became available in late 2007 and will be used to digitize impervious area in FY 2009. New pictometry data (oblique, 6-inch resolution, aerial photography) will be in use during 2008 with updates planned for every two years. The County plans to participate in a future Light Detection and Ranging (LIDAR) State contract that will provide high accuracy elevation data countywide. Vector parcel data collection is nearly ready for staff use. The Roadway Centerline Data Project provides accurately geocoded addresses and roadway calibration, integrating existing County databases and providing consistency with Maryland State Highway Administration (SHA) data.

The Division of Planning has also updated GIS data. Water and sewer, developed areas, current zoning, and comprehensive plans are being transferred to the parcel layer. Two regional plans (Thurmont and New Market) are currently undergoing updates. Staff maintains agricultural preservation property and district data. The Division of Planning is also working on the Water Resource Element project to address HB1141 requirements, including modeling pollutant loads and impervious areas for current and 20-year projections. In conjunction with the U.S. Census Bureau's Local Update of Census Addresses (LUCA) project, the Division is creating a countywide housing unit inventory.

The Division of Planning has employed GIS in several special projects concerning water quality: the Stream Buffer Ordinance, Wellhead Protection Ordinance, Stream Use Classifications, and Federal Emergency Management Agency (FEMA) Floodplain mapping. In July 2007, the Frederick County Commissioners adopted enhanced stream protection regulations for the Linganore Watershed, which establish new stream buffer requirements to protect Lake Linganore, a recreational lake and drinking water reservoir.

At present, all stormwater management (SWM) facilities have been entered into Frederick County's urban best management practices (BMP) database. There are 599 entries in the database, including 25 new facilities completed on or after January 1, 2007. 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

Long-term chemical monitoring has continued at the Peter Pan Run instream monitoring station in the Villages of Urbana Planned Unit Development (PUD) since May 1999. Since December 2002, the outfall at Pond R has been monitored as a land use-specific stormwater management structure. Monthly baseflow and storm samples are analyzed for 13 constituents. Physical and biological data are collected from four permanent stream monitoring stations on Peter Pan Run and its tributaries. Quality assurance project plans have been completed for the County's water chemistry and biological and physical monitoring.

Between October 1, 2006 and September 30, 2007 (Water Year [WY] 2007), 12 storms were monitored at both the Peter Pan Run instream and Pond R outfall stations. First flush grab samples were taken during nine instream station storms and eight outfall storms. For monitored storms, rainfall amounts ranged in quantity from 0.10 to 1.88 inches, and in duration from 2 hours to 34 hours. Annual rainfall was below normal, with above-normal rainfall recorded only in October, November and April.

At the instream station, average annual storm event mean concentrations (EMCs) of all pollutants increased during WY 2007 from the prior year. Zinc increased by 199% and copper increased by 22%. Cadmium was detected in storm samples more frequently than in the prior year. Cadmium was also detected in a baseflow sample for the first time in the nine-year monitoring program. In general, mean concentrations for metals (except for baseflow copper) have increased in each of the last three years after several years of general decline since

construction began in 1999. Total petroleum hydrocarbons (TPH) were detected in six of eight first flush storm samples, a marked increase from previous years. Stormflow oil and grease increased by 169% compared to the prior monitoring year. Elevated concentrations of fecal coliform were found in several baseflow and storm event samples, with high values particularly noted during mid-May to September 2007. Results included a concentration of over 24,000 organisms/100 mL at the instream station during the September 27, 2007 storm. In general, high levels of fecal coliform may be the result of applications of fertilizer, wildlife excrement, and failing septic systems. In these cases, Frederick County has not undertaken an evaluation to determine whether failing septic systems are a definite source.

Stormflow EMCs for 5-day biochemical oxygen demand (BOD), total Kjeldahl nitrogen (TKN), phosphorus, and total suspended solids (TSS) at the instream station were significantly higher than corresponding baseflow concentrations. The combined nitrate and nitrite baseflow MC was significantly higher than the stormflow EMC.

At the outfall station, average annual concentrations of pollutants at the outfall increased in WY 2007 for several pollutants. Zinc storm EMCs increased 154% over last year. Lead concentration (primarily a product of vehicle emissions) increased 20-fold over the prior year, likely due to a 0.120 mg/L result during the November 2, 2006 storm. Copper levels were comparable to the prior year. Cadmium was detected in outfall storm runoff samples the previous year, but not in WY 2007. Storm and baseflow Total Suspended Solids (TSS) increased 147% and 39%, respectively. Baseflow phosphorus increased as well (54%); however, storm phosphorus EMCs dropped sharply (74%) from the prior year, suggesting less phosphorus is available for transport despite increased solids concentrations during storms. Storm EMCs and baseflow mean concentrations for nitrate and nitrite increased to the highest levels since monitoring began in 2003. In contrast, storm and baseflow TKN dropped to their lowest levels.

At the outfall, oil and grease was present in seven of eight storm event samples and four of five baseflow samples. Oil and grease storm concentrations were over three times higher than in WY 2006, but baseflow concentrations were 18% lower. TPH was present in both baseflow and storm samples after being absent in each prior monitoring year. Phenols were detected at slightly higher levels than minimum detectible concentrations in four storm runoff samples and one baseflow sample. Elevated fecal coliform concentrations were found in a few samples.

Average storm EMCs were higher at instream than at outfall except for BOD and oil and grease.

Annual estimates of pollutant loadings at the instream site showed increases in zinc (249%), cadmium (297%), copper (35%) and lead (62%), respectively, from the prior year. Phosphorus increased by 68% from the prior year, associated with increased TSS load (184%). Other nutrients increased by at least 49%. Oil and grease and TPH loadings increased by 169% and over 40-fold, respectively, reflecting increased detection frequencies of both parameters as a probable result of increased paving activity in the watershed.

At outfall, estimated pollutant loadings rose for all parameters except TKN, phosphorus, copper, and oil and grease. Loadings of oil and grease, along with copper, may have fallen in the current year despite having higher EMCs than the prior year because of a reduction in overall discharge

from Pond R (21% less than in WY 2006). For nearly all parameters, the contribution of Pond R to the total loading of the watershed did not exceed 0.5%.

In 2007, all benthic macroinvertebrate indexes of biotic integrity (BIBI) scores for Peter Pan Run sites were Poor, and this is consistent with previous results. Fish IBI (FIBI) scores have remained consistent since sampling began in 1999, with each site usually scoring in the same category each year. This year, PPAN-02 returned to the Good category, and PPAN-04 maintained its Poor rating after improving from Very Poor to Poor in 2006; however, numeric FIBI values did not change much from previous years. Despite drought conditions during summer 2007, other values for fish remained in the same range as the previous year, including the number of taxa, number of fish captured, and percentage of tolerant individuals. This may indicate a stable fish community that is able to withstand fluctuations in stream conditions. However, since sampling was completed in early July 2007, the 2008 data will reveal if biota were able to withstand the full extent of the drought, which worsened in late summer.

In situ water quality values for temperature, pH, and conductivity were consistent with those of previous years, and all were within a normal range. High turbidity was observed at site PPAN-04 in April, which coincided with a release of water from the stormwater pond upstream of the site.

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 incremental change over time. Embeddedness increased in PPAN-04 in previous years (from 25% in 2002 to 75% in 2005). In 2006, embeddedness had decreased and epifaunal substrate quality had improved at PPAN-04, but embeddedness at the site increased again in 2007. The continued fluctuations suggest that embedded condition is associated with fine sediments that accumulate on the stream bottom, but then are periodically flushed out during higher flows.

Cross-sectional surveys at monumented locations within each station and bank pins installed to measure bank erosion rates show the changes that have occurred to the channel in Peter Pan Run since 1999. Bank instability was measured at all stations, using a bank pin to track new erosion. In 2007, the only site that suffered bank loss was PPAN-03 (8 cm). Previously, measurements at PPAN-01 for 2005 and 2006 recorded the two greatest amounts of bank loss in a single year (30 cm and 29 cm, respectively; Figure 5-23).

The cross sectional survey at PPAN-01 shows that the channel has continued to widen (by 1.8 feet to the left between 2003 and 2005, and by an additional 2 feet since 2005) as a large gravel bar has filled in the center and the right half of the channel. At PPAN-02, the cross sectional profile shows that material removed by downward scouring during 2004 was partially replaced in 2005, possibly because of slumping of the left bank, but the channel has remained relatively stable between 2005 and 2007. Changes in the cross sectional profiles of PPAN-03 and PPAN-04 suggested only minor alterations within their channels.

Wolman pebble count data over time indicate that, in 2001, much finer sediments began to appear at the four stations, a shift in substrate size that coincides with increased land clearing and development upstream in the Villages of Urbana. In 2003, substrate particle size was notably larger at the four stations than in previous years, which is likely the result of substrate sorting by

higher flows in the first half of WY 2003 and the completion of construction in some areas of the development. Results for 2007 showed a slight increase in the D50 for all sites, with coarse gravel being the median particle size.

Frederick County is currently developing a three-pronged Stream Assessment and Monitoring program that will include (1) the Frederick County Stream Survey, a Countywide probability-based survey of wadeable streams using rapid benthic macroinvertebrate and physical habitat assessment methods, (2) targeted monitoring to evaluate restoration success and address management questions at specific locations, and (3) special studies that will support the County's planning and management decisions.

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* (MD 2000).

The Environmental Compliance Section (ECS) of the Frederick County Division of Permitting and Development Review 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. The County continues to maintain an acceptable stormwater management program in accordance with State stormwater management laws, including implementation of appropriate County ordinances. County inspections in 2007 met the requirements for triennial inspections in its inspection of more than 150 facilities. During the period from January 1, 2007, to December 31, 2007, the County conducted SWM maintenance inspections at 360 facilities.

Frederick County has been implementing 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, which were revised in 2001 and 2003, respectively. The County's Development Review staff continues to make progress with interpretation of the stormwater management designs outlined in the Manual. The most significant improvements continue to be related to smaller developments, common driveway construction and minor additions to existing developments. Development Review has established some guidelines for the development community to use when designing common driveways, especially on steep slopes, to minimize the impacts to the existing drainage patterns and to create non-structural stormwater management solutions. Staff has refined the criteria used for determining the levels of management required for sites that are providing additions on uses built prior to 2001. The most significant improvements to the County's implementation of the MD2000 design guidelines relate to the participation with MDE in establishing the necessary changes in law and design guidelines to meet the Stormwater Act of 2007.

Frederick County continues to improve its Illicit Connection Detection and Enforcement Program. Over the past three years, all SWM structures were inspected for illicit connections or

discharges through the County's ongoing maintenance inspection program. During 2007, the County conducted wet/dry screenings of 335 facilities with visual inspections for illicit connections. Field screening results are recorded in the County's facilities database to ensure proper tracking and to follow up when potential problems are detected. Chemical results did not indicate any illicit discharges. Frederick County is undertaking a new task to establish standard procedures for internal and external reporting of illicit discharges.

In 2007, Frederick County received a final report from Maryland State Highway Administration (MD SHA) on Illicit Discharge Detection and Elimination field reconnaissance. Using the protocol to be established, the County's Watershed Management Section (WMS) will respond to those discharges deemed necessary for further investigation by MD SHA that are not related to SHA activities, report these discharges to MDE, and report on its progress in the next annual report.

Under the permit, the County is required to ensure that all non-stormwater discharges to the municipal storm sewer system are permitted or eliminated. All County-owned properties requiring an NPDES industrial discharge permit must be identified. With guidance from the County's DPW staff, all required permits and No Exposure Certifications have been issued, and all permitted County facilities have completed a Stormwater Pollution Prevention Plan (SWPPP).

Frederick County continued to implement a successful program to respond to illegal dumping and spills including procedures for public reporting and citizen complaints. Hazardous spill response calls are forwarded to 911; first responders are trained to respond to hazardous spills. Non-hazardous spill responses, including environmental releases, are forwarded to the WMS, who notifies MDE for further investigation. WMS is working with its NPDES consultant to develop a standard set of procedures for responding to all citizen complaints of spills and illicit discharges.

For hazardous spills requiring evacuation, the Department of Emergency Preparedness is rewriting its Emergency Operation Plan, which will include provisions for an emergency evacuation annex, triggers, escalations and evacuation plans. The County also has a reverse 911 system to perform targeted calling based on georeferenced locations for localized problems like hazardous spills. The Fire Department coordinates the Local Emergency Planning Committee and has conducted trial emergency responses for hazardous spills.

The County's WMS responded to one environmental release in 2007. A citizen complaint of suspected discharge was referred to MDE for investigation; MDE found clean sump discharges and no illicit discharge.

Frederick County's Erosion and Sediment Control program is well established and the County's delegation was under review at the end of the reporting period. Frederick County works to maintain an acceptable Erosion and Sediment Control Program in accordance with Environmental Article, Title 4, Subtitle 1, Annotated Code of Maryland. Site compliance and minimum inspection guidelines were identified by MDE as needing improvement. Frederick County anticipates a successful review of its program and subsequent renewal of its delegation of authority for the inspection and enforcement of sediment control.

Frederick County recognizes the importance of conducting responsible personnel certification classes ("Green Card" classes) to educate construction site operators about erosion and sediment control requirements. It is Frederick County's goal to conduct regular classes to certify responsible personnel. All classes are advertised on County Cable TV, area radio stations, and in local newspapers. ECS staff has discussed, with our information technology staff, the feasibility of creating an interactive, on-line version of the "Greencard" class. Due to staffing issues, there were no certification classes held in 2007. ECS hopes to conduct four classes in 2008 to make up for the two missed in 2007. Through quarterly reports, the County has met requirements for the electronic reporting of earth disturbances in 2007.

In 2007, WMS staff continued to make impacts through the County's public outreach and education program. Frederick County addressed permit-suggested outreach topics and met its own goals and objectives of its 2003 *Strategic Plan to Improve Water Quality Through Public Outreach in Frederick County, Maryland*. County staff continued to support the Monocacy & Catoctin Watershed Alliance (known as MCWA or the Alliance), a group born of the two Watershed Restoration Action Strategy (WRAS) Steering Committees. The bimonthly meeting schedule enables attendees to discuss educational outreach opportunities as well as to develop restoration and protection projects to support water quality and habitat initiatives. WMS staff coordinated with various County divisions and outside agencies to enhance and track their outreach efforts. Outreach activities were used to educate citizens, to direct the course of watershed plans, and to identify landowners for potential restoration activities. Public outreach efforts implemented by the Alliance during 2007 included the Watershed Steward Program, quarterly E-newsletters, participation in the 2007 Frederick County Fair, the continued expansion of the Alliance website, and the launching of the Toms Creek Watershed Stewardship Outreach Initiative in fall 2007.

The County continued to enhance its Landowner Tracking Database that was developed to track landowner permission responses for Stream Corridor Assessments (SCA). Staff used mailing lists to contact landowners who requested specific property information (*i.e.,* want results of the SCA on their property) or expressed a specific restoration and outreach program interest (*e.g.,* want to install cattle fencing). Staff also tracked responses to County-sponsored initiatives like the Backyard Buffers program, which distributed free trees to landowners with stream frontage.

Through a grant obtained from the National Fish and Wildlife Foundation (NFWF), the WMS Community Restoration Coordinator met with a variety of agricultural and urban property owners using the "House Calls" GIS tool, which shows stream conditions and restoration opportunities.

The Frederick County Recycling Program was able to divert a growing proportion of solid waste from the landfill by promoting recycling among county residents. In fiscal year 2007, 32,887 tons of waste were collected and recycled from the County's residential curbside and satellite drop off programs. In 2007, Frederick County reported a recycling rate of 36.02% and a source reduction credit rate of 3% for a combined waste reduction rate of 39.02%.

TransIT promotes alternatives to driving as well as providing assistance with initiatives like commuter trip planning, vanpools, employer services, Air Quality Action Days, and Bike to

Work Day. TransIT's ongoing service improvements have resulted in an average ridership increase of 20% each year for four consecutive years and a doubling of ridership over the past five years.

The Frederick County Health Department, in partnership with Canaan Valley Institute (CVI, a Monocacy & Catoctin Watershed Alliance partner), has been awarded over $700,000 through the Maryland Bay Restoration Fund (BRF) in order to address nutrient impacts by failing and underperforming On-site Disposal Systems (OSDS) in the Monocacy Watershed and in Frederick County's proposed source water protection areas. An estimated 65 OSDS will be upgraded over a two-year period. Currently, thirteen applications have been submitted to the Health Department and are in various stages of review. Four new nitrogen-reducing systems have been installed and four have received approval to install.

During 2007, Frederick County's Office of Highways and Transportation continued to implement recommendations from the County's 2002 assessment of road maintenance practices. Improvements were made in street sweeping; litter control; deicing materials; inlet cleaning; data collection; and reducing the use of pesticides, herbicides, fertilizers and other pollutants. A total of 936.89 acres (802.72 miles) of road and bridges were swept, with special attention paid to bridges, where deicing materials are applied in greater amounts. The Office of Highways and Transportation was a main sponsor of the Big Sweep Cleanup in 2007, which removed 22.5 tons of trash and the County continued its Adopt-A-Road program. Additional improvements were made in reporting practices in 2007.

Frederick County continues to implement responsible use of herbicides, pesticides, and fertilizers and to report annual usage. Agencies strive to minimize use of these materials to the lowest rate required for effectiveness. Applicators have proper certification. Integrated Pest Management programs are in place at County schools. Earlier evaluations of herbicide use along roadsides led to a shift away from one potentially harmful herbicide to a more environmentally friendly alternative.

Frederick County continues to build upon and strengthen the various components of its NPDES stormwater management programs. The past year brought progress in many areas. Frederick County government has been particularly effective in leading well-coordinated efforts involving multiple agencies and organizations working toward common goals for water quality improvements and better management of the County's watersheds. The County has capitalized on opportunities to leverage substantial funding for outreach and restoration.

Watershed Restoration

Frederick County continued to build upon its previous efforts to identify and evaluate water quality problems in its priority watersheds by conducting biological and physical stream monitoring. To date, monitoring has been conducted approximately every two to three years in the County's three highest priority watersheds: Lower Bush Creek, Ballenger Creek, and Lower Linganore Creek. Beginning in 2008, this assessment of watershed conditions will be replaced by area-wide estimates of stream condition developed for all County watersheds through the probability-based Frederick County Stream Survey (FCSS).

In 2007, the County undertook two separate monitoring efforts. First, the County continued monitoring at five stations in Ballenger Creek, Bennett Creek, and Linganore Creek in support of on-going and potential future restoration and community outreach efforts. Second, the County conducted a pilot study in Bennett Creek and Catoctin Creek watersheds to help develop and test methods and procedures for the FCSS. In addition, results from Bennett Creek were used to support watershed assessment and restoration planning.

At the five targeted sites, water quality sampling, conducted in April and June-August 2007, generally showed good results. Percent embeddedness continued to be high at BALL-04 and BALL-07. BENN-05 was the only site with inadequate riparian buffer (0 m wide), due to active pasture immediately adjacent to both banks of the stream. The IBI ratings for benthic macroinvertebrates were Poor to Fair, while fish IBI scores were all in the Good range for all five sites. Most of the sites were characterized by large amounts of run/pool/glide habitat, with few riffles or instream rootwads, the most productive habitats for benthic macroinvertebrates. Several large pools, deep holes, and woody debris provided the necessary protection and cover for fish, allowing sites to be poor for the BIBI, but good for the FIBI.

A number of agencies and organizations are involved in monitoring waterways in Frederick County. To aid in watershed planning and management, in 2005-2006 the County compiled information on these existing programs and to evaluate their utility in assessing stream conditions. In all, survey information was gathered on monitoring data from 27 programs, as reported in last year's annual report. Frederick County is considering potential future ways to use and integrate data from the various sources.

To provide a comprehensive assessment of County streams, the County is working with Versar to design and implement a Countywide stream survey using a probability-based design. The FCSS has been modeled after the statewide MBSS to leverage MBSS reference conditions, IBIs, stressor identification methods, and other tools. MBSS methods are being used to collect rapid benthic macroinvertebrate, physical habitat, and water quality data. A pilot study to help test and refine methods developed for the countywide stream survey was conducted in Bennett and Catoctin Creek watersheds in 2007. In this pilot study, 15 randomly selected sites were sampled in each watershed from April 23-26, 2007, using MBSS field protocols. Benthic IBI scores for each site ranged from Very Poor to Good in Bennett Creek, and Poor to Good in Catoctin Creek. Several sites exceeded the MBSS's "High" water quality thresholds for nitrogen and phosphorus. Among lessons learned through the pilot study were a recommendation to use the MBSS stream layer as the basis for its sample frame for the County survey, maintaining consistency in the range of stream sizes sampled, and the need to maximize the opportunities to obtain landowner permissions to access sites. Beginning in spring 2008, the FCSS is scheduled to survey 50 sites per year for a total of 200 sites across the County over a four-year period.

Frederick County Government has focused its restoration tracking reductions in nutrients, sediments, and impervious area and in tracking BMP statistics (*e.g.*, area treated or linear feet of stream restored). Frederick County Government has taken a role in a wide variety of watershed restoration efforts. Projects are sorted according to project type (County Capital Improvement Program (CIP), Community Restoration, and MCWA Partnership Projects). Based on BMP

pollutant efficiency figures from the Bay Program and other sources, it is estimated that upon completion of NPDES-related projects, nitrogen will be reduced by 1,262 lbs/yr, phosphorus by 111 lbs/yr, sediment by 52,780 lbs/yr, and the total treated impervious area will equal 1,302.09 acres. The projects are all, at a minimum, planned and funded with many completed. Combined, these projects provide for 1,302.09 acres of treatment, more than the permit goal of treating 10% (672 acres) of untreated urban impervious area.

In Lower Bush Creek, DPW used County General Funds from the Capital Improvement Program (CIP) budget to sponsor the design and installation of a Low-Impact Development (LID) retrofit project at the Urbana High School. The project includes rain gardens and a bioretention area to treat water from the school's courtyard, roof, and bus lot. Project design was completed by Tetra Tech, Inc., and installation was completed by Environmental Quality Resources (EQR) in summer 2007. The project is currently being modified to improve drainage in the rain gardens in the courtyard and to add additional treatment using porous pavers. The effectiveness of the retrofit will be assessed by comparing pre- and post-retrofit pollutant data. Five pre-retrofit storm events have been monitored. Frederick County completed a baseline watershed assessment for Lower Bush Creek in 2001 and an assessment of stormwater retrofit and stream restoration opportunities in 2003, providing guidance for further watershed restoration measures.

Frederick County continues to implement recommendations from its 2001 watershed assessment of Ballenger Creek and 2005 assessment of retrofit and restoration opportunities. DPW completed a CIP-funded stream restoration project on Ballenger Creek behind Ballenger Creek Elementary School during summer 2007. The goal of the project was to improve the condition of approximately 605 linear feet of stream to improve watershed water quality, in-stream and riparian habitat, and aesthetic conditions. The project design was completed by Brightwater/ Ecosite/CCJM Joint Venture. The County continues to track sinkhole formation and repair using a customized spatial database and now uses the 2004 Maryland Geological Survey karst map showing karst prone areas. Development Review, Planning, and Engineering are now using Maryland Geological Survey (MGS)/ U.S. Geological Survey (USGS) maps.

Frederick County is also implementing recommendations from the 2002 watershed assessment of Lower Linganore Creek and a stormwater retrofit/stream restoration assessment completed in July 2006 for the entire Linganore Creek watershed. CIP and Community Restoration projects are proceeding. The Pinecliff Park Stream Restoration Project will restore about 930 feet of stream by reconnecting it to its floodplain and reducing entrenchment, and will also involve riparian plantings and other stabilization techniques. The design engineering firm for the project is Greenhorne and O'Mara, and stream restoration design is 30% complete. The County Department of Program Development and Management in DPW is planning to redevelop the Public Safety Training Facility site and add water quality treatment through bioretention. This project is a good example of how to improve existing developed sites. Water quality treatment is estimated at 15 acres. Frederick County secured $25,000 in grant funding from the Chesapeake Bay Trust (CBT) for community restoration projects in Libertytown and completed all projects by December 2006. Projects included Liberty Village Rain Gardens, Liberty Elementary School Rain Garden, Stream Buffer Restoration on Town Branch at St. Peter the Apostle Roman Catholic Church, and Tree Planting at Libertytown Community Park.

The National Fish and Wildlife Foundation (NFWF) provided $40,000 in funding to improve water quality in the Linganore Creek watershed by supporting educational initiatives targeted to increase stewardship ethics among watershed citizens through the development of the "House Calls" program. The "House Calls" program has allowed the Community Restoration Coordinator to make site visits to interested landowners to discuss specific property conditions and possible voluntary restoration, enhancement, and protection options. The County's Community Restoration Coordinator met with several municipalities, homeowner associations, community groups, the Soil Conservation District, farm owners, and others.

The County will continue to update its Landowner Tracking database of riparian property owners and their participation in the program.

The County secured grant funds from MDE in the amount of $216,237 for its Linganore Creek TMDL - Urban Demonstration Project under the EPA 319 (h) program. In this project, key landowners are targeted and offered increased technical assistance in the design and installation of BMPs for sediment and phosphorus control. Efforts began in December 2006. The project will fund demonstration BMPs to treat 30 acres of urban land, help establish approximately three miles of riparian buffer, and effectively treat approximately 36 acres. Project sites will include schools, regional parks, golf courses, and other publicly owned property.

Reforestation of the Fred Archibald Sanctuary, located on Audubon Society property, is in progress. The four-acre planting is adjacent to a tributary to Hazelnut Run (a tributary to Linganore Creek) and treats 12 acres. A permanent conservation easement for the sanctuary was donated to Maryland Environmental Trust in 2007.

Planting projects at three Mt. Airy parks were begun in 2007; weed control and additional plantings will be continued in 2008.

Bennett Creek Watershed was included as part of the Lower Monocacy Watershed Restoration Action Strategy in 2004; 23 sites were listed as priority for restoration. In Bear, Fahrney, North, Pleasant, and Urbana Branches there are combinations of fish migration barriers, inadequate riparian buffer, livestock access to the stream (horses, cattle), exposure to future development, and several areas of accelerated erosion due to golf courses and residential developments. The County anticipates that Bennett Creek will be the next watershed listed for restoration in its third generation permit. In anticipation of this, the County is contracting with TetraTech to provide a Restoration/Retrofit Assessment in 2008. TetraTech is conducting a stressor source inventory and watershed assessment, prioritizing sites with active stressors, and developing a 10% design for the highest ranked projects.

In January 2007, Frederick County Government's Watershed Management Section (WMS) was awarded a $247,800 grant from the Environmental Protection Agency (EPA) and MDE for the Urban Wetlands Program (UWP), Bennett Creek Watershed Pilot project. The UWP project provides the foundation for identifying the characteristics of high quality reference wetlands in Frederick County. Such wetland characteristics and data can be used to influence important water resource management and land use decisions and can provide guidance on prioritizing the protection, creation, restoration, and enhancement of wetlands in urban areas. The long-term goal

of the project is to develop a wetland strategy that maintains data on current wetland conditions and outlines methods for constructing new wetlands that provide the same level of critical habitat for amphibians, vegetation, and birds, as do well-established wetlands.

The project also includes education and outreach to Frederick County Public Schools about wetland functions, and the establishment of two stormwater wetland restoration/enhancement projects, involving local partners.

The Bennett Creek Restoration Initiative has completed a 3.0-acre riparian planting treating nine acres and a rain garden treating 1.25 acres. Projects continue to develop through the Bennett Creek Restoration Initiative as more landowners and land managers seek to work with the Potomac Conservancy, a MCWA partner, to implement projects that will address water quality improvement goals in the Monocacy River Watershed. The Potomac Conservancy has been working closely with the Frederick County Community Restoration Coordinator, Natural Resources Conservation Service (NRCS), and the Frederick County Soil Conservation District to encourage private agricultural landowners to take advantage of the many cost-share conservations programs. After vandals on ATVs destroyed several acres of newly planted trees, students at Windsor Knolls Middle School replanted the vandalized area with over 200 trees.

Potomac Conservancy is planning follow-up meetings with landowners in the hopes that others will follow the example of their neighbors and work to improve stream health in the Bennett Creek watershed. Demonstration rain gardens have been installed at both Kemptown Elementary and Windsor Knolls Middle Schools. At Kemptown Park, the Potomac Conservancy is teaming up with the Center for Watershed Protection (CWP) and Frederick County Parks and Recreation to create plans for an innovative bio-retention garden that will absorb water from a parking lot and road before it enters Fahrney Branch.

Frederick County is working on a number of other efforts to treat impervious areas in other watersheds:

- Frederick County is compiling its list of county-owned properties and hired an intern in the summer of 2007 to digitize these properties. Properties will be evaluated for reforestation opportunities through the Community Restoration Program. The Catoctin Antietam and Monocacy Brookie Initiative (CAMBI) plans to conduct the first of these projects at a County-owned property at MD Route 550 and Kelbaugh Road, treating about 1.5 acres.
- The County Health Department and the Canaan Valley Institute have received $700,000 in state Bay Restoration Fee funds to conduct septic upgrades to control nitrogen. The program will target areas of known septic failures and high resource value.
- Catoctin Mountain Park is increasing the riparian buffer at the park headquarters parking area and has installed porous pavers (turf block), an LID retrofit.
- Highway Operations used a vacuum-assisted street sweeper and swept 936.89 acres of roads and bridges.

- The Potomac Watershed Partnership (PWP) continued to sponsor the Backyard Buffer program for the fifth year, providing tree seedlings and technical support to 67 households during 2007.
- The Town of Myersville received funds from Chesapeake Bay Trust (CBT) to restore one mile of Little Catoctin Creek to a stable, self-maintaining state. The project included design and implementation of stream channel restoration, stream bank stabilization, and riparian plantings.
- The Thorpe Foundation will create a 1/4-acre model native plant demonstration garden in Frederick, MD, to educate landowners and contractors about the benefits of conservation landscaping.
- The Brook Hill United Methodist Church built a rain garden next to their church and enlisted the help of ICPRB to obtain grant funding and help manage the project.
- The Maryland State Highway Administration (SHA) has received funds from the Transportation Enhancement Program (TEP) to restore a small, unnamed tributary in Potomac Direct watershed. The project involves stream stabilization along 1,300 linear feet of channel in the unnamed tributary.
- The Carroll Creek Stream Restoration project was provided with biologs for a stream restoration project behind the County's Cooperative Extension building along Carroll Creek.
- The Fountain Rock Wetland Planting received Chesapeake Bay Trust funds to improve the habitat for the Checkerspot butterfly.
- For the Utica Park Planting, about nine acres of treatment area was produced by reforestation with native trees. Each County Commissioner planted a tree on opening day (April 26, 2007).
- The Master Gardeners planted the Nancy Adamson Native Hedgerow Garden, to provide watershed protection for Carroll Creek.

Frederick County Public Schools provided educational opportunities for students while improving stormwater management through various methods. Projects are constructed under a Chesapeake Bay Trust (CBT) grant. Projects take place at school locations throughout the county and the list continues to grow. The following actions were completed under the project:

- Thurmont Elementary Tree Planting
- Thurmont Middle School Tree Planting and Bayscape garden
- West Frederick Middle School Tree Planting
- Governor Thomas Johnson Middle School raised beds, bay-scaping, and stream buffer
- Governor Thomas Johnson High Rain Garden

- Monocacy Elementary School wild meadow establishment
- Tuscarora Elementary Tree Planting

The Tom's Creek Stewardship Initiative is supported with funding from the Chesapeake Bay Trust and Frederick County Division of Public Works. It is also supported by the Monocacy & Catoctin Watershed Alliance. The following projects will be or have been installed under this initiative:

- Mt. Saint Mary's Run Riparian Planting
- Upland Tree Planting at Up County Family Support Center. Also, a riparian buffer planting is planned for April 2008 along with a rain barrel.
- Emmitsburg Elementary School on Willow Rill, riparian buffer and rain garden.
- New Forest Society Grow Out Nursery

Program Funding

The NPDES program has consistently maintained adequate funding to support the requirements of the program. The FY 2007 budget included $159,984 budgeted for personnel costs and $375,400 budgeted for program operating funds, for a total of $535,384. The approved budget contained an additional $60,000 which was moved into other budgets to cover NPDES-related items. Frederick County has also received several substantial grants to support its NPDES program, particularly through Community Restoration. The FY 2008 budget included $172,088 budgeted for personnel costs and $396,235 budgeted for program operating funds, for a total of $568,323, an increase of $32,939 over the previous year. The proposed budget for FY2009 (to begin July 1, 2008) includes a request for $172,572 in personnel expenses and $480,897 in operating expenses for a total of $653,469. This request is an increase of $85,146 over the previous year.

FY 2007 and 2008 CIP project budgets included funds for restoration projects in Ballenger, Linganore, Lower Bush, and Bennett Creek Watersheds. For FY 2009, CIP project funds have been requested for land acquisition and site improvement in Bennett Creek Watershed and for a Watershed Management Plan and Restoration/Retrofit Assessment in Catoctin Creek Watershed.

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 41% of total suspended solids are removed by these facilities, with only 28% to 24% of total phosphorus and nitrogen being removed, respectively. These facilities also remove 13% of dissolved phosphorus and 21% of carbon (BOD and Chemical Oxygen Demand). Removal of metals ranged from 27% to 43%.

Special Programmatic Conditions

Frederick County continues to work toward meeting the Chesapeake Bay 2000 Agreement and updates. In 2007, Frederick County continued the efforts that earned it recognition in the past. Additionally, the County participated in many activities, including attending Tributary Team meetings; conducting restoration and outreach in support of Chesapeake Bay 2000 Agreement goals; participating in the Alice Ferguson Foundation's Trash Free Potomac Initiative; participating in the Schoolyard Habitats program; coordinating with the Eastern Brook Trout Joint Venture; developing capacity for stormwater wetland projects through the Urban Wetlands Program Bennett Creek Watershed Pilot Project; coordinating House Bill 1141 compliance with the Planning Division; using a "House Calls" GIS tool to provide environmental data to citizens that have an interest in voluntary conservation programs; facilitating the Monocacy & Catoctin Watershed Alliance; speaking at various leadership and educational events; initiating public education, outreach, and restoration in the Toms Creek Watershed; implementing tree plantings with Maryland Urban and Community Forestry Committee (MUCFC) funds; approving a stream buffer setback for Linganore Watershed; and reviewing riparian buffer literature to propose changes to the Forest Resource Ordinance (FRO).

The Interstate Commission on the Potomac River Basin (ICPRB) is currently preparing TMDLs for the nontidal Potomac River, and it is expected that there will be several more TMDLs to come for water bodies in Frederick County, in addition to the existing Linganore TMDL. Future NPDES MS4 permits are likely to include language that relates to TMDL implementation. To this effect, Frederick County has been working diligently to address pollutant loads in the Linganore TMDL through numerous activities and via coordination with MDE and other agencies. Frederick County has focused a great deal of effort in assessment and restoration of Linganore Creek through the Watershed Restoration Action Strategy, Stream Corridor Assessments, and developing a Task Force Report on Source Water Protection and Action Plan to reduce nutrient and sediment pollution. In 2006, Frederick County completed an Assessment of Stormwater Management Retrofit and Stream Restoration Opportunities for Linganore Creek Watershed, and has since dedicated Capital funds and obtained substantial grant funds to conduct outreach and restoration within the watershed. The County has also developed a tool to model pollutant load reductions projected from restoration based on BMP removal rates in the literature. A variable width stream buffer ordinance for Linganore Creek Watershed was adopted by the County Commissioners in July 2007. County staff has been working with MDE's TARSA group as TMDL guidance has been developed for local governments. Frederick County has made other zoning, outreach, and coordination steps to facilitate progress in the Linganore watershed, as well as coordination on development and review of other TMDLs within the County.