



EXECUTIVE SUMMARY

The submission of this annual progress report to the Maryland Department of Environment (MDE) fulfills requirements specified under Frederick County's 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 2009 Annual Report was submitted on March 10, 2010. 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

This report 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.

The Frederick County Division of Public Works (DPW), the Division of Permitting and Development Review, Division of Planning & Zoning, and the Office of Environmental Sustainability support compliance with the County's NPDES MS4 permit.

Source Characterization

The NPDES MS4 Permit requires source identification as well as tracking of new and existing Best Management Practices (BMP) for stormwater control. Much of the source identification is made and documented via use of Geographical Information Systems (GIS).

All but three categories of GIS data required by the NPDES permit have been digitized. All data layers are under constant update. The three categories of data not included in GIS are: sanitary sewer systems, sewage treatment plants, and landfills. The data for all three are considered sensitive and are available only to pertinent staff. All as-built drawings for these layers are maintained in AutoCAD by those staff.

A number of County Divisions completed work on other GIS activities related to stormwater control during 2010. Enterprise GIS developed a program to allow staff to "virtually" drive the County's roads, updated pictometry and orthophotography data, and completed a roadway centerline project. The GIS Section within DPW piloted a snow plow data download project and scanned and referenced archival aerial imagery. GIS staff within the Planning Division completed updates to the Comprehensive Plan and compiled and analyzed data for the completion of the Water Resources Element.

Discharge Characterization

Long-Term Monitoring – Peter Pan Run

In May 1999, the County initiated a long-term physical, chemical and biological monitoring program at Peter Pan Run; its headwaters are located within the county's top-priority watershed, Bush Creek Watershed. The purpose of the program is to monitor and assess the effects of storm-water runoff stemming from development in the Villages of Urbana PUD. The area has been monitored to establish baseline, pre-construction conditions in the catchment and subsequently to monitor conditions as development progresses within the Peter Pan Run watershed in order to assess potential long-term impacts associated with the new land use. Following NPDES permit requirements, baseflow and storm flow samples from both instream and outfall locations are analyzed for a slate of chemical parameters, including metals, nitrogen, phosphorus, oil and grease, biochemical oxygen demand, fecal coliform, and others.

Water Chemistry at Peter Pan Run Instream

Annual, estimated pollutant loadings at the instream station decreased compared to estimates in water year (WY) 2009 for all parameters except BOD (increased 20.5%), nitrate and nitrite (increased 29.8%), and phenols (present when previously absent). The loading reductions posted for most analytes between this year and last are likely a consequence of lower event mean concentrations (EMCs) for those pollutants coupled with lower total storm runoff volume for the year (11.5%).

Compared to earlier years, loading estimates for copper, lead, and zinc during WY 2010 were between 50.1% and 66.1% less than during WY 1999. The cadmium loading estimate in WY 2010 was 27.1% higher than the first year of monitoring. Annual estimated loadings for phosphorus and TKN were 19 times and 48 times higher, respectively, in WY 2010 than in WY 1999. The WY 2010 annual loading estimate for phosphorus, which may have reached a turning point in WY 2009, declined after three successive years of increases, with the result being no apparent trend.

Sediment concentrations (TSS) in the stream in WY 2010 were, on average, approximately 53 times higher during storms than at baseflow, compared to approximately 32 to 217 times (in 1999 and 2007, respectively) higher in prior years. Average annual TSS storm runoff EMCs have gradually declined since the onset of monitoring and annual loadings estimates appear to be following suit with 2010 results.

Water Chemistry at Pond R Outfall

At the outfall site, individual storm EMCs for nitrate and nitrite, zinc, TSS, and phosphorus declined shortly after the conversion of Pond R from a sediment basin to a SWM facility in July 2004, but only TSS and phosphorus have remained lower since WY 2004 and WY 2005. Estimated annual loadings at the Pond R outfall station were higher in WY 2010 than in WY 2009 for nearly all parameters (except cadmium), likely due to an increase in discharge volume from the pond (nearly 140% greater). Annual loadings estimates at the outfall peaked during

WY 2004 for zinc, copper, phosphorus, TKN, BOD, TSS, and nitrate and nitrite and again in WY 2008 for zinc, copper, lead, phosphorus, TKN, TSS, and nitrate and nitrite. Annual loading of BOD at the outfall has increased each of the last four years.

Biological Indicators at Peter Pan Run

In 2010, the Benthic IBI ratings were in the Fair and Poor categories. Two sites returned to Fair condition after rating Poor in 2009, while one site improved from Very Poor in 2009 to Poor in 2010. Numeric Fish IBI scores and narrative ratings remained the same as 2009 results at each site, with three sites Fair and one Very Poor.

Physical Stream Condition at Peter Pan Run

Physical stream conditions within Peter Pan Run in 2010 were generally similar to those in years past, though certain stream parameters are beginning to show a pattern of incremental change over time. Physical habitat, namely increased bank erosion and sediment deposition, appears to be the most substantially affected element within the monitoring program as a result of disturbance from upstream construction. While construction impacts are likely to be short term, no signs of recovery were noted in the field data. The channel does not presently appear to be morphologically stable.

Although Fish IBI scores have shown some improvement in recent years, the continued depressed scores of the benthic community appear to reflect the noted changes in physical habitat, in particular the highly mobile substrate and bed features, which can make recolonization difficult.

Management Programs

Stormwater Management in Frederick County

Frederick County continually evaluates its stormwater management programs to identify and bring about needed improvements as required under its NPDES permit. The 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 current Maryland stormwater design standards.

Inspection and Compliance

Frederick County's Environmental Compliance Section (ECS) continues to conduct a regular program of preventative maintenance inspections of stormwater management facilities built, approved, and operating within the County. In 2010, ECS made 224 maintenance inspections of Stormwater Management Facilities. Re-inspections were made when site conditions were found to be unacceptable.

Stormwater Best Management Practices

The County continues to coordinate with MDE to establish the necessary changes in law and design guidelines to meet the Stormwater Act of 2007, the latest modification to stormwater regulations enacted by the State of Maryland. Frederick County adopted the Stormwater Act of 2007 on May 4, 2010, and is committed to working with the state to improve the implementation of these regulations and to achieve the best approach for moving forward with environmental site design implementation in an efficient manner. The County will continue to educate both the development community and the general public in the proper design, implementation and maintenance of stormwater management.

Illicit Connection Detection and Elimination Program

ECS field inspectors note evidence of dry weather flows, if present, at all Stormwater Management Structure "As-Built" inspections and at every triennial maintenance inspection. If water is present, inspectors gather chemical information. If water quality test results or inspections indicate potential illicit connections, pollutant sources are identified and appropriate measures are taken to abate violations. During 2010, the County conducted 224 inspections. Field screening results are recorded in the County's facilities database to ensure proper tracking and to follow up when potential problems are detected.

Also, the County implemented its expanded Illicit Discharge Detection and Elimination Protocol that serves as the field operations and data management manual for the NPDES dry weather screening program. The protocol establishes a system for consistent reporting, referral, and addressing of potential illicit discharges and develops a mechanism for tracking and reporting to satisfy the County's NPDES permit requirements. During 2010, two potential illicit discharges were reported and investigated. The first was on March 26, 2010, when the County was notified by its consultant of a foul-smelling stream. The case was immediately reported to MDE for action. It was determined to be a leak in the manure storage facility; compliance actions against the landowner were taken by MDE. The second was when Frederick County responded to a citizen complaint on June 11, 2010. The complaint concerned an orange-colored liquid flowing from a residential property. Field tests showed that the flowing water was likely groundwater and that the orange coloring reported by the citizen was iron flocculant resulting from the presence of naturally-occurring bacteria.

NPDES Permit Evaluation Process for County-Owned Properties

All County-owned properties requiring an NPDES industrial discharge permit must be identified and the County must submit documentation that a permit has been applied for or obtained. All permit applications have been submitted and are on record with MDE

Spill Response

In 2010, Frederick County continued to implement a successful program to respond to illegal dumping and spills. WMS modified a standard set of procedures for responding to all citizen complaints of spills and illicit discharges, as part of the County's IDDE protocol. The procedures

were developed in 2009 to help citizens report spills to the correct agencies with a minimum of internal transfers. The County's protocol establishes a system for consistent reporting, referral, and addressing of potential illicit discharges, dumping, and spills. The County responded to one spill complaint in 2010.

Erosion and Sediment Control Program

A robust erosion and sediment control program to regulate site clearing and construction practices is an integral part of NPDES permit compliance. Frederick County's ECS strives to maintain an acceptable Erosion and Sediment Control Program in accordance with Environment Article, Title 4, Subtitle 1, Annotated Code of Maryland. The County's program was evaluated during the fall and winter of 2009 and was granted the maximum allowed delegation of enforcement authority of 2 years (July 1, 2010 - June 30, 2012).

ECS has continued to make program improvements and enhancements, including a focus on field-related inspections and compliance. A Standard Operating Procedures Manual has been written intended to aid staff in this process. During 2010, ECS revamped their responsible personnel certification program changing how the material is presented to participants. Initial results have been positive.

Public Outreach and Education

Frederick County has addressed all permit-suggested outreach topics and met its own goals and objectives from its 2003 Strategic Plan to Improve Water Quality through Public Outreach in Frederick County, Maryland.

Details of the County's outreach and education activities related to the permit requirements are available in Table 6-4. Below are examples of programs that have been developed by the County to address permit-required outreach and education topics.

Monocacy & Catoctin Watershed Alliance

County staff continued to coordinate 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. In 2010 MCWA members gathered for six bi-monthly meetings held throughout the County and hosted by various partners including numerous local and regional organizations, funding agencies, higher education institutions as well as local, state and federal government agencies. Public outreach efforts implemented by the Alliance during 2010 included the Watershed Steward Program, quarterly E-newsletters, participation in the 2010 Frederick County Fair, and the continued expansion of the Alliance website (www.watershed-alliance.com).

Frederick County Recycling Program

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 FY 2010, 21,166.05 tons of waste were collected and recycled from the County's residential curbside and satellite drop off programs. Frederick County reported a recycling rate of 41.63% and a source reduction credit rate of 5% for a combined waste reduction rate of 46.63%.

Private Well and Septic System Management

The Frederick County Health Department, in partnership with Canaan Valley Institute (a Monocacy & Catoctin Watershed Alliance partner), was awarded a second round of funding through the Maryland Bay Restoration Fund (BRF) in order to address nutrient impacts from failing and under-performing On-site Disposal Systems in the Monocacy Watershed and in Frederick County's proposed source water protection areas. The current grant award of \$200,000 will allow for the upgrade of roughly 15 failing septic systems in the county. Two projects have been approved for installation and applications for additional projects are currently being accepted.

Public Transportation Improvements

TransIT ridership increased for the 14th consecutive year to nearly 787,000 one-way passenger trips, an increase of 2% from 2009. The Walkersville Connector ridership increased by 17%. At the same time, TransIt was able to reduce fuel consumption by 2.8%, saving \$40,000. TransIt also provides assistance with commuter trip planning via phone or email, the formation of vanpools, employer services, free rides on Air Quality Code Red Days, and participates in a "Bike to Work" day.

Road Maintenance Activities

During 2010, Frederick County continued to implement recommendations from its 2002 Assessment of Road Maintenance Practices which evaluated the effects of road maintenance activities on stormwater runoff and resulting impacts on surface water quality. They include the following:

- **Street Sweeping:** A total of 395 acres (408 lane miles) of road were swept, with special attention paid to bridges.
- **Litter Control:** The Office of Highways and Transportation removed a total of 40.05 tons of trash and 932 tires during 2010.
- **Deicing:** Caliber M1000, a liquid deicer which is a 30% Magnesium Chloride solution with an additional agricultural by-product, is used in 41 of 51 of the County's trucks, when the temperature is $\leq 20^{\circ}\text{F}$. Caliber M1000 enhances the effectiveness of road salt application. A total of 23,652 gallons of Caliber M1000 was used in 2010 in addition to 11,529.66 tons standard road salt, and 2,815.22 tons Anti-Skid in 2010, for all watersheds.

- Inlet Cleaning: A total of 613 inlets were cleaned in 2010. Seventy-two inlets were “vactored”.
- Reducing the Use of Pesticides, Herbicides, Fertilizers and Other Pollutants: In 2010, the Office of Highway Operations sprayed 8,177 gallons (diluted quantity) of the herbicide Glystar/Glyphosate 41 along approximately 142 miles of road guardrails in the County.

Herbicide, Pesticide, and Fertilizer Use

Frederick County annually reports on the amounts and types of herbicides, pesticide, and fertilizers used at County-owned facilities and by Frederick County Government agencies. This report provides an overview of the amounts and types of chemicals used from 2004 through 2010.

Watershed Restoration

Stream Quality Monitoring

From 1999-2007, Frederick County identified and evaluated water quality problems in its priority watersheds by conducting, on a rotating basis, stream monitoring using both biological and physical habitat methods. Beginning in 2008, the County modified its monitoring program to include two separate monitoring efforts. The first involves targeted monitoring in specific watersheds to support on-going and potential restoration and community outreach efforts. The second involves a County-wide, randomly stratified, stream sampling program called the Frederick County Stream Survey (FCSS). Sampling includes collection of water quality data, determining indexes of biological integrity (IBI) via benthic macroinvertebrate and fish sampling, and quantitative assessment of physical habitat using Maryland Biological Stream Survey (MBSS) methods.

The watersheds in which targeted monitoring efforts are occurring are Ballenger Creek, Bennett Creek, and Linganore Creek.

- Ballenger Creek was selected as the second watershed to be assessed under Frederick County’s NPDES stormwater permit because of substantial growth in the north-central and eastern portions of the watershed, near the City of Frederick. Biological, physical, and water quality monitoring were conducted at the Ballenger Creek Elementary School Stream Restoration project, constructed in 2008.
- Bear Branch, a tributary to Bennett Creek, was chosen because it has been classified by MDE as Class IV Recreational Trout Waters and is the only such stream in the Lower Monocacy watershed. Pre-restoration monitoring of streams at the Mt. Ephraim Road Culvert Replacement site included physical habitat assessment. These four sites are located within Sugarloaf Mountain Park. They are in very good condition, with a well-forested riparian buffer, little to no bank erosion, and high quality instream habitat.
- Linganore Creek is considered a high priority for assessment because of its close proximity to the City of Frederick, concerns for Lake Linganore water quality, and recent, significant

residential development in the Lake Linganore area. Monitoring of the stream restoration project in Pinecliff Park moved into the post-restoration phase, as the restoration project was completed in 2010. Monitoring included physical, biological, water quality, and geomorphic assessments of the stream.

The year 2010 marked the third of four years of the countywide FCSS. Cumulative results from 2008-2010 showed that the average benthic IBI score for the County was Fair. Scores were spread throughout the County, with 6% of stream miles scoring Very Poor, 35% scoring Poor, 43% scoring Fair, and only 15% of stream miles scoring Good. Total nitrogen concentration exceeded the MBSS “High” water quality threshold for 10% of the stream miles in the County. Thirty-five percent of stream miles were low for total nitrogen and the remaining 55% were in the middle range. Total phosphorus concentrations exceeded the “High” water quality threshold for 13% of stream miles in the County, while 51% of stream miles were low for total phosphorus and the remaining 36% were in the middle range.

Restoration Efforts in Frederick County

Regulatory Drivers

In Frederick County, there are currently five main regulatory drivers that influence restoration efforts. The primary regulation driving restoration projects is the NPDES Program of the Clean Water Act, addressed in this Annual Report. Under the County’s NPDES permit for its municipal separate storm sewer system (MS4), it is required to reduce discharges to the MS4 in urban areas. The County is also required to restore areas degraded by urban stormwater and to treat 10% of the untreated urban impervious areas. Other regulatory drivers include: Total Maximum Daily Load (TMDL) regulations of the CWA, which require sources of pollutants in impaired water bodies to limit their releases; the Safe Drinking Water Act regulations which set higher standards for water bodies, such as Linganore, that are used as a public drinking water supply; the Chesapeake Bay 2000 Agreement (C2K) which calls for voluntary reductions of bay pollutants and increased restoration activities such as riparian buffer plantings; and lastly, House Bill 1141 (HB1141) which required the development of a Water Resource Element in County Comprehensive Plans to protect sensitive resources.

Restoration Projects

Frederick County Government has taken a role in a wide variety of watershed restoration efforts, which can be organized into three primary categories:

- **Frederick County NPDES Capital Improvement Program (CIP) Projects** are conducted through the County’s CIP program and are conducted primarily as a result of NPDES requirements. The projects must cost over \$100,000 and impact county property or county-owned infrastructure.
- **Frederick County Community Restoration Projects (CCRP)** fall into two subcategories: NPDES Community Restoration Projects and Non-point Source Community Restoration Projects.

- ***NPDES Community Restoration Projects*** are sponsored by Frederick County Government and count towards NPDES goals. These projects rely on calculated BMP efficiencies to determine pollutant reduction. They usually have significant community involvement, such as planting events. They are not funded by the CIP and therefore are not subject to the restrictions of CIP funding.
- ***Non-point Source (NPS) Community Restoration Projects*** are sponsored by Frederick County Government and are non-point source projects whose nutrient and sediment reductions count towards meeting TMDL WLAs. These projects are not used to meet specific NPDES MS4 permit requirements. These projects rely on calculated BMP efficiencies to determine pollutant reduction. They usually have significant community involvement, such as planting events. They are not funded by the CIP and therefore are not subject to the restrictions of CIP funding. These projects have already been reported to the Bay Program.
- **Monocacy & Catoctin Watershed Alliance (MCWA) Partnership Projects** may include participation and/or facilitation by Frederick County Government, but the lead partner is outside the County government.

To date, stormwater retrofit and stream restoration assessments have been completed in Lower Bush Creek, Ballenger Creek, Linganore Creek, and Bennett Creek Watersheds. Restoration project locations, type, watershed, status, and pollutant or impervious area reduction are detailed in Table 7-5. Based on BMP pollutant efficiency figures from the Bay Program, it is estimated that the suite of current, planned, and completed watershed restoration projects will result in substantial reductions in pollutant loads: nitrogen will be reduced by 2,083 lbs/yr, phosphorus by 169 lbs/yr, and sediment by 67,077 lbs/yr. The County CIP projects, the NPDES Community Restoration projects, and the MCWA Partnership projects are considered to be NPDES restoration projects and count towards the County's permit requirement to treat 672 acres of untreated impervious area. The total area treated by these projects will equal 725.39 acres. The County tracks the impervious area treated by the NPS Community Restoration projects, though they do not count towards the County's impervious area reduction goal in the permit. The total treated impervious area for NPDES restoration projects and NPS restoration projects will equal 999.64 acres. The projects are all, at a minimum, planned and funded, with many completed. Frederick County continues to work towards restoration of its watersheds and BMP implementation and is proud to have excelled in this permit area.

Program Funding

The NPDES program has consistently maintained adequate funding to support the requirements of the program. The FY 2010 budget year began July 1, 2009. The budget included \$183,772 in personnel expenses and \$475,275 in operating expenses for a total of \$659,047. This request was an increase of \$15,810 over the previous year.

The FY 2011 budget year began July 1, 2010 and is currently in effect. The budget included \$189,806 in personnel expenses and \$424,275 in operating expenses for a total of \$614,081. The Operating budget decreased by \$50,000 because MDE allowed Frederick County to cease conducting monitoring that had been required under the MD2000 task.

Staff continues to leverage funds and efforts through its partnerships with outside grantors and through its coordination of the Monocacy & Catoctin Watershed Alliance (MCWA). No additional funds were requested for the CIP budget because all projects required for the current permit cycle are fully funded and are underway.

Pollutant Loadings for Municipal Storm Outfalls & Removal by Associated BMPs

Between 2009 and 2010, total evaluated drainage area increased from 13,391 to 15,155 acres and total managed drainage area increased from 10,935 to 12,156 acres. In 2010, 80.2% of the total evaluated drainage area was managed and that value increased from 78.5% in 2009.

Extended Dry Detention Ponds, Infiltration Trenches, Extended Wet Detention Ponds, Bioretentions, and Dry Ponds make up 70% of the structural BMPs in Frederick County (29.7%, 13.0%, 9.6%, 9.1%, and 8.8%, respectively). Extended Wet Detention Ponds are most efficient, removing an average 26.9% of all pollutants considered.

These results show that 50% of total suspended solids are removed by these facilities, with only 23% and 32% of total nitrogen and phosphorus being removed, respectively. These facilities also remove 18% of dissolved phosphorus and 24% of carbon (BOD and COD). Removal of metals ranged from 27% to 43%.

TMDLs: Total Maximum Daily Loads

TMDLs for watersheds in Frederick County now cover 87.5% of the County's land area. Furthermore, the development of the Chesapeake Bay TMDL and Watershed Implementation Plans (WIPs) has brought added focus to federal, state, and local government efforts to stem pollutant loadings to the Bay and its tributaries. Staff worked to meet requirements of the TMDL regulations that restrict sediment and phosphorus loads to Lake Linganore. Frederick County is also working to build capacity to address new TMDLs and those in the pipeline, building upon its efforts including watershed restoration, stream clean-ups, Green Infrastructure planning, and forest conservation efforts. Staff also focused on community outreach and voluntary restoration projects in several key watersheds. In addition, Frederick County has participated in reviewing TMDL issues related to NPDES MS4 permits and provided feedback to MDE, EPA, and the Chesapeake Bay Program.

Conclusion

Frederick County has met its permit requirements and continues to significantly build upon and strengthen the various components of its NPDES stormwater management programs. As detailed throughout this report, the County continues to ensure permit compliance and the past year brought additional program expansion 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 continued to

capitalize on opportunities to leverage substantial funding for outreach and restoration. This has allowed the County to accomplish program goals most cost-effectively, despite having a small in-house staff.

