

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

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
MUNICIPAL SEPARATE STORM SEWER SYSTEM DISCHARGE PERMIT
MD0068268**

REVIEW OF HARFORD COUNTY'S 2006 & 2007 ANNUAL REPORTS

Harford County was reissued a National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer system discharge permit on November 1, 2004. NPDES regulations require permit conditions that effectively prohibit non-stormwater discharges and reduce the discharge of pollutants to the "maximum extent practicable." For each year of the County's permit, an annual report is required to help assess the County's stormwater program. The following is a review of Harford County's annual reports that were submitted to the Maryland Department of the Environment (MDE) on October 31, 2007 and October 31, 2008.

Permit Administration

Harford County is required to identify key administrative and technical personnel responsible for permit compliance. The County submitted an updated contact list with its annual reports. No major changes were reported. Any additional or future changes should be immediately reported to MDE.

Legal Authority

Harford County is required to maintain legal authority to perform the activities described in 40 Code of Federal Regulations (CFR) 122.26(d)(2)(i) and permit MD0068268. The County Attorney submitted the required certification on October 29, 1999. In the event that any provision of its legal authority is found to be invalid, the County will need to make the necessary changes to maintain adequate legal authority.

Source Identification

Harford County is required to identify sources of pollutants in stormwater runoff and link these sources to specific water quality impacts on a watershed-by-watershed basis. To demonstrate this capability, the County is required to submit information regarding its storm drain system, urban best management practices (BMPs), impervious surfaces, monitoring locations, and watershed restoration locations in geographic information system (GIS) format. The County routinely updates these data as new information is obtained. The County reported that location point features (e.g., outfalls, inlets, etc.) were entered for 11.2 miles of roadway constructed during 2006 and 2007. This includes 74 new storm drain outfalls and 359 inlets. Drainage areas were delineated for nine of the outfalls that were considered "major."

The County is required to submit stormwater management facility construction completion data

on MDE's Urban BMP Database. The County reported that a total of 110 BMPs were completed during the two reporting periods and that the associated drainage areas were delineated for all except those completed in 2007.

The County is also required to delineate controlled and uncontrolled impervious areas. The County submitted an impervious data layer, using 2000 aerial photography, with its March 2004 Interim Report. The impervious data layer is to be updated in 2008 based upon new aerial photography obtained in 2007. EA Engineering, Science, and Technology, Inc. (EA) are contracted to determine the area managed by 100 (approximately 20%) of the existing stormwater management facilities. Completion of this task and the remaining (approximately 450) stormwater management facilities has languished and needs to be accelerated so that permit compliance can be maintained.

The County is required to provide chemical, biological, and physical monitoring locations and watershed restoration areas. Thirty-three active monitoring locations were provided and this information is considered complete. There were no watershed restoration projects completed during 2006 or 2007. Harford County continues to make progress with its source identification efforts and most requirements have been addressed. As noted above, efforts to identify impervious area treatment needs to be completed to maintain permit compliance.

Management Program

Harford County is required to conduct preventative maintenance inspections of all stormwater management facilities at least on a triennial basis. Additionally, documentation identifying the facilities inspected, the number of inspections, follow-up inspections, and the enforcement action(s) used to ensure compliance are to be submitted in the County's annual report. The County reported that a total of 748 facilities were inspected during the two reporting periods. Three hundred eighty-seven of these facilities required some type of maintenance. Typically, three inspections were required to ensure that adequate maintenance was provided. However, work remained to be done at 104 of the 748 facilities. The compliance status of these facilities is unclear and the County needs to provide better documentation of inspection and enforcement activities on a year-to-year basis. Additionally, information submitted regarding as-built certifications indicates a high rate of facilities with problems. This points to a need for better construction inspection and perhaps field presence by the County. The County should address these reporting and inspection shortcomings.

The County is also required to implement the stormwater management design policies, principles, methods, and practices found in the *2000 Maryland Stormwater Design Manual* (Design Manual). Modifications to the Harford County Code Chapter 214, Sediment Control and Stormwater Management that incorporated current State stormwater regulations and the Design Manual criteria became effective on January 28, 2002. No problems were noted regarding program implementation.

The County is required to maintain an acceptable erosion and sediment control program. Additionally, any needed program improvements identified during MDE's evaluation of the County's application for the delegation of erosion and sediment control enforcement authority are to be addressed. MDE's review of the County's program in 2006 and 2008 determined that the program was acceptable. The County is also required to conduct responsible personnel certification classes to educate construction site operators regarding erosion and sediment control compliance. Program activity is to be recorded on MDE's "green card" database and submitted with annual reports. The County reported that it conducted eight classes with 182 individuals receiving certification during the two reporting periods. The required database for identifying responsible personnel was submitted. Additionally, information regarding earth disturbances exceeding one acre or more is to be reported quarterly and should be specific to the permitting activity for the three months preceding submittal. The County continues to submit this information consistently to MDE.

The County is required to implement an inspection and enforcement program to ensure that all discharges to and from the municipal separate storm sewer system that are not composed entirely of stormwater are either permitted by MDE or eliminated. At a minimum, the County is to field screen 100 outfalls annually, conduct routine surveys of commercial and industrial watersheds for discovering and eliminating pollutant sources, maintain a program to address illegal dumping and spills, use appropriate enforcement procedures for investigating and eliminating illicit discharges, and report significant discharges to MDE for enforcement and/or permitting.

During 2007, the County completed a desktop assessment of approximately 2,900 outfalls for their illicit discharge potential (IDP) according to the criteria described in the *"Illicit Discharge Detection and Elimination Guidance Manual for Program Development and Technical Assessments"* (Center for Watershed Protection, October 2004). During the two reporting years, a total of 232 outfalls were screened with 26 having dry-weather flow. Flow was not observed at 12 of the 26 outfalls during follow-up visits. Elevated chlorine levels from swimming pool discharges or wash water were found at most of the outfalls having flow while sewage was being discharged at two of the outfalls. Similar to the preventative maintenance inspection of stormwater management facilities, better reporting regarding the status of problem outfalls is needed to provide year-to-year continuity.

Windshield surveys were conducted at 101 commercial and industrial facilities deemed a "high-risk" for illicit discharge potential during 2006 and 2007. Forty-six of the inspected facilities were determined to be "hotspots" with 27 requiring corrective action. Improper material storage and poor waste management were the most frequent problems encountered. The County reported that corrective action occurred at all but four of the facilities. The County should report on the status of the four facilities in its next annual report. Typically, corrective action was obtained via on-site visits and education of the facility operators. A review of the information submitted indicates that the timeliness of follow-up inspection and compliance could be improved. For example, in 2006, the initial windshield inspections occurred in February with follow-up inspections not occurring until June. Similarly, documentation indicates that it took six months to resolve an illicit discharge at the Duclaw Brewing Company.

In Harford County, response to dumping and spills is a coordinated effort by its Division of Water and Sewer, Health Department, and Emergency Operations (HCEO) Hazmat Team. During the reporting periods, Harford County responded an annual average of 274 calls regarding dumping and spills. Approximately one-half of the responses have a potential for adverse water quality impacts. The County reported that it will be developing a “numbers to know” brochure to assist residents with the reporting of illicit discharges, dumping, and spills.

The County is required to identify all County-owned and municipal facilities requiring NPDES stormwater general permit coverage and submit Notices of Intent (NOI) to MDE for each. Additionally, the status of pollution prevention plan development and implementation shall be reported annually. In 2006, eighteen facilities were identified as being required to have a discharge permit. All but two of these facilities have been permitted and both also require pollution prevention plans. In 2007, there were eighteen facilities listed as having permits. Five of these had expired permits and the status of the two facilities identified in 2006 as needing permits and plans is unclear. The County needs to better report the status of permitting and pollution prevention plan implementation.

The County is required to develop and implement a plan to reduce pollutants associated with its road maintenance activities. At a minimum, annual progress reports are to be submitted that document street sweeping, inlet cleaning, roadside vegetation management, and winter weather deicing activities. Annually, 1,240 lane miles of roads were swept with approximately 1,380 tons of material being collected. Additionally, 1,070 cubic yards of materials were from the 2,150 drainage structures that were cleaned annually. The County reported that 1,755 tons of salt were applied for deicing during 2006. In 2007, 18,600 tons of salt were applied, a 960 percent increase over the previous year. While recorded snowfall was only 2.7 inches more in 2007 compared to 2006, the County reported that deicing was necessary in 39 instances versus 19 for the same years. Roadside vegetation maintenance is done mostly by mowing and limited the use of Roundup® herbicide. Harford County should continue its efforts regarding pollutant reduction and road maintenance activities.

The County is required to implement a public education and outreach program to reduce stormwater pollutants. Outreach efforts are to be integrated with all aspects of the County’s NPDES activities, documented, and summarized in each annual report. At a minimum, the County is to establish and publicize a compliance hotline for the public reporting of suspected illicit discharges, illegal dumping, and spills. The County’s Water and Sewer Division operates continuously (e.g., 24/7) and its emergency phone number is published on water and sewer bills. Additionally, the HCEO responds to 911 calls. The County is also required to provide information regarding various water quality issues to the general public. The County continues to implement a diverse public outreach program that focuses on pollution prevention. Recent activities include participating in numerous public, school, and community events. This includes disseminating information regarding pollution prevention, recycling, lawn care, and household hazardous waste. As in previous years, the County continues to do a good job with public outreach efforts.

Harford County has successfully implemented many of the stormwater management program elements required by its NPDES permit. A noteworthy effort has been put forth to implement stormwater management, erosion and sediment control, and public outreach requirements.

Significant improvement has been made to address illicit discharge detection and elimination requirements. Other than some minor reporting problems, the County's management program implementation efforts are considered to be exemplary.

Watershed Assessment and Planning

Harford County is required to conduct a systematic assessment of water quality within its 10 identified watersheds. The goal is to have all land area in Harford County covered by a specific action plan to address the water quality problems identified. At a minimum, the County is to perform a detailed watershed assessment for one County watershed during this permit term.

The County reported that Stream Corridor Assessments (SCA) have been completed for approximately seventy-five percent of the County. More detailed assessments were undertaken during 2007 in Woodland Run (Bynum Creek watershed) and Plumtree Run (Winters Run watershed). In 2007, KCI Technologies was contracted to do pre-restoration monitoring (geomorphic, biological, and physical) on a 4,000 foot reach of Woodland Run. Additionally, the County has contracted Bayland Consultants & Designs and Clear Creek Consulting to assess potential stormwater retrofits and stream restoration opportunities in Wheel Creek (Winters Run watershed). EA was also contracted in 2007 to assess Mariner Run (Little Gunpowder watershed) using the CWP's Unified Subwatershed Site Reconnaissance (USSR).

Previously, the County's annual reports have included water quality and stream restoration studies for the Bush River, Swan Creek, Bynum Run, Winters Run, Foster Branch, Rumsey Island, Little Gunpowder, and Church Creek watersheds. Potential restoration and retrofit opportunities have been identified and ranked for these watersheds. Many of these opportunities have been placed on the County's capital improvement project (CIP) schedule and are in various stages of design or construction.

During 2007, a Watershed Restoration Action Strategy (WRAS) was completed for the Deer Creek watershed. WRAS's are the end product of Maryland's Unified Watershed Assessment (UWA) process that was developed by the Maryland Department of Natural Resources (MDNR) in 1998 as a result of the federal Clean Water Action Plan (CWAP) initiative. The information from MDNR's technical watershed assessment, local knowledge from stakeholder involvement, and leadership from local government are combined to provide a consensus-based strategy for watershed restoration. The strategies identify priorities, opportunities, concerns, and challenges as well as potential mitigation, restoration, and protection sites.

In cooperation with the United States Geologic Survey (USGS), four stream gages are maintained in Harford County. These gages are located in the Bynum Run, Plumtree Run, James Run, and Swan Creek watersheds. In addition to flow, monthly surface water quality samples are obtained for nutrients and bacteria (e.g., e. coli). Bacteria counts exceeded EPA's water quality criteria of 200 MPN for seven and five of the monthly samples collected in Bynum Run and Plumtree Run, respectively. Additionally, the County established ten e. coli monitoring sites within its development envelope in August 2006. A little more than 40 percent of the samples exceeded the 200 MPN threshold. Lastly, the Bush River Shallow Water Monitoring Project has been conducted by the MDNR since 2003. In Harford County, this project includes water quality sampling in the Lauderick Creek and Otter Pond Creek. The 2006 results found that

salinity and total phosphorus are within normal ranges, nitrogen concentrations are rated as “fair” with low dissolved oxygen in Otter Point Creek possibly due to excessive nutrients, and chlorophyll concentration rated as “poor.” The monitoring also found a significant reduction of submerged aquatic vegetation (SAVs) in Bush Creek. SAVs were reported to have declined from 1,024 acres in 2004 to 321 acres in 2006. This was most likely due to borderline conditions for clarity and chlorophyll. The relationship between these monitoring results and restoration planning is unclear at this time.

The County continues to do very well with its watershed assessment efforts. Quite a few of the planned restoration and retrofit opportunities are nearing the design and/or construction phase. Ultimately, the success of the County’s assessment and planning efforts will be gauged by implementation of restoration projects and ultimately improved water quality.

Watershed Restoration

Harford County is required to implement the water quality opportunities identified in its watershed plans. The goal is to maximize the water quality in a single watershed, or combination of watersheds, using efforts that are definable and the effects of which are measurable. At a minimum, the County is to complete the implementation of those restoration efforts that were identified and initiated during the previous permit term to restore ten percent of the County’s impervious surface area. The watershed, or combination of watersheds, where restoration efforts are implemented are to be monitored to determine effectiveness toward improving water quality. Additionally, the County is required to implement restoration efforts to restore an additional ten percent of the County’s impervious surface area during this permit term. The progress toward meeting the goal is to be reported annually. Annual reports are to include the estimated cost and the actual expenditures for program implementation and the monitoring data and surrogate parameter analyses used to determine water quality improvements.

In Harford County, there are approximately 8,300 acres of impervious surface that require treatment. Therefore, approximately 1,660 acres of impervious surface needs to be treated during this permit cycle. The County identified 15 proposed water quality retrofit projects. One existing stormwater management facility will be retrofitted to provide water quality treatment, five new facilities will be constructed, and nine stream segments (10,700 feet) will be stabilized. It is anticipated that project design and construction will be completed during this permit term.

When completed, these projects will provide structural treatment for approximately 1,470 acres, 316 being impervious, which is 19 percent of the goal. Total cost is approximately \$5.6 million, which averages \$3,809 per acre or \$17,721 per impervious acre. The County also reported that one project is under construction and nine are being designed.

During 2007, the County contracted Biohabitats, Incorporated to explore pollutant load reduction accounting for nonstructural practice implementation. The approach to the nonstructural credits (e.g., tree planting, turf conversion or soil conditioning, street sweeping, inlet cleaning, and pet waster management) appears to be sound. Similarly, incentives and partnership opportunities should be explored. Accounting for nonstructural implementation is essential and will help quantify the County’s efforts to address impervious surface treatment goals. However,

accounting for pollutant load reduction and associated impervious area treatment for nonstructural practice implementation deserves further discussion between MDE and Maryland's entire NPDES stormwater community.

Pre and post-construction monitoring is conducted for most of the restoration projects. Post-construction monitoring reports were submitted for four of the completed restoration projects (e.g., Mt. Royal, Box Hill South, Laurel Valley, and Winters Run. Three of the completed projects involve stream restoration that include in-stream structures (e.g., step pools, gabion drop structures, cross vane weirs, etc.) to promote bed and bank stability, grade control, and habitat. Assessments are made regarding fluvial geomorphology (e.g., profile and cross-section comparisons, pebble counts, etc.), structural stability (e.g., bank pins), and vegetative cover. Results indicate that the projects are stable for the most part and functioning according to their design goals and objectives. Post-construction results indicate little or no change in the biological community.

Much of Harford County's restoration work has been structural and results have been well quantified. However, given the pace of implementation, it is unlikely that compliance with NPDES watershed restoration goals will be met. Recognizing that the time and cost required to get from the initial design through construction are great, it is imperative to account for other nonstructural activities associated with water quality improvement and impervious surface treatment.

Assessment of Controls

Harford County is required to use chemical, biological, and physical monitoring to document work toward meeting the watershed restoration goal. The County chose to monitor a land use specific outfall and an associated in-stream station in the Winters Run watershed. The outfall drainage is comprised of 50 acres of medium-density and 15 acres of high-density residential land use and 14 acres of open space. The in-stream station drains 169 acres, 27 of which are impervious.

For chemical monitoring, at least three discrete samples determined to be representative of each storm event are to be analyzed for ten specified parameters. Eight storm events are to be monitored each year, two during each quarter with quarters based upon calendar year. For periods of extended dry weather, baseflow samples are to be taken once per month. Continuous flow monitoring is required at the in-stream station to develop stage and discharge relationships and pollutant load estimates. Temperature and pH are also to be recorded. Numerous problems were reported with the monitoring equipment for the 2006 reporting period. Presently, the County collects monthly baseflow samples and EA consultants are under contract to conduct the storm event monitoring. Microbac Laboratory has been contracted to conduct sample analyses for all parameters except bacteria. Community Environmental Laboratories, Inc (CEL) performs the bacteria analyses.

The County reported that six storm event and ten baseflow samples were collected during the 2006 reporting period. Eight storm events and nine baseflow samples were obtained during the 2007 reporting period. Except for the first quarter of 2006, the storm event sampling is well

represented for both reporting periods. Rainfall depths for the 2006 sampled storm events ranged from 0.17 to 3.24 inches. Rainfall depths for the 2007 sampled storm events ranged from 0.12 to 0.80 inches.

EMCs were calculated and reported on MDE's Chemical Monitoring Storm Event Database as required. Annual and seasonal pollutant loads were calculated as well. The EMCs were compared to Maryland's water quality criteria and lead was found to exceed chronic criteria for storm and baseflow samples during both years. The average yearly EMCs were also compared to the results from Maryland's NPDES community (Bahr 1997) and the Nationwide Urban Runoff Program (EPA, 1983). Nitrate plus nitrite concentrations were above the Maryland and EPA results.

Historically, sample results have indicated elevated fecal coliform concentration. Except for a sewer line break above the in-stream station on August 24, 2006, bacteria concentrations were lower than usual (e.g., less than 200 MPN). The County reported that bacterial source tracking (BST) commenced in October 2007. *Escherichia coli* (*E. coli*) samples are now collected and sent to Salisbury University where Antibiotic Resistance Analysis (ARA) is performed to determine potential sources. The initial findings of this effort will be reported in the next annual report.

The County is also required to conduct biological and physical assessments between the outfall and in-stream stations. Benthic macroinvertebrate sampling occurs at three locations along this stream segment during the Spring of each year. Samples are collected and sorted by County staff and the MDNR conducts genus specific identification. Similar to the chemical data, EA also provided biological data analyses. The results continue to indicate a "fair" to "poor" biological community with "partially degraded" to "degraded" habitat.

For physical assessment, a stream profile and three monumented cross-sections were established in 1999. Measurements and a comparative analysis are to occur annually. During the 2006 and 2007 reporting periods, a longitudinal profile and cross-section survey was conducted and the results were represented graphically. Only minor changes have occurred and the stream has not undergone any major adjustments such as incision or aggradation. Previously, the County submitted a separate report that included the results of hydrologic (TR-20) and hydraulic (HEC-RAS, Ver. 2.2) models used to analyze stream reach characteristics during 2000. This information included schematics (e.g., topography, cross-section, and profile) and a narrative summary of the model analyses. The County reported that additional hydrologic and hydraulic modeling will be done in 2008.

In addition to the annual interpretive reports prepared by EA, the County contracted KCI Technologies to conduct a comprehensive analysis of sampling data obtained at its ambient in-stream station for the 1998 to 2007 sampling years. The analysis includes an assessment of geomorphologic conditions, hydrologic and hydraulic modeling, water quality, and biological and physical habitat data. Results indicate that the stream profile slope is relatively consistent with only minor changes to the cross-sections which are attributed to normal adjustments to maintain stability. Analysis indicates that D₅₀ particles are mobile for most storms. From a biological perspective, the benthic macroinvertebrate community is rated as "poor" to "fair" and

the physical habitat as “partially degraded” to “degraded.” Regarding water quality, yearly EMCs are elevated for nitrate plus nitrite and phenols. Additionally, copper concentrations in baseflow exceed MDE acute criteria and lead concentrations exceed MDE chronic criteria during storm flows. However, the analysis did not find any significant correlation between water quality and the benthic community assessment. Overall, based on nine years of monitoring, the results indicate that no significant changes have occurred within the watershed and that changes are unlikely unless watershed conditions are altered.

As described above, steps are being taken to identify nutrient sources. Additionally, the County has contracted Biohabitats, Incorporated to develop a plan to address water quality impacts within the watershed. The scope of work will include data collection and assessment, community outreach, a workshop and public meeting, and a management plan for the Brentwood Park and Woodland Hills communities.

Finally, Harford County was required to select a watershed to monitor in order to evaluate the effectiveness of stormwater management system implementation for stream channel protection. The County has selected a 181-acre drainage area that includes Wexford (a new 134-lot single-family residential development) for monitoring. Land use changes will include commercial redevelopment and new residential development designed to meet the Design Manual criteria. In addition to a longitudinal profile, four monumented cross-sections were established and surveyed in 2003. The stream profile and established cross-sections were again surveyed in 2006 and 2007. The results were represented graphically and the County reported that a shift in the thalweg was occurring at cross-section 3 during 2006. Subsequently, the 2007 data indicated the same and that the shift was not a function of normal variability. The County reported that the cause of the shift is uncertain but it is suspected that an upstream debris jam is responsible for the channel alteration. Additionally, preliminary hydrologic and hydraulic modeling (TR-20 and HEC-RAS, Ver. 3.1.3) was completed in 2005 to determine existing discharge rates for the 1-year to the 100-year storm event frequencies.

The County’s efforts with regard to the long-term monitoring requirements continue to be strong. Bacteria source tracking and moving toward development of a management plan for the Brentwood Park and Woodland Hills communities are welcome additions to the County’s stormwater program. These efforts will go a long way toward effectively integrating monitoring and management requirements.

Program Funding

Harford County is required to maintain adequate funding to comply with all conditions of its NPDES stormwater permit. Funding for the County’s NPDES program is provided through general funds distributed to the Department of Public Works (DPW). The DPW’s operating budget for FY08, specific to NPDES implementation, is approximately \$1.2 million. Capital budget allocations for watershed restoration and stream gauge operation total \$1.4 million. These figures have increased to \$1.3 and \$1.6 million for the projected FY09 budget. As program implementation expands and costs increase, the County should consider developing a dedicated funding source for its NPDES stormwater programs.

Summary

Harford County has successfully implemented many of the stormwater management program elements required by its NPDES permit. A noteworthy effort has been put forth to implement stormwater management, erosion and sediment control, and public outreach requirements. Similarly, watershed assessment, restoration, and control assessment efforts are considered to be strong. Significant improvement has been made to address illicit discharge detection and elimination requirements. Other than some minor reporting problems, the County's management program implementation efforts are considered to be exemplary.

Efforts to identify impervious area treatment need to be improved and the drainage areas delineated for BMPs completed in 2007. Similarly, problems were noted regarding reporting the compliance status of facilities inspected for maintenance and illicit discharge activities from year-to-year. Most importantly, it is imperative that the County accelerate its current level of structural control implementation. The County also needs to account for nonstructural activities associated with water quality improvement and impervious surface treatment.