

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

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
MUNICIPAL SEPARATE STORM SEWER SYSTEM DISCHARGE PERMIT
MD0068306**

REVIEW OF ANNE ARUNDEL COUNTY'S 2005 ANNUAL REPORT

Anne Arundel County was reissued a National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer system discharge permit (MD0068306) on November 8, 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 NPDES stormwater related programs. The following is a review of the annual report submitted to the Maryland Department of the Environment, Water Management Administration (MDE\WMA) by Anne Arundel County on December 16, 2005.

Permit Administration

Anne Arundel County is required to identify key administrative and technical personnel responsible for NPDES permit compliance. The required information was submitted to MDE in this annual report and included primary NPDES contacts and an organizational chart. This information is considered complete.

Legal Authority

Anne Arundel County is required to maintain adequate legal authority throughout the permit term according to 40 Code of Federal Regulations (CFR) 122.26(d)(2)(i). During the past several years, certification from the County's Office of Law was provided stating that adequate NPDES legal authority is maintained and the County adopted a "Stormwater Management Practices and Procedures Manual" reflecting the *2000 Maryland Stormwater Design Manual* (Design Manual). More recently, the County Code was reorganized. In November 2005, the County Council passed a bill moving NPDES-related legal authority to Article 13 Public Works, Title 5 Water and Wastewater, Subtitle 5 Wastewater Discharge Requirements. Additionally, the County is reviewing and proposing revisions to its Floodplain, Sediment Control and Stormwater Article (Article 16) with a targeted completion date by the end of 2006. In the meantime, the County indicated it will review and discuss these changes with MDE.

Proposed changes should be submitted to MDE for review and approval. This will ensure consistency with State Sediment Control and Stormwater Management Laws. Anne Arundel County should also submit an updated certification from its Office of Law stating that adequate legal authority continues to be maintained subsequent to the modification mentioned above.

Source Identification

Anne Arundel County is required in its NPDES permit to identify sources of pollutants in stormwater runoff and link them to specific water quality impacts on a watershed basis. Information regarding the storm drain system, urban best management practices (BMPs), impervious surfaces, monitoring locations, and watershed restoration, is required to be submitted in a database and in geographic information system (GIS) format. Additionally, the current permit requires the County to submit a schedule in the first annual report for completing drainage areas to its storm drain system.

A complete inventory of all storm drain inlets, manholes, outfalls, culverts, and pipes for the South and Severn River watersheds has been completed. Additionally, partial mapping was completed for the remainder of the County. GIS data were included and contained County-wide information for 2,703 outfalls, 15,222 inlets, 7,599 manholes, and 23,546 pipe sections. Each storm drain attribute table also included details regarding field conditions of each structure. The required outfall database in Access format was also provided and contained 3,473 outfalls. This does not match with the GIS database of outfalls because not all had location coordinates. As required by the permit, a schedule for completing drainage areas to these outfalls was provided. Outfall drainage areas in the Severn and South River watersheds are anticipated to be completed and submitted in the 2006 annual report. The goal is to complete all outfall drainage areas County-wide by the end of the permit term in 2009. A sample GIS coverage of drainage areas for 66 outfalls in the Upper Patuxent River watershed was provided. Drainage areas for these outfalls, located in the Crofton area, were generated using the Light Detection and Ranging (LIDAR)-derived Digital Elevation Model (DEM). Subsequently, polygons were created with acreage information being recorded on the attribute table. Upon completion of drainage areas, acreage information will be transcribed from the GIS attribute tables to the outfall database (Attachment A). This process will be repeated until all drainage areas are completed by the end of the permit term. The County has made substantial progress and is commended for its work to date.

Anne Arundel County provided its Urban BMP database that contains 8,146 records. However, several database fields were incomplete. Specifically, grid coordinates were provided for 4,223 records but only a quarter of these were valid. When plotting these coordinates on GIS, many were outside of the County boundaries due to transposed numbers or incompatible coordinates systems. Other fields needing attention include land use, drainage area, approval date, as-built date, and last update. The County indicated it was aware of these issues and will work to rectify them. To help improve this database, the County intends to link it with grading permit information to ensure accurate as-built information and populate land use and drainage area fields using satellite imagery and GIS delineation tools.

The County's permit requires that a schedule for delineating controlled and uncontrolled impervious surfaces be submitted. GIS data and a hard copy map of a small sample area with impervious area delineations for each of its 12 major watersheds were provided. These were generated using 2004 1-meter high resolution satellite imagery using automated classification methods available through the ArcGIS Feature Analyst. This completes the general delineation of all impervious areas in the County and will be updated as needed. For distinguishing between controlled and uncontrolled impervious areas, controlled areas will be updated commensurate

with completion of drainage areas as described in the Urban BMP discussion above. Completing the overall impervious area County-wide is a good first-step in this process.

The County is required to provide chemical, biological, and physical monitoring locations and watershed restoration areas. Several GIS files were provided with this information. Sites where data were collected as part of the County-wide biological monitoring program were highlighted and included information such as habitat conditions for 24 sampling areas. Overall, 57% of the sites were deemed to have poor or very poor aquatic biological conditions. Both NPDES and non-NPDES physical and chemical monitoring locations were provided and this information is considered complete. Finally, for watershed restoration locations, 18 capital improvement projects consisting of storm drain and waterway improvements were plotted and provided on GIS.

Anne Arundel County continues to make progress with its storm drain system mapping and urban BMP database efforts. A majority of the new permit source identification requirements have been addressed. However, aspects that need improvement include grid coordinates and information recorded on the Urban BMP database.

Management Programs

Anne Arundel County is required to submit detailed information encompassing a variety of NPDES management programs. Requirements include maintaining acceptable erosion and sediment control and stormwater management programs; and documenting all maintenance inspections, necessary corrections, and enforcement actions. Additional responsibilities include maintaining illicit connection detection and enforcement and public outreach programs.

Between March 2004 and November 2005, 830 stormwater facility maintenance inspections were performed with 34 violations being reported. According to the County, all came into compliance. The County indicated that the Urban BMP database “reflects the facilities that were inspected and the dates the inspections were performed.” However, a review indicates that no such information exists. The database reflects only the fields required by MDE in Attachment A of the permit and not maintenance related items. An Inspections and Permits BMP GIS coverage that was submitted separate from the Urban BMP database contained two maintenance-related fields. However, most of the dates provided were invalid and, among the valid records, only one fell within the date range where the County reported the 830 maintenance inspections. The County needs to clarify its documentation of these inspections. This includes not only recording proper dates when inspections occur, but documenting follow-up inspections, the enforcement used to ensure compliance, and any maintenance inspection schedules. MDE performed a review of the County’s stormwater management program in September 2005 and found it to be acceptable. Updated information is required to ensure that this rating is sustained.

The County’s erosion and sediment control program was reviewed in 2004 and delegation of enforcement authority was granted for the maximum 2-year period. The next delegation review will commence in Fall 2006. Additionally, the County reported that 208 grading permits were issued. For the “Responsible Personnel Certification Training” requirement, five courses were held.

The illicit discharge detection and elimination section of the permit requires the County to inspect 150 storm drain outfalls annually and emphasizes surveying commercial and industrial land uses. Reflecting these permit conditions, the County targeted 151 outfalls with commercial and industrial drainage areas in the Patapsco River watershed and scoured them for evidence of illicit discharges, illegal spills or dumping, poor housekeeping, or inadequate maintenance of stormwater management facilities. Where flow was observed, a LaMotte chemical test kit was used to sample the discharges and results were reported on the required illicit discharge database.

A detailed report was provided summarizing the findings. Structurally, three outfalls had cracking concrete, one had spalling concrete, and 15 others had other types of structural problems that needed to be addressed. These types of problems were reported to the County's Infrastructure Management Division for follow-up action. Visible pollution signs were as follows: 54 had significant sediment deposits, two had oil deposits, and "other" deposits were found at 13 locations. Oil sheens were observed at three locations and 20 had significant amounts of trash present at the outfall. Six had abnormal odor, color, or clarity. Of these, one had cloudy standing water and five had opaque discharges.

Thirty-five of the outfalls exhibited dry-weather flow. Chemical tests were performed and compared to thresholds identified in Dry Weather Flow and Illicit Discharges in Maryland Storm Drain Systems (MDE, 1997). These thresholds are 0.17 ppm for phenol, 0.4 ppm for chlorine, 0.21 ppm for copper, and 0.5 ppm for detergents. Overall, there were no measurable results for Phenol or Copper. Chlorine evidence was minimal as none of the three discharges testing positive for it were above the threshold. The most commonly detected pollutant was detergents which were detected at 12 outfalls with three having concentrations higher than the threshold. Five outfalls were deemed potential illicit discharges and were further investigated. Results reported by field staff included a residence discharging detergents through a garden hose, dumping of paints and kitchen grease, large pools of oil downstream from a truck maintenance facility, and a truck washing facility with no controls for detergents. Excellent photo documentation and detailed descriptions of the five suspected outfalls and their associated drainage areas were provided. This is outstanding work and the County is to be commended for its efforts.

Excellent public education and outreach programs continue in Anne Arundel County. The County maintains its environmental hotline, updates public school curricula, provides trash recycling information, and promotes "grasscycling" and home composting of yard trimmings to 30% of its single-family households. Examples of pamphlets and other materials distributed were provided. Additionally, the County's Citizens Water Quality Monitoring Program was described. Through this program, eight volunteers were trained and supplied monitoring equipment for the Broadwater Creek watershed. The County staff also discussed the program with 12 citizens in the Bodkin Creek watershed interested in becoming volunteers. Finally, a list of 15 presentations on stormwater pollution reduction to various groups ranging from local citizens to the Severn River Commission to staff of other agencies was provided.

Overall, Anne Arundel County continues its comprehensive work for management programs. The illicit discharge effort, in particular, is exemplary. However, details regarding

the stormwater management program is lacking and needs to be addressed. Improvements that will need to be made include better reporting of maintenance inspection results including facilities inspected, follow-up inspections, enforcement actions, and maintenance schedules. Improved reporting of this information will be emphasized during this permit term.

Watershed Assessment and Planning

Anne Arundel County is required to systematically assess water quality within all of its watersheds. This includes prioritizing watersheds, selecting restoration areas that comprise 10% of the County's impervious area, performing detailed water quality analyses, identifying water quality improvement opportunities, and implementing plans to control stormwater discharges to the maximum extent practicable. In addition, the County is required to propose additional watersheds for restoration during the next permit term. This work will establish long-term water quality improvement.

The primary requirement under this permit condition is the completion of a watershed management plan in a priority watershed by the end of the first year of the permit term. While the County has completed a plan for the South River watershed, the Severn River watershed management plan remains in the final stages. The County anticipates this plan will be finished in the next few months and subsequently submitted to MDE. Additionally, the County will revisit the South River watershed plan and update data to reflect current conditions. These data will be incorporated in its Watershed Management Tool (WMT), which is a computer interface composed of database management, spatial analysis, and pollutant load tracking capabilities. Watershed management plans for each of the 12 major watersheds are targeted for completion by 2012. This will exceed the permit requirements if accomplished. The County continues to make acceptable progress with regard to this permit condition.

Watershed Restoration

Anne Arundel County is required to implement the practices identified in its watershed plans with a goal of maximizing 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 10% of the County's impervious surface area. The watershed, or combinations of watersheds where the 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 10% 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.

As stated above, the County is targeting current watershed restoration efforts in the South and Severn River watersheds. Projects that serve to satisfy the restoration requirements are compiled and analyzed with its WMT. Currently, a list of 30 watershed restoration projects was provided including efforts such as a small storm drain study and potential retrofit solutions in a

residential neighborhood to fix erosion. Using the WMT, the impervious area GIS coverages will be updated to show the cumulative impact of these projects toward satisfying the 10% restoration requirement. While a list of projects was submitted, no drainage area information was available. Instead, the County indicated that it had been able to restore an additional 10% of impervious area because the project recommendations were being implemented as much as possible. Details, however, are incomplete and the County needs to clarify these projects with regard to the amount of impervious area addressed and areas that have been restored to date. Included should be provisions for non-structural controls such as public education and outreach that have been included in previous annual reports.

The permit requires that progress toward meeting the overall watershed restoration goals needs to be described. For the Severn River watershed, some excerpts from the yet to be completed report were provided. Maps highlighting scoring indicators from “very poor condition – needs restoration” to “Good condition – probably needs little to no restoration” were included along with overall scoring for individual stream reaches. The WMT again was used to analyze restoration alternatives including wetland mitigation, bioretention retrofits, and retrofit of dry ponds to wet ponds. The analyses showed that using bioretention retrofits at commercial and industrial areas, followed by dry to wet pond retrofits, would provide the most water quality benefits. Using this information, the County has begun to develop an implementation plan for the Severn River watershed and further details will be provided in next year’s annual report.

Other projects were described for the South River watershed where 5,247 (15%) of the 36,216 acres are impervious. Within this watershed, the Beard’s Creek subwatershed (14% impervious) has been targeted for storm drain improvements and detailed maps were provided. Additionally, “various innovated stormwater management restorative techniques have emerged from the Severn River Watershed Study” including improving habitat through channel restoration, restoration of inadequate stream buffers, cleanup of any known dumpsites, restoration of poor or failed stormwater management facilities, and reducing impervious cover at sites and implementing innovative BMP designs.

Overall, the County has made good progress and provided adequate details regarding its watershed restoration activities. It would be helpful, however, to submit a description in table or other format summarizing all work to date. This information should include total and impervious acres restored, a mention of how non-structural controls are factored in, and costs associated with all restoration activities.

Assessment of Controls

Anne Arundel County is required to use chemical, biological, and physical monitoring to document work toward meeting watershed restoration goals. The County has chosen to conduct monitoring at a land use specific outfall and an associated in-stream station in Parole Plaza and on Church Creek. Continuous flow monitoring is required at the in-stream station to develop stage and discharge relationships and pollutant load estimates. For chemical monitoring, at least three discrete samples determined to be representative of each storm event sampled are to be collected and analyzed for 12 specified parameters in addition to temperature, pH, precipitation, and flow. Twelve storm events need to be monitored each year, three during each quarter with

quarters based upon calendar year. For periods of extended dry weather, baseflow samples are to be taken once per month.

A detailed report was provided summarizing the chemical monitoring work. Overall, ten events were monitored between 9/15/04 and 11/30/05. These results were compared to historical data since monitoring began at this site and no clear trends have been established. However, it appears there may be some correlation between rainfall volumes and loads of BOD, Phosphorus, Copper, Lead, and Cadmium. Bar charts for each parameter were provided highlighting these results. One issue regarding parameters required to be monitored needs to be addressed. It appears that the County mistakenly believes that fecal coliform is an optional constituent. Oil and grease is the only parameter that is optional. Fortunately, the County has not suspended monitoring of fecal coliform, however it is a mandatory pollutant that needs to be included.

Regarding the database reporting requirement, the issues described in MDE's previous annual report review apply once again. Missing from the chemical monitoring database were rainfall depth and intensity and storm flow in gallons. Additionally, there are a few issues with the reporting of metals. These data need to be reported in micrograms per liter (ug/l) and not milligrams per liter (mg/l) and it appears that the detection limits being used for metals are too high and need to be revised. A list of appropriate detection limits is attached to the end of this review.

For biological monitoring, samples taken using Rapid Bioassessment Protocol (RBP) III are required each Spring between the outfall and instream stations. However, no biological monitoring was performed during the reporting year. The County blamed confusion with the monitoring contract along with the idea that because site demolition and reconstruction had not occurred in the watershed, no changes to the biology of Church Creek would be expected. This is unacceptable and needs to be rectified presently.

For physical monitoring, a geomorphological stream assessment is required that includes permanently monumented stream channel cross-sections and a stream profile. A report was provided detailing this monitoring effort and included comprehensive measurements, photographs, and recommendations. The County reported that no significant changes have been observed as Church Creek remains in the "non-supporting" category, is unstable, and is heavily impacted by development and construction activities. As in previous years, the report highlights the need to focus a stream restoration project here. However, to date, nothing has been proposed.

For Design Manual monitoring, the County continues its work in Picture Spring Branch where stream profiles and cross-section data were surveyed to determine the stability of the channel downstream of the West County Library redevelopment site. Details regarding hydrologic and hydraulic data during pre-construction and post-construction were provided. Additionally, details relating to Design Manual considerations for each of the subdivided areas were provided with information regarding channel protection volumes, recharge volumes, and water quality volume. Overall sixteen drainage areas were studied.

In summary, Anne Arundel County's monitoring efforts need improvement. Falling short of chemical monitoring of the required number of storm events and failing to perform

biological monitoring are unacceptable. These problems not only jeopardize the County's NPDES permit compliance but also prevent it from adequately assessing whether its watershed restoration efforts are succeeding.

Program Funding

Anne Arundel County is required to establish and maintain adequate program funding to comply with all conditions of its NPDES permit. The total budget for the next five years was estimated at more than \$45 million and includes stormwater permitting, rehabilitation, and retrofit projects. Other expenditures include \$1,100,000 for implementation of the NPDES permit program. Additionally, a table was provided breaking down the program costs by permit condition. Funding for the NPDES program in Anne Arundel County appears adequate.

Summary

Anne Arundel County continues to perform well with regard to its source identification and GIS efforts, erosion and sediment control, illicit connection detection and elimination, and public education and outreach. However, significant issues have arisen regarding monitoring and the County's stormwater management program reporting. Recommendations made above will need to be made to ensure the County remains in compliance with its NPDES permit.