MARYLAND DEPARTMENT OF THE ENVIRONMENT
WATER MANAGEMENT ADMINISTRATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM MUNICIPAL SEPARATE STORM SEWER SYSTEM DISCHARGE PERMIT MD00683625

REVIEW OF CHARLES COUNTY'S 2006 - 2009 ANNUAL REPORTS

Charles County was reissued a National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer system discharge permit (MD0068322) on July 31, 2002. NPDES regulations require permit conditions that effectively prohibit non-stormwater discharges and reduce the discharge of stormwater pollutants to the "maximum extent practicable." For each year of the permit, an annual report is required to help assess the County's NPDES stormwater related programs. The following is a review of the annual reports submitted to the Maryland Department of the Environment, Water Management Administration (MDE\WMA) by Charles County in 2006, 2007, 2008, and 2009.

Permit Administration

Charles County is required to identify key administrative and technical personnel responsible for NPDES permit compliance. Updated information with names, addresses, and phone numbers of personnel responsible for the NPDES program was submitted in all of these annual reports. MDE considers this information complete.

Legal Authority

Charles County is required to maintain adequate legal authority in accordance with NPDES regulations 40 Code of Federal Regulations (CFR) 122.26(d)(2)(i) throughout the permit term. On June 19, 2003, the Office of the County Attorney provided recertification that adequate legal authority exists to control the quality and quantity of discharges through the County storm drain system. As a result, adequate legal authority continues to be maintained by Charles County.

Source Identification

Charles County is required in its NPDES permit to compile and submit any new source identification information. Data include the identification and mapping of storm drain outfalls, land use activities, population estimates, runoff coefficients, major structural controls, landfills and controls, publicly owned lands, State and federal properties, NPDES industrial discharges, and industries organized by watershed and Standard Industrial Classification (SIC) codes. Furthermore, the County is required to describe progress made toward geographic information system (GIS) implementation.

Charles County continues to update and maintain its source identification data. GIS coverages with metadata were provided and included storm drain pipes, outfalls, drainage areas, and best management practices (BMP). Additionally, the county-wide Light Detection and Ranging (LIDAR) data with 2'contours became available at the end of 2005. Since that time, higher

resolution orthophotography has become available for county employees. Due to the higher resolution aerial photos, additional impervious surface was captured by the Feature Analyst software. This software provides capabilities for feature extraction within the ArcGIS environment requiring access to current, high quality aerial orthophotography. Since 2007, KCI Technologies has been using Feature Analyst to estimate impervious surface coverage in the County.

In February, 2006 Charles County began requiring digital submittals of as-built drawings by surveyors and engineers. Development plans and their associated BMPs are also identified and updated each year. In each of the reporting years 2006 through 2009, a total of 8, 13, 28 and 30 development plans were added, respectively. At this time major outfalls associated with these developments were also identified. In addition, a total of 232 new BMPs were added over the four year reporting period. The updated database shows a total of 621 BMPs in the Development District and 1034 BMPs county-wide.

Charles County continues to maintain adequate source identification data and the County's urban BMP database is well-maintained. MDE commends Charles County's effort in taking advantage of new technology to meet these permit requirements. Substantial progress has been made to resolve the discrepancy between the County database and the number of mapped BMPs in the Development District.

Discharge Characterization

Charles County is required to perform storm event monitoring and estimate annual and seasonal pollutant loads. In December of 2005, the chemical monitoring station was relocated to Arthur Middleton Elementary School to develop baseline pollutant inflow data to the receiving channel prior to construction of a wetland restoration project. Baseline sampling began in 2006 through 2007 and the wetland construction began in April of 2007. Baseline monitoring is shown in the 2007 and 2008 reports and post wetland construction data are provided in the 2009 report. Overall 9 storm events were observed and 8 wet weather samples were taken after the wetland construction. The highest concentration of pollutants was just as likely to be found in the peak or falling samples as the first flush for both the inlet and the outlet sampling. Chemical data at the inflow station show that the average EMCs for 2008 and 2009 for each pollutant are below literature values from the Nationwide Urban Runoff Project (NURP) with the exception of zinc. The concentrations for several contaminants, including TSS, lead, zinc, and nitrate plus nitrite are significantly reduced from previous years. For every contaminant except BOD, significant reductions are present when comparing the inflow to the wetland outflow. The largest reductions can be found in TKN, nitrate and nitrite, TSS, and fecal coliform. This indicates that the wetland is improving water quality in the downstream channel.

In the Fall of 2005 a new site was chosen for the biological and physical monitoring on a tributary to Mattawoman Creek located between Berry Road and Acton Lane. The site was chosen because it was identified within the Acton-Hamilton area in the Charles County Watershed Restoration plan. The site was monitored in the Fall of 2005 to establish baseline conditions. Monitoring continued in 2007 through present to include geomorphic and biological assessments. The complete history of the monitoring is provided in the 2009 report.

Physical monitoring included an analysis of channel substrate, stream cross-sections, and a stream habitat assessment. An annual comparison of the stream profile was not done and should be provided in future years. Channel cross-section data show no difference at the top of bank and very small differences in bankfull elevation between the 2005 through 2008 surveys. The substrate is highly mobile and extensive point bar formations, channel aggradation, and some finer sedimentation in the pools have been noted. The channel is slightly entrenched and experiences overbank flows in the floodprone zone regularly.

The physical habitat assessment rated the habitat for both fish and benthic macroinvertebrates at the midrange to suboptimal. From the baseline observations to 2009, conditions appear to have generally degraded in the study reach. Extensive bar formations and excessive algae have been consistently observed. Brown algae was found on the channel bed in 2007, floating and green algae was observed in 2008, and attached algae was found on 90% of the reach in 2009. Benthic scores have returned to the "Poor" range after receiving a score of "Fair" in 2008. Water quality has decreased from 2008 levels with lower dissolved oxygen levels and higher conductivity and turbidity. These conditions are very likely due to the lack of stormwater management in this watershed.

Charles County continues to perform comprehensive chemical, biological, and physical monitoring. The information is detailed and complete. MDE commends the County for moving the monitoring locations to areas designated for watershed restoration. The chemical data at Arthur Middleton Elementary School is already providing useful information with respect to the completed restoration project. Charles County may want to consider performing biological and physical monitoring at this location in order to better evaluate the effectiveness of the restored wetland.

The biological and physical data at the Acton-Hamilton site provide baseline conditions from 2005 to present. This information will be very useful in evaluating the effectiveness of future restoration projects at this site. These projects are currently under design and are planned for construction in FY 2011 and propose to treat 18 acres of impervious area.

In 2003, the County began monitoring the effectiveness of the *2000 Maryland Stormwater Design Manual* (Design Manual). Monitoring occurs along a tributary to Piney Branch draining 294 acres of agricultural and forested land use. Development in the watershed over the course of the study period includes the addition of North Point High School, William A. Diggs Elementary School, and the residential developments of Windsor Mill and Avalon. Three stormwater management ponds are located in the study area.

Stream profiles, cross-sections, and a stream gauge have been established and discharges continue to be analyzed and reported annually since 2003. Results show that the presence of wetlands, a broad floodplain, and beaver activity all contribute to the stability of the channel. In addition, vast forested areas were protected in the floodplain and the developed areas did not encroach on existing steep slopes. These development techniques offer enhanced protection to the stream and associated wetlands.

The purpose of the study however, is to evaluate the effectiveness of the stormwater ponds in protecting stream channels. As noted above, a number of factors contribute to the stability of the

system as a whole. A more detailed field evaluation of the tributary channels that convey runoff directly from the ponds to the main stream is appropriate. Assessing the stability of these outfall channels will more accurately evaluate the performance of the ponds. Any signs of erosion or sedimentation at these outfall points may require maintenance or additional action.

In addition to the above recommendation, MDE suggests that more information related to the original design of the ponds and the drainage area, forest, and impervious areas draining to each facility should be provided. The existing and proposed land use should also be provided for each development and each corresponding BMP along with the dates of construction completion for further analysis. All stormwater structures should be identified in the aerial photos for futher clarity. This information will provide a more complete evaluation of the performance of the ponds within the context of the ongoing development activities.

Management Programs

Charles County is required to submit detailed information addressing a wide variety of NPDES management programs. The County is required to maintain an acceptable stormwater management program and document all maintenance inspections, necessary corrective actions, and enforcement actions. The County continues to conduct preventative maintenance inspections of all stormwater management facilities on a triennial basis. These are reported per calendar year. Between 2005 and 2008, the County performed a total of 331, 365, 761, and 501 inspections in each respective year. Clearly the inspection effort has been improved over the last two years. In addition, 67 and 81 facilities were brought into compliance in 2007 and 2008. Overall, facilities typically require only routine maintenance as no major structural defects have been reported. However, the number of unacceptable facilities remains high each year (51% and 41% in 2007 and 2008). While progress has been made, additional efforts are needed to bring unacceptable facilities into compliance.

In addition to the BMP maintenance data, Charles County has also tabulated the stormwater management credits appled to single family lots on an annual basis. The data in the 2006 through 2009 reports show that stormwater credits were provided for the great majority of projects, sometimes eliminating the need for structural practices. The reports also show that rooftop runoff disconnections were the most prevalently used credit in each year by a wide margin.

Improvement also has been made with Charles County's illicit connection detection and elimination program. Field screening for illicit discharges was performed for 50, 101, 100, and 108 outfalls in each of the reporting years 2006 through 2009. The reporting requirements have been improved over this time period, however, even more importantly there have been improved efforts in recent years to track and correct the problems observed in the field. For example, in 2008 problems were observed at 15 outfalls. The 2009 report, itemized each of these problems and the actions taken toward resolution. This was tabulated in Appendix H. MDE recommends that Appendix H be updated annually to provide the follow up actions taken for illicit discharge problems discovered in prior years. Some of the problems addressed in 2009 were a result of investigations performed in 2006, 2007, and 2008. Specifically, outfalls 96 and 157 were found to have major erosion. These were noted in the 2007 and 2006 reports. Both of these were

repaired in June, 2009 at a total cost of $6,600. Pictures of the repair work will be helpful for formal documentation and future reference.

Outfall 179 was found to have severe erosion in 2006 and was repaired in the Spring of 2007. Pictures of the repair are provided in the 2007 annual report. Charles County should continue to monitor the downstream channel, as this has been an ongoing concern. It appears that this problem is going to be addressed as part of a stream restoration project in the Fox Run watershed. Design is planned for FY 2011 with construction in FY 2012.

The 2009 annual report noted that erosion was observed below outfall 14 and 139. In addition, the maintenance work at outfall 185 needs follow up. Outfall 185 discharges into a stormwater pond and is nearly entirely submerged. It appears that backwater from the pond could be contributing to the debris build up in the storm drain system. In addition, the aerial photo shows that a significant amount of disturbed land could also be contributing to the blockage in the storm drain system. For these reasons, MDE recommends that Charles County investigate the drainage area to all of the pond outfalls to determine if similar problems are observed. An assessment of the entire system as it relates to the pond function may also be warranted (i.e. whether there is excess sediment build up in the pond, and if this affects the storage capacity).

Outfall number 106 was observed to be undergoing severe erosion in the 2006 annual report. Engineering plans to address this issue are currently underway. The repair work is planned for FY 2011 as part of the Pinefield Community retrofit projects.

It is clear that the illicit detection connection and elimination program is doing a good job of identifying problems and following up with proper action to address the issues. Charles County should continue to follow up with action to address the problems noted in previous annual reports. MDE commends Charles County for combining efforts to meet restoration requirements with opportunities to fix problems observed under the illicit detection program.

Charles County continues to maintain comprehensive public education and outreach programs. These efforts have been excellent and include the Potomac River Watershed Cleanup, and partnerships with University of Maryland Cooperative Extension, and Master Gardeners to educate the public on water quality issues. Additionally, recycling, distributing information to citizens via the media and website, Adopt-a-Road, and Earth Day celebrations continue. Charles County also incorporates various permit requirements into opportunities for public outreach and education. Between January 2006 and April 2008 the County conducted a total of 11 outreach activities associated with wetland restoration projects at Gustuvas Brown and Arthur Middleton Elementary Schools. These activities involved workshops for teachers, wetland plantings and education sessions on the restoration activities. Teachers, parents, students, and community members participated in these activities.

At the beginning of the permit term, Charles County was encouraged to apply to MDE for delegation of erosion and sediment control enforcement authority. Charles County formally submitted an application for delegation in September of 2005, and was granted authority for erosion and sediment control in the Fall of 2006. At that time, personnel from both MDE and Charles County met in the field to provide a smooth transition for the new program. In October and November of 2007, MDE performed field reviews of active construction sites to evaluate the

program. Significant improvements and the progress made toward addressing violations were noted at that time. In September through November of 2009, MDE performed another evaluation of Charles County's erosion and sediment control program. MDE's review of the program included recommendations for continued improvements related to proper installation of controls and on-site stabilization. Overall, the review showed continued progress by Charles County and their erosion and sediment control program was found to be acceptable.

Additional elements of an acceptable erosion and sediment control program include education and documentation of construction activity in the County. Charles County should consider performing their own responsible personnel certification classes to educate field personnel on erosion and sediment control compliance. At this time, these classes are conducted by MDE. Information regarding earth disturbances exceeding one acre is consistently provided in the annual reports. This information should be submitted on a quarterly basis.

Overall, Charles County has improved its management programs and outreach efforts. The stormwater management, illicit connection detection and elimination programs, and erosion and sediment control programs have made considerable progress. The County is commended for its efforts to address these programs.

Watershed Restoration

Charles 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. This work establishes long-term water quality improvement programs.

Eight large capital projects and four outreach projects in three neighborhoods have been approved for implementation as outlined in the Watershed Restoration Study completed in 2004. Of these projects, two shallow marsh wetlands were constructed at Gustavus Brown and Arthur Middleton Elementary Schools. These were reported in 2008 with a total of 45 acres of impervious area restored. As stated above, the County has relocated its chemical monitoring site to the Carrington area to monitor the progress of these restoration efforts.

In order to meet the 10% impervious area restoration goal, a total of 260 acres of impervious area is required for water quality treatment. The 2009 annual report did not show any additional projects that were implemented to meet this goal, however, an action plan and budget estimates were presented in a table in Appendix K to show how the 10% restoration target would be accomplished. The table shows that engineering and design analysis was performed in 2009 and the beginning of 2010 for five additional projects, and their construction is planned for FY 2011. Charles County needs to stay committed to this action plan and continue to show further progress in future years.

Charles County is required to submit a detailed assessment for an additional watershed area equaling 10% of the County's untreated impervious area. The 2007 Watershed Study identified 10 study areas that could provide an additional 276 acres of impervious area to

meet this requirement. As a result of implementation of projects identified in the 2004 and 2007 Watershed Studies, a total of 20% of untreated impervious areas within the Development District will be restored.

Charles County is showing a good effort to meet these targets and Appendix K provides an action plan to meet the first 10% requirement. In addition, there are several projects that propose stream restoration in highly degraded and eroded streams. Charles County needs to quantify an appropriate credit for these restored areas. MDE will continue to provide suggestions and recommendations on the specific restoration plans and the credits applied to each project as more detail becomes available.

Charles County continues to make progress toward meeting its watershed restoration goals. It should be noted that future permit requirements will be more stringent. Charles County should be prepared to continue the efforts outlined in the watershed management plans, while also recognizing that the restoration requirements in the future will be even greater.

Program Funding

Charles County is required to maintain adequate program funding to comply with the conditions of its NPDES permit. The County continues to use a portion of its annual Environmental Service Fee and Recordation Fees for NPDES-related programs. Funds spent on NPDES related activities in FY2006 and FY2007 were approximately $155,000 and increased to $171,000 in FY2008. A small decrease in program spending occurred in FY2009, with a total of $130,000. A budget of $184,000 is projected for FY2010.

In addition, the Capital Improvement Project budget was increased from $7.69 million to $12 million to accommodate watershed restoration projects for the permit term. This funding appears adequate to meet existing NPDES permit requirements. However, future permit requirements will be more stringent. Charles County is encouraged to seek additional funding mechanisms in order to meet future permit requirements.

Assessment of Controls

Charles County is required annually to submit estimates of expected pollutant load reductions as a result of its management programs. The County continues to use PLOAD to estimate annual pollutant loads for total nitrogen, total phosphorus, total suspended solids (TSS), copper, zinc, and lead. The pollutant load computations use event mean concentrations (EMCs) developed by Charles County as part of the monitoring component of its permit, as well as from MDE's statewide NPDES monitoring averages. These numbers are used to estimate pollutant concentrations for each parameter listed above county-wide. The loading estimates are tabulated for each year between 2004 and 2009 and the results show that loading inputs stayed nearly the same for each year. Pollutant reductions for this time period were estimated by using removal efficiencies for each BMP type compiled from the Center for Watershed Protection, National Pollutant Removal Database, 2nd Edition (2000). This information was used to calculate pollutant loading reductions county-wide from 2004 to 2009. The data over this time period show significant increases in pollutant removal efficiencies. This is in part due to the increase in

available data for existing BMPs and the construction of new BMPs. These results are from improvements to the County's BMP database management.

The County's work with assessment of controls continues to be excellent. The use of PLOAD helps judge management program effectiveness and the County is commended for its efforts. It should be noted however, that because the pollutant removal data assume that BMPs are functioning properly, it is imperative that the County vigorously pursue efforts to bring unacceptable stormwater management facilities into compliance. Otherwise, the condition of existing BMPs could bring into question the results for the pollutant reduction analysis.

Summary

Charles County is commended for its continued efforts toward NPDES stormwater program implementation. Legal authority continues to be maintained, GIS data are comprehensive, chemical monitoring and reporting have improved, and educational programs are excellent. Commitment put forth toward the County's watershed restoration work has been outstanding and MDE looks forward to future monitoring results. Along with these programs, the County has addressed previous shortcomings by substantially improving its County's stormwater management and illicit connection detection and elimination programs. Moving forward, it will be important to consider evaluating the performance of nonstructural and environmental site design (ESD) practices. ESD is now required to be implemented to the maximum extent practicable (MEP) for all new development and redevelopment projects. Investigating the implementation of ESD will allow for a more complete evaluation of the effectiveness of Charles County's stormwater management program. Future consideration toward more vigorous permit requirements need to be considered in the County plans.