

2.0 Permit Requirements

C. Source Identification

Sources of pollutants in stormwater runoff countywide shall be identified and linked to specific water quality impacts on a watershed basis. The source identification process shall be used to develop watershed restoration plans. The following information shall be submitted annually for all County watersheds within the permit area in geographic information system (GIS) format with associated tables as required in PART V of this permit:

1. Storm drain system: all infrastructure, major outfalls, inlets, and associated drainage areas delineated;
2. Industrial/Commercial sources: industrial and commercial land uses and sites that the County has determined have the potential to contribute significant pollutants;
3. Urban best management practices (BMPs): stormwater management facility data including outfall locations and delineated drainage areas;
4. Impervious surfaces: public and private land use delineated, controlled and uncontrolled impervious areas based on, at a minimum, Maryland hierarchical eight-digit sub-basins;
5. Monitoring locations: locations established for chemical, biological, and physical monitoring of watershed restoration efforts and the *2000 Maryland Stormwater Design Manual*; and
6. Water quality improvement projects: projects proposed, under construction, and completed with associated drainage areas delineated.

PART V. PROGRAM REVIEW AND ANNUAL PROGRESS REPORTING

A. Annual Reporting

2. To enable MDE to evaluate the effectiveness of permit requirements, the following information shall be submitted in a format consistent with Attachment A:
 - a. Storm drain system mapping (PART IV.C.1);
 - b. Urban BMP locations (PART IV.C.2);
 - c. Impervious surfaces (PART IV.C.3);
 - d. Water quality improvement locations (PART IV.C.6);
 - e. Monitoring site locations (PART IV.C.4);
 - f. Chemical monitoring results (PART IV.F.1);
 - g. Pollutant load reductions (PART IV.E.4 and IV.F.1);
 - h. Biological and habitat monitoring (PART IV.F.1)
 - i. Illicit discharge detection and elimination activities (PART IV.D.3);

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- j. Responsible personnel certification information (PART IV.D.1);
- k. Grading permit information – quarterly (PART IV.D.2);
- l. Fiscal analyses – cost for NPDES related implementation (PART IV.G).

This section describes the Geographic Information System (GIS) data layers and the databases submitted with the Annual Report. The GIS data layers are described in Section 2.1. Section 2.2 describes the databases that have been created for the NPDES Report, along with data sources and limitations. Table 2-2 in this section identifies the file folders and locations of the mentioned GIS data layers and databases, along with additional databases that have been created to meet NPDES MS4 Permit requirements.

2.1 Source Identification – Geographic Information System Data Layers

The GIS Data Layers are discussed below along with the associated databases contained in the Attachment A Excel file. Table 2-1 summarizes the relationship between the section discussion, the GIS data layer, and the Attachment A Excel file database tab. MDE is requiring phase 1 MS4 permittees to use a new reporting method (the NPDES MS4 Geodatabase) as a replacement for Attachment A. The MS4 geodatabase must be fully implemented and used for all reports beginning with the next permit term (anticipated to begin in 2019). Baltimore County has begun migrating from Attachment A to the MDE NPDES MS4 geodatabase, as detailed in section 2.3.

Table 2-1: Relationship between Source Identification Topic, Section Discussion, and Attachment A Databases

Source Identification Topic	Section Discussion	GIS Layers	Attachment A Tab
Storm Drain System Mapping	2.1.1	outfall_maj.shp outfall_min.shp StormDrains geodatabase OutfallDrainageAreas.gdb: sdOutfallDrainageArea	A
Industrial/Commercial Sources	2.1.2	BUSINESS2014.shp	None
Urban Best Management Practices	2.1.3	SWMfacilities geodatabase: sdSWMPondPoint sdSWMDrainageArea	B
Impervious Surfaces	2.1.4	ImperviousSurfaces geodatabase: IMPERV_BASELINE_2002_FINAL ...RESTORATION_C	C
Monitoring Locations	2.1.5	MonitoringLocations geodatabase: ...Bacteria	E, E1, E2

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		...Biological_Geomorph_Monitoring ...Random ...Scotts_Level_Chemical_Monitoring ...Tidal ...Trash_Monitoring ...Trend ...SCOTTS_LEVEL_LU ...SCOTTS_LEVEL_BMP ...DrainageAreas	
Water quality improvement projects	2.1.6	WQIP geodatabase: many layers	D

2.1.1 Storm Drain System

The storm drain system GIS geodatabase has been submitted with this year’s report in the 2016 GIS Datalayers folder. Inside the URDL, the stormdrain system features were captured by a consultant digitizing construction drawings. Outside the URDL, the stormdrain system features were captured using GPS followed by editing in the office. The inside and outside the URDL data has been combined into a single geodatabase, found on the accompanying CD under Data 2016/2016 GIS Datalayers/Storm Drain System. The depiction of the storm drain system in this geodatabase remains incomplete. Notable omissions include outfalls for some systems, many parts of storm drain systems in older subdivisions, and most state and private storm drain systems.

The storm drain system is also represented by two files for the outfall locations, outfall_maj.shp and outfall_min.shp. The drainage areas to the major outfalls are presented in the OutfallDrainageAreas.gdb geodatabase. These three files can be found on the accompanying CD under Data 2016/2016 GIS Datalayers/Storm Drain System. The database for the storm drain system mapping with associated GIS coverage can be found in Attachment A tab A. Here the outfall ID is shown with the dimensions, watershed code, outfall type and associated drainage area and predominant land use.

2.1.2 Industrial/Commercial Sources

A database of businesses located in Baltimore County attributed with North American Industry Classification System (NAICS) codes was obtained from Infogroup during 2014, containing 32,049 records. Place of business addresses were geocoded, creating a GIS data layer with 27,875 records. The Excel file, GIS shapefile, and a code sheet are located under Data 2016/2016 GIS Datalayers/IndustrialCommercialSources.

Baltimore County is still evaluating the suitability of this data for identifying potential pollution sources. We intend to query the database for high pollution potential NAICS codes, and do field investigations on a sample of the records returned. Results will guide both the further

prioritization of field investigations, and the use of this particular database. Address accuracy and closed businesses are a concern: 4,174 records (13%) contained erroneous or incomplete addresses information and could not be geocoded. Similarly, the Baltimore County Department of Economic Development utilized the database for mailing and telephone campaigns, and found that ~20% of addresses were undeliverable and ~40% of phone numbers were out of service.

2.1.3 Urban Best Management Practices

The urban best management practices are represented by three feature classes (sdSWMPondPoint, sdSWMDrainageArea, and swmDAF) stored in the SWMfacilities.gdb geodatabase. These layers are located under Data 2016/2016 GIS Datalayers/Urban Best Management Practices. The locations layer displays the site of the stormwater management facilities as a point, while the drainage area layer displays the drainage areas to constructed facilities. The swmDAF feature class is the result of merging areas of overlap between drainage areas together, as is necessary for pollution load calculations and reporting via the NPDES MS4 geodatabase.

Attachment A tab B contains the database for the above mentioned data layers. It includes the structure type, location, land use, drainage areas, other attributes necessary for pollutant load and impervious surface credit calculations, and other information requested by MDE.

The location data layer will have errors due to incorrect coordinates in County databases. Some of this is historical, as until 2000 the County required engineers to submit drawings based on the Baltimore County Metropolitan District coordinate system. Conversion to Maryland State Plane resulted in errors in point locations and shifting of drainage areas.

2.1.4 Impervious Surfaces

The impervious surfaces in Baltimore County are represented by one layer showing the 2002 baseline, with ownership, watershed, and SWM BMP treatment credit level information. These layers are located under Data 2016/2016 GIS Datalayers/Impervious surfaces. The data were created based on aerials flown in 1995, 1996, 1997, 2001, and 2005, with modifications made based on razing and construction permits issued between those years and the 2002 baseline year. The data includes all residential, commercial, and industrial buildings, sheds, barns and other accessory structures, and roads and parking lots. It does not include residential driveways, except those longer than 200 feet. Sidewalks are not depicted.

Attachment A tab C contains the database for the impervious surfaces with associated GIS coverage. It includes the 2002 baseline impervious acreage and the amount treated by BMPs. The impervious acreage proposed and under construction for watershed restoration was not calculated for this reporting year.

2.1.5 Monitoring Locations

Monitoring locations for Baltimore County are presented in the five separate GIS files, one for chemical monitoring, one for biological monitoring, one for trash monitoring, one for bacteria monitoring and one for geomorphological monitoring. The files are located under Data 2016/2016 GIS Datalayers/Monitoring Locations in a GIS file geo-database.

Attachment A tab E contains the database for all current monitoring sites in Baltimore County, which includes water quality trend, bacteria, trash, geomorphic and biological. It includes the

site location, watershed code and associated drainage area (when possible). The additional databases E.1 and E.2 have been completed for this reporting year. They include the predominant land use and ranking of the multiple BMPs within each drainage area for the Scotts Level and Spring Branch chemical monitoring sites.

2.1.6 Water Quality Improvement Projects

The WQIP.gdb geodatabase is submitted with this report. When possible, data is stored with the geometry type indicated by the MDE NPDES geodatabase. The data in this geodatabase is used to calculate the pollutant load reductions and impervious surface restoration that result from stream restoration, shoreline enhancement, tree planting, impervious surface removal, street sweeping, storm drain and inlet cleaning, and septic practices. It is located in the Data 2016/2016 GIS Datalayers/Water quality improvement projects directory.

Attachment A tab D contains the database for the various water quality improvement projects. It contains the structure type, land use, drainage area (when possible), pounds removed by street sweeping and inlet cleaning, attributes necessary for pollutant load and impervious surface credit calculations, and other information requested by MDE.

2.2 Databases

Databases can be found in the Data 2016 directory, and includes Attachment A of the County's MS4 permit and additional databases. The database items are indexed in Table 2-2.

2.2.1 Chemical Monitoring Results

Databases containing the storm event and baseflow monitoring data from Scotts Level Branch can be found in the 2016 Chemical Data file folder. Also included is the file containing the Scotts Level Branch in-stream gage data and the calculated pollutant concentrations and loads at 15-minute intervals. The final database contains the calculated EMCs for each storm at the Scotts Level Branch in-stream monitoring site. The chemical monitoring site locations can be found in Attachment A tab E along with the results in tab F.

2.2.2 Pollutant Load Reductions

Pollutant load reductions from various County projects and County funded projects are shown in Attachment A tab G. It contains the pre-treatment load and load reductions by the associated BMP for total nitrogen, total phosphorus and total suspended solids.

2.2.3 Biological, Habitat, Geomorphic, and Bacteria Monitoring

Attachment A tab H contains the annual reporting database for biological and habitat monitoring. Several databases, stored in the Data 2016 folder under the 2016 Biological Data sub folder, contain biological macroinvertebrate, fish assemblage, and habitat data collected by Baltimore County in calendar year 2015. The sites include streams and tidal benthic sites. This data is presented in three excel files:

- 2015 RPs_Inhouse Sites.xlsx
- Compiled_BIBI Data_2015.xls
- Compiled_FIBI Data_2015.xlsx

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Four Excel spreadsheet files in the Data 2016 folder under the 2016 Geomorphic Data sub folder contain the geomorphological data. These files are:

- Scotts Level 2016.xls – This file contains data from the 20 cross section in Scotts Level Branch, including the overlay charts from previous years, and the calculations of cut/fill volumes
- Scotts Level Geo Pollutant Load Calcs.xls – Contains monitoring site characteristics and pollutant load calculations derived from the cut/fill volumes from Scotts Level 2015.xls.
- WRCX 2016.xls – Contains the cross section data for Windlass Run
- Powder Mill 2016.xls – Contains the cross section data for Powder Mill Run

Bacteria monitoring at trend and subwatershed prioritization sites is a vital part of the County's strategy for complying with bacteria TMDLs. Two excel databases are included with this report, in the Data 2016 folder, 2016 Bacteria Data subfolder. Data collected at trend sites from 2010 to 2015 are stored in Bacteria Monitoring Data – 2015.xlsx. Data collected at subwatershed prioritization sites during calendar year 2015 are stored in subwatershedprioritization-2015.xlsx.

2.2.4 Illicit Discharge Detection and Elimination Activities

The results from the illicit discharge monitoring program are presented in Attachment A tab I. Since the inception of the program only major outfalls were screened, however we initiated the screening of minor outfalls in CY 2012 and now report screening results for both major and minor outfalls.

2.2.5 Responsible Personnel Certification Information

A database of Responsible Personnel Certification is now maintained by MDE and cannot be queried by Baltimore County staff. This data is therefore no longer reported by Baltimore County.

2.2.6 Grading Permit Information

Grading permit information is presented in Attachment A tab K. This includes all grading permits from July 1, 2015 through June 30, 2016.

2.2.7 Fiscal Analyses

This reporting requirement has been superceded by the Financial Assurance Plan requirement in Annotated Code of Maryland, Environment Article §4-202.1(J). Baltimore County's Financial Assurance Plan was delivered to MDE earlier in 2016.

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Table 2-2: File locations of data layers and databases

Databases	GIS Layer	GIS layer folder	Attachment A EXCEL file Tab	Data folder
Storm drain system mapping	Y	2016 GIS Datalayers/Storm Drain System	A	
Industrial and Commercial Facilities	Y	2016 GIS Datalayers/Industrial Commercial Sources	not applicable	
Urban BMP locations	Y	2016 GIS Datalayers/Urban Best Management Practices	B	
Impervious Surfaces	Y	2016 GIS Datalayers/Impervious Surfaces	C	
Water quality improvement projects	Y	2016 GIS Datalayers/Water Quality Improvement Projects	D	
Monitoring sites	Y	2016 GIS Datalayers/Monitoring Locations	E, E1, E2	2016 Geomorphic Data
Chemical monitoring results			F	2016 Chemical Data
Pollutant load reductions			G	
Biological & habitat monitoring			H	2016 Biological Data
IDDE activities			I	
Responsible personnel certification			J	
Grading Permits			K	
Fiscal Analysis			L	
MS4 Geodatabase	Y	2016 GIS Datalayers\Urban Best Management Practices	N/A	

2.3 NPDES MS4 Geodatabase Migration

Complying with the MS4 geodatabase requirement will require modifications to County information systems and business processes. Baltimore County views the NPDES MS4 geodatabase requirement as not just a new reporting requirement, but also as an opportunity to improve and streamline existing systems and procedures for MS4 compliance documentation and restoration tracking. Work relevant to the MS4 permit is distributed across many County agencies, thus information systems should be coordinated across agencies, and so Environmental Protection and Sustainability (EPS) requested that the Office of Information Technology (OIT) assist in the MS4 geodatabase migration.

In 2016, Baltimore County hired consultants to prepare a formal needs assessment and requirements specifications document covering NPDES MS4 geodatabase reporting and a comprehensive NPDES tracking compliance system. The consultants inventoried and analyzed existing databases and information systems, and used stakeholder interviews to document existing MS4 business processes. The project was completed in December 2016, and key (high priority short timeframe) recommendations include:

- Migration of tracking systems for the following areas into a centralized data management system:
 - SWM facilities
 - BMP inspections
 - Tree planting (County directed)
 - Impervious surface removal
 - Stream restoration
 - Shoreline restoration
 - IDDE
 - Outfalls
 - Municipal facilities
- Maintenance of tracking systems for the following areas, with uploads into the data management system:
 - Pollutant load modelling
 - Monitoring
 - Street sweeping
 - Inlet and storm drain cleaning
 - Tree giveways
 - Watershed Association tree plantings
 - Septic practices
 - Grading permits
 - Municipal chemical application data
- Updates to SWM pond data intake sheets
- Mobile BMP inspection application
- Implement strategies to reduce impervious surface baseline
- Hiring contractual staff to assist in triennial BMP inspections
- Securing external lab services to assist in processing of monitoring samples
- Complete the standardization of outfall GIS data

The needs assessment and requirements specification document will be used to direct the next stage of the migration, which is the design and deployment of the NPDES tracking compliance system, scheduled to begin in 2017.

Although MDE is not requiring full implementation of the MS4 geodatabase until the next permit term, MDE has requested that the Phase I MS4 permittees submit some data in the MS4

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geodatabase format, beginning with this 2016 annual report. Refer to Table 2-3 below for a list of geodatabase items Baltimore County is and is not submitting with this 2016 annual report.

Table 2-3. NPDES MS4 Geodatabase Item Submittal Status

MS4 Geodatabase Item	2016 Submittal Status
AltBMPLine	Not submitted
AltBMPLineInspections	Not submitted
AltBMPPoint	Not submitted
AltBMPPointInspections	Not submitted
AltBMPPoly	Not submitted
AltBMPPolyInspections	Not submitted
BiologicalMonitoring	Not submitted
BMP	Not submitted
BMPDrainageArea	Not submitted
BMPInspections	Not submitted
BMPPOI	Not submitted
ChemicalApplication	Not submitted
ChemicalMonitoring	Not submitted
CountywideStormwaterWatershedAssessment	Not submitted
ErosionSedimentControl	Not submitted
FiscalAnalyses	Not submitted
IDDE	Not submitted
ImperviousSurface	Not submitted
LocalConcern	Not submitted
LocalStormwaterWatershedAssessment	Not submitted
MonitoringDrainageArea	Not submitted
MonitoringSite	Not submitted
MunicipalFacilities	Not submitted
NarrativeFiles	Not submitted
Outfall	Not submitted
OutfallDrainageArea	Not submitted
PermitInfo	Submitted, partially populated
QuarterlyGradingPermits	Submitted, fully populated
QuarterlyGradingPmtInfo	Submitted, partially populated
RespPersonnelCertInfo	Not submitted
RestBMP	Not submitted
RestBMPInspections	Not submitted
ShorelineManagementPractices	Not submitted

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StrRestProtocols	Not submitted
SWM	Not submitted