

Phase II Scope of Work

Introduction

Phase I of the Act 167 Mercer County Watersheds Stormwater Management Plan (SWMP) has been completed. Phase I included the background research and secondary source data collection to identify the various stormwater related issues affecting Mercer County. Phase I also included participation by the municipalities through several meetings of the Watershed Plan Advisory Committee (WPAC) and questionnaires for each municipality.

Phase II of the SWMP preparation includes detailed data collection, technical analysis, watershed modeling, Geographic Information System (GIS) preparation, municipal and public participation, and development of the SWMP.

To assist with development of the SWMP, the MCRPC will enter into an agreement for professional services with an engineering consulting firm (Consultant). The Consultant will be responsible for technical and non-technical tasks, as identified in the following sections.

Project Administration

The County [MCRPC and Mercer County Conservation District (MCCD)] will review and approve project invoices and progress reports, organize and attend meetings, and perform any other administrative duties required to fulfill the obligations of the Phase II project. The MCRPC will be responsible for administration of the overall project, including coordination with the Pennsylvania Department of Environmental Protection (PaDEP), municipalities, and the Consultant. The MCCD will participate in meetings and data collection as needed.

TASK A - Data Collection, Review, and Analysis

A.1 - Data Collection

The detailed data collection will begin with the collection and review of published information from each municipality and/or local, state, and federal agencies, including Comprehensive Plans, Ordinances related to stormwater management, Federal Emergency Management Agency (FEMA) Floodplain Maps and Reports, National Pollution Discharge Elimination System (NPDES) permits within the County, etc.

Information concerning existing and future conditions throughout Mercer County will be compiled from these agencies and from the WPAC and their questionnaires. Data to be collected will include, but may not be limited to:

1. Comprehensive land use plans.
2. Existing municipal ordinances.
3. Stormwater-related problems areas and proposed conceptual solutions.

4. Existing and proposed flood control projects.
5. Existing and proposed stormwater collection and stormwater control facilities, including a designation of those areas to be served by stormwater collection and control facilities, and an estimate of the design capacity and costs of such facilities.
6. Soils.
7. Geology.
8. Significant water obstructions.
9. Topographic and other readily available mapping.
10. Aerial photographs and topographic mapping, including the County GIS.
11. Previously completed engineering and planning studies.
12. Stream flow and rain gauge data and other water quality information.
13. FEMA FIS floodplain information.

Based on the results of the Phase I data collection, it is estimated that approximately 100 locations would require field investigations to assess in detail the problem areas identified by the WPAC. Information that might be gathered would include an assessment of visible damage, culvert sizes and possible limitations, photographs, streambank erosion estimates of severity (e.g. mild, moderate, severe) and lengths of eroded areas, etc.

The obtained technical data would also be reviewed for accuracy. The review of the data collected from the Phase I Questionnaire Form will also be reviewed for consistency and usability in the final SWMP.

A.2 - Municipal Ordinance Reviews/Evaluations

The municipal information collected and reviewed during Phase II would include Comprehensive Plans and Ordinances related to stormwater management, either published, adopted, or work in progress. The Consultant and the MCRPC would review and evaluate the various elements of the information to determine their impact on the development of the SWMP. Relevant information would be noted and summarized.

A matrix would be created that provides a comparison of similar topics between the municipalities and with the intent of aiding in the municipal education process. The objective of the matrix is to easily and effectively see the similarities and differences, as well as the consistency/inconsistency, between the various municipal ordinances in the County. The matrix will be used to develop ordinance provision recommendations for the various municipalities.

A.3 - Data Preparation for Technical Analysis

The Consultant will delineate watersheds and sub-watersheds on the project base mapping, as discussed in Task D.2. The Consultant will work with the MCRPC to determine which sub-watersheds will be established for modeling purposes. It is

estimated that seven (7) of the major streams and twenty (20) of the smaller streams would be modeled for this project.

The sub-watersheds will be delineated based on the following:

1. The location of existing significant stormwater management problems, as identified by the WPAC, during the field reconnaissance, or from data compiled in any previous studies or reports.
2. The location of significant regional stormwater and flood control obstructions such as highway and railroad bridges and culverts, or stormwater control facilities.
3. Confluence points of tributaries, as deemed appropriate and significant relative to stormwater management planning based on engineering judgment and good modeling practice.
4. Other points of interest, such as stream gauge or water quality monitoring stations, locations of water quality concerns, potential flood control project sites, significant outfall locations downstream of existing developments, or where significant development is anticipated and projected to occur.

All other data collected during the site reconnaissance and as described in the other tasks will be reduced and prepared in an appropriate manner for analysis.

A.4 – Timber Harvesting Regulations

The Consultant will research the standards and provisions regarding regulating timber harvesting in regards to stormwater management controls to ensure the protection of health, safety, and property of the people and Mercer County streams. Published regulations would be reviewed and BMPs would be suggested, as appropriate. The DCNR Bureau of Forestry would be contacted to discuss regulations and current control measures.

A.5 – Oil and Gas Well Development Regulations

The Consultant will research the standards and provisions regarding well drilling and development in regards to stormwater management controls to ensure the protection of health, safety, and property of the people and Mercer County streams. Published regulations would be reviewed and BMPs would be suggested, as appropriate. The PaDEP would be contacted to discuss regulations and current control measures

A.6 – Mining Regulations

Mercer County has a history of mining and the vestiges of many mines are still evident in many areas of the county. The locations of these and their affect on stormwater in these areas will be discussed.

The Consultant will research current mining regulations in regards to stormwater management controls to ensure the protection of health, safety, and property of the people

and Mercer County streams. The Consultant will coordinate with the PaDEP Mining Office to obtain and discuss published regulations regarding underground and surface mining of coal and other minerals. BMPs would be suggested, as appropriate.

TASK B - Technical Analysis

B.1 – Technical Standards and Criteria

The Consultant would perform a comprehensive analysis of existing stormwater management ordinances, Act 167 Plans for other counties, and the Pennsylvania Stormwater Best Management Practices Manual, December 30, 2006 (BMP Manual).

The Consultant will coordinate with county, state and federal agencies (e.g. Mercer County Conservation District, U.S. Department of Agriculture Natural Resource Conservation Service (NRCS), PaDEP, and engineering professionals) to analyze the various BMPs for their effectiveness in Mercer County. Recommendations of BMPs that are most effective in Mercer County will be made within the SWMP.

This task also includes the review of stormwater management ordinances and other Act 167 Plans to identify any unique and effective stormwater control techniques used in other counties.

The Consultant will work with the MCRPC to evaluate and establish stormwater control criteria on a watershed basis. The eight (8) significant watersheds with Mercer County include a wide range of factors that effect stormwater runoff and level of protection of water quality within the streams. These factors include the degree of urbanization, impervious surface, forests and woodlands, farming practices, geology and soil types, etc. Phase II will attempt to identify the sensitivity of streams within each watershed to stormwater runoff and the needs for more appropriate BMP implementation and stormwater controls. An important goal of the SWMP is to improve water quality and the overall health of Mercer County streams.

The proposed standards and criteria will address the following control requirements:

1. Apply to all areas covered by the SWMP.
2. Establish release rate percentages (if applicable) or other levels of control of runoff.
3. Specify design flood frequencies and computational methodologies for design of stormwater management measures.
4. Provide specifications for construction and maintenance of stormwater management systems (if applicable).
5. Provide conceptual solutions to both regional and local problems areas.
6. Prioritize strategies for long-term potential solutions.
7. Identify funding sources for correction of existing problems related to infrastructure.

8. Maintain consistency with concurrent studies including a summary of what tasks will be completed so as to avoid duplication of effort.
9. Provide a fee schedule for submission of permit applications, review of permit applications, construction inspections, periodic inspections, and enforcement actions.
10. An implementation strategy, including funding, for retrofit measures, if necessary.

B.2 – Watershed Modeling

Based on the results of Phase I, seven (7) of the major streams would be modeled using the U.S. Army Corps of Engineers (ACOE) Hydraulic Engineering Circular River Analysis System (HEC RAS) [Refer to Section 6.0 of the Phase I document]. The Consultant will also use appropriate software to model twenty (20) smaller streams where problem areas have been identified. The number of smaller streams may increase or decrease during the detailed data collection in Phase II.

The hydrologic and hydraulic modeling includes quantitative computations, and evaluations necessary to analyze runoff characteristics of the sub-watersheds under existing and future conditions. The modeling would also assist in developing the need and extent of release rate criteria for the watersheds. Sub-watersheds chosen will be based on existing problem areas or future development pressures based on input provided by the WPAC. Many factors would be used to determine if restrictions would be required for future release rates for each watershed. Some of the factors would include existing and future land use and land cover, history of flooding, degree of unstable streambanks, land development forecasting, etc.

Input data including rainfall information, drainage network layouts and capacities, travel times within sub-watersheds, significant obstructions, and GIS based data will be added to develop the selected hydrologic model.

Model Calibration

The use of the HEC RAS computer model requires the calibration of the existing models that were prepared by FEMA. Calibration efforts include the adjustment of the model parameters to accurately simulate the existing conditions of the watershed. Consideration will be given to all calibration techniques including, but not limited to: use of any available gauging information, comparison with rainfall and runoff information from similar watersheds, and comparison with Flood Insurance Study information. The County GIS mapping would be used as the base map for creating the cross sections. Limited field verification would be conducted to verify other input variables for the model.

Design Storm Selection

All hydrologic modeling of the streams would include analysis of the 2-, 10-, 25-, 50- and 100-year, 24 hour storm events. An analysis on downstream impacts during these storms will be performed.

Model Runs

The calibrated models will be run for the selected watersheds to analyze the existing problem areas, potential future development areas, and other locations deemed necessary to aid in development of the SWMP. This task may also involve performing a release rate analysis for the various watersheds and developing criteria and standards for the management of flooding events (2-, 10- and 25-year storms) and the extreme flooding events (50- and 100-year storms), to be determined by the WPAC.

The technical analysis will describe the analytical processes involved with developing a strategy to regulate existing and new land development and activities that may affect stormwater runoff. Since stormwater runoff has a direct impact on flooding, water quality, and groundwater recharge, this analysis will consider the following objectives:

- Implement non-point source pollution removal methodologies.
- Preserve and restore natural stormwater runoff regimes and natural course, current, and cross section of Waters of the Commonwealth, to the maximum extent practicable.
- Preserve, protect, maintain, and restore groundwater discharge and recharge areas.
- Protect stream channel and land areas from erosion.
- Restore and preserve flood carrying capacity of streams and maintain a natural stream corridor through the use of Natural Stream Channel Design techniques.

B.3 – Existing Problem Areas and Solutions

Based on the results of the hydrologic modeling of the watersheds and professional judgment, the Consultant will develop alternative conceptual solutions for the problem areas identified in Phase I and any other problems areas as identified by the WPAC during Phase II. The conceptual solutions will be presented as recommendations to the municipalities. It will be up to the individual municipality's discretion whether or not to implement the conceptual solutions to the problem areas. The municipality will also be responsible to acquire funding sources to implement the final solutions.

Stormwater problems will be restated as goals and objectives for the Act 167 planning process. The goals and objectives need to:

- Satisfy all regulatory requirements (including correcting water quality impairments related to stormwater or urbanization appearing in the EPA 303(b) and (d) lists, or impairments associated with approved Total Maximum Daily Loads (TMDLs)).
- Meet the purpose and policy of Act 167.
- Meet regulatory and permit requirements associated with the NPDES MS4 program, where applicable.
- Meet local requirements and objectives established by the WPAC.

The candidate stormwater management strategies will meet the identified goals and objectives (i.e. show how the proposed standards and criteria for the SWMP and Model Ordinance will meet the goals and objectives set by the WPAC) will be prepared and presented to the WPAC.

Water quality BMP information will be presented including recommendations for the implementation of water quality BMPs for land development and activities to minimize stormwater impacts from land development and activities. This educational effort will primarily involve discussions, presentations, and handouts on BMP technology to municipal officials during regularly scheduled WPAC meetings (refer to task C.2). Information available from PaDEP and other sources will be distributed.

Methods for controlling stormwater runoff quantity and quality will be evaluated and included in the Model Ordinance.

B.4 – Economic Analysis

The Consultant will prepare cost estimates in current dollars for each of the alternate solutions for the problem areas identified during the technical analysis (Task B.3). A cost benefit analysis and a list prioritizing the solutions will be prepared. The list prioritizing the solutions would be coordinated with the MCRPC and the municipalities, as appropriate. Input would be gained during the Task C work elements.

This task will also include an economic analysis of implementing the technical standards and provisions of the SWMP. A design example will be created and estimated costs will be associated with the design example to demonstrate how implementation of the standards and provisions can be cost effective to developers.

B.5 – Water Quality Impairments

The Consultant will research and identify water quality impairments throughout Mercer County from the 303(b) and 303(d) lists and designated TMDLs. Information gathered would be included in the project GIS, as applicable, and noted in the final SWMP. Possible solutions to the source of degradation of the stream would be identified and included in Task B.3 above.

TASK C – Public/Municipal Participation

C.1 – Project Team Meetings

The Consultant and MCRPC would meet bi-monthly to review the progress of work tasks and set goals for future tasks to meet the deadline of the project schedule. All meetings would be documented with meeting minutes.

C.2 – WPAC Meetings

Coordination and meetings with the WPAC will continue throughout the duration of the Phase II project. These meetings will be held to collect and distribute information on the

progress of the Phase II planning process and creation of the SWMP and model ordinance. It is anticipated that the WPAC would meet with the Consultant and MCRPC four times regionally (16 meetings), and as needed, throughout the duration of the project.

The Consultant and MCRPC would schedule a workshop to review the PaDEP BMP Manual to educate the municipalities on the PaDEP guidelines for water quality protection. The workshop would show examples of the design and construction of BMPs as they apply within Mercer County, including design calculations, review procedures, and approval of permit applications.

C.3 – Municipal Engineers Committee Meetings

A new committee would be formed that includes the engineering representatives for the municipalities. The Municipal Engineers Committee (MEC) would assist in providing and reviewing technical information pertinent to the County and the municipality they represent. Information gained would be recorded and distributed to all municipalities in the form of official Meeting Minutes.

The goal of the MEC includes the collaboration on the technical standards used to create the overall criteria within the SWMP and model ordinance that protects water quality in Mercer County streams. It is anticipated that the MEC would meet with the Consultant and MCRPC twice (2 times) throughout the duration of the project.

C.4 – Legal Advisory Committee Meetings

A new committee would be formed that includes the solicitors for each municipality. The Legal Advisory Committee (LAC) would assist in providing information and review on the development of the SWMP and model ordinance. It is anticipated that the LAC would meet with the Consultant and MCRPC twice (2 times) throughout the duration of the project.

C.5 – Municipal Coordination, Education, Assistance

The following presents the process for adoption of the SWMP:

One copy of the draft SWMP will be transmitted to each municipality and the PaDEP. The municipalities and PaDEP would then review the draft SWMP and provide comments to the MCRPC. The review comments would be tabulated and responses created and included as an appendix in the final SWMP.

Prior to final SWMP adoption, meetings will be held with the municipalities to identify specific ordinance changes and method(s) of incorporation of the standards and criteria into municipalities' existing ordinance framework. In addition, the meetings would also serve to provide clarification of any remaining questions or concerns that municipalities may have concerning the implementation of the SWMP. The MCRPC would lead the effort to work with the municipalities to educate, assist and implement the SWMP and model ordinance. The County would meet with municipalities, WPAC and LAC in small

groups to discuss the process for legally implementing the SWMP. A schedule of meetings would be developed during the Phase II project.

The County will hold a public hearing concerning the Mercer County Watersheds Stormwater Management Plan. A notice for the public hearing will be published at least two (2) weeks before the hearing date. The public hearing notice will contain a brief summary of the principal provisions of the SWMP and a reference to the sites and/or website where copies of the SWMP may be examined or purchased at cost. The MCRPC will review the comments received at the public hearing and appropriate modifications in the SWMP will be made as applicable. All comments received would be included as an appendix to the final SWMP.

The Mercer County Commissioners will vote by resolution on the adoption of the SWMP. The resolution will have to be carried by an affirmative vote by a majority of the Commissioners and should refer expressly to the maps, charts, textual matter, and other materials intended to comprise the SWMP. Upon positive resolution, this action will then be recorded on the adopted SWMP.

The County would then submit to the PaDEP three (3) copies of the adopted SWMP, GIS data layers, public hearing notice and minutes, official reviews by the municipalities, and the resolution of adoption of the SWMP by the County. The letter of transmittal will state that the County has complied with all procedures outlined in Act 167 and will request the PaDEP to approve the adopted SWMP. The MCRPC will submit to the PaDEP a current list of all names, addresses, and phone numbers of the municipalities, municipal engineers, and solicitors located in Mercer County. Subsequent to the PaDEP's approval of the SWMP, the MCRPC will post the SWMP on their website at www.mcrpc.com. Copies of the SWMP in print or on a compact disc (CD) will be made available upon request.

All backup material including hydrologic and hydraulic analyses of the watersheds will be retained at the MCRPC office for future use during SWMP updates or any other reference.

TASK D – Stormwater Management Plan Preparation

D.1 – SWMP Report Preparation

The Consultant will prepare the SWMP for review and approval by the MCRPC prior to submission to the PaDEP. The SWMP would include the model ordinance, graphics, and backup data, as described in the previous sections.

Components of the previous tasks will be included in the SWMP. The SWMP shall contain provisions that are necessary to efficiently and effectively manage stormwater runoff from land development or other activities in each municipality in a consistent manner. The stormwater runoff shall not adversely affect health, safety, property, and water quality. In addition, the SWMP shall consider and be consistent with other existing

municipal, county, regional and state environmental and land use plans and local and state laws and regulations. The SWMP shall include the following:

- A description of the hydrologic characteristics of the sub-watersheds; the existing and future land uses and their impacts on stormwater runoff and stormwater collection systems; the available runoff control techniques and their efficiencies in the sub-watersheds; a list of significant obstructions; and available FEMA FIS floodplain information. The available floodplain information will either be included in the SWMP or their sources will be referenced.
- Based on the results of the sub-watershed modeling, the technical evaluation will result in the creation of criteria and standards governing the use of stormwater management controls throughout the watersheds. An important aspect of the technical components of the SWMP will be the delineation of watersheds with specific management strategies. Many factors will be included during development of the management strategies, including an evaluation of land development and land use activities on critical drainage points throughout Mercer County. Peak discharge tables from the hydrologic modeling and BMP tables and data on their effectiveness and applicability will be presented or referenced.
- Approximate floodplain limits for areas where detailed FIS studies are available. Where detailed flood control engineering plans for proposed remedial measures are available from municipality, county, or private agencies, a summary analysis and evaluation of those plans will be included in the SWMP. Where detailed plans are not available, preliminary recommendations relating to such measures will be provided.
- Recommendations for new drainage facilities to prevent future problems due to new land development and a discussion regarding inter-municipal arrangements for funding the projects will also be discussed.
- Priorities for Implementation. The conclusions and recommendations of the goals and objectives of the SWMP will be summarized. Recommended actions will be listed according to agency, municipality, or individual responsible for each action. Priority of recommended actions will be based on chronological order, importance, hydrologic significance, or other factors as may be appropriate. Possible funding sources would be included for municipal consideration.

D.2 – Project Mapping and GIS Preparation

The Consultant will obtain the best available topographic mapping and continue to build upon the GIS database that began in Phase I. The GIS would be used to assist in the analysis of various technical tasks, including hydrologic and hydraulic modeling and map production. The County GIS would be used as an additional data source. The final GIS developed for this project would be easily integrated into the County GIS at the end of the project.

The GIS data would include, but not be limited to the following layers:

- Base Mapping – the best available topographic mapping for Mercer County would be used as the foundation of the GIS. Mapping planimetrics (e.g. roads, streams, municipal boundaries, watershed boundaries, text, etc.) that are published and available would be displayed. The most accurate and current data would be merged into a seamless base map.
- Land Use/Land Cover Information – Current aerial photographs, GIS land use coverage, and any current zoning maps will be collected and formatted into the format required for hydrologic modeling based on NRCS land use classifications. Land development projects completed after the collection of the existing data will be added, to the extent possible and as necessary. The National Wetland Inventory (NWI) wetland coverage created by the U.S. Fish and Wildlife Service (USFWS) would be included in the land use cover data.
- Future Land Use Conditions – Projected planning information will be layered over existing land use mapping in an attempt to determine future land use and development for the next ten years, as available.
- Soils Information – The County Soils Survey maps will be modified to illustrate NRCS hydrologic soils groups (HSG) instead of individual soil types. Accurate HSG information is necessary for the accuracy of the hydrologic modeling.
- Digital Elevation Models – Digital Elevation Models (DEMs) will be utilized and evaluated for watershed and sub-watershed delineation and to assign slope category information to the sub-watersheds for which detailed modeling will be completed. The DEMs will be merged to form a seamless watershed map and projected to the appropriate coordinate system.
- Digital Raster Graphics (DRGs) – Ortho digital USGS topographical maps will be compiled and utilized to evaluate NRCS land use classifications and to determine the location of significant obstructions and problem areas.
- Geology – If available, digital geologic maps that include pertinent geologic features, such as bedrock types will be developed for the County and be extracted and displayed as part of the SWMP.
- Obstructions – Obstructions will be located on the appropriate base map and data or attributes will be attached or linked to the locations.
- Problem Areas, Flood Control Structures, and Stormwater Management Facilities – These items will be located on the appropriate base map and data or attributes will be attached or linked to the locations.
- Floodplains – Available FEMA FIS floodplain mapping will be transposed to the appropriate base map and displayed with the development in Mercer County.

A summary of data sources will be supplied (simplified Metadata) and will include data type (coverage, shape file, image), source, projection, and year.

D.3 – Reproduction Costs

The MCRPC will post the SWMP on their website at www.mcrpc.com. Copies of the SWMP report and graphics in print or on a compact disc (CD) will be made available upon request at costs necessary for copying and reproduction of the documents. Electronic versions of the Phase II report and graphics would be included in the reproduction costs.