IV. DRAINAGE PROBLEMS AND PROPOSED SOLUTIONS

A survey questionnaire was incorporated into the 2022 Plan Renewal work plan to obtain municipal input on how well the current Plan is working, how it could be improved, and to determine areas that may necessitate reevaluation. The questionnaire is also designed to solicit input from each municipality relative to specific problems in the watershed, as well as for the need for stormwater management in their particular area. The questionnaire, along with a summary of the purpose of Act 167 (which includes an emphasis on Act 167 goals as they relate to this watershed), was distributed to municipalities, watershed groups and other agencies and interested individuals. These questionnaires included broad questions such as "Do you have any issues with overbank (stream) flooding?," and specific questions on new problem areas and new needs within the watershed. An example of the questionnaire package is included as Appendix A of this document.

Because the most important part of the Act 167 planning process is the implementation of the Plan, another consideration in utilizing this questionnaire strategy is to develop interest by the responding municipalities for the need and the desire to actively implement stormwater management measures within their community. A summary of the stormwater related problems and the identification of properties affected by flooding incidents in each municipality is an important expected product of this study.

The overall evaluation of the municipal questionnaires which were received shows several occurrences of small stream flooding and stream bank erosion throughout the watershed during major storm events resulting in both private and public property damages.

These problems are more pronounced in the more populated areas most likely due to encroachments onto floodplain areas and undersized culverts or bridges. A large number of these stormwater related problems have been traced back to uncontrolled runoff from local and upstream areas, inadequate culverts or bridges, and obstructions in the system that are blocking the natural flow of stormwater. The DEP sponsored Stroudsburg/East Stroudsburg Levee project aids in flood control in this area as shown in Appendix D. The management district criteria are consistent with maintaining design flows for which the project was designed at this location.

An example of a problem stormwater hotspot area which was fixed is the Flory Pond area. East Stroudsburg Borough has reported flooding in the Flory Pond area. Flory Pond does not have an outlet; therefore, the flooding problem surrounding the pond is related to the increase in volume of runoff from new development as opposed to the increase in peak flow. The recharge requirements of this plan helped this situation, but a structural solution was needed to fix the problem. Pumps were installed to provide a discharge to Flory Pond to alleviate the flooding.

An additional problem of major concern in this watershed relates to water quality. Runoff from parking lots and streets contribute non-point source pollution to the storm sewers and eventually the streams. Due to the residential land use in the watershed, the area experiences contamination caused by residential nutrient runoff as well as soil erosion and stream bank erosion. Bacteria, nutrients, sediments and erosion have been identified as water quality problems in the watershed. Water quality problems have been identified as being a result of developed land non-point source pollution and sediment from stream bank erosion. In addition, habitat loss and eutrophication have also been reported. The following list summarizes the major problems for individual municipalities obtained from the municipal questionnaires and demonstrates the types of stormwater runoff and water quality problems in the watershed as well as where they occur in the watershed. Figure IV-1 of Appendix D is a map of stormwater problem areas and Table IV-1

summarizes the problems identified in the public questionnaires. See Appendix A for a sample of the questionnaire used to identify these problem areas and a more detailed summary of the responses received with references to the locations identified in Figure IV-1.

Table IV-1: Stormwater Problems by Municipality

Township	Most Severe Problems
Barrett Township	No reported problem areas
Chestnuthill Township	Localized & Sewer/Roadway Flooding
Coolbaugh Township	Sewer / Roadway Flooding
East Stroudsburg Borough	Localized & Sewer/Roadway Flooding
Greene Township (Pike County)	No reported problem areas
Hamilton Township	Roadway Flooding
Jackson Township	Localized Flooding
Middle Smithfield Township	Localized Flooding
Mt. Pocono Borough	No reported problem areas
Paradise Township	Roadway Flooding
Pocono Township	Roadway Flooding, Stream Flooding
Price Township	No reported problem areas
Ross Township	No reported problem areas
Smithfield Township	Roadway Flooding
Stroud Township	Sewer/Roadway Flooding, Localized Flooding, Stream Flooding
Stroudsburg Borough	Localized Flooding, Sewer/Roadway Flooding
Tobyhanna Township	Sewer/Roadway Flooding
Tunkhannock Township	No reported problem areas

Although some of these problems are not directly related to stormwater runoff, this stormwater management plan will coordinate with the programs that address some of these other problems.

Although the land use of the watershed has become more urbanized since the original Plan adoptions, the storm water management ordinance provisions to reduce post-development peak rates to pre-development peak rates of runoff have been implemented where it was found to be necessary. The goal of the original Plan was to maintain the existing conditions peak flows as of the adoption of the Plan. Plan implementation achieves these goals, as verified in the municipal survey. Therefore an extensive re-evaluation of hydrologic modeling and resulting standards was not warranted. In the 2003 plan update, the original percentage discharge requirement was modified to a Management District approach to address the smaller, more frequent storms that create water quality and stream bank erosion problems. It has been determined from WPAC input that under this update, the release rate concept of stormwater management was successfully being implemented and was not creating any problems.

Stormwater management planning is critical in the areas both affected and currently unaffected by stormwater problems in the Brodhead Creek and McMichaels Creek watershed. For areas which are currently being affected, the frequency of flooding is mainly during larger storm events. The Act 167 Plan can significantly address future, more frequent flooding problems in these areas by managing runoff from newly developing areas and by providing rainfall design values which address changing precipitation patterns. For areas currently unaffected by stormwater problems, the Act 167 Plan will provide controls on future development to aid in preventing future stormwater runoff problems. The plan is also being updated to incorporate

updated guidance and design rationale (i.e. NOAA Atlas 14 Point Precipitation Frequency Estimates, revised PaDEP BMP manuals, etc.) to address the effects of climate change producing shorter duration, higher intensity storms.

Any technical evaluations and revisions to standards will be performed with input from the advisory committee, municipal engineers committee and legal advisory committee as in regular plan preparations.