









SECTION XIV

RECOMMENDATIONS

Based on the findings and needs identified in the Pennridge Water Resources Study, it is recommended that the Pennridge Area Coordinating Committee (PACC) and its member municipalities move on to Phase III—Implementation, and take the Implementation Steps outlined in Section XV of this Plan, in order to successfully address the recommendations in **Table XIV-1** below:

Table XIV-1
Recommendations of the Pennridge Water Resources Plan

<p> A. Form a Pennridge Intermunicipal Water Resources Committee.</p> <p> B. Develop a Public Education and Awareness Program.</p> <p> C. Develop a Model Water Resources Management Ordinance.</p> <p> D. Update Municipal Act 537 Sewage Facilities Plans.</p> <p> E. Establish the Pennridge Area Watershed Monitoring Program.</p> <p> F. Conduct a Nonpoint Source Pollution Assessment.</p> <p> G. Develop a Source Water Protection Program.</p> <p> H. Prepare an Integrated Water Resource Plan (IRP) for the East Branch Perkiomen Creek watershed.</p>
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A brief summary of each of the recommended action items above is presented below. The reader is occasionally referred to other sections of the report or to an Appendix for more detail on certain topics discussed in the summaries.

Recommendation A. Form a Pennridge Intermunicipal Water Resources Committee

It is recommended that multimunicipal cooperation and coordination continue among the eight municipalities, particularly in regard to managing water resources. Thus far, the coordination among the eight municipalities making up the Pennridge Area Coordinating Committee (PACC) has been a tremendous accomplishment and should be commended. The committee provides coordination efforts and guidance on complex issues that cross municipal boundaries. Because implementation of consistent ordinances, procedures and follow-up is difficult on a municipality-by-municipality basis with each municipality acting on its own, one option that the PACC should consider is to form an official agency providing it with administrative, financial, and legal authority to regulate. For discussion purposes, let us say that PACC and its municipalities would

achieve multimunicipal cooperation and coordination “nirvana” by creating a legal instrument called the *Pennridge Intergovernmental Cooperation Agreement* (PICA). Such an instrument would legally bind and empower the municipalities to work cooperatively toward the goal of sustainable water resources management. Such an agreement might charter an agency to handle water resources related issues in the Pennridge Area. It could collect fees through the land development process to pay for a full time professional staff person to review applications and the water resource protection plans.

Another organizational-related aspect that should be considered during Phase III—Implementation is that of providing incentives to business and industry to practice sustainable water resource management. A suggested way to do that would be to establish a promotional water resources conservation district. The district could, for discussion purposes, be called the “Pennridge Area Sustainable Water Resources Technology District.” The purpose of the district would be to promote industry, businesses, and land development that can prove that they would properly manage, reuse, conserve, and recharge all surface and groundwater on the site to existing or better than existing conditions. Incentives could be granted to prospective industry/developers in the way of tax relief, additional density, etc. (assuming water resources sustainability can still be achieved). New and innovative technology would also be promoted and those industries related to water resource protection could be actively recruited. One major advantage to this approach is that the education of the business, industry and citizens would be tremendous through the publicity received. Using this approach an organization such as the Pennridge Area Chamber of Commerce could foster the coordination of economic development with water resources protection.

Recommendation B. Develop a Public Education and Awareness Program

It is recommended that the public education and awareness program that was begun during Phase II of the planning process be continued throughout Phase III—Implementation. The program will continue to utilize the PACC’s link on Hilltown Township’s web site at <http://hilltown.org/pacc/> to disseminate information on the progress of Phase III—Implementation. Fact sheets will continue to be used to inform the public on the progress of plan implementation and will contain hyperlinks to appropriate web sites and reference documents. The BCPC staff will continue to provide updates at the monthly PACC meetings throughout Phase III. The need for and timing of public meetings and/or workshops will be assessed during Phase III with the intent of providing a forum where residents and other concerned parties can become informed and provide input to the plan implementation process. It is also recommended that information and education on the Plan and its implementation be made a part of the science curriculum in the Pennridge School District.

Recommendation C. Develop Model Water Resources Management Ordinance Language

In Pennsylvania the most common way for municipalities to regulate land use is through ordinances as provided for by the Pennsylvania Municipalities Planning Code (MPC). The MPC authorizes municipalities to enact ordinances regulating land development and land uses to (i) ensure the public health, safety and welfare, (ii) provide a safe, reliable, and adequate water supply, and (iii) preserve natural values and aquifers. Therefore, it is recommended that the

PACC and its member municipalities use the enabling power of the MPC to develop model water resources management ordinance language to achieve the three aforementioned objectives (i, ii, and iii).

What is envisioned for protection of the water resources of the Pennridge Area would be for municipalities to require the submission of a standardized “water resources protection site plan” for each proposed land development. The water resources protection site plan would incorporate all the existing water-related requirements such as stormwater management and floodplain management items; however, it would also include additional computations to balance land use with water budget. The plan would comprehensively describe specific performance requirements that, when implemented, would ensure that the development does not adversely affect water resources. This is consistent with DEP’s “Principles for Groundwater Pollution Prevention and Remediation” document.

Two alternatives were considered for implementing Recommendation C: (1) revise existing ordinances with new provisions; or (2) develop all-encompassing water resources management ordinance language that would absorb any other existing water-related ordinance language into it.

The recommended alternative under Recommendation C is to develop model Comprehensive Water Resources Management Ordinance Language (CoWaRMOL) to be put into place along with all the recommendations of this Plan. The CoWaRMOL should initially be developed as a model ordinance with each municipality then adopting the model, in full or in part, as their own with the intent that all participating municipalities will have adopted nearly identical ordinance language. The CoWaRMOL should be used to update and the municipal land use regulations (i.e., zoning and subdivision/land development ordinances), stormwater, floodplain, wellhead protection, and other applicable ordinances. In addition, the development of a water resources management manual (WRMM) to help guide municipal officials is also recommended.

Many of the current ordinances contradict one another since they were developed for a specific purpose. For instance, the model wellhead protection ordinance prohibits stormwater retention facilities in wellhead protection zones. However, in certain cases it may be advantageous to recharge relatively “clean” stormwater such as roof runoff in such zones. Conversely, once all the wellhead protection zones are delineated in the Pennridge Area, large areas could conceivably be within wellhead protection zones and stormwater discharges to those recharge zones might be prohibited.

The CoWaRMOL will need to be closely coordinated with the Act 167 Stormwater Management Plans for the four major watersheds in the Pennridge Area. Currently, there are two official, DEP-approved Act 167 plans in place in the Study Area. The *Neshaminy Creek Watershed Stormwater Management Plan* was completed in 1992 and is currently being updated. The *Tohickon Creek Watershed Stormwater Management Plan* was completed in 1999 and revised in 2001 to incorporate stricter water quality and infiltration requirements. The *East Branch Perkiomen Watershed Stormwater Management Plan* is expected to be completed by June 2003. The East Branch Perkiomen Plan will include mandatory groundwater recharge and water quality management standards that can be achieved by using Best Management Practices (BMPs) and

innovative site design. Act 167 standards that are up to the level of those in the Tohickon and East Branch Act 167 plans need to be incorporated into the CoWaRMOL to ensure consistency and cover the other portions of the Study Area.

The CoWaRMOL will also need to be coordinated with the municipal requirements for compliance with the Pennsylvania Floodplain Management Act (Act 166). Municipalities are required by Act 166 to adopt a floodplain management ordinance. However, the state’s model floodplain ordinance requires only the minimum to prevent flood damages during the 100-year flood. The municipal floodplain ordinances should be reviewed and/or modified to evaluate the impact of flooding on water quality and preventative measures should be developed as necessary.

The CoWaRMOL, by way of requiring a Water Resources Protection Site Plan for each proposed land development, will establish the basis for a **two-pronged approach** for effecting sustainable development in the Pennridge Area as follows:

1) The CoWaRMOL will tie the stormwater management requirements of the Study Area’s Act 167 plans to a unified approach for designing stormwater BMPs to meet pollutant removal goals, maintain groundwater recharge, reduce channel erosion, prevent overbank flooding, and pass extreme floods. Although the development and application of the CoWaRMOL will take place during Phase III—Implementation, a set of standards called **“Proposed Unified Stormwater Management Design Criteria”** has been drafted for consideration as part of this Plan. The preliminary criteria are described in detail in **Appendix H-1**.

2) To accomplish the goals of sustainable water resource management, the typical subdivision/land development process would be subject to specific plan submission requirements (in addition to the current typical requirements for land development, stormwater management, and erosion and sediment pollution control plans) that prove a “site design sustainable water budget” is achievable for the proposed site. A set of draft procedural requirements called **“Proposed Subdivision/Land Development Procedure for Sustainable Water Budget”** is presented for consideration in **Appendix H-2**. The specific procedural details will be worked out during Phase III—Implementation (refer to Task B in Section XV).

Recommendation D. Update Municipal Act 537 Sewage Facilities Plans

It is recommended that each municipality update its official Act 537 Sewage Facilities Plan in order to develop wastewater facilities policies consistent with the land use and water resources policies and procedures to be developed in the Comprehensive Water Resources Management Ordinance Language (CoWaRMOL). Updating Act 537 plans would also provide an opportunity to identify and set goals for eliminating infiltration/inflow problems, a major factor in water loss from the hydrologic balance.

Subsurface sewage disposal systems can cause nitrate nitrogen pollution of groundwater. Nitrate in excess of 10 mg/l (ppm) has been found to cause infant cyanosis caused by methemoglobinemia. Ten ppm is therefore set as the maximum concentration in drinking water.

DEP does not approve or disapprove permits for on-lot or small community on-lot subsurface disposal systems treating less than 10,000 gallons per day. These systems are regulated through the sewage enforcement officer (SEO) permit process, which is administered by the Bucks County Department of Health. However, a large, or a high density of, subsurface disposal systems can create values in excess of 10 mg/l nitrate nitrogen. Theoretically, 1.4 acres is necessary to isolate each sewage system serving a single family dwelling in a subdivision so that sufficient dilution of nitrate can occur; however, zoning for 1.4 acre lots is counter productive to conservation planning. The existing isolation distance requirement of 100 feet between a well and on-lot septic system may not be adequate to prevent water supply contamination in many instances.

Because the nitrate pollution issue is typically not specifically addressed in municipal Act 537 plans, the following are recommended as part of updating those plans:

- Evaluate all municipalities Act 537 plans for their suitability to prevent nitrate-nitrogen pollution.
- Establish standards for subsurface disposal for systems less than 10,000 gpd that would exceed the 10 ppm limit of nitrate nitrogen. A threshold should be established as to when a hydrogeologic evaluation would be required. These standards should establish the hydrogeologic investigation process. The legal framework for establishing these standards should be determined, whether it is the MPC or Act 537.
- Research and recommend nitrate-nitrogen reducing treatment systems for on-lot disposal. The typical septic tank/absorption field system does little to reduce the nitrate discharge.

Recommendation E: Establish the Pennridge Area Watershed Monitoring Program

It is recommended that a formal watershed monitoring program be developed and put into place to establish baseline data and maintain future information concerning watershed health. The program should include the following elements that will need to be developed over the two-year Phase III—Implementation time frame.

- Fluvial geomorphology (FGM) assessment for stream classification
- Macroinvertebrate study to assess aquatic stream health
- Stream flow gauge installations (10) by USGS
- Static well-water levels and
- Baseline water quality testing

Recommendation F. Conduct a Nonpoint Source Pollution Assessment

It is recommended that a nonpoint source pollution assessment be conducted during Phase III—Implementation to correlate the results with the water quality monitoring data, determine “hotspots” for nonpoint source pollution, and develop a long-term nonpoint source pollution management program. The information gathered through such an assessment will also be

valuable to the source water protection program (Recommendation G, below) and will aid municipalities in complying with the NPDES program.

The recognition of the importance of nonpoint sources of pollution has led to increased efforts over the last two decades to identify and quantify nonpoint source pollutant loads, especially at the watershed level. Typical techniques for determining the extent and magnitude of nonpoint source pollution problems include long-term surface water monitoring and computer-based simulation modeling. Due to the time and expense associated with surface water monitoring, however, simulation modeling has been relied upon more frequently to provide needed information for the development and implementation of nonpoint source control programs (Novotny and Olem, 1994).

Refer to **Appendix G** for more detail on the approach for conducting a nonpoint source pollution assessment.

Recommendation G: Develop a Source Water Protection Program

It is recommended that a source water protection program (SWPP) for both surface water sources and groundwater sources of community water supply systems be developed for the Pennridge Area. The program would be developed under the auspices of the Pennsylvania Department of Environmental Protection (DEP) and their source water protection guidelines. The approach that should be taken in Phase III—Implementation for the SWPP is summarized below and will be more fully developed during Phase III.

Surface Water Sources

DEP's Source Water Assessment and Protection Program (SWAPP) details the approach the State will take to support the development of voluntary local, source water protection program. DEP will be delineating public water systems source water assessment areas using available information as time and resources permit. DEP will be using the GIS-linked wellhead delineation software developed by the Environmental Resources Research Institute (ERRI) at Penn State University, in consultation with Borton-Lawson Engineering as a consultant to DEP. It is recommended that the PACC work closely with DEP to make the delineation of the wellheads in the Pennridge Area a priority, utilizing the ERRI/Borton-Lawson team to expedite and test the process. Furthermore, it is recommended that DEP make this area a pilot study for the state.

DEP's criteria for surface water protection zones are as follows:

- Zone A: ¼-mile-wide area on either side of a river or stream from an area ¼ mile downstream of the intake to a 5-hour time-of-travel (TOT) upstream.
- Zone B: A two-mile-wide area on either side of the river or stream extending upstream to a 25-hour TOT.
- Zone C: The remainder of the watershed.

As can be seen from the criteria, river/stream hydraulics and intermunicipal cooperation outside the study will be required to implement the surface water protection criteria.

The main purpose of DEP's SWAPP is to support the development and implementation of local, voluntary source water protection programs through public education, program promotions, technical assistance, agency coordination and most importantly, local grants for program development and implementation.

It is recommended that the PACC contact DEP to have the public water systems in the Study Area placed on the high priority list.

Groundwater Sources—Delineation of Wellhead Protection Areas

The *Bucks County Water Supply Plan and Wellhead Protection Study* established Wellhead Protection Zones I, II, and III for a representative number (7) of public water supply wells in Bucks County. In the county plan, wellhead protection zones were delineated for Hilltown Township Well #1, located on Keystone Drive near Hilltown Pike. The Telford Borough Authority (TBA) has a formal wellhead protection program that has been in place since 1998.

Zones I, II, and III have been defined as:

- Zone I: A 100 to 400-foot radius based upon site-specific source and aquifer characteristics.
- Zone II: Capture zone of the source which is a ½ mile radius unless a more rigorous delineation is conducted.
- Zone III: The land area beyond Zone II that contributes to recharge to the aquifer within the first two areas via surface water or groundwater.
Collectively, Zones I and II constitute the contributing area of the well.

It is recommended that wellhead protection zones be developed for the remaining public wells in the Pennridge Area. This can be accomplished by obtaining a wellhead protection grant or by having DEP perform the analysis through the Source Water Assessment and Protection Program (SWAPP).

The *Bucks County Water Supply Plan and Wellhead Protection Study* also has model ordinance language that regulates land uses in wellhead protection (WHP) zones and establishes reporting requirements. Several of the municipalities in the Study Area have well ordinances; however they are geared more toward construction standards for wells as opposed to source water protection. Therefore, it is recommended that the provisions in the Bucks County model WHP ordinance be incorporated into the Comprehensive Water Resources Management Ordinance Language (CoWaRMOL).

Well Siting Procedures

Current regulations (Act 537) require that on-lot wastewater disposal systems be installed no closer than 100 feet from wells. There are no regulations that set minimum distances that wells can be drilled from potential contamination sources. The well siting criteria presented in the

Bucks County Water Supply Plan and Wellhead Protection Study should be incorporated into the Comprehensive Water Resources Management Ordinance Language (CoWaRMOL).

Areawide Water Conservation and Reuse Plan

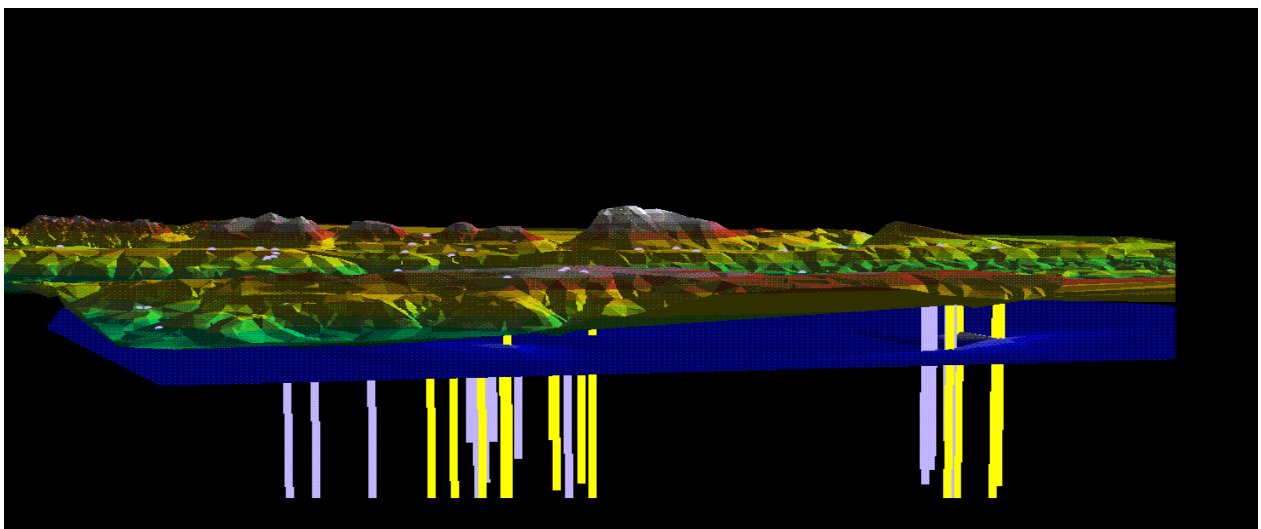
It is recommended that an areawide conservation and reuse plan be instituted as one of the first steps in implementing a water resources plan for the Pennridge Area. (At the time of this writing, an organized, consistent water conservation plan was not known to exist in the Study Area.) Grants should be pursued to purchase water saving devices to be installed for all users of community/public water systems. Water conservation devices should be mandatory as part of the building permit program for new construction and the use of water saving /reuse processes in industries should be encouraged.

Static Well Water Level and GPS Locations

It is recommended that the existing water table elevation should be determined in order to establish the basis for a long-term monitoring and assessment tool. Such a tool will aid in evaluating drawdown areas (i.e., areas where groundwater withdrawal is greater than replenishment) and establish a means to monitor groundwater levels in the future. To develop this program, the following measures are proposed.

- Identify the most reliable wells throughout the Study Area for data gathering efforts
- Obtain GPS locations, elevations, and depth to static water levels for the well network
- Convert collected data into a GIS database, calculate water table and 3-D image as shown in Figure XIV-1 so that the water table can be monitored
- Establish a long term sampling program for future analysis and monitoring that could include water quality sampling, defining the quality of the area's groundwater resources

Figure XIV-1. Sample 3-D Portrayal of Water Table Beneath the Pennridge Area



Recommendation H: Prepare an Integrated Resource Plan (IRP) for the East Branch Perkiomen Creek Watershed.

It is recommended that an Integrated Resource Plan (IRP) be prepared for the East Branch Perkiomen Creek watershed. The Delaware River Basin Commission (DRBC) requires that an IRP be prepared for each DRBC-designated watershed shown in **Figure I-2**. The East Branch Perkiomen is the logical first watershed in the Pennridge Area for an IRP because (1) it encompasses all or portions of each of the eight municipalities in the study area; and (2) it has an Act 167 stormwater management plan being developed concurrently. The Pennridge Water Resource Plan can be molded into an (IRP) by building on the strong foundation of information already gathered for the East Branch Perkiomen Creek watershed. The following is a listing of tasks that need to be undertaken during Phase III—Implementation in order to comply with the nine IRP requirements specified in the Groundwater Protection Area Regulations (GWPAR) that can be found in **Appendix C**. **Appendix D** contains DRBC’s Integrated Resource Plan (IRP) Guidance Document and a synopsis of the nine IRP requirements listed below.

1. Assess water resources and existing uses of water.
2. Conduct existing water resources assessment.
3. Conduct existing water use assessment.
4. Estimate future water demands and resource requirements.
5. Determine water use for water supply purposes.
6. Determine water use to maintain in-stream needs.
7. Assess the capacity of the subbasin to meet present and future demands for withdrawal and nonwithdrawal uses such as in-stream flows.
8. Evaluate supply-side and demand-side alternatives to meet withdrawal needs.
9. Identify potential conflicts and problems and outline plans and programs to resolve conflicts and meet needs.
10. Develop implementation plan.

Measurable Environmental Results Anticipated for Phase III—Implementation

The results that are anticipated to be achieved during Phase III—Implementation of this *Pennridge Water Resources Plan* are summarized in **Table XIV-2 Measurable Environmental Results Summary Chart**.

Insert

Table XIV-2 Measurable Environmental Results Summary Chart.