

SECTION IX

INFORMATION GAPS

A. Overview

The geographic information system developed for this project has enabled the participants to compile, analyze, and depict an enormous amount of data about the Study Area (see Section III Information Gathering and Mapping). The data and the analyses that were conducted enabled a thorough, comprehensive assessment of the study area. As this water resources plan was being prepared, additional data were identified that could provide useful information. This is a natural and progressive procedure. When data are assembled and analyzed, patterns begin to emerge which often warrant further investigation. In some cases, existing data may be outdated or it may provide only partial information (e.g., the data do not cover the entire study area or the data are incomplete). In other cases, the data have not yet been created.

As the *Pennridge Water Resources Plan* moves into Phase III – Implementation, the members of the Pennridge Area Coordinating Committee and other participants, including the public, should consider other data that may be readily available or that could be generated. Below is a brief summary of some additional GIS information that should be obtained, analyzed, and utilized throughout Phase III. Further discussion on information gaps relative to water quantity, water quality and flow (i.e., water budget) are also presented below.

B. GIS and Related Data

- *Individual Supply Well Data (Residential, Commercial, Industrial, Municipal)* Existing data are incomplete. While many well locations are known and have been plotted, the information associated with these wells is incomplete. Additional well information is needed, including (but not limited to) location, yield, depth and withdrawals.
- *Wellhead Protection Areas* Wellhead protection areas were delineated in 1995 as part of the *Bucks County Water Supply and Wellhead Protection Study*. However, only one well in the Pennridge Area, Hilltown Township Well #1 was part of that study and delineation. Wellhead protection areas should be delineated for all community water supply wells in the Pennridge Area during Phase III – Implementation.
- *Quarry Information* Quarries require substantial dewatering when in operation. The dewatering processes removes water from the aquifer and discharges to surface water. The dewatering process can potentially have a significant impact on local water resources. More data on quarry pumping needs to be obtained and analyzed in terms of its effect on the water budget of the study area. Efforts should be undertaken during Phase III – Implementation to establish a coordinative structure between and among municipalities and the PADEP (the Non-coal Surface Mining and Water Supply Management sections of DEP) to begin to

resolve issues related to quarrying and water supply.

- *Updated Aerial Photography* The digital aerial photographs used for parts of this project were the most recent ones available from the USGS. The flight dates vary from 1992 to 1995. The Delaware Valley Regional Planning Commission (DVRPC) undertook new flights in 2000. The new 2000 aerial photographs should be obtained in digital format when available.
- *Municipal Zoning* Municipalities are authorized by the PA Municipalities Planning Code (MPC) to establish zoning ordinances to guide land use. While specifics of the various ordinances vary, all municipalities are required to comply with the MPC that establishes basic criteria. An updated composite map of the study area would assist in determining how the study area will develop and what future land uses will be.
- *Approved Future Land Development* New developments (subdivisions, commercial, and industrial developments, etc.) are continually being proposed and approved throughout the study area. Areas currently approved for development should be identified and mapped to assess how they may impact water resources in the study area. Data on water use demand should be catalogued and maintained to establish an historical perspective.
- *Proposed Open Space* Bucks County government is actively promoting and supporting the development of open space. All eight Pennridge municipalities have county-approved open space plans and therefore qualify for county open space funds. Areas proposed for open space should be mapped to provide additional information on the future land uses in the study area. The *Pennridge Area Greenway Plan* is a good reference document for seeing an overview of the open space situation in the study area.

NOTE: The previous four items should be coordinated to establish a sort of “build-out scenario” from which to develop long-range estimates of future water supply needs.

- *Contaminated Sites* Areas known to be contaminated include industrial properties, leaking underground storage tank locations, EPA-designated Superfund sites, DEP-designated HSCA sites, and brownfields sites that are part of the Pennsylvania Land Recycling Program. All known contaminated sites in the study area should be identified, especially if groundwater or surface water have been impacted. If contaminant plumes (areas of contaminated groundwater) have been delineated, these areas could be mapped to illustrate potential problem areas. (Refer to the Pollution Incidents subsection below for further discussion of potential contaminant sources).
- *Landfills and Junk Yards* Operating and abandoned landfills and junkyards are also potential sources of contamination but may not have been tested or identified as contaminated. These areas should be delineated and mapped to assist in assessing water quality and potential contamination.

NOTE: The previous two items should be done in conjunction with Item 2 as part of Source Water Protection Program to be developed during Phase III – Implementation.

C. Water Quantity

While the Pennridge Area has a broad-ranging history of involvement in water quantity issues, much of the information needed to generate valid water budget values is not readily available. Some of this information exists but is not easily located; some needed information exists but is outdated, sporadic or inaccurate; and some necessary information has never been collected. Provided below is a listing of data deficiencies with recommendations regarding the desired information.

1. Stream Baseflow Data

The data required are stream water levels calculated on a daily basis from strategic locations within the study area. From these data are obtained baseflow values, which are important in defining how much water has entered the aquifers from infiltration. They also provide stormwater loss values, which are helpful for understanding runoff behavior under various surface and geologic conditions. The baseflow component can provide more precise DRBC 1-in-25-year low baseflow values than those currently used by DRBC from the Skippack Creek stream site. The baseflow data can also provide the Q 7-10 values considered by some as a water management limit. Stream monitoring will provide future benefit by creating benchmark data and, hopefully, future data with which to witness actual stream flows that are important to aquatic life and protect flooding concerns.

Some useful historical data were derived from the USGS recorder at the East Branch Perkiomen Creek station from 1983 to 1989; however, the data is for a small portion of the study area and is limited in duration. The station is still in operation but the data are nearly useless for our needs since PECO Energy is adding water pumped from the Bradshaw Reservoir (Delaware River) that cannot be reasonably removed from the record. Monthly stream baseflow readings are being taken in the Pleasant Springs Creek watershed by the Hilltown Water and Sewer Authority. While useful, they are not ideal to obtain accurate values.

Ideally, to obtain valid useable data for accurate water budget calculations, quality stream flow continuous measuring stations are needed at key locations. In addition, manual stations could be located at other important sites. The manual stations could be monitored by volunteers. The manual data would be correlated to the continuous data to further refine the quality of information available from the manual data. This should be performed for at least two years and ideally continue indefinitely into the future with a reduction in stream station monitoring over time.

2. Central Database System

A water budget relies heavily upon data regarding man-induced water movement through the study area. Provided is a listing of information required to create an accurate water budget:

- **Public Water Supply Well Production** Monthly and annual data are submitted to the BCHD/PA DEP and in some cases the DRBC. In addition, pipe leakage studies are often

performed by the larger water suppliers that would indicate the amount of well water returned to the shallow aquifer system.

- **Community Sewage Treatment Plant Discharges** Monthly and annual sewage treatment plant flows are recorded with reports sent to the BCHD/PA DEP and in some cases the DRBC. In addition, infiltration calculations are often performed by the larger sewer operators. This is useful to estimate loss of shallow groundwater from the watershed via the sewer piping system.
- **NPDES Wastewater Discharge Permits** Any NPDES permit to discharge wastewater into streams usually requires reporting on a monthly basis the amount of water discharged. PA DEP holds these records with the data filed by county.
- **DRBC Groundwater Withdrawal Wells (nonpublic)** Wells that collectively produce more than an average of 10,000 gallons per day, which are not used for drinking water purposes, such as golf course wells, do not get involved with the PA DEP. They report only to the DRBC their water use on an annual basis.
- **BCHD Septic System Permits** Permits are on file at the BCHD that will describe the anticipated volume of sewage proposed for homes and community systems. It could be presumed that each house has a standard amount of sewage discharge. It is important to understand the water use by larger community systems such as businesses, churches, and multiunit housing. These values are within the permit application that is on file with the BCHD but not easily attained without extensive file searching. It is also important to know what type of system is being used, i.e., spray, sand mound, or stream discharge.
- **Township Well Permits (Developments and Individual Wells)** Some of the municipalities require well tests for larger developments and small community systems. A general well test is also usually required for individual house wells prior to obtaining a building permit. This information is usually kept in individual property files held by the municipality.
- **Development Features** Data is needed on the amount of impervious surface created by each new land development, how runoff from impervious cover is diverted to detention basins, and whether sump pump discharges are connected to stormwater systems. If groundwater recharge systems exist, i.e., pervious pavement, what is the calculated annual return of water to the subsurface?

Some useful data were derived from the USGS recorder at the East Branch Perkiomen Creek station using streamflow measurements collected since the station began in 1983 until 1989. After 1989, PECO Energy began pumping water from the Delaware River into the stream upstream of the USGS

recording station. As a result, further data were not useful to determine stream base or low flows. The pumping water rates cannot simply be deducted from total stream flow. This is because, under natural conditions, the headwater stream had run dry at times. Now during similar dry periods, some of the pumped water will infiltrate into the underlying aquifer. During more wet periods, the stream baseflow will discharge more than natural as a result of the aquifer having been supplemented by pumped water. The storage effect cannot be reasonably compensated for as a result of the limited accuracy and resolution of the stream and pumping records.

Ideally, municipalities should require that they be sent copies of all the above-noted correspondence. This information should go into a central water database system where the data are compiled in a useable fashion (i.e., latitude/longitude, water parameters, flow value). The data could then be integrated into a GIS system to calculate current water budget conditions.

3. Precipitation Data

Currently the Sellersville National Oceanic and Atmospheric Administration (NOAA) precipitation station is the only valid station in the study area. Precipitation can vary widely, especially during summer storms. Ideally, stations that record rainfall intensity and totals should be strategically located across the study area. These could be relatively inexpensively installed at public buildings with the data compiled into a central database.

D. Water Quality

1. Public Well Water Quality

The data required are chemical analyses of drinking water parameters, required to be tested by the BCHD through the PA DEP. This represents a very wide range of chemicals, both natural and man-made. Depending upon the chemical parameter and the situation, water tests are required to be performed on a one- to three-year interval. This information is useful to monitor changes in water quality and areas of marginal quality. One shortcoming is that the water samples are collected after water treatment; therefore, for example, if a well is being properly treated for TCE, the data alone may not reveal the problem.

The laboratory analysis information is on file at the BCHD. Time should be allocated, in a joint effort with the BCHD, to obtain the recent information. To avoid going through numerous files in the future at the county level, municipalities should be copied and the data sent to a central database.

2. Private Well Water Quality

Many municipalities require basic testing of water quality from an individual private well prior to approving a building permit. In addition, tests may be required as part of a hydrogeologic impact study performed for a subdivision. The parameters required are often limited in scope and sometimes not pertinent. The data, when available, are usually within an individual property file and are not updated.

Time should be allocated to compile existing information and present it to a central database. Future permit data should be copied and sent directly to the central database. Consideration should be made to require updated water quality tests at the time of new ownership. A review should be made of the existing required water parameters and updated to include the following tests:

- Total plate count
- Fecal coliform
- Hardness as calcium carbonate
- Langlier Index of Corrosivity
- Nitrate as nitrogen
- Nitrite as nitrogen
- Benzene, toluene, ethylbenzene and xylenes (omp) (BTEX)
- Methyl tertiary butyl ether (MTBE)
- Trichloroethene (TCE)
- Perchloroethylene (tetrachloroethylene or PCE)
- 1,1,1 trichloroethane (111 TCE)
- Iron
- Manganese
- Arsenic
- Lead
- Odor
- Radon

Water samples are usually take from residential taps. Testing should be performed by a laboratory certified by and in a manner consistent with Pennsylvania Safe Drinking Water Standards. These tests typically cost about \$440.00 (total) to perform.

3. Pollution Incidents

Whenever a spill, leak, or waste material causes contamination of the soil or groundwater, technically the PA DEP is notified and may become involved. Individual files may be generated by the PA DEP or they may put the information into a general file stored by municipality. The BCHD is often copied on this correspondence. Local knowledge of these incidents would be helpful in the early stages of the cleanup to become aware of potential regional problems.

An example of the need for awareness of current problems is the MTBE groundwater contamination at the intersection of PA Route 113 and PA Route 313. Until the issue is resolved, residents in the area may not be aware of a need to test their wells, and a new water supply well may be permitted nearby with the potential of being affected or altering the plume of contamination to complicate the situation.

File searches should be performed for all existing data. Most of the existing data probably will reveal that the problems have been rectified. A system should be developed for municipalities to obtain all copies of future correspondence sent to PA DEP/BCHD and emergency spill teams, usually related to the local emergency service system.

Ideally, representative house wells throughout the study area should be tested for the parameters previously listed. This information will fill gaps where public well data is not available. The primary purpose is to locate areas that are currently of poorer water quality so that methods of avoiding or improving the situation may be offered.

E. Water Flow Data

Overall, local, accurate, readily available data on water resources is very limited. The only valid data obtained at this time for natural water movement is from the USGS East Branch Perkiomen Creek Station between 1983 and 1989 and some less refined data from Pleasant Spring Creek. From the stream data, a 1-in-25-year low annual stream baseflow can be indirectly calculated. Additional altered water use factors, such as well use and septic system discharges may be obtained through intensive review of individual files for house and septic system permits, as well as research of individual regulatory agency files.

There are two types of data that should be obtained to improve the understanding of water flow through the Pennridge Study Area:

- **Surface Water Stormwater and Baseflows** This will require the use of new stream gages located at strategic points throughout the Pennridge Study Area. **Figure XI-1** provides recommended stream monitoring stations based upon reasonable hydrogeologic parameters. Continuous stream flow measurements are ideally desired. As a result of expenses to install and monitor such stations (USGS estimates \$30,000 per station installation and \$15,000 per year satellite monitoring) less refined manual flow and gage height stations can be set up at secondary locations to save costs. These would primarily involve monitoring base and low flows by measuring stream gage heights.
- **Man Made Factors** The presence and influence of most of these factors can be obtained through detailed review of paper files and registration/documentation of future construction. It is believed that most municipalities have a lot of useful data, but it is not easily available. Local permits for future water users can specify desired information and the need for installation of flow meters and water use reporting.

In addition, data from the existing precipitation stations at the sewage treatment plants should be copied and sent to a central database. A few of these precipitation stations should be improved to use automated systems that monitor the intensity and duration of rainfall events and temperature. These can be connected to internet systems for quick public access. Soil tensiometer (soil moisture

readings), combined with evaporative pan measurements at key locations in the Pennridge Area would ultimately create a comprehensive picture of the water movement within the area. The more data that can be presented in electronic format, with rapid distribution at or near the time data is generated, will increase the uses, efficiency, and accuracy of the hydrogeologic model.

In lieu of using data from the immediate Pennridge study area, searches can be made for valid data close to the region or from empirical data that can consider the factors present in the Study Area. Usually, water budget factors related to surface issues (i.e., runoff coefficients) can most readily be transferred into the Pennridge Area with a high degree of confidence. It is the subsurface geologic and geomorphological factors that require the greatest site-specific data. A secondary benefit of gathering site-specific data is that the process of data collection often provides baseline information to compare to future measurements after a region has experienced a high degree of development. That is also the best form of quality control, i.e., to test the hydrogeologic water budget model after it has been put to use.