## SECTION XII

## ANALYSIS OF STUDY AREA DATA

### A. DEVELOPMENT IN FLOODPLAINS

Figure XII-1—Development in Floodplains illustrates the infringements of residential, industrial, and commercial areas in the 100-year floodplain. The Pennsylvania State University's Office of Remote Sensing generated the floodplain data using Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map/Federal Hazard Boundary maps. The developed areas were extracted from the existing land use data (Figure III-8).

There are about 4.2 square miles of floodplains within the Study Area (about 4 percent of the total Study Area). Of the 4.2 square miles of floodplain area, about 0.5 square miles (12 percent) are developed. Most of the development in floodplains is along the East Branch Perkiomen Creek in the Perkasie/Sellersville area. **Table XII-1** outlines development and land uses that infringe upon the floodplain.

**Table XII-1**
**Approximate Land Use Areas in Floodplains**

| | Acres | Square Miles | Percent of Total Floodplain |
|---|---|---|---|
| Commercial | 101 | 0.158 | 3.76 |
| Industrial | 23 | 0.036 | 0.86 |
| Institutional | <1 | 0.001 | 0.02 |
| Mining | 1 | 0.002 | 0.05 |
| High Density Residential | 24 | 0.037 | 0.89 |
| Medium - High Density Residential | 16 | 0.026 | 0.61 |
| Medium Density Residential | 17 | 0.026 | 0.62 |
| Low Density Residential | 136 | 0.213 | 5.06 |
| **Total** | **318** | **0.499** | **11.87** |

One of the biggest problems in floodplain management is the increase in peak runoff flow caused by development in the watershed. Recognizing this, the National Flood Insurance Program (NFIP) has developed a Community Rating System (CRS) to give communities credit for managing surface water outside the floodplain. Credit points are awarded to communities if they have the following:

- ordinance language requiring the peak rate of runoff from development to be no greater than the pre-development runoff rate
- a stormwater management plan (i.e., an official DEP-approved Act 167 Plan)
- requirement for a building's lowest floor to be elevated above flood levels
- erosion and sediment control regulations (consistent with DEP's Chapter 102)
- water quality regulations

The more credits a community can accumulate, the less its residents will have to pay for flood insurance. The FEMA publication *CRS Credit for Stormwater Management*, July 1996, provides further information on the community rating system.

## B. SLOPES ANALYSIS

The USGS digital elevation model (DEM) for Bucks County was used to derive contours and slopes (see Figure XII-2—Slopes and Contours). The vertical and horizontal data in the USGS DEM for Bucks County are measured in metric units. Each grid in the DEM measures 30 meters by 30 meters. The elevation assigned to each grid is measured in meters above mean sea level. The metric units (meters) were converted to English units (feet) and processed to derive elevation contours at 20-foot intervals. The DEM was further processed to derive the percent slope for each grid (vertical distance ÷ horizontal distance x 100). The percent slope for each grid is calculated using the elevation values for neighboring grids.

After the percent slope was determined for each grid, the slope values were grouped and a unique color assigned to each group. The group ranges are 0 to 8 percent, 8 to 12 percent, 12 to 15 percent, 15 to 25 percent and greater than 25 percent. The slopes are arranged in these groups to illustrate general restrictions for sewerage disposal and land development. Slopes that are 8 percent or less have few regulatory restrictions. Sewage system restrictions begin to apply at 8 percent. For example, standard subsurface systems may not be constructed in areas with slopes exceeding 8 percent. Elevated sand mounds and grassy area spray fields are not permitted in areas above 12 percent. Slopes above 25 percent are considered unsuitable for absorption areas and forested spray fields. Slopes above 15 percent restrict general land development activities due to engineering constraints.

Slopes within the majority of the Study Area are 8 percent or less. Steeper areas (8 to 25 percent) are found along the slopes of the some of the higher hills in West Rockhill, East Rockhill and Hilltown Townships and along the banks of the Tohickon Creek and Deep Run in Bedminster Township. Very little of the Study Area was calculated to have slopes greater than 25 percent (based on the 30 x 30 meter grid size). Small, localized areas with slopes greater than 25 percent probably occur with the study area but are too small to derive at the scale of the DEM.

Although on-site surveys are needed to accurately determine slope, the planning tools such as the USDA-NRCS soil survey and digital elevation models, help to assess the

overall "lay of the land." Figure XII-3—Surface Flow Direction provides an interactive view of how surface water moves throughout the study area.

## C. POLLUTION VULNERABILITY

Figure XII-4 -- Groundwater Recharge Potential provides a generalized illustration of the relative degree to which groundwater is vulnerable to contamination from releases of hazardous substances and pollutants at or near the ground surface. The pollution vulnerability was determined by comparing the general characteristics of the three geologic formations, hydrologic soil properties, and slopes of the Pennridge Area. Those factors control the rate at which contaminants could potentially reach and impact groundwater resources.

In this area, the Brunswick formation is the most fractured and most likely to transport water and contaminants. The Lockatong formation is similar in some ways to the Brunswick formation but is generally less fractured and less likely than the Brunswick to transport water and contaminants. Diabase is the least fractured and can actually provide a barrier to groundwater contamination in some areas. Soils are ranked according to their permeability. Soils with high permeability will transport contamination more deeply and more quickly than soils with low permeability. If an area is steeply sloped, contaminants will run off more quickly, reducing the likelihood of infiltration.

The groundwater pollution vulnerability mapping concept was used in the *Bucks County Water Supply and Wellhead Protection Plan* and was developed as a planning tool. The user needs to exercise caution when using that tool because it is by nature a generalized guide to assist in determining which areas are more or less suitable for development and which areas are more or less susceptible to groundwater pollution. The map should not be used for specific site planning or engineering purposes.

## D. OPPORTUNITIES AND CONSTRAINTS

Preliminary analyses were conducted using five factors:

- severely erodible soils
- wetlands
- floodplains
- slopes greater than 12 percent
- areas where pollution vulnerability is moderate-to-high.

Areas of diabase geology were also designated as presenting a constraint due to general low groundwater yield for wells drilled in that formation.

Figure XII-5—Generalized Opportunities and Constraints depicts in a general fashion the suitability for future development across the Pennridge Area.