

UPDATE REVISION TO CHADDS FORD TOWNSHIP'S
SEWAGE FACILITIES MANAGEMENT (ACT 537) PLAN

APPENDIX I

Pennsylvania Department of Environmental Protection - General Plan Contents Checklist".



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

Instructions for Completing Act 537 Plan Content and Environmental Assessment Checklist

Remove and recycle these instructions prior to submission

CHECKLIST INSTRUCTIONS

These instructions are designed to assist the applicant in completing the Act 537 Plan Content and Environmental Assessment Checklist.

This checklist is composed of three parts: one for "General Information," one for "Administrative Completeness," and one for "General Plan Content". A plan must be "administratively complete" in order to be formally reviewed by DEP. The General Plan Content portion of the checklist identifies each of the issues that must be addressed in your Act 537 Plan Update based on the pre-planning meeting between you and/or your consultant and DEP.

Use the right-hand column blanks in the checklist to identify the page in the plan on which each planning issue is found or to reference a previously approved update or special study (title and page number).

If you determine a planning issue is not applicable even though it was previously thought to be needed, please explain your decision within the text of the plan (or as a footnote) and indicate the page number where this documentation is found.

When information required as part of an official plan update revision has been developed separately or in a previous update revision, incorporate the information by reference to the planning document and page.

For specific details covering the Act 537 planning requirements, refer to Chapters 71 and 73 of DEP's regulations.

Wastewater projects proposing funding through the following sources must prepare an "Environmental Report" as described in the Uniform Environmental Review Process (UER) and include it with the plan submission designated as "Plan-Appendix A". The following funding programs use the UER process.

- The Clean Water State Revolving Loan Fund (PENNVEST, DEP, EPA)
- The RUS Water and Waste Disposal Grant and Loan Program (USDA-RD)
- The Community Development Block Grant Program (DCED, HUG)
- Other Federal Funding Efforts (EPA)

The checklist items or portions of checklist items required in the Act 537 Plan Update revision and that are also included in the UER process are indicated by shading. Most of the "Environmental Report" document may be constructed from the Act 537 Official Plan Update revision by using "copy & paste" techniques. The technical guidance document *Uniform Environmental Review Process* (UER) (DEP ID. 381-5511-111) is available electronically on DEP's website at www.dep.state.pa.us.

After Municipal Adoption by Resolution, submit three copies of the plan, any attachments or addenda and this checklist to DEP.

A copy of this completed checklist must be included with your Act 537 plan. DEP will use the "DEP USE ONLY" column during the completeness evaluation of the plan. This column may also be used by DEP during the pre-planning meeting with the municipality to identify planning elements that are not required to be included in the plan.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

Act 537 Plan Content and Environmental Assessment Checklist

PART 1 GENERAL INFORMATION

A. Project Information

1. Project Name Chadds Ford Township Act 537 Plan Update
2. Brief Project Description Update to the Township's current Act 537 plan

B. Client (Municipality) Information

Municipality Name	County	City	Boro	Twp
Chadds Ford Township	Delaware	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Municipality Contact Individual - Last Name	First Name	MI	Suffix	Title
Serock	Amanda			Manager
Additional Individual Last Name	First Name	MI	Suffix	Title

Municipality Mailing Address Line 1 10 Ring Rd	Mailing Address Line 2
Address Last Line -- City Chadds Ford	State ZIP+4 Pa 19317
Phone + Ext. 610-388-8800	FAX (optional) Email (optional) MGR@chaddsfordpa.gov

C. Site Information

Site (or Project) Name Chadds Ford Township	(Municipal Name) Act 537 Plan
Site Location Line 1	Site Location Line 2

D. Project Consultant Information

Last Name Schneider	First Name Michael	MI	Suffix
Title Township Engineer	Consulting Firm Name Pennoni Associates, Inc		
Mailing Address Line 1 One South Church Street	Mailing Address Line 2 Second Floor		
Address Last Line -- City West Chester	State ZIP+4 Pa 19382	Country USA	
Email mschneider@pennoni.com	Phone + Ext. 215-422-2461	FAX	

PART 2 ADMINISTRATIVE COMPLETENESS CHECKLIST

DEP Use Only	Indicate Page #(s) in Plan	In addition to the main body of the plan, the plan must include items one through eight listed below to be accepted for formal review by the department. Incomplete Plans will be returned unless the municipality is clearly requesting an advisory review.
_____	_____	1. Table of Contents
_____	_____	2. Plan Summary
_____	_____	A. Identify the proposed service areas and major problems evaluated in the plan. (Reference - Title 25, §71.21.a.7.i).
_____	_____	B. Identify the alternative(s) chosen to solve the problems and serve the areas of need identified in the plan. Also, include any institutional arrangements necessary to implement the chosen alternative(s). (Reference Title 25 §71.21.a.7.ii).
_____	_____	C. Present the estimated cost of implementing the proposed alternative (including the user fees) and the proposed funding method to be used. (Reference Title 25, §71.21.a.7.ii).
_____	_____	D. Identify the municipal commitments necessary to implement the Plan. (Reference Title 25, §71.21.a.7.iii).
_____	_____	E. Provide a schedule of implementation for the project that identifies the MAJOR milestones with dates necessary to accomplish the project to the point of operational status. (Reference Title 25, §71.21.a.7.iv).
_____	_____	3. Municipal Adoption: Original , signed and sealed Resolution of Adoption by the municipality which contains, at a minimum, alternatives chosen and a commitment to implement the Plan in accordance with the implementation schedule. (Reference Title 25, §71.31.f) Section V.F. of the Planning Guide.
_____	_____	4. Planning Commission / County Health Department Comments: Evidence that the municipality has requested, reviewed and considered comments by appropriate official planning agencies of the municipality, planning agencies of the county, planning agencies with area wide jurisdiction (where applicable), and any existing county or joint county departments of health. (Reference-Title 25, §71.31.b) Section V.E.1 of the Planning Guide.
_____	_____	5. Publication: Proof of Public Notice which documents the proposed plan adoption, plan summary, and the establishment and conduct of a 30 day comment period. (Reference-Title 25, §71.31.c) Section V.E.2 of the Planning Guide.
_____	_____	6. Comments and Responses: Copies of ALL written comments received and municipal response to EACH comment in relation to the proposed plan. (Reference-Title 25, §71.31.c) Section V.E.2 of the Planning Guide.
_____	_____	7. Implementation Schedule: A complete project implementation schedule with milestone dates specific for each existing and future area of need. Other activities in the project implementation schedule should be indicated as occurring a finite number of days from a major milestone. (Reference-Title 25, §71.31.d) Section V.F. of the Planning Guide. Include dates for the future initiation of feasibility evaluations in the project's implementation schedule for areas proposing completion of sewage facilities for planning periods in excess of five years. (Reference Title 25, §71.21.c).
_____	_____	8. Consistency Documentation: Documentation indicating that the appropriate agencies have received, reviewed and concurred with the method proposed to resolve identified inconsistencies within the proposed alternative and consistency requirements in 71.21.(a)(5)(i-iii). (Reference-Title 25, §71.31.e). Appendix B of the Planning Guide.

PART 3 GENERAL PLAN CONTENT CHECKLIST

DEP Use Only	Indicate Page #(s) in Plan	Item Required
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- | | | |
|-------|-------|---|
| _____ | _____ | <p>I. Previous Wastewater Planning</p> <p>A. Identify, describe and briefly analyze all past wastewater planning for its impact on the current planning effort:</p> |
| _____ | _____ | <p>1. Previously undertaken under the Sewage Facilities Act (Act 537). (Reference-Act 537, Section 5 §d.1).</p> |
| _____ | _____ | <p>2. Has not been carried out according to an approved implementation schedule contained in the plans. (Reference-Title 25, §71.21.a.5.i.A-D). Section V.F of the Planning Guide.</p> |
| _____ | _____ | <p>3. Is anticipated or planned by applicable sewer authorities or approved under a Chapter 94 Corrective Action Plan. (Reference-Title 25, §71.21.a.5.i.A&B). Section V.D. of the Planning Guide.</p> |
| _____ | _____ | <p>4. Through planning modules for new land development, planning “exemptions” and addenda. (Reference-Title 25, §71.21.a.5.i.A).</p> |
| _____ | _____ | <p>II. Physical and Demographic Analysis utilizing written description and mapping
(All items listed below require maps, and all maps should show all current lots and structures and be of appropriate scale to clearly show significant information).</p> |
| _____ | _____ | <p>A. Identification of planning area(s), municipal boundaries, Sewer Authority/Management Agency service area boundaries. (Reference-Title 25, §71.21.a.1.i).</p> |
| _____ | _____ | <p>B. Identification of physical characteristics (streams, lakes, impoundments, natural conveyance, channels, drainage basins in the planning area). (Reference-Title 25, §71.21.a.1.ii).</p> |
| _____ | _____ | <p>C. Soils - Analysis with description by soil type and soils mapping for areas not presently served by sanitary sewer service. Show areas suitable for in-ground onlot systems, elevated sand mounds, individual residential spray irrigation systems, and areas unsuitable for soil dependent systems. (Reference-Title 25, §71.21.a.1.iii). Show Prime Agricultural Soils and any locally protected agricultural soils. (Reference-Title 25, §71.21.a.1.iii).</p> |
| _____ | _____ | <p>D. Geologic Features - (1) Identification through analysis, (2) mapping and (3) their relation to existing or potential nitrate-nitrogen pollution and drinking water sources. Include areas where existing nitrate-nitrogen levels are in excess of 5 mg/L. (Reference-Title 25, §71.21.a.1.iii).</p> |
| _____ | _____ | <p>E. Topography - Depict areas with slopes that are suitable for conventional systems; slopes that are suitable for elevated sand mounds and slopes that are unsuitable for onlot systems. (Reference-Title 25, §71.21.a.1.ii).</p> |
| _____ | _____ | <p>F. Potable Water Supplies - Identification through mapping, description and analysis. Include public water supply service areas and available public water supply capacity and aquifer yield for groundwater supplies. (Reference-Title 25 §71.21.a.1.vi). Section V.C. of the Planning Guide.</p> |
| _____ | _____ | <p>G. Wetlands-Identify wetlands as defined in Title 25, Chapter 105 by description, analysis and mapping. Include National Wetland Inventory mapping and potential wetland areas per USDA, SCS mapped hydric soils. Proposed collection, conveyance and treatment facilities and lines must be located and labeled, along with the identified wetlands, on the map. (Reference-Title 25, §71.21.a.1.v). Appendix B, Section II.I of the Planning Guide.</p> |

_____ III. Existing Sewage Facilities in the Planning Area - Identifying the Existing Needs

_____ A. Identify, map and describe municipal and non-municipal, individual and community sewerage systems in the planning area including:

- _____ 1. Location, size and ownership of treatment facilities, main intercepting lines, pumping stations and force mains including their size, capacity, point of discharge. Also include the name of the receiving stream, drainage basin, and the facility's effluent discharge requirements. (Reference-Title 25, §71.21a.2.i.A).
- _____ 2. A narrative and schematic diagram of the facility's basic treatment processes including the facility's NPDES permitted capacity, and the Clean Streams Law permit number. (Reference-Title 25, §71.21.a.2.i.A).
- _____ 3. A description of problems with existing facilities (collection, conveyance and/or treatment), including existing or projected overload under Title 25, Chapter 94 (relating to municipal wasteload management) or violations of the NPDES permit, Clean Streams Law permit, or other permit, rule or regulation of DEP. (Reference-Title 25, §71.21.a.2.i.B).
- _____ 4. Details of scheduled or in-progress upgrading or expansion of treatment facilities and the anticipated completion date of the improvements. Discuss any remaining reserve capacity and the policy concerning the allocation of reserve capacity. Also discuss the compatibility of the rate of growth to existing and proposed wastewater treatment facilities. (Reference-Title 25, §71.21.a.4.i & ii).
- _____ 5. A detailed description of the municipality's operation and maintenance requirements for small flow treatment facility systems, including the status of past and present compliance with these requirements and any other requirements relating to sewage management programs. (Reference-Title 25, §71.21.a.2.i.C).
- _____ 6. Disposal areas, if other than stream discharge, and any applicable groundwater limitations. (Reference-Title 25, §71.21.a.4.i & ii).

_____ B. Using DEP's publication titled *Sewage Disposal Needs Identification*, identify, map and describe areas that utilize individual and community onlot sewage disposal and, unpermitted collection and disposal systems ("wildcat" sewers, borehole disposal, etc.) and retaining tank systems in the planning area including:

- _____ 1. The types of onlot systems in use. (Reference-Title 25, §71.21.a.2.ii.A).
- _____ 2. A sanitary survey complete with description, map and tabulation of documented and potential public health, pollution, and operational problems (including malfunctioning systems) with the systems, including violations of local ordinances, the Sewage Facilities Act, the Clean Stream Law or regulations promulgated thereunder. (Reference-Title 25, §71.21.a.2.ii.B).
- _____ 3. A comparison of the types of onlot sewage systems installed in an area with the types of systems which are appropriate for the area according to soil, geologic conditions, topographic limitations sewage flows, and Title 25 Chapter 73 (relating to standards for sewage disposal facilities). (Reference-Title 25, §71.21.a.2.ii.C).
- _____ 4. An individual water supply survey to identify possible contamination by malfunctioning onlot sewage disposal systems consistent with DEP's *Sewage Disposal Needs Identification* publication. (Reference-Title 25 §71.21.a.2.ii.B).
- _____ 5. Detailed description of operation and maintenance requirements of the municipality for individual and small volume community onlot systems, including the status of past and present compliance with these requirements and any other requirements relating to sewage management programs. (Reference-Title 25, §71.21.a.2.i.C).

- C. Identify wastewater sludge and septage generation, transport and disposal methods. Include this information in the sewage facilities alternative analysis including:
 - 1. Location of sources of wastewater sludge or septage (Septic tanks, holding tanks, wastewater treatment facilities). (Reference-Title 25 §71.71).
 - 2. Quantities of the types of sludges or septage generated. (Reference-Title 25 §71.71).
 - 3. Present disposal methods, locations, capacities and transportation methods. (Reference-Title 25 §71.71).

IV. Future Growth and Land Development

- A. Identify and briefly summarize all municipal and county planning documents adopted pursuant to the Pennsylvania Municipalities Planning Code (Act 247) including:
 - 1. All land use plans and zoning maps that identify residential, commercial, industrial, agricultural, recreational and open space areas. (Reference-Title 25, §71.21.a.3.iv).
 - 2. Zoning or subdivision regulations that establish lot sizes predicated on sewage disposal methods. (Reference – Title 25§71.21.a.3.iv).
 - 3. All limitations and plans related to floodplain and stormwater management and special protection (Ch. 93) areas. (Reference-Title 25 §71.21.a.3.iv) Appendix B, Section II.F of the Planning Guide.
- B. Delineate and describe the following through map, text and analysis.
 - 1. Areas with existing development or plotted subdivisions. Include the name, location, description, total number of EDU’s in development, total number of EDU’s currently developed and total number of EDU’s remaining to be developed (include time schedule for EDU’s remaining to be developed). (Reference-Title 25, §71.21.a.3.i).
 - 2. Land use designations established under the Pennsylvania Municipalities Planning Code (35 P.S. 10101-11202), including residential, commercial and industrial areas. (Reference-Title 25,§71.21.a.3.ii). Include a comparison of proposed land use as allowed by zoning and existing sewage facility planning. (Reference-Title 25, §71.21.a.3.iv).
 - 3. Future growth areas with population and EDU projections for these areas using historical, current and future population figures and projections of the municipality. Discuss and evaluate discrepancies between local, county, state and federal projections as they relate to sewage facilities. (Reference-Title 25, §71.21.a.1.iv). (Reference-Title 25, §71.21.a.3.iii).
 - 4. Zoning, and/or subdivision regulations; local, county or regional comprehensive plans; and existing plans of any other agency relating to the development, use and protection of land and water resources with special attention to: (Reference-Title 25, §71.21.a.3.iv).
 - public ground/surface water supplies
 - recreational water use areas
 - groundwater recharge areas
 - industrial water use
 - wetlands
 - 5. Sewage planning necessary to provide adequate wastewater treatment for five and ten year future planning periods based on projected growth of existing and proposed wastewater collection and treatment facilities. (Reference-Title 25, §71.21.a.3.v).

V. Identify Alternatives to Provide New or Improved Wastewater Disposal Facilities

A. Conventional collection, conveyance, treatment and discharge alternatives including:

1. The potential for regional wastewater treatment. (Reference-Title 25, §71.21.a.4).
2. The potential for extension of existing municipal or non-municipal sewage facilities to areas in need of new or improved sewage facilities. (Reference-Title 25, §71.21.a.4.i).
3. The potential for the continued use of existing municipal or non-municipal sewage facilities through one or more of the following: (Reference-Title 25, §71.21.a.4.ii).
 - a. Repair. (Reference-Title 25, §71.21.a.4.ii.A).
 - b. Upgrading. (Reference-Title 25, §71.21.a.4.ii.B).
 - c. Reduction of hydraulic or organic loading to existing facilities. (Reference-Title 25, §71.71).
 - d. Improved operation and maintenance. Reference-Title 25, §71.21.a.4.ii.C).
 - e. Other applicable actions that will resolve or abate the identified problems. (Reference-Title 25, §71.21.a.4.ii.D).
4. Repair or replacement of existing collection and conveyance system components. (Reference-Title 25, §71.21.a.4.ii.A).
5. The need for construction of new community sewage systems including sewer systems and/or treatment facilities. (Reference-Title 25, §71.21.a.4.iii).
6. Use of innovative/alternative methods of collection/conveyance to serve needs areas using existing wastewater treatment facilities. (Reference-Title 25, §71.21.a.4.ii.B).

B. The use of individual sewage disposal systems including individual residential spray irrigation systems based on:

1. Soil and slope suitability. (Reference-Title 25, §71.21.a.2.ii.C).
2. Preliminary hydrogeologic evaluation. (Reference-Title 25, §71.21.a.2.ii.C).
3. The establishment of a sewage management program. (Reference-Title 25, §71.21.a.4.iv). See also Part "F" below.
4. The repair, replacement or upgrading of existing malfunctioning systems in areas suitable for onlot disposal considering: (Reference-Title 25, §71.21.a.4).
 - a. Existing technology and sizing requirements of Title 25 Chapter 73. (Reference-Title 25, §73.31-73.72).
 - b. Use of expanded absorption areas or alternating absorption areas. (Reference-Title 25, §73.16).
 - c. Use of water conservation devices. (Reference-Title 25, §71.73.b.2.iii).

C. The use of small flow sewage treatment facilities or package treatment facilities to serve individual homes or clusters of homes with consideration of: (Reference-Title 25, §71.64.d).

1. Treatment and discharge requirements. (Reference-Title 25, §71.64.d).
2. Soil suitability. (Reference-Title 25, §71.64.c.i).

_____ _____ G. Non-structural comprehensive planning alternatives that can be undertaken to assist in meeting existing and future sewage disposal needs including: (Reference-Title 25, §71.21.a.4).

- _____ _____ 1. Modification of existing comprehensive plans involving:
 - _____ _____ a. Land use designations. (Reference-Title 25, §71.21.a.4).
 - _____ _____ b. Densities. (Reference-Title 25, §71.21.a.4).
 - _____ _____ c. Municipal ordinances and regulations. (Reference-Title 25, §71.21.a.4).
 - _____ _____ d. Improved enforcement. (Reference-Title 25, §71.21.a.4).
 - _____ _____ e. Protection of drinking water sources. (Reference-Title 25, §71.21.a.4).
- _____ _____ 2. Consideration of a local comprehensive plan to assist in producing sound economic and consistent land development. (Reference-Title 25, §71.21.a.4).
- _____ _____ 3. Alternatives for creating or changing municipal subdivision regulations to assure long-term use of on-site sewage disposal that consider lot sizes and protection of replacement areas. (Reference-Title 25, §71.21.a.4).
- _____ _____ 4. Evaluation of existing local agency programs and the need for technical or administrative training. (Reference-Title 25, §71.21.a.4).

_____ _____ H. A no-action alternative which includes discussion of both short-term and long-term impacts on: (Reference-Title 25, §71.21.a.4).

- _____ _____ 1. Water Quality/Public Health. (Reference-Title 25, §71.21.a.4).
- _____ _____ 2. Growth potential (residential, commercial, industrial). (Reference-Title 25, §71.21.a.4).
- _____ _____ 3. Community economic conditions. (Reference-Title 25, §71.21.a.4).
- _____ _____ 4. Recreational opportunities. (Reference-Title 25, §71.21.a.4).
- _____ _____ 5. Drinking water sources. (Reference-Title 25, §71.21.a.4).
- _____ _____ 6. Other environmental concerns. (Reference-Title 25, §71.21.a.4).

_____ _____ **VI. Evaluation of Alternatives**

_____ _____ A. Technically feasible alternatives identified in Section V of this check-list must be evaluated for consistency with respect to the following: (Reference-Title 25, §71.21.a.5.i.).

- _____ _____ 1. Applicable plans developed and approved under **Sections 4 and 5 of the Clean Streams Law or Section 208 of the Clean Water Act** (33 U.S.C.A. 1288). (Reference-Title 25, §71.21.a.5.i.A). Appendix B, Section II.A of the Planning Guide.
- _____ _____ 2. Municipal wasteload management **Corrective Action Plans or Annual Reports** developed under PA Code, Title 25, Chapter 94. (Reference-Title 25, §71.21.a.5.i.B). The municipality's recent Wasteload Management (Chapter 94) Reports should be examined to determine if the proposed alternative is consistent with the recommendations and findings of the report. Appendix B, Section II.B of the Planning Guide.
- _____ _____ 3. Plans developed under **Title II of the Clean Water Act** (33 U.S.C.A. 1281-1299) or **Titles II and VI of the Water Quality Act of 1987** (33 U.S.C.A. 1251-1376). (Reference-Title 25, §71.21.a.5.i.C). Appendix B, Section II.E of the Planning Guide.

_____ _____ D. Provide cost estimates using present worth analysis for construction, financing, on going administration, operation and maintenance and user fees for alternatives identified in Section V of this checklist. Estimates shall be limited to areas identified in the plan as needing improved sewage facilities within five years from the date of plan submission. (Reference-Title 25, §71.21.a.5.iv).

_____ _____ E. Provide an analysis of the funding methods available to finance the proposed alternatives evaluated in Section V of this checklist. Also provide documentation to demonstrate which alternative and financing scheme combination is the most cost-effective; and a contingency financial plan to be used if the preferred method of financing cannot be implemented. The funding analysis shall be limited to areas identified in the plan as needing improved sewage facilities within five years from the date of the plan submission. (Reference-Title 25, §71.21.a.5.v).

_____ _____ F. Analyze the need for immediate or phased implementation of each alternative proposed in Section V of this checklist including: (Reference-Title 25, §71.21.a.5.vi).

_____ _____ 1. A description of any activities necessary to abate critical public health hazards pending completion of sewage facilities or implementation of sewage management programs. (Reference-Title 25, §71.21.a.5.vi.A).

_____ _____ 2. A description of the advantages, if any, in phasing construction of the facilities or implementation of a sewage management program justifying time schedules for each phase. (Reference-Title 25, §71.21.a.5.vi.B).

_____ _____ G. Evaluate administrative organizations and legal authority necessary for plan implementation. (Reference - Title 25, §71.21.a.5.vi.D.).

_____ _____ **VII. Institutional Evaluation**

_____ _____ A. Provide an analysis of all existing wastewater treatment authorities, their past actions and present performance including:

_____ _____ 1. Financial and debt status. (Reference-Title 25, §71.61.d.2).

_____ _____ 2. Available staff and administrative resources. (Reference-Title 25, §71.61.d.2)

_____ _____ 3. Existing legal authority to:

_____ _____ a. Implement wastewater planning recommendations. (Reference-Title 25, §71.61.d.2).

_____ _____ b. Implement system-wide operation and maintenance activities. (Reference-Title 25, §71.61.d.2).

_____ _____ c. Set user fees and take purchasing actions. (Reference-Title 25, §71.61.d.2).

_____ _____ d. Take enforcement actions against ordinance violators. (Reference-Title 25, §71.61.d.2).

_____ _____ e. Negotiate agreements with other parties. (Reference-Title 25, §71.61.d.2).

_____ _____ f. Raise capital for construction and operation and maintenance of facilities. (Reference-Title 25,§71.61.d.2).

_____ _____ B. Provide an analysis and description of the various institutional alternatives necessary to implement the proposed technical alternatives including:

_____ _____ 1. Need for new municipal departments or municipal authorities. (Reference-Title 25, §71.61.d.2).

_____ _____ 2. Functions of existing and proposed organizations (sewer authorities, onlot maintenance agencies, etc.). (Reference-Title 25, §71.61.d.2).

_____ _____ 3. Cost of administration, implementability, and the capability of the authority/agency to react to future needs. (Reference-Title 25, §71.61.d.2).

- C. Describe all necessary administrative and legal activities to be completed and adopted to ensure the implementation of the recommended alternative including:
 1. Incorporation of authorities or agencies. (Reference-Title 25, §71.61.d.2).
 2. Development of all required ordinances, regulations, standards and inter-municipal agreements. (Reference-Title 25, §71.61.d.2).
 3. Description of activities to provide rights-of-way, easements and land transfers. (Reference-Title 25, §71.61.d.2).
 4. Adoption of other municipal sewage facilities plans. (Reference-Title 25, §71.61.d.2).
 5. Any other legal documents. (Reference-Title 25, §71.61.d.2).
 6. Dates or timeframes for items 1-5 above on the project's implementation schedule.
- D. Identify the proposed institutional alternative for implementing the chosen technical wastewater disposal alternative. Provide justification for choosing the specific institutional alternative considering administrative issues, organizational needs and enabling legal authority. (Reference-Title 25, §71.61.d.2).

VIII. Implementation Schedule and Justification for Selected Technical & Institutional Alternatives

- A. Identify the technical wastewater disposal alternative which best meets the wastewater treatment needs of each study area of the municipality. Justify the choice by providing documentation which shows that it is the best alternative based on:
 1. Existing wastewater disposal needs. (Reference-Title 25, §71.21.a.6).
 2. Future wastewater disposal needs. (five and ten years growth areas). (Reference-Title 25, §71.21.a.6).
 3. Operation and maintenance considerations. (Reference-Title 25, §71.21.a.6).
 4. Cost-effectiveness. (Reference-Title 25, §71.21.a.6).
 5. Available management and administrative systems. (Reference-Title 25, §71.21.a.6).
 6. Available financing methods. (Reference-Title 25, §71.21.a.6).
 7. Environmental soundness and compliance with natural resource planning and preservation programs. (Reference-Title 25, §71.21.a.6).
- B. Designate and describe the capital financing plan chosen to implement the selected alternative(s). Designate and describe the chosen back-up financing plan. (Reference-Title 25, §71.21.a.6)
- C. Designate and describe the implementation schedule for the recommended alternative, including justification for any proposed phasing of construction or implementation of a Sewage Management Program. (Reference – Title 25 §71.31d)

IX. Environmental Report (ER) generated from the Uniform Environmental Review Process (UER)

- A. Complete an ER as required by the UER process and as described in the DEP Technical Guidance 381-5511-111. Include this document as "Appendix A" to the Act 537 Plan Update Revision. Note: *An ER is required only for Wastewater projects proposing funding through any of the funding sources identified in the UER.*

ADDITIONAL REQUIREMENTS FOR PENNVEST PROJECTS

Municipalities that propose to implement their official sewage facilities plan updates with PENNVEST funds must meet six additional requirements to be eligible for such funds. See A Guide for Preparing Act 537 Update Revisions (362-0300-003), Appendix N for greater detail or contact the DEP regional office serving your county listed in Appendix J of the same publication.

DEP Use Only	Indicate Page #(s) in Plan	Item Required
_____	_____	1. Environmental Impact Assessment. (Planning Phase) The Uniform Environment Review (UER) replaces the Environmental Impact Assessment that was a previous requirement for PENNVEST projects.
_____	_____	2. Cost Effectiveness (Planning Phase) The cost-effectiveness analysis should be a present-worth (or equivalent uniform annual) cost evaluation of the principle alternatives using the interest rate that is published annually by the Water Resources Council. Normally, for PENNVEST projects the applicant should select the most cost-effective alternative based upon the above analysis. Once the alternative has been selected the user fee estimates should be developed based upon interest rates and loan terms of the selected funding method.
_____	_____	3. Second Opinion Project Review. (Design Phase)
_____	_____	4. Minority Business Enterprise/Women’s Business Enterprise (Construction Phase)
_____	_____	5. Civil Rights. (Construction Phase)
_____	_____	6. Initiation of Operation/Performance Certification. (Post-construction Phase)

I/A TECHNOLOGIES

PARTIAL LISTING OF INNOVATIVE AND ALTERNATIVE TECHNOLOGIES

TREATMENT TECHNOLOGIES

Aquaculture
Aquifer Recharge
Biological Aerated Filters
Constructed Wetlands
Direct Reuse (NON-POTABLE)
Horticulture
Overland Flow
Rapid Infiltration
Silviculture
Microscreens
Controlled Release Lagoons
Swirl Concentrator

SLUDGE TREATMENT TECHNOLOGIES

Aerated Static Pile Composting
Enclosed Mechanical Composting (In vessel)
Revegetation of Disturbed Land
Aerated Windrow Composting

ENERGY RECOVERY TECHNOLOGIES

Anaerobic Digestion with more than 90 percent
Methane Recovery
Cogeneration of Electricity
Self-Sustaining Incineration

**INDIVIDUAL & SYSTEM-WIDE
COLLECTION TECHNOLOGIES**

Cluster Systems
Septage Treatment
Small Diameter Gravity Sewers
Step Pressure Sewers
Vacuum Sewers
Variable Grade Sewers
Septic Tank Effluent Pump with
Pressure Sewers

UPDATE REVISION TO CHADDS FORD TOWNSHIP'S
SEWAGE FACILITIES MANAGEMENT (ACT 537) PLAN

APPENDIX II

MAPS

- Map 1 Chadds Ford Township Public Sewer Services Areas
- Map 2 Chadds Ford Township, Water Resources Map
- Map 3 Soils of Chadds Ford Township with Soil Data *by Natural Resources Conservation Service*
- Map 4 Prime Agricultural Soils in Chadds Ford Township
- Map 5 Historical Resources in Chadds Ford Township
- Map 6 Archeological Areas in Chadds Ford Township
- Map 7 Physiographic Provinces of Pennsylvania *by Commonwealth of Pennsylvania, Department of Conservation and Natural Resources, Bureau of Topographic and Geologic Survey*
- Map 8 Surficial Materials of Pennsylvania, *by Commonwealth of Pennsylvania, Department of Environmental Resources, Office of Parks and Forestry, Bureau of Topographic and Geologic Survey*
- Map 9 Limestone and Dolomite Distribution in Pennsylvania *by Commonwealth of Pennsylvania, Department of Natural Resources, Bureau of Topographic and Geologic Survey*
- Map 10 Density of Mapped Karst Features in South-Central and Southeastern Pennsylvania *by Department of Conservation and Natural Resources*
- Map 11 USGS Map
- Map 12 National Wetlands Inventory *by U.S. Fish and Wildlife Service*

FEMA Maps

- 42045C0064F – Delaware County, PA - Panel 64 of 250
- 42045C0151F – Delaware County, PA - Panel 151 of 250
- 42045C0152F – Delaware County, PA – Panel 152 of 250
- 42045C0154F – Delaware County, PA – Panel 154 of 250
- 42045C0156F – Delaware County, PA – Panel 156 of 250

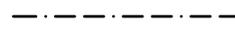
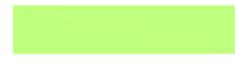
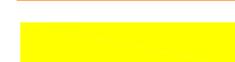
UPDATE REVISION TO CHADDS FORD TOWNSHIP'S
SEWAGE FACILITIES MANAGEMENT (ACT 537) PLAN

TABLES

- Table 1 Suitability of Soils for Conventional Septic Systems with Soil Data
 - Table 2 Suitability of Soils for Sand Mound Systems with Soil Data
 - Table 3 Suitability of Soils for Spray Irrigation Systems with Soil Data
- 2012 Water Data Report – Brandywine Creek at Chadds Ford, Pa

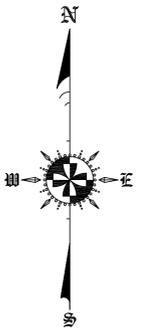
LEGEND

MAP 1 - PUBLIC SEWER SERVICE AREAS

-  STATE ROAD
-  TOWNSHIP ROAD
-  PRIVATE ROAD
-  STATE BOUNDARY
-  COUNTY BOUNDARY
-  TOWNSHIP BOUNDARY
-  RIGHT-OF-WAY
-  STREAMS
-  SEWER FORCE MAIN
-  SEWER GRAVITY LINE
-  KNIGHTS BRIDGE SERVICE AREA
-  TURNERS MILL SERVICE AREA
-  SPRING HILL FARMS SERVICE AREA
-  RIDINGS SERVICE AREA

THORNBURY TOWNSHIP

CHESTER COUNTY
DELAWARE COUNTY



WAWA STORE SERVED BY THORNBURY TOWNSHIP (DELAWARE COUNTY) BY LOW PRESSURE SEWER (PRIVATE AGREEMENT).

THORNBURY TOWNSHIP

BIRMINGHAM TOWNSHIP

DELAWARE COUNTY

KNIGHTS BRIDGE WWTP (PRIVATE)

PAINTERS CROSSING PS (PRIVATE)

ESTATES AT CHADDS FORD P.S. (PRIVATE)

WOODLAND DRIVE P.S.

1792-1798 WILMINGTON PIKE (28 EDUs)

1820 WILMINGTON PIKE (29 EDUs)

SPRING HILL FARM WWTP (PRIVATE)

RIDINGS WWTP CONCORD TOWNSHIP

RIDGE ASSOCIATES (28 EDU)

INTERMEDIATE (ECKMAN) P.S.

REMOTE (SMITH BRIDGE) P.S.

1386 Baltimore Pike (1 EDUs)

1361 BALTIMORE PIKE (1 EDU)

1392 Baltimore Pike (1 EDU)

COOPERS HAWK LANE (5 EDU)

160 RIDGE RD (5 EDUs)

89 RING ROAD (1 EDU)

1609 BALTIMORE PIKE (10 EDUs)

TURNERS MILL WWTP OPENED FEBRUARY 2008

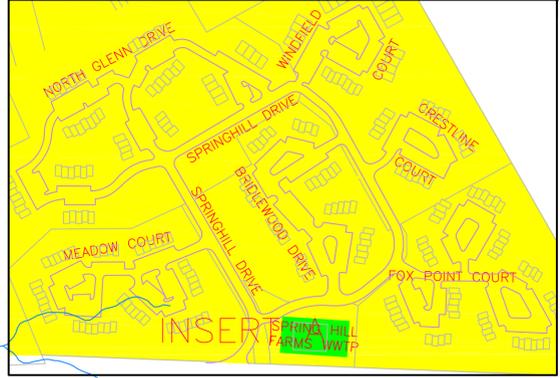
PENNSBURY TOWNSHIP

3 UPPER BANK DR (1 EDU)

CHESTER COUNTY

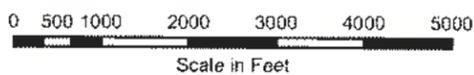
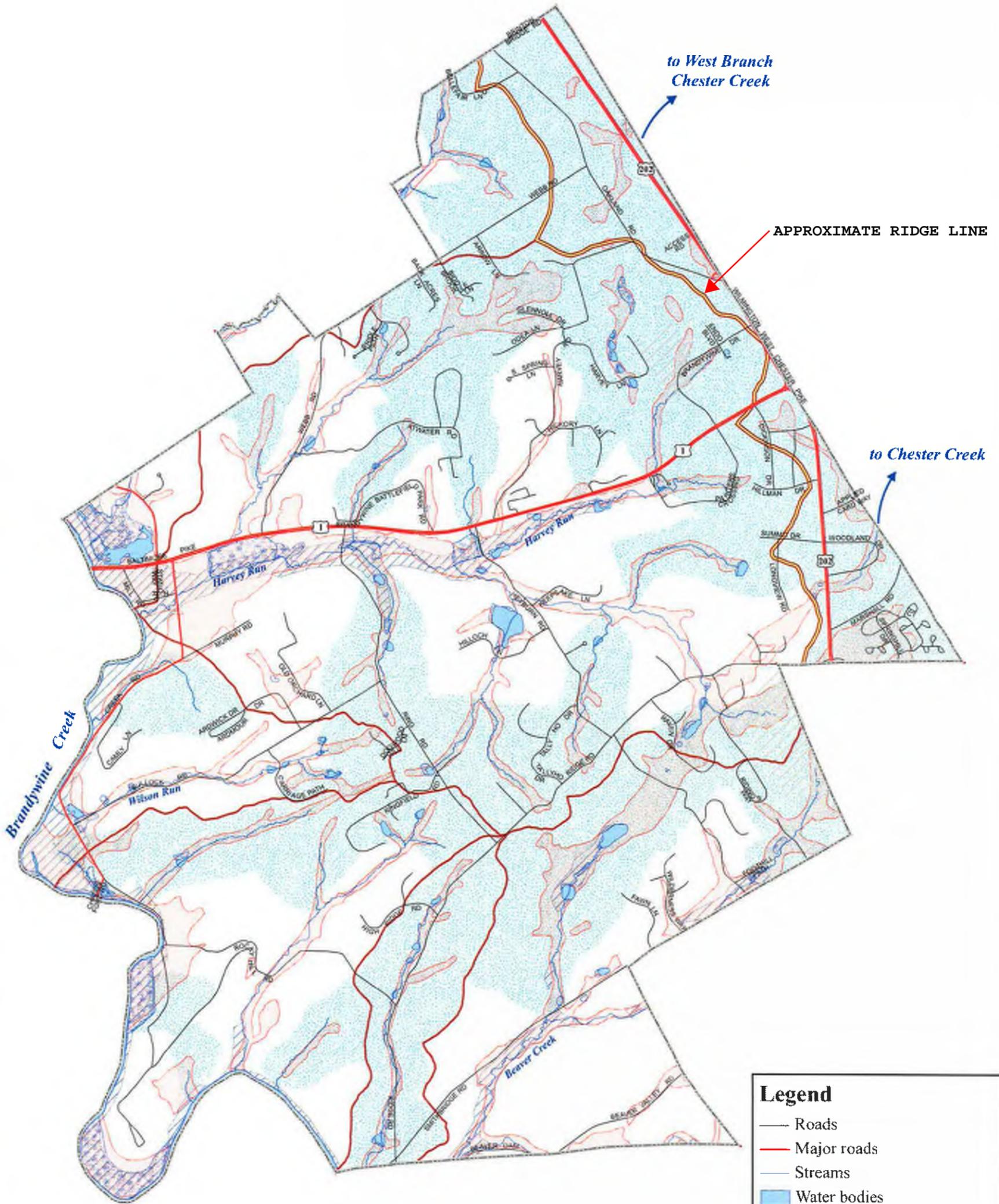
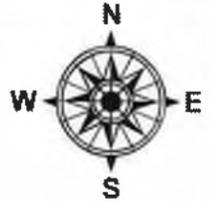
BIRMINGHAM TOWNSHIP

NEW CASTLE COUNTY, DELAWARE



INSERT

Chadds Ford Township



Brandywine Conservancy
 Environmental Management Center
 P. O. Box 141 Chadds Ford, Pennsylvania 19317 (610) 388-2700

Data source: Base data from Delaware County GIS Department, 3/2006 (edited to reflect recent subdivisions, 8/2006). Streams and waterbodies from Delaware County and Chester County GIS Departments edited, 7/2006. Floodplains from FEMA, 1996. Hydric soils from NRCS. Soil Survey Digital Database, 1996. Wetlands from FWS National Wetlands Inventory, 1994. Watersheds from USGS, 1996. Headwaters watersheds created by the Brandywine Conservancy, 8/2006.

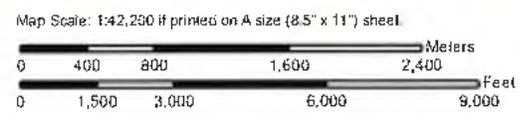
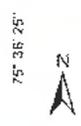
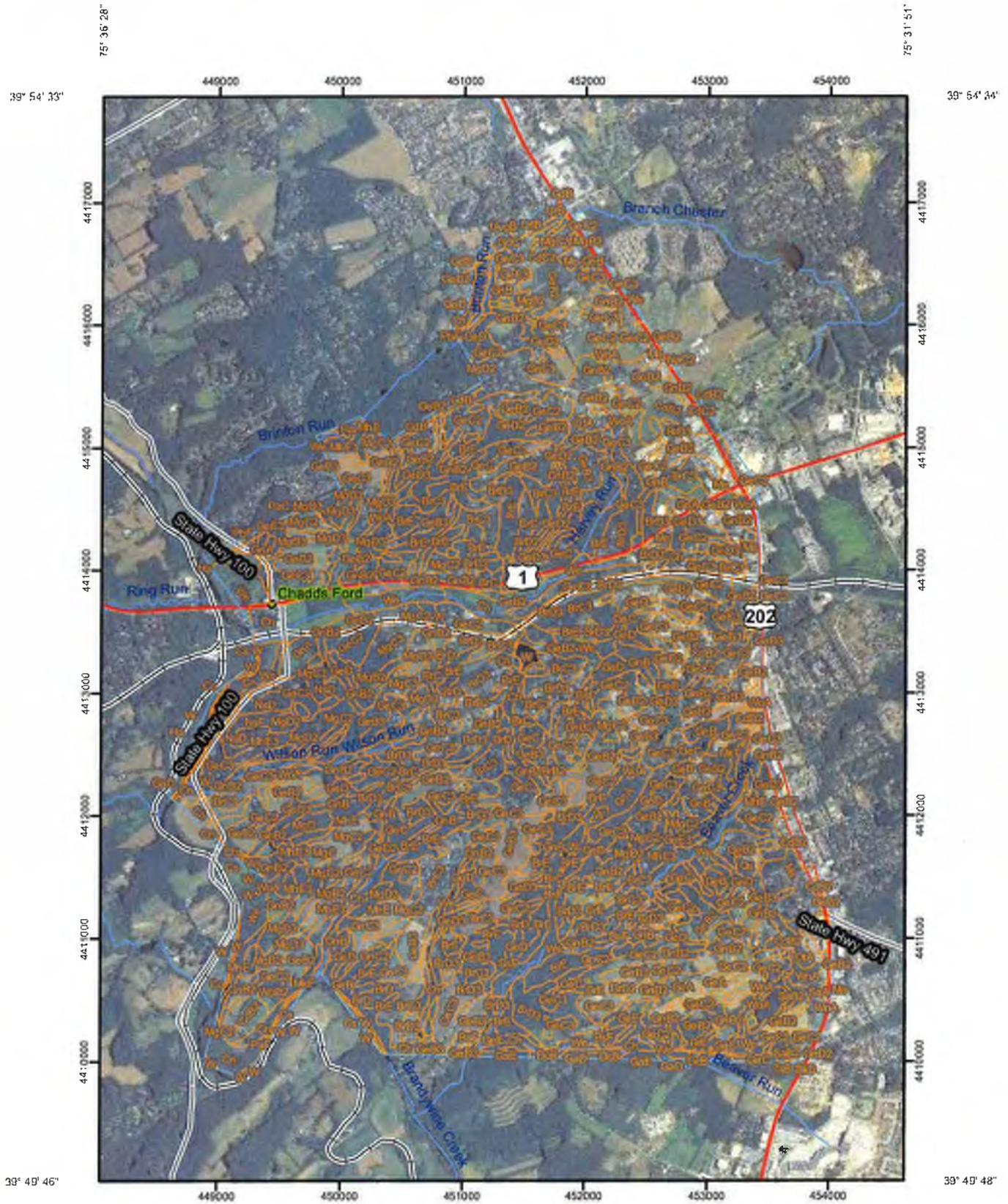
Map created: August 31, 2006

Legend

- Roads
- Major roads
- Streams
- Water bodies
- Pending development
- Tax parcels
- Municipal boundary
- Hydric soils
- Wetlands
- Floodplain
- Headwaters
- Chester Creek / Brandywine Creek watershed boundary
- Minor watersheds within the Brandywine Creek Watershed

MAP 3 - SOILS OF CHADDS FORD TOWNSHIP

Soil Map—Chester County, Pennsylvania, Delaware County, Pennsylvania, and New Castle County, Delaware
(Chadds Ford Soils Map)



MAP LEGEND

	Area of Interest (AOI)		Very Stony Spot
	Soils		Wet Spot
	Soil Map Units		Other
	Special Point Features		Special Line Features
	Blowout		Gully
	Borrow Pit		Short Steep Slope
	Clay Spot		Other
	Closed Depression		Political Features
	Gravel Pit		Cities
	Gravelly Spot		Water Features
	Landfill		Streams and Canals
	Lava Flow		Transportation
	Marsh or swamp		Rails
	Mine or Quarry		US Routes
	Miscellaneous Water		Major Roads
	Perennial Water		
	Rock Outcrop		
	Saline Spot		
	Sandy Spot		
	Severely Eroded Spot		
	Sinkhole		
	Slide or Slipp		
	Sodic Spot		
	Spoil Area		
	Stony Spot		

MAP INFORMATION

Map Scale: 1:42,200 if printed on A size (8.5" x 11") sheet.

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chester County, Pennsylvania
Survey Area Data: Version 3, Dec 3, 2008

Soil Survey Area: Delaware County, Pennsylvania
Survey Area Data: Version 6, Feb 24, 2009

Soil Survey Area: New Castle County, Delaware
Survey Area Data: Version 6, Sep 28, 2012

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Chester County, Pennsylvania (PA029)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CaA	Califon loam, 0 to 3 percent slopes	1.8	0.0%
CaB	Califon loam, 3 to 8 percent slopes	0.6	0.0%
Co	Codorus silt loam	2.7	0.0%
CpA	Cokesbury silt loam, 0 to 3 percent slopes	0.2	0.0%
Cs	Comus silt loam	13.6	0.2%
GaD	Gaila silt loam, 15 to 25 percent slopes	0.0	0.0%
GdB	Gladstone gravelly loam, 3 to 8 percent slopes	16.9	0.3%
GdC	Gladstone gravelly loam, 8 to 15 percent slopes	5.1	0.1%
GdD	Gladstone gravelly loam, 15 to 25 percent slopes	0.8	0.0%
GeD	Gladstone-Parker gravelly loams, 15 to 25 percent slopes	2.3	0.0%
GgC	Glenelg silt loam, 8 to 15 percent slopes	0.0	0.0%
Ha	Hatboro silt loam	17.3	0.3%
MaE	Manor loam, 25 to 35 percent slopes	0.1	0.0%
MIB	Mount Lucas silt loam, 3 to 8 percent slopes	0.7	0.0%
PaC	Parker gravelly loam, 8 to 15 percent slopes	2.8	0.0%
PaD	Parker gravelly loam, 15 to 25 percent slopes	1.0	0.0%
PaE	Parker gravelly loam, 25 to 35 percent slopes	0.8	0.0%
PaF	Parker gravelly loam, 35 to 60 percent slopes	0.6	0.0%
PbF	Parker loam, 25 to 60 percent slopes, extremely stony	5.3	0.1%
ToB	Towhee silt loam, 3 to 8 percent slopes	1.1	0.0%
UrB	Urban land, 0 to 8 percent slopes	3.3	0.1%
UrIB	Urban land-Gladstone complex, 0 to 8 percent slopes	9.9	0.2%
UugB	Urban land-Udorthents, schist and gneiss complex, 0 to 8 percent slopes	0.1	0.0%
UugD	Urban land-Udorthents, schist and gneiss complex, 8 to 25 percent slopes	0.3	0.0%
W	Water	15.2	0.2%
Subtotals for Soil Survey Area		102.5	1.6%
Totals for Area of Interest		6,237.6	100.0%

Delaware County, Pennsylvania (PA045)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BrB2	Brandywine loam, 3 to 8 percent slopes, moderately eroded	13.8	0.2%

Delaware County, Pennsylvania (PA045)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BrC	Brandywine loam, 8 to 15 percent slopes	41.8	0.7%
BrC3	Brandywine loam, 8 to 15 percent slopes, severely eroded	331.9	5.3%
BrD	Brandywine loam, 15 to 25 percent slopes	33.8	0.5%
BrD2	Brandywine loam, 15 to 25 percent slopes, moderately eroded	8.3	0.1%
BrD3	Brandywine loam, 15 to 25 percent slopes, severely eroded	403.7	6.5%
BrE	Brandywine loam, 25 to 40 percent slopes	363.2	5.8%
BsD	Brandywine very stony loam, 8 to 25 percent slopes	0.6	0.0%
BsF	Brandywine very stony loam, 25 to 50 percent slopes	28.1	0.5%
ByB2	Butlertown silt loam, 3 to 8 percent slopes, moderately eroded	1.9	0.0%
CdA	Chester silt loam, 0 to 3 percent slopes	2.0	0.0%
CdA2	Chester silt loam, 0 to 3 percent slopes, moderately eroded	1.0	0.0%
CdB2	Chester silt loam, 3 to 8 percent slopes, moderately eroded	227.8	3.7%
CdC2	Chester silt loam, 8 to 15 percent slopes, moderately eroded	3.7	0.1%
Ch	Chewacla silt loam	195.3	3.1%
Cn	Congaree silt loam	44.9	0.7%
GeA	Glenelg channery silt loam, 0 to 3 percent slopes	27.7	0.4%
GeB	Glenelg channery silt loam, 3 to 8 percent slopes	29.0	0.5%
GeB2	Glenelg channery silt loam, 3 to 8 percent slopes, moderately eroded	698.6	11.2%
GeB3	Glenelg channery silt loam, 3 to 8 percent slopes, severely eroded	239.7	3.8%
GeC	Glenelg channery silt loam, 8 to 15 percent slopes	114.1	1.8%
GeC2	Glenelg channery silt loam, 8 to 15 percent slopes, moderately eroded	569.6	9.1%
GeC3	Glenelg channery silt loam, 8 to 15 percent slopes, severely eroded	532.0	8.5%
GeD	Glenelg channery silt loam, 15 to 25 percent slopes	112.5	1.8%
GeD2	Glenelg channery silt loam, 15 to 25 percent slopes, moderately eroded	31.0	0.5%
GeD3	Glenelg channery silt loam, 15 to 25 percent slopes, severely eroded	114.1	1.8%
GeE	Glenelg channery silt loam, 25 to 35 percent slopes	18.9	0.3%

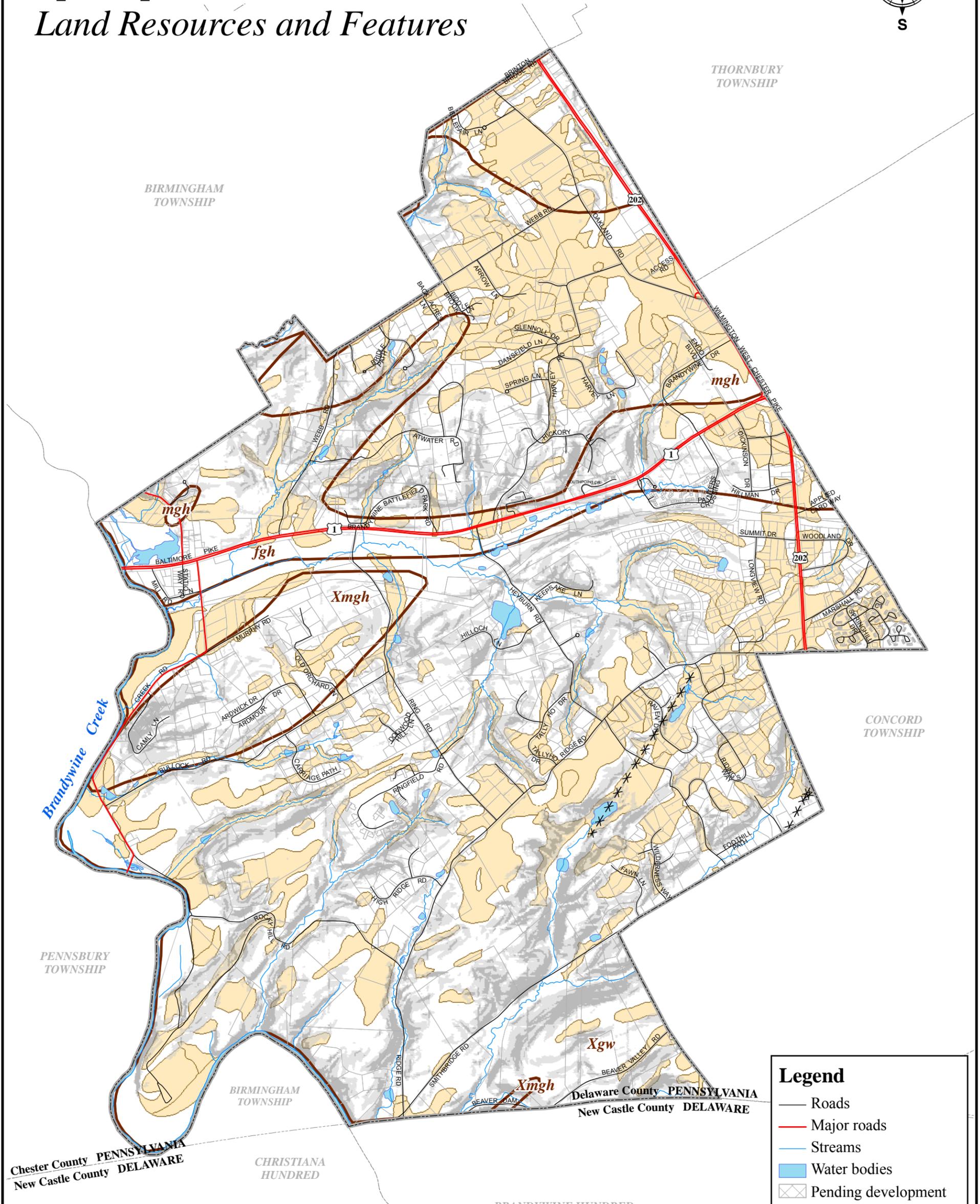
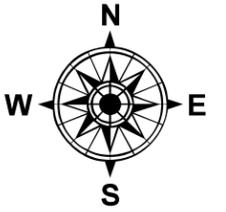


Delaware County, Pennsylvania (PA045)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
GeE3	Glenelg channery silt loam, 25 to 35 percent slopes, severely eroded	19.5	0.3%
GnA	Glenville silt loam 0 to 3 percent slopes	61.7	1.0%
GnB	Glenville silt loam, 3 to 8 percent slopes	157.7	2.5%
GnB2	Glenville silt loam, 3 to 8 percent slopes, moderately eroded	437.5	7.0%
GnC2	Glenville silt loam, 8 to 15 percent slopes, moderately eroded	11.4	0.2%
GsB	Glenville very stony silt loam, 0 to 8 percent slopes	2.4	0.0%
Ma	Made land, gravelly materials	3.5	0.1%
Mc	Made land, silt and clay materials	5.7	0.1%
Me	Made land, schist and gneiss materials	95.0	1.5%
MgB2	Manor loam, 3 to 8 percent slopes, moderately eroded	87.4	1.4%
MgC	Manor loam, 8 to 15 percent slopes	5.6	0.1%
MgC2	Manor loam, 8 to 15 percent slopes, moderately eroded	157.4	2.5%
MgC3	Manor loam, 8 to 15 percent slopes, severely eroded	71.2	1.1%
MgD	Manor loam, 15 to 25 percent slopes	15.3	0.2%
MgD2	Manor loam, 15 to 25 percent slopes, moderately eroded	37.3	0.6%
MgD3	Manor loam, 15 to 25 percent slopes, severely eroded	118.6	1.9%
MhE	Manor loam and channery loam, 25 to 35 percent slopes	38.4	0.6%
MhE3	Manor loam and channery loam, 25 to 35 percent slopes, severely eroded	80.6	1.3%
MkF	Manor soils, 35 to 60 percent slopes	13.9	0.2%
MmF	Manor very stony loam, 25 to 60 percent slopes	2.1	0.0%
NaB2	Neshaminy gravelly silt loam, 3 to 8 percent slopes, moderately eroded	0.5	0.0%
NaC2	Neshaminy gravelly silt loam, 8 to 15 percent slopes, moderately eroded	0.8	0.0%
NsB	Neshaminy very stony silt loam, 0 to 8 percent slopes	4.5	0.1%
NsD	Neshaminy very stony silt loam, 8 to 25 percent slopes	31.5	0.5%
NsF	Neshaminy very stony silt loam, 25 to 45 percent slopes	18.0	0.3%
OtA	Othello silt loam	8.7	0.1%
Qu	Quarries	10.7	0.2%
SaA	Sassafras loam, 0 to 3 percent slopes	7.8	0.1%

Delaware County, Pennsylvania (PA045)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
SaB2	Sassafras loam, 3 to 8 percent slopes, moderately eroded	34.4	0.6%
W	Water	31.6	0.5%
We	Wehadkee silt loam	237.3	3.8%
WnA	Woodstown loam, 0 to 3 percent slopes	16.5	0.3%
WoA	Worsham silt loam, 0 to 3 percent slopes	64.5	1.0%
WoB	Worsham silt loam, 3 to 8 percent slopes	4.3	0.1%
WoB2	Worsham silt loam, 3 to 8 percent slopes, moderately eroded	6.0	0.1%
Subtotals for Soil Survey Area		6,088.2	97.6%
Totals for Area of Interest		6,237.6	100.0%

New Castle County, Delaware (DE003)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BkD	Brinklow channery loam, 15 to 25 percent slopes	0.6	0.0%
DcB	Delanco-Codorus-Hatboro complex, 0 to 8 percent slopes, flooded	15.6	0.3%
GaD	Gaila loam, 15 to 25 percent slopes	7.8	0.1%
GaE	Gaila loam, 25 to 45 percent slopes	11.3	0.2%
GeB	Glenelg loam, 3 to 8 percent slopes	0.7	0.0%
GeC	Glenelg loam, 8 to 15 percent slopes	5.2	0.1%
GgB	Glenelg silt loam, 3 to 8 percent slopes	1.0	0.0%
GgC	Glenelg silt loam, 8 to 15 percent slopes	0.4	0.0%
GnB	Glenville silt loam, 3 to 8 percent slopes	1.1	0.0%
Hw	Hatboro-Codorus complex, 0 to 3 percent slopes, frequently flooded	0.7	0.0%
MaE	Manor loam, 25 to 45 percent slopes	0.3	0.0%
MzB	Mount Lucas silt loam, 3 to 8 percent slopes	1.0	0.0%
TaB	Talleyville silt loam, 3 to 8 percent slopes	0.9	0.0%
W	Water	0.2	0.0%
Subtotals for Soil Survey Area		46.9	0.8%
Totals for Area of Interest		6,237.6	100.0%

Chadds Ford Township Open Space Plan Land Resources and Features



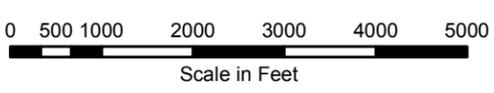
Legend

- Roads
- Major roads
- Streams
- Water bodies
- Pending development
- Tax parcels
- Adjacent municipalities
- Municipal boundary
- ** Dikes
- Geology
- Prime agricultural soils

Slopes

- 15 - 25%
- >25%

Map symbol	Geology Type
fgh	Felsic and intermediate gneiss
Xgw	"Glenarm Wissahickon" formation
mgh	Mafic gneiss
Xmgh	Mafic gneiss

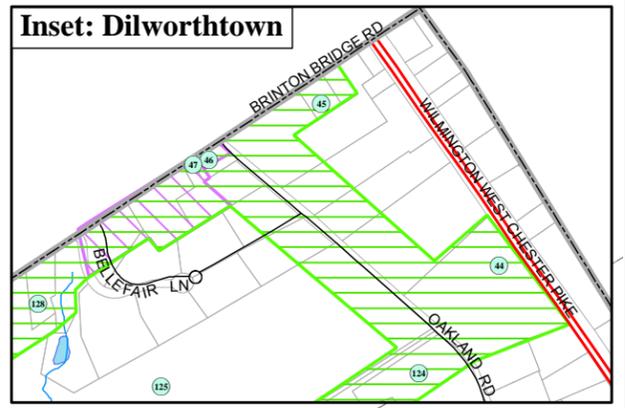
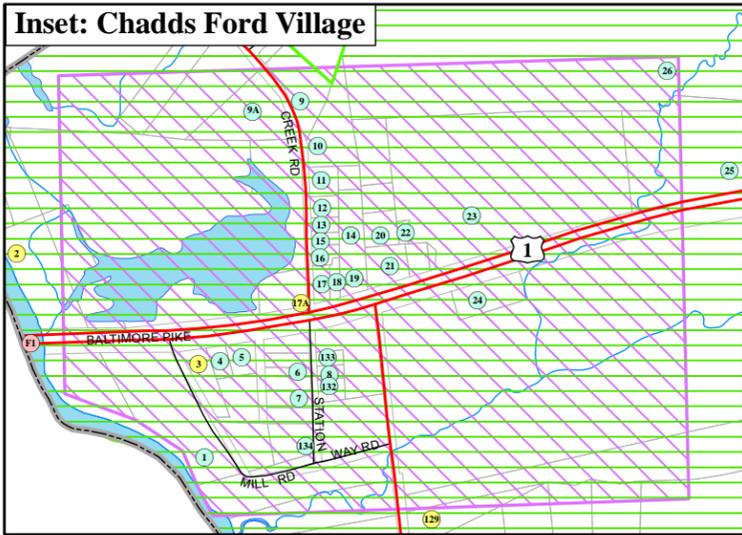
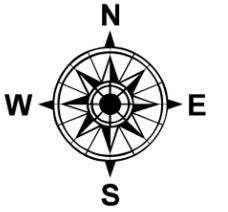


Brandywine Conservancy
Environmental Management Center
P. O. Box 141 Chadds Ford, Pennsylvania 19317 (610) 388-2700

Data source: Base data from Delaware County GIS Department, 3/2006 (edited to reflect recent subdivisions, 8/2006). Prime agricultural soils from NRCS, 2001. Slopes derived from USGS contours, 1996. Headwaters created by Brandywine Conservancy, 7/2006.

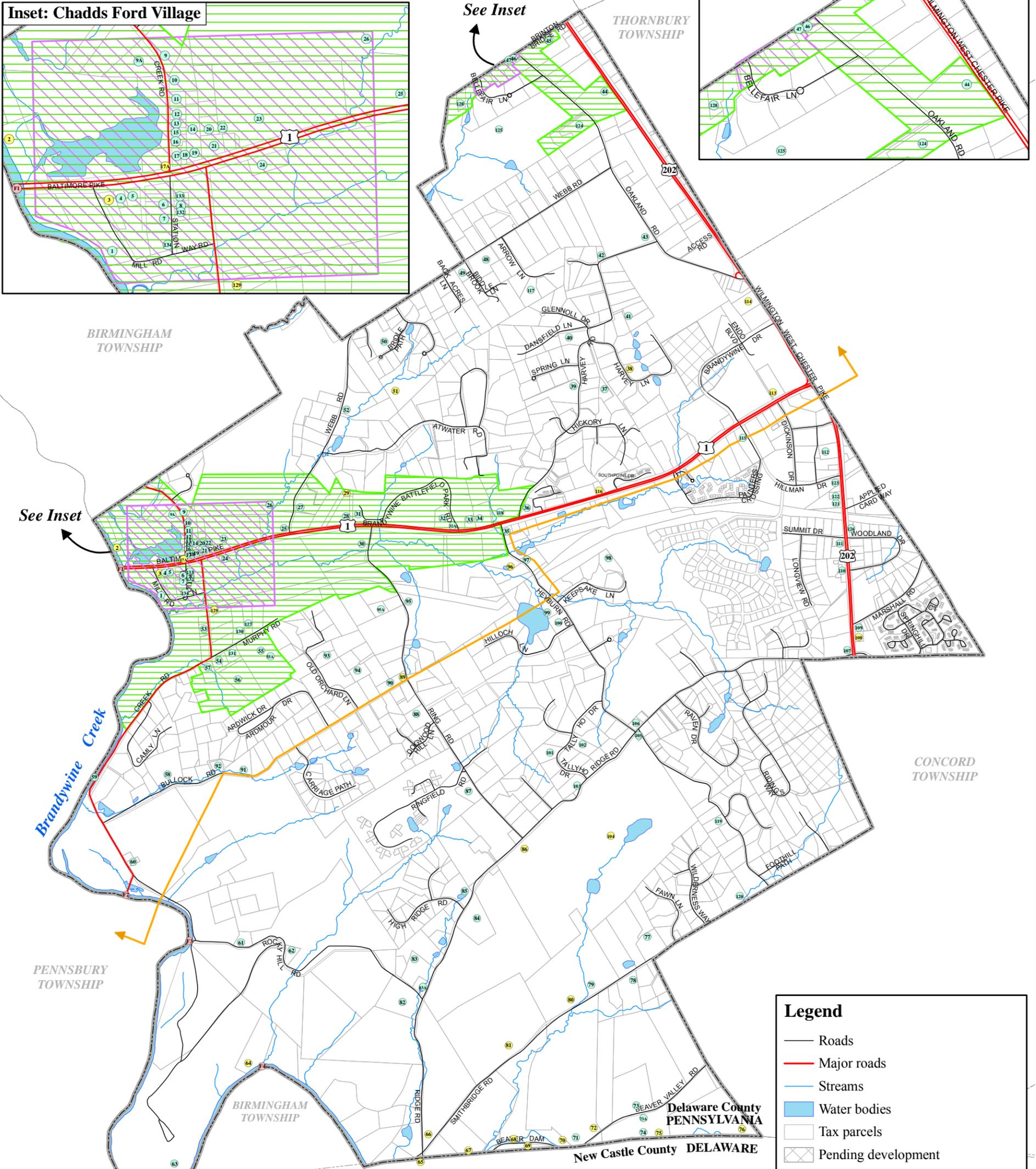
Map created: July 19, 2007

Chadds Ford Township Open Space Plan Historic Resources



See Inset

See Inset



Legend

- Roads
- Major roads
- Streams
- Water bodies
- Tax parcels
- Pending development
- Adjacent municipalities
- Municipal boundary

Historic resources (refer to Open Space Plan for inventory information)

- Historic Sites
- Historic Structures
- Historic Fords
- Act 167 Historic District
- National Register District
- Brandywine Battlefield National Historic Landmark boundary

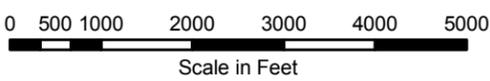
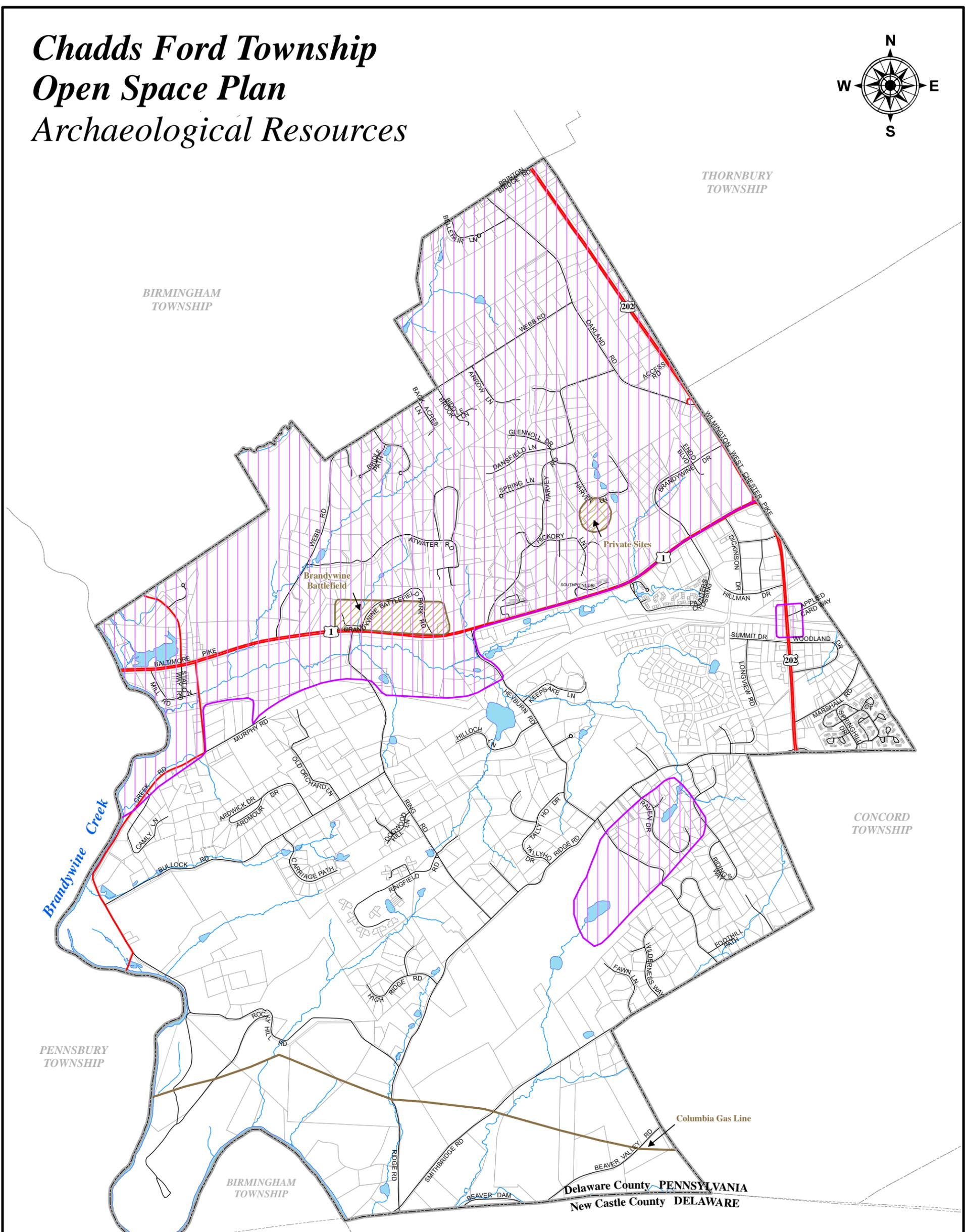
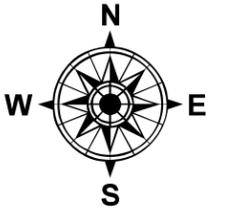
0 500 1000 2000 3000 4000 5000
Scale in Feet



Brandywine Conservancy
Environmental Management Center
P. O. Box 141 Chadds Ford, Pennsylvania 19317 (610) 388-2700

Data source: Base data from Delaware County GIS Department, 3/2006 (edited to reflect recent subdivisions, 8/2006). Historic resources received from Natural Lands Trust, 2005. Additional historic resources from Delaware County Planning Department, 2006.
Map created: July 19, 2007

Chadds Ford Township Open Space Plan Archaeological Resources



Brandywine Conservancy
Environmental Management Center
P. O. Box 141 Chadds Ford, Pennsylvania 19317 (610) 388-2700

Data source: Base data from Delaware County GIS Department, 3/2006 (edited to reflect recent subdivisions, 8/2006). Streams and waterbodies from Delaware County and Chester County GIS Departments edited, 7/2006. Delaware County Archaeological Resource Inventory and Management Plan and accompanying map, 1991.

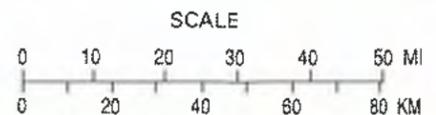
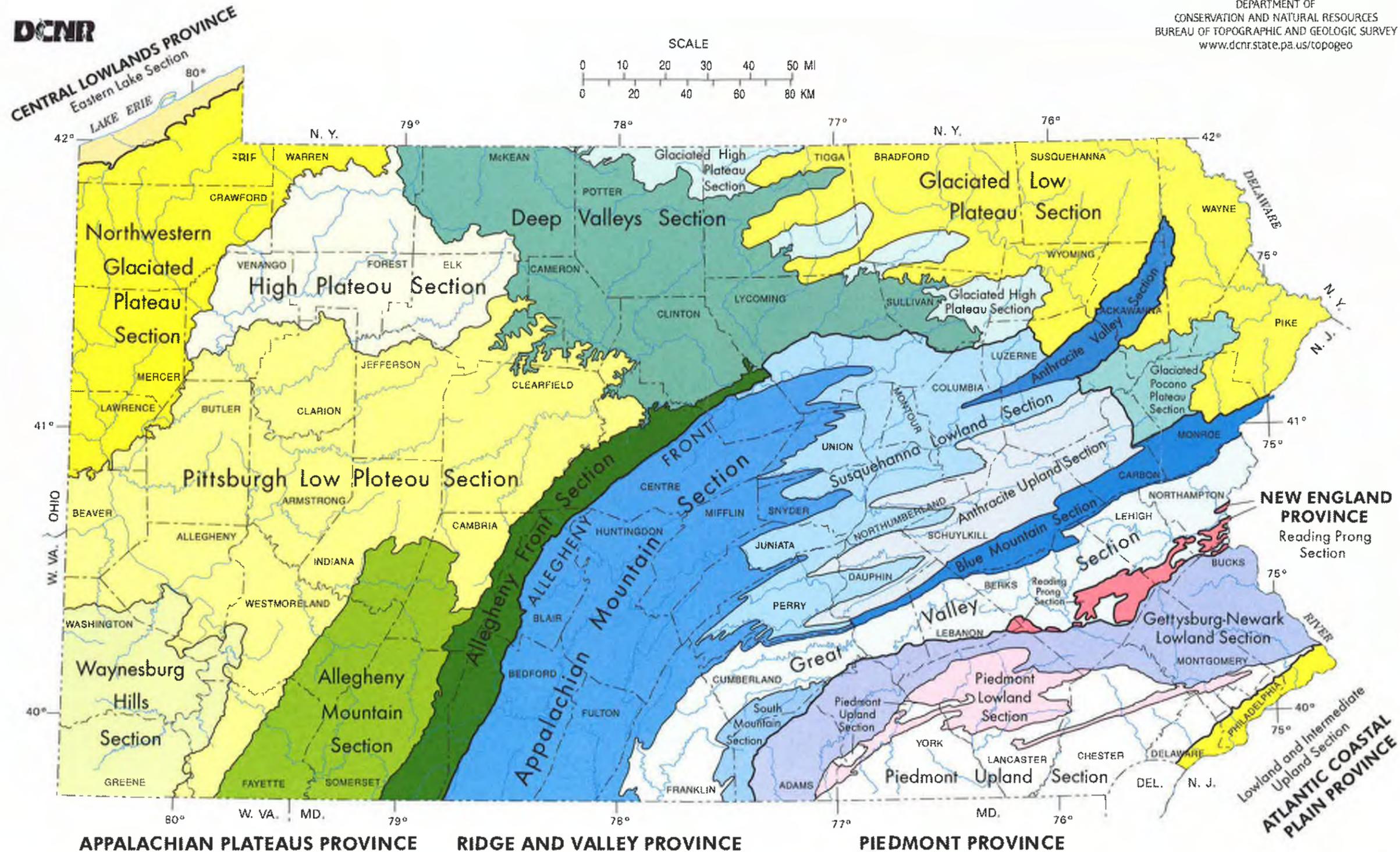
Map created: July 19, 2007

Legend

- Roads
- Major roads
- Streams
- Water bodies
- Areas of moderate to high archaeological sensitivity
- Previous archaeological investigations
- Pending development
- Tax parcels
- Adjacent municipalities
- Municipal boundary

MAP 7 - PHYSIOGRAPHIC PROVINCES OF PENNSYLVANIA

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF
CONSERVATION AND NATURAL RESOURCES
BUREAU OF TOPOGRAPHIC AND GEOLOGIC SURVEY
www.dcnr.state.pa.us/topogeo



EXPLANATION

CENTRAL LOWLANDS PROVINCE	APPALACHIAN PLATEAUS PROVINCE	RIDGE AND VALLEY PROVINCE	NEW ENGLAND PROVINCE	PIEDMONT PROVINCE	ATLANTIC COASTAL PLAIN PROVINCE	SYMBOLS
<ul style="list-style-type: none"> Eastern Lake Section Northwestern Glaciated Plateau Section High Plateau Section Pittsburgh Low Plateau Section Waynesburg Hills Section Allegheny Mountain Section Allegheny Front Section Deep Valleys Section Glaciated High Plateau Section Glaciated Low Plateau Section Glaciated Pocono Plateau Section 	<ul style="list-style-type: none"> Appalachian Mountain Section Susquehanna Lowland Section Anthracite Valley Section Anthracite Upland Section Blue Mountain Section Great Valley Section South Mountain Section 	<ul style="list-style-type: none"> Reading Prong Section Gettysburg-Newark Lowland Section Piedmont Lowland Section Piedmont Upland Section 	<ul style="list-style-type: none"> Lowland and Intermediate Upland Section 	<ul style="list-style-type: none"> Approximate boundary between physiographic provinces Approximate boundary between physiographic sections 		

Compiled by W. D. Sevon, Fourth Edition, 2000.

PHYSIOGRAPHIC PROVINCES OF PENNSYLVANIA

PHYSIOGRAPHIC PROVINCE	PHYSIOGRAPHIC SECTION	DOMINANT TOPOGRAPHIC FORM	LOCAL RELIEF ¹	UNDERLYING ROCK TYPE	GEOLOGIC STRUCTURE	APPROXIMATE ELEVATION ² Min. Max.	DRAINAGE PATTERN	BOUNDARIES	ORIGIN	
CENTRAL LOWLANDS	Eastern Lake	Northwest-sloping, lake-parallel, low-relief ridges	Very low to low.	Shale and siltstone.	Beds either horizontal or having low south dip.	570 1,000	Parallel.	Northwest: Lake Erie. Southeast: Base of escarpment.	Glacial, lake, and fluvial deposition and erosion.	
	APPALACHIAN PLATEAUS	Northwestern Glaciated Plateau	Broad, rounded upland and deep, steep-sided, linear valleys partly filled with glacial deposits	Very low to moderate.	Shale, siltstone, and sandstone.	Subhorizontal beds.	900 2,200	Dendritic.	Northwest: Base of escarpment. Southeast: Glacial border.	Fluvial and glacial erosion; glacial deposition.
		High Plateau	Broad, rounded to flat uplands having deep, angular valleys.	Moderate to high.	Sandstone, siltstone, shale, and conglomerate; some coal.	Low-amplitude, open folds.	980 2,360	Dendritic.	Northwest: Glacial border. Northeast: Margins of deep valleys. South: Arbitrary along drainage divides between coal and noncoal areas.	Fluvial erosion; periglacial mass wasting.
		Pittsburgh Low Plateau	Smooth to irregular, undulating surface; narrow, relatively shallow valleys; strip mines and reclaimed land.	Low to moderate.	Shale, siltstone, sandstone, limestone, and coal.	Moderate- to low-amplitude, open folds, decreasing in occurrence northwestward.	660 2,340	Dendritic.	Northwest: Glacial border. Elsewhere: Arbitrary at topographic changes with adjacent sections.	Fluvial erosion; periglacial mass wasting; strip mining.
		Waynesburg Hills	Very hilly with narrow hilltops and steep-sloped, narrow valleys.	Moderate.	Sandstone, shale, red beds, and limestone.	Horizontal beds.	848 1,638	Dendritic.	Arbitrary at change of topography.	Fluvial erosion and landslides.
		Allegheny Mountain	Wide ridges separated by broad valleys; ridge elevations decrease to north.	Moderate to high.	Sandstone, siltstone, shale, and conglomerate; some limestone and coal.	Large-amplitude, open folds.	775 3,210	Dendritic.	East: Arbitrary between coal and noncoal areas. West: Base of west flank of Chestnut Ridge. North: Approximates northeast terminus of large-amplitude, open folds.	Fluvial erosion; some periglacial mass wasting.
		Allegheny front	East: Rounded to linear hills rising by steps to an escarpment; hills cut by narrow valleys. West: Undulating hills sloping away from escarpment.	Moderate to high.	Shale, siltstone, and sandstone.	South: Broad fold. Elsewhere: Beds having low northwest dip; some faults.	540 2,980	Parallel and trellis.	East: Stream at base of hills below escarpment. West: Arbitrary between coal and noncoal areas.	Fluvial erosion; periglacial mass wasting.
		Deep Valleys	Very deep, angular valleys; some broad to narrow uplands.	Moderate to very high.	Sandstone, siltstone, shale, and conglomerate.	Moderate-amplitude, open folds that control valley orientations.	560 2,560	Angulate and rectangular.	Arbitrary at margins of deep valleys, either at top of valley slope or along drainage divide.	Fluvial erosion; periglacial mass wasting.
		Glaciated High Plateau	Broad to narrow, rounded to flat, elongate uplands and shallow valleys.	Low to high.	Sandstone, siltstone, shale, and conglomerate; some coal.	Moderate-amplitude, open folds.	620 2,560	Angulate and dendritic.	East: Base of escarpment. Elsewhere: Arbitrary with margins of deep valleys.	Fluvial and glacial erosion; glacial deposition.
		Glaciated Low Plateau	Rounded hills and valleys.	Low to moderate.	Sandstone, siltstone, and shale.	Low-amplitude folds.	440 2,690	Dendritic.	Base of escarpments of adjacent uplands; base of Pocono escarpment. Elsewhere: Arbitrary.	Fluvial and glacial erosion; glacial deposition.
Glaciated Pocono Plateau	Broad, undulatory upland surface having dissected margins.	Low to moderate.	Sandstone, siltstone, and shale; some conglomerate.	Beds having low north dip; some small folds.	1,200 2,320	Deranged.	South and east: Base of Pocono escarpment. North: Crest of drainage divide. West: Arbitrary.	Fluvial and glacial erosion; glacial deposition.		
RIDGE AND VALLEY	Appalachian Mountain	Long, narrow ridges and broad to narrow valleys; some karst.	Moderate to very high.	Sandstone, siltstone, shale, conglomerate, limestone, and dolomite.	Open and closed plunging folds having narrow hinges and planar limbs; variety of faults.	440 2,775	Trellis, angulate, and some karst.	Southeast: Base of slope change, on southeast side of Blue Mountain. West and northwest: Center of valley bottom west of westernmost linear ridge. Elsewhere: Base of slope change of eastern ridges; arbitrary between ridges.	Fluvial erosion; solution of carbonate rocks; periglacial mass wasting.	
	Susquehanna Lowland	Low to moderately high, linear ridges; linear valleys; Susquehanna River valley.	Low to moderate.	Sandstone, siltstone, shale, conglomerate, limestone, and dolomite.	Open and closed plunging folds having narrow hinges and planar limbs.	260 1,715	Trellis and angulate.	Base of slope change to higher ridges of all surrounding areas; arbitrary in valley areas.	Fluvial erosion; some glacial erosion and deposition in northeast.	
	Anthracite Valley	Narrow to wide, canoe-shaped valley having irregular to linear hills; valley enclosed by steep-sloped mountain rim.	Low to moderate.	Sandstone, siltstone, conglomerate, and anthracite.	Broad, doubly-plunging syncline; faults and smaller folds.	500 2,368	Trellis and parallel.	Outer base of surrounding mountain.	Fluvial and glacial erosion; some glacial deposition.	
	Anthracite Upland	Upland surface having low, linear to rounded hills, strip mines, and waste piles; upland surrounded by an escarpment, a valley, and a mountain rim.	Low to high.	Sandstone, shale, conglomerate, and anthracite.	Many narrow folds having steep limbs; many faults.	320 2,094	Trellis.	Northeast: Arbitrary between coal and noncoal areas. Elsewhere: Outer base of surrounding mountain.	Fluvial erosion; some glacial erosion and periglacial mass wasting.	
	Blue Mountain	Linear ridge to south and valley to north; valley widens eastward and includes low linear ridges and shallow valleys.	Moderate to high.	Sandstone, siltstone, and shale; some limestone and conglomerate.	Southwest: South limb of broad fold. Northeast: Small folds north of Blue Mountain.	300 1,680	Trellis.	Southeast: Base of slope change on southeast side of Blue Mountain. Northwest: Base of mountain; base of Pocono escarpment. Northeast: Arbitrary.	Fluvial erosion; some glacial erosion and deposition in northeast.	
	Great Valley	Very broad valley. Northwest half: Dissected upland. Southeast half: Low karst terrain.	Low to moderate.	Northwest: Shale and sandstone; slate at east end. Southeast: Limestone and dolomite.	Thrust sheets, nappes, overturned folds, and steep faults; many third- and fourth-order folds.	140 1,100	Dendritic and karst.	North: Base of slope change on southeast side of Blue Mountain. South: Base of slope change to adjacent uplands.	Fluvial erosion; solution of carbonate rocks; some periglacial mass wasting.	
	South Mountain	Linear ridges, deep valleys, and flat uplands.	Moderate to high.	Metavolcanic rocks, quartzite, and some dolomite.	Major anticlinorium having many second- and third-order folds.	450 2,080	Dendritic.	Base of slope change to adjacent lowlands.	Fluvial erosion of highly variable rocks; some periglacial mass wasting.	
NEW ENGLAND	Reading Prong	Circular to linear, rounded hills and ridges	Moderate.	Granitic gneiss, granodiorite, and quartzite.	Multiple nappes.	140 1,364	Dendritic.	Base of slope change to adjacent lowlands.	Fluvial erosion; some periglacial mass wasting.	
REDMONT	Gettysburg-Newark Lowland	Rolling lowlands, shallow valleys, and isolated hills.	Low to moderate.	Mainly red shale, siltstone, and sandstone; some conglomerate and diabase.	Half-graben having low, monoclinal, northwest-dipping beds.	20 1,355	Dendritic and trellis.	Base of slope changes with adjacent uplands and lowlands. Elsewhere: Arbitrary.	Fluvial erosion of rocks of variable resistance.	
	Piedmont Lowland	Broad, moderately dissected, karst valleys separated by broad, low hills.	Low.	Dominantly limestone and dolomite; some phyllitic shale and sandstone.	Complexly folded and faulted.	60 700	Dendritic and karst.	South: Base of slope change to adjacent upland. North: Mesozoic red rocks.	Fluvial erosion; some periglacial mass wasting.	
	Piedmont Upland	Broad, rounded to flat-topped hills and shallow valleys.	Low to moderate.	Mainly schist, gneiss, and quartzite; some saprolite.	Extremely complexly folded and faulted.	100 1,220	Dendritic.	East: Base of low to vague Fall Line escarpment. North: Base of slope change to adjacent lowlands.	Fluvial erosion; some periglacial mass wasting.	
ATLANTIC COASTAL PLAIN	Lowland and Intermediate Upland	Flat upper terrace surface cut by shallow valleys; Delaware River floodplain.	Very low.	Unconsolidated to poorly consolidated sand and gravel; underlain by schist, gneiss, and other metamorphic rocks.	Unconsolidated deposits underlain by complexly folded and faulted rocks.	0 200	Dendritic.	Northwest: Base of low to vague Fall Line escarpment. East: Arbitrary.	Fluvial erosion and deposition.	

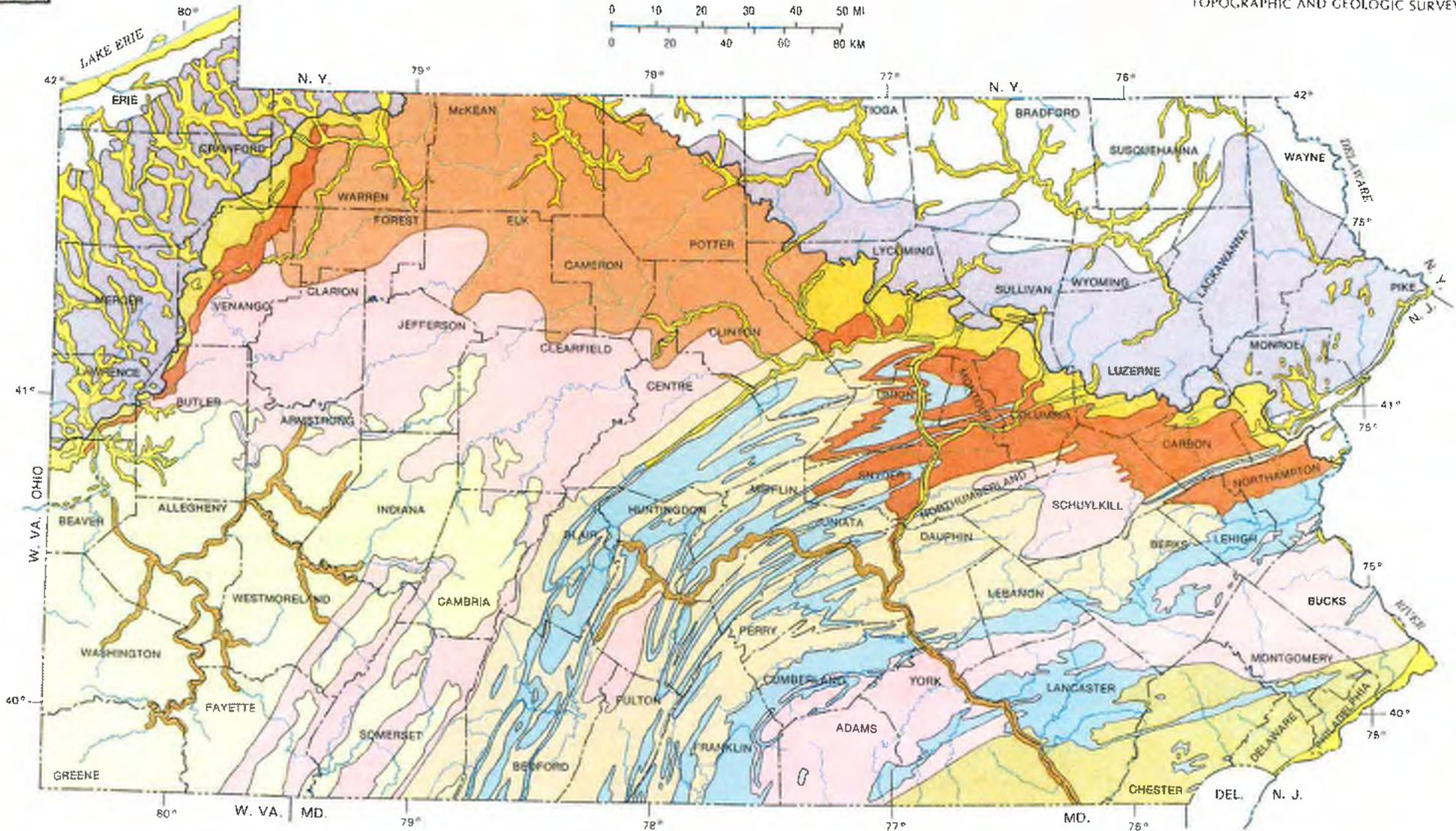
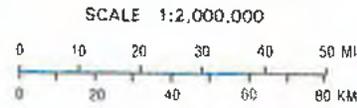
¹Local relief: 0 to 100 feet, very low; 101 to 300 feet, low; 301 to 600 feet, moderate; 601 to 1,000 feet, high; >1,000 feet, very high.

(Relief categories listed here for Pennsylvania do not necessarily apply to other states or countries.)

²Elevations are in feet.

MAP 8 - SURFICIAL MATERIALS OF PENNSYLVANIA

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
OFFICE OF PARKS AND FORESTRY
BUREAU OF
TOPOGRAPHIC AND GEOLOGIC SURVEY



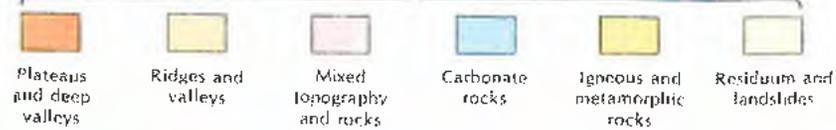
EXPLANATION

(See reverse side for detailed explanation of map units)

GLACIAL DIAMICTS



RESIDUUM, COLLUVIUM, AND ALLUVIUM



SYMBOLS

Approximate contact between surficial materials

Late Wisconsinan glacial border

SURFICIAL MATERIALS OF PENNSYLVANIA

STRATIFIED SAND AND GRAVEL

Stratified sand and gravel includes flat-surfaced deposits in valley bottoms and hummocky deposits along valley sides. The valley-bottom deposits comprise clay, silt, sand, and gravel arranged in distinct layers, which are approximately parallel to the surface. The range of grain size within any layer is generally small (well sorted), and each layer may be laterally continuous for a few feet or several hundred feet. The material was deposited either from flowing water of streams (alluvium, outwash) or in quiet waters of glacial lakes (lake deposits).

The hummocky, valley-side deposits are composed mainly of sand and gravel arranged in distinct layers, which commonly are steeply inclined and have large contrasts in grain size between adjacent layers. The lateral continuity of the layers is generally a few feet or less. These materials occur in kames or kame terraces, which were deposited by flowing water adjacent to glacial ice.

STREAM TERRACE DEPOSITS

Stream terrace deposits are isolated, narrow, thin to moderately thick deposits of clay, silt, sand, gravel, and some boulders. The materials are moderately to poorly sorted and occur in layers that vary from poorly to well defined. Deposited by flowing river water when the streambed was at the level of the deposit, the deposits occur on long, narrow, relatively flat or gently inclined surfaces at various heights above the modern river. The terraces are commonly benchlike, their margins clearly defined by steep slopes.

GLACIAL DIAMICTS

Glacial diamicts, often called glacial till, are unconsolidated, unsorted or poorly sorted, non-layered or vaguely layered deposits consisting of clay, silt, sand, gravel, and boulders. The larger clasts, cobbles and boulders, generally appear to be floating in a finer grained matrix. Most of the pebbles, cobbles, and boulders in the diamict are sandstone or siltstone derived from underlying or nearby bedrock. Some far-travelled lithologies, such as igneous or metamorphic rocks, are locally present. Glacial diamicts are formed by a variety of mechanisms associated with movement or melting of glacial ice. Areas of glacial diamicts shown on the map are defined on the basis of texture of the matrix, the amount of rock surface covered by diamict, the degree of weathering and soil development, and the degree to which the diamict has been eroded since deposition.

Silty Glacial Diamict

Silty glacial diamict has moderate to abundant silt and clay matrix. Thickness is variable; diamict greater than 3 feet in thickness covers over 75 percent of the area of occurrence in northwestern Pennsylvania and 25 to 50 percent of the area of occurrence in northeastern Pennsylvania. Deposits less than 3 feet thick are common. The diamict has minimal weathering, has thin soil development, and generally has suffered little erosion.

Sandy Glacial Diamict

Sandy glacial diamict has moderate to abundant silt and sand matrix and minimal clay. The diamict overlies mainly sandstone bedrock. Thickness is variable; diamict greater than 3 feet thick covers over 75 percent of the area of occurrence in northwestern Pennsylvania and 25 to 50 percent of the area of occurrence in northeastern Pennsylvania. Deposits less than 3 feet thick are common. The diamict has minimal weathering, has thin soil development, and generally has suffered little erosion.

Sandy to Silty Glacial Diamict

Sandy to silty glacial diamict has variable amounts of sand and silt in the matrix and generally small amounts of clay. Thickness is variable; diamict greater than 3 feet thick covers only 10 to 25 percent of the area of occurrence, and there is no diamict on the remaining surface. The diamict has been moderately weathered, has moderately thick soil development, and has been moderately to severely eroded.

Sandy to Clayey Glacial Diamict

Sandy to clayey glacial diamict has variable amounts of sand, silt, and clay in the matrix. Thickness is variable; diamict greater than 3 feet thick covers less than 10 percent of the area of occurrence, and there is no diamict on the remaining surface. The diamict has been deeply weathered, has thick soil development, and has been largely removed by erosion.

RESIDUUM, COLLUVIUM, AND ALLUVIUM

Differences in the general character of residuum, colluvium, and alluvium deposits are used to define several areas shown on the map.

Residuum is a surface accumulation of unconsolidated rock debris developed in place by the processes of physical and chemical weathering operating on the underlying bedrock. Residuum varies in character from thin accumulations of angular rock fragments broken from the bedrock by the physical process of freeze and thaw to thick accumulations of unfragmented bedrock that has been extensively altered by chemical weathering (saprolite).

Colluvium is a hillside deposit of unconsolidated, generally matrix-supported, poorly sorted material that has been transported downslope by gravity-driven processes ranging in rate from slow (creep) to fast (debris flow). **Talus** is a form of colluvium that lacks matrix and generally offers poor support for vegetation. Rock fragments in colluvium are generally angular to subangular and range widely in size. The material originated from weathering of bedrock. Most colluvium in Pennsylvania was formed during multiple intervals of the Pleistocene.

Alluvium comprises unconsolidated, well- to poorly defined layers of clay, silt, sand, gravel, and some boulders. The constituent particles vary from well to poorly sorted and are subangular to well rounded. Individual layers generally are not continuous for more than a few feet. The alluvium is a flat-surfaced deposit on valley bottoms into which the modern stream is trenching. Alluvium is deposited by flowing water in stream channels and on adjacent floodplains.

Plateaus and Deep Valleys

Flat-surfaced to gently sloping uplands developed on mixed rock types are generally covered with thick (>5 feet) residuum. The uplands are dissected by steep-sloped valleys, which have some colluvium on the hillsides and thin (<3 feet) alluvium in narrow valley bottoms.

Ridges and Valleys

Long, steep-sloped, curvilinear ridges developed on resistant sandstones have broken rock at their crests and/or thick talus or colluvium covering most of the adjacent hillsides. The colluvium is generally thickest on the lower parts of the hillsides. Broad to narrow, low-relief, interridge valleys are developed on less resistant rock types and have thin to moderately thick (3 to 5 feet) residuum on the crest of low hills and some thin to moderately thick colluvium on the hillsides. Thin to moderately thick alluvium occurs in narrow drainageways.

Mixed Topography and Rocks

Mixed topography developed on mixed rock types has moderately thick residuum on upland surfaces and thin to moderately thick colluvium on hillsides. Thin to moderately thick alluvium occurs in the valley bottoms.

Carbonate Rocks

Carbonate rocks underlie lowland areas having low relief and poorly developed surface drainage. Both open and filled sinkholes are common. Thin to moderately thick residuum covers most of the surface, but bedrock outcrops are locally common. Thin to moderately thick colluvium derived from adjacent, noncarbonate uplands occurs in some places along the margins of the carbonate areas. Alluvium is generally thin.

Igneous and Metamorphic Rocks

Igneous and metamorphic rocks underlie broad upland areas having smoothly rounded and nearly flat hilltops, which grade laterally into smoothly shaped and gradually deepening valleys. The upland surfaces are underlain by very thick (>10 feet) saprolite. The upper parts of the hillsides are underlain by thin to thick saprolite, and the lower parts of the hillsides are underlain by thin to thick colluvium. Thin to thick alluvium covers the broad valley bottoms and grades into the colluvium at the base of the hillsides.

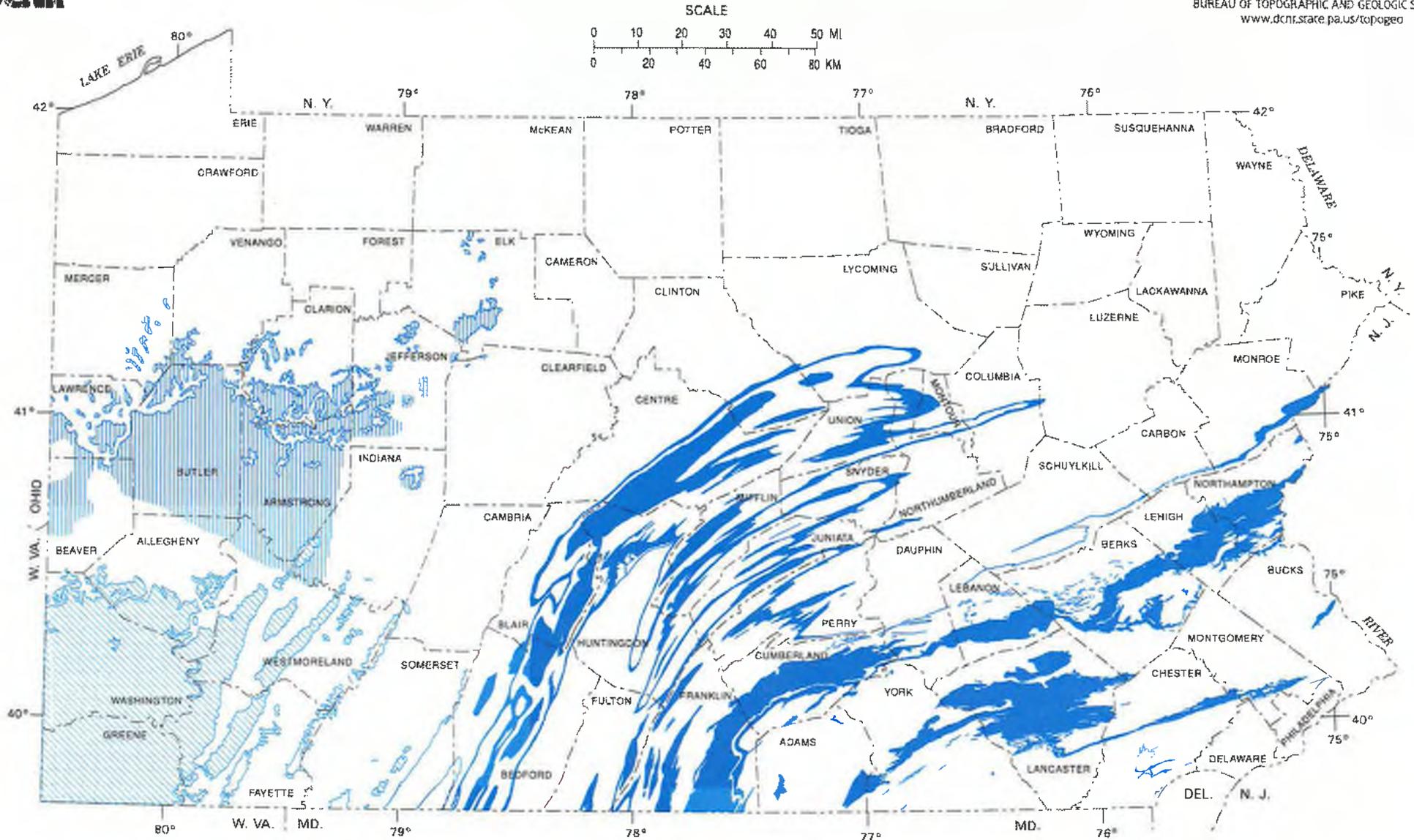
Residuum and Landslides

Mixed topography developed on mixed rock types has moderately thick to thick residuum on the upland surfaces and moderately thick to thick colluvium on the hillsides. Up to 30 percent of the surface is underlain by landslide debris, particularly in the southwestern five counties. The landslide debris in many places comprises chaotic mixtures of residuum, colluvium, and bedrock, which have moved down the hillside by gravity-driven sliding. Alluvium is thin to thick.

MAP 9 - LIMESTONE AND DOLOMITE DISTRIBUTION IN PENNSYLVANIA



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF
CONSERVATION AND NATURAL RESOURCES
BUREAU OF TOPOGRAPHIC AND GEOLOGIC SURVEY
www.dcnr.state.pa.us/topogeo



EXPLANATION



Area where limestone, dolomite, or both are at the surface. Layers are usually strongly folded and steeply dipping. Includes economically important high-calcium limestones of the Kinzers, Annville, Benner, and Keyser Formations and the Cockeysville Marble, as well as the high-magnesian dolomites of the Ledger Formation and the Cockeysville Marble. This area is most susceptible to sinkhole development.



Area underlain by flat-lying, generally thin, but locally thick, limestone beds, which are discontinuous in places and are commonly interbedded with shale.



Area underlain by the generally flat-lying Pennsylvania Vanport Limestone, a high-calcium limestone. This limestone is generally overlain by less than 100 feet of sedimentary rocks, except in the southern part of the area.

LIMESTONE AND DOLOMITE DISTRIBUTION IN PENNSYLVANIA

Carbonate rocks, consisting of limestone and dolomite, are significant among the great variety of rock types in Pennsylvania. These rocks affect man's activities in three major ways: as hazards, as mineral resources, and as groundwater reservoirs. This map shows the distribution of limestone and dolomite in Pennsylvania and will be of assistance to those engaged in planning and development in these carbonate areas.

HAZARDS—Carbonate rocks can present potential construction problems and hazards due to the presence of solution cavities and bedrock irregularities in the subsurface and sinkholes at the surface. The cavities are the result of the gradual dissolving of the rock by water, particularly along fractures or joints. In turn, joints and cavities are enlarged and can form caves. Related features, such as surface depressions and sinkholes, are caused by the movement of surficial materials into the cavities shaped by the dissolving process. Sinkholes also can result from the collapse of the roof of a cave. Because the potential exists for sinkhole development in most of the carbonate rocks of Pennsylvania, areas underlain by these rocks should receive a thorough subsurface investigation prior to construction so that remedial measures may be designed to cope with these hazards. These investigations should include local geologic mapping, test borings, and possibly geophysical surveys to establish subsurface conditions for such structures as highways, dams, bridges, disposal sites, transmission lines, and buildings.

RESOURCES—Limestone (CaCO_3 -rich) and dolomite (MgCO_3 -rich) are major sources of mineral raw materials for the construction, agricultural, and manufacturing indus-

tries of the Commonwealth. Except for coal, carbonates are the major rock type mined in Pennsylvania, accounting for about 80 percent of all nonfuel mineral production. Significant uses of mined limestone and dolomite in Pennsylvania include (1) crushed stone for roads, concrete, and railroads; (2) agricultural lime and grit; (3) the manufacture of cement; (4) fluxstone and refractory materials for the steel industry; (5) acid neutralization; (6) raw material for the glass industry; and (7) mineral fillers and whiting. Thus, the carbonates in various parts of Pennsylvania should be recognized as a valuable mineral resource, and land use planners should take this into account.

WATER—Because of the development of solution cavities in carbonate rocks, these rock formations may contain and yield large quantities of underground water. Areas underlain by limestones and dolomites may supply the water needs of a community through the proper development of the subsurface water resources. Those charged with the planning and development of water supplies should recognize the existence of this valuable underground water source.

The permeable nature of the carbonate rocks also makes them natural conduits for conveying solid and liquid wastes. Using these conduits, contaminants can rapidly enter the groundwater system and travel long distances underground over a relatively short period of time. Therefore, it is important to be particularly careful in conducting industrial, agricultural, or construction activities in limestone-dolomite areas to prevent the contamination of valuable groundwater resources.

STATEWIDE REFERENCES

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- M 20 *Limestones of Pennsylvania*, B. L. Miller, 1934, 729 p.
- M 50 *Atlas of Pennsylvania's mineral resources. Part 1, Limestones and dolomites of Pennsylvania*, B. J. O'Neill, Jr., 1964, 40 p., 6 maps, scale 1:250,000.
- M 50 *Atlas of Pennsylvania's mineral resources. Part 1, Supplement; Limestones and dolomites of Pennsylvania*, G. F. Deasy, P. R. Griess, R. F. Balazik, and J. W. Burtnett, 1967, 83 p.
- Part 4, The distribution of limestones containing at least 90 percent CaCO_3 in Pennsylvania*, B. J. O'Neill, Jr., 1976, 2 p., 1 map, scale 1:500,000.
- M 83 *Reconnaissance survey of potential carbonate whiting sources in Pennsylvania*, S. W. Berkheiser, Jr., 1983, 53 p.

OTHER PUBLICATIONS

PUBLICATIONS ON LIMESTONES AND DOLOMITES—For publications dealing with limestones and dolomites in local areas of Pennsylvania, please refer to *Pennsylvania Geological Publications*, available on-line at www.dcnr.state.pa.us/topogeo/pub/pub.htm, and upon request from the Pennsylvania Geological Survey, Department of Conservation and Natural Resources, P. O. Box 8453, Harrisburg, Pa. 17105-8453.

OPEN-FILE REPORTS—Open-file reports on sinkholes and karst-related features of various counties in central and southeastern Pennsylvania are available for inspection at the Pennsylvania Geological Survey office in Harrisburg; copies of these county reports are also available for a price to cover copying and handling. For further information, please contact the Survey at the address listed in the previous paragraph.



MAP 10 - DENSITY OF MAPPED KARST FEATURES IN SOUTH-CENTRAL AND SOUTHEASTERN PENNSYLVANIA

KARST DENSITY MAP—AN INNOVATIVE APPROACH TO VISUALIZING KARST FEATURES

INTRODUCTION

Approximately 7 percent of Pennsylvania is covered by carbonate rock. In the form of limestone or dolomite, most of this carbonate rock occurs in the valleys and basins of south-central and southeastern Pennsylvania, where more than 50 percent of the state's population lives.

Carbonate rocks are unique in that they weather more readily than other types of rock. The dissolution or leaching away of the carbonate rock by water over long periods of time results in a landscape characterized by karst topography. It is characterized by features such as sinkholes, surface depressions, and caves. The dissolution of the carbonate rock also develops the subsurface drainage network for water along widened cracks or fractures within the bedrock layers. The capacity of water in karst areas does not occur in surface streams but is primarily in the subsurface karst system.

Subsidence and surface depression or collapse of the ground surface are common in karst areas as a result of water leaching and the resulting loss of support for the overlying rock. This process is most common in karst areas where the rock is highly soluble. In some cases, the dissolution of the carbonate rock can result in the formation of sinkholes or other surface depressions. Sinkholes are formed when the surface rock is dissolved away, causing the ground surface to collapse into the subsurface karst system.

Karst features often impact public safety and health. Subsidence and water-related problems are common in karst areas. Sinkholes can cause property damage and injury. In some cases, sinkholes can result in the collapse of buildings or other structures. Water-related problems can include contamination of drinking water supplies and the degradation of aquatic ecosystems.

In 1995, the Pennsylvania Geological Survey began an initiative to map karst features throughout the commonwealth. The first step in this initiative was the completion of a karst density map for the state. This map was developed by the Pennsylvania Geological Survey and the Pennsylvania Department of Environmental Protection. The map shows the density of mapped karst features in south-central and southeastern Pennsylvania. The map is based on data collected from a variety of sources, including field surveys, aerial photography, and historical maps.

After completion of the open file reports, karst features and karst density were digitized as point data from the topographic base maps using COGO software from the U.S. Geological Survey. Data were digitized in the state plane coordinate system of surface depression, sinkholes, or surface mine, and in the surface depression, sinkholes, or surface mine layer were saved in ASCII files. The data were then imported into ArcView 3.2a software. The data were then processed to create the karst density map. The map shows the density of mapped karst features in south-central and southeastern Pennsylvania. The map is based on data collected from a variety of sources, including field surveys, aerial photography, and historical maps.

As a result of this initiative, 11,715 individual points were digitized for 14 counties (117 7-minute quadrangles). Karst features were digitized as 89 percent of the points, sinkholes, 96 percent, surface depressions, 2.3 percent, sinkholes, and 3.6 percent, cave entrances. A total of 1,616 points of karst features were digitized, with 1,616 points of karst features were digitized.

DENSITY LAYER CALCULATION

To create the karst density layer, 11,715 individual points were digitized for 14 counties (117 7-minute quadrangles). Karst features were digitized as 89 percent of the points, sinkholes, 96 percent, surface depressions, 2.3 percent, sinkholes, and 3.6 percent, cave entrances. A total of 1,616 points of karst features were digitized, with 1,616 points of karst features were digitized.

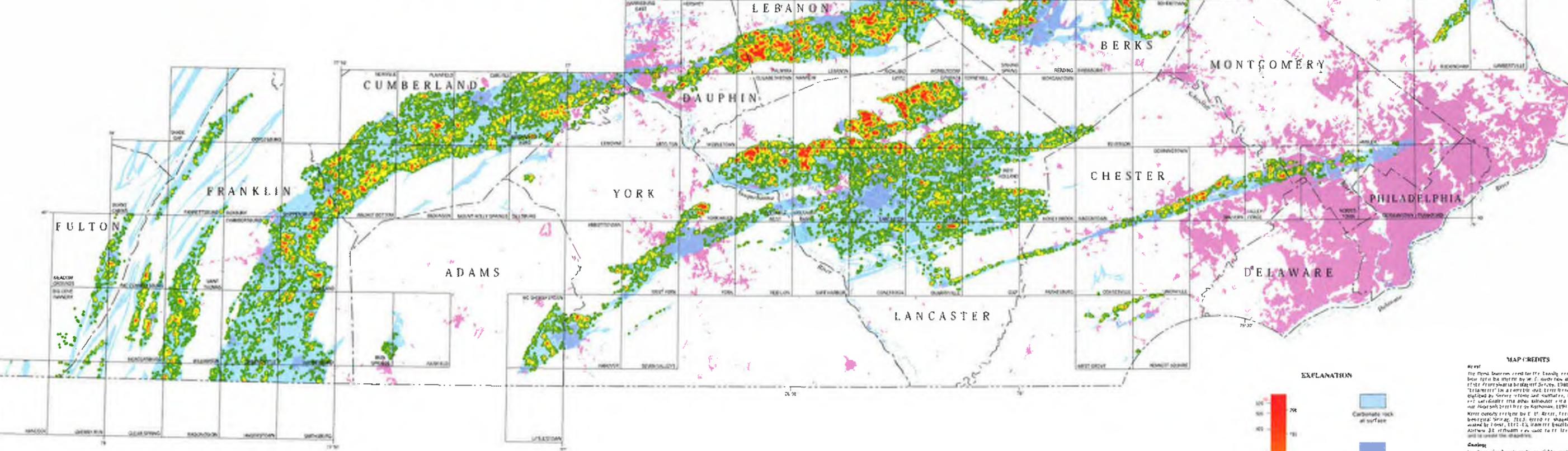
DISCLAIMER

While this map is useful for planning and preliminary site location, it is not a substitute for site-specific geologic investigations. The location of karst features and surface depressions depends on numerous factors, including rock type, rock structure, and hydrology. Karst features are particularly common in the glaciated areas of Pennsylvania and other regions. The map shows the density of mapped karst features in south-central and southeastern Pennsylvania. The map is based on data collected from a variety of sources, including field surveys, aerial photography, and historical maps.

LOCATION OF AREA

A type of karst topography that is common in the south-central and southeastern Pennsylvania region is the karst topography. Karst topography is characterized by features such as sinkholes, surface depressions, and caves. The karst topography is formed by the dissolution of carbonate rock by water over long periods of time. The karst topography is common in the south-central and southeastern Pennsylvania region.

Because of the factors mentioned above, the map is not a substitute for site-specific geologic investigations. The location of karst features and surface depressions depends on numerous factors, including rock type, rock structure, and hydrology. Karst features are particularly common in the glaciated areas of Pennsylvania and other regions. The map shows the density of mapped karst features in south-central and southeastern Pennsylvania. The map is based on data collected from a variety of sources, including field surveys, aerial photography, and historical maps.



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MAP 11

USGS West Chester and Wilmington North



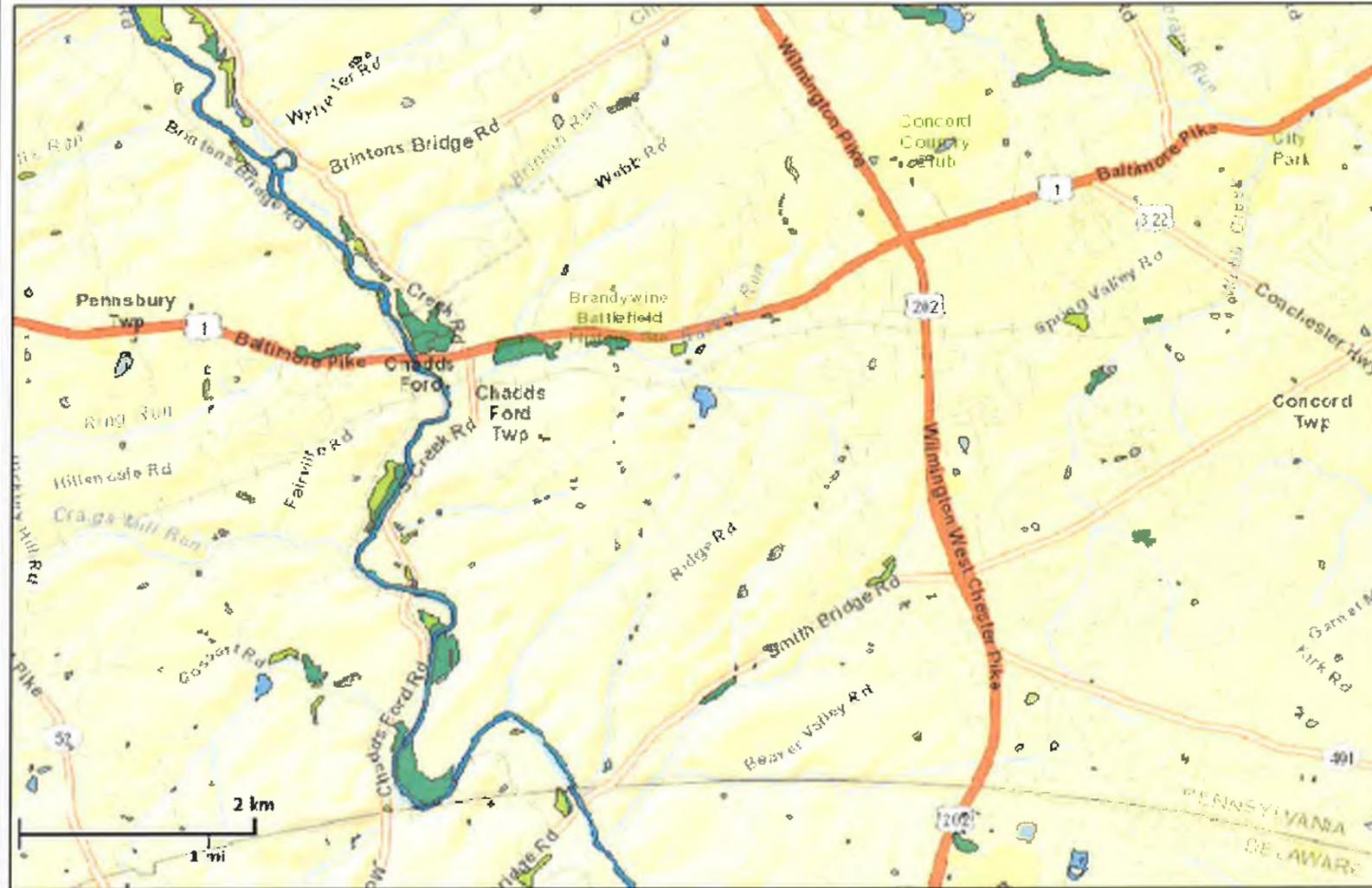
MAP 12 - NATIONAL WETLANDS INVENTORY



U.S. Fish and Wildlife Service National Wetlands Inventory

CHADDS FORD,
DELAWARE
COUNTY, PA

Aug 7, 2013



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

Riparian

- Herbaceous
- Forested/Shrub

Riparian Status

- Digital Data

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

User Remarks:

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small creeks. The community map regularly should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where Base Flood Elevations (BFEs) and/or Floodway Data are not shown, users are encouraged to consult the Flood Profile and Floodway Data and/or Subinlet Elevation Station Report (if available) for the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. The use of BFEs is intended for flood insurance purposes only and should not be used as the sole source of flood elevation information. Although flood elevation data are available in the FIS report, they should be used in conjunction with the FIRM for guidance in construction and floodplain management.

Boundaries of the Floodways were computed at cross sections and interpolated between cross sections. The Floodways were based on hydraulic considerations with regard to the National Flood Insurance Program Floodway widths and other pertinent Floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas are in Special Flood Hazard Areas that are protected by flood control structures. For information on flood control structures, see the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in this map is the Universal Transverse Mercator (UTM) Zone 18, North. Horizontal datum was NAD 83 GRS80 spheroid. Different elevations, datum, and/or projection of UTM zones used in the products of the FIS may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIS.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These elevations must be compared to the elevation of a specific structure to determine if the structure is in a flood hazard area. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

National Geodetic Survey
National Geodetic Survey, NOAA
2825 Spring Mills Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 763-3131

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the National Geodetic Survey at the following address:

NATIONAL GEODETIC SURVEY
Base map files were obtained in digital raster data format from the Delaware Valley Regional Planning Commission and Delaware County Road and Bridge Department, and townships through boundaries were provided by Delaware County. The county boundary was downloaded from the 2006 TIGER/Line files 2002 and 2005 digital topographic maps were provided by the Delaware Valley Regional Planning Commission. Adjustments were made to specific base map features to align them to the 2005 scale orthophotos.

Based on updated topographic information, this map reflects more detailed and up-to-date stream channel configurations and floodplain delineations than those shown on the previous FIS for this jurisdiction. As a result, the Flood Profile and Floodway Data tables may reflect various changes that differ from what is shown on the map. Also, the relationship for unadjusted elevations may differ from what is shown on previous maps.

Coastal limits shown on this map are based on the best data available at the time of publication. Because changes due to subsidence or sea-level rise may occur after this map is published, map users should contact appropriate community officials to verify correct coastal limit locations.

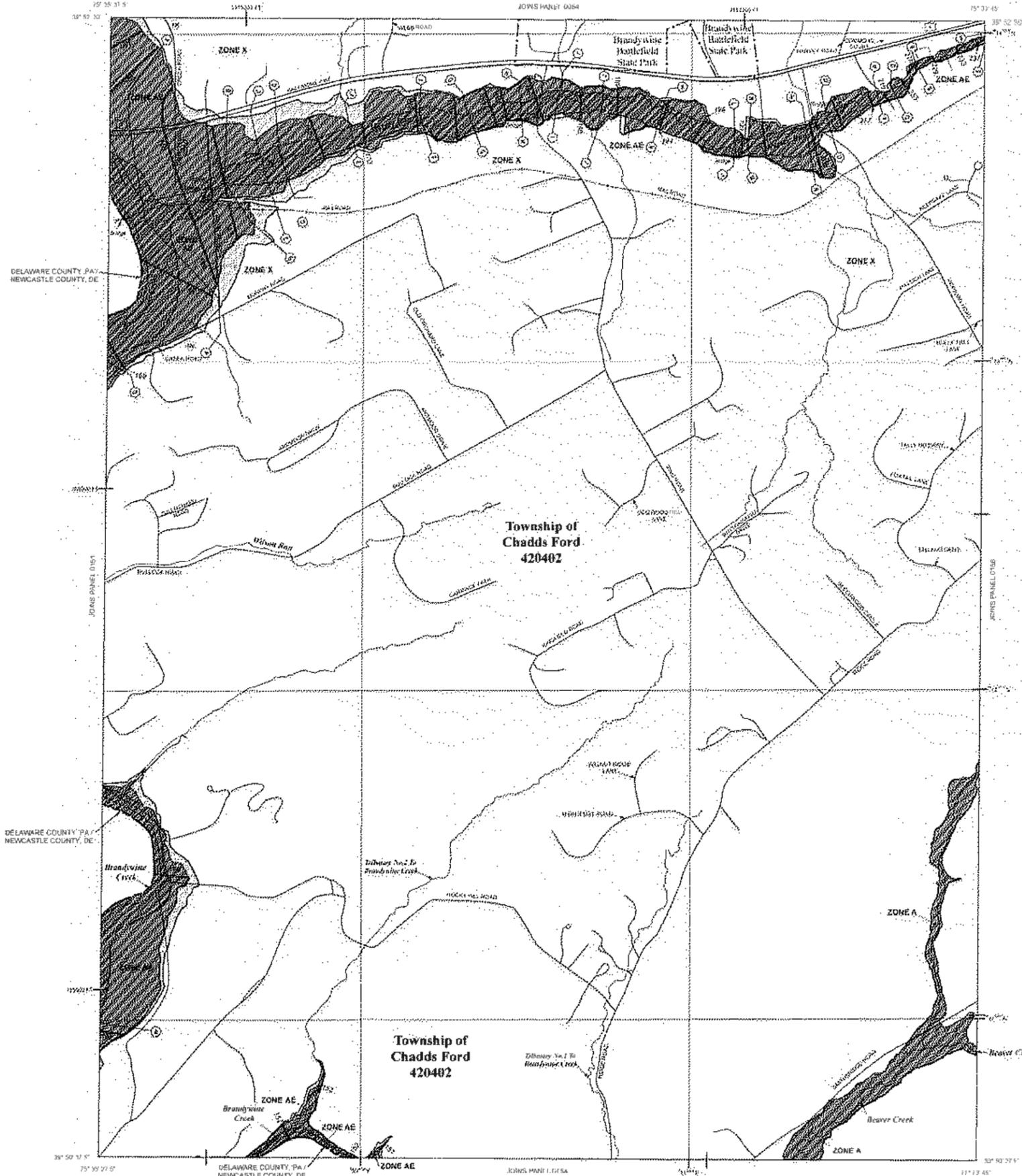
Please refer to the separately printed map index for a viewable map of the county showing the layout of map panels; community map repository addresses; and a listing of Communities at Risk containing National Flood Insurance Program data for each community, as well as a listing of the panels on which each community is located.

Contact the FEMA Map Service Center at 1-800-358-9610 for information on available products, website, and/or FIRM. Available products may also be found previously if you letters of Map Change, a Flood Insurance Study report, and/or digital version of this map. The FEMA Map Service Center may also be reached by fax at 1-800-358-9610 and its website at <http://www.fema.gov>.

If you have questions about this map or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-366-7627) or visit the FEMA website at <http://www.fema.gov>.

Additional information may be shown in the reverse side of this map. Users should consult the Flood Insurance Study (FIS) for detailed flood hazard information.

MAP 8 - FEMA MAPS (3 OF 5)



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD:

- ZONE X:** Areas with a 1% Annual Chance Flood.
- ZONE AE:** Areas with a 1% Annual Chance Flood and a Floodway.
- ZONE A:** Areas with a 1% Annual Chance Flood.

FLOODWAY AREAS IN ZONE AE:

OTHER FLOOD AREAS:

- ZONE X:** Areas with a 1% Annual Chance Flood.
- ZONE AE:** Areas with a 1% Annual Chance Flood and a Floodway.
- ZONE A:** Areas with a 1% Annual Chance Flood.

OTHER AREAS:

- COASTAL BARRIERS SOURCE SYSTEM (CBRS) AREAS:** Areas with a 1% Annual Chance Flood.
- OTHERWISE PROTECTED AREAS (OPAs):** Areas with a 1% Annual Chance Flood.

Scale: MAP SCALE 1" = 600'

Scale: MAP SCALE 1" = 600'

Scale: MAP SCALE 1" = 600'

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0152F

FIRM FLOOD INSURANCE RATE MAP

DELAWARE COUNTY, PENNSYLVANIA (ALL JURISDICTIONS)

PANEL 152 OF 250 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

COMMUNITY CHADDS FORD 420402

MAP NUMBER 42045C0152F

MAP REVISED NOVEMBER 18, 2009

Federal Emergency Management Agency

MAP 8 - FEMA MAPS (4 OF 5)

NOTES TO USERS

The information on this map was prepared for the Flood Insurance Program. It is not intended to be used for any other purpose. The community map may be used for other purposes if it is used in conjunction with the Flood Insurance Program. The community map may be used for other purposes if it is used in conjunction with the Flood Insurance Program.

To obtain more detailed information in areas where the Flood Insurance Program is not shown, contact the Flood Insurance Study (FIS) for the community. The FIS is available on the FEMA website at www.fema.gov. The FIS is available on the FEMA website at www.fema.gov.

For more information on the Flood Insurance Program, contact the Flood Insurance Study (FIS) for the community. The FIS is available on the FEMA website at www.fema.gov. The FIS is available on the FEMA website at www.fema.gov.

For more information on the Flood Insurance Program, contact the Flood Insurance Study (FIS) for the community. The FIS is available on the FEMA website at www.fema.gov. The FIS is available on the FEMA website at www.fema.gov.

The projection used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 18N. The datum used was NAD 83. The datum used was NAD 83. The datum used was NAD 83.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These elevations must be compared to the structure and ground elevations, referenced to the same vertical datum, for the community. The datum used was NAD 83. The datum used was NAD 83.

Special Reference System (SRS) for the National Geodetic Survey (NGS) is used. The datum used was NAD 83. The datum used was NAD 83.

To obtain current elevation information for the community, contact the National Geodetic Survey (NGS) at <http://www.ngs.noaa.gov>. The datum used was NAD 83. The datum used was NAD 83.

BASE MAP SOURCE: Base map data were obtained from the Delaware Valley Regional Planning Commission and Delaware County. The datum used was NAD 83. The datum used was NAD 83.

Based on updated topographic information, this map reflects more detailed and up-to-date stream channels and floodplains. The datum used was NAD 83. The datum used was NAD 83.

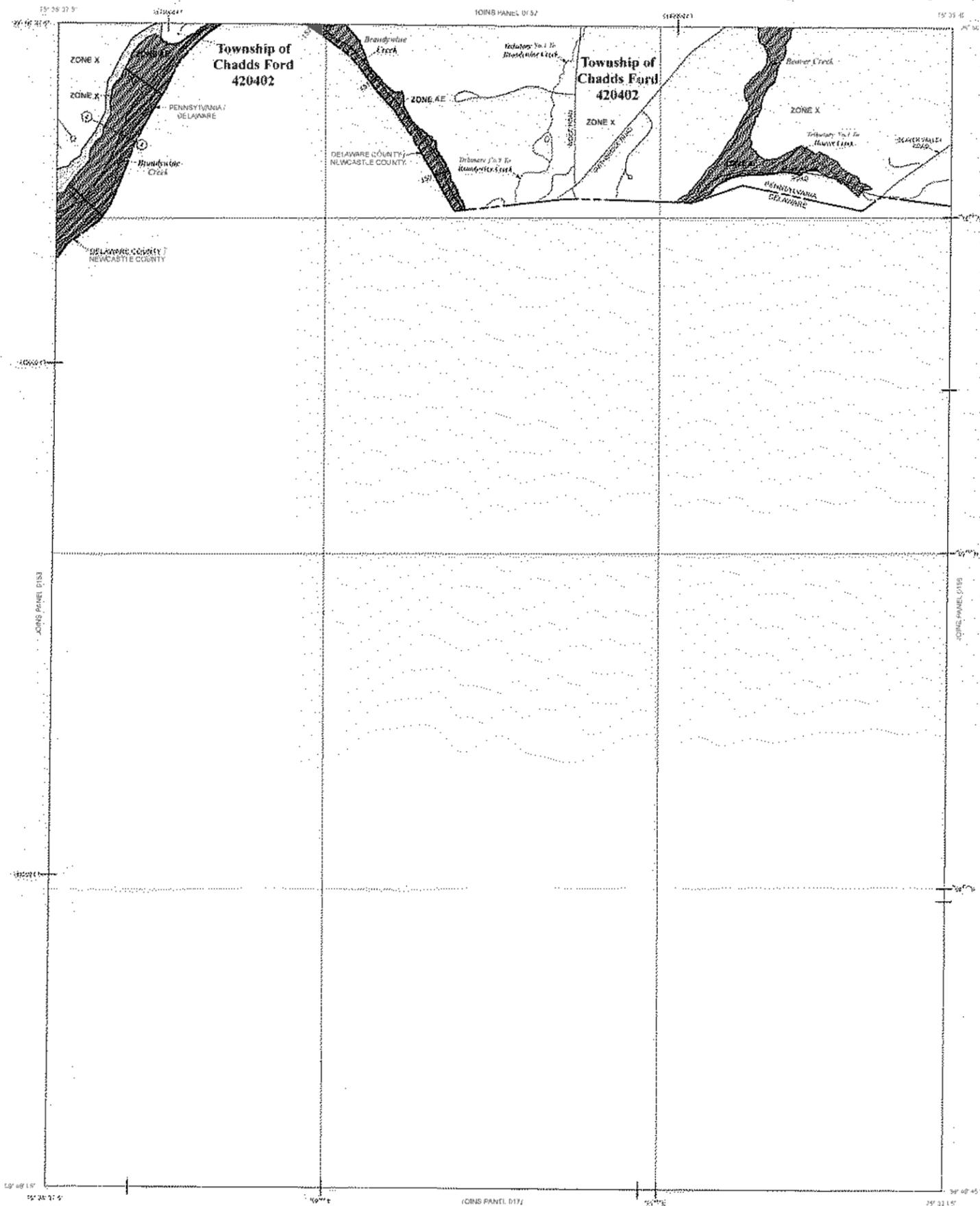
Corporate limits shown on this map are based on the best data available at the time of publication. The datum used was NAD 83. The datum used was NAD 83.

Please refer to the separate Flood Map Index for a review map of the county showing the layout of map panels. The datum used was NAD 83. The datum used was NAD 83.

Contact the FEMA Map Service Center at 1-800-358-3616 for information on available products associated with the FIS. The datum used was NAD 83. The datum used was NAD 83.

If you have questions about this map or need further information on the Flood Insurance Program, please call 1-877-FEMA-MAP (1-877-326-2627) or visit the FEMA website at <http://www.fema.gov>.

For more information on the Flood Insurance Program, contact the Flood Insurance Study (FIS) for the community. The FIS is available on the FEMA website at www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

ZONE X
 Areas of moderate to high flood hazard. Flood depths of 1 to 3 feet (1.5 to 3.0 meters) are expected. Flood velocities are 1 to 3 feet per second (0.3 to 0.9 meters per second). Flood waves are 1 to 3 feet (0.3 to 0.9 meters) high. Flood waves are 1 to 3 feet (0.3 to 0.9 meters) high.

ZONE AE
 Areas of high flood hazard. Flood depths of 3 to 6 feet (0.9 to 1.8 meters) are expected. Flood velocities are 3 to 6 feet per second (0.9 to 1.8 meters per second). Flood waves are 3 to 6 feet (0.9 to 1.8 meters) high. Flood waves are 3 to 6 feet (0.9 to 1.8 meters) high.

OTHER FLOOD AREAS

ZONE A
 Areas of moderate flood hazard. Flood depths of 1 to 3 feet (1.5 to 3.0 meters) are expected. Flood velocities are 1 to 3 feet per second (0.3 to 0.9 meters per second). Flood waves are 1 to 3 feet (0.3 to 0.9 meters) high. Flood waves are 1 to 3 feet (0.3 to 0.9 meters) high.

OTHER AREAS

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CONCRETE AND MASONRY FOUNDATIONS

WOOD FOUNDATIONS

SOFT SOILS

MAP SCALE 1" = 600'

MAP SCALE 1" = 600'

MAP SCALE 1" = 600'

NATIONAL FLOOD INSURANCE PROGRAM

FIRM FLOOD INSURANCE RATE MAP

DELAWARE COUNTY, PENNSYLVANIA (ALL JURISDICTIONS)

PANEL 154 OF 250

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

MAP NUMBER 42045C0154F

MAP REVISED NOVEMBER 18, 2009

Federal Emergency Management Agency

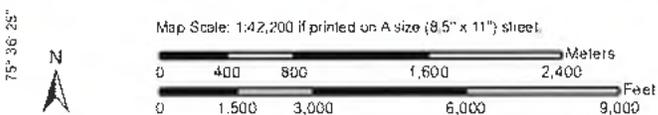
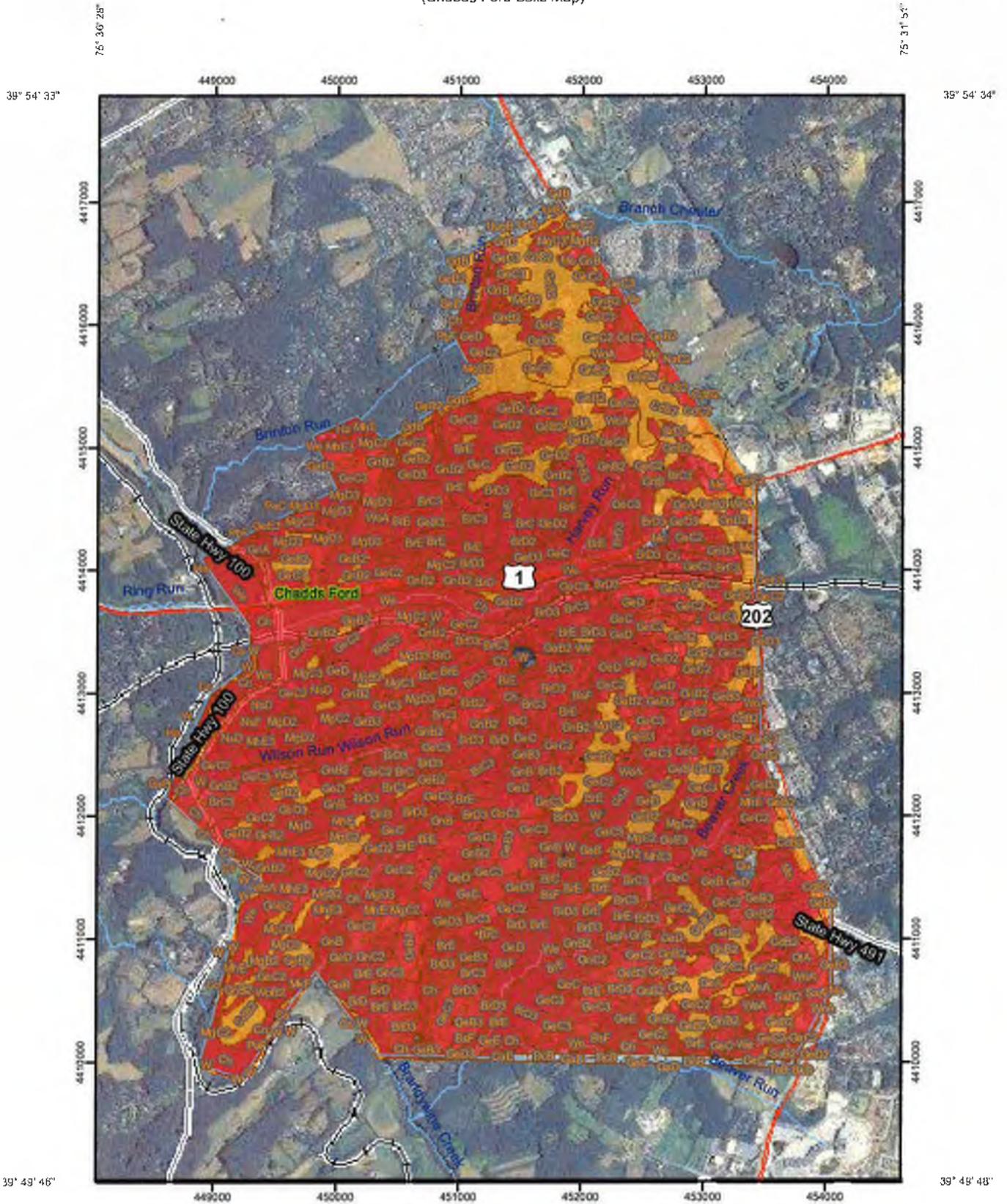
CHADDS FORD TOWNSHIP, DELAWARE COUNTY, PA

TABLE 1 - SUITABILITY OF SOILS FOR CONVENTIONAL SEPTIC SYSTEMS

SOIL	MAP SYMBOL	PERCENT SLOPE	ON-LOT SEPTIC SYSTEM		PERCENT IN AREA
			RATING	REASON	
BRANDYWINE LOAM	Brb2	3-8	VERY LIMITED	FAST PERCOLATION, TOO STEEP, POTENTIAL BEDROCK	0.2%
	BrC	8-15	VERY LIMITED	TOO STEEP, FAST PERCOLATION, POTENTIAL BEDROCK	0.7%
	BrC3	8-15	VERY LIMITED	TOO STEEP, FAST PERCOLATION, POTENTIAL BEDROCK	5.3%
	BrD	15-25	VERY LIMITED	TOO STEEP, FAST PERCOLATION, POTENTIAL BEDROCK	0.5%
	BrD2	15-25	VERY LIMITED	BEDROCK ABOVE, TOO STEEP	0.1%
	BrD3	15-25	VERY LIMITED	TOO STEEP, FAST PERCOLATION, POTENTIAL BEDROCK	6.5%
	BrE	25-40	VERY LIMITED	TOO STEEP, FAST PERCOLATION, POTENTIAL BEDROCK	5.8%
	BsD	8-25	VERY LIMITED	TOO STEEP, BEDROCK, SLOW PERCOLATION	0.0%
BUTLERTOWN SILT LOAM	BsF	25-50	VERY LIMITED	TOO STEEP, BEDROCK, SLOW PERCOLATION	0.5%
	ByB2	3-8	VERY LIMITED	HIGH WATER TABLE, TOO STEEP, SLOW PERCOLATION	0.0%
CHESTER SILT LOAM	CdA	0-3	MODERATELY LIMITED	SLOW PERCOLATION, SLOPE	0.0%
	CdA2	0-3	MODERATELY LIMITED	SLOW PERCOLATION, SLOPE	0.0%
	CdB2	3-8	MODERATELY LIMITED	SLOW PERCOLATION, SLOPE	3.7%
	CdC2	8-15	VERY LIMITED	TOO STEEP, SLOW PERCOLATION	0.1%
CHEWACLA SILT LOAM	Ch	----	VERY LIMITED	HIGH WATER TABLE, FLOODING, FAST PERCOLATION, SLOPE	3.1%
CONGAREE SILT LOAM	Cn	----	VERY LIMITED	FLOODING, SLOPE, SLOW PERCOLATION	0.7%
GLENELG	GeA	0-3	VERY LIMITED	BEDROCK, SLOW PERCOLATION, SLOPE	0.4%
	GeB	3-8	VERY LIMITED	BEDROCK, SLOW PERCOLATION, TOO STEEP	0.5%
	GeB2	3-8	MODERATELY LIMITED	SLOW PERCOLATION, TOO STEEP	11.2%
	GeB3	3-8	VERY LIMITED	BEDROCK, SLOW PERCOLATION, TOO STEEP	3.8%
	GeC	8-15	VERY LIMITED	BEDROCK, TOO STEEP, SLOW PERCOLATION	1.8%
	GeC2	8-15	VERY LIMITED	TOO STEEP, SLOW PERCOLATION	9.1%
	GeC3	8-15	VERY LIMITED	TOO STEEP, SLOW PERCOLATION	9.1%
	GeD	15-25	VERY LIMITED	TOO STEEP, BEDROCK, SLOW PERCOLATION	8.5%
	GeD2	15-25	VERY LIMITED	BEDROCK, TOO STEEP, SLOW PERCOLATION	1.8%
	GeD3	15-25	VERY LIMITED	TOO STEEP, SLOW PERCOLATION	0.5%
	GeD3	15-25	VERY LIMITED	TOO STEEP, BEDROCK, SLOW PERCOLATION	1.8%
	GeE	25-35	VERY LIMITED	TOO STEEP, BEDROCK, SLOW PERCOLATION	0.3%
GLENVILLE SILT LOAM	GeE3	25-35	VERY LIMITED	TOO STEEP, BEDROCK, SLOW PERCOLATION	0.3%
	GnA	0-3	VERY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, SLOPE	1.0%
	GnB	3-8	VERY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, TOO STEEP	2.5%
	GnB2	3-8	VERY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, TOO STEEP	7.0%
	GnC2	8-15	VERY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, TOO STEEP	0.2%
	GsB	0-8	VERY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, SLOPE	0.0%
MADE LAND	Ma	---	VERY LIMITED	HIGH WATER TABLE, BEDROCK, SLOW PERCOLATION, TOO STEEP	0.1%
	Mc	---	NOT RATED		0.1%
	Me	---	VERY LIMITED	HIGH WATER TABLE, SLOW PERCOLATING, SLOPE, BEDROCK	1.5%
	MgB2	3-8	MODERATELY LIMITED	TOO STEEP, SLOW PERCOLATION	1.4%
MANOR LOAM	MgC	8-15	VERY LIMITED	TOO STEEP, SLOW PERCOLATION	0.1%
	MgC2	8-15	VERY LIMITED	TOO STEEP, BEDROCK	2.5%
	MgC3	8-15	VERY LIMITED	TOO STEEP, BEDROCK	1.1%
	MgD	15-25	VERY LIMITED	TOO STEEP, SLOW PERCOLATION	0.2%
	MgD2	15-25	VERY LIMITED	TOO STEEP, BEDROCK	0.6%
	MgD3	15-25	VERY LIMITED	TOO STEEP, BEDROCK	1.9%
	MhE	25-35	VERY LIMITED	TOO STEEP, SLOW PERCOLATION	0.6%
	MhE3	25-35	VERY LIMITED	TOO STEEP, BEDROCK	1.3%
	MkF	35-60	VERY LIMITED	TOO STEEP, SLOW PERCOLATION	0.2%
	MmF	25-60	VERY LIMITED	TOO STEEP, SLOW PERCOLATION	0.0%
	NESHAMINY SILT LOAM	NaB2	3-8	VERY LIMITED	BEDROCK, TOO STEEP, SLOW PERCOLATION
NaC2		8-15	VERY LIMITED	TOO STEEP, BEDROCK, HIGH WATER TABLE	0.0%
NsB		0-8	VERY LIMITED	SLOW PERCOLATION, BEDROCK, SLOPE	0.1%
NsD		8-25	VERY LIMITED	SLOW PERCOLATION, TOO STEEP, BEDROCK	0.5%
NsF		25-45	VERY LIMITED	SLOW PERCOLATION, TOO STEEP, BEDROCK	0.3%
OTHELLO SILT LOAM	OTA	----	VERY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, SLOPE	0.1%
QUARRIES	Qu	----	NOT RATED		0.2%
SASSAFRAS LOAM	5aA	0-3	VERY LIMITED	FAST PERCOLATION, SLOPE	0.1%
	5aB2	3-8	VERY LIMITED	FAST PERCOLATION, SLOPE	0.6%
WATER	W	----	NOT RATED		0.5%
WEHADKEE SILT LOAM	We	---	VERY LIMITED	HIGH WATER TABLE, FLOODING, SLOW PERCOLATION	3.8%
WOODSTOWN LOAM	WnA	0-3	VERY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, SLOPE	0.3%
WORSHAM LOAM	WoA	0-3	VERY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, SLOPE	1.0%
	WoB	3-8	VERY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, TOO STEEP	0.1%
	WoB2	3-8	VERY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, TOO STEEP	0.1%

97.2%

Septic System In-Ground Bed (Conventional) (PA)—Chester County, Pennsylvania, Delaware County, Pennsylvania, and New Castle County, Delaware (Chadds Ford Soils Map)



MAP LEGEND

- Area of Interest (AOI)
 -  Area of Interest (AOI)
- Soils
 -  Soil Map Units
- Soil Ratings
 -  Very limited
 -  Moderately limited
 -  Slightly limited
 -  Not limited
 -  not rated or not available
- Political Features
 -  Cities
- Water Features
 -  Streams and Canals
- Transportation
 -  Rails
 -  Interstate Highways
 -  US Routes
 -  Major Roads

MAP INFORMATION

Map Scale: 1:42,200 if printed on A size (8.5" x 11") sheet.

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chester County, Pennsylvania
Survey Area Data: Version 3, Dec 3, 2008

Soil Survey Area: Delaware County, Pennsylvania
Survey Area Data: Version 6, Feb 24, 2009

Soil Survey Area: New Castle County, Delaware
Survey Area Data: Version 6, Sep 28, 2012

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Septic System In-Ground Bed (Conventional) (PA)

Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — Chester County, Pennsylvania (PA029)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
CaA	Califon loam, 0 to 3 percent slopes	Very limited	Califon (90%)	Seasonal high water table (1.00)	1.8	0.0%
				Slow percolation >12" (1.00)		
				Slope (0.13)		
			Holly (4%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
				Potential slow percolation >12" (0.01)		
			Baile (3%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
				Slope (0.13)		
			Fluvaquents (3%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
				Slope (0.03)		
CaB	Califon loam, 3 to 8 percent slopes	Very limited	Califon (82%)	Seasonal high water table (1.00)	0.6	0.0%
				Slow percolation >12" (1.00)		
				Slope (0.72)		
			Baile (4%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
				Slope (0.13)		
			Hatboro (4%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
				Slow percolation >12" (0.89)		
				Slope (0.13)		

Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — Chester County, Pennsylvania (PA029)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
Co	Codorus silt loam	Very limited	Codorus (85%)	Seasonal high water table (1.00)	2.7	0.0%
				Flooding (1.00)		
				Fast percolation >12" (1.00)		
				Slope (0.13)		
			Hatboro (8%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
				Slope (0.13)		
			Baite (3%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
Slope (0.13)						
CpA	Cokesbury silt loam, 0 to 3 percent slopes	Very limited	Cokesbury (85%)	Seasonal high water table (1.00)	0.2	0.0%
				Slow percolation >12" (1.00)		
				Slope (0.13)		
			Holly (3%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
				Potential slow percolation >12" (0.01)		
Cs	Comus silt loam	Very limited	Comus (90%)	Flooding (1.00)	13.6	0.2%
				Slope (0.13)		
				Potential slow percolation >12" (0.01)		
			Holly (8%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
				Slope (0.13)		
				Potential slow percolation >12" (0.01)		
GaD	Gaila silt loam, 15 to 25 percent slopes	Very limited	Gaila (85%)	Too steep (1.00)	0.0	0.0%
				Potential bedrock near 60" (0.33)		
GdB	Gladstone gravelly loam, 3 to 8 percent slopes	Moderately limited	Gladstone (93%)	Too steep (0.88)	16.9	0.3%
				Potential bedrock near 60" (0.33)		

Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — Chester County, Pennsylvania (PA029)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
GdC	Gladstone gravelly loam, 8 to 15 percent slopes	Very limited	Gladstone (90%)	Too steep (1.00)	5.1	0.1%
				Potential bedrock near 60" (0.33)		
			Cokesbury (5%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
				Slope (0.13)		
GdD	Gladstone gravelly loam, 15 to 25 percent slopes	Very limited	Gladstone (90%)	Too steep (1.00)	0.8	0.0%
				Potential bedrock near 60" (0.33)		
			Cokesbury (5%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
				Slope (0.13)		
GeD	Gladstone-Parker gravelly loams, 15 to 25 percent slopes	Very limited	Gladstone (58%)	Too steep (1.00)	2.3	0.0%
				Potential bedrock near 60" (0.33)		
				Potential slow percolation >12" (0.01)		
			Parker (42%)	Too steep (1.00)		
				Fast percolation >12" (1.00)		
				Slight voided fragments (0.08)		
				Potential bedrock near 60" (0.03)		
GgC	Glenelg silt loam, 8 to 15 percent slopes	Very limited	Glenelg (90%)	Too steep (1.00)	0.0	0.0%
				Slow percolation >12" (0.89)		
Ha	Hatboro silt loam	Very limited	Hatboro (95%)	Seasonal high water table (1.00)	17.3	0.3%
				Flooding (1.00)		
				Slow percolation >12" (0.89)		
				Slope (0.13)		
MaE	Manor loam, 25 to 35 percent slopes	Very limited	Manor (98%)	Too steep (1.00)	0.1	0.0%
				Potential slow percolation >12" (0.01)		

Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — Chester County, Pennsylvania (PA029)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
MIB	Mount Lucas silt loam, 3 to 8 percent slopes	Very limited	Mount Lucas (94%)	Seasonal high water table (1.00)	0.7	0.0%
				Too steep (0.88)		
				Potential slow percolation >12" (0.06)		
			Towhee (6%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
				Too steep (0.88)		
PaC	Parker gravelly loam, 8 to 15 percent slopes	Very limited	Parker (97%)	Too steep (1.00)	2.8	0.0%
				Fast percolation >12" (1.00)		
				Slight voided fragments (0.08)		
				Potential bedrock near 60" (0.03)		
PaD	Parker gravelly loam, 15 to 25 percent slopes	Very limited	Parker (97%)	Too steep (1.00)	1.0	0.0%
				Fast percolation >12" (1.00)		
				Slight voided fragments (0.08)		
				Potential bedrock near 60" (0.03)		
PaE	Parker gravelly loam, 25 to 35 percent slopes	Very limited	Parker (98%)	Too steep (1.00)	0.8	0.0%
				Fast percolation >12" (1.00)		
				Slight voided fragments (0.08)		
				Potential bedrock near 60" (0.03)		
PaF	Parker gravelly loam, 35 to 60 percent slopes	Very limited	Parker (85%)	Too steep (1.00)	0.6	0.0%
				Fast percolation >12" (1.00)		
				Slight voided fragments (0.08)		
				Potential bedrock near 60" (0.03)		
PbF	Parker loam, 25 to 60 percent slopes, extremely stony	Very limited	Parker, extremely stony (97%)	Too steep (1.00)	5.3	0.1%
				Fast percolation >12" (1.00)		
				Slight voided fragments (0.47)		
				Potential bedrock near 60" (0.03)		

Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — Chester County, Pennsylvania (PA029)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
ToB	Towhee silt loam, 3 to 8 percent slopes	Very limited	Towhee (88%)	Seasonal high water table (1.00)	1.1	0.0%
				Slow percolation >12" (1.00)		
				Too steep (0.88)		
			Watchung, silt loam (2%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
				Slope (0.13)		
UrB	Urban land, 0 to 8 percent slopes	Not rated	Urban land (85%)		3.3	0.1%
UrIB	Urban land-Gladstone complex, 0 to 8 percent slopes	Not rated	Urban land (65%)		9.9	0.2%
UugB	Urban land-Udorthents, schist and gneiss complex, 0 to 8 percent slopes	Not rated	Urban land (80%)		0.1	0.0%
UugD	Urban land-Udorthents, schist and gneiss complex, 8 to 25 percent slopes	Not rated	Urban land (80%)		0.3	0.0%
W	Water	Not rated	Water (99%)		15.2	0.2%
Subtotals for Soil Survey Area					102.5	1.6%
Totals for Area of Interest					6,237.6	100.0%

Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
BrB2	Brandywine loam, 3 to 8 percent slopes, moderately eroded	Very limited	Brandywine (85%)	Fast percolation >12" (1.00)	13.8	0.2%
				Too steep (0.88)		
				Potential bedrock near 60" (0.17)		
BrC	Brandywine loam, 8 to 15 percent slopes	Very limited	Brandywine (85%)	Too steep (1.00)	41.8	0.7%
				Fast percolation >12" (1.00)		
				Potential bedrock near 60" (0.17)		

Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
BrC3	Brandywine loam, 8 to 15 percent slopes, severely eroded	Very limited	Brandywine (85%)	Too steep (1.00)	331.9	5.3%
				Fast percolation >12" (1.00)		
				Potential bedrock near 60" (0.17)		
BrD	Brandywine loam, 15 to 25 percent slopes	Very limited	Brandywine (85%)	Too steep (1.00)	33.8	0.5%
				Fast percolation >12" (1.00)		
				Potential bedrock near 60" (0.17)		
BrD2	Brandywine loam, 15 to 25 percent slopes, moderately eroded	Very limited	Brandywine (85%)	Bedrock, above 60" (1.00)	8.3	0.1%
				Too steep (1.00)		
BrD3	Brandywine loam, 15 to 25 percent slopes, severely eroded	Very limited	Brandywine (85%)	Too steep (1.00)	403.7	8.5%
				Fast percolation >12" (1.00)		
				Potential bedrock near 60" (0.17)		
BrE	Brandywine loam, 25 to 40 percent slopes	Very limited	Brandywine (85%)	Too steep (1.00)	363.2	5.8%
				Fast percolation >12" (1.00)		
				Potential bedrock near 60" (0.17)		
BsD	Brandywine very stony loam, 8 to 25 percent slopes	Very limited	Brandywine (85%)	Too steep (1.00)	0.6	0.0%
				Bedrock, above 60" (1.00)		
				Potential slow percolation >12" (0.01)		
BsF	Brandywine very stony loam, 25 to 50 percent slopes	Very limited	Brandywine (85%)	Too steep (1.00)	28.1	0.5%
				Bedrock, above 60" (1.00)		
				Potential slow percolation >12" (0.01)		
ByB2	Butlertown silt loam, 3 to 8 percent slopes, moderately eroded	Very limited	Butlertown (85%)	Seasonal high water table (1.00)	1.9	0.0%
				Slow percolation >12" (1.00)		
				Too steep (0.88)		
			Othello (5%)	Seasonal high water table (1.00)		
				Slow percolation >12" (0.94)		
				Slope (0.13)		

Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
CdA	Chester silt loam, 0 to 3 percent slopes	Moderately limited	Chester (92%)	Slow percolation >12" (0.89)	2.0	0.0%
				Slope (0.28)		
CdA2	Chester silt loam, 0 to 3 percent slopes, moderately eroded	Moderately limited	Chester (90%)	Slow percolation >12" (0.89)	1.0	0.0%
				Slope (0.13)		
CdB2	Chester silt loam, 3 to 8 percent slopes, moderately eroded	Moderately limited	Chester (90%)	Slow percolation >12" (0.89)	227.8	3.7%
				Too steep (0.88)		
CdC2	Chester silt loam, 8 to 15 percent slopes, moderately eroded	Very limited	Chester (90%)	Too steep (1.00)	3.7	0.1%
				Slow percolation >12" (0.89)		
Ch	Chewacla silt loam	Very limited	Chewacla (85%)	Seasonal high water table (1.00)	195.3	3.1%
				Flooding (1.00)		
				Fast percolation >12" (1.00)		
				Slope (0.13)		
			Wehadkee (5%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
				Slow percolation >12" (0.89)		
				Slope (0.13)		
Cn	Congaree silt loam	Very limited	Comus (90%)	Flooding (1.00)	44.9	0.7%
				Slope (0.13)		
				Potential slow percolation >12" (0.01)		
				Seasonal high water table (1.00)		
			Holly (8%)	Flooding (1.00)		
				Slope (0.13)		
				Potential slow percolation >12" (0.01)		
				Bedrock, above 60" (1.00)		
GeA	Glenelg channery silt loam, 0 to 3 percent slopes	Very limited	Glenelg (100%)	Slow percolation >12" (0.89)	27.7	0.4%
				Slope (0.13)		

Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
GeB	Glenelg channery silt loam, 3 to 8 percent slopes	Very limited	Glenelg (85%)	Bedrock, above 60" (1.00)	29.0	0.5%
				Slow percolation >12" (0.89)		
				Too steep (0.88)		
GeB2	Glenelg channery silt loam, 3 to 8 percent slopes, moderately eroded	Moderately limited	Glenelg (85%)	Slow percolation >12" (0.89)	698.6	11.2%
				Too steep (0.88)		
GeB3	Glenelg channery silt loam, 3 to 8 percent slopes, severely eroded	Very limited	Glenelg (85%)	Bedrock, above 60" (1.00)	239.7	3.8%
				Slow percolation >12" (0.89)		
				Too steep (0.88)		
GeC	Glenelg channery silt loam, 8 to 15 percent slopes	Very limited	Glenelg (85%)	Bedrock, above 60" (1.00)	114.1	1.8%
				Too steep (1.00)		
				Slow percolation >12" (0.89)		
GeC2	Glenelg channery silt loam, 8 to 15 percent slopes, moderately eroded	Very limited	Glenelg (85%)	Too steep (1.00)	569.6	9.1%
				Slow percolation >12" (0.89)		
GeC3	Glenelg channery silt loam, 8 to 15 percent slopes, severely eroded	Very limited	Glenelg (85%)	Too steep (1.00)	532.0	8.5%
				Bedrock, above 60" (1.00)		
				Slow percolation >12" (0.89)		
GeD	Glenelg channery silt loam, 15 to 25 percent slopes	Very limited	Glenelg (85%)	Bedrock, above 60" (1.00)	112.5	1.8%
				Too steep (1.00)		
				Slow percolation >12" (0.89)		
GeD2	Glenelg channery silt loam, 15 to 25 percent slopes, moderately eroded	Very limited	Glenelg (85%)	Too steep (1.00)	31.0	0.5%
				Slow percolation >12" (0.89)		
GeD3	Glenelg channery silt loam, 15 to 25 percent slopes, severely eroded	Very limited	Glenelg (85%)	Too steep (1.00)	114.1	1.8%
				Bedrock, above 60" (1.00)		
				Slow percolation >12" (0.89)		

Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
GeE	Glenelg channery silt loam, 25 to 35 percent slopes	Very limited	Glenelg (85%)	Too steep (1.00)	18.9	0.3%
				Bedrock, above 60" (1.00)		
				Slow percolation >12" (0.89)		
GeE3	Glenelg channery silt loam, 25 to 35 percent slopes, severely eroded	Very limited	Glenelg (85%)	Too steep (1.00)	19.5	0.3%
				Bedrock, above 60" (1.00)		
				Slow percolation >12" (0.89)		
GnA	Glenville silt loam 0 to 3 percent slopes	Very limited	Glenville (90%)	Seasonal high water table (1.00)	61.7	1.0%
				Slow percolation >12" (1.00)		
				Slope (0.13)		
			Baile (5%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
				Slope (0.13)		
GnB	Glenville silt loam, 3 to 8 percent slopes	Very limited	Glenville (90%)	Seasonal high water table (1.00)	157.7	2.5%
				Slow percolation >12" (1.00)		
				Too steep (0.88)		
			Baile (5%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
				Slope (0.13)		
GnB2	Glenville silt loam, 3 to 8 percent slopes, moderately eroded	Very limited	Glenville (85%)	Seasonal high water table (1.00)	437.5	7.0%
				Slow percolation >12" (1.00)		
				Too steep (0.88)		
			Worsham (7%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
				Too steep (0.88)		
GnC2	Glenville silt loam, 8 to 15 percent slopes, moderately eroded	Very limited	Glenville (100%)	Seasonal high water table (1.00)	11.4	0.2%
				Slow percolation >12" (1.00)		
				Too steep (1.00)		



Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
GsB	Glenville very stony silt loam, 0 to 8 percent slopes	Very limited	Glenville, extremely stony (100%)	Seasonal high water table (1.00)	2.4	0.0%
				Slow percolation >12" (1.00)		
				Slope (0.72)		
Ma	Made land, gravelly materials	Very limited	Udorthents, shale and sandstone (85%)	Seasonal high water table (1.00)	3.5	0.1%
				Miscellaneous area (1.00)		
				Slope (0.50)		
				Potential bedrock near 60" (0.17)		
			Croton (1%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
Too steep (0.88)						
Mc	Made land, silt and clay materials	Not rated	Made land (95%)		5.7	0.1%
Me	Made land, schist and gneiss materials	Very limited	Udorthents, schist and gneiss (95%)	Seasonal high water table (1.00)	95.0	1.5%
				Slow percolation >12" (1.00)		
				Miscellaneous area (1.00)		
				Slope (0.50)		
			Potential bedrock near 60" (0.48)			
			Hatboro (1%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
Slow percolation >12" (0.89)						
Slope (0.13)						
MgB2	Manor loam, 3 to 8 percent slopes, moderately eroded	Moderately limited	Manor (95%)	Too steep (0.88)	87.4	1.4%
				Potential slow percolation >12" (0.01)		
MgC	Manor loam, 8 to 15 percent slopes	Very limited	Manor (95%)	Too steep (1.00)	5.6	0.1%
				Potential slow percolation >12" (0.01)		
			Hatboro (2%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
Slope (0.13)						

Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
MgC2	Manor loam, 8 to 15 percent slopes, moderately eroded	Very limited	Manor (90%)	Too steep (1.00)	157.4	2.5%
				Bedrock, above 60" (1.00)		
MgC3	Manor loam, 8 to 15 percent slopes, severely eroded	Very limited	Manor (90%)	Too steep (1.00)	71.2	1.1%
				Bedrock, above 60" (1.00)		
MgD	Manor loam, 15 to 25 percent slopes	Very limited	Manor (97%)	Too steep (1.00)	15.3	0.2%
				Potential slow percolation >12" (0.01)		
MgD2	Manor loam, 15 to 25 percent slopes, moderately eroded	Very limited	Manor (90%)	Too steep (1.00)	37.3	0.6%
				Bedrock, above 60" (1.00)		
MgD3	Manor loam, 15 to 25 percent slopes, severely eroded	Very limited	Manor (85%)	Too steep (1.00)	118.6	1.9%
				Bedrock, above 60" (1.00)		
MhE	Manor loam and channery loam, 25 to 35 percent slopes	Very limited	Manor (98%)	Too steep (1.00)	38.4	0.6%
				Potential slow percolation >12" (0.01)		
MhE3	Manor loam and channery loam, 25 to 35 percent slopes, severely eroded	Very limited	Manor (90%)	Too steep (1.00)	80.6	1.3%
				Bedrock, above 60" (1.00)		
MkF	Manor soils, 35 to 60 percent slopes	Very limited	Manor (100%)	Too steep (1.00)	13.9	0.2%
				Potential slow percolation >12" (0.01)		
MmF	Manor very stony loam, 25 to 60 percent slopes	Very limited	Manor, very stony (100%)	Too steep (1.00)	2.1	0.0%
				Potential slow percolation >12" (0.01)		
NaB2	Neshaminy gravelly silt loam, 3 to 8 percent slopes, moderately eroded	Very limited	Neshaminy (85%)	Bedrock, above 60" (1.00)	0.5	0.0%
				Too steep (0.88)		
				Potential seasonal high water table (0.47)		
NaC2	Neshaminy gravelly silt loam, 8 to 15 percent slopes, moderately eroded	Very limited	Neshaminy (85%)	Too steep (1.00)	0.8	0.0%
				Bedrock, above 60" (1.00)		
				Potential seasonal high water table (0.47)		

Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
NsB	Neshaminy very stony silt loam, 0 to 8 percent slopes	Very limited	Neshaminy, extremely bouldery (95%)	Slow percolation >12" (1.00)	4.5	0.1%
				Bedrock, above 60" (1.00)		
				Slope (0.50)		
			Towhee, extremely stony (5%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
				Slope (0.50)		
NsD	Neshaminy very stony silt loam, 8 to 25 percent slopes	Very limited	Neshaminy, extremely bouldery (97%)	Slow percolation >12" (1.00)	31.5	0.5%
				Too steep (1.00)		
				Bedrock, above 60" (1.00)		
			Towhee, extremely stony (3%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
				Slope (0.50)		
NsF	Neshaminy very stony silt loam, 25 to 45 percent slopes	Very limited	Neshaminy, extremely bouldery (97%)	Slow percolation >12" (1.00)	18.0	0.3%
				Too steep (1.00)		
				Bedrock, above 60" (1.00)		
			Towhee, extremely stony (3%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
				Slope (0.50)		
OtA	Othello silt loam	Very limited	Othello (90%)	Seasonal high water table (1.00)	8.7	0.1%
				Slow percolation >12" (0.94)		
				Slope (0.13)		
			Nanticoke (2%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
				Flooding (1.00)		
Qu	Quarries	Not rated	Pits, quarries (80%)	Slope (0.03)	10.7	0.2%
SaA	Sassafras loam, 0 to 3 percent slopes	Very limited	Sassafras (85%)	Fast percolation >12" (1.00)	7.8	0.1%
				Slope (0.13)		

Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
SaB2	Sassafras loam, 3 to 8 percent slopes, moderately eroded	Very limited	Sassafras (85%)	Fast percolation >12" (1.00) Too steep (0.88)	34.4	0.6%
W	Water	Not rated	Water (99%)		31.6	0.5%
We	Wehadkee silt loam	Very limited	Wehadkee (90%)	Seasonal high water table (1.00) Flooding (1.00) Slow percolation >12" (0.89) Slope (0.13)	237.3	3.8%
WnA	Woodstown loam, 0 to 3 percent slopes	Very limited	Woodstown (90%)	Seasonal high water table (1.00) Slow percolation >12" (1.00) Slope (0.13)	16.5	0.3%
WoA	Worsham silt loam, 0 to 3 percent slopes	Very limited	Worsham (85%)	Seasonal high water table (1.00) Slow percolation >12" (1.00) Slope (0.13)	64.5	1.0%
WoB	Worsham silt loam, 3 to 8 percent slopes	Very limited	Worsham (85%)	Seasonal high water table (1.00) Slow percolation >12" (1.00) Too steep (0.88)	4.3	0.1%
WoB2	Worsham silt loam, 3 to 8 percent slopes, moderately eroded	Very limited	Worsham (85%)	Seasonal high water table (1.00) Slow percolation >12" (1.00) Too steep (0.88)	6.0	0.1%
Subtotals for Soil Survey Area					6,088.2	97.6%
Totals for Area of Interest					6,237.6	100.0%

Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — New Castle County, Delaware (DE003)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
BkD	Brinklow channery loam, 15 to 25 percent slopes				0.6	0.0%
DcB	Delanco-Codorus-Hatboro complex, 0 to 8 percent slopes, flooded				15.6	0.3%
GaD	Galla loam, 15 to 25 percent slopes				7.8	0.1%



Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — New Castle County, Delaware (DE003)						
Map unit symbol	Map-unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
GaE	Gailla loam, 25 to 45 percent slopes				11.3	0.2%
GeB	Glengel loam, 3 to 8 percent slopes				0.7	0.0%
GeC	Glengel loam, 8 to 15 percent slopes				5.2	0.1%
GgB	Glengel silt loam, 3 to 8 percent slopes				1.0	0.0%
GgC	Glengel silt loam, 8 to 15 percent slopes				0.4	0.0%
GnB	Glenville silt loam, 3 to 8 percent slopes				1.1	0.0%
Hw	Hatboro-Codorus complex, 0 to 3 percent slopes, frequently flooded				0.7	0.0%
MaE	Manor loam, 25 to 45 percent slopes				0.3	0.0%
MzB	Mount Lucas silt loam, 3 to 8 percent slopes				1.0	0.0%
TaB	Talleyville silt loam, 3 to 8 percent slopes				0.9	0.0%
W	Water				0.2	0.0%
Subtotals for Soil Survey Area					46.9	0.8%
Totals for Area of Interest					6,237.6	100.0%

Septic System In-Ground Bed (Conventional) (PA)— Summary by Rating Value		
Rating	Acres in AOI	Percent of AOI
Very limited	5,080.1	81.4%
Moderately limited	1,033.7	16.6%
Null or Not Rated	123.8	2.0%
Totals for Area of Interest	6,237.6	100.0%

Description

This is a system of subsurface lines that distribute effluent from a septic tank into the natural soil. The distribution lines are at a minimum depth of 12 inches. Only the part of the soils between depths of 0 and 60 inches is considered when the soils are rated.

The soil properties and site features considered are those that affect absorption of the effluent and construction and maintenance of the system and those that may affect public health. These include depth to a water table, depth to bedrock, content of rock fragments, flooding, slope, and saturated hydraulic conductivity (Ksat). Flooding is a serious problem because it can result in improper treatment of the effluent and contamination of ground water or surface water. If Ksat is too fast or too slow, if the content of rock fragments is too high, or if the water table is too close to the surface, the effluent can contaminate the ground water. If this system is improperly installed on the steeper slopes, the effluent could flow along the surface of the soils. Additional grading may be needed in areas downslope from the system.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Slightly limited" indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. "Moderately limited" indicates that the soil has features that are somewhat favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen, which is displayed on the report. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the Selected Soil Interpretations report with this interpretation included from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart

site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

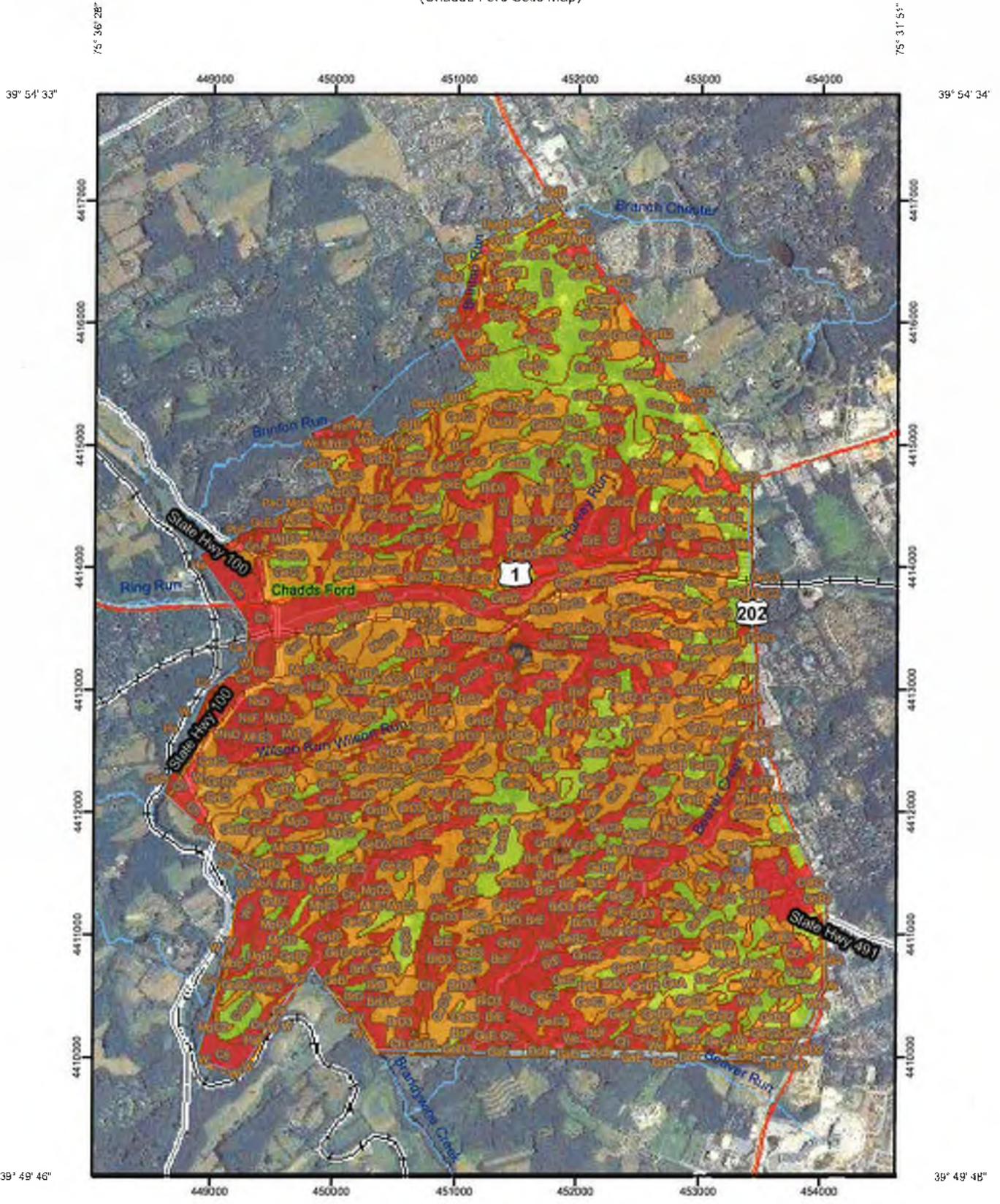
CHADDS FORD TOWNSHIP, DELAWARE COUNTY, PA

TABLE 2 - SUITABILITY OF SOILS FOR SAND MOUND SYSTEMS

SOIL	MAP SYMBOL	PERCENT SLOPE	SAND MOUND SYSTEMS		PERCENT IN AREA
			RATING	REASON	
BRANDYWINE LOAM	Brb2	3-8	SLIGHTLY LIMITED	FAST PERCOLATION, SLOPE	0.2%
	BrC	8-15	MODERATELY LIMITED	FAST PERCOLATION, TOO STEEP	0.7%
	BrC3	8-15	MODERATELY LIMITED	FAST PERCOLATION, TOO STEEP	5.3%
	BrD	15-25	VERY LIMITED	FAST PERCOLATION, TOO STEEP	0.5%
	BrD2	15-25	VERY LIMITED	FAST PERCOLATION, TOO STEEP	0.1%
	BrD3	15-25	VERY LIMITED	FAST PERCOLATION, TOO STEEP	6.5%
	BrE	25-40	VERY LIMITED	FAST PERCOLATION, TOO STEEP	5.8%
	BsD	8-25	VERY LIMITED	TOO STEEP	0.0%
	BsF	25-50	VERY LIMITED	TOO STEEP	0.5%
BUTLERTOWN SILT LOAM	ByB2	3-8	SLIGHTLY LIMITED	SLOPE	0.0%
CHESTER SILT LOAM	CdA	0-3	SLIGHTLY LIMITED	SLOPE	0.0%
	CdA2	0-3	SLIGHTLY LIMITED	SLOPE	0.0%
	CdB2	3-8	SLIGHTLY LIMITED	SLOPE	3.7%
	CdC2	8-15	MODERATELY LIMITED	TOO STEEP	0.1%
CHEWACLA SILT LOAM	Ch	---	VERY LIMITED	HIGH WATER TABLE, FLOODING, SLOPE	3.1%
CONGAREE SILT LOAM	Cn	---	VERY LIMITED	HIGH WATER TABLE, FLOODING, SLOPE	0.7%
GLENELG	GeA	0-3	SLIGHTLY LIMITED	SLOPE	0.4%
	GeB	3-8	SLIGHTLY LIMITED	SLOPE	0.5%
	GeB2	3-8	SLIGHTLY LIMITED	SLOPE	11.2%
	GeB3	3-8	SLIGHTLY LIMITED	SLOPE	3.8%
	GeC	8-15	MODERATELY LIMITED	TOO STEEP	1.8%
	GeC2	8-15	MODERATELY LIMITED	TOO STEEP	9.1%
	GeC3	8-15	MODERATELY LIMITED	TOO STEEP	8.5%
	GeD	15-25	VERY LIMITED	TOO STEEP	1.8%
	GeD2	15-25	VERY LIMITED	TOO STEEP	0.5%
	GeD3	15-25	VERY LIMITED	TOO STEEP	1.8%
	GeE	25-35	VERY LIMITED	TOO STEEP	0.3%
	GeE3	25-35	VERY LIMITED	TOO STEEP	0.3%
GLENVILLE SILT LOAM	GnA	0-3	MODERATELY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, TOO STEEP	1.0%
	GnB	3-8	MODERATELY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, TOO STEEP	2.5%
	GnB2	3-8	MODERATELY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, TOO STEEP	7.0%
	GnC2	8-15	MODERATELY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, TOO STEEP	0.2%
	GsB	0-8	MODERATELY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, TOO STEEP	0.0%
MADE LAND	Ma	---	NOT RATED	HIGH WATER TABLE, PERCOLATION, SLOPE	0.1%
	Mc	----	NOT RATED		0.1%
	Me	----	VERY LIMITED	HIGH WATER TABLE, SLOPE, FLOODING	1.5%
MANOR LOAM	MgB2	3-8	SLIGHTLY LIMITED	SLOPE	1.4%
	MgC	8-15	MODERATELY LIMITED	TOO STEEP	0.1%
	MgC2	8-15	MODERATELY LIMITED	TOO STEEP	2.5%
	MgC3	8-15	MODERATELY LIMITED	TOO STEEP	1.1%
	MgD	15-25	VERY LIMITED	TOO STEEP	0.2%
	MgD2	15-25	VERY LIMITED	TOO STEEP	0.6%
	MgD3	15-25	VERY LIMITED	TOO STEEP	1.9%
	MhE	25-35	VERY LIMITED	TOO STEEP	0.6%
	MhE3	25-35	VERY LIMITED	TOO STEEP	1.3%
	MkF	35-60	VERY LIMITED	TOO STEEP	0.2%
NESHAMINY SILT LOAM	MmF	25-60	VERY LIMITED	TOO STEEP	0.0%
	NaB2	3-8	MODERATELY LIMITED	TOO STEEP, SLOW PERCOLATION	0.0%
	NaC2	8-15	MODERATELY LIMITED	TOO STEEP, SLOW PERCOLATION	0.0%
	NsB	0-8	MODERATELY LIMITED	TOO STEEP, SLOW PERCOLATION	0.1%
	NsD	8-25	VERY LIMITED	SLOW PERCOLATION, HIGH WATER TABLE, FLOODING	0.5%
	NsF	25-45	VERY LIMITED	SLOW PERCOLATION, HIGH WATER TABLE, FLOODING	0.3%
OTHELLO SILT LOAM	OtA	----	VERY LIMITED	SLOW PERCOLATION, HIGH WATER TABLE, FLOODING	0.1%
QUARRIES	Qu	----	NOT RATED		0.2%
SASSAFRAS LOAM	SaA	0-3	SLIGHTLY LIMITED	SLOPE	0.1%
	SaB2	3-8	SLIGHTLY LIMITED	SLOPE	0.6%
WATER	W	---	NOT RATED		0.5%
WEHADKEE SILT LOAM	We	----	VERY LIMITED	HIGH WATER TABLE, FLOODING, SLOPE	3.8%
WOODSTOWN LOAM	WnA	0-3	MODERATELY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, SLOPE	0.3%
WORSHAM LOAM	WoA	0-3	VERY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, SLOPE	1.0%
	WoB	3-8	VERY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, SLOPE	0.1%
	WoB2	3-8	VERY LIMITED	HIGH WATER TABLE, SLOW PERCOLATION, SLOPE	0.1%

97.2%

Septic System Sand Mound Bed or Trench (PA)—Chester County, Pennsylvania, Delaware County, Pennsylvania, and New Castle County, Delaware
(Chadds Ford Soils Map)



MAP LEGEND

	Area of Interest (AOI)
	Area of Interest (AOI)
	Soils
	Soil Map Units
	Soil Ratings
	Very limited
	Moderately limited
	Slightly limited
	Not limited
	not rated or not available
	Political Features
	Cities
	Water Features
	Streams and Canals
	Transportation
	+++ Rafts
	Interstate Highways
	US Routes
	Major Roads

MAP INFORMATION

Map Scale: 1:42,200 if printed on A size (8.5" x 11") sheet.

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chester County, Pennsylvania
Survey Area Data: Version 3, Dec 3, 2008

Soil Survey Area: Delaware County, Pennsylvania
Survey Area Data: Version 6, Feb 24, 2009

Soil Survey Area: New Castle County, Delaware
Survey Area Data: Version 6, Sep 28, 2012

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Septic System Sand Mound Bed or Trench (PA)

Septic System Sand Mound Bed or Trench (PA)— Summary by Map Unit — Chester County, Pennsylvania (PA029)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acre in AOI	Percent of AOI
CaA	Califon loam, 0 to 3 percent slopes	Very limited	Califon (90%)	Seasonal high water table (1.00)	1.8	0.0%
				Slope (0.18)		
				Holly (4%)		
			Holly (4%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
				Slope (0.18)		
			Baile (3%)	Seasonal high water table (1.00)		
				Slow percolation 12-20" (1.00)		
				Slope (0.18)		
			Fluvaquents (3%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
				Slow percolation 12-20" (0.79)		
Slope (0.09)						
CaB	Califon loam, 3 to 8 percent slopes	Very limited	Califon (82%)	Seasonal high water table (1.00)	0.6	0.0%
				Slope (0.35)		
			Baile (4%)	Seasonal high water table (1.00)		
				Slow percolation 12-20" (1.00)		
				Slope (0.18)		
			Hatboro (4%)	Seasonal high water table (1.00)		
Flooding (1.00)						
				Slope (0.18)		

Septic System Sand Mound Bed or Trench (PA)— Summary by Map Unit — Chester County, Pennsylvania (PA029)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
Co	Codorus silt loam	Very limited	Codorus (85%)	Flooding (1.00)	2.7	0.0%
				Low potential seasonal high water table (0.67)		
				Slope (0.18)		
			Hatboro (8%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
				Slope (0.18)		
			Baile (3%)	Seasonal high water table (1.00)		
				Slow percolation 12-20" (1.00)		
				Slope (0.18)		
CpA	Cokesbury silt loam, 0 to 3 percent slopes	Very limited	Cokesbury (85%)	Seasonal high water table (1.00)	0.2	0.0%
				Slow percolation 12-20" (0.50)		
				Slope (0.18)		
			Holly (3%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
				Slope (0.18)		
Cs	Comus silt loam	Very limited	Comus (90%)	Flooding (1.00)	13.6	0.2%
				Slope (0.18)		
			Holly (8%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
				Slope (0.18)		
GaD	Gaila silt loam, 15 to 25 percent slopes	Very limited	Gaila (85%)	Too steep (1.00)	0.0	0.0%
GdB	Gladstone gravelly loam, 3 to 8 percent slopes	Slightly limited	Gladstone (93%)	Slope (0.40)	16.9	0.3%
GdC	Gladstone gravelly loam, 8 to 15 percent slopes	Moderately limited	Gladstone (90%)	Too steep (0.85)	5.1	0.1%
GdD	Gladstone gravelly loam, 15 to 25 percent slopes	Very limited	Gladstone (90%)	Too steep (1.00)	0.8	0.0%
			Cokesbury (5%)	Seasonal high water table (1.00)		
				Slow percolation 12-20" (0.50)		
				Slope (0.18)		

Septic System Sand Mound Bed or Trench (PA)— Summary by Map Unit — Chester County, Pennsylvania (PA029)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
GeD	Gladstone-Parker gravelly loams, 15 to 25 percent slopes	Very limited	Gladstone (58%)	Too steep (1.00)	2.3	0.0%
			Parker (42%)	Too steep (1.00)		
				Slight voided fragments (0.08)		
GgC	Glenelg silt loam, 8 to 15 percent slopes	Moderately limited	Glenelg (90%)	Too steep (0.85)	0.0	0.0%
Ha	Hatboro silt loam	Very limited	Hatboro (95%)	Seasonal high water table (1.00)	17.3	0.3%
				Flooding (1.00)		
				Slope (0.18)		
MaE	Manor loam, 25 to 35 percent slopes	Very limited	Manor (98%)	Too steep (1.00)	0.1	0.0%
MIB	Mount Lucas silt loam, 3 to 8 percent slopes	Moderately limited	Mount Lucas (94%)	Potential seasonal high water table (0.98)	0.7	0.0%
				Slow percolation 12-20" (0.79)		
				Slope (0.40)		
PaC	Parker gravelly loam, 8 to 15 percent slopes	Moderately limited	Parker (97%)	Too steep (0.85)	2.8	0.0%
				Fast percolation 12-20" (0.50)		
				Slight voided fragments (0.08)		
PaD	Parker gravelly loam, 15 to 25 percent slopes	Very limited	Parker (97%)	Too steep (1.00)	1.0	0.0%
				Fast percolation 12-20" (0.50)		
				Slight voided fragments (0.08)		
PaE	Parker gravelly loam, 25 to 35 percent slopes	Very limited	Parker (98%)	Too steep (1.00)	0.8	0.0%
				Fast percolation 12-20" (0.50)		
				Slight voided fragments (0.08)		
PaF	Parker gravelly loam, 35 to 60 percent slopes	Very limited	Parker (85%)	Too steep (1.00)	0.6	0.0%
				Slight voided fragments (0.08)		
PbF	Parker loam, 25 to 60 percent slopes, extremely stony	Very limited	Parker, extremely stony (97%)	Too steep (1.00)	5.3	0.1%
				Slight voided fragments (0.01)		

Septic System Sand Mound Bed or Trench (PA)— Summary by Map Unit — Chester County, Pennsylvania (PA029)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
ToB	Towhee silt loam, 3 to 8 percent slopes	Very limited	Towhee (88%)	Seasonal high water table (1.00)	1.1	0.0%
				Slope (0.40)		
			Watchung, silt loam (2%)	Seasonal high water table (1.00)		
				Slow percolation 12-20" (1.00)		
				Slope (0.18)		
UrB	Urban land, 0 to 8 percent slopes	Not rated	Urban land (85%)		3.3	0.1%
UrB	Urban land-Gladstone complex, 0 to 8 percent slopes	Not rated	Urban land (65%)		9.9	0.2%
UugB	Urban land-Udorthents, schist and gneiss complex, 0 to 8 percent slopes	Not rated	Urban land (80%)		0.1	0.0%
UugD	Urban land-Udorthents, schist and gneiss complex, 8 to 25 percent slopes	Not rated	Urban land (80%)		0.3	0.0%
W	Water	Not rated	Water (99%)		15.2	0.2%
Subtotals for Soil Survey Area					102.5	1.6%
Totals for Area of Interest					6,237.6	100.0%

Septic System Sand Mound Bed or Trench (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
BrB2	Brandywine loam, 3 to 8 percent slopes, moderately eroded	Slightly limited	Brandywine (85%)	Slope (0.40)	13.8	0.2%
				Potential fast percolation 12-20" (0.26)		
BrC	Brandywine loam, 8 to 15 percent slopes	Moderately limited	Brandywine (85%)	Too steep (0.85)	41.8	0.7%
				Potential fast percolation 12-20" (0.26)		
BrC3	Brandywine loam, 8 to 15 percent slopes, severely eroded	Moderately limited	Brandywine (85%)	Too steep (0.85)	331.9	5.3%
				Potential fast percolation 12-20" (0.26)		
BrD	Brandywine loam, 15 to 25 percent slopes	Very limited	Brandywine (85%)	Too steep (1.00)	33.8	0.5%
				Potential fast percolation 12-20" (0.26)		

Septic System Sand Mound Bed or Trench (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
BrD2	Brandywine loam, 15 to 25 percent slopes, moderately eroded	Very limited	Brandywine (85%)	Too steep (1.00)	8.3	0.1%
				Potential fast percolation 12-20" (0.26)		
BrD3	Brandywine loam, 15 to 25 percent slopes, severely eroded	Very limited	Brandywine (85%)	Too steep (1.00)	403.7	6.5%
				Potential fast percolation 12-20" (0.26)		
BrE	Brandywine loam, 25 to 40 percent slopes	Very limited	Brandywine (85%)	Too steep (1.00)	363.2	5.8%
				Potential fast percolation 12-20" (0.26)		
BsD	Brandywine very stony loam, 8 to 25 percent slopes	Very limited	Brandywine (85%)	Too steep (1.00)	0.6	0.0%
BsF	Brandywine very stony loam, 25 to 50 percent slopes	Very limited	Brandywine (85%)	Too steep (1.00)	28.1	0.5%
ByB2	Butlertown silt loam, 3 to 8 percent slopes, moderately eroded	Slightly limited	Butlertown (85%)	Slope (0.40)	1.9	0.0%
				Low potential seasonal high water table (0.24)		
CdA	Chester silt loam, 0 to 3 percent slopes	Slightly limited	Chester (92%)	Slope (0.25)	2.0	0.0%
CdA2	Chester silt loam, 0 to 3 percent slopes, moderately eroded	Slightly limited	Chester (90%)	Slope (0.18)	1.0	0.0%
CdB2	Chester silt loam, 3 to 8 percent slopes, moderately eroded	Slightly limited	Chester (90%)	Slope (0.40)	227.8	3.7%
CdC2	Chester silt loam, 8 to 15 percent slopes, moderately eroded	Moderately limited	Chester (90%)	Too steep (0.85)	3.7	0.1%
Ch	Chewacla silt loam	Very limited	Chewacla (85%)	Seasonal high water table (1.00)	195.3	3.1%
				Flooding (1.00)		
				Slope (0.18)		
			Wehadkee (5%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
				Slope (0.18)		

Septic System Sand Mound Bed or Trench (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
Cn	Congaree silt loam	Very limited	Comus (90%)	Flooding (1.00)	44.9	0.7%
				Slope (0.18)		
			Holly (8%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
GeA	Glenelg channery silt loam, 0 to 3 percent slopes	Slightly limited	Glenelg (100%)	Slope (0.18)	27.7	0.4%
GeB	Glenelg channery silt loam, 3 to 8 percent slopes	Slightly limited	Glenelg (85%)	Slope (0.40)	29.0	0.5%
GeB2	Glenelg channery silt loam, 3 to 8 percent slopes, moderately eroded	Slightly limited	Glenelg (85%)	Slope (0.40)	698.6	11.2%
GeB3	Glenelg channery silt loam, 3 to 8 percent slopes, severely eroded	Slightly limited	Glenelg (85%)	Slope (0.40)	239.7	3.8%
GeC	Glenelg channery silt loam, 8 to 15 percent slopes	Moderately limited	Glenelg (85%)	Too steep (0.85)	114.1	1.8%
GeC2	Glenelg channery silt loam, 8 to 15 percent slopes, moderately eroded	Moderately limited	Glenelg (85%)	Too steep (0.85)	569.6	9.1%
GeC3	Glenelg channery silt loam, 8 to 15 percent slopes, severely eroded	Moderately limited	Glenelg (85%)	Too steep (0.85)	532.0	8.5%
GeD	Glenelg channery silt loam, 15 to 25 percent slopes	Very limited	Glenelg (85%)	Too steep (1.00)	112.5	1.8%
GeD2	Glenelg channery silt loam, 15 to 25 percent slopes, moderately eroded	Very limited	Glenelg (85%)	Too steep (1.00)	31.0	0.5%
GeD3	Glenelg channery silt loam, 15 to 25 percent slopes, severely eroded	Very limited	Glenelg (85%)	Too steep (1.00)	114.1	1.6%
GeE	Glenelg channery silt loam, 25 to 35 percent slopes	Very limited	Glenelg (85%)	Too steep (1.00)	18.9	0.3%
GeE3	Glenelg channery silt loam, 25 to 35 percent slopes, severely eroded	Very limited	Glenelg (85%)	Too steep (1.00)	19.5	0.3%

Septic System Sand Mound Bed or Trench (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
GnA	Glenville silt loam 0 to 3 percent slopes	Moderately limited	Glenville (90%)	Potential seasonal high water table (0.98)	61.7	1.0%
				Slow percolation 12-20" (0.79)		
				Slope (0.18)		
GnB	Glenville silt loam, 3 to 8 percent slopes	Moderately limited	Glenville (90%)	Potential seasonal high water table (0.98)	157.7	2.5%
				Slow percolation 12-20" (0.79)		
				Slope (0.40)		
GnB2	Glenville silt loam, 3 to 8 percent slopes, moderately eroded	Moderately limited	Glenville (85%)	Potential seasonal high water table (0.98)	437.5	7.0%
				Slow percolation 12-20" (0.79)		
				Slope (0.40)		
GnC2	Glenville silt loam, 8 to 15 percent slopes, moderately eroded	Moderately limited	Glenville (100%)	Potential seasonal high water table (0.98)	11.4	0.2%
				Too steep (0.85)		
				Slow percolation 12-20" (0.79)		
GsB	Glenville very stony silt loam, 0 to 8 percent slopes	Moderately limited	Glenville, extremely stony (100%)	Potential seasonal high water table (0.98)	2.4	0.0%
				Slow percolation 12-20" (0.79)		
				Slope (0.35)		
Ma	Made land, gravelly materials	Very limited	Udorthents, shale and sandstone (85%)	Miscellaneous area (1.00)	3.5	0.1%
				Slope (0.31)		
				Potential fast percolation 12-20" (0.17)		
			Croton (1%)	Seasonal high water table (1.00)		
				Slow percolation 12-20" (1.00)		
				Slope (0.40)		
Mc	Made land, silt and clay materials	Not rated	Made land (95%)		5.7	0.1%

Septic System Sand Mound Bed or Trench (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
Me	Made land, schist and gneiss materials	Very limited	Udorthernts, schist and gneiss (95%)	Slow percolation 12-20" (1.00)	95.0	1.5%
				Miscellaneous area (1.00)		
				Slope (0.31)		
			Hatboro (1%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
MgB2	Manor loam, 3 to 8 percent slopes, moderately eroded	Slightly limited	Manor (95%)	Slope (0.40)	87.4	1.4%
MgC	Manor loam, 8 to 15 percent slopes	Moderately limited	Manor (95%)	Too steep (0.85)	5.6	0.1%
MgC2	Manor loam, 8 to 15 percent slopes, moderately eroded	Moderately limited	Manor (90%)	Too steep (0.85)	157.4	2.5%
MgC3	Manor loam, 8 to 15 percent slopes, severely eroded	Moderately limited	Manor (90%)	Too steep (0.85)	71.2	1.1%
MgD	Manor loam, 15 to 25 percent slopes	Very limited	Manor (97%)	Too steep (1.00)	15.3	0.2%
MgD2	Manor loam, 15 to 25 percent slopes, moderately eroded	Very limited	Manor (90%)	Too steep (1.00)	37.3	0.6%
MgD3	Manor loam, 15 to 25 percent slopes, severely eroded	Very limited	Manor (85%)	Too steep (1.00)	118.6	1.9%
MhE	Manor loam and channery loam, 25 to 35 percent slopes	Very limited	Manor (98%)	Too steep (1.00)	38.4	0.6%
MhE3	Manor loam and channery loam, 25 to 35 percent slopes, severely eroded	Very limited	Manor (90%)	Too steep (1.00)	80.6	1.3%
MkF	Manor soils, 35 to 60 percent slopes	Very limited	Manor (100%)	Too steep (1.00)	13.9	0.2%
MmF	Manor very stony loam, 25 to 60 percent slopes	Very limited	Manor, very stony (100%)	Too steep (1.00)	2.1	0.0%
NaB2	Neshaminy gravelly silt loam, 3 to 8 percent slopes, moderately eroded	Moderately limited	Neshaminy (85%)	Slow percolation 12-20" (0.50)	0.5	0.0%
				Slope (0.40)		

Septic System Sand Mound Bed or Trench (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
NaC2	Neshaminy gravelly silt loam, 8 to 15 percent slopes, moderately eroded	Moderately limited	Neshaminy (85%)	Too steep (0.85)	0.8	0.0%
				Slow percolation 12-20" (0.50)		
NsB	Neshaminy very stony silt loam, 0 to 8 percent slopes	Moderately limited	Neshaminy, extremely bouldery (95%)	Slow percolation 12-20" (0.50)	4.5	0.1%
				Slope (0.31)		
NsD	Neshaminy very stony silt loam, 8 to 25 percent slopes	Very limited	Neshaminy, extremely bouldery (97%)	Too steep (1.00)	31.5	0.5%
				Slow percolation 12-20" (0.50)		
			Towhee, extremely stony (3%)	Seasonal high water table (1.00)		
				Slope (0.31)		
NsF	Neshaminy very stony silt loam, 25 to 45 percent slopes	Very limited	Neshaminy, extremely bouldery (97%)	Too steep (1.00)	18.0	0.3%
				Slow percolation 12-20" (0.50)		
			Towhee, extremely stony (3%)	Seasonal high water table (1.00)		
				Slope (0.31)		
OtA	Othello silt loam	Very limited	Othello (90%)	Seasonal high water table (1.00)	8.7	0.1%
				Slow percolation 12-20" (0.50)		
				Slope (0.18)		
			Nanticoke (2%)	Seasonal high water table (1.00)		
			Flooding (1.00)			
			Slow percolation 12-20" (0.50)			
				Slope (0.09)		
Qu	Quarries	Not rated	Pits, quarries (80%)		10.7	0.2%
SaA	Sassafras loam, 0 to 3 percent slopes	Slightly limited	Sassafras (85%)	Slope (0.18)	7.8	0.1%
SaB2	Sassafras loam, 3 to 8 percent slopes, moderately eroded	Slightly limited	Sassafras (85%)	Slope (0.40)	34.4	0.6%
W	Water	Not rated	Water (99%)		31.6	0.5%
We	Wehadkee silt loam	Very limited	Wehadkee (90%)	Seasonal high water table (1.00)	237.3	3.8%
				Flooding (1.00)		
				Slope (0.18)		

Septic System Sand Mound Bed or Trench (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
WnA	Woodstown loam, 0 to 3 percent slopes	Moderately limited	Woodstown (90%)	Potential seasonal high water table (0.98)	16.5	0.3%
				Slope (0.18)		
WoA	Worsham silt loam, 0 to 3 percent slopes	Very limited	Worsham (85%)	Seasonal high water table (1.00)	64.5	1.0%
				Slow percolation 12-20" (1.00)		
				Slope (0.18)		
WoB	Worsham silt loam, 3 to 8 percent slopes	Very limited	Worsham (85%)	Seasonal high water table (1.00)	4.3	0.1%
				Slow percolation 12-20" (1.00)		
				Slope (0.40)		
WoB2	Worsham silt loam, 3 to 8 percent slopes, moderately eroded	Very limited	Worsham (85%)	Seasonal high water table (1.00)	6.0	0.1%
				Slow percolation 12-20" (1.00)		
				Slope (0.40)		
Subtotals for Soil Survey Area					6,088.2	97.6%
Totals for Area of Interest					6,237.6	100.0%

Septic System Sand Mound Bed or Trench (PA)— Summary by Map Unit — New Castle County, Delaware (DE003)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
BkD	Brinklow channery loam, 15 to 25 percent slopes				0.6	0.0%
DcB	Delanco-Codorus-Hatboro complex, 0 to 8 percent slopes, flooded				15.6	0.3%
GaD	Gaila loam, 15 to 25 percent slopes				7.8	0.1%
GaE	Gaila loam, 25 to 45 percent slopes				11.3	0.2%
GeB	Glenelg loam, 3 to 8 percent slopes				0.7	0.0%
GeC	Glenelg loam, 8 to 15 percent slopes				5.2	0.1%
GgB	Glenelg silt loam, 3 to 8 percent slopes				1.0	0.0%
GgC	Glenelg silt loam, 8 to 15 percent slopes				0.4	0.0%
GnB	Glenville silt loam, 3 to 8 percent slopes				1.1	0.0%

Septic System Sand Mound Bed or Trench (PA)— Summary by Map Unit — New Castle County, Delaware (DE003)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
Hw	Hatboro-Codorus complex, 0 to 3 percent slopes, frequently flooded				0.7	0.0%
MaE	Manor loam, 25 to 45 percent slopes				0.3	0.0%
MzB	Mount Lucas silt loam, 3 to 8 percent slopes				1.0	0.0%
TaB	Talleyville silt loam, 3 to 8 percent slopes				0.9	0.0%
W	Water				0.2	0.0%
Subtotals for Soil Survey Area					46.9	0.8%
Totals for Area of Interest					6,237.6	100.0%

Septic System Sand Mound Bed or Trench (PA)— Summary by Rating Value		
Rating	Acres in AOI	Percent of AOI
Moderately limited	2,528.9	40.5%
Very limited	2,197.0	35.2%
Slightly limited	1,387.9	22.3%
Null or Not Rated	123.8	2.0%
Totals for Area of Interest	6,237.6	100.0%



Description

This is a system of pressurized lines that distribute effluent from a septic tank into a mound with sand under aggregate. The mound is placed on top of the mineral soil surface. About 1 to 4 feet of sand could be placed on the mineral soil surface in a sand mound system. Only the part of the soils between depths of 0 and 20 inches is considered when the soils are rated.

The soil properties and site features considered are those that affect absorption of the effluent and construction and maintenance of the system and those that may affect public health. These include depth to a water table, depth to bedrock, content of rock fragments, flooding, slope, and saturated hydraulic conductivity (Ksat). Flooding is a serious problem because it can result in improper treatment of the effluent and contamination of ground water or surface water. If Ksat is too fast or too slow, if the content of rock fragments is too high, or if the water table is too close to the surface, the effluent can contaminate the ground water. If this system is improperly installed on the steeper slopes, the effluent could flow along the surface of the soils. Additional grading may be needed in areas downslope from the system.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Slightly limited" indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. "Moderately limited" indicates that the soil has features that are somewhat favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen, which is displayed on the report. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the Selected Soil Interpretations report with this interpretation included from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart

site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Rating Options

Aggregation Method: Dominant Condition

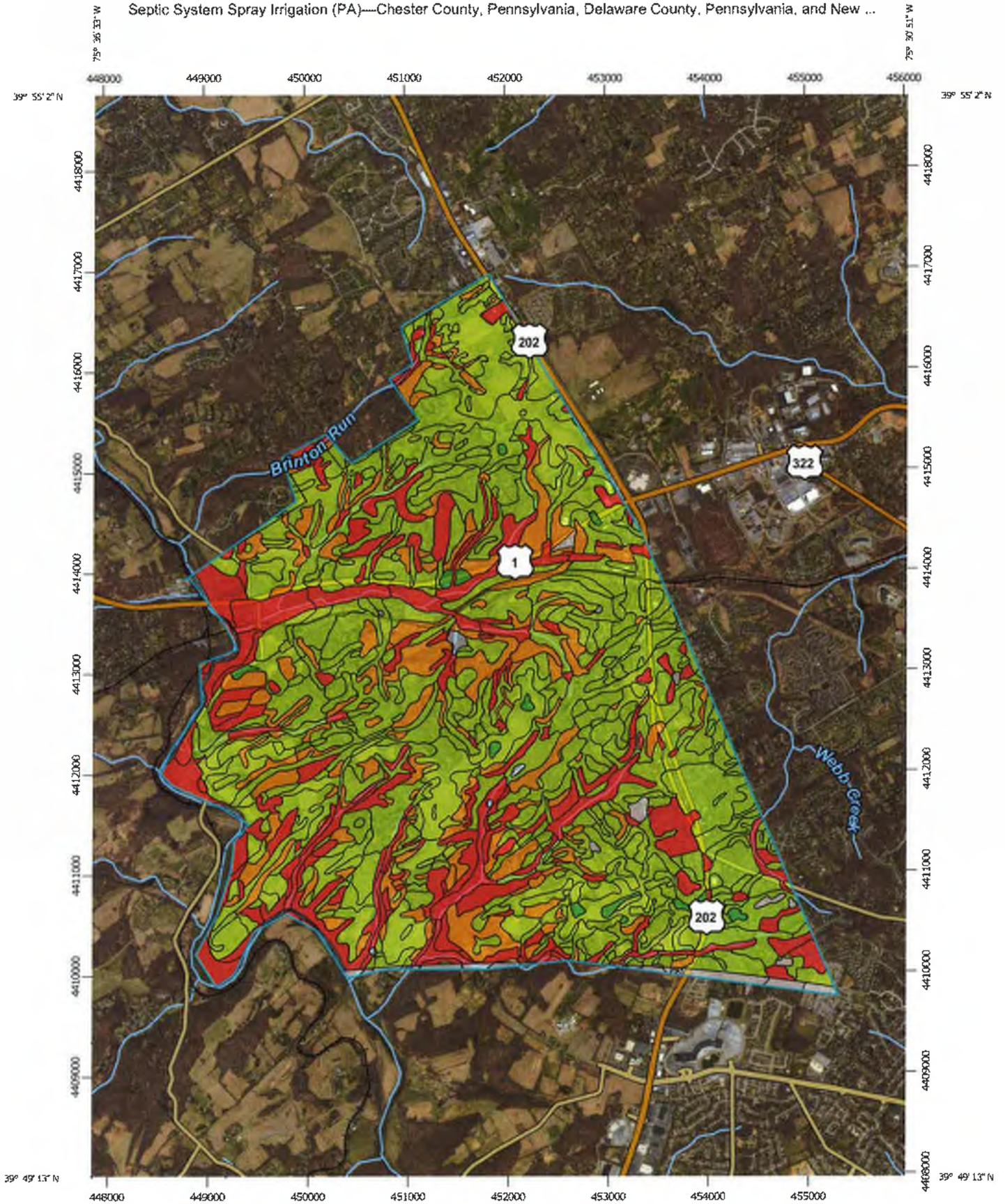
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

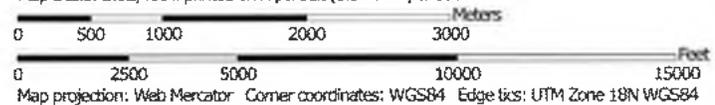
CHADDS FORD TOWNSHIP, DELAWARE COUNTY, PA

TABLE 3 - SUITABILITY OF SOILS FOR SPRAY IRRIGATION SYSTEMS

SOIL	MAP SYMBOL	PERCENT SLOPE	SPRAY IRRIGATION SYSTEMS		PERCENT IN AREA
			RATING	REASON	
BRANDYWINE LOAM	Brb2	3-8	SLIGHTLY LIMITED	SLOPE	0.2%
	BrC	8-15	SLIGHTLY LIMITED	SLOPE	0.7%
	BrC3	8-15	SLIGHTLY LIMITED	SLOPE	5.3%
	BrD	15-25	MODERATELY LIMITED	SLOPE	0.5%
	BrD2	15-25	MODERATELY LIMITED	SLOPE	0.1%
	BrD3	15-25	MODERATELY LIMITED	SLOPE	6.5%
	BrE	25-40	VERY LIMITED	SLOPE	5.8%
	BsD	8-25	MODERATELY LIMITED	SLOPE	0.0%
BUTLERTOWN SILT LOAM	BsF	25-50	VERY LIMITED	SLOPE	0.5%
	ByB2	3-8	SLIGHTLY LIMITED	HIGH WATER TABLE, SLOPE	0.0%
CHESTER SILT LOAM	CdA	0-3	NOT LIMITED		0.0%
	CdA2	0-3	NOT LIMITED		0.0%
	CdB2	3-8	SLIGHTLY LIMITED	SLOPE	3.7%
	CdC2	8-15	SLIGHTLY LIMITED	SLOPE	0.1%
CHEWACLA SILT LOAM	Ch	----	VERY LIMITED	HIGH WATER TABLE, FLOODING	3.1%
CONGAREE SILT LOAM	Cn	---	VERY LIMITED	HIGH WATER TABLE, FLOODING	0.7%
GLENELG	GeA	0-3	NOT LIMITED		0.4%
	GeB	3-8	SLIGHTLY LIMITED	SLOPE	0.5%
	GeB2	3-8	SLIGHTLY LIMITED	SLOPE	11.2%
	GeB3	3-8	SLIGHTLY LIMITED	SLOPE	3.8%
	GeC	8-15	SLIGHTLY LIMITED	SLOPE	1.8%
	GeC2	8-15	SLIGHTLY LIMITED	SLOPE	9.1%
	GeC3	8-15	SLIGHTLY LIMITED	SLOPE	8.5%
	GeD	15-25	MODERATELY LIMITED	SLOPE	1.8%
	GeD2	15-25	MODERATELY LIMITED	SLOPE	0.5%
	GeD3	15-25	MODERATELY LIMITED	SLOPE	1.8%
	GeE	25-35	VERY LIMITED	SLOPE	0.3%
	GeE3	25-35	VERY LIMITED	SLOPE	0.3%
	GLENVILLE SILT LOAM	GnA	0-3	SLIGHTLY LIMITED	HIGH WATER TABLE
GnB		3-8	SLIGHTLY LIMITED	HIGH WATER TABLE, SLOPE	2.5%
	GnB2	3-8	SLIGHTLY LIMITED	HIGH WATER TABLE, SLOPE	7.0%
	GnC2	8-15	SLIGHTLY LIMITED	HIGH WATER TABLE, SLOPE	0.2%
	GsB	0-8	SLIGHTLY LIMITED	HIGH WATER TABLE, SLOPE	0.0%
MADE LAND	Ma	---	VERY LIMITED	HIGH WATER TABLE, SLOPE	0.1%
	Mc	---	NOT RATED		0.1%
	Me	----	VERY LIMITED	HIGH WATER TABLE, FLOODING	1.5%
MANOR LOAM	MgB2	3-8	SLIGHTLY LIMITED	SLOPE	1.4%
	MgC	8-15	SLIGHTLY LIMITED	SLOPE	0.1%
	MgC2	8-15	SLIGHTLY LIMITED	SLOPE	2.5%
	MgC3	8-15	SLIGHTLY LIMITED	SLOPE	1.1%
	MgD	15-25	MODERATELY LIMITED	SLOPE	0.2%
	MgD2	15-25	MODERATELY LIMITED	SLOPE	0.6%
	MgD3	15-25	MODERATELY LIMITED	SLOPE	1.9%
	MhE	25-35	VERY LIMITED	SLOPE	0.6%
	MhE3	25-35	VERY LIMITED	SLOPE	1.3%
	MkF	35-60	VERY LIMITED	SLOPE	0.2%
NESHAMINY SILT LOAM	MmF	25-60	VERY LIMITED	SLOPE	0.0%
	NsB	0-8	NOT RATED		0.1%
	NsD	8-25	MODERATELY LIMITED	SLOPE	0.5%
	NsF	25-45	VERY LIMITED	SLOPE, HIGH WATER TABLE	0.3%
OTHELLO SILT LOAM	OtA	----	VERY LIMITED	SLOPE, HIGH WATER TABLE	0.1%
QUARRIES	Qu	----	NOT RATED		0.2%
SASSAFRAS LOAM	SaA	0-3	NOT LIMITED		0.1%
	SaB2	3-8	SLIGHTLY LIMITED	SLOPE	0.6%
WATER	W	----	NOT RATED		0.5%
WEHADKEE SILT LOAM	We	----	VERY LIMITED	HIGH WATER TABLE, FLOODING	3.8%
WOODSTOWN LOAM	WnA	0-3	SLIGHTLY LIMITED	HIGH WATER TABLE	0.3%
WORSHAM LOAM	WoA	0-3	VERY LIMITED	HIGH WATER TABLE	1.0%
	WoB	3-8	VERY LIMITED	HIGH WATER TABLE, SLOPE	0.1%
	WoB2	3-8	VERY LIMITED	HIGH WATER TABLE, SLOPE	0.1%
	WsB	0-8	VERY LIMITED	HIGH WATER TABLE	0.2%
					97.4%



Map Scale: 1:52,400 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge ticks: UTM Zone 18N WGS84

MAP LEGEND

 Area of Interest (AOI)	 US Routes
 Area of Interest (AOI)	 Major Roads
Soils	 Local Roads
Soil Rating Polygons	 Background
 Very limited	 Aerial Photography
 Moderately limited	
 Slightly limited	
 Not limited	
 Not rated or not available	
Soil Rating Lines	
 Very limited	
 Moderately limited	
 Slightly limited	
 Not limited	
 Not rated or not available	
Soil Rating Points	
 Very limited	
 Moderately limited	
 Slightly limited	
 Not limited	
 Not rated or not available	
Water Features	
 Streams and Canals	
Transportation	
 Rails	
 Interstate Highways	

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chester County, Pennsylvania

Survey Area Data: Version 3, Dec 3, 2008

Soil Survey Area: Delaware County, Pennsylvania

Survey Area Data: Version 6, Feb 24, 2009

Soil Survey Area: New Castle County, Delaware

Survey Area Data: Version 6, Sep 28, 2012

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 17, 2010—May 10, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Septic System Spray Irrigation (PA)

Septic System Spray Irrigation (PA)— Summary by Map Unit — Chester County, Pennsylvania (PA029)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
CaA	Califon loam, 0 to 3 percent slopes	Moderately limited	Califon (90%)	Low potential seasonal high water table (0.61)	0.0	0.0%
CaB	Califon loam, 3 to 8 percent slopes	Moderately limited	Califon (82%)	Low potential seasonal high water table (0.61) Slope 0-12%; see land cover criteria (0.50)	0.1	0.0%
Co	Codorus silt loam	Very limited	Codorus (85%)	Flooding (1.00) Low potential seasonal high water table (0.19)	3.0	0.0%
			Hatboro (8%)	Seasonal high water table (1.00) Flooding (1.00)		
			Baile (3%)	Seasonal high water table (1.00)		
CpA	Cokesbury silt loam, 0 to 3 percent slopes	Very limited	Cokesbury (85%)	Seasonal high water table (1.00)	0.5	0.0%
			Holly (3%)	Seasonal high water table (1.00) Flooding (1.00)		
Cs	Comus silt loam	Very limited	Comus (90%)	Flooding (1.00)	9.0	0.1%
			Holly (8%)	Seasonal high water table (1.00) Flooding (1.00)		
GdB	Gladstone gravelly loam, 3 to 8 percent slopes	Slightly limited	Gladstone (93%)	Slope 0-12%; see land cover criteria (0.50)	6.2	0.1%
GdC	Gladstone gravelly loam, 8 to 15 percent slopes	Slightly limited	Gladstone (90%)	Slope 0-12%; see land cover criteria (0.50)	7.6	0.1%

Septic System Spray Irrigation (PA)— Summary by Map Unit — Chester County, Pennsylvania (PA029)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
GdD	Gladstone gravelly loam, 15 to 25 percent slopes	Moderately limited	Gladstone (90%)	Slope 0-25%; see land cover criteria (0.75)	1.0	0.0%
GeD	Gladstone-Parker gravelly loams, 15 to 25 percent slopes	Moderately limited	Gladstone (58%)	Slope 0-25%; see land cover criteria (0.75)	0.7	0.0%
			Parker (42%)	Slope 0-25%; see land cover criteria (0.75) Slight voided fragments (0.08)		
Ha	Hatboro silt loam	Very limited	Hatboro (95%)	Seasonal high water table (1.00)	6.4	0.1%
				Flooding (1.00)		
MaD	Manor loam, 15 to 25 percent slopes	Moderately limited	Manor (97%)	Slope 0-25%; see land cover criteria (0.75)	1.0	0.0%
MiB	Mount Lucas silt loam, 3 to 8 percent slopes	Slightly limited	Mount Lucas (94%)	Slope 0-12%; see land cover criteria (0.50)	0.3	0.0%
				Low potential seasonal high water table (0.47)		
PaC	Parker gravelly loam, 8 to 15 percent slopes	Slightly limited	Parker (97%)	Slope 0-12%; see land cover criteria (0.50)	8.8	0.1%
				Slight voided fragments (0.08)		
PaD	Parker gravelly loam, 15 to 25 percent slopes	Moderately limited	Parker (97%)	Slope 0-25%; see land cover criteria (0.75)	3.5	0.1%
				Slight voided fragments (0.08)		
PaE	Parker gravelly loam, 25 to 35 percent slopes	Very limited	Parker (98%)	Slope > 25% too steep (1.00)	0.8	0.0%
				Slight voided fragments (0.08)		
PaF	Parker gravelly loam, 35 to 60 percent slopes	Very limited	Parker (85%)	Slope > 25% too steep (1.00)	4.2	0.1%
				Slight voided fragments (0.08)		

Septic System Spray Irrigation (PA)— Summary by Map Unit — Chester County, Pennsylvania (PA029)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
PbF	Parker loam, 25 to 60 percent slopes, extremely stony	Very limited	Parker, extremely stony (97%)	Slope > 25% too steep (1.00) Slight voided fragments (0.01)	1.4	0.0%
ToB	Towhee silt loam, 3 to 8 percent slopes	Very limited	Towhee (88%)	Seasonal high water table (1.00) Slope 0-12%; see land cover criteria (0.50)	0.3	0.0%
			Watchung, silt loam (2%)	Seasonal high water table (1.00)		
UrB	Urban land, 0 to 8 percent slopes	Not rated	Urban land (85%)		0.2	0.0%
UrIB	Urban land-Gladstone complex, 0 to 8 percent slopes	Not rated	Urban land (65%)		0.9	0.0%
W	Water	Not rated	Water (99%)		13.6	0.2%
Subtotals for Soil Survey Area					69.4	1.0%
Totals for Area of Interest					6,834.3	100.0%

Septic System Spray Irrigation (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
BrB2	Brandywine loam, 3 to 8 percent slopes, moderately eroded	Slightly limited	Brandywine (85%)	Slope 0-12%; see land cover criteria (0.50)	13.8	0.2%
BrC	Brandywine loam, 8 to 15 percent slopes	Slightly limited	Brandywine (85%)	Slope 0-12%; see land cover criteria (0.50)	41.8	0.6%
BrC3	Brandywine loam, 8 to 15 percent slopes, severely eroded	Slightly limited	Brandywine (85%)	Slope 0-12%; see land cover criteria (0.50)	332.0	4.9%
BrD	Brandywine loam, 15 to 25 percent slopes	Moderately limited	Brandywine (85%)	Slope 0-25%; see land cover criteria (0.75)	33.8	0.5%

Septic System Spray Irrigation (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
BrD2	Brandywine loam, 15 to 25 percent slopes, moderately eroded	Moderately limited	Brandywine (85%)	Slope 0-25%; see land cover criteria (0.75) Potential bedrock near 16" (0.02)	8.3	0.1%
BrD3	Brandywine loam, 15 to 25 percent slopes, severely eroded	Moderately limited	Brandywine (85%)	Slope 0-25%; see land cover criteria (0.75)	403.7	5.9%
BrE	Brandywine loam, 25 to 40 percent slopes	Very limited	Brandywine (85%)	Slope > 25% too steep (1.00)	364.3	5.3%
BsD	Brandywine very stony loam, 8 to 25 percent slopes	Moderately limited	Brandywine (85%)	Slope 0-25%; see land cover criteria (0.75)	0.3	0.0%
BsF	Brandywine very stony loam, 25 to 50 percent slopes	Very limited	Brandywine (85%)	Slope > 25% too steep (1.00)	27.5	0.4%
ByB2	Butlertown silt loam, 3 to 8 percent slopes, moderately eroded	Slightly limited	Butlertown (85%)	Slope 0-12%; see land cover criteria (0.50) Low potential seasonal high water table (0.03)	1.9	0.0%
CdA	Chester silt loam, 0 to 3 percent slopes	Not limited	Chester (92%)		2.0	0.0%
CdA2	Chester silt loam, 0 to 3 percent slopes, moderately eroded	Not limited	Chester (90%)		5.3	0.1%
CdB2	Chester silt loam, 3 to 8 percent slopes, moderately eroded	Slightly limited	Chester (90%)	Slope 0-12%; see land cover criteria (0.50)	284.7	4.2%
CdC2	Chester silt loam, 8 to 15 percent slopes, moderately eroded	Slightly limited	Chester (90%)	Slope 0-12%; see land cover criteria (0.50)	2.3	0.0%

Septic System Spray Irrigation (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
Ch	Chewacla silt loam	Very limited	Chewacla (85%)	Flooding (1.00)	209.4	3.1%
				Low potential seasonal high water table (0.61)		
			Wehadkee (5%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
Cn	Congaree silt loam	Very limited	Comus (90%)	Flooding (1.00)	42.7	0.6%
			Holly (8%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
GeA	Glenelg channery silt loam, 0 to 3 percent slopes	Not limited	Glenelg (100%)		27.7	0.4%
GeB	Glenelg channery silt loam, 3 to 8 percent slopes	Slightly limited	Glenelg (85%)	Slope 0-12%; see land cover criteria (0.50)	48.5	0.7%
GeB2	Glenelg channery silt loam, 3 to 8 percent slopes, moderately eroded	Slightly limited	Glenelg (85%)	Slope 0-12%; see land cover criteria (0.50)	818.1	12.0%
GeB3	Glenelg channery silt loam, 3 to 8 percent slopes, severely eroded	Slightly limited	Glenelg (85%)	Slope 0-12%; see land cover criteria (0.50)	239.7	3.5%
GeC	Glenelg channery silt loam, 8 to 15 percent slopes	Slightly limited	Glenelg (85%)	Slope 0-12%; see land cover criteria (0.50)	115.4	1.7%
GeC2	Glenelg channery silt loam, 8 to 15 percent slopes, moderately eroded	Slightly limited	Glenelg (85%)	Slope 0-12%; see land cover criteria (0.50)	597.7	8.7%

Septic System Spray Irrigation (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
GeC3	Glenelg channery silt loam, 8 to 15 percent slopes, severely eroded	Slightly limited	Glenelg (85%)	Slope 0-12%; see land cover criteria (0.50)	579.2	8.5%
GeD	Glenelg channery silt loam, 15 to 25 percent slopes	Moderately limited	Glenelg (85%)	Slope 0-25%; see land cover criteria (0.75)	114.7	1.7%
GeD2	Glenelg channery silt loam, 15 to 25 percent slopes, moderately eroded	Moderately limited	Glenelg (85%)	Slope 0-25%; see land cover criteria (0.75)	34.1	0.5%
GeD3	Glenelg channery silt loam, 15 to 25 percent slopes, severely eroded	Moderately limited	Glenelg (85%)	Slope 0-25%; see land cover criteria (0.75)	117.1	1.7%
GeE	Glenelg channery silt loam, 25 to 35 percent slopes	Very limited	Glenelg (85%)	Slope > 25% too steep (1.00)	18.9	0.3%
GeE3	Glenelg channery silt loam, 25 to 35 percent slopes, severely eroded	Very limited	Glenelg (85%)	Slope > 25% too steep (1.00)	19.5	0.3%
GnA	Glenville silt loam 0 to 3 percent slopes	Slightly limited	Glenville (90%)	Low potential seasonal high water table (0.47)	72.5	1.1%
GnB	Glenville silt loam, 3 to 8 percent slopes	Slightly limited	Glenville (90%)	Slope 0-12%; see land cover criteria (0.50) Low potential seasonal high water table (0.47)	199.9	2.9%

Septic System Spray Irrigation (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
GnB2	Glenville silt loam, 3 to 8 percent slopes, moderately eroded	Slightly limited	Glenville (85%)	Slope 0-12%; see land cover criteria (0.50)	474.3	6.9%
				Low potential seasonal high water table (0.47)		
GnC2	Glenville silt loam, 8 to 15 percent slopes, moderately eroded	Slightly limited	Glenville (100%)	Slope 0-12%; see land cover criteria (0.50)	11.4	0.2%
				Low potential seasonal high water table (0.47)		
GsB	Glenville very stony silt loam, 0 to 8 percent slopes	Slightly limited	Glenville, extremely stony (100%)	Slope 0-12%; see land cover criteria (0.50)	2.4	0.0%
				Low potential seasonal high water table (0.47)		
Ma	Made land, gravelly materials	Very limited	Udorthents, shale and sandstone (85%)	Miscellaneous area (1.00)	4.3	0.1%
			Croton (1%)	Seasonal high water table (1.00)		
				Slope 0-12%; see land cover criteria (0.50)		
Mc	Made land, silt and clay materials	Not rated	Made land (95%)		5.7	0.1%
Me	Made land, schist and gneiss materials	Very limited	Udorthents, schist and gneiss (95%)	Miscellaneous area (1.00)	80.2	1.2%
			Hatboro (1%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
MgB2	Manor loam, 3 to 8 percent slopes, moderately eroded	Slightly limited	Manor (95%)	Slope 0-12%; see land cover criteria (0.50)	87.4	1.3%
MgC	Manor loam, 8 to 15 percent slopes	Slightly limited	Manor (95%)	Slope 0-12%; see land cover criteria (0.50)	5.6	0.1%

Septic System Spray Irrigation (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
MgC2	Manor loam, 8 to 15 percent slopes, moderately eroded	Slightly limited	Manor (90%)	Slope 0-12%; see land cover criteria (0.50)	157.5	2.3%
MgC3	Manor loam, 8 to 15 percent slopes, severely eroded	Slightly limited	Manor (90%)	Slope 0-12%; see land cover criteria (0.50)	71.2	1.0%
MgD	Manor loam, 15 to 25 percent slopes	Moderately limited	Manor (97%)	Slope 0-25%; see land cover criteria (0.75)	15.3	0.2%
MgD2	Manor loam, 15 to 25 percent slopes, moderately eroded	Moderately limited	Manor (90%)	Slope 0-25%; see land cover criteria (0.75)	44.9	0.7%
MgD3	Manor loam, 15 to 25 percent slopes, severely eroded	Moderately limited	Manor (85%)	Slope 0-25%; see land cover criteria (0.75)	118.8	1.7%
MhE	Manor loam and channery loam, 25 to 35 percent slopes	Very limited	Manor (98%)	Slope > 25% too steep (1.00)	34.9	0.5%
MhE3	Manor loam and channery loam, 25 to 35 percent slopes, severely eroded	Very limited	Manor (90%)	Slope > 25% too steep (1.00)	81.1	1.2%
MkF	Manor soils, 35 to 60 percent slopes	Very limited	Manor (100%)	Slope > 25% too steep (1.00)	14.7	0.2%
MmF	Manor very stony loam, 25 to 60 percent slopes	Very limited	Manor, very stony (100%)	Slope > 25% too steep (1.00)	2.1	0.0%
NsB	Neshaminy very stony silt loam, 0 to 8 percent slopes	Not limited	Neshaminy, extremely bouldery (95%)		4.5	0.1%
NsD	Neshaminy very stony silt loam, 8 to 25 percent slopes	Moderately limited	Neshaminy, extremely bouldery (97%)	Slope 0-25%; see land cover criteria (0.75)	31.5	0.5%

Septic System Spray Irrigation (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
NsF	Neshaminy very stony silt loam, 25 to 45 percent slopes	Very limited	Neshaminy, extremely bouldery (97%)	Slope > 25% too steep (1.00)	18.0	0.3%
			Towhee, extremely stony (3%)	Seasonal high water table (1.00)		
OtA	Othello silt loam	Very limited	Othello (90%)	Seasonal high water table (1.00)	28.4	0.4%
			Nanticoke (2%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
Qu	Quarries	Not rated	Pits, quarries (80%)		20.0	0.3%
SaA	Sassafras loam, 0 to 3 percent slopes	Not limited	Sassafras (85%)		7.8	0.1%
SaB2	Sassafras loam, 3 to 8 percent slopes, moderately eroded	Slightly limited	Sassafras (85%)	Slope 0-12%; see land cover criteria (0.50)	120.1	1.8%
W	Water	Not rated	Water (99%)		30.4	0.4%
We	Wehadkee silt loam	Very limited	Wehadkee (90%)	Seasonal high water table (1.00)	264.8	3.9%
				Flooding (1.00)		
WnA	Woodstown loam, 0 to 3 percent slopes	Slightly limited	Woodstown (90%)	Low potential seasonal high water table (0.47)	68.1	1.0%
WoA	Worsham silt loam, 0 to 3 percent slopes	Very limited	Worsham (85%)	Seasonal high water table (1.00)	95.9	1.4%
WoB	Worsham silt loam, 3 to 8 percent slopes	Very limited	Worsham (85%)	Seasonal high water table (1.00)	4.3	0.1%
				Slope 0-12%; see land cover criteria (0.50)		
WoB2	Worsham silt loam, 3 to 8 percent slopes, moderately eroded	Very limited	Worsham (85%)	Seasonal high water table (1.00)	6.0	0.1%
				Slope 0-12%; see land cover criteria (0.50)		

Septic System Spray Irrigation (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
WsB	Worsham very stony silt loam, 0 to 8 percent slopes	Very limited	Worsham (85%)	Seasonal high water table (1.00)	15.7	0.2%
Subtotals for Soil Survey Area					6,703.9	98.1%
Totals for Area of Interest					6,834.3	100.0%

Septic System Spray Irrigation (PA)— Summary by Map Unit — New Castle County, Delaware (DE003)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
BkD	Brinklow channery loam, 15 to 25 percent slopes				1.1	0.0%
DcB	Delanco-Codorus-Hatboro complex, 0 to 8 percent slopes, flooded				5.5	0.1%
GaD	Gaila loam, 15 to 25 percent slopes				4.7	0.1%
GaE	Gaila loam, 25 to 45 percent slopes				5.6	0.1%
GeC	Glenelg loam, 8 to 15 percent slopes				3.7	0.1%
GgB	Glenelg silt loam, 3 to 8 percent slopes				2.2	0.0%
GgC	Glenelg silt loam, 8 to 15 percent slopes				0.5	0.0%
GnB	Glenville silt loam, 3 to 8 percent slopes				0.3	0.0%
Hw	Hatboro-Codorus complex, 0 to 3 percent slopes, frequently flooded				3.9	0.1%
MzB	Mount Lucas silt loam, 3 to 8 percent slopes				1.0	0.0%

Septic System Spray Irrigation (PA)— Summary by Map Unit — New Castle County, Delaware (DE003)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
TaB	Talleyville silt loam, 3 to 8 percent slopes				17.7	0.3%
UaB	Udorthents, bedrock substratum, 0 to 8 percent slopes				6.4	0.1%
WaA	Watchung silt loam, 0 to 3 percent slopes				8.0	0.1%
Subtotals for Soil Survey Area					60.7	0.9%
Totals for Area of Interest					6,834.3	100.0%

Septic System Spray Irrigation (PA)— Summary by Rating Value		
Rating	Acres in AOI	Percent of AOI
Slightly limited	4,368.3	63.9%
Very limited	1,358.1	19.9%
Moderately limited	928.8	13.6%
Not limited	47.2	0.7%
Null or Not Rated	131.5	1.9%
Totals for Area of Interest	6,834.3	100.0%

Description

This is a system of pressurized lines that distribute effluent from a septic tank into a sand filter tank and chlorination system and then through spray heads that disperse the effluent onto the surface of the soil. Only the part of the soils between depths of 0 and 16 inches is considered when the soils are rated.

The soil properties and site features considered are those that affect absorption of the effluent and construction and maintenance of the system and those that may affect public health. These include depth to a water table, depth to bedrock, content of rock fragments, flooding, slope, and saturated hydraulic conductivity (Ksat). Flooding is a serious problem because it can result in improper treatment of the effluent and contamination of ground water or surface water. If Ksat is too fast or too slow, if the content of rock fragments is too high, or if the water table is too close to the surface, the effluent can contaminate the ground water. If this system is improperly installed on the steeper slopes, the effluent could flow along the surface of the soils. Additional grading may be needed in areas downslope from the system.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Slightly limited" indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. "Moderately limited" indicates that the soil has features that are somewhat favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

These ratings do not preclude the need for onsite investigation to determine the limitations affecting system placement.

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen, which is displayed on the report. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the Selected Soil Interpretations report with this interpretation included from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Water-Data Report 2012

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA

Lower Delaware Basin
Brandywine-Christina Subbasin

LOCATION.--Lat 39°52'11", long 75°35'37" referenced to North American Datum of 1927, Delaware County, PA, Hydrologic Unit 02040205, on left bank 27 ft upstream from Penn Central Railroad bridge at Chadds Ford, 150 ft upstream from Harvey Run, and 1,200 ft downstream from highway bridge on U.S. Highway 1.

DRAINAGE AREA.--287 mi².

SURFACE-WATER RECORDS

PERIOD OF RECORD.--August 1911 to September 1953, October 1962 to current year. Prior to October 1911, monthly discharge only, published in WSP 1302.

REVISED RECORDS.--WSP 756: Drainage area. WSP 1202: 1917-18(M), 1919-20, 1922-31(M), 1932-33, 1934(M), 1936, 1938(P), 1939(M), 1942, 1944-46(M), WDR PA-98-1: 1996-97 (M).

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 150.45 ft above National Geodetic Vertical Datum of 1929. Prior to May 21, 1927, non-recording gage at same site and datum. Satellite and landline telemetry at station.

COOPERATION.--Station established and maintained by the U.S. Geological Survey. Funding for the operation of this station is provided by the Pennsylvania Department of Environmental Protection, Chester County Water Resources Authority, the City of Wilmington, Delaware, and the U.S. Geological Survey through the Cooperative Water Program.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Flow regulated since November 1973 by Marsh Creek Reservoir (station 01480684) about 17 mi upstream.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Aug. 19, 1955, reached a stage of 14.64 ft, gage datum, discharge, about 16,400 ft³/s.

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
DAILY MEAN VALUES
[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	672	591	767	710	578	1,320	323	348	277	150	112	95
2	839	521	665	693	569	578	331	354	1,170	142	123	97
3	738	480	618	660	553	536	306	371	350	138	115	1,230
4	620	460	586	616	546	479	293	366	288	135	108	436
5	567	439	654	623	540	415	288	701	297	131	101	191
6	521	423	775	623	524	389	283	388	267	121	156	154
7	494	423	1,210	620	505	381	276	355	248	118	119	134
8	478	433	4,550	607	490	378	270	343	236	123	105	125
9	465	423	1,150	592	503	375	267	392	223	118	99	205
10	452	420	991	590	489	358	264	389	213	123	115	e145
11	430	428	881	575	510	349	264	343	207	116	169	115
12	434	407	821	1,930	513	352	262	317	254	111	255	107
13	523	399	790	1,010	477	355	258	306	626	106	132	104
14	849	395	759	738	478	349	255	306	261	187	162	98
15	876	392	732	652	477	338	250	703	225	181	194	97
16	484	484	729	598	469	336	252	756	211	206	133	91
17	447	774	676	692	498	337	246	414	203	173	118	88
18	426	467	655	796	471	336	241	362	199	133	261	206
19	498	420	639	621	458	331	255	344	198	124	151	682
20	754	408	636	607	450	329	252	326	196	163	125	203
21	520	423	642	618	438	318	247	327	188	169	117	167
22	450	668	650	599	438	313	449	326	185	144	112	170
23	430	5,390	2,160	650	439	312	2,290	316	192	131	104	190
24	419	1,590	892	986	475	314	573	335	180	124	101	149
25	414	864	734	753	469	319	428	354	174	115	99	141
26	406	739	697	638	430	311	389	312	170	107	97	134
27	425	671	1,010	841	420	295	376	295	156	163	192	194
28	463	634	2,070	805	416	294	355	283	152	133	149	161
29	567	856	849	642	764	297	342	270	155	115	118	140
30	855	1,630	772	618	---	289	331	425	157	117	105	136
31	748	---	742	600	---	326	---	308	---	114	101	---
Total	17,264	22,652	30,502	22,303	14,387	12,009	11,216	11,735	7,858	4,231	4,148	6,185
Mean	557	755	984	719	496	387	374	379	262	136	134	206
Max	876	5,390	4,550	1,930	764	1,320	2,290	756	1,170	206	261	1,230
Min	406	392	586	575	416	289	241	270	152	106	97	88

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1911-1953, 1963-1973 BY WATER YEAR (WY) (PRIOR TO REGULATION)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	219	301	348	444	570	605	530	435	364	309	278	230
Max	666	625	827	1,020	1,130	1,366	1,043	946	1,144	802	1,089	1,050
(WY)	(1972)	(1972)	(1973)	(1936)	(1971)	(1920)	(1973)	(1952)	(1972)	(1919)	(1933)	(1971)
Min	67.7	98.3	114	145	214	247	226	175	149	91.1	82.1	59.4
(WY)	(1964)	(1942)	(1966)	(1966)	(1934)	(1931)	(1963)	(1926)	(1963)	(1963)	(1930)	(1932)

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

SUMMARY STATISTICS

Water Years 1911-1953, 1963-1973

Annual mean	385	
Highest annual mean	625	1928
Lowest annual mean	218	1932
Highest daily mean	9,590	Aug 24 1933
Lowest daily mean	42	Sep 12 1966
Annual seven-day minimum	45	Sep 7 1966
Maximum peak flow	^a 23,800	Jun 22 1972
Maximum peak stage	16.56	Jun 22 1972
Instantaneous low flow	4.9	Oct 2 1942
Annual runoff (cfsm)	1.34	
Annual runoff (inches)	18.23	
10 percent exceeds	700	
50 percent exceeds	274	
90 percent exceeds	118	

^a From rating curve extended above 9,000 ft³/s on basis of area-velocity study.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 2012, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	323	366	527	539	552	678	634	495	413	321	258	328
Max	924	1,044	1,634	1,664	1,308	1,713	1,509	1,097	1,459	1,153	761	1,239
(WY)	(1997)	(2004)	(1997)	(1979)	(1979)	(1994)	(1983)	(1989)	(2003)	(1975)	(2011)	(2011)
Min	99.5	105	112	106	144	195	183	249	153	88.8	64.0	80.2
(WY)	(2002)	(2002)	(1999)	(1981)	(2002)	(1981)	(2002)	(1999)	(1999)	(2002)	(2002)	(2002)

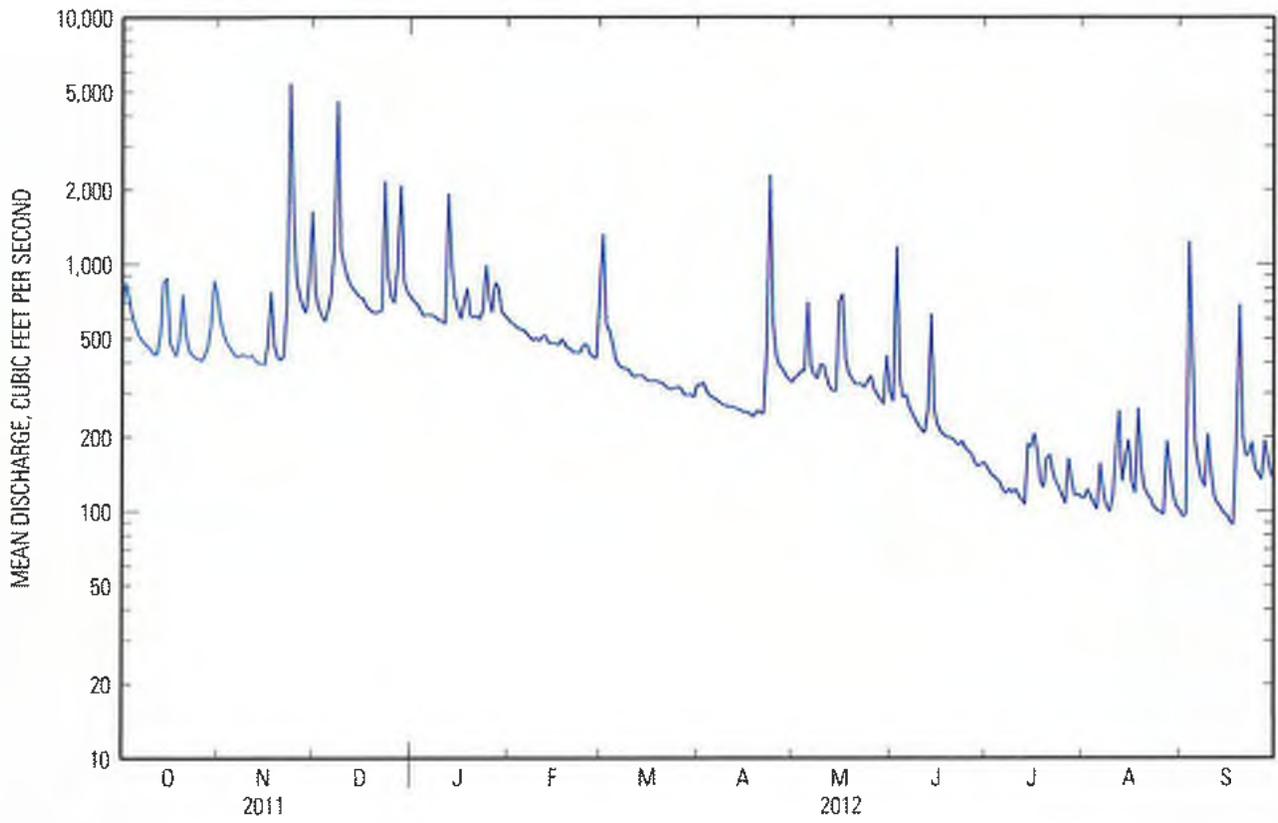
SUMMARY STATISTICS

	Calendar Year 2011		Water Year 2012		Water Years 1974 - 2012	
Annual total	249,599		164,490			
Annual mean	684		449		452	
Highest annual mean					754	
Lowest annual mean					152	
Highest daily mean	11,500	Aug 28	5,390	Nov 23	11,500	Aug 28, 2011
Lowest daily mean	108	Aug 3 ^a	88	Sep 17	33	Aug 22, 2002
Annual seven-day minimum	120	Jul 28	100	Sep 11	36	Aug 17, 2002
Maximum peak flow			6,760	Nov 23	^b 26,900	Sep 17, 1999
Maximum peak stage			10.13	Nov 23	17.15	Sep 17, 1999
Instantaneous low flow			87	Sep 17	8.4	Sep 13, 1980
10 percent exceeds	1,070		760		835	
50 percent exceeds	484		360		313	
90 percent exceeds	176		119		127	

^a Also Aug 13.

^b From rating curve extended above 18,100 ft³/s on basis of area-velocity study at gage height 16.56 ft.

01481000 BRANDYWINE CREEK AT CHADDS FDRD, PA--Continued



01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1963 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: October 1965 to current year.

pH: October 1965 to September 1966, December 1971 to current year.

WATER TEMPERATURES: October 1964 to current year.

DISSOLVED OXYGEN: October 1971 to current year.

TURBIDITY: October 2005 to current year.

INSTRUMENTATION.--Water-quality monitor since August 1971.

REMARKS.--Water temperature, pH, dissolved oxygen records rated good. Specific conductance records rated good, except for those from March 21-25, which are poor. Turbidity records rated fair, except for those from January 30 to February 8, and March 22 to April 24, which are poor. The reporting precision of the turbidity probe in low turbidity water is +/-0.3 FNU. The lowest reportable value, 0 FNU, does not necessarily indicate a condition of zero turbidity. Except for turbidity, data collection suspended during winter months since 1981 water year. Other interruptions in the record were due equipment malfunctions.

Analyses for pH, water temperature, specific conductance, and dissolved oxygen were performed on site. All other sample analyses were performed at the Pennsylvania Department of Environmental Protection laboratory in Harrisburg, Pa. Some values for filtered parameters exceed values for the corresponding unfiltered parameter. These results are within the limits of analytical precision and methods.

Explanations of sample characteristics are available from the USGS NWISWeb Help System pages: <http://waterdata.usgs.gov/nwis/help>

COOPERATION.--Water-quality samples were collected as part of the Pennsylvania Department of Environmental Protection Water-Quality Network (WQN) in cooperation Pennsylvania Department of Environmental Protection and the Chester County Water Resources Authority.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum, 701 microsiemens/cm, Mar 18, 2007; minimum, 42 microsiemens/cm, Nov 26, 1979.

pH: Maximum, 9.8, Apr 9, 1975; minimum, 6.1, Feb 22, 1976.

WATER TEMPERATURE: Maximum, 31.2°C, Jul 23, 2011; minimum, 0.0°C, many days during winter periods.

DISSOLVED OXYGEN: Maximum, 17.1 mg/L, Dec 5, 1976; minimum, 3.0 mg/L, Jun 21, 1984.

TURBIDITY: Maximum 980 FNU, Sep 30, 2010; minimum, 0 FNU, many days.

EXTREMES FOR CURRENT YEAR.--

TURBIDITY: Maximum, 860 FNU, Sept. 3; minimum, 0.0 FNU, Oct. 11, 26, Jan. 16, Aug. 3.

WATER-QUALITY DATA

WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Part 1 of 6

[ANC, acid neutralizing capacity; CaCO₃, calcium carbonate; MF, membrane filter; N, nitrogen; P, phosphorus; col/100 mL, colonies per 100 milliliters; ft³/s, cubic feet per second; mg/L, milligrams per liter; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; M, presence verified but not quantified]

Date	Sample start time	Discharge, instantaneous, ft ³ /s (00061)	Dissolved oxygen, water, unfiltered, mg/L (00300)	Osmotic pressure, water, unfiltered, milliosmoles per kilogram (82550)	pH, water, field, standard units (00400)	pH, water, laboratory, standard units (00403)	Specific conductance, water, unfiltered, laboratory, µS/cm at 25°C (90095)	Specific conductance, water, unfiltered, µS/cm at 25°C (00095)	Temperature, water, °C (00010)	Bio-chemical oxygen demand, water, unfiltered, 5 days at 20°C, mg/L (00310)
10-19-2011	1600	553	10.1	< 1.0	7.6	7.7	321	306	14.9	1.1
12-13-2011	1500	783	13.6	< 1.0	7.5	7.7	281	265	4.7	1.9
02-08-2012	1300	482	14.1	3.0	7.9	7.6	290	290	4.8	1.2
04-24-2012	1330	535	10.8	< 1.0	7.7	7.7	228	225	11.3	2.2
06-18-2012	1430	198	10.2	3.0	8.0	8.1	321	326	19.8	1.5
08-15-2012	1200	187	9.3	< 1.0	7.9	8.1	287	285	24.0	1.9

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Part 2 of 6

[ANC, acid neutralizing capacity; CaCO₃, calcium carbonate; MF, membrane filter; N, nitrogen; P, phosphorus; col/100 mL, colonies per 100 milliliters; ft³/s, cubic feet per second; mg/L, milligrams per liter; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; M, presence verified but not quantified]

Date	Sample start time	Dissolved solids dried at 180°C, water, filtered, mg/L (70300)	Hardness, water, mg/L as CaCO ₃ (00900)	Suspended solids, water, unfiltered, mg/L (00530)	Calcium, water, unfiltered, recoverable, mg/L (00916)	Magnesium, water, unfiltered, recoverable, mg/L (00927)	Sodium, water, unfiltered, recoverable, mg/L (00929)	ANC, water, unfiltered, fixed endpoint (pH 4.5) titration, laboratory, mg/L as CaCO ₃ (00417)	Bromide, water, filtered, mg/L (71870)	Chloride, water, filtered, mg/L (00940)
10-19-2011	1600	194	97	< 5	23.5	9.2	15.2	63	< .1	38.0
12-13-2011	1500	188	89	6	21.8	8.3	14.0	53	< .1	24.2
02-08-2012	1300	196	93	< 5	22.5	9.0	14.9	54	< .1	30.9
04-24-2012	1330	166	72	14	17.8	6.7	12.5	47	< .1	24.5
06-18-2012	1430	216	100	6	24.7	9.7	18.1	65	M	37.3
08-15-2012	1200	186	82	< 5	20.4	7.6	14.5	61	M	33.0

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Part 3 of 6

[ANC, acid neutralizing capacity; CaCO₃, calcium carbonate; MF, membrane filter; N, nitrogen; P, phosphorus; col/100 mL, colonies per 100 milliliters; ft³/s, cubic feet per second; mg/L, milligrams per liter; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; M, presence verified but not quantified]

Date	Sample start time	Sulfate, water, filtered, mg/L (00945)	Ammonia, water, unfiltered, mg/L as N (00610)	Nitrate, water, unfiltered, mg/L as N (00620)	Nitrite, water, unfiltered, mg/L as N (00615)	Orthophosphate, water, unfiltered, mg/L as P (70507)	Phosphorus, water, unfiltered, mg/L as P (00665)	Total nitrogen, water, unfiltered, mg/L (00600)	Fecal coliform, M-FC MF (0.45 micron) method, water, col/100 mL (31616)	Aluminum, water, filtered, µg/L (01106)
10-19-2011	1600	18.6	0.030	3.06	< .040	0.08	0.102	3.4	--	12
12-13-2011	1500	18.4	.030	3.11	< .040	.05	.060	3.4	30	< 10
02-08-2012	1300	19.4	.030	3.59	< .040	.04	.045	3.9	10	< 10
04-24-2012	1330	14.8	.130	1.93	< .040	.06	.099	2.6	800	10
06-18-2012	1430	19.1	.020	2.62	< .040	.08	.095	3.1	80	< 10
08-15-2012	1200	16.7	.040	1.67	< .040	.08	.098	2.0	100	< 10

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Part 4 of 6

[ANC, acid neutralizing capacity; CaCO₃, calcium carbonate; MF, membrane filter; N, nitrogen; P, phosphorus; col/100 mL, colonies per 100 milliliters; ft³/s, cubic feet per second; mg/L, milligrams per liter; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; M, presence verified but not quantified]

Date	Sample start time	Aluminum, water, unfiltered, recoverable, µg/L (01105)	Barium, water, unfiltered, recoverable, µg/L (01007)	Cadmium, water, filtered, µg/L (01025)	Copper, water, filtered, µg/L (01040)	Copper, water, unfiltered, recoverable, µg/L (01042)	Iron, water, filtered, µg/L (01046)	Iron, water, unfiltered, recoverable, µg/L (01045)	Lead, water, filtered, µg/L (01049)	Lead, water, unfiltered, recoverable, µg/L (01051)
10-19-2011	1600	200	M	< 0.20	< 4	< 4	50	310	< 1.0	< 1.0
12-13-2011	1500	M	M	< 0.20	< 4	< 4	70	230	< 1.0	< 1.0
02-08-2012	1300	M	M	< 0.20	< 4	< 4	60	150	< 1.0	< 1.0
04-24-2012	1330	300	M	< 0.20	< 4	< 4	90	570	< 1.0	< 1.0
06-18-2012	1430	M	M	< 0.20	< 4	< 4	60	190	< 1.0	< 1.0
08-15-2012	1200	M	M	< 0.20	< 4	< 4	40	190	< 1.0	< 1.0

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Part 5 of 6

[ANC, acid neutralizing capacity; CaCO₃, calcium carbonate; MF, membrane filter; N, nitrogen; P, phosphorus; col/100 mL, colonies per 100 milliliters; ft³/s, cubic feet per second; mg/L, milligrams per liter; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; M, presence verified but not quantified]

Date	Sample start time	Manganese, water, filtered, µg/L (01056)	Manganese, water, unfiltered, recoverable, µg/L (01055)	Nickel, water, filtered, µg/L (01065)	Nickel, water, unfiltered, recoverable, µg/L (01067)	Strontium, water, unfiltered, recoverable, micrograms per liter (01082)	Zinc, water, filtered, µg/L (01090)	Zinc, water, unfiltered, recoverable, µg/L (01092)	Arsenic, water, filtered, µg/L (01000)	Boron, water, unfiltered, recoverable, micrograms per liter (01022)
10-19-2011	1600	20	40	< 4.0	< 4.0	140	--	--	< 3.0	< 200
12-13-2011	1500	30	30	< 4.0	< 4.0	110	10	10	< 3.0	< 200
02-08-2012	1300	20	20	< 4.0	< 4.0	120	10	10	< 3.0	< 200
04-24-2012	1330	30	50	< 4.0	< 4.0	90	< 5.0	10	< 3.0	< 200
06-18-2012	1430	20	30	< 4.0	< 4.0	120	M	M	< 3.0	< 200
08-15-2012	1200	20	30	< 4.0	< 4.0	120	< 5.0	< 5.0	< 3.0	< 200

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

**WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO
SEPTEMBER 2012**

Part 6 of 6

(ANC, acid neutralizing capacity; CaCO₃, calcium carbonate; MF, membrane filter; N, nitrogen; P, phosphorus; col/100 mL, colonies per 100 milliliters; ft³/s, cubic feet per second; mg/L, milligrams per liter; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; -, no data; <, less than; M, presence verified but not quantified]

Date	Sample start time	Selenium, water, unfiltered, µg/L (01147)
10-19-2011	1600	< 7
12-13-2011	1500	< 7
02-08-2012	1300	< 7
04-24-2012	1330	< 7
06-18-2012	1430	< 7
08-15-2012	1200	< 7

**WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012**

(FNU, Formazin nephelometric units; LED, light-emitting diode; MF, membrane filter; col/100 mL, colonies per 100 milliliters; ft³/s, cubic feet per second; mg/L, milligrams per liter; nm, nanometers; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data; E, estimated]

Date	Sample start time	Discharge, instantaneous, ft ³ /s (00061)	Dissolved oxygen, water, unfiltered, mg/L (00300)	pH, water, unfiltered, field, standard units (00400)	Specific conductance, water, unfiltered, µS/cm at 25°C (00095)	Temperature, water, °C (00010)	Turbidity, water, unfiltered, monochrome near infrared LED light, 780-900 nm, detection angle 90 +/- 2.5 degrees, FNU (63680)	Fecal coliform, M-FC MF (0.7 micron) method, water, col/100 mL (31625)
03-06-2012	1045	386	14.6	7.6	305	4.9	1.8	E 5
04-04-2012	1100	293	10.5	8.0	303	12.5	1.1	10
05-02-2012	1230	353	9.9	7.6	298	14.9	2.1	E 78
06-06-2012	1145	264	9.0	7.7	290	17.6	3.1	180
07-02-2012	1045	143	7.7	7.7	335	25.8	.8	100
08-01-2012	1300	112	9.3	8.0	354	24.9	.5	E 46
09-04-2012	1145	283	7.8	7.2	200	22.5	12	E 2,800

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

SPECIFIC CONDUCTANCE, WATER, UNFILTERED, MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	October			November			December			January		
1	285	267	278	330	307	318	260	222	243	---	---	---
2	285	266	280	320	306	312	279	259	270	---	---	---
3	285	263	273	328	311	318	288	269	280	---	---	---
4	293	284	289	323	316	318	293	276	283	---	---	---
5	308	293	297	333	318	322	---	---	---	---	---	---
6	312	301	303	336	321	325	---	---	---	---	---	---
7	311	304	307	338	319	327	---	---	---	---	---	---
8	310	306	308	341	311	320	---	---	---	---	---	---
9	325	309	316	320	313	316	---	---	---	---	---	---
10	324	317	319	332	315	317	---	---	---	---	---	---
11	327	318	321	331	317	321	---	---	---	---	---	---
12	324	311	314	335	316	323	---	---	---	---	---	---
13	314	297	307	344	318	328	---	---	---	---	---	---
14	306	210	275	334	313	318	---	---	---	---	---	---
15	250	223	237	319	311	314	---	---	---	---	---	---
16	285	247	271	316	305	310	---	---	---	---	---	---
17	298	285	293	317	261	276	---	---	---	---	---	---
18	303	298	300	288	268	278	---	---	---	---	---	---
19	307	300	303	298	288	292	---	---	---	---	---	---
20	308	270	285	308	298	303	---	---	---	---	---	---
21	289	267	277	307	303	305	---	---	---	---	---	---
22	296	289	294	309	265	299	---	---	---	---	---	---
23	300	296	298	265	142	170	---	---	---	---	---	---
24	308	299	304	235	162	199	---	---	---	---	---	---
25	313	305	307	256	235	248	---	---	---	---	---	---
26	335	304	316	267	256	264	---	---	---	---	---	---
27	332	315	322	274	267	272	---	---	---	---	---	---
28	323	311	318	280	274	276	---	---	---	---	---	---
29	322	303	310	281	240	270	---	---	---	---	---	---
30	472	320	414	241	203	216	---	---	---	---	---	---
31	374	320	340	---	---	---	---	---	---	---	---	---
Month	472	210	302	344	142	292	293	222	269	---	---	---

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

SPECIFIC CONDUCTANCE, WATER, UNFILTERED, MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	February			March			April			May		
1	---	---	---	262	228	238	311	290	300	302	296	299
2	---	---	---	273	244	262	301	291	297	302	289	296
3	---	---	---	290	273	282	302	292	297	296	290	292
4	---	---	---	289	285	287	301	295	299	299	262	287
5	---	---	---	295	288	293	306	299	304	267	219	235
6	---	---	---	296	294	295	311	305	308	278	232	260
7	---	---	---	296	294	295	310	305	308	290	278	285
8	---	---	---	298	295	296	313	305	309	300	286	291
9	---	---	---	297	293	295	314	307	311	306	290	297
10	---	---	---	296	293	295	314	308	311	299	291	295
11	---	---	---	299	295	297	315	308	312	315	297	306
12	---	---	---	302	296	299	315	311	313	318	309	314
13	---	---	---	299	293	296	321	310	313	313	308	310
14	---	---	---	298	295	296	316	310	313	319	309	314
15	---	---	---	300	297	298	318	310	313	325	219	291
16	---	---	---	301	297	300	324	311	316	233	197	213
17	---	---	---	302	294	298	320	310	315	266	215	244
18	---	---	---	301	296	298	318	312	314	287	266	279
19	---	---	---	298	292	295	318	309	314	300	287	295
20	---	---	---	315	294	301	313	306	310	308	296	301
21	---	---	---	312	298	304	313	306	310	321	301	312
22	---	---	---	326	299	312	331	262	306	317	305	310
23	---	---	---	316	307	312	262	159	182	319	305	311
24	---	---	---	319	308	314	246	195	223	351	280	311
25	322	310	317	333	308	321	268	246	258	320	295	309
26	312	309	310	309	305	307	279	268	273	306	283	295
27	312	304	308	311	305	309	285	279	283	319	286	306
28	308	302	305	309	305	307	290	285	288	330	304	315
29	305	262	297	309	303	306	292	289	291	330	307	319
30	---	---	---	310	302	306	298	290	295	341	239	294
31	---	---	---	313	303	307	---	---	---	303	262	284
Month	322	262	307	333	228	297	331	159	296	351	197	293

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

**SPECIFIC CONDUCTANCE, WATER, UNFILTERED, MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012**

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	June			July			August			September		
1	312	291	302	359	343	350	364	351	356	375	362	369
2	309	157	218	347	343	345	368	355	363	374	348	370
3	257	181	225	352	345	348	364	335	357	372	137	243
4	289	257	273	360	349	356	363	355	359	253	136	195
5	300	286	293	367	357	360	360	353	357	319	253	294
6	304	288	296	369	355	363	370	346	361	345	319	332
7	311	297	305	378	363	367	353	337	343	359	345	355
8	316	307	311	375	365	369	348	319	330	368	356	364
9	325	309	318	372	362	367	358	331	345	373	338	355
10	324	311	319	376	363	369	362	334	346	345	311	331
11	322	315	317	369	353	358	360	343	351	345	313	332
12	320	295	316	373	354	365	369	244	309	365	345	355
13	298	215	244	369	361	366	262	244	251	379	365	372
14	292	249	272	369	341	358	341	262	288	380	375	377
15	315	287	304	341	300	315	345	286	314	388	379	384
16	325	306	316	325	290	309	306	274	287	389	386	388
17	333	314	321	324	291	310	334	306	322	392	383	387
18	338	319	326	343	296	318	336	282	313	391	338	381
19	329	320	324	334	299	319	315	273	291	338	186	218
20	334	321	328	349	328	338	327	315	322	277	223	249
21	339	327	331	354	337	344	356	327	346	312	277	297
22	342	326	332	350	327	336	358	340	354	334	233	321
23	348	330	338	349	331	339	362	355	359	355	323	341
24	338	326	333	355	346	348	370	361	365	363	347	353
25	337	328	332	364	349	355	375	367	371	356	335	344
26	343	334	337	363	356	359	379	366	372	367	344	358
27	348	335	341	365	351	359	375	327	356	382	356	369
28	350	336	344	351	339	342	345	303	323	385	303	330
29	351	341	348	346	330	337	325	303	314	361	324	346
30	357	349	351	351	340	347	345	309	331	359	345	348
31	---	---	---	357	344	348	371	343	352	---	---	---
Month	357	157	310	378	290	347	379	244	336	392	136	335

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

pH, WATER, UNFILTERED, FIELD, STANDARD UNITS
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Max	Min	Median	Max	Min	Median	Max	Min	Median	Max	Min	Median
	October			November			December			January		
1	7.2	7.1	7.2	7.6	7.4	7.5	7.5	7.4	7.5	---	---	---
2	7.3	7.2	7.2	7.6	7.5	7.5	7.6	7.5	7.5	---	---	---
3	7.4	7.3	7.4	7.6	7.4	7.6	7.6	7.5	7.5	---	---	---
4	7.7	7.3	7.4	7.6	7.5	7.6	7.6	7.5	7.5	---	---	---
5	7.7	7.6	7.6	7.7	7.5	7.6	---	---	---	---	---	---
6	7.8	7.6	7.7	7.7	7.5	7.6	---	---	---	---	---	---
7	7.8	7.6	7.7	7.7	7.5	7.6	---	---	---	---	---	---
8	7.8	7.5	7.6	7.7	7.5	7.6	---	---	---	---	---	---
9	7.6	7.3	7.5	7.7	7.5	7.6	---	---	---	---	---	---
10	7.8	7.3	7.5	7.6	7.5	7.6	---	---	---	---	---	---
11	7.9	7.4	7.6	7.8	7.5	7.6	---	---	---	---	---	---
12	7.7	7.3	7.6	7.7	7.6	7.7	---	---	---	---	---	---
13	7.6	7.5	7.5	7.8	7.5	7.6	---	---	---	---	---	---
14	7.6	7.2	7.4	7.8	7.6	7.7	---	---	---	---	---	---
15	7.5	7.3	7.4	7.7	7.5	7.6	---	---	---	---	---	---
16	7.5	7.3	7.4	7.5	7.4	7.5	---	---	---	---	---	---
17	7.6	7.4	7.5	7.5	7.4	7.5	---	---	---	---	---	---
18	7.6	7.4	7.5	7.6	7.5	7.6	---	---	---	---	---	---
19	7.5	7.4	7.4	7.7	7.6	7.6	---	---	---	---	---	---
20	7.4	7.3	7.4	7.7	7.6	7.6	---	---	---	---	---	---
21	7.5	7.4	7.4	7.6	7.5	7.6	---	---	---	---	---	---
22	7.6	7.4	7.5	7.6	7.4	7.5	---	---	---	---	---	---
23	7.5	7.3	7.4	7.4	7.1	7.2	---	---	---	---	---	---
24	7.5	7.3	7.4	7.4	7.2	7.4	---	---	---	---	---	---
25	7.5	7.3	7.4	7.5	7.4	7.4	---	---	---	---	---	---
26	7.6	7.3	7.4	7.5	7.4	7.4	---	---	---	---	---	---
27	7.6	7.5	7.6	7.5	7.4	7.5	---	---	---	---	---	---
28	7.7	7.5	7.6	7.6	7.4	7.5	---	---	---	---	---	---
29	7.6	7.4	7.4	7.5	7.4	7.5	---	---	---	---	---	---
30	7.5	7.3	7.4	7.4	7.4	7.4	---	---	---	---	---	---
31	7.5	7.4	7.4	---	---	---	---	---	---	---	---	---
Max	7.9	7.6	7.7	7.8	7.6	7.7	7.6	7.5	7.5	---	---	---
Min	7.2	7.1	7.2	7.4	7.1	7.2	7.5	7.4	7.5	---	---	---

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

pH, WATER, UNFILTERED, FIELD, STANDARD UNITS
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Max	Min	Median	Max	Min	Median	Max	Min	Median	Max	Min	Median
	February			March			April			May		
1	---	---	---	7.6	7.5	7.5	8.4	7.5	7.7	8.3	7.6	7.8
2	---	---	---	7.7	7.5	7.6	8.5	7.6	8.1	8.0	7.5	7.7
3	---	---	---	7.9	7.6	7.7	8.4	7.6	8.1	8.1	7.5	7.7
4	---	---	---	8.0	7.6	7.8	8.4	7.6	8.1	8.2	7.6	7.8
5	---	---	---	8.0	7.6	7.8	8.5	7.7	8.1	7.8	7.4	7.4
6	---	---	---	8.0	7.6	7.8	8.5	7.7	8.2	7.5	7.4	7.4
7	---	---	---	8.1	7.6	7.8	8.5	7.7	8.2	7.5	7.4	7.4
8	---	---	---	8.1	7.6	7.8	8.5	7.7	8.2	7.6	7.3	7.5
9	---	---	---	8.2	7.5	7.8	8.5	7.8	8.2	7.5	7.4	7.4
10	---	---	---	8.2	7.6	7.9	8.4	7.7	8.1	7.6	7.4	7.5
11	---	---	---	8.1	7.6	7.9	8.5	7.8	8.1	7.6	7.4	7.5
12	---	---	---	8.2	7.5	7.8	8.4	7.8	8.1	7.7	7.4	7.5
13	---	---	---	8.2	7.5	7.9	8.6	7.7	8.1	7.7	7.4	7.5
14	---	---	---	8.3	7.5	7.9	8.6	7.8	8.2	7.5	7.4	7.5
15	---	---	---	8.3	7.5	8.0	8.5	7.7	8.2	7.5	7.4	7.4
16	---	---	---	8.2	7.5	7.9	8.5	7.6	8.0	7.4	7.3	7.3
17	---	---	---	8.4	7.5	7.9	8.4	7.6	8.0	7.6	7.3	7.4
18	---	---	---	8.3	7.5	8.0	8.0	7.6	7.7	7.7	7.4	7.5
19	---	---	---	8.4	7.5	8.0	8.4	7.6	7.8	7.8	7.4	7.5
20	---	---	---	8.3	7.5	8.0	8.4	7.7	8.0	7.9	7.4	7.6
21	---	---	---	8.2	7.5	8.0	8.3	7.6	8.0	7.7	7.4	7.6
22	---	---	---	8.5	7.5	7.9	8.1	7.5	7.6	8.1	7.4	7.6
23	---	---	---	8.7	7.6	8.1	7.5	7.3	7.4	8.5	7.4	7.8
24	---	---	---	8.6	7.6	7.8	7.6	7.4	7.4	8.1	7.4	7.7
25	8.5	7.6	7.9	8.2	7.5	7.7	7.7	7.4	7.5	7.9	7.4	7.5
26	8.5	7.7	8.2	8.6	7.6	8.1	7.6	7.5	7.6	7.9	7.3	7.4
27	8.5	7.7	8.1	8.6	7.8	8.4	7.8	7.5	7.6	7.8	7.3	7.4
28	8.6	7.7	8.1	8.6	7.8	8.3	7.8	7.5	7.7	7.9	7.3	7.4
29	8.3	7.6	7.7	8.7	7.7	8.3	8.0	7.6	7.7	7.8	7.3	7.4
30	---	---	---	8.8	7.8	8.5	8.0	7.6	7.8	7.5	7.3	7.4
31	---	---	---	8.7	7.7	7.8	---	---	---	7.7	7.3	7.4
Max	8.6	7.7	8.2	8.8	7.8	8.5	8.6	7.8	8.2	8.5	7.6	7.8
Min	8.3	7.6	7.7	7.6	7.5	7.5	7.5	7.3	7.4	7.4	7.3	7.3

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

pH, WATER, UNFILTERED, FIELD, STANDARD UNITS
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Max	Min	Median	Max	Min	Median	Max	Min	Median	Max	Min	Median
	June			July			August			September		
1	7.7	7.4	7.4	8.1	7.4	7.6	8.5	7.6	7.8	8.2	7.5	7.7
2	7.5	7.2	7.3	8.1	7.4	7.6	8.5	7.5	7.9	7.7	7.5	7.6
3	7.4	7.2	7.3	8.1	7.4	7.6	8.6	7.6	7.8	7.5	7.1	7.2
4	7.6	7.4	7.5	8.2	7.5	7.7	8.4	7.4	7.7	7.3	7.1	7.2
5	7.7	7.4	7.6	8.3	7.5	7.6	8.4	7.4	7.6	7.5	7.3	7.4
6	7.8	7.5	7.6	8.2	7.5	7.6	8.2	7.5	7.7	7.6	7.3	7.4
7	7.8	7.5	7.6	8.4	7.5	7.6	8.4	7.4	7.7	7.6	7.4	7.5
8	7.9	7.5	7.7	8.2	7.4	7.7	8.6	7.4	7.7	7.6	7.4	7.4
9	8.0	7.5	7.7	8.3	7.4	7.7	8.4	7.4	7.7	7.6	7.4	7.5
10	8.2	7.5	7.8	8.3	7.5	7.7	8.2	7.3	7.6	7.6	7.4	7.5
11	8.3	7.5	7.8	8.4	7.4	7.8	8.2	7.4	7.7	7.7	7.5	7.6
12	7.9	7.5	7.5	8.5	7.5	7.9	7.9	7.4	7.6	7.8	7.5	7.6
13	7.6	7.3	7.4	8.6	7.6	7.8	7.9	7.3	7.4	7.8	7.5	7.6
14	7.6	7.3	7.5	7.9	7.5	7.7	7.8	7.3	7.4	7.9	7.6	7.7
15	7.7	7.4	7.5	8.1	7.4	7.6	8.0	7.5	7.6	7.9	7.6	7.7
16	7.8	7.4	7.6	8.0	7.4	7.6	8.0	7.4	7.6	8.0	7.6	7.7
17	7.8	7.4	7.6	8.2	7.4	7.7	8.4	7.4	7.7	8.0	7.6	7.7
18	7.9	7.5	7.6	8.3	7.4	7.6	7.7	7.4	7.6	7.7	7.5	7.6
19	8.0	7.5	7.7	7.8	7.4	7.6	7.9	7.4	7.6	7.5	7.3	7.4
20	8.1	7.6	7.7	7.6	7.4	7.5	8.0	7.5	7.7	7.6	7.3	7.4
21	8.0	7.4	7.6	8.2	7.5	7.8	8.2	7.5	7.8	7.6	7.5	7.6
22	8.0	7.4	7.5	8.3	7.6	7.8	8.3	7.6	7.8	7.7	7.5	7.6
23	8.0	7.4	7.6	8.4	7.5	7.8	8.3	7.6	7.9	7.8	7.5	7.7
24	8.0	7.4	7.6	8.4	7.5	7.8	8.5	7.6	7.9	7.8	7.6	7.8
25	8.0	7.4	7.6	8.4	7.5	7.8	8.2	7.6	7.8	7.8	7.6	7.7
26	8.1	7.4	7.6	8.5	7.6	7.8	8.4	7.5	7.8	7.9	7.6	7.7
27	8.2	7.5	7.6	8.3	7.6	7.8	7.9	7.5	7.7	8.0	7.5	7.7
28	8.3	7.4	7.7	8.4	7.5	7.8	7.9	7.4	7.5	7.7	7.4	7.6
29	8.2	7.5	7.7	8.5	7.5	7.8	7.9	7.4	7.6	7.8	7.5	7.6
30	8.0	7.4	7.6	8.5	7.5	7.8	8.1	7.4	7.6	7.9	7.6	7.7
31	---	---	---	8.6	7.5	7.9	8.0	7.5	7.6	---	---	---
Max	8.3	7.6	7.8	8.6	7.6	7.9	8.6	7.6	7.9	8.2	7.6	7.8
Min	7.4	7.2	7.3	7.6	7.4	7.5	7.7	7.3	7.4	7.3	7.1	7.2

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

TEMPERATURE, WATER, DEGREES CELSIUS
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	October			November			December			January		
1	18.5	16.9	17.6	9.5	8.0	8.7	9.8	8.0	8.6	---	---	---
2	16.9	14.2	15.3	9.5	8.2	8.9	8.0	6.9	7.3	---	---	---
3	14.2	13.5	13.8	9.7	8.4	9.1	7.2	6.3	6.8	---	---	---
4	14.3	13.0	13.7	10.0	9.2	9.6	7.0	5.8	6.4	---	---	---
5	15.5	13.7	14.6	9.5	8.2	8.8	---	---	---	---	---	---
6	15.2	13.8	14.6	8.3	7.1	7.8	---	---	---	---	---	---
7	14.4	12.9	13.8	8.8	7.3	8.1	---	---	---	---	---	---
8	14.6	12.9	13.9	10.0	8.4	9.3	---	---	---	---	---	---
9	15.5	13.6	14.6	10.2	9.1	9.8	---	---	---	---	---	---
10	15.8	14.5	15.3	11.1	10.2	10.7	---	---	---	---	---	---
11	16.4	15.4	16.0	10.7	8.4	9.5	---	---	---	---	---	---
12	16.4	15.9	16.2	8.4	7.3	7.9	---	---	---	---	---	---
13	16.3	15.7	16.0	8.4	7.2	7.8	---	---	---	---	---	---
14	17.2	16.3	16.7	11.0	8.4	9.6	---	---	---	---	---	---
15	16.6	14.9	15.6	12.0	11.0	11.6	---	---	---	---	---	---
16	14.9	13.5	14.2	12.3	12.0	12.2	---	---	---	---	---	---
17	15.2	14.0	14.6	12.3	9.7	11.4	---	---	---	---	---	---
18	14.6	13.4	14.1	9.7	7.1	8.2	---	---	---	---	---	---
19	15.3	14.3	14.7	7.1	6.0	6.6	---	---	---	---	---	---
20	16.1	15.1	15.7	8.7	6.7	7.5	---	---	---	---	---	---
21	15.1	13.1	14.0	10.2	8.7	9.6	---	---	---	---	---	---
22	13.1	11.8	12.4	10.2	10.1	10.2	---	---	---	---	---	---
23	12.3	11.2	11.8	11.2	10.1	10.6	---	---	---	---	---	---
24	12.2	11.0	11.7	10.4	8.9	9.4	---	---	---	---	---	---
25	12.5	11.5	12.1	8.9	8.1	8.6	---	---	---	---	---	---
26	12.4	11.4	11.9	8.7	7.8	8.3	---	---	---	---	---	---
27	13.5	12.4	12.9	9.5	8.1	8.8	---	---	---	---	---	---
28	12.7	11.0	11.6	11.4	9.4	10.2	---	---	---	---	---	---
29	11.0	7.2	9.3	12.5	11.4	12.0	---	---	---	---	---	---
30	7.6	6.4	7.1	12.3	9.8	11.1	---	---	---	---	---	---
31	8.1	6.9	7.5	---	---	---	---	---	---	---	---	---
Month	18.5	6.4	13.7	12.5	6.0	9.4	9.8	5.8	7.3	---	---	---

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

TEMPERATURE, WATER, DEGREES CELSIUS
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	February			March			April			May		
1	---	---	---	7.4	6.3	6.8	10.9	9.5	10.2	15.7	12.8	14.0
2	---	---	---	7.1	6.2	6.6	12.5	10.2	11.3	15.7	14.6	15.1
3	---	---	---	8.5	6.8	7.6	12.6	10.3	11.6	14.9	14.0	14.5
4	---	---	---	8.2	6.9	7.6	14.0	12.0	12.9	17.5	14.7	15.9
5	---	---	---	6.9	5.5	6.1	14.0	12.0	13.1	18.3	17.0	17.7
6	---	---	---	6.3	4.4	5.6	13.5	11.6	12.6	17.9	17.1	17.5
7	---	---	---	8.1	5.1	6.6	12.8	10.8	11.9	17.1	15.4	16.0
8	---	---	---	11.7	8.0	9.7	13.2	10.7	12.1	16.2	14.9	15.6
9	---	---	---	11.8	9.7	11.0	13.5	11.7	12.7	17.3	15.9	16.5
10	---	---	---	9.7	7.5	8.3	13.3	12.0	12.7	17.6	16.2	16.9
11	---	---	---	8.3	6.2	7.4	12.3	11.0	11.7	17.1	14.8	16.1
12	---	---	---	9.9	7.2	8.4	11.6	10.2	11.0	17.9	15.2	16.7
13	---	---	---	13.2	9.9	11.4	12.8	9.8	11.4	19.6	16.8	18.2
14	---	---	---	14.0	12.1	13.2	13.6	11.3	12.5	19.2	18.1	18.8
15	---	---	---	13.5	12.0	13.0	16.6	13.4	14.9	18.1	17.4	17.7
16	---	---	---	13.1	12.1	12.6	19.3	15.9	17.6	19.6	17.6	18.5
17	---	---	---	14.1	11.7	12.9	20.5	18.6	19.4	20.3	18.1	19.2
18	---	---	---	14.2	12.9	13.6	18.8	15.2	17.0	19.6	17.4	18.7
19	---	---	---	15.0	12.6	13.9	16.8	14.3	15.5	19.7	17.3	18.6
20	---	---	---	16.5	14.6	15.4	17.9	15.5	16.7	20.4	18.1	19.4
21	---	---	---	16.5	15.9	16.2	19.0	16.8	17.9	20.1	19.1	19.5
22	---	---	---	16.2	15.3	15.8	18.3	13.1	16.1	19.5	18.6	19.0
23	---	---	---	17.1	14.8	16.0	13.1	11.0	11.5	21.6	18.6	20.0
24	---	---	---	16.9	14.3	15.6	12.6	9.9	11.3	22.2	20.3	21.2
25	7.6	5.6	6.5	14.3	13.0	13.5	13.8	11.3	12.6	22.5	21.1	21.7
26	6.0	4.3	5.3	13.5	11.7	12.7	13.5	12.1	12.6	23.3	21.2	22.2
27	6.6	4.5	5.7	11.7	9.6	10.7	13.3	12.0	12.6	24.4	22.2	23.3
28	7.5	5.6	6.7	11.2	9.6	10.4	12.4	11.0	11.5	25.0	22.5	23.8
29	7.2	6.1	6.4	12.6	11.0	11.6	13.5	10.3	12.0	26.3	23.6	25.0
30	---	---	---	12.1	10.1	11.2	13.1	12.0	12.7	25.1	22.7	23.5
31	---	---	---	11.6	10.1	10.9	---	---	---	23.5	21.3	22.5
Month	7.6	4.3	6.1	17.1	4.4	11.0	20.5	9.5	13.3	26.3	12.8	18.8

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

TEMPERATURE, WATER, DEGREES CELSIUS
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	June			July			August			September		
1	22.6	20.7	21.3	27.5	24.4	26.0	25.6	24.6	25.1	25.7	22.8	24.0
2	20.7	19.1	19.7	27.8	25.0	26.3	26.3	23.7	25.1	24.1	23.2	23.6
3	20.2	18.0	19.1	27.4	24.2	25.8	27.4	24.6	25.8	23.2	22.0	22.4
4	19.1	18.3	18.7	28.3	24.9	26.5	27.8	24.8	26.2	23.5	22.0	22.7
5	18.5	17.1	17.9	29.3	26.2	27.7	28.3	25.7	26.8	24.5	23.2	23.8
6	18.6	16.6	17.6	29.2	26.0	27.6	27.7	25.9	26.9	23.9	22.9	23.2
7	19.7	17.1	18.4	29.7	26.6	28.1	26.7	25.0	26.0	24.3	21.9	23.2
8	21.0	18.1	19.6	28.7	26.9	27.8	27.0	24.7	25.8	25.1	23.0	23.8
9	21.7	19.4	20.6	27.6	25.8	26.7	27.2	24.6	25.9	23.9	21.9	22.7
10	23.7	20.6	22.1	27.4	25.3	26.3	26.6	25.0	25.8	21.9	20.2	21.1
11	24.4	22.1	23.3	27.2	24.2	25.7	26.3	24.5	25.4	20.7	18.2	19.5
12	23.6	20.6	22.2	27.4	24.0	25.7	25.6	24.1	25.0	20.5	17.5	19.1
13	21.9	19.7	20.8	26.7	24.4	25.4	26.1	23.3	24.6	20.8	17.9	19.4
14	22.1	20.4	21.3	25.3	22.8	24.2	24.8	23.3	24.1	21.1	18.4	19.8
15	22.2	20.2	21.3	25.0	22.4	23.6	24.4	22.8	23.7	21.2	18.8	19.9
16	22.7	20.0	21.4	25.9	23.7	24.8	25.5	22.7	24.0	20.5	18.1	19.2
17	21.7	20.6	21.0	27.1	24.3	25.8	25.8	22.7	24.2	19.8	17.1	18.5
18	20.6	19.2	19.6	28.7	25.4	26.7	24.7	22.8	23.6	19.6	18.9	19.3
19	20.7	18.8	19.7	26.9	25.2	25.7	23.1	21.7	22.2	20.2	18.8	19.6
20	23.8	20.0	21.9	25.2	22.4	23.8	22.6	20.8	21.7	18.8	17.1	18.0
21	26.2	22.9	24.6	22.9	21.4	22.2	23.7	20.8	22.2	18.6	16.4	17.6
22	27.1	24.9	25.8	24.5	21.9	23.0	24.6	21.3	22.8	19.8	17.0	18.5
23	26.5	24.3	25.5	25.7	22.7	24.1	24.9	21.7	23.2	19.7	18.0	18.8
24	25.7	23.4	24.7	27.5	24.0	25.7	25.3	22.3	23.7	18.2	16.3	17.1
25	25.4	23.5	24.3	27.4	24.2	25.8	23.9	23.1	23.5	17.1	14.6	16.0
26	23.5	21.2	22.3	26.6	24.1	25.3	25.3	22.4	23.6	18.0	15.8	17.0
27	23.1	20.0	21.6	26.5	24.3	25.6	24.5	23.0	23.8	19.0	17.6	18.3
28	24.2	20.7	22.5	27.6	24.7	26.2	25.5	23.2	24.2	18.9	18.1	18.5
29	26.1	22.5	24.4	27.3	25.2	26.2	25.3	22.7	24.0	18.5	17.6	18.0
30	27.3	24.7	25.9	27.0	24.6	25.8	25.0	21.9	23.3	17.7	16.4	17.1
31	---	---	---	26.6	24.3	25.5	25.5	22.1	23.5	---	---	---
Month	27.3	16.6	21.6	29.7	21.4	25.7	28.3	20.8	24.4	25.7	14.6	20.0

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

DISSOLVED OXYGEN, WATER, UNFILTERED, MILLIGRAMS PER LITER
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	October			November			December			January		
1	9.5	8.9	9.2	12.0	11.5	11.8	11.8	11.0	11.5	---	---	---
2	9.9	9.2	9.6	12.1	11.4	11.7	12.4	11.8	12.1	---	---	---
3	10.4	9.9	10.1	12.1	11.3	11.6	12.7	12.1	12.4	---	---	---
4	10.8	10.0	10.3	11.8	11.0	11.4	12.8	12.3	12.6	---	---	---
5	10.7	10.1	10.4	12.3	11.2	11.7	---	---	---	---	---	---
6	10.8	10.0	10.4	12.8	11.7	12.2	---	---	---	---	---	---
7	11.2	10.3	10.7	12.6	11.7	12.1	---	---	---	---	---	---
8	11.3	10.5	10.8	12.2	11.3	11.7	---	---	---	---	---	---
9	11.2	10.2	10.6	12.1	11.0	11.5	---	---	---	---	---	---
10	11.4	9.9	10.5	11.3	10.7	11.0	---	---	---	---	---	---
11	11.4	9.6	10.4	12.0	10.5	11.3	---	---	---	---	---	---
12	10.6	9.4	9.9	12.7	11.5	12.1	---	---	---	---	---	---
13	10.0	9.4	9.7	12.9	11.6	12.2	---	---	---	---	---	---
14	9.7	8.9	9.3	12.3	11.1	11.7	---	---	---	---	---	---
15	9.6	9.1	9.4	11.1	10.2	10.6	---	---	---	---	---	---
16	10.3	9.5	9.9	10.4	10.0	10.2	---	---	---	---	---	---
17	10.3	9.7	9.9	10.8	10.0	10.3	---	---	---	---	---	---
18	10.7	9.7	10.1	12.2	10.8	11.7	---	---	---	---	---	---
19	10.0	9.3	9.7	13.1	12.0	12.5	---	---	---	---	---	---
20	9.5	9.1	9.3	12.8	11.7	12.3	---	---	---	---	---	---
21	10.3	9.4	9.9	11.7	11.1	11.4	---	---	---	---	---	---
22	11.0	10.1	10.5	11.1	10.7	10.9	---	---	---	---	---	---
23	11.2	10.4	10.8	10.7	9.6	10.0	---	---	---	---	---	---
24	11.4	10.5	10.9	11.4	10.0	11.1	---	---	---	---	---	---
25	11.2	10.3	10.7	11.8	11.4	11.6	---	---	---	---	---	---
26	11.3	10.3	10.8	12.0	11.5	11.7	---	---	---	---	---	---
27	10.7	10.0	10.3	11.9	11.3	11.6	---	---	---	---	---	---
28	11.5	10.1	10.8	11.5	10.8	11.2	---	---	---	---	---	---
29	11.8	10.8	11.2	10.8	10.2	10.6	---	---	---	---	---	---
30	12.5	11.8	12.2	11.0	10.1	10.6	---	---	---	---	---	---
31	12.5	11.9	12.2	---	---	---	---	---	---	---	---	---
Month	12.5	8.9	10.3	13.1	9.6	11.4	12.8	11.0	12.2	---	---	---

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

DISSOLVED OXYGEN, WATER, UNFILTERED, MILLIGRAMS PER LITER
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	February			March			April			May		
1	---	---	---	12.2	11.8	12.1	13.7	10.6	12.0	12.4	9.9	11.0
2	---	---	---	13.0	11.8	12.3	13.3	10.6	12.0	10.9	9.0	9.9
3	---	---	---	13.0	11.7	12.3	13.4	10.3	11.9	11.7	9.5	10.5
4	---	---	---	13.3	11.5	12.3	13.0	10.0	11.5	11.6	9.3	10.4
5	---	---	---	14.1	12.1	13.1	13.0	9.8	11.4	9.7	8.4	8.6
6	---	---	---	14.7	12.7	13.6	13.1	10.0	11.6	9.4	8.4	8.8
7	---	---	---	14.5	12.6	13.5	13.3	10.3	11.8	9.7	8.7	9.3
8	---	---	---	13.6	11.4	12.5	13.3	10.4	11.8	9.9	9.1	9.5
9	---	---	---	13.2	10.3	11.8	12.8	10.1	11.4	9.6	8.8	9.2
10	---	---	---	14.2	11.3	12.8	12.7	9.9	11.3	9.8	8.6	9.2
11	---	---	---	14.5	12.1	13.3	13.3	10.3	11.7	10.3	9.0	9.6
12	---	---	---	14.3	11.7	13.0	13.3	10.7	12.0	10.6	9.1	9.7
13	---	---	---	13.4	10.8	12.1	13.8	10.9	12.3	10.4	8.8	9.4
14	---	---	---	13.0	9.8	11.4	13.6	10.5	12.0	9.4	8.2	8.8
15	---	---	---	13.3	9.9	11.6	12.8	9.8	11.2	9.0	8.4	8.6
16	---	---	---	12.8	9.9	11.3	12.0	8.9	10.4	8.8	8.2	8.5
17	---	---	---	13.4	10.2	11.8	11.3	8.0	9.7	9.2	8.0	8.6
18	---	---	---	12.8	9.7	11.2	10.6	8.3	9.4	9.8	8.2	8.9
19	---	---	---	13.3	9.9	11.5	12.1	9.2	10.5	10.2	8.3	9.2
20	---	---	---	12.5	9.3	10.9	11.8	9.0	10.4	10.4	8.1	9.2
21	---	---	---	11.9	8.9	10.4	11.4	8.5	9.9	9.8	7.8	8.7
22	---	---	---	12.6	9.1	10.8	9.6	8.0	8.9	10.6	8.0	9.2
23	---	---	---	13.1	9.3	11.2	10.4	9.4	10.0	11.5	8.1	9.7
24	---	---	---	10.9	8.9	10.0	11.0	10.3	10.6	10.7	7.5	8.9
25	14.5	11.5	12.9	12.3	9.5	10.7	11.2	10.1	10.6	10.0	7.2	8.5
26	15.4	12.7	14.0	13.0	10.0	11.6	11.0	9.8	10.4	10.0	7.1	8.2
27	15.3	12.7	14.0	13.9	10.7	12.3	11.5	10.0	10.7	9.6	6.7	8.0
28	15.1	12.2	13.7	13.6	11.0	12.4	12.1	10.3	11.2	9.5	6.7	7.9
29	13.3	12.0	12.5	13.6	10.4	12.1	12.4	10.6	11.4	9.1	6.5	7.5
30	---	---	---	14.1	10.7	12.4	12.1	10.0	11.2	7.8	6.7	7.1
31	---	---	---	12.5	10.4	11.2	---	---	---	8.6	6.9	7.7
Month	15.4	11.5	13.4	14.7	8.9	11.9	13.8	8.0	11.0	12.4	6.5	9.0

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

DISSOLVED OXYGEN, WATER, UNFILTERED, MILLIGRAMS PER LITER
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	June			July			August			September		
1	9.0	7.1	7.9	9.9	6.7	8.0	10.5	6.6	8.4	10.9	6.9	8.5
2	8.1	7.3	7.9	9.9	6.5	7.8	10.9	6.8	8.6	8.6	6.9	7.5
3	8.6	7.9	8.2	10.5	6.7	8.1	11.1	6.6	8.4	7.9	7.0	7.6
4	8.9	7.9	8.4	10.3	6.6	8.0	10.8	6.3	8.2	7.9	7.3	7.6
5	9.5	8.3	8.9	10.2	6.3	7.8	11.1	6.0	8.1	8.3	7.0	7.5
6	10.0	8.6	9.2	10.1	6.1	7.7	10.0	6.5	7.9	8.7	7.0	7.7
7	10.0	8.7	9.3	10.2	6.2	7.7	10.7	6.1	8.2	9.2	7.4	8.1
8	10.2	8.4	9.2	9.7	6.0	7.6	11.4	6.2	8.5	9.0	7.1	7.8
9	10.3	8.1	9.1	10.3	6.2	7.9	10.8	6.3	8.3	8.9	7.3	8.0
10	10.5	7.9	9.1	10.1	6.3	7.9	10.0	6.0	7.6	9.4	7.7	8.4
11	10.4	7.7	9.0	10.6	6.2	8.2	10.1	6.4	8.0	10.2	8.2	9.0
12	8.5	7.4	7.9	11.1	6.5	8.4	9.2	6.8	7.9	10.7	8.6	9.4
13	9.0	8.1	8.4	11.2	6.6	8.4	9.8	6.6	7.8	10.9	8.6	9.5
14	9.2	7.7	8.5	8.8	6.5	7.6	9.5	6.5	7.7	11.1	8.5	9.5
15	9.4	7.8	8.6	9.9	7.1	8.2	9.5	7.2	8.3	10.8	8.4	9.3
16	9.9	8.1	8.9	9.4	6.9	8.0	10.2	6.9	8.2	11.2	8.4	9.5
17	9.9	7.9	8.8	10.1	6.6	8.0	10.8	6.8	8.5	11.5	8.7	9.7
18	10.1	8.3	9.2	10.2	6.1	7.7	8.9	7.2	7.9	9.2	8.4	8.8
19	10.5	8.7	9.5	8.7	6.6	7.7	9.5	7.1	8.2	8.9	8.2	8.5
20	10.6	8.4	9.3	8.1	6.8	7.5	10.5	7.5	8.8	9.8	8.4	9.0
21	10.0	7.6	8.6	10.5	7.4	8.8	11.0	7.6	8.9	10.2	8.8	9.4
22	9.6	6.9	8.0	10.7	7.7	8.9	11.3	7.5	9.0	10.3	8.7	9.3
23	9.4	6.8	7.9	10.9	7.4	8.8	11.4	7.4	9.0	10.0	8.4	9.1
24	9.9	6.9	8.2	10.8	6.9	8.5	11.5	7.4	9.0	10.7	8.8	9.6
25	9.9	7.0	8.2	10.8	6.6	8.3	10.1	7.1	8.5	11.2	9.4	10.1
26	10.2	7.3	8.6	11.2	6.8	8.5	11.4	7.1	8.8	11.3	9.3	10.1
27	10.8	7.8	9.0	10.4	7.0	8.4	9.4	7.1	8.0	10.6	8.9	9.6
28	10.9	7.8	9.0	10.5	6.7	8.3	9.7	6.9	8.0	10.4	8.3	9.2
29	10.4	7.4	8.6	10.9	6.5	8.3	9.9	6.8	8.0	10.5	8.5	9.3
30	9.8	6.8	7.9	10.9	6.5	8.4	10.6	7.0	8.4	10.9	8.7	9.7
31	---	---	---	11.1	6.7	8.5	10.9	7.2	8.5	---	---	---
Month	10.9	6.8	8.6	11.2	6.0	8.1	11.5	6.0	8.3	11.5	6.9	8.9

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

TURBIDITY, WATER, UNFILT, NEAR IR LED LIGHT, 780-900 NM, DETECT ANG. 90 DEG, FORMAZIN NEPHELOMETRIC UNITS
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	October			November			December			January		
1	20	5.9	9.0	4.3	2.7	3.4	35	7.8	16	2.9	1.9	2.4
2	---	---	---	3.5	1.9	2.7	11	4.5	6.5	2.6	1.7	2.0
3	---	---	---	4.9	1.8	2.4	4.7	2.0	2.5	2.6	1.6	1.9
4	---	---	---	3.9	1.8	2.3	9.2	1.8	4.2	2.5	1.6	1.9
5	2.3	0.6	1.4	3.2	1.7	2.1	11	1.0	3.0	2.1	1.6	1.7
6	2.3	0.3	1.3	3.7	1.5	1.9	10	3.7	5.1	2.4	1.4	1.7
7	2.9	0.1	1.0	2.9	1.2	1.8	110	3.6	16	2.2	1.4	1.7
8	1.9	0.1	0.8	2.1	1.1	1.6	110	59	89	1.9	1.4	1.6
9	2.2	0.2	1.0	2.8	1.3	1.8	59	7.2	22	2.0	1.3	1.5
10	2.4	0.1	0.7	3.0	1.6	2.0	7.3	3.9	5.2	1.9	1.3	1.5
11	1.8	0.0	0.7	2.5	1.7	2.1	4.4	2.7	3.3	1.8	1.0	1.2
12	2.7	0.5	1.4	3.3	1.6	1.8	3.1	2.3	2.6	120	1.8	59
13	5.0	1.0	2.5	3.7	1.6	2.0	2.7	1.9	2.3	44	10	23
14	150	1.0	35	3.5	1.8	2.3	5.2	2.0	2.8	11	3.3	6.0
15	70	28	48	5.0	2.5	3.3	4.8	2.0	2.4	3.7	2.5	3.0
16	42	5.5	16	12	2.6	4.1	3.2	2.1	2.4	2.7	0.0	2.2
17	5.6	1.5	3.4	18	9.1	13	14	1.9	3.8	5.2	2.0	2.8
18	3.2	0.9	1.8	10	6.5	7.9	2.8	1.8	2.1	9.5	3.3	5.6
19	6.2	1.8	3.1	7.8	5.1	6.2	2.3	1.7	1.9	3.7	2.4	2.8
20	19	6.2	8.6	7.5	4.9	5.8	2.5	1.7	1.9	3.7	2.1	2.4
21	7.4	2.7	5.0	6.9	3.3	5.9	3.2	1.7	2.1	3.9	2.1	2.7
22	3.4	1.8	2.4	88	2.7	9.0	2.9	2.1	2.5	4.5	2.2	3.2
23	2.5	1.3	1.7	240	88	120	100	2.7	63	8.3	2.5	3.7
24	1.8	0.9	1.3	100	16	49	58	11	32	10	5.9	7.9
25	2.6	0.6	1.1	16	6.3	9.4	11	3.2	5.7	6.2	3.7	4.8
26	2.2	0.0	0.9	6.5	4.1	5.1	4.0	2.3	2.8	3.9	2.4	3.0
27	18	0.6	2.4	5.5	3.0	3.8	100	1.9	18	16	2.4	6.1
28	4.9	0.7	2.8	4.7	2.6	3.4	130	42	79	21	10	16
29	8.8	0.8	3.9	52	3.4	9.4	42	6.7	17	11	3.1	6.1
30	11	4.1	6.7	55	35	44	6.7	3.6	4.6	4.7	1.5	2.5
31	5.6	3.7	4.5	---	---	---	3.7	2.4	2.9	2.5	1.1	1.6
Month	150	0.0	6.0	240	1.1	11	130	1.0	14	120	0.0	5.9

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

TURBIDITY, WATER, UNFILT, NEAR IR LED LIGHT, 780-900 NM, DETECT ANG. 90 DEG, FORMAZIN NEPHELOMETRIC UNITS
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	February			March			April			May		
1	4.2	0.9	1.4	62	24	39	---	---	---	3.3	1.8	2.3
2	3.3	0.7	1.3	24	5.5	12	6.0	1.8	2.7	3.6	1.9	2.6
3	2.1	0.7	1.2	5.6	2.7	3.6	15	1.6	4.0	5.4	1.9	2.5
4	3.8	0.7	1.6	5.2	2.0	2.5	11	2.0	3.6	29	1.9	4.0
5	3.7	0.9	2.2	2.5	1.6	1.9	7.8	1.5	3.3	76	21	38
6	6.8	0.9	2.6	1.8	1.4	1.6	---	---	---	23	3.9	9.3
7	6.8	1.0	2.9	1.9	1.3	1.6	---	---	---	6.4	3.1	4.1
8	6.1	0.8	2.6	2.6	1.5	1.8	6.8	1.0	2.0	4.7	2.3	3.3
9	1.2	0.8	1.0	3.6	2.1	2.7	3.3	1.0	1.8	6.3	3.2	4.0
10	1.3	0.8	1.0	5.6	2.0	3.0	8.9	1.0	3.4	5.1	2.6	3.6
11	1.6	0.9	1.1	5.2	0.8	2.6	12	0.8	4.2	4.6	2.1	2.8
12	1.7	1.0	1.3	1.5	0.7	0.9	2.5	1.3	1.7	4.1	1.7	2.7
13	1.9	1.0	1.2	1.1	0.7	0.8	3.7	1.3	2.1	4.1	1.7	2.6
14	1.5	0.9	1.1	1.1	0.7	0.8	---	---	---	4.0	1.7	2.6
15	1.4	0.9	1.1	1.2	0.6	0.8	---	---	---	48	2.9	18
16	2.5	0.9	1.1	1.0	0.6	0.7	---	---	---	39	19	26
17	1.5	1.0	1.1	1.1	0.4	0.6	11	2.9	5.3	19	7.8	11
18	1.8	0.9	1.2	0.8	0.4	0.5	7.3	2.9	4.0	9.1	6.6	7.6
19	2.0	1.0	1.2	0.6	0.3	0.5	11	4.7	5.7	8.6	5.1	6.5
20	1.5	0.9	1.2	3.5	0.3	0.7	18	4.2	6.0	9.4	6.6	7.5
21	1.7	0.9	1.2	3.8	0.4	1.3	5.8	3.0	4.0	10	7.1	8.0
22	2.0	0.9	1.4	2.3	1.2	1.7	97	4.5	12	10	4.7	6.7
23	5.1	1.3	2.0	3.4	1.4	2.1	---	---	---	12	6.3	7.9
24	5.2	1.0	1.7	4.7	2.2	3.1	---	---	---	24	9.5	19
25	1.7	1.0	1.1	5.6	1.7	3.3	7.1	2.5	3.9	26	14	20
26	1.1	0.7	0.9	7.2	1.4	3.3	3.2	1.9	2.6	30	15	20
27	1.0	0.8	0.9	10	1.7	4.5	3.2	2.0	2.6	20	6.5	12
28	1.3	0.8	1.0	12	0.9	2.8	3.1	1.6	2.1	6.8	4.4	5.4
29	62	1.0	1.3	2.6	1.3	1.8	2.7	1.5	1.9	6.8	3.4	5.5
30	---	---	---	9.8	1.9	3.5	5.2	1.6	2.3	10	3.3	5.2
31	---	---	---	---	---	---	---	---	---	4.4	2.3	3.4
Month	62	0.7	1.8	62	0.3	3.5	97	0.8	3.7	76	1.7	8.8

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

TURBIDITY, WATER, UNFILT, NEAR IR LED LIGHT, 780-900 NM, DETECT ANG. 90 DEG, FORMAZIN NEPHELOMETRIC UNITS
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	June			July			August			September		
1	13	2.1	3.4	3.0	1.4	2.0	1.3	0.2	0.6	2.3	0.5	0.9
2	160	7.7	72	2.7	1.2	1.7	1.1	0.2	0.6	2.3	0.5	0.9
3	38	9.2	18	2.3	1.2	1.7	5.0	0.0	1.1	860	1.0	140
4	9.3	4.7	6.5	2.5	1.2	1.7	1.2	0.2	0.7	410	10	37
5	7.0	3.5	4.9	2.0	0.9	1.4	1.9	0.2	0.5	---	---	---
6	5.3	2.5	3.7	1.9	0.8	1.2	2.1	0.6	1.3	---	---	---
7	4.2	2.1	3.1	1.8	0.7	1.1	2.0	0.6	1.1	2.7	1.2	1.9
8	4.3	2.1	3.0	1.7	0.7	1.1	1.8	0.5	0.9	2.8	1.2	2.0
9	4.8	1.8	2.9	1.5	0.6	1.0	1.3	0.1	0.7	6.3	1.7	3.1
10	3.8	1.9	2.7	1.4	0.7	1.0	3.4	0.3	0.8	5.2	1.3	2.4
11	5.3	1.5	2.2	2.0	0.7	1.0	2.6	0.5	1.1	4.2	1.0	1.8
12	28	1.6	4.6	1.7	0.6	1.0	18	1.0	4.7	5.2	0.9	1.7
13	71	8.2	29	4.9	0.5	1.5	3.1	1.1	1.9	5.0	0.9	1.7
14	8.6	4.0	5.5	19	0.9	4.3	5.1	1.0	2.1	4.5	0.9	1.5
15	17	3.2	6.5	6.0	2.4	3.7	3.7	1.1	2.0	2.2	0.9	1.4
16	8.1	3.2	4.5	5.5	2.9	3.9	2.5	0.7	1.4	2.8	0.7	1.2
17	4.3	2.1	3.2	---	---	---	2.1	0.4	1.0	53	0.8	2.4
18	4.9	1.8	2.5	---	---	---	18	1.3	5.8	180	1.3	9.8
19	3.2	1.4	2.2	1.8	0.4	0.9	5.6	1.0	1.9	310	31	69
20	4.2	1.6	2.2	3.8	1.1	1.9	2.6	0.5	1.1	---	---	---
21	4.7	1.4	2.2	2.9	1.0	1.7	1.7	0.3	0.9	4.4	1.8	2.7
22	3.0	1.3	2.0	2.0	0.6	1.1	2.0	0.2	0.8	14	1.6	3.6
23	3.4	1.4	2.2	2.3	0.5	1.0	1.6	0.4	0.8	5.8	1.3	3.1
24	2.6	1.0	1.7	3.5	0.4	0.9	2.6	0.4	0.9	2.9	0.9	1.8
25	2.8	0.9	1.5	3.5	0.4	0.9	1.3	0.4	0.8	3.2	0.9	1.6
26	2.3	0.8	1.4	1.3	0.3	0.7	1.5	0.4	0.8	2.4	0.8	1.5
27	2.1	0.6	1.3	11	0.5	1.3	7.3	0.9	2.7	7.3	1.3	2.6
28	2.1	0.7	1.3	1.3	0.4	0.9	58	1.3	4.0	3.8	1.4	2.4
29	2.9	1.0	1.6	1.3	0.3	0.7	4.7	1.2	2.2	2.9	0.9	1.6
30	2.4	1.2	1.7	1.1	0.2	0.6	2.2	0.6	1.1	3.0	1.2	1.8
31	---	---	---	2.1	0.1	0.6	1.5	0.4	0.9	---	---	---
Month	160	0.6	6.7	19	0.1	1.5	58	0.0	1.5	860	0.5	11

	Max	Min	Mean
Year	860	0.0	6.3

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

CLIMATOLOGICAL RECORDS

PERIOD OF RECORD.--October 2005 to current year.

INSTRUMENTATION.--Precipitation gage interfaced with data collection platform.

REMARKS.--Record is good.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
DAILY SUM VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.06	0.00	0.00	0.04	0.01	0.01	0.16	0.07	1.11	0.00	0.15	0.00
2	0.48	0.00	0.00	0.00	0.00	0.12	0.15	0.06	0.03	0.00	0.00	0.30
3	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.16	0.10	0.00	1.07	2.34
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.24	0.01	0.00	1.39
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.32	0.02
6	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	1.94	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
8	0.00	0.00	0.04	0.00	0.01	0.01	0.00	0.08	0.00	0.00	0.00	0.37
9	0.00	0.00	0.00	0.00	0.11	0.04	0.00	0.93	0.00	0.00	0.00	0.00
10	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.03	0.72	0.00
11	0.00	0.00	0.00	0.46	0.22	0.00	0.01	0.00	0.00	0.00	0.07	0.00
12	0.29	0.00	0.00	0.92	0.00	0.00	0.00	0.00	1.93	0.00	0.00	0.00
13	0.06	0.00	0.00	0.08	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
14	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.65	0.70	0.00
15	0.00	0.00	0.07	0.00	0.00	0.00	0.01	0.68	0.00	0.35	0.06	0.00
16	0.00	0.70	0.00	0.05	0.15	0.00	0.00	0.06	0.00	0.00	0.00	0.00
17	0.00	0.01	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.00	0.00	0.00	0.59	1.38
19	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.02	0.05	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.06	0.00
21	0.00	0.03	0.16	0.00	0.00	0.00	0.07	0.16	0.00	0.01	0.00	0.01
22	0.00	1.42	0.27	0.01	0.00	0.00	1.87	0.01	0.20	0.00	0.00	1.29
23	0.00	0.97	1.15	0.58	0.00	0.00	0.26	0.02	0.00	0.01	0.00	0.00
24	0.00	0.00	0.00	0.00	0.29	0.16	0.00	0.04	0.00	0.00	0.00	0.00
25	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.01	0.15	0.00	0.00	0.29	0.17	0.00
27	0.19	0.00	1.01	0.33	0.00	0.00	0.01	0.00	0.00	0.01	0.93	0.24
28	0.03	0.04	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.14	0.02
29	0.99	1.06	0.00	0.00	1.21	0.00	0.00	0.19	0.22	0.02	0.00	0.00
30	0.25	0.00	0.00	0.00	---	0.00	0.00	0.03	0.08	0.00	0.00	0.00
31	0.00	---	0.00	0.00	---	0.19	---	0.00	---	0.00	0.00	---
Total	3.04	4.37	4.89	2.75	2.01	0.75	3.06	3.41	3.93	2.13	5.21	7.36

UPDATE REVISION TO CHADDS FORD TOWNSHIP'S
SEWAGE FACILITIES MANAGEMENT (ACT 537) PLAN

APPENDIX III

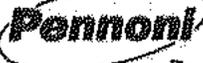
Flow Charts

- F-1 Springhill Farm Service Area
- F-2 Ridings Service Area
- F-3 Knight's Bridge Service Area
- F-4 Turners Mill Service Area

SPRINGHILL FARM
SUBDIVISION

GLEN EAGLE
SQUARE SHOPPING
CENTER

SPRINGHILL
FARM STP



Pennoni Associates Inc.
3001 Market Street, Suite 200
Philadelphia, PA 19104

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AW

CHECKED BY:
LN

JOB No.
CFTP0570

SCALE:
N.T.S.

DATE:
11/22/13

SKETCH No.

F-1

CHADDS FORD TOWNSHIP ACT 537 PLAN UPDATE
SPRING HILL FARM SERVICE AREA

SMITHBRIDGE
PUMP STATION

ECKMAN
PUMP STATION

WOODLAND DRIVE
PUMP STATION

RIDINGS
STP

Pennoni

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CFTP0570

SCALE:
N.T.S.

DATE:
11/22/13

SKETCH No.

F-2

CHADDS FORD TOWNSHIP ACT 537 PLAN UPDATE

RIDINGS SERVICE AREA

CHADDS FORD
BUSINESS
CAMPUS

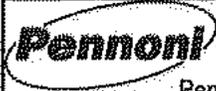


HENDERSON
PUMP STATION

VILLAGE AT
PAINTER'S CROSSING
SHOPPING CENTER



KNIGHTS
BRIDGE
STP



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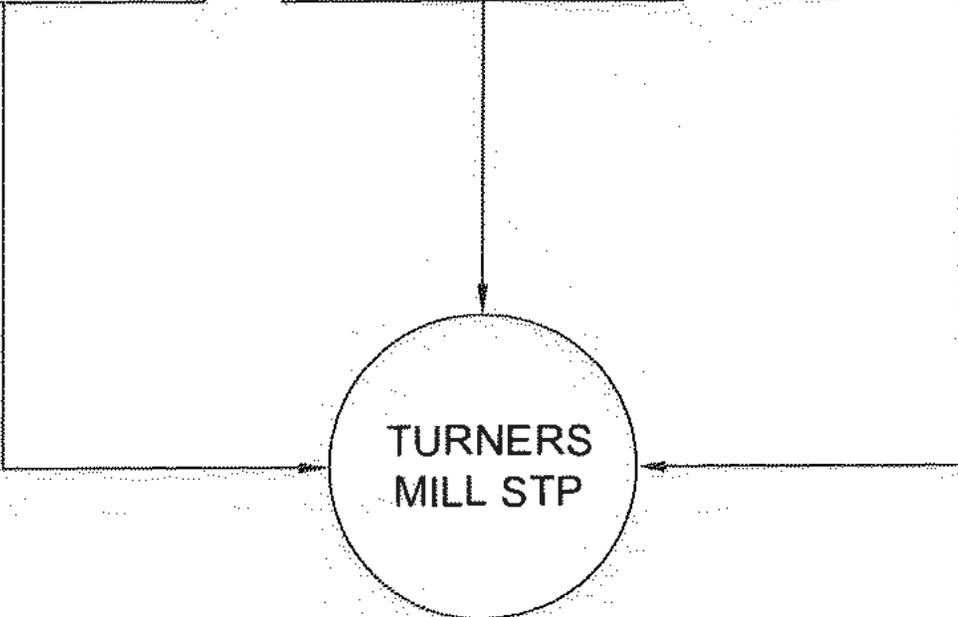
F-3

CHADDS FORD TOWNSHIP ACT 537 PLAN UPDATE
KNIGHT'S BRIDGE SERVICE AREA

BALTIMORE PIKE
LOW PRESSURE
SEWER SYSTEM

ESTATES AT
CHADDS FORD
PUMP STATION

PAINTERS
CROSSING
PUMP STATION



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F-4

CHADDS FORD TOWNSHIP ACT 537 PLAN UPDATE
TURNERS MILL SERVICE AREA

UPDATE REVISION TO CHADDS FORD TOWNSHIP'S
SEWAGE FACILITIES MANAGEMENT (ACT 537) PLAN

APPENDIX IV

Chadds Ford Township Comprehensive Plan

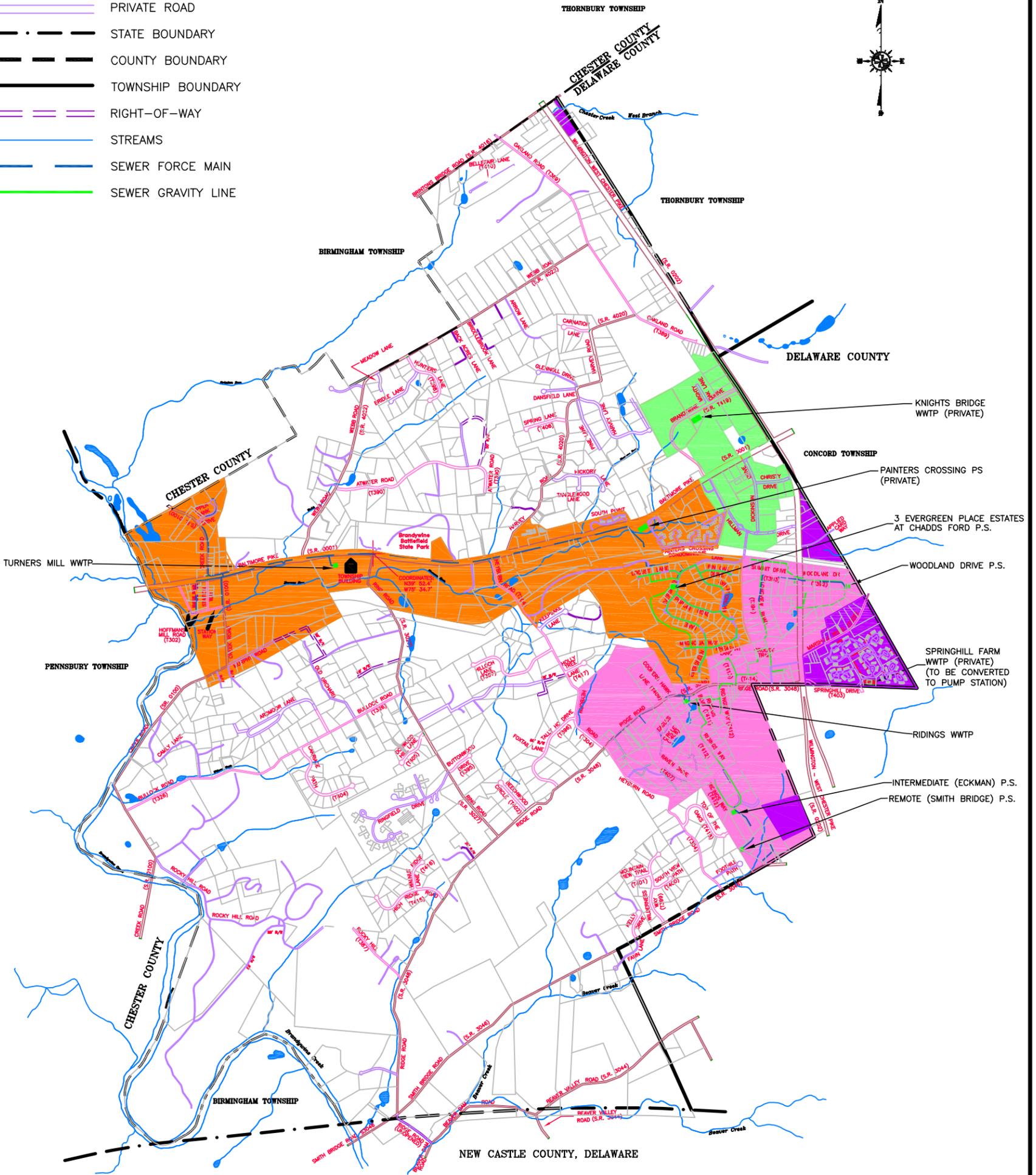
UPDATE REVISION TO CHADDS FORD TOWNSHIP'S
SEWAGE FACILITIES MANAGEMENT (ACT 537) PLAN

APPENDIX V

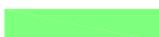
Alternative 1 – Sewer Service Map

LEGEND

-  STATE ROAD
-  TOWNSHIP ROAD
-  PRIVATE ROAD
-  STATE BOUNDARY
-  COUNTY BOUNDARY
-  TOWNSHIP BOUNDARY
-  RIGHT-OF-WAY
-  STREAMS
-  SEWER FORCE MAIN
-  SEWER GRAVITY LINE



SERVICE AREAS

-  KNIGHTS BRIDGE SERVICE AREA
-  TURNERS MILL SERVICE AREA
-  RIDINGS SERVICE AREA
-  TO CONCORD SERVICE AREA

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ALTERNATIVE 1

CHADDS FORD TOWNSHIP SEWER AUTHORITY
 CHADDS FORD, PENNSYLVANIA

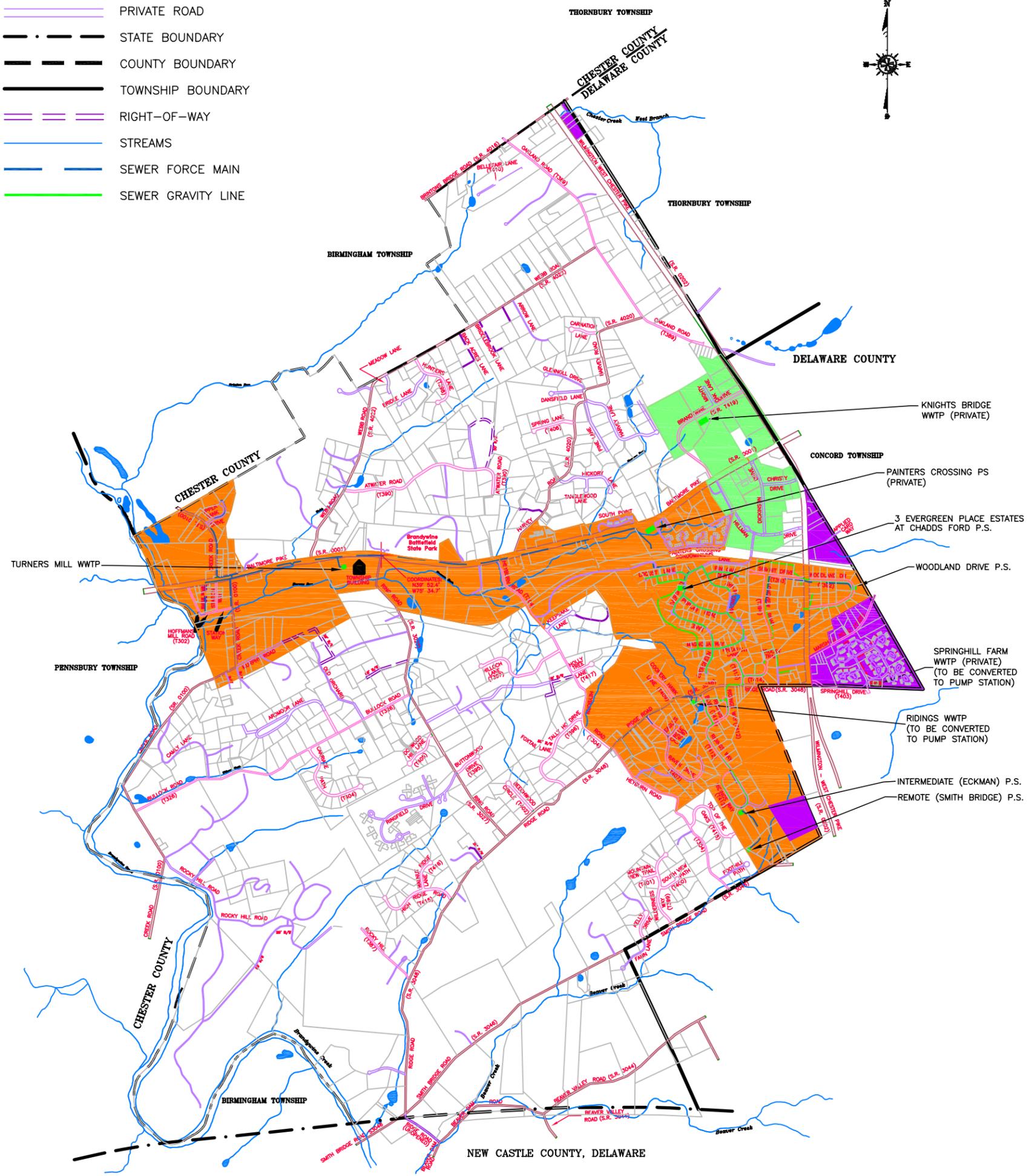
UPDATE REVISION TO CHADDS FORD TOWNSHIP'S
SEWAGE FACILITIES MANAGEMENT (ACT 537) PLAN

APPENDIX VI

Alternative 2 – Sewer Service Map

LEGEND

-  STATE ROAD
-  TOWNSHIP ROAD
-  PRIVATE ROAD
-  STATE BOUNDARY
-  COUNTY BOUNDARY
-  TOWNSHIP BOUNDARY
-  RIGHT-OF-WAY
-  STREAMS
-  SEWER FORCE MAIN
-  SEWER GRAVITY LINE



SERVICE AREAS

-  KNIGHTS BRIDGE SERVICE AREA
-  TURNERS MILL SERVICE AREA
-  TO CONCORD SERVICE AREA

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 CHADDS FORD TOWNSHIP SEWER AUTHORITY
 CHADDS FORD, PENNSYLVANIA