

COMMONWEALTH OF PENNSYLVANIA
BEFORE THE PENNSYLVANIA PUBLIC
UTILITY COMMISSION

In the Matter of: Application of	:	
PPL Electric Utilities Corporation	:	
Filed Pursuant to 52 PA. Code	:	
Chapter 57, Subchapter G, for	:	
Approval of the Siting and	:	Docket No. A- 2008-2022941
Reconstruction of the Proposed	:	
Coopersburg #1 and #2 138/69 kV	:	
TAP in Upper Saucon Township,	:	
Lehigh County and Springfield	:	
and Richland Townships, Bucks	:	
County, Pennsylvania	:	
Petition of PPL Electric Utilities	:	
Corporation for a Finding that a	:	
Building to Shelter Control	:	
Equipment at the Substation to be	:	Docket No. P-2008-2038262
Constructed in Springfield	:	
Township, Bucks County,	:	
Pennsylvania is Reasonably	:	
Necessary for the Convenience	:	
or Welfare of the Public	:	

**DIRECT TESTIMONY
AND EXHIBITS OF
ANN F. RHOADS Ph.D.**

**On Behalf of Springfield Township,
Bucks County, PA**

August 18, 2008

1 Q. PLEASE STATE YOUR NAME, AFFILIATION AND BUSINESS ADDRESS.

2 A. Ann F. Rhoads, Ph.D., Morris Arboretum of the University of Pennsylvania, 100
3 Northwestern Avenue, Philadelphia, PA 19118

4
5 Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND.

6 A. I am a graduate of Trenton State College, where I received a Bachelor's of Science
7 Degree. I have a Master's Degree from Trenton State College and a Ph.D. from Rutgers –
8 The State University of New Jersey.

9
10 Q. PLEASE DESCRIBE YOUR PROFESSIONAL EXPERIENCE.

11 A. I have been employed by the Morris Arboretum of the University of Pennsylvania since
12 1976. From 1976 through 2000, I was Chair of Botany and Director of the Pennsylvania
13 Flora Project. I am currently Senior Botanist for the Pennsylvania Flora Project of the
14 Morris Arboretum. In addition, I am an Adjunct Professor in the Biology Department of
15 the University of Pennsylvania and a Research Associate at the Academy of Natural
16 Sciences of Philadelphia. My responsibilities include conducting research on the Flora of
17 Pennsylvania and preparing major publications on the state flora, conducting field
18 surveys of rare and endangered plant species throughout Eastern Pennsylvania,
19 conducting vegetation inventories for the Pennsylvania Bureau of State Parks, teaching
20 courses in plant systematics and field botany at the University of Pennsylvania..

21

22

1 Q. DESCRIBE RELEVANT PROFESSIONAL ACTIVITIES IN WHICH YOU ENGAGE.

2 A. I have served on the Ecosystem Management Advisory Committee, Pennsylvania
3 Department of Conservation and Natural Resources, Bureau of Forestry, since 1996, and
4 the Pennsylvania Biological Survey where I was President from 1998 through 2001. I
5 also served as a member of the Biodiversity Technical Committee and as Chair of the
6 Vascular Plants Technical Committee.

7

8 Q. TO WHAT PROFESSIONAL SOCIETIES DO YOU BELONG?

9 A. The American Association for the Advancement of Science, the Pennsylvania Academy
10 of Science and the Pennsylvania Biological Survey.

11

12 Q. HAVE YOU ALSO PUBLISHED IN THE AREA OF PLANT BIOLOGY IN
13 GENERAL AND BUCKS COUNTY IMPORTANT NATURAL AREAS IN
14 PARTICULAR?

15 A. Yes. A list of my publications is provided in my Curriculum Vitae attached to my
16 testimony as Exhibit AFR-1. There are many publications listed there. Of particular
17 relevance to my testimony is a document I prepared with Timothy A. Block in 1999 titled
18 “A Natural Areas Inventory of Bucks County, Pennsylvania.” This document continues
19 to be used by the County of Bucks in determining significant natural areas worthy of
20 preservation through the Bucks County Open Space Program. It is also utilized by the
21 Pennsylvania Department of Conservation and Natural Resources when evaluating
22 properties worthy of preservation.

1 Q. ARE THERE ANY PROPERTIES WITHIN THE CORRIDOR OF THE PROPOSED
2 “CROSS COUNTRY” TRANSMISSION LINE ROUTE PROPOSED BY PPL WHICH
3 HAVE BEEN PRESERVED THROUGH THE BUCKS COUNTY OPEN SPACE
4 PROGRAM?

5 A. Yes, Veterans Park on East Pumping Station Road in Richland Township (Tax Parcel #
6 36-005-136) was purchased in part with county open space funds. It is my understanding
7 that PPL was required to route the proposed transmission line around this property due to
8 the existence of a Conservation Easement on the property. However, other properties in
9 the proposed “Cross Country” corridor possess natural areas of equal or greater
10 significance to the property on which Bucks County holds a Conservation Easement.

11
12 Q. HAVE YOU GIVEN EXPERT TESTIMONY IN ANY JUDICIAL OR QUASI-
13 JUDICIAL PROCEEDINGS?

14 A. Yes, I gave testimony at a Zoning Hearing Board proceeding in Tinicum Township,
15 Bucks County in late 2007 or early 2008. I have also submitted depositions in several
16 court proceedings which involved botanical evidence.

17
18 Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

19 A. The purpose of my testimony, on behalf of Springfield Township is:

20 (1) To identify rare plants within the proposed PPL “Cross Country” transmission
21 line corridor;

22 (2) To evaluate the impacts of construction of the proposed “Cross Country” corridor
23 with respect to habitat fragmentation and invasive species proliferation; and

1 (3) To provide an opinion concerning the relative value of the natural areas through
2 which the proposed “Cross Country” route would pass.

3
4 Q. ON WHAT INFORMATION IS YOUR TESTIMONY BASED?

5 A. I have reviewed maps overlaying the proposed “Cross Country” route and alternative
6 routes onto 2005 aerial photography provided by the Delaware Valley Regional Planning
7 Commission and the National Wetlands Inventory polygons for this area. I am familiar
8 with what has been referred to as the “Route 309 Forest” and the natural areas through
9 which all three transmission line corridors would pass from my previous work. In
10 addition, where accessible, the “Cross Country” corridor and adjacent areas were walked
11 to search for plant species listed as endangered, threatened, rare, vulnerable, tentatively
12 undetermined, or watch list by the Pennsylvania Natural Heritage Program. Also, I
13 inspected areas within the corridor for the presence of plants and/or sites indicated by the
14 Pennsylvania Natural Diversity Inventory (“PNDI”) review.

15
16 Q. WHAT IS THE SIGNIFICANCE OF THESE VARIOUS DESIGNATIONS?

17 A. The Pennsylvania Natural Heritage Program (PNHP) evaluates the status of native flora
18 and fauna throughout the Commonwealth and assigns an appropriate conservation status
19 to species found to be endangered, threatened, rare, vulnerable, tentatively undetermined,
20 or watch list. In the case of plants this process involves the implementation of
21 Pennsylvania Code Title 17, Chapter 82, Conservation of Pennsylvania Wild Plants.
22 PNHP also maintains a database of known occurrences of listed species. PNHP is
23 managed by a coalition of state agencies and conservation organizations including

1 Pennsylvania Department of Conservation and Natural Resources, Pennsylvania Fish
2 and Boat Commission, Pennsylvania Game Commission, and Western Pennsylvania
3 Conservancy. PNHP was formerly known as the Pennsylvania Natural Diversity
4 Inventory (PNDI). That name now applies to the process in which land owners or
5 developers who propose changes in land use are required by the Pennsylvania
6 Department of Environmental Protection to search the PNHP database for possible
7 conflicts with endangered, threatened, rare, vulnerable, tentatively undetermined or watch
8 list species.

9
10 Q. DID YOU PREPARE A REPORT CONTAINING THE RESULTS OF YOUR
11 INVESTIGATION AND DISCUSSING THE IMPACTS OF THE CROSS COUNTRY
12 CORRIDOR ON HABITATS WHICH YOU CONSIDER IMPORTANT?

13 A. Yes. Attached to my testimony as Exhibit AFR-2 is a report prepared by me titled “Rare
14 Plant Survey and Report Concerning Impacts on Habitat from Construction of the
15 Proposed “Cross Country” PPL Transmission Line Corridor” and dated August 15, 2008.

16
17 Q. PLEASE SUMMARIZE THE RESULTS OF YOUR INVESTIGATION WITH
18 REFERENCE TO PLANTS LISTED BY THE PENNSYLVANIA NATURAL
19 HERITAGE PROGRAM.

20 A. Four plants listed by PNHP were found along the proposed “Cross Country” transmission
21 corridor: *Samolus parviflorus* (tentatively undetermined/proposed PA rare), *Orontium*
22 *aquaticum* (PA rare/proposed watch list), *Hydrastis canadensis* (PA vulnerable), and
23 *Carya laciniosa* (watch list). The locations at which these plants were found are shown in

1 Appendix B to my report. They occurred on three different sites. Shellbark hickory
2 (*Carya laciniosa*) was found on the Veterans Memorial Park tract in Richland Township
3 which abuts the Cross Country corridor and will be impacted by the removal of riparian
4 forest within the corridor. It is adjacent to the Luber property on Cherry Road where there
5 is habitat for Shellbark hickory which would be severely impacted by construction of the
6 Cross Country route. Two listed plant species were found on the Baringer property
7 located on the north side of Povinski Road in Springfield Township: *Samolus parviflorus*
8 (water pimpernel) and *Orontium aquaticum* (goldenclub). They have a recommended
9 status of rare and watch list respectively, and were found along the muddy edges of the
10 Tohickon Creek on this property. One PNHP-listed species, *Hydrastis canadensis*
11 (goldenseal) was found on the Weaver property located on the north side of Rocky Valley
12 Road in Springfield Township. This plant is listed as vulnerable.

13
14 Q. WHAT IS THE RESULT OF YOUR INVESTIGATION CONCERNING PLANTS
15 IDENTIFIED IN THE PNDI REVIEW RECEIVED FROM THE PENNSYLVANIA
16 DEPARTMENT OF ENVIRONMENTAL PROTECTION BY PPL'S CONSULTANT,
17 RICHARD MELLON?

18 A. Because of the time of year when I had access to the properties, certain species, notably,
19 *Carex buxbaumii* and *Phlox pilosa* were not visible because of their seasonal growth
20 cycle. However, habitat for *Carex buxbaumii* was identified in a large wetland bisected
21 by the proposed corridor on the west side of The Lookout in Springfield Township. I
22 would expect to find *Carex buxbaumii* if the inspection occurred during the growing
23 season. No other species on the PNDI list were found during this survey.

1 Q. DID YOU FIND OTHER SENSITIVE FEATURES WITHIN THE PROPOSED CROSS
2 COUNTRY CORRIDOR?

3 A. Yes. Vernal pools were found on the Clark property on California Road, the border of the
4 Emilian and Hrebicick properties on Salem Road in Springfield Township and Veterans
5 Park in Richland Township. Vernal pools are water-filled in winter and spring but usually
6 dry out by mid to late summer. They are important because they serve as breeding sites
7 for frogs, toads, and salamanders, providing a safe haven for them to complete the
8 aquatic stage of their life cycle. Vernal pools must be surrounded by forest in order to
9 provide habitat for terrestrial forms of these animals. In addition, three of the previously
10 identified plant species of concern, *Samolus parviflorus* (water pimpernel) and *Orontium*
11 *aquaticum* (Goldenclub), which were found on the Baringer property located on the
12 North side of Povenski Road and *Carya laciniosa* (shellbark hickory), are plants of
13 forested riparian corridors. The Cross Country route would destroy the riparian forest
14 which is habitat for these plants.

15
16 Q. DOES THE CROSS COUNTRY ROUTE PRESENT CONCERNS TO YOU WITH
17 REFERENCE TO HABITAT FRAGMENTATION AND INVASIVE SPECIES
18 PROLIFERATION? IF SO, PLEASE EXPLAIN.

19 A. Yes. The most obvious impact of construction of the proposed transmission corridor is
20 the fragmentation of habitat. Cutting a 100 foot wide swath through a forested area
21 breaks the continuity of forest habitat and creates edges. Many species of plants and
22 animals are forest specialists. Edges alter the environment by allowing sunlight and wind
23 to dry the soil and raise the air and soil temperatures. Openings created by clearing inhibit

1 the movement of amphibians to and from breeding areas. Edges permit the establishment
2 of non-native, invasive species of plants such as multiflora rose.

3 An 80 acre wetland complex exists on the west side of The Lookout located in the
4 western end of Springfield Township; it would be cut in half by the “Cross Country”
5 corridor. This wetland is exceptional both for its size and ecological integrity. It is
6 expected that a survey performed earlier in the growing season would have revealed
7 populations of *Carex buxbaumii* and other plant or animal species of concern within this
8 wetland complex. This wetland complex is also part of the headwaters of the Tohickon
9 Creek. The wetlands serve as a sponge absorbing water and releasing it slowly to feed the
10 stream. Cutting a 100 foot wide swath through it would alter both its hydrological and
11 biological characteristics by opening it to invasion by non-native, invasive plants such as
12 purple loosestrife, common reed and multiflora rose – all of which are prominent
13 components of existing utility corridors in the vicinity.

14
15 Q. WHAT IMPACTS WOULD CONSTRUCTION OF THE CROSS COUNTRY ROUTE
16 HAVE ON RIPARIAN FORESTS?

17 A. The value of riparian forests in maintaining water quality and quantity in streams has
18 been demonstrated again and again. Streams through forested areas are broad and shallow
19 with maximum underwater surfaces for the maintenance of aquatic life which generate
20 oxygen and reduce pollutants. Shading helps to maintain cool water temperatures
21 important to aquatic vertebrates and invertebrates. Native vegetation along stream banks
22 is also an important part of the food chain.

1 Forested riparian also increase filtration of surface water flowing into streams thereby
2 reducing siltation and water pollution. Forest cover permits maximum percolation of rain
3 and snow water into the ground to maintain water aquifers.

4 Because so much of the proposed PPL “Cross Country” corridor lies along the Tohickon
5 Creek and its headwaters tributaries, the potential for damage to stream ecosystems
6 through deforestation of the riparian zone is great.

7

8 Q. DOES THIS CONCLUDE YOUR TESTIMONY?

9 A. Yes, it does.

Exhibit AFR-1

CURRICULUM VITAE

Ann F. Rhoads, Ph.D.

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EDUCATIONAL BACKGROUND

Ph.D.	1976	Rutgers - The State University of New Jersey, New Brunswick, NJ
MA	1970	Trenton State College, Trenton, NJ
BS	1961	Trenton State College, Trenton, NJ

CURRENT PROFESSIONAL STATUS

- Senior Botanist, Pennsylvania Flora Project
- Adjunct Professor, Biology Department, University of Pennsylvania
- Research Associate, Academy of Natural Sciences of Philadelphia

Responsibilities include:

- Representing the Morris Arboretum on various state boards and committees.
- Conducting research on the Flora of Pennsylvania and preparing major publications on the state flora.
- Conducting field surveys of rare and endangered plant species throughout eastern Pennsylvania.
- Conducting vegetation inventories for Pennsylvania Bureau of State Parks.
- Teaching Plant Systematics (Bio-450) and Field Botany (Bio-400) Biology Department, University of Pennsylvania.
- Supervising interns and overseeing the Morris Arboretum Plant Clinic

PREVIOUS APPOINTMENTS

- Chair of Botany/Director, Pennsylvania Flora Project, Morris Arboretum of the University of Pennsylvania 1976-2000
- Research Assistant, Rutgers University 1971-1976

COMMITTEES AND OTHER PROFESSIONAL ACTIVITIES

- Deer Management Forum convened by Audubon Pennsylvania and the Pennsylvania Habitat Alliance, 2001-2005.
- Pennsylvania Biodiversity Partnership executive board, June 2000-January 2003
- Deer Management Working Group, Pennsylvania Game Commission, September 1998-December 1999.
- Ecosystem Management Advisory Committee, Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, 1996-
- Advisory Committee to the Forestry Task Force of the Joint Legislative Air and Water Pollution Control and Conservation Committee of the Pennsylvania Legislature, 1995-1996.
- Pennsylvania Biological Survey, President, 1998- 2001; Member, Biodiversity Technical Committee 1993-1995; Chair, Vascular Plants Technical Committee, 1987-1993.
- Advisory Committee US National Park Service Delaware and Lehigh Navigation Canal National Heritage Corridor Commission, 1991-1993.
- Advisory Committee, Bucks County Conservancy Significant Natural Areas Protection Program, 1988-1996.

PROFESSIONAL SOCIETIES

American Association for the Advancement of Science
American Institute for the Biological Sciences
Pennsylvania Academy of Science
Pennsylvania Biological Survey

RECENT PUBLICATIONS

Khan, Nancy R., Ann F. Rhoads, and Timothy A. Block. 2008. Vascular flora and community assemblages of Evansburg State Park, Montgomery County, Pennsylvania. *Bulletin of the Torrey Botanical Club* (in press).

Horvath, Jamie L., Timothy A. Block, and Ann F. Rhoads. 2008. Description of the population, canopy cover, and associated vegetation of the globally rare sedge *Carex polymorpha* (Cyperaceae) in Nescopeck State Park, Pennsylvania. In *Sedges: Uses, Diversity, and Systematics of the Cyperaceae*, eds. R. Naczi and B. Ford. Missouri Botanical Garden Press, St. Louis, MO.

Rhoads, Ann F. and Timothy A. Block. 2007. Natural Areas Inventory and Update, Montgomery County, Pennsylvania. Montgomery County Planning Commission, Norristown, PA.

Rhoads, Ann Fowler and Timothy A. Block. 2007. *The Plants of Pennsylvania, an Illustrated Manual. Second Edition*. University of Pennsylvania Press. Philadelphia, PA.

Latham, Roger and Ann F. Rhoads 2006. The historical flora of Wykers Island in the Delaware River, Bucks county, Pennsylvania, from the 1884 to 1887 botanical notes of John and Harvey Ruth. *Bartonia* 63: 29-47.

Latham, R.E., J. Beyea, M. Benner, C.A.Dunn, M.A. Fajvan, R.R. Freed, M. Grund, S.B. Horsley, A.F. Rhoads, and B.P. Shissler. 2005. Managing White-tailed Deer in Forest Habitat from an Ecosystem Perspective: Pennsylvania Case Study. Report by the Deer Management Forum for Audubon Pennsylvania and Pennsylvania Habitat Alliance, Harrisburg. xix + 340 pp.

Rhoads, Ann Fowler and Timothy A. Block. 2005. *Trees of Pennsylvania, a Complete Reference Guide*. University of Pennsylvania Press, Philadelphia, PA.

Rhoads, Ann F. and Timothy A. Block. 2000. *Natural Bucks County, Guide to Public Natural Areas*. Bucks County Commissioners, Doylestown, PA.

Rhoads, Ann F. and Timothy A. Block. 2000. *Plants of Pennsylvania: An illustrated Manual*. University of Pennsylvania Press, Philadelphia, PA.

Sullivan, Maura, Ann Rhoads, and Timothy Block. 2000. Delineation and management recommendations for the vegetation communities of Tinicum Township, Bucks County, Pennsylvania. *J. PA Academy of Science* 73: 179 (abstract).

Rhoads, Ann F. and Timothy A. Block. 1999. A Natural Areas Inventory of Bucks County, Pennsylvania. Report to the Bucks County Commissioners, Doylestown, PA.

White, Pamela and Ann F. Rhoads. 1996. The botanical work of the Ruth brothers of Bucks County, Pennsylvania and its significance today. *Bartonia* 59: 71-79.

Rhoads, Ann F. 1994. *Magnolia tripetala* in Pennsylvania. *Bartonia* 58:75-78.

Rhoads, Ann Fowler and William McKinley Klein, Jr. 1993. *The Vascular Flora of Pennsylvania: Annotated Checklist and Atlas*. American Philosophical Society, Philadelphia, PA.

Rhoads, Ann F. and Laura Thompson. 1992. Integrating herbarium data into a Geographic Information System: requirements for spatial analysis. *Taxon* 41(1):43-49.

Kirkland, Gordon L., Ann F. Rhoads and Ke Chung Kim. 1991. Perspectives on biodiversity in Pennsylvania and its maintenance. *Journal Pennsylvania Academy Science*. Vol. 65, No. 1.

Rhoads, Ann F. 1990. Flora of Pennsylvania database, a valuable resource for rare plant studies. In: *Ecosystem Management: Rare Species and Significant Habitats*. Proceedings of the 15th Annual Natural Areas Conference. Editors: Richard S. Mitchell, Charles J. Sheviak and Donald J. Leopold. New York State Museum Bulletin 471, Albany, NY.

Rhoads, Ann F. 1989. Endangered and Threatened Plants of Pennsylvania Wetlands. In *Wetlands Ecology and Conservation: Emphasis on Pennsylvania*. Majumdar, S. K.; F. J. Brenner, Robert P. Brooks and Ralph Tiner, Jr. eds. PA Academy of Sciences.

Rhoads, Ann F., Douglas F. Ryan and Ella W. Aderman. 1989. Land Use Study of Valley Forge National Historical Park. National Park Service, Valley Forge, PA.

Rhoads, Ann F. 1986. Rare plants of Eastern Pennsylvania, pp. 103-110. In *Endangered and Threatened Species Programs in Pennsylvania and other states: Causes, Issues and Management*. Majumdar et al., eds. Pennsylvania Academy of Science.

Rhoads, Ann F., Richard Mellon, Roger Latham and Ann Newbold. 1985. Endangered, threatened, vulnerable and rare vascular plants of the Pennsylvania Portion of Upper Delaware Scenic and Recreational River. MAR-13, National Park Service, Mid-Atlantic Region. 143 S. Third St., Philadelphia, PA, 19106.

Rhoads, Ann F., Ann Newbold, Richard H. Mellon and Roger E. Latham. 1985. *Montia chamissoi* rediscovered along the Delaware River in Wayne County, Pennsylvania. *Bartonia* 51:77.

May 2008

Exhibit AFR-2

Rare Plant Survey and Report Concerning Impacts on Habitat from Construction of the Proposed “Cross Country” PPL Transmission Line Corridor

**Springfield and Richland Townships
Bucks County, Pennsylvania**

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August 15, 2008

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Introduction and Methods

This survey was commissioned by Springfield Township for the purpose of:

- 1) Identifying rare plants within the proposed “cross country” transmission corridor
- 2) Evaluating the impact of construction of the proposed “cross country” corridor on natural habitats and other sensitive features
- 3) Providing an evaluation of the relative significance of natural areas that would be affected by the proposed transmission corridor routes

Fieldwork was carried out on August 10-13, 2008 during which most of the areas of natural vegetation along the proposed “cross country” corridor were walked by Ann Rhoads. Several properties crossed by the corridor were not visited because permission to enter could not be obtained.

Maps were prepared by overlaying the corridor route (GIS layer provided by Princeton Hydro) and National Wetlands Inventory polygons (PASDA) on 2005 aerial photography (DVRPC) in ArcGIS version 9.2. An assessment was made of sites to visit based on vegetation types along the corridor route as revealed by the aerial photography.

Where accessible, the corridor and adjacent areas were walked to search for plant species listed as endangered, threatened, rare, vulnerable, tentatively undetermined or watch list by the Pennsylvania Natural Heritage Program (PNHP). Locations of listed species were recorded with GPS, and voucher specimens were collected and deposited in the herbarium of the Morris Arboretum of the University of Pennsylvania. In addition sensitive natural features such as vernal pools, wetlands, and potential habitat for PNHP-listed species were also noted.

Results

Plants Listed by the Pennsylvania Natural Heritage Program

Fifteen properties were visited; see Appendix A for a list and brief description of each. Four plants listed by Pennsylvania Natural Heritage Program (PNHP 2008) were found on three properties along the proposed “cross country” transmission corridor.

Samolus parviflorus (tentatively undetermined/proposed PA rare) and *Orontium aquaticum* (PA rare/proposed watch list) were both present in the corridor on the Baringer property on Povenski Road in Springfield Township (Tax Parcel # 42-008-022).

Hydrastis canadensis (PA vulnerable) was found in the corridor on the Weaver property north side of Rocky Valley Road on the west slope of The Lookout in Springfield Township (Tax Parcel # 42-004-150).

Carya laciniosa (watch list) was present in along the Tohickon Creek in Richland Township’s Veterans Park, a site that was protected with County Open Space funding.

The locations at which these plants were found are shown in Appendix B. None of these plants and/or sites was indicated by the Pennsylvania Natural Diversity Inventory (PNDI) review received by PPL consultant Richard Mellon from the Pennsylvania Department of Environmental Protection dated April 10, 2007.

Plants Identified in the PNDI Review

The Pennsylvania Natural Diversity Inventory review listed five additional species that the project might have an impact on based on historical occurrences in or near the project area; *Carex buxbaumii*, *Iris prismatica*, *Phlox pilosa*, *Ratibida pinnata*, and *Symphotrichum dumosum* (*Aster dumosus*).

Potential habitat for *Carex buxbaumii* was identified in a large wetland which is bisected by the proposed “cross country” corridor on the western side of The Lookout in Springfield Township. It is expected that *Carex buxbaumii* would have been found if the inspection occurred during its period of active growth. None of the other species were found during this survey. Further information about these plants and their historical and current known locations in Bucks County is included in Appendix C.

Other Sensitive Features

Vernal pools were found in or near the corridor on three properties: the Clark property on California Road in Richland Township (Tax Parcel # 36-009-068, Veterans Park in Richland Township (Tax Parcel # 36-005-0136); and 2028 Salem Road (Tax parcel 42-004-086-001) in Springfield Township.

In addition many sites included riparian forests along the Tohickon Creek and its headwaters tributaries. A large wetland located at the base of the diabase hill known as The Lookout, includes headwaters of the Tohickon Creek and potential habitat for one or more Pennsylvania Natural Heritage Program (PNHP)-listed species.

Discussion

Habitat Fragmentation and Invasive Species Proliferation

The most obvious impact of construction of the proposed “cross country” transmission corridor is the fragmentation of habitat. Cutting a 100 foot wide swath through a forested area breaks the continuity of forest habitat and creates edges. Many species of plants and animals are forest specialists. Edges alter the environment by allowing sunlight and wind to dry the soil, raise the air and soil temperatures, and reduce relative humidity. Openings inhibit the movement of amphibians to and from breeding areas. Edges also permit the establishment of non-native, invasive species of plants such as multiflora rose.

A 70-80 acre wetland complex on the west side of The Lookout, the diabase hill located in the western end of Springfield Township, would be cut in half by the proposed “cross country” corridor. This wetland is exceptional for its size and ecological integrity. It contains a variety of forested swamp, shrub, and open marsh habitats. It is expected that

a survey earlier in the growing season would have revealed significant populations of *Carex buxbaumii* as well as other PNHP-listed plants or animals.

In addition, the wetland is part of the headwaters of the Tohickon Creek. The wetland serves as a sponge, absorbing water and releasing it slowly to feed the stream. Cutting a 100 foot wide swath through it would alter both its hydrological and biological characteristics by opening it to invasion by non-native, invasive plants such as purple loosestrife (*Lythrum salicaria*), common reed (*Phragmites australis*), and multiflora rose all of which are prominent components of existing utility corridors in the vicinity.

Vernal Pools

Vernal pools are critical breeding habitat for amphibians including salamanders, toads, and frogs. These woodland pools are water-filled in winter and spring but usually dry out by mid to late summer. Because they are isolated from permanent bodies of water, fish and some other predators of amphibian eggs and larvae are reduced. In order to serve as successful breeding sites, vernal pools must remain wet long enough for tadpoles and salamander larvae to reach the terrestrial stage of their life cycle. Vernal pools must also be surrounded by forest which provides habitat for the terrestrial forms of these animals (Brown and Jung 2005).

Removing the tree canopy over vernal pools, as would happen at several locations along the proposed “cross country” corridor would jeopardize these important habitats by exposing them to more rapid loss of water through heating and evaporation and destroy adjacent forest habitat for maturing amphibians.

Riparian Forests

The value of riparian forests in maintaining water quality and quantity in streams has been demonstrated again and again. Numerous state and federal programs are directed at restoration of riparian buffers. Streams through forested areas are broad and shallow with maximum underwater surfaces for the maintenance of aquatic life. Shading helps to maintain cool water temperatures important to aquatic vertebrates and invertebrates (Sweeney et al. 2004). Native vegetation along stream banks is an important part of the aquatic food chain as leaves and twigs that fall into the stream are the food source for aquatic invertebrates. Research at the Stroud Water Research Center in Chester County has shown that the survival of aquatic larvae of mayflies declines when stream side areas are dominated by non-native plants such as multiflora rose, Japanese honeysuckle or Oriental bittersweet as compared to native trees and shrubs (Sweeney 1993).

Forested riparian areas also increase filtration of surface flow into the streams thus reducing water pollution. In addition, forest cover permits maximum percolation of rain and melting snow to maintain ground water aquifers.

Because so much of the proposed “cross country” PPL corridor route lies along the Tohickon Creek and its headwaters tributaries, the potential for damage to stream ecosystems through deforestation of the riparian zone is great.

Relative Value of Natural Areas

The Natural Areas Inventory of Bucks County (Rhoads and Block 1999) identified two areas in northern Bucks County that are relevant to the selection of a route for the proposed “cross country” transmission corridor.

The Lookout in Springfield Township was listed as a priority two site because of its extensive mixed deciduous forest cover extending from Richlandtown Pike to Salem Road. Also cited were the rich herbaceous layer of the forest and the presence of vernal pools, springs, and headwaters of Tohickon Creek and Cooks Creek (Rhoads and Block 1999). The “cross country” route traverses a part of The Lookout area.

Included in the number four priority list was a site referred to as Route 309 Woods. This site is a fragment of wet diabase woods and rock outcrops on the margin of the Quakertown basin (Rhoads and Block 1999). It was assigned a lower priority because of its small size and isolated location.

There should be no question that preservation of the The Lookout and its multiple natural features should be a higher priority than that of the Route 309 Woods.

References

- Brown, Lesley and Robin E. Jung. 2005. *An Introduction to Mid-Atlantic Seasonal Pools*, U.S. Environmental Protection Agency. Washington, DC.
- Commonwealth of Pennsylvania, 1993. Pennsylvania Code Title 17, Chapter 82. Conservation of Pennsylvania Native Wild Plants.
- Fike, Jean. 1999. Terrestrial and Palustrine Plant Communities of Pennsylvania. Pennsylvania Department of Conservation and Natural Resources, Harrisburg, PA.
- Greenman, David W. 1955. Ground Water Resources of Bucks County Pennsylvania. Topographic and Geologic Survey Bulletin W11. Commonwealth of Pennsylvania, Department of Internal Affairs, Topographic and Geologic Survey, Harrisburg, PA
- National Wetlands Inventory. 2008. <http://www.fws.gov/nwi/>. Site accessed August 1, 2008.
- Pennsylvania Natural Heritage Program. plant status listings. <http://www.naturalheritage.state.pa.us/PlantsPage.aspx>. Viewed August 14, 2008.
- Rhoads, Ann F. and Timothy A. Block. 1999. Natural Areas Inventory of Bucks County, Pennsylvania. Bucks County Commissioners, Doylestown, PA.
- Rhoads, Ann Fowler and Timothy A. Block. 2005. *Trees of Pennsylvania, A Complete Reference Guide*. University of Pennsylvania Press, Philadelphia, PA.
- Rhoads, Ann Fowler and Timothy A. Block. 2007. *The Plants of Pennsylvania, An Illustrated Manual*, second edition. University of Pennsylvania Press, Philadelphia, PA
- Sweeney, Bernard W. 1993. Effects of vegetation on microinvertebrate communities of White Clay Creek in Eastern North America. *Proceedings of the Academy of Natural Sciences of Philadelphia* 144: 291-340.
- Sweeney, Bernard W., Thomas L. Bott, John K. Jackson, Louis A. Kaplan, J. Denis Newbold, Laurel J. Standley, W. Cully Hession, and Richard J. Horwitz. 2004. Riparian deforestation, stream narrowing, and loss of stream ecosystem services. *Proceedings of the National Academy of Sciences* 101(39): 14132-14137.
- Woodland Design Associates, Inc. 2007. Jurisdictional Wetland Determination Report, lands of David N. Clark California Road, Quakertown, PA. Report prepared for PP&L Electric Utilities, 2 North Ninth Street, Allentown, PA.

Appendix A. Descriptions of Properties Visited

Richland Township

Veterans Park (township park and open space), East Pumping Station Road – Tax parcel # 36-005-136

The site is nearly level and lies on Brunswick Formation geology within the band of diabase intrusions that encircle Quakertown (Greenman 1955). It is located in the upper reaches of the Tohickon Creek watershed and is bisected by the Tohickon Creek and several tributary streams. Seventy-five percent of the site is wetlands according to the National Wetlands Inventory map (NWI 2008); the remainder contains developed park facilities.

Wetlands on the tract are primarily forested, but areas of shrub-dominated swamp and herbaceous marsh are also present. Wet channels and vernal pools are present throughout. These features are important breeding areas for amphibians such as salamanders and wood frogs.

The forested part of the tract is primarily bottomland oak - hardwood palustrine forest (Fike 1999). Species include swamp white oak, pin oak, shellbark hickory, shagbark hickory, slippery elm, American elm, wild black cherry, American beech, American basswood, red maple, and sugar maple. Shrubs included spicebush, bladdernut, southern arrow-wood, and silky dogwood. A diverse herbaceous layer was also present.

Some invasive, non-native species were present, mostly around the edges of the woods; the interior areas were not severely impacted.

One plant listed by the Pennsylvania Natural Heritage Program was found on the tract, shellbark hickory (*Carya laciniosa*). Shellbark hickory is on the PNHP watch list (PNHP 2008) because it is limited to riparian forest habitat. This species and its riparian habitat could be seriously damaged by construction of the corridor along the Tohickon Creek on the eastern end of this tract.

Luber property, Cherry Road – Tax parcel # 36-009-135

The proposed “cross country” transmission corridor crosses the southern end of the Luber property. The site consists of seasonally wet, successional forest dominated by pin oak and a band of mature riparian forest along the Tohickon Creek. No plants listed by the Pennsylvania Natural Heritage Program were found, however, this tract is just across the Tohickon Creek for the area in Veterans Park where shellbark hickory (*Carya laciniosa*) was found. The riparian forest would be severely impacted by construction of the proposed “cross country” transmission corridor.

Clark property, California Road – Tax parcel # 36-009-068

The proposed “cross country” transmission corridor crosses the Tohickon Creek on the north edge of the Clark property and then follows the creek through the northeastern portion of the tract. The site contains mature riparian forest and includes several large

vernal pools. According to a jurisdictional wetland determination report prepared by Woodland Design Associates, Inc. in 2007, 80% of the area of the proposed “cross country” transmission corridor on this property is wetlands.

No plant species listed by the Pennsylvania Natural Heritage Program were found on this property; however, the vernal pools are important breeding areas for frogs and salamanders. Construction of the proposed “cross country” corridor would destroy the vernal pools by opening them to the drying effects of the sun and removing the proximity to intact forest that is essential for successful amphibian breeding.

Schmitt property, Cherry Road – Tax parcel # 36-009-094-001

The proposed “cross country” transmission corridor does not actually cross the Schmitt property, but it is close enough to have an impact. Canopy removal on the adjacent Gruver property would open up the riparian forest along the Tohickon Creek to invasion by invasive species and other changes that come with creation of a forest edge.

Keller property, Gross Road – Tax parcel # 36-009-086

The proposed “cross country” transmission corridor crosses the southeastern part of the Keller tract. The land in question is weedy, disturbed forest which is seasonally wet. Pin oak, white ash, and red maple made up a native forest canopy. Non-native invasive species such as multiflora rose and Morrow’s honeysuckle were prominent in the shrub layer. No species listed by the Pennsylvania Natural Program were found.

Metzger (Liberty Homes) property, Gross Road – Tax parcel # 36-009-116

We did not walk the Metzger tract, but observed it from the driveway. The forest appears to have undergone a timber harvest within the past few years. The canopy was very open and non-native shrubs such as multiflora rose had become established in the gaps. The site is low, wet woods dominated by ash, red maple and tuliptree with spicebush comprising the native shrub layer. The site did not appear to contain habitat for any plants listed by the Pennsylvania Natural Heritage Program. The proposed “cross country” right-of-way goes through the lowest and wettest part of the wooded section of this tract.

Springfield Township

PP&L property, Hickon Road – Tax parcel # 42-008-048

South of the existing power lines the proposed “cross country” corridor bisects a forested corner of this tract that contains a tributary stream and several very large sugar maple trees. The remainder of this tract consists of farm fields and a manmade pond, the only area mapped as wetland by the National Wetlands Inventory.

Creticos property, Povenski Road – Tax parcel # 42-008-048

This is a large tract through which the Tohickon Creek and several tributaries flow. The proposed “cross country” right-of-way traverses a mature upland forest on the east side of the Tohickon Creek, crossing three tributary streams. Riparian forest borders the creek.

Diabase boulders were present throughout. The forest canopy was dominated by American beech, sugar maple, and shagbark hickory, with occasional basswood and hop-hornbean. A shrub layer of spicebush and southern arrow-wood was present. Herbaceous species included a variety of native wildflowers and ferns.

The proposed “cross country” corridor also crosses the western end of a narrow strip of land that appears to have been farmed until very recently. It was dominated by very early successional species such as ragweed and Japanese stiltgrass.

South of the existing power lines the proposed “cross country” corridor bisects a forested corner of the site that contains a tributary stream and several very large sugar maple trees. The remainder of this site consists of farm fields and a manmade pond, the only wetland mapped by the National Wetlands Inventory.

No PNHP-species were found on this site. However, construction of the proposed “cross country” corridor would destroy riparian forest and fragment what is now a mature, mixed hardwood forest creating opportunities for invasive, non-native species to colonize the tract.

Baringer property, north side of Povenski Road – Tax parcel # 42-008-022

The Baringer property would be split in half by the proposed “cross country” transmission corridor. Except for the area around the house, this site consists of hummocky wet woods through which the Tohickon Creek flows. The forest is dominated by ash and red maple with a shrub layer of spicebush. The ground surface is covered with mossy hummocks formed by sedges (primarily *Carex bromoides*) and crisscrossed by numerous wet channels. The majority of the site is shown as wetland on the National Wetlands Inventory map.

The muddy edges of the Tohickon Creek support two plant species listed by the Pennsylvania Natural Heritage Program: *Samolus parviflorus* (water pimpernel) and *Orontium aquaticum* (goldenclub). Water pimpernel has a recommended status of rare; it is listed as tentatively undetermined in the regulations (Commonwealth of Pennsylvania 1993; PNHP 2008). Goldenclub is listed as rare in the regulations, but is currently placed on the watch list (Commonwealth of Pennsylvania 1993; PNHP 2008).

The proposed “cross country” corridor route as shown would destroy the riparian forest along the Tohickon Creek in the area where both water pimpernel and goldenclub were found, opening the site to invasion by exotic, non-native weeds such as multiflora rose.

Weaver property, north side of Rocky Valley Road – Tax parcel # 42-004-150

This property lies on the southwestern slope of the diabase hill known as The Lookout. It is bisected by a pipeline right-of-way; the remainder of the tract is forested. The eastern section is mature, upland forest with a canopy dominated by tuliptree, sugar maple, hickory, black birch, and red oak. The shrub layer contains spicebush and maple-leaved viburnum. The herbaceous layer contains a high diversity of wildflowers and ferns.

To the west of the pipeline the property slopes down into a 70-80 acre wetland that forms an arc along the base of the western flank of The Lookout. The wetland includes areas of red maple swamp forest as well as shrub-dominated and herbaceous areas. It is shown on the National Wetlands Inventory map.

One PNHP-listed species was found on this property; goldenseal (*Hydrastis canadensis*) an herbaceous plant with purported medicinal properties, was growing in the forest understory. Goldenseal is listed as vulnerable (Commonwealth of Pennsylvania 1993; PHNP 2008.). In addition The Lookout is identified as a priority 2 area for preservation in the Natural Areas Inventory of Bucks County (Rhoads and Block 1999) because of the extensive forested habitat and the presence of headwaters of Tohickon Creek and Cooks Creeks. In addition the open areas of the wetland could serve as habitat for *Carex buxbaumii*, a rare species that was listed in the PNDI review.

The proposed “cross country” corridor route would fragment the forest and wetland areas, opening them to degradation from the drying effects of the sun and invasion by invasive species such as purple loosestrife, common reed (*Phragmites*) and multiflora rose. These plants are abundant in existing utility rights-of-way in the vicinity.

Lerch property, Tumblebrook Road – Tax parcel # 42-004-173

The back portion of this property is part of a large forested wetland that extends along the base of the western slope of The Lookout. It is a continuation of the wetland described in the discussion of the Weaver property above. The forested portions of the wetland, which is indicated on the National Wetlands Inventory map, have a canopy dominated by red maple, swamp white oak, and elm.

The ground vegetation is dominated by tussock sedge (*Carex stricta*) and other hummock-forming species, particularly *Carex bromoides*. Other prominent herbaceous species include royal fern, sensitive fern, skunk-cabbage, jewelweed, northern blue flag, tearthumb, and marsh purslane.

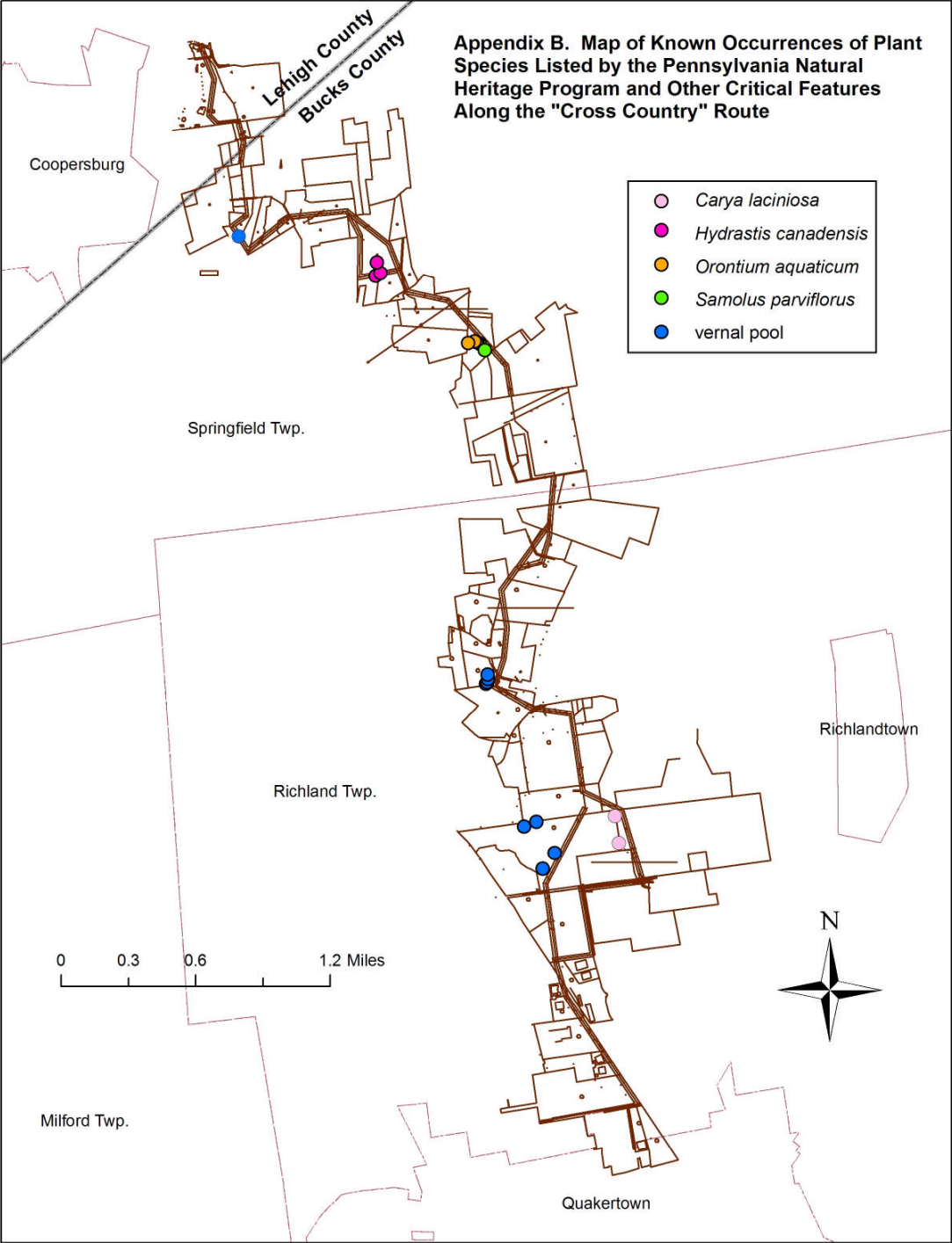
No species listed by the Pennsylvania Natural Heritage Program were found on this property. However, wet channels, which are headwaters of the Tohickon Creek, traverse the swamp. This extensive wetland is presently bordered by utility rights-of-way on two sides. The proposed “cross country” PP&L corridor would cut right across the middle of it opening it to changes in soil moisture from the drying effects of the sun and colonization by non-native, invasive species.

Jones property and adjacent properties, west side of Salem Road – 42-004-088, 42-004-086-001, 42-004-086-002, 42-004-087, 42-004-087-001, 42-004-087-002

The proposed “cross country” transmission corridor crosses the rear of five residential properties and along a section of a headwaters tributary of the Tohickon Creek. The forest ranges from early successional to more mature riparian forest along the tributary stream. Diabase boulders were evident in the wooded area.

No PNHP-listed plant species were found, but the corridor would cross a well-developed vernal pool as well as the riparian area along the stream. Removal of the tree canopy in these areas would have a negative impact on their current ecological function by opening them to the drying effects of the sun and invasion by exotic, non-native species.

Appendix B. Map of Known Occurrences of Plant Species Listed by the Pennsylvania Natural Heritage Program



Appendix C.

Descriptions of Plants Listed by the Pennsylvania Natural Heritage Program

PNHP-listed Plants Found During this Survey

Carya laciniosa (shellbark hickory)

Status: watch list

Description: deciduous tree to 30 m tall with shaggy bark exfoliating in long strips; leaves alternate, pinnately compound with 7-9 leaflets; nuts strongly flattened, 4-6 cm

Habitat and range: moist bottomland soils along streams and rivers, usually on limestone or diabase geology

Known locations in Bucks County: Richland, Tinicum Townships

Hydrastis canadensis (goldenseal)

Status: vulnerable

Description: herbaceous perennial spreading by rhizomes; underground parts bright yellow; flowering stems to 30 cm bearing 2 leaves and a small cluster of red fruits.

Flowering time: May

Habitat: Well-drained, rich forests on diabase

Known locations in Bucks County: Haycock, Richland, and Springfield Townships

Orontium aquaticum (goldenclub)

Status: rare/proposed watch list

Description: Herbaceous perennial with elliptical grayish-green leaves and a dense spike of yellow flowers

Flowering time: late April-early May

Habitat and range: Shallow water or muddy shores of ponds and streams, occurs from Massachusetts and New York to Florida, mostly on the coastal plain

Current known locations in Bucks County: Haycock Township and Springfield Townships

Samolus parviflorus (pineland pimpernel) TU/PR

Perennial with entire leaves forming a rosette prior to flowering

Flowering stem to 35 cm, with alternate leaves and a raceme of tiny white flowers

Flowering time May-September

Muddy banks of streams and ditches, eastern Canada south to Florida and the West Indies

Current known locations in Bucks County: along streams in areas of diabase geology in Tinicum, Nockamixon, and Haycock Townships.

Plants Identified in the PNDI Review dated April 10, 2007
(None of these were found in the current survey)

Symphyotrichum dumosum (long-stalked aster)

Status: tentatively undetermined

Description: Rhizomatous perennial WITH Stems 0.1-1 m tall; leaves linear to lance-linear, sessile, entire or nearly so, scabrous above, glabrous beneath, 3-11 cm x 3-10 mm; leaves of the flowering branches much reduced; inflorescence open, diffuse, with spreading or ascending branches; heads numerous, long pedunculate, peduncles bracteate, involucre 4-6 mm, bracts imbricate, with a short, broad green tip; rays lavender or bluish; lobes of the disk corollas 20-30% of the limb.

Habitat and range: Dry or moist sandy soils, mostly on the coastal plain; occurs from Maine to Florida and inland to Michigan, Arkansas, and Louisiana.

Blooming time: September-October.

Current locations in Bucks County: none known

Historic location: open woods on rocky slope 2 miles east of Center Valley, Lehigh County (1953)

Ratibida pinnata – globular coneflower

Status: tentatively undetermined/proposed endangered

Description: Fibrous rooted perennial with stems 0.4-1.2 m tall; leaves long-petioled below, short-petioled or sessile above, pinnatifid with lanceolate segments, hirsute or strigose; heads with disk grayish and shorter than the rays; rays pale yellow, reflexed
Habitat and range: Prairies, old fields, dry woods, often on limestone; occurs from Ontario to Minnesota and South Dakota south to Tennessee, Georgia, Louisiana, and Oklahoma.

Blooming time: June-August.

Current locations in Bucks County: none known

Historic location: 1 mile north of Richlandtown, roadside bank (1946 and 1951)

Phlox pilosa – prairie phlox, downy phlox

Status: tentatively undetermined/proposed endangered

Description: Perennial with stems 0.3-0.6 m tall; leaves lanceolate or lance ovate, with a sharp tip; inflorescence a loose cyme; flowers peduncled, pale red-purple

Habitat and range: Prairies and upland woods Connecticut to Florida and west to Manitoba, Nebraska and Texas

Blooming time: late May to mid-June; senescing after fruits mature in late June

Current locations in Bucks County: moist meadows, woods edges, and roadsides on diabase geology in Nockamixon, East Rockhill, West Rockhill and Haycock Townships.

Historic location: 2.5 miles west of Richlandtown (1921).

Iris prismatica – slender blue flag

Status: endangered

Description: Herbaceous perennial with stems 0.5-0.7 m tall, rhizomatous; leaves linear 0.5-0.7 m long; flowers light violet to lavender; fruit sharply angled, 3-5 cm long

Habitat and range: Marshes, swamps and damp meadows, Nova Scotia to Georgia near the coast

Blooming time: June, however leaves remain visible through the growing season

Current known locations in Bucks County: moist, alluvial meadows in Haycock, and West Rockhill Townships

Historic location: Quakertown (1919)

Carex buxbaumii (brown sedge)

Status: tentatively undetermined/ proposed rare

Description: Perennial, rhizomatous sedge with linear leaves; flowering/fruitletting stem with terminal male spike and 2-3 female spikes below, pistillate scales with distinctive reddish brown margins.

Habitat and range: Marshes and wet meadows, fruitletting time late May to late June, occurs from Canada south to North Carolina.

Current known location in Bucks County: moist alluvial meadow in West Rockhill Township

Historic location: Quakertown (1894)