Smedley County Park 6

Chapter 6: Smedley County Park

INTRODUCTION

BREIF HISTORY

Long before the existence of Smedley County Park between the 18th and 20th centuries, the land was owned by the Lewis family. The Lewis' were an industrious family and established cotton mills and paper mills along Crum Creek that lasted well into the 1900's. By 1913, the Lewis family had sold off most of the land they owned along Crum Creek (except for land around their paper mill) to various new landowners. Most prominent was the Margaret W. Banes' 65 acre estate on the west side of Crum Creek affectionately known as "Krumleigh Farm". Little remains today of Krumleigh Farm, only pillars at the front gate off of Baltimore Pike and a portion of its access drive. Much of the Banes estate is now part of Smedley County Park including the parcel known as Penza West, 12 acres east of Crum Creek and the area of the Lewis House.

In 1937, Smedley County Park first was established by Delaware County with operation of a 10.5 acre parcel called the "Hemlocks." This parcel was soon accompanied by an additional 36 acre tract on the east side of Crum Creek along Paper Mill Road and Baltimore Pike.

A third parcel of land extended Smedley County Park northward toward Beatty Road. This parcel was not acquired by the County, but leased to them by Swarthmore College for park use. The next large parcel acquired was the 60 acre Penza tract in 1967 and then was subdivided for the partial use of the construction of the Blue Route (I-476) in 1981.

The Commonwealth of Pennsylvania took just over 28 acres of land for Blue Route development. Design changes in the Blue Route left the Commonwealth with land that was not needed for roadway construction. This was given back to the County in the form of what is known as Penza East (2.74 acres). In a 1988 settlement with the Commonwealth, the County received the 7.78 acres north of the Swarthmore property known as the Lawton tract. The most recent property acquisition to the park was the Paper Mill Tract at 29.5 acres in the early 2000's.

After all land acquisition, leases and the implementation of the Blue Route, Smedley County Park now occupies about 116.9 acres and has been developed by Delaware County Parks and Recreation into an active and passive recreation park facility along the scenic Crum Creek.

CONTEXT WITHIN THE DELAWARE COUNTY PARKS SYSTEM

At 116.9 acres, Smedley County Park offers a mixture of different recreational activities. Facilities within the park include hiking trails, tot-lot/playgrounds, ball-fields, soccer fields, open playing fields and open lawn for passive activities (Frisbee, sunbathing, etc.). Although Smedley County Park is bisected overhead by the Blue Route (north and south), it contains large areas of mature mixed deciduous woodlands and riparian areas along the Crum Creek valley for pleasurable walking, bird watching, and picnicking.

Smedley County Park also features an Environmental Center and the Lewis House that is the Penn State's Cooperative Extension of Delaware County.

In the context of the overall Delaware County Park System, Smedley County Park is one of County's premier parks and is the third largest County Park in Delaware County.

CURRENT SERVICE AREA

Smedley County Park is a Community and Regional Park. Most daily users access the park by vehicle from the immediate surrounding area and major communities along the Blue Route corridor and on the trolley line. The trolley has a station within Smedley County Park.

Some local park users who live in the adjacent neighborhoods arrive on foot via walking paths.

The current service area of Smedley County Park supports the municipalities of Media Borough, Upper Providence Township, Marple Township, Springfield Township, Nether Providence Township, Middletown Township, Ridley Township, Brookhaven Borough, Morton Borough, Swarthmore Borough, Rutledge Borough and Rose Valley Borough.

Smedley County Park's current service area also includes many other similar open space resources and user constituencies that benefit the park. These resources include: Rose Tree County Park, Glen Providence County Park, Martin County Park, Saul Wildlife Sanctuary, Scott Arboretum, Swarthmore College, Hildacy Farms, Springfield Memorial Park, Rolling Green Park, Spring Valley Park, Jane Lownes Park, Walsh Park, Crowell Park, The Triangle Park, Indian Orchard Park, and several connecting local trails that will be identified in the Existing Conditions and Inventory section of this Smedley County Park narrative.

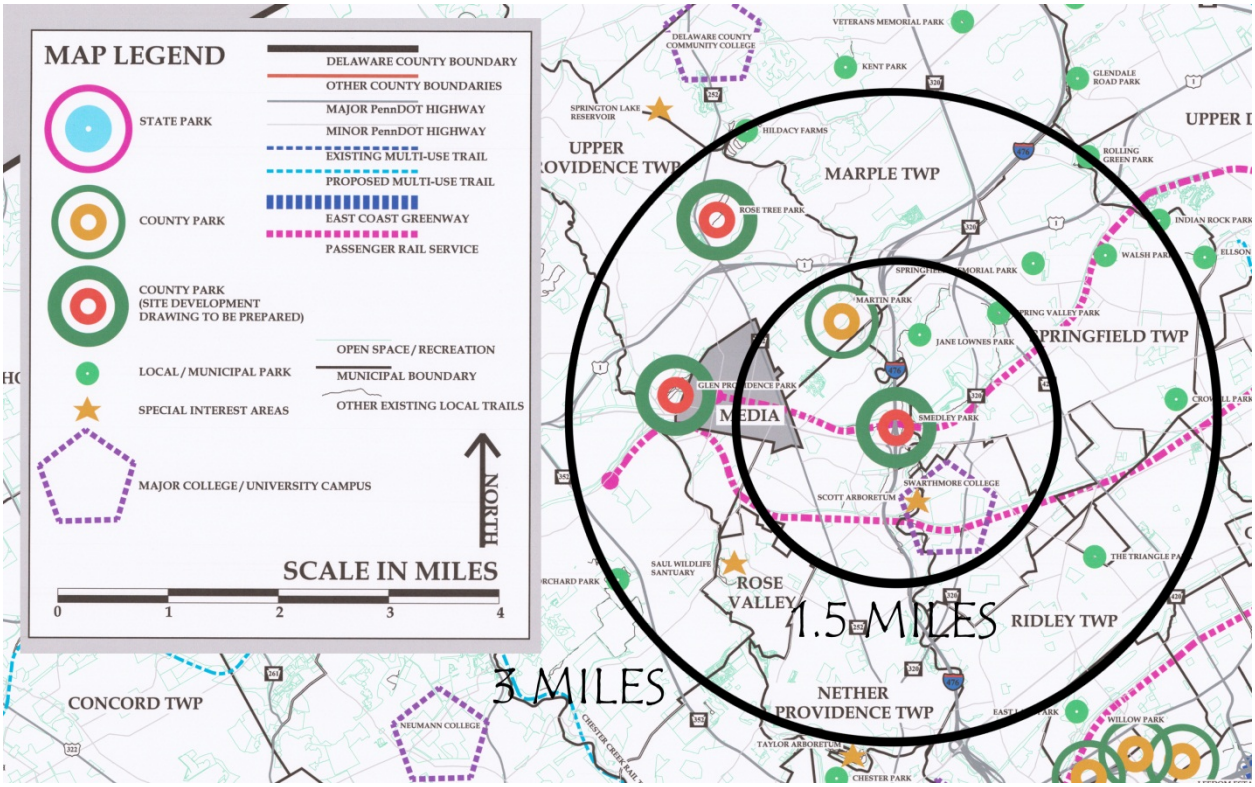

Figure 6-1: Smedley County Park service area

BASKETBALL COURTS
TOT LOT / PLAYGROUND
PLAYING FIELDS
VERNON RD.
OLD SCHOOLHOUSE DR.
BEATTY RD.
SPRINGFIELD GOLF & COUNTRY CLUB
WHISKEY RUN
TROLLEY LINE
0.75 ACRES
BALTIMORE PK.
TROLLEY STATION
PAPER MILL RD.
SMEDLEY YELLOW TRAIL
SWARTHMORE TRAIL
OPEN LAWN
PARKING
BRIDGE
ENVIRONMENTAL CENTER
OPEN LAWN
PARKING
LEWIS HOUSE
BRIDGE
PAVILION PARKING
TOT LOT / PLAYGROUND
16.73 ACRES
CRUM CREEK
WOODED AREA
WOODED AREA
SMEDLEY YELLOW TRAIL
UTILITY ACCESS DRIVE
53.68 ACRES
WOODED AREA
22.13 ACRES
WOODED AREA
BRIDGE
INTERSTATE 476 (BLUE RT.)
INTERSTATE 476 (BLUE RT.)
PLAYING FIELDS
26.09 ACRES
PARKING W/ RAINGARDEN AREA
BRIDGE
4.33 ACRES
LEIPER SMEDLEY TRAIL
WOODED AREA
RESERVOIR
SPRINGFIELD TWP.
NETHER PROVIDENCE TWP.
RESTROOMS
TOT LOT / PLAYGROUND
SOCCER FIELDS
HEMLOCK RD.
0.28 ACRES
TROLLEY STATION TRAIL
TURNER RD.
23.21 ACRES
BEATTY RD.
WOODED AREA
TRIBUTARY TO CRUM CREEK
BALTIMORE PK.

LEGEND
- RESIDENTIAL LAND USE
- OPEN SPACE / INSTITUTIONAL LAND USE
- COMMERCIAL LAND USE
- PARCEL LINE (COUNTY GIS)
- PARK BOUNDARY
- 10 FT. LIDAR CONTOURS
- EXISTING WATER COURSE
- EXISTING WOODLINE
- EXISTING TREE
- EXISTING PARK ACCESS POINT

LOCATION MAP
UPPER PROVIDENCE TWP
PARK SITE
SPRINGFIELD TWP
NETHER PROVIDENCE TWP
RIDLEY TWP
W. BALTIMORE PK.
BEATTY RD.
E. BALTIMORE PK.

NO. | BY | DATE | REVISION

SEAL

PROJECT MANAGER: TIMOTHY PAUL WILSON RLA, LEED AP
DESIGN BY: | CHECKED BY:
DRAWN BY: TPW | CHECKED BY:

CLIENT
DELAWARE COUNTY PLANNING DEPARTMENT
TOWL BUILDING, 2ND & ORANGE STREETS
MEDIA, PA. 19063
PH: 610-891-5200 FAX: 610-891-5293

0 100' 200' 400' 800'
SCALE: 1" = 400'

PROJECT TITLE
SITE DEVELOPMENT DRAWINGS
SMEDLEY PARK
SPRINGFIELD TOWNSHIP & NETHER PROVIDENCE TOWNSHIP DELAWARE COUNTY, PA.

SHEET TITLE
EXISTING CONDITIONS DRAWING

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DESIGN STUDIOS

DATE: FEBRUARY 23, 2012
PROJECT NO.: 13.1 - DELCO
SHEET NO.: 1 OF 1

EXISTING CONDITIONS AND INVENTORY

SURROUNDING LAND USE

Smedley County Park is located partially in Springfield Township and partially in Nether Providence Township. The municipal boundary is the Crum Creek corridor that meanders through the park.

Smedley County Park is in a residentially developed area along the Blue Route (I-476) with some commercial/industrial use, mostly along the Baltimore Pike corridor. The park also has the benefit of being connected to other adjacent green space in the Springfield Golf & Country Club, the Crum Creek corridor that extends to the northwest, and the wooded area the stretches to the northeast. See the Existing Conditions Drawing on the previous page.

NATURAL RESOURCES

Vegetation

Smedley County park is mostly dense vegetation and was actually first known as “Forest Park.” The mixed deciduous forest that blankets the Crum Creek Valley is mainly made up of Oak, Beech and Hickory, but there are also mature specimens of Tulip Poplar, Red Oak, Sassafras, Ash and Sycamore. Some of the less accessible areas of the park are home to some of the more majestic specimen trees. The large trees form a canopy high above the dense understory plantings that include both deciduous and evergreens. Mountain laurel is commonly seen on the higher elevations and sloped areas of the park. In the lower wet areas around Crum Creek, more Maples and Ash can be found.

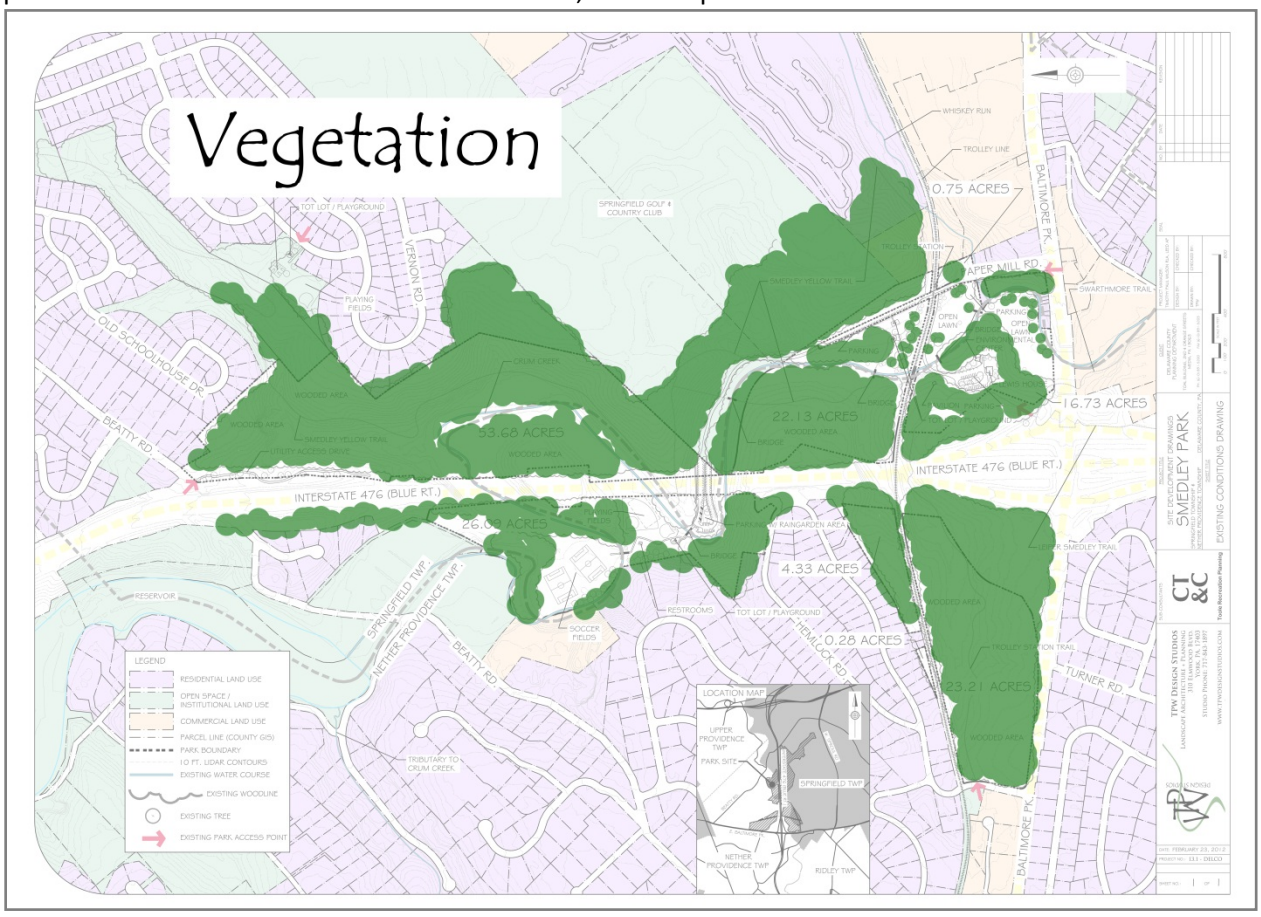


Figure 6-2: Existing vegetation at Smedley County Park

Large portions of the lower riparian buffer of Crum Creek are dominated by a monoculture of lesser celandine (*Ficaria verna*). Japanese Knotweed (*Polygonum cuspidatum*) was also observed but limited to small portions of the stream bank primarily along the pedestrian bridges. Oriental bittersweet (*Celastrus obiculatus*) and Japanese honeysuckle (*Lincera japonica*) were found throughout the forest. All four of these species are listed by the PA Department of Conservation and Natural Resources (DCNR) as invasive in PA.

Wildlife and Pennsylvania Natural Diversity Inventory

Wildlife

Wildlife is abundant in Smedley County Park and the Crum Creek valley. The main wildlife corridor follows Crum Creek through the park. This creek "greenway" corridor provides fauna such as deer, a migration route and access to the park woodlands and open space. Other species that were evident in the park were chipmunks, squirrels, skunks and rabbits.

Also, various birds were spotted nesting and using the tree canopy as refuge. Some of these birds included, a red-tailed hawk, robins, blue jays, cardinals, red-winged black birds, and mockingbirds, and some Grouse were also spotted.

Although there was evidence of burrowing rodents (such as groundhogs) present in the park, none were seen.

Figure 6-3: Penza Tract forest

Preliminary Environmental Review

The Pennsylvania Natural Diversity Inventory (PNDI) records for Smedley County Park indicate that there are potential impacts to threatened and endangered species and/or special concern species and resources within the Park boundary.

Further coordination with PA Department of Conservation and Natural Resources and PA Fish and Boat Commission would be necessitated at the time of construction and plan implementation. (See Appendix S-2 for details of the review and limits).

The agencies typically needing coordination in regards to a PNDI are: PA Game Commission; PA Department of Conservation and Natural Resources; PA Fish and Boat Commission; and the U.S. Fish and Wildlife Service.

Soils and Topography

Soils

According to the United States Department of Agriculture (USDA) soil survey, the soils present within Smedley County Park are as follows:

Ch – Chewacla silt loam (Hydric Soil)
Cn – Congaree silt loam (Hydric Soil)
GeB2 – Glenelg channery silt loam, 3 to 8 percent slopes, moderately eroded
GeC – Glenelg channery silt loam, 8 to 15 percent slopes
GeD – Glenelg channery silt loam, 15 to 25 percent slopes
GeE – Glenelg channery silt loam, 25 to 35 percent slopes

GnB – Glenville channery silt loam, 3 to 8 percent slopes
Me – Made land, schist and gneiss material (Hydric Soil)
MgC – Manor loam, 8 to 15 percent slopes (Hydric Soil)
MgC2 – Manor loam, 8 to 15 percent slopes, moderately eroded
MgC3 – Manor loam, 8 to 15 percent slopes, severely eroded
MgD – Manor loam, 15 to 25 percent slopes
MgD2 – Manor loam, 15 to 25 percent slopes, moderately eroded
MhE – Manor loam and channery loam, 25 to 35 percent slopes
MkF – Manor loam and channery loam, 25 to 35 percent slopes, severely eroded
Mn – Melvin silt loam (Hydric Soil)
We – Wehadkee silt loam

Hydric Soils are those soils that are sufficiently wet in the upper part to develop anaerobic conditions during the growing season. Hydric Soils are generally associated with wetland conditions but do not necessarily mean there are wetlands present within an area of Hydric Soil.

Based on our field investigation, no wetlands were found within the park during the site visit. On the National Wetland Inventory (NWI) mapping from the U.S. Fish and Wildlife Service, forested palustrine emergent wetlands are indicated as present in the northern extents of Smedley County Park. The three parameter wetland identification approach outlined in the 1987 United States Army Corps of Engineer Wetland Manual and corresponding regional supplement was not practical for the level of investigation that was required for this survey report and NWI often does not show smaller wetland pockets. Preliminary wetland investigation criteria used for the sake of this report consisted of hydrophytic vegetation, landform and visible signs of hydrology. It is recommended that prior to any park improvements including land disturbance that a wetland investigation be conducted. A wetland investigation and, if necessary, wetland delineation may be required to be submitted with PADEP and

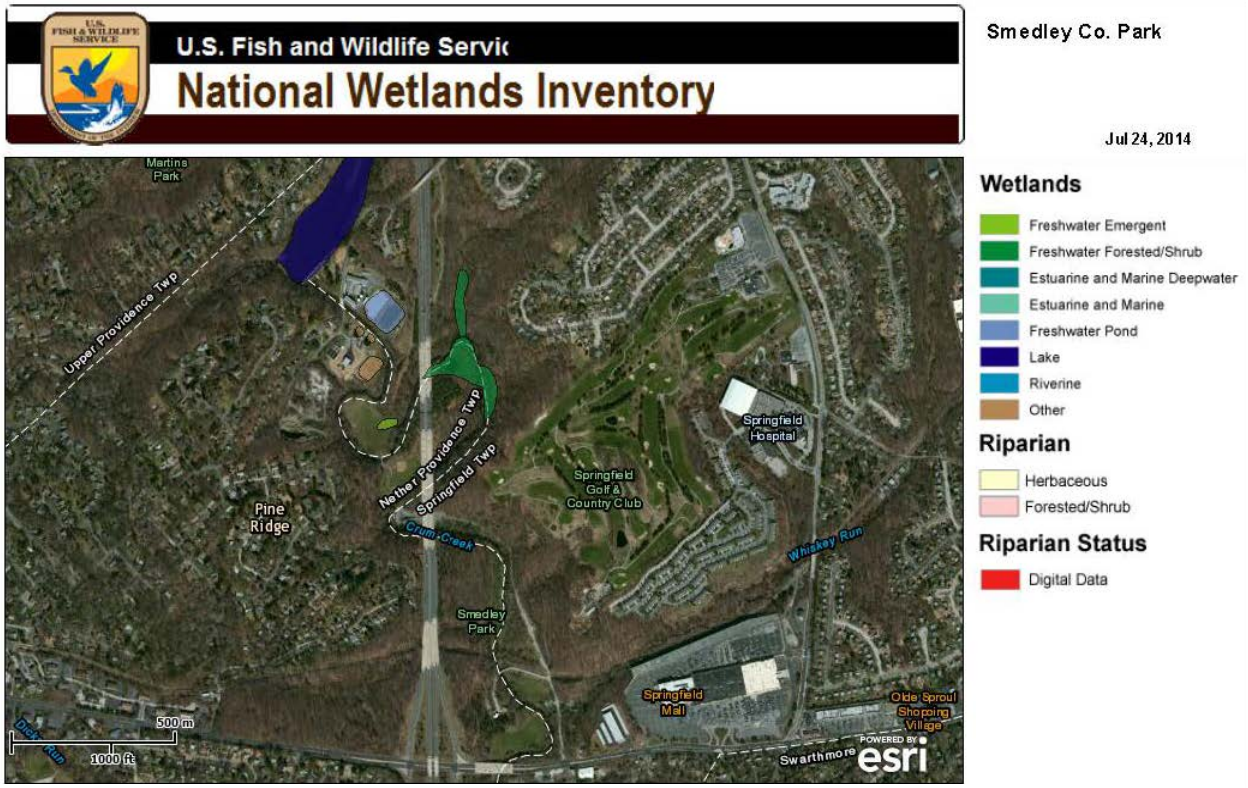


Figure 6-4: National Wetland Inventory of Smedley County Park

NPDES permits.
The soils identified above are detailed further in Appendix S-1.

Topography

Smedley County Park has great variation in topographic relief, mainly due to the Crum Creek valley. The topography is a mix of level, seasonally flooded areas along Crum Creek and steeply sloped hillsides that are heavily forested with mature vegetation.

Mainly because of this varying topography, lands occupied by Smedley County Park were never developed in the past, the only exception being the mills on the flatter areas along Crum Creek.

Hydrology

The major hydrological feature of Smedley County Park is Crum Creek. The creek is a prominent feature that carries through the park from north to south. There are numerous other unnamed tributaries to Crum Creek that flow off of the hillsides throughout the park. Whiskey Run also flows parallel to the trolley line and discharges into Crum Creek near the Baltimore Pike park entrance.

There is a combination of well drained and not so well drained soils within the park typically associated with elevation and slope. What stormwater is not infiltrated generally sheet flows to drainage swales and tributaries to Crum Creek.

There are some stormwater management facilities on the Smedley County Park site. There are many small channelized swales that flow during significant rain events and there is one retention / rain garden

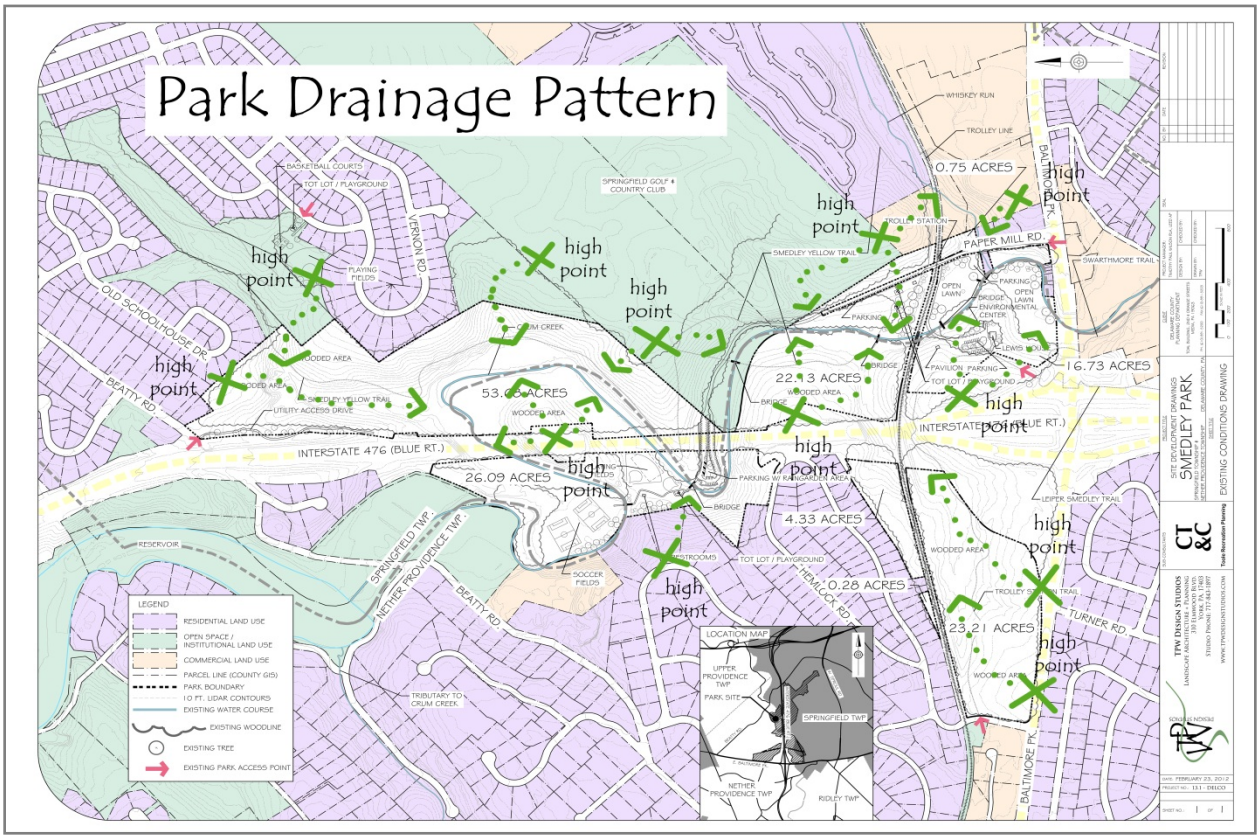


Figure 6-5: Existing park drainage pattern at Smedley County Park

basin associated with the parking area in the middle area of the park at the end of Paper Mill Road.

Figure 6-6: Existing retention / rain garden basin

Crum Creek and Chapter 93 Designation

One of the larger watersheds in Delaware County, Crum Creek drains about 33 square miles and is a direct tributary to the Delaware River. Crum Creek extends all of the way through Delaware County approximately 14 miles to its origination point in Chester County. In Chester, tributaries feed Crum Creek flowing in a southeasterly direction and feeding Springton Reservoir. From the Reservoir, Crum Creek is outlet and continues south and through Smedley County Park on its way down to the Delaware River. Smedley County Park is about 5.25 miles upstream of the Delaware River.

Figure 6-7: Crum Creek from pedestrian bridge

The Chapter 93 Protected Use Designations for the Crum Creek in the area of Smedley County Park are:

WWF – Warm Water Fishes
MF – Migratory Fishes

Designated use of a WWF by Pennsylvania Department of Environmental Protection (PADEP) is defined as "Maintenance and propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat" according to PADEP's Chapter 93 guidelines. According to PADEP, Crum Creek's aquatic life is listed as impaired because of urban influence from urban runoff causing flow variation, siltation, thermal modifications and flow alterations.

There are no Exceptions to Specific Criteria and the waters of Crum Creek in this area are not "HQ" High Quality or "EV" Exceptional Value waters.

Figure 6-8: Crum Creek in Smedley County Park

EXISTING PARK FACILITIES

Figure 6-9: Two baseball/softball fields

Figure 6-10: Six pedestrian bridges over Crum Creek

Figure 6-11: Mountain bike course

Figure 6-12: Several hiking trails

Figure 6-13: Two large open lawn areas

Figure 6-14: Three paved parking areas

Figure 6-15: Concession Stand

Figure 6-16: Environmental Center

Figure 6-17: Two tot-lot / playground areas

Figure 6-18: Pavilion

Figure 6-19: Two soccer fields

Figure 6-20: Paper Mill Road park access drive

HISTORICAL AND CULTURAL RESOURCES

There are two historical and cultural resources associated with Smedley County Park that still remain from past use. Both relate to the Lewis Family and their mill operations along Crum Creek.

The first is the Lewis House and the current home of the Penn State Cooperative Extension of Delaware County. After building the paper mill on Crum Creek, the Lewis family constructed their house on higher ground, probably due to flooding issues.

The house stayed in the family until 1913 when it was part of the Margaret W. Banes 65-acre estate, “Krumleigh Farm.”

Figure 6-21: Lewis House

Figure 6-22: Mill Remains

The other remaining resource is the ruins of a portion of the paper mill operations in Crum Creek.

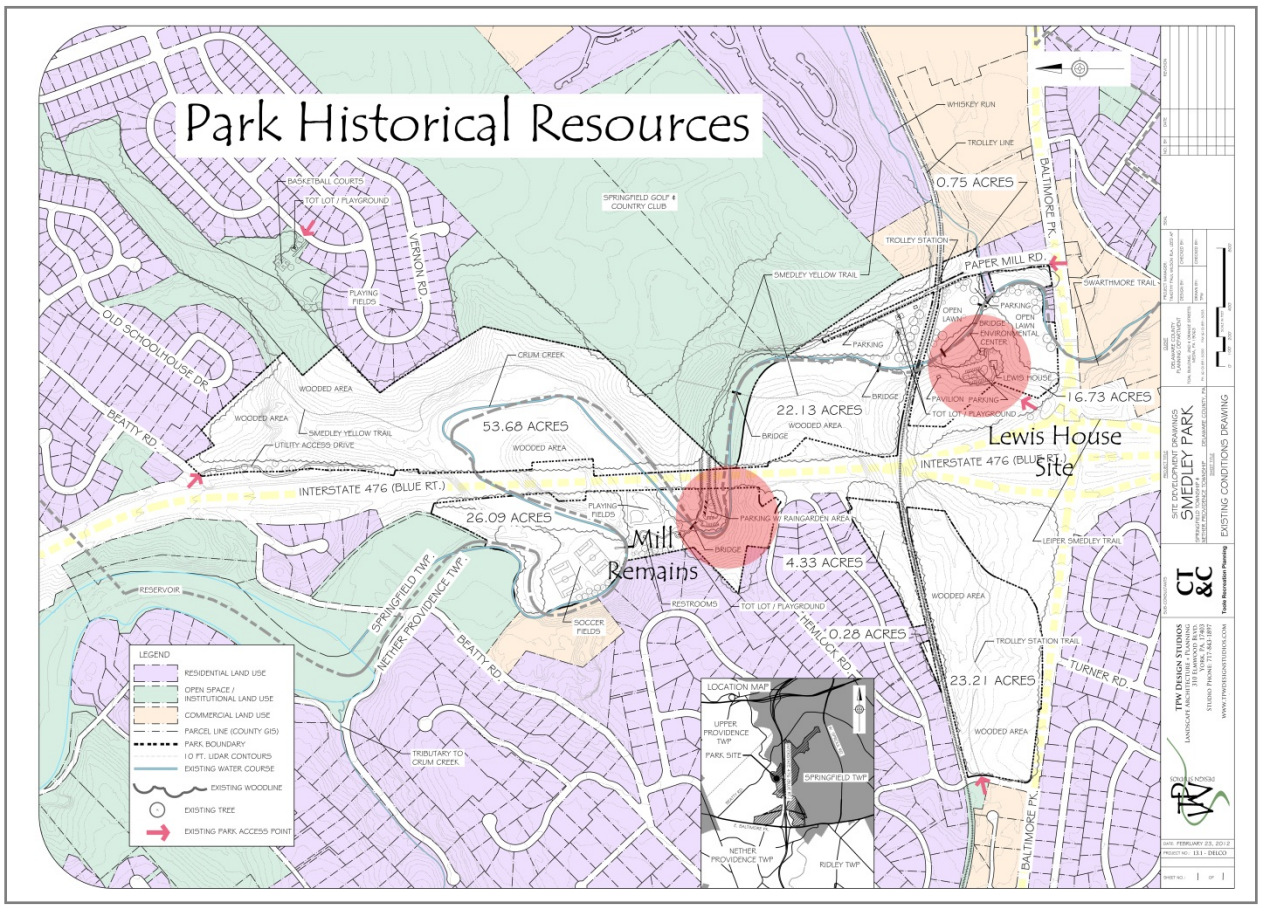


Figure 6-23: Existing historical structures at Smedley County Park

STRUCTURES

Lewis House

2 plus story, masonry and timber construction from the 18th or 19th century. Home of the Penn State's Cooperative Extension of Delaware County, the building appears to have been renovated in recent years and is well maintained.

Environmental Center

1 plus story wood frame construction with masonry foundation, contemporary construction. The Environmental Center is a part of the Penn State program at the site. The building is in generally good condition and well maintained.

Figure 6-24: Environmental Center

Pavilion

Wood timber construction. Its location, up the hill from the parking area of the Penn State program buildings, seems to put it off the beaten path from the more active areas of the park. The timber structure appears in relatively good condition as does the roof for the most part. The two most notable issues that should be

addressed as soon as possible are the extensive build-up of moss on the wood shake roof and the missing blades in the wood louvers. From the ground the wood shakes that are not covered in moss seem to be in reasonable condition for the use and if the ones under the moss are in similar condition, it would appear the roof can be restored to good condition with minimal repair. However, the heavy moss covering accelerates the deterioration of the wood shakes. The moss should be removed, both scraping and treated with an appropriate cleaning agent, and the roof shakes replaced as needed. Replacing the louver blades will not only give users better protection in the advent of rain, but will further protect the timber structure and extend its useful life.

Figure 6-25: Pavilion

PARK ACCESS

Pedestrian

Smedley County Park has an extensive network of formally recognized and rogue walking and earthen path hiking trails that connect to surrounding neighborhoods and other adjacent open space. These trails are the main access point for pedestrians to the park. The formally named trails include the Smedley Yellow Trail, Trolley Trail and Leiper - Smedley Trail.

Figure 6-26: Pedestrian access at Smedley County Park

Trails and Greenways

Smedley County Park is well connected to the area by trails and greenways. The internal park trail system ties into other area trails such as the Lieper - Smedley Trail that carries across Baltimore Pike to the south and on down to Swarthmore Borough towards the College campus. The Smedley Yellow Trail connects to Jane Lownes Park and to communities along Beatty Road to the north. The Trolley Trail moves through the Penza Tract to the west and toward the Trolley Station and downtown Media. This is proposed as a connector to Media in the near future.

Public Transit

Delaware County has an extensive public transit system and Smedley County Park is directly on Bus Route 110 – 69th Street Terminal to Granite Run Mall and Penn State University. The bus service frequency during peak park use times of the day are every half hour Monday – Saturday, and every hour on Sundays.

Smedley County Park also has the luxury of having two trolley station stops within the park at Paper Mill Road and Pine Ridge.

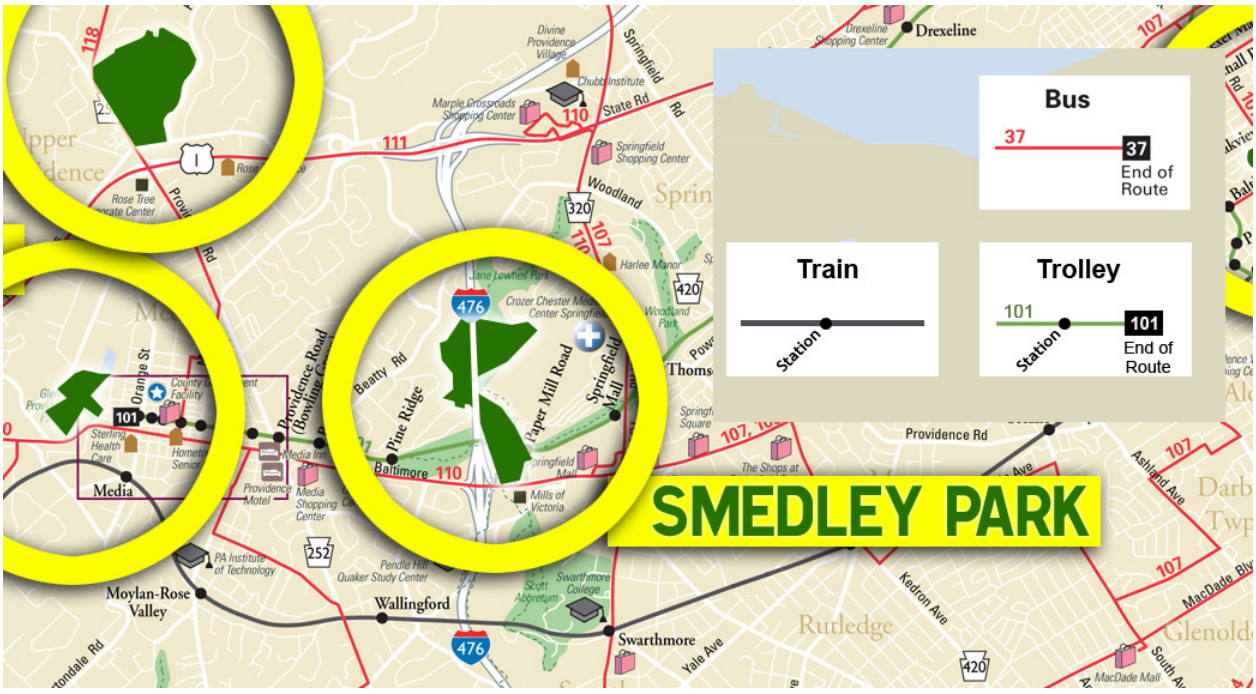


Figure 6-27: Transit connections to Smedley County Park

Vehicular

As it stands, there is only one vehicular access to Smedley County Park. Ingress and egress to the park takes place on Paper Mill Road off of Baltimore Pike. From this sole access, a very narrow access drive (17'-20' wide) meanders through the park.

PARK NEEDS ANALYSIS

PARK USE, PROGRAMS, AND VISITATION IN 2015

As far as what is known, there is currently no documented visitation data for Smedley County Park, so no visitation data was acquired or analyzed. Based on information from Delaware County and what has been visually attained from numerous park visits, the following are points and analysis regarding park use, programs and visitation in 2015.

1) A majority of everyday use comes from an even mixture of local residents and users that drive to the park. These park users typically make a specific trip to the park to recreate and enjoy the many activities Smedley County Park has to offer.

   This use will continue to increase based on development and facility improvements in Smedley County Park.

2) Mostly on week nights and weekends, organized active recreation sports (softball, football, baseball, soccer, and lacrosse) are played on the playing field areas.

   This use and constituency presents the opportunity to increase programming and use with improving and defining the playing field areas and coordinating with local recreation organizations.

   During the day, a majority of the park users enjoy walking / hiking the scenic trail system and using the playground / tot-lot areas.

3) Programs:
   Active Recreation Leagues (soccer, baseball, softball)

   The Environmental Center: educational programs and groups (Boy Scouts, School groups, garden planting groups, nutritional seminars, etc.)

   The Penn State Cooperative Extension: Coordinates with organizations such as the 4-H Club, Master Gardeners, and Horticultural Agents while providing educational opportunities in agriculture, horticulture, nutrition, etc.

PARK NEEDS

The needs of Smedley County Park have been compiled objectively and have been identified based on many variables including numerous consultant site visits and visual observations, public participation and input, Delaware County Planning and Parks and Recreation needs, and user demographic. Public survey information relating to Smedley County Park can be found in Volume IV of the comprehensive Delaware County Open Space Recreation Plan.

The Smedley County Park needs are as follows:

1) Improve access and park circulation improvement
2) Improve pedestrian network and trails
3) Signage

4) Build upon existing resources
5) Better defined open space and playing fields
6) Build upon existing park programming
7) Promotion of park facilities and programs
8) A more efficient and cost effective maintenance program
9) Additional parking
10) Enhance the user experience / make continuously interesting
11) "Curb appeal" and entrance re-design
12) Emphasize and promote the SEPTA Transit System as it relates to park use
13) Preserve and steward site woodlands and riparian areas
14) Site stormwater management facilities
15) The development of relationships between Delaware County and local groups, community oriented and business organizations in the area of Smedley County Park
16) Refurbish pavilion
17) New pedestrian bridges on the hiking trails

PARK DEVELOPMENT OPPORTUNITIES

Based on all information gathered and input attained, the following opportunities have been identified as Smedley County Park existing features, facilities or connections that should be built upon within the Site Development Plan:

1) Park trail network
2) Current mountain bike activities on the Penza Tract
3) Park access and a trailhead at a Beatty Road entrance
4) Build upon tot-lot / playground
5) Playing Fields and associated Programming
6) Environmental Center and Penn State Cooperative Extension programming
7) Woodland and Crum Creek riparian preservation and stewardship
8) Immediately available transit access
9) Tying into the surrounding pedestrian network (sidewalks, crossings, etc.)
10) Delaware County maintenance resources

MANAGEMENT, MAINTENANCE, AND OPERATIONS

Management

Smedley County Park is managed by the Delaware County Parks and Recreation Department, located in Rose Tree County Park. Given the close proximity of Smedley County Park to Rose Tree County Park and the County offices at that facility, the current method of park management is sufficient for the size and use of Smedley County Park.

No future improvement or development of Smedley County Park would necessitate offices or the everyday presence of Delaware County Parks and Recreation staff.

Maintenance & Operations

Delaware County crews have a maintenance facility on site at Smedley County Park, and these crews currently perform weekly maintenance duties that include trash pick-up, mowing, preventative maintenance, and incident maintenance.

As Smedley County Park is improved and programming increases, use will increase, but not to levels that the current maintenance and operations will be insufficient. A detailed maintenance and operation task schedule and frequencies should be implemented in order to effectively manage park upkeep tasks and coordinate with other County Park facility schedules.

PARK SITE DEVELOPMENT PLAN AND RECOMMENDATIONS

THE SITE DEVELOPMENT PLAN "CONCEPT"

The concept of the Smedley County Park Site Development Plan is to provide a well-connected passive and active recreation destination in the Delaware County Park system while protecting its natural resources and character.

The concept places emphasis on internal pedestrian movement and making critical community and regional links while connecting active and passive recreation areas with open areas, "green" space and trails.

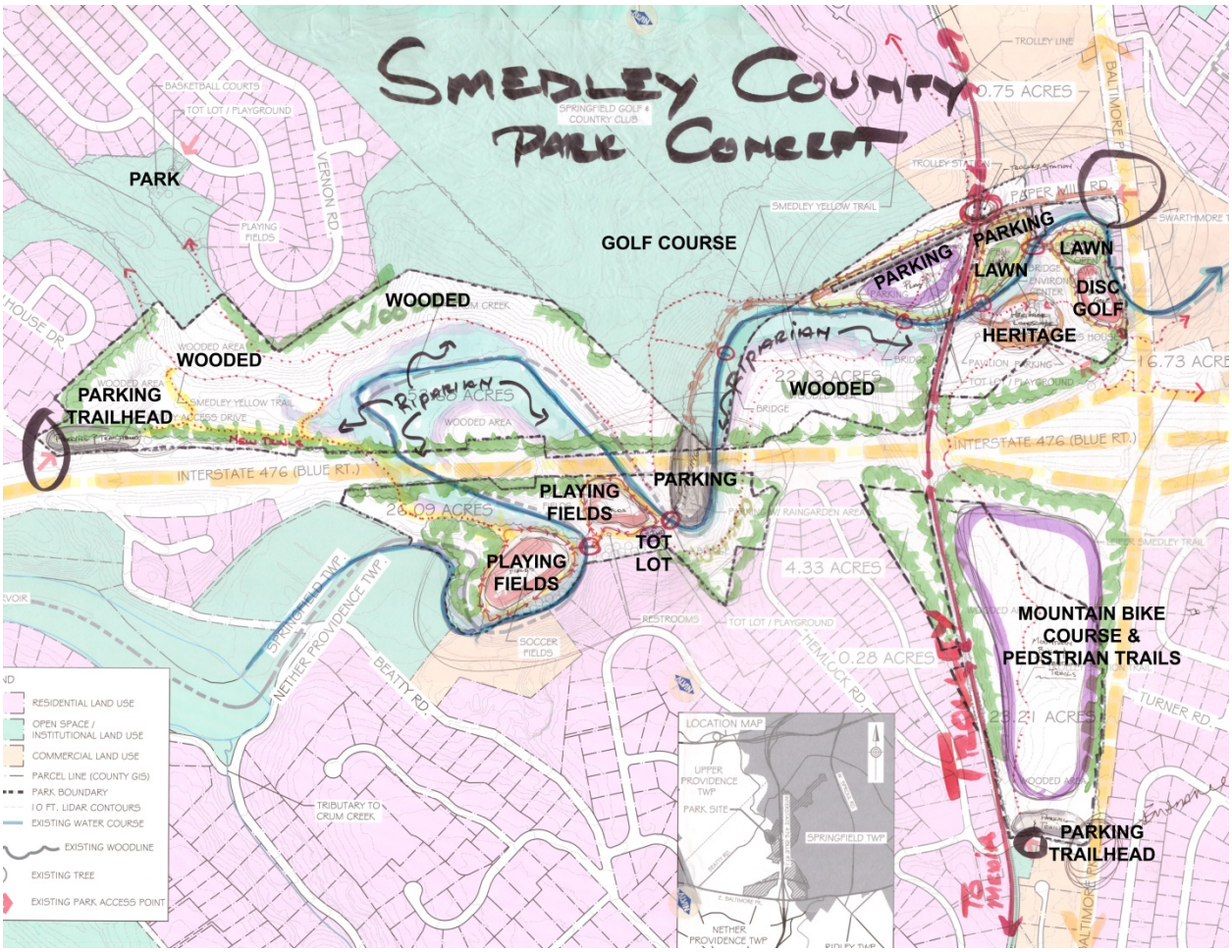


Figure 6-28: Smedley County Park concept sketch

RECOMMENDATIONS

All recommendations suggested in this narrative are the result of an extensive analysis of existing park and Delaware County resources, public involvement (and surveys), and potential park user demand.

Facilities & Park Site Development

The following Smedley County Park Recommendations are in no particular order based on needs or priority. Phasing and implementation priority will be discussed further along in this park narrative.

Recommended Smedley County Park improvements are as follows:

1) Improve Smedley County Park (and overall County Park) signage to a standardized system that is identifiable and recognizable as such. Including interpretive signage.
2) Implement of a new 18-hole Disc Golf Course.
3) Construct a new parking area / trailhead off of Beatty Road.
4) Coordinate parking in conjunction with the Pine Ridge trolley station.
5) Improve and develop the park pedestrian circulation network including multi-use paths, earthen path trail improvements (with bridges), sidewalk improvements and crosswalk improvements to better access park resources including the Trolley Station and existing connecting trails.
6) Expand / Re-design and improve Playgrounds / Tot-lots.
7) Install park / county park system kiosks (Signage), benches and seating areas (including picnic groves).
8) Refurbish pavilion area.
9) Better define open spaces and lawn areas with native plant material and meadows.
10) Redesign of the existing playing fields / baseball fields / soccer fields.
11) Advocate for park "friends" groups and foster partnerships with local business and recreation organizations that could be park stewards and potentially work with Delaware County on park upkeep, maintenance and/or security. In particular, the PMBA (Philadelphia Mountain Bike Association) group of mountain bikers on the Penza Tract.
12) Implement mountain bike course on Penza Tract.
13) A redesign / improvement of existing parking facilities.
14) Install on-site compost and recycling area.
15) Establish and Maintain a 50' riparian buffer and floodplain restoration along Crum Creek.
16) Improve the pedestrian underpass of the trolley line.
17) Redesign / improve park entrance on Baltimore Pike.

The Site Development Plan

The site development plan is an illustrative rendering of Smedley County Park that reflects the recommended improvements at full park "build out." The plan incorporates all phases of development including "long-range" concepts.

Many factors play a role in the development and timeframe of park improvements: available funds and funding sources, County needs, park use demands and the like. It is recognized that priorities change over time. That being said, a recommended phasing plan for the Smedley County Park development has been laid out further along in this section of the park narrative.

SMEDLEY COUNTY PARK

SITE DEVELOPMENT PLAN

JANUARY 2015

SPRINGFIELD GOLF & COUNTRY CLUB

SPRINGFIELD TOWNSHIP

NETHER PROVIDENCE TOWNSHIP

VERNON ROAD

JANE TOWNES PARK

OLD SCHOOLHOUSE DR.

BEATTY ROAD

INTERSTATE 476 (BLUE ROUTE)

PAPER MILL RD.

COUNTY PARK SIGN & MEMORIAL

TO SWARTHMORE COLLEGE

BALTIMORE PIKE

PINE RIDGE ROAD

HEMLOCK ROAD

PARKRIDGE DRIVE

TO DOWNTOWN MEDIA

TROLLEY STATION

TROLLEY LINE

TROLLEY STATION TRAIL (MULTI-USE PATH)

PEDESTRIAN UNDERPASS

18 HOLE DISC GOLF COURSE

8' MULTI-USE PATH

SMEDLEY YELLOW TRAIL (EARTHEN PATH TRAIL)

CRUM CREEK

RIPARIAN

WOODED

BRIDGE

ACCESS DRIVE

RESTROOMS

MAINTENANCE BUILDING INCLUDES AREA FOR SITE COMPOST AND RECYCLING

PICNIC GROVE

PAVILION

LAWN

PLAYING FIELDS

TOT LOT

SOCCER FIELDS

RESTROOMS & CONCESSIONS

RESERVOIR

ADDITIONAL PLAN INFORMATION

PARK ACREAGE - 116.90 ACRES
IN SPRINGFIELD TOWNSHIP AND NETHER PROVIDENCE TOWNSHIP

- PARK BOUNDARY
- EXISTING 10 FOOT CONTOUR
- 100 YEAR FLOODPLAIN
- MUNICIPAL BOUNDARY

1. MOUNTAIN BIKE COURSE / PARK WITH SHARED USE SIGNAGE
2. ENVIRONMENTAL CENTER & LEWIS HOUSE (PENN STATE EXTENSION) COMPLEX
3. BEATTY ROAD PARK ENTRANCE / TRAILHEAD
4. ADA ACCESSIBLE PARKING, TOT LOTS AND PICNIC GROVE. REDESIGN PLAY AREAS
5. RIPARIAN AND FLOODPLAIN WETLAND CONSERVATION ALONG ENTIRE CRUM CREEK CORRIDOR THROUGH PARK
6. PINE RIDGE TROLLEY STATION PARKING AREA WITH CROSSING AND PARK ACCESS

VEGETATION

- LAWN
- RIPARIAN CONSERVATION
- NATIVE MEADOW
- FOREST / WOODED AREA

FEATURES & AMENITIES

- POTENTIAL TRAIL / PED. CONNECTION
- BENCHES
- INTERPRETIVE SIGNAGE
- PARK KIOSK
- SMALL PARK KIOSK
- PARKING
- NEW PEDESTRIAN CROSSING

NOTE: ITALIC LABELS REPRESENT EXISTING SITE INFORMATION

SCALE IN FEET
0' 85' 170' 340' 680

TPW DESIGN STUDIOS
LANDSCAPE ARCHITECTURE & PLANNING
310 ELMWOOD BOULEVARD YORK, PA.
STUDIO PHONE: 717.843.1897

TOOLE RECREATION PLANNING

CT&C

Trail & Greenway Connections

Smedley County Park has the luxury of having earthen path trails that directly connect to the regional pedestrian network.

These trails are the: 1) Leiper - Smedley Trail that crosses Baltimore Pike on the south end of the park parallels I-476 through Nether Providence Township; 2) The Smedley Yellow Trail that winds through the park from north to south and; 3) the Trolley Station Trail the crosses the park from east to west.

It is recommended that these links be improved, maintained and promoted as Smedley Park connectors through signage.

Figure 6-29: Trolley Station Trail

Figure 6-31: Leiper-Smedley Trail

Park Programming

With the long range Smedley County Park site development plan and the idea of the park building on the identity of an active and passive recreation destination in Delaware County, there are many opportunities to increase park programming and potentially capitalize on revenues associated with certain programs.

Park programming can take on so many different meanings and programming can change from season to season and year to year. Some general park programming elements as it relates to the Smedley County Park Site Development Plan are as follows:

1) Disc Golf
2) Organized active recreation leagues, and field rentals
3) Mountain Biking Facility
4) Concessions
5) Environmental Center and Penn State Cooperative Extension of Delaware County – These facilities, aside from the programming mentioned previously in the needs analysis section of this narrative, should add classes and programs to broaden the user demographic and attraction to the park and its natural resources.
6) Pavilion use and rental

Management

It is recommended that Smedley County Park, even with the implementation of the Site Development Plan, continue to be managed remotely from the Delaware County Park and Recreation offices at the nearby Rose Tree County Park.

Maintenance and Operations

The mission of an operation and maintenance program for Smedley County Park is to create a regularly scheduled routine, reactive and preventative maintenance system that guides the stewardship of the park in a way that provides a safe, sustainable, and aesthetically pleasing County and community asset that is operational for public use.

Smedley County Park is and will continue to be a major player in the Delaware County Park system. This fact points to increased use and park visitation rates. With improved park access, amenities and increased awareness, the usage rates of the park shall steadily increase over time. Keeping the park well maintained will prove to be an important task in the sustainable success of the park.

Maintenance and Operations Tasks

Smedley County Park maintenance tasks and schedule typically involves mowing, keeping the grounds free of trash and debris, removal of downed limbs or dead trees, snow removal, inspection and repair of permanent structures, fencing, park amenities and parking areas on a per year basis.

Grass & Turf Care

Cut once every 10 working days. A grass clipping deposit area should be designated on site for composting located away from park waterbodies. Aeration of grass area is not necessary unless grass quality indicates a need or an application of fertilizer is anticipated. Reseed and sod only when major bare spots are present. Weeding shall ensue when grass is 50% weed infested or grass quality is low in 15% or more of the surface.

Fertilizer

Apply only when grass vigor seems low. Low level applications can be administered on a once per year basis.

Irrigation

No irrigation should be anticipated.

Planting Beds
Landscape bed areas should be kept in a weed, leaf and debris-free condition. Plants should be trimmed to maintain desired shape and to maintain natural growth habit of plant species.

Litter Control
Litter service is needed two times a week or as necessary. In times of warmer weather and increased use, litter control may be more frequent.

Disease and Insect Control
Done only on epidemic or serious complaint basis. Pest, weed and rodent control measures may be put into effect when the health or survival of the plant material is threatened or where public's comfort is concerned.

Snow Removal
Snow removal shall only be necessary after all snowfall events. Snow removal shall be accomplished by the day following the snowfall.

Lighting
Replacement or repair of fixtures when a report is filed or when a malfunction is detected by inspection staff.

Amenity and Permanent Structure Repairs
Should be accomplished immediately when safety or function is at question.

General Inspection
Once per week.

The following routine preventative maintenance program and schedule has been fashioned to reflect the projected amount of park use at full park build out.

Table 6-1: General Maintenance and Operation Frequencies

Operation	Frequency					
	Daily	Weekly	Monthly	Quarterly	Annually	As Needed
Parking Areas						
Inspection		x				
Repair						x
Remove Litter						x
Remove Snow						x
Permanent Structures						
All Bridges						
Inspection				x		
Repair						x
Stormwater Management Facilities						
Inspection / Clear Obstructions				x		
Repair						x

Table 6-1: General Maintenance and Operation Frequencies (cont.)

Operation	Frequency					
	Daily	Weekly	Monthly	Quarterly	Annually	As Needed
Landscape Maintenance						
Trimming						x
Leaf Removal					x	
Tree Pruning					x	x
Tree Replacement						x
Seasonal Plantings				x		
Weeding				x		
Mulching					x	
Fertilizing / Treatment					x	x
Watering / Irrigation						x
Cleaning						
Empty Trash Cans		2x				
Restroom Facilities		x				x
Remove Litter		2x				x
Amenity Maintenance						
Lighting						
Inspection			x			
Repair / Replace						x
Signage						
Inspection			x			
Cleaning					x	
Repair / Replace						x
Furnishings						
Inspection			x			
Repair / Replace						x
Bollards / Gates						
Inspection			x			
Repair / Replace						x
Other Services						
Update Park Kiosk Information						x
Security Patrol	x					
Graffiti Removal						x
Riparian Repair & Rehabilitation						x

Tree Care

Tree care is important to sustaining and guiding responsible tree growth within Smedley County Park. Trees and other woody plant material respond biologically to pruning in specific and predictable ways. Careful study of these responses has led to pruning practices that can best develop, preserve, and enhance the structural integrity, beauty and functional value of trees. Through pruning, one can: maintain or direct plant form; enhance health and appearance; influence flowering, fruiting, and vigor; regulate growth; control plant size; and invigorate declining plants. Tree pruning should occur annually but may be needed in emergency situations. The following are high and medium to low priorities for emergency pruning:

High Priority

1) Trees or limbs that have fallen and caused accidents or personal injury.
2) Trees or limbs that have fallen and caused damage to the trail, vehicles, or structures.
3) Trees or limbs which are in immediate danger of falling or breaking.
4) Broken hanging limbs adjacent to the trail, structures, roads, or picnic or play areas.
5) Trees or limbs that block roads or access points.

Medium to Low Priority:

1) Trees or limbs that have fallen and are not an immediate hazard.
2) Trees or limbs that have fallen and are not blocking the trail, roads or access points.
3) Hanging tree limbs that may not be in immediate danger of falling.
4) Dead or severely declining trees without a target present.

Timing of tree pruning can vary. Trees deemed as hazardous should be pruned immediately and during any season. Generally, light pruning can be done at any time during the year on most species if the trees are in good health. Most deciduous plants can be pruned during the dormant period between leaf fall and the end of winter. This can minimize the risk of pest problems. Avoid pruning broadleaf trees in early to late spring. Evergreens will be set back the least if they are pruned in the late winter. It is recommended to evaluate each tree before pruning and avoid large scale pruning efforts during the bird nesting season. There are many types of tree pruning practices to achieve certain desired results. Pruning can be performed for structure, general cleaning, thinning, raising, reducing, and/or restorations.

Pruning for Structure

Structural pruning is the removal of live branches and stems to influence structural integrity. It usually follows four procedures: 1) Canopy cleaning by removing dead, broken, diseased and dying branches, 2) development or re-establishment of a dominant leader, 3) establishment of the lowest permanent scaffold limb and 4) establishment of scaffold limbs by removing competing stems or branches.

Pruning to Clean

Cleaning is the selective removal of dead, diseased, detached, rubbing and broken branches. This type of pruning is done to reduce the risk of branch failure and the transmission of decay, insects and diseases.

Pruning to Thin

Thinning is the selective removal of small live branches to reduce crown density. Branches are 0.25 to 1.00 inches in diameter. 10-15 percent of live foliage can be removed at one time. If more pruning is desired, it should not exceed 25 percent in a single year. Excessive removal of small branches on the lower two-thirds of a branch or stem is called lion tailing and may have an adverse effect on the tree – it is not an accepted practice.

Pruning to Raise

Raising is the selective removal of branches to provide vertical clearance. Caution must be taken to not remove too many lower branches. This can cause slow development of trunk taper, cause cracks or decay in the trunk, or transfer too much weight to the top of the tree.

Pruning to Reduce (Drop Crotch)

Reduction is the selective removal of branches and stems to decrease the height and/or spread of a tree. This type of pruning is done to minimize the risk of failure, to reduce height or spread, for utility clearance, to clear vegetation from buildings or other structures, or to improve tree appearance. Crown reduction shall be accomplished with reduction cuts rather than heading cuts.

Pruning to Restore

Restoration is the selective removal of branches, sprouts, and stubs from trees that have been topped, severely headed, vandalized, lion –tailed, broken during a storm, or otherwise damaged. Full restoration usually requires several pruning events over a number of years.

Pruning Conifers

Conifers are primarily pruned to control the density of branching, the shape of young trees, and the size of older ones. They are intolerant of topping or heading. Conifers typically have an ex-current growth habit, which is usually maintained throughout the lifespan of the tree. Thinning, by the selective removal of small branches, is the most appropriate method when pruning conifers.

Tree Removal and Replacement

Trees should be removed in Smedley County Park for the following reasons: the tree is dead or dying; it is diseased; it is damaged or injured to the extent that is likely to die and become a hazard; or it constitutes a hazard. Nuisance trees should be removed when the tree causes or is about to cause impairment to the park.

It is most desirable to replace a tree of the same (native) species in the same place it was removed, but sometimes crowding and other physical constraints make it impossible to replace the tree in the same spot. In this case, finding an alternate location is the best option. Undesirable species (non-native) are not to be replaced. It is a responsible and environmentally friendly idea to plant desirable, sustainable trees within the park.

Recommended Native Plant Material

It is a sustainable practice to design with and use native plant material within Smedley County Park whenever possible. Native plant material is hardy and requires less watering and general care because it is naturally acclimated to the seasons and weather cycles of the region. The following is a list of plant material native to Pennsylvania:

Table 6-2: Native Plant Material for Smedley County Park

Medium to Large Trees

Common Name	Scientific Name	Bloom Period	Height	Notes
Red Maple	*Acer rubrum*	Mar-Apr	40-60 ft.	Red flowers; adaptable; fall color
Sugar Maple	*acer saccharum*	Apr-May	60-75 ft.	Yellow flowers in spring; fall color; maple syrup
Yellow Birch	*Betula alleghaniensis*	Apr-May	60-80 ft.	Catkins in winter
Black Birch	*Betula lenta*	Apr-May	45-55 ft.	Catkins in winter
River Birch	*Betula nigra*	Apr-May	60-80 ft.	Catkins; striking bark
Eastern White Pine	*Pinus strobus*	N/A	50-80 ft.	N/A
White Oak	*Quercus alba*	Mar-Jun	50-100 ft.	Edible nuts
Chestnut Oak	*Quercus montana*	May-Jun	40-75 ft.	Fall color; nuts attractive to wildlife

Small Trees and Shrubs

Common Name	Scientific Name	Bloom Period	Height	Notes
Smooth Alder	*Alnus serrulata*	Mar-Apr	6-10 ft.	Yellow catkins; multi-stemmed; needs wet soil
Serviceberry	*Amelanchier arborea*	Mar-May	15-25 ft.	White flowers in spring; edible berries; fall color
Alternate-leaved Dogwood	*Cornus alternifolia*	May-Jun	15-25 ft.	White flowers in early summer; blue berries
Flowering Dogwood	*Cornus florida*	Apr-Jun	10-30 ft.	White branchts in spring; red berries
Winterberry	*Ilex verticillata*	May-Jun	6-10 ft.	Showy berries in winter; multi-stemmed
Mountain Laurel	*Kalmia latifolia*	May-Jul	7-15 ft.	White flowers; evergreen; multi-stemmed; PA state flower
Spicebush	*Lindera benzoin*	Mar-May	6-12 ft.	Berries and foliage in fall; multi-stemmed; ferbal uses
Wild Plum	*Prunus americana*	Apr-May	15-25 ft.	White flowers; edible fruit; nulti-stemmed
Elderberry	*Sambucus canadensis*	Jun-Jul	5-15 ft.	White flowers; multi-stemmed; edible berries & flowers
Highbush Blueberry	*Vaccinium corymbosum*	May-Jun	6-12 ft.	White flowers; multi-stemmed; edible berries; fall colors
Arrow-wood	*Viburmun recognitum*	May-Jun	3-15 ft.	White flowers in late spring; multi-stemmed
Virginia Creeper	*Parthenocissus quinquefolia*	July	10-40 ft.	Fall color; berries improtant for wildlife; considered a vine

Grasses (Perennial)

Common Name	Scientific Name	Bloom Period	Height	Notes
Lurid Sedge	*Carex lurida*	Jun-Oct	1-2 ft.	Wetland plant; interseting seeds
Bottlebrush Grass	*Elymus hystix*	Jun-Aug	2-4 ft.	Grass that grows in shade
Virginia Wild-rye	*Elymus virginicus*	Jul-Sep	2-4 ft.	Grass that tolerates a wide range of conditions

Ferns (Perennial)

Common Name	Scientific Name	Bloom Period	Height	Notes
Maidenhair Fern	*Adiantum pedatum*	N/A	1-2 ft.	Grows in clumps; delicate texture; herbal uses
Evergreen Shield Fern	*Dryopteris marginalis*	N/A	1-3 ft.	Evergreen; clump-forming; attractive
Interrupted Fern	*Osmunda claytoniana*	N/A	2-4 ft.	Grows in clumps; distinctive fronds
Christmas Fern	*Polystichum achrostichoides*	N/A	1-2 ft.	Evergreen; grows in clumps

Showy Flowers (Perennial)

Common Name	Scientific Name	Bloom Period	Height	Bloom Color & Notes
Wild Columbine	*Aquilegia canadensis*	Apr-Jun	1-3 ft.	Red & Yellow - Commonly cultivated; spreads by seeds; hummingbirds
Jack-in-the-pulpit	*Arisaema triphyllum*	Apr-Jun	1-3 ft.	Green-purple - Unusual flower; bright red berries
Wild Ginger	*Asarum canadense*	Apr-May	< 1 ft.	Maroon - Edible and herbal uses
Butterfly-weed	*Asclepias tuberosa*	May-Sep	1-3 ft.	Orange - Butterfly plant; tolerates dry conditions; taproot
Turtlehead	*Chelone glabra*	Jul-Sep	1-3 ft.	Whitish - Tolerates wet areas; strong grower; herbal uses; hummingbirds
White snakeroot	*Eupatorium rugosum*	Jul-Oct	2-3 ft.	White - Tough plant; can grow in dry shade; cultivars availible
Wood Geranium	*Geranium maculatum*	Apr-Jul	1-2 ft.	Rose - Adaptable plant; long bloom time spreader; herbal uses
Common Sneezeweed	*Helenium autumnale*	Aug-Oct	2-6 ft.	Yellow - Tolerates wet areas; showy flowers; herbal uses
Sunflowers	*Helianthus sp.*	Jul-Sep	4-6 ft.	Yellow - Perennials; often aggressive; showy flowers; good for birds
Oxeye Sunflower	*Heliopsis helianthoides*	Jul-Sep	1-5 ft.	Yellow - long bloom time; butterfly plant
Alum-root	*Heuchera americana*	May-Aug	1-2 ft.	Greenish - Long bloom time; many culitvars and hybrids
Cardinal Flower	*Lobelia cardinalis*	Jul-Sep	2-5 ft.	Scarlet - Long bloom time; butterfly and hummingbird plant
Great Blue Lobelia	*Lobelia siphilitica*	Jul-Oct	1-3 ft.	Blue - Long bloom time; white cultivars; hummingbirds
Partridge-berry	*Mitchella repens*	Jun-Jul	< 1 ft.	White - Evergreen; ground cover; berry edible and showy
Bee-balm	*Monarda didyma*	Jul-Aug	2-5 ft.	Red - Showy flowers; aromatic; butterfly plant; herbal uses
Phlox	*Phlox divaricata*	May-jun	1-2 ft.	Lilac - Aromatic; butterfly plant
Phlox	*Phlox maculata*	Jul-Sep	1-3 ft.	Purple - Aromatic; showy flowers; butterfly plant
Phlox	*Phlox paniculata*	Jul-Oct	2-5 ft.	Pink - Aromatic; showy flowers; butterly plant
May-apple	*Podophyllum petatum*	May	1-2 ft.	White - Ground cover, edible fruit; mottled foliage
Jacob's Ladder	*Polemonium reptans*	Apr-Jun	1-2 ft.	Blue - Attractive flowers; slow spreader; herbal uses
Solomon's Seal	*Polygonatum pubescens*	Apr-Jun	1-3 ft.	Yellow - Not fussy; blue berries; herbal and edible uses
Black-eyes Susan	*Rudbeckia hirta*	May-Sep	2-3 ft.	Orange - Bright daisy-like flowers; long bloom time; many cultivars
Bloodroot	*Sanguinaria canadensis*	Mar-May	< 1 ft.	White - Red juice; herbal uses
Golden Ragwort	*Senecio aureus*	May-Jul	1-2 ft.	Yellow - Wetland plant; long bloom time; early daisy-like flowers
False Solomon's Seal	*Smilacina racemosa*	May-Jul	1-2 ft.	White - Plume like flower; re berries; herbal uses
Wrinkle-leaf Goldenrod	*Solidago rugosa*	Jul-Nov	2-6 ft.	Yellow - Aggressive; tough plant; butterfly plant
Tall Meadow-rue	*Thalictrum pubescens*	May-Jun	2-8 ft.	White - Wet to moist soil; tall plant; delicate flowers
Foamflower	*Tiarella cordifolia*	Apr-Jun	< 1 ft.	White - Attractive, long-blooming flower; many cultivars
Trillium	*Trillium grandiflorum*	Apr-Jun	1-2 ft.	White - Showy flowers
American Dog Violet	*Viola conspersa*	Apr-May	< 1 ft.	Violet - Delicate plant and flower; edible
Common Blue Violet	*Viola sororia*	Apr-May	< 1 ft.	Violet - Delicate plant and flower; edible
Golden-alexanders	*Zizia aurea*	Apr-Jun	1-2 ft.	Gold - Not fussy; attracts good insects

RECOMMENDED PHASING & COST PROJECTIONS (ESTIMATES)

The following are recommended phasing and estimated cost projections for each phase of development for Smedley County Park. The Phases have been broken down into three different phases: Phase I – Short Term (0-5 years); Phase II – Medium Term (5-15 Years); and Phase III – Long Term (15-30 Years).

The following phasing recommendations and estimated costs are based on 2014 dollars, the current park condition, outlook of capital expenditure and funding, and proposed development. Recommendations are fluid and always susceptible to change for any number of reasons: cost increases in materials, priorities change, use and demographic changes, and unexpected funding sources (or lack thereof). Phasing recommendation are always a best guess of how the park will most likely develop over the next 30 or 40 years and the phases will most likely overlap somewhat. All estimated costs assume furnish and install prices.

Phase I – Short Term (0-5 Years)

1) Improve Smedley County Park (and overall County Park) Signage
2) Begin improvement and development of the park pedestrian circulation network and connections and crosswalks to adjacent neighborhoods and trails
3) Begin installation of park amenities, benches and seating areas (including picnic groves)
4) Define open spaces and lawn areas with native plant material and naturalized meadows
5) Implement on-site compost and recycling area
6 Riparian Buffer and floodplain restoration along Crum Creek
7) Advocate for park "friends" groups and foster partnerships with local business and recreation organizations

Table 6-3: Smedley County Park - Phase I: Short Term (0-5 Years) Cost Estimate

Description	Cost Basis	Quantity	Unit Price	Total Cost
1) Smedley County Park Signage				
Kiosks	LS	1	$17,200.00	**$17,200.00**
Roadway	LS	1	$2,600.00	**$2,600.00**
Interpretive	LS	1	$9,900.00	**$9,900.00**
Directional, Informational & General Park	LS	1	$12,500.00	**$12,500.00**
2) Begin Park Ped. Circulation Network & Connections				
Paved Multi-use Path	SY	900	$52.00	**$46,800.00**
Concrete Sidewalk	SY	250	$63.00	**$15,750.00**
Road Crossings	Each	3	$1,200.00	**$3,600.00**
Earthen Path	SY	1600	$19.00	**$30,400.00**
3) Begin Implementing Park Amenities				
Benches	Each	16	$725.00	**$11,600.00**
Trash Cans	Each	8	$560.00	**$4,480.00**
Improve Picnic Groves	LS	1	$14,500.00	**$14,500.00**
4) Begin Developing Open Space, Meadows, Lawn Areas				
Landscaping, Planting and Seeding	LS	1	$23,000.00	**$23,000.00**
5) On-site Compost and Recycling Area				
Building On-site Compost and Recycling Area	LS	1	$3,800.00	**$3,800.00**
7) Riparian Buffer & Floodplain Restoration				
Crum Creek Restoration	LS	1	$58,000.00	**$58,000.00**
8) Develop Local Partnerships				
Delaware county staff time	LS	1	$12,400.00	**$12,400.00**
Phase I Total				**$266,530.00**

Note: Costs associated with Design and Maintenance have not been built into the costs per phase. Design work needed for any park improvement items would carry a cost of approximately 15% of the estimated construction/installation cost of the improvement.

Phase II – Medium Term (5-15 Years)

1) Continue improvement and development of the park pedestrian circulation network and connections and crosswalks to adjacent neighborhoods and trails
2) Continue installation of park amenities, benches and seating areas
3) New 18-hole disc golf course
4) Expand / re-design and improve playgrounds / tot-lots
5) Refurbish pavilion
6) Coordinate parking in conjunction with the Pine Ridge Trolley Station (SEPTA) and improve stations associated with park
7) Continue developing open spaces and lawn areas with native plant material and naturalized meadows
8) Redesign / improve park entrance on Baltimore Pike

Table 6-4: Smedley County Park - Phase II: Medium Term (5-15 Years) Cost Estimate

Description	Cost Basis	Quantity	Unit Price	Total Cost
1) Continue Park Ped. Circulation Network and Connections				
Paved Multi-use Path	SY	750	$52.00	**$39,00.00**
Concrete Sidewalk	SY	300	$63.00	**$18,900.00**
Road Crossings	Each	2	$1,200.00	**$2,400.00**
Earthen Path	SY	375	$19.00	**$7,125.00**
2) Begin Park Ped. Circulation Network & Connections				
Benches	Each	10	$725.00	**$7,250.00**
Trash Cans	Each	5	$560.00	**$2,80.00**
3) New 18-Hole Disc Golf Course				
Implementing Course	LS	1	$68,000.00	**$68,000.00**
4) Improve Playgrounds/Tot Lots				
Improvements	LS	1	$24,500.00	**$24,500.00**
5) Pavilion				
Refurbish Work	LS	1	$18,500.00	**$18,500.00**
6) Trolley Stations Coordination & Improvements				
Station in Park	LS	1	$38,000.00	**$38,000.00**
Pine Ridge Road Station	LS	1	$95,000.00	**$95,000.00**
7) Continue Developing Open Space, Meadows, Lawn Areas				
Landscaping, Planting and Seeding	LS	1	$12,500.00	**$12,500.00**
8) Park Entrance (Baltimore Pike) Improvements				
Improvements	LS	1	$188,000.00	**$188,000.00**
Phase II Total				**$521,975.00**

Phase III – Long Term (15-30 Years)

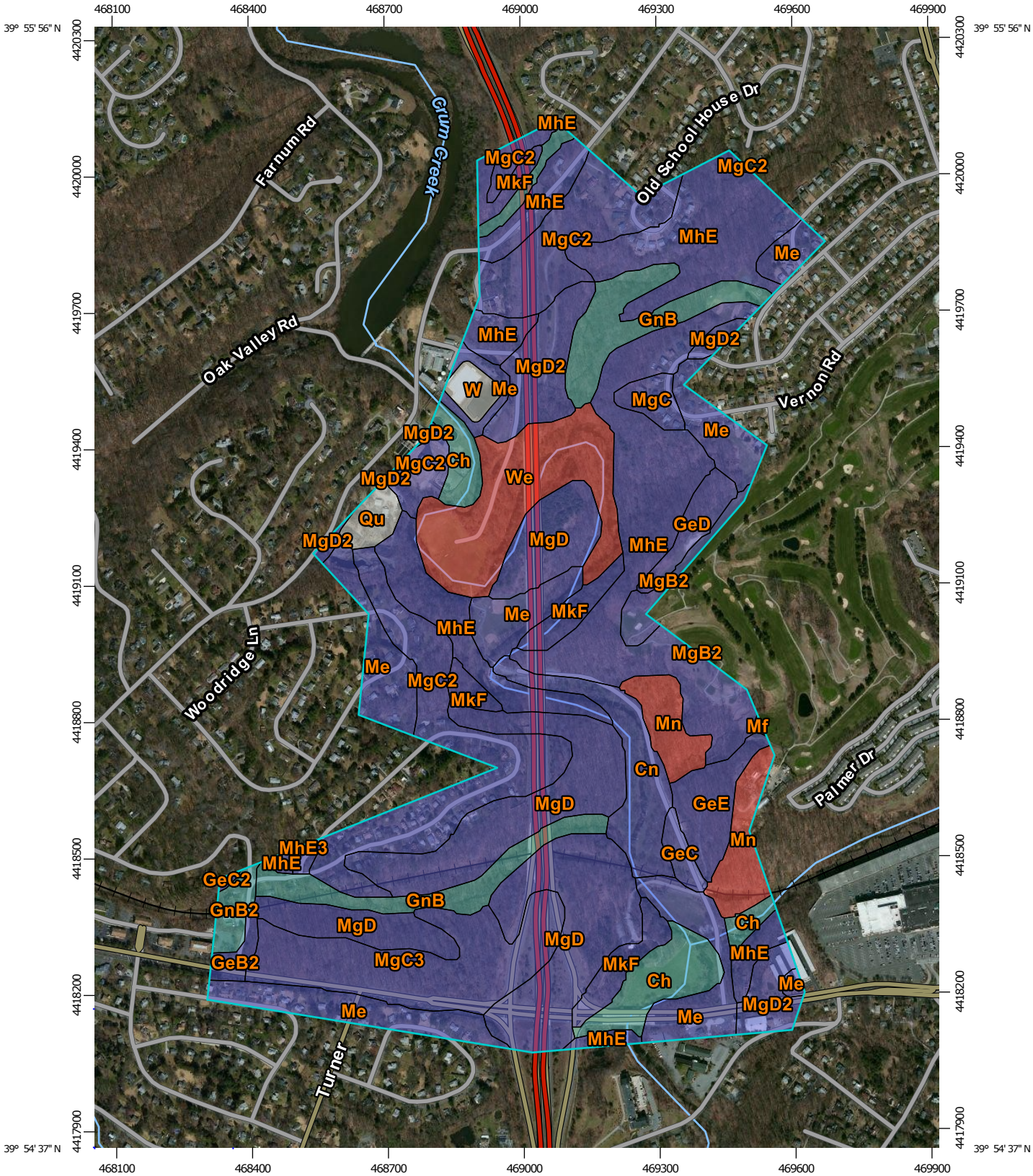
1) Continue improvement and development of the park pedestrian circulation network
2) Continue installation of park amenities, benches and seating areas
3) Redesign the existing playing fields / baseball fields
4) Redesign / improve existing parking facilities and the addition of new trailhead / parking areas at Beatty Road
5) New pedestrian bridges
6) Implement mountain bike course on Penza Tract
7) Continue developing open spaces and lawn areas with native plant material and naturalized meadows

Table 6-5: Smedley County Park - Phase III: Long Term (15-30 Years) Cost Estimate

Description	Cost Basis	Quantity	Unit Price	Total Cost
1) Continue Park Ped. Circulation Network & Connections				
Paved Multi-use Path	SY	600	$52.00	**$31,200.00**
Concrete Sidewalk	SY	150	$63.00	**$9,450.00**
Road Crossings	Each	3	$1,200.00	**$3,600.00**
Earthen Path	SY	800	$19.00	**$15,200.00**
2) Continue Implementing Park Amenities				
Benches	Each	12	$725.00	**$8,700.00**
Trash Cans	Each	6	$560.00	**$3,360.00**
3) Redesign of Existing Playing Fields				
Playing Field Improvements	LS	1	$180,000.00	**$180,000.00**
4) Improve Ex. Parking Areas/Construct New Trailhead				
Improve Existing Parking Areas	LS	1	$230,000.00	**$230,000.00**
Implement New Trailhead parking Areas (Beatty)	LS	1	$95,000.00	**$95,000.00**
5) New Pedestrian Bridges				
Bridges Along Earthen Trails	LS	4	$35,000.00	**$140,000.00**
6) Implement Mountain Bike Facility				
Mountain Bike Course Penza Tract	LS	1	$85,000.00	**$85,000.00**
7) Continue Developing Open Space, Meadows, Lawn Areas				
Landscaping, Planting and Seeding	LS	1	$15,000.00	**$15,000.00**
Phase III Total				**$816,510.00**

APPENDIX S-1: SMEDLEY COUNTY PARK SOILS

Hydrologic Soil Group—Delaware County, Pennsylvania
(Smedley County Park)



Map Scale: 1:12,000 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 150 300 600 900

Feet
0 500 1000 2000 3000

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Delaware County, Pennsylvania
Survey Area Data: Version 7, Dec 14, 2013

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—Jul 1, 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.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Delaware County, Pennsylvania (PA045)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Ch	Chewacla silt loam	C	13.7	3.4%
Cn	Congaree silt loam	B	11.5	2.9%
GeB2	Glenelg channery silt loam, 3 to 8 percent slopes, moderately eroded	B	1.9	0.5%
GeC	Glenelg channery silt loam, 8 to 15 percent slopes	B	2.1	0.5%
GeC2	Glenelg channery silt loam, 8 to 15 percent slopes, moderately eroded	B	0.2	0.1%
GeD	Glenelg channery silt loam, 15 to 25 percent slopes	B	4.2	1.1%
GeE	Glenelg channery silt loam, 25 to 35 percent slopes	B	7.2	1.8%
GnB	Glenville silt loam, 3 to 8 percent slopes	C	22.1	5.5%
GnB2	Glenville silt loam, 3 to 8 percent slopes, moderately eroded	C	3.1	0.8%
Me	Made land, schist and gneiss materials	B	43.2	10.8%
Mf	Made land, sanitary land fill	A	0.1	0.0%
MgB2	Manor loam, 3 to 8 percent slopes, moderately eroded	B	3.3	0.8%
MgC	Manor loam, 8 to 15 percent slopes	B	2.9	0.7%
MgC2	Manor loam, 8 to 15 percent slopes, moderately eroded	B	47.0	11.8%
MgC3	Manor loam, 8 to 15 percent slopes, severely eroded	B	24.3	6.1%
MgD	Manor loam, 15 to 25 percent slopes	B	61.0	15.3%
MgD2	Manor loam, 15 to 25 percent slopes, moderately eroded	B	16.1	4.0%

Hydrologic Soil Group— Summary by Map Unit — Delaware County, Pennsylvania (PA045)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
MhE	Manor loam and channery loam, 25 to 35 percent slopes	B	80.5	20.2%
MhE3	Manor loam and channery loam, 25 to 35 percent slopes, severely eroded	B	0.8	0.2%
MkF	Manor soils, 35 to 60 percent slopes	B	11.8	3.0%
Mn	Melvin silt loam	D	12.2	3.1%
Qu	Quarries		3.1	0.8%
W	Water		2.5	0.6%
We	Wehadkee silt loam	D	23.4	5.9%
Totals for Area of Interest			**398.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Physical Soil Properties

This table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (Ksat), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates in the table are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (Ksat) is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In this table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter in a soil can be maintained by returning crop residue to the soil.

Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and Ksat. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook."

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. (http://soils.usda.gov)

Report—Physical Soil Properties

Physical Soil Properties–Delaware County, Pennsylvania														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
Ch—Chewacla silt loam														
Chewacla	0-9	-27-	-54-	15-20- 25	1.20-1.40	4.23-14.11	0.14-0.20	0.0-2.9	2.0-4.0	.37	.37	5	5	56
	9-60	-19-	-54-	18-27- 35	1.20-1.50	4.23-14.11	0.14-0.18	0.0-2.9	0.0-0.5	.37	.37			
	60-64	—	—	5- 9- 12	1.20-1.50	14.11-141.14	0.04-0.08	0.0-2.9	0.0-0.5	.24	.24			
Cn—Congaree silt loam														
Comus	0-12	-32-	-56-	5-12- 18	1.20-1.40	4.23-14.11	0.13-0.21	0.0-2.9	2.0-4.0	.43	.43	5	5	56
	12-39	-32-	-56-	5-12- 18	1.20-1.40	4.23-14.11	0.13-0.21	0.0-2.9	1.0-4.0	.43	.43			
	39-60	—	—	5-20- 34	1.30-1.60	4.23-42.34	0.07-0.21	0.0-2.9	0.5-1.0	.28	.32			
GeB2—Glenelg channery silt loam, 3 to 8 percent slopes, moderately eroded														
Glenelg	0-8	-27-	-54-	15-20- 25	1.10-1.40	4.23-14.11	0.14-0.17	0.0-2.9	1.0-3.0	.32	.64	5	6	48
	8-26	-20-	-54-	20-26- 32	1.20-1.60	4.23-14.11	0.14-0.20	0.0-2.9	0.0-0.5	.43	.64			
	26-60	-46-	-42-	5-13- 20	1.20-1.40	4.23-14.11	0.10-0.20	0.0-2.9	0.0-0.5	.49	.64			

Physical Soil Properties–Delaware County, Pennsylvania														
Map symbol and soil name	**Depth**	**Sand**	**Silt**	**Clay**	**Moist bulk density**	**Saturated hydraulic conductivity**	**Available water capacity**	**Linear extensibility**	**Organic matter**	**Erosion factors**			**Wind erodibility group**	**Wind erodibility index**
										Kw	**Kf**	**T**		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
GeC—Glenelg channery silt loam, 8 to 15 percent slopes														
Glenelg	0-8	-27-	-54-	15-20- 25	1.10-1.40	4.23-14.11	0.14-0.17	0.0-2.9	1.0-3.0	.32	.32	5	6	48
	8-29	-20-	-54-	20-26- 32	1.20-1.60	4.23-14.11	0.14-0.20	0.0-2.9	0.0-0.5	.43	.49			
	29-50	-46-	-42-	5-13- 20	1.20-1.40	4.23-14.11	0.10-0.20	0.0-2.9	0.0-0.5	.49	.55			
GeC2—Glenelg channery silt loam, 8 to 15 percent slopes, moderately eroded														
Glenelg	0-8	-27-	-54-	15-20- 25	1.10-1.40	4.23-14.11	0.14-0.17	0.0-2.9	1.0-3.0	.32	.64	5	6	48
	8-26	-20-	-54-	20-26- 32	1.20-1.60	4.23-14.11	0.14-0.20	0.0-2.9	0.0-0.5	.43	.64			
	26-60	-46-	-42-	5-13- 20	1.20-1.40	4.23-14.11	0.10-0.20	0.0-2.9	0.0-0.5	.49	.64			
GeD—Glenelg channery silt loam, 15 to 25 percent slopes														
Glenelg	0-8	-27-	-54-	15-20- 25	1.10-1.40	4.23-14.11	0.14-0.17	0.0-2.9	1.0-3.0	.32	.32	5	6	48
	8-29	-20-	-54-	20-26- 32	1.20-1.60	4.23-14.11	0.14-0.20	0.0-2.9	0.0-0.5	.43	.49			
	29-50	-46-	-42-	5-13- 20	1.20-1.40	4.23-14.11	0.10-0.20	0.0-2.9	0.0-0.5	.49	.55			

Physical Soil Properties–Delaware County, Pennsylvania														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
GeE—Glenelg channery silt loam, 25 to 35 percent slopes														
Glenelg	0-8	-27-	-54-	15-20- 25	1.10-1.40	4.23-14.11	0.14-0.17	0.0-2.9	1.0-3.0	.32	.64	5	6	48
	8-26	-20-	-54-	20-26- 32	1.20-1.60	4.23-14.11	0.14-0.20	0.0-2.9	0.0-0.5	.43	.64			
	26-60	-46-	-42-	5-13- 20	1.20-1.40	4.23-14.11	0.10-0.20	0.0-2.9	0.0-0.5	.49	.64			
GnB—Glenville silt loam, 3 to 8 percent slopes														
Glenville	0-9	-30-	-55-	10-15- 20	1.20-1.40	4.23-14.11	0.16-0.20	0.0-2.9	2.0-4.0	.32	.32	3	5	56
	9-19	-22-	-55-	20-23- 35	1.40-1.60	4.23-14.11	0.12-0.16	0.0-2.9	0.0-0.5	.24	.28			
	19-39	-27-	-54-	15-19- 35	1.60-1.80	0.42-4.23	0.08-0.12	0.0-2.9	0.0-0.5	.24	.28			
	39-82	-43-	-39-	5-18- 25	1.40-1.60	1.41-4.23	0.06-0.12	0.0-2.9	0.0-0.5	.24	.32			
GnB2—Glenville silt loam, 3 to 8 percent slopes, moderately eroded														
Glenville	0-10	-30-	-55-	10-15- 20	1.20-1.40	4.23-14.11	0.16-0.20	0.0-2.9	2.0-4.0	.32	.32	3	5	56
	10-16	-19-	-54-	20-27- 35	1.40-1.60	4.23-14.11	0.12-0.16	0.0-2.9	0.0-0.5	.24	.32			
	16-50	-20-	-54-	20-26- 35	1.60-1.80	0.42-4.23	0.08-0.12	0.0-2.9	0.0-0.5	.24	.32			
	50-70	-44-	-41-	5-15- 25	1.40-1.60	1.41-4.23	0.06-0.12	0.0-2.9	0.0-0.5	.24	.64			

Physical Soil Properties–Delaware County, Pennsylvania														
Map symbol and soil name	**Depth**	**Sand**	**Silt**	**Clay**	**Moist bulk density**	**Saturated hydraulic conductivity**	**Available water capacity**	**Linear extensibility**	**Organic matter**	**Erosion factors**			**Wind erodibility group**	**Wind erodibility index**
										Kw	**Kf**	**T**		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
Me—Made land, schist and gneiss materials														
Udorthents, schist and gneiss	0-3	-27-	-54-	15-20- 25	1.00-1.45	0.42-4.23	0.14-0.18	0.0-2.9	1.0-2.0	.37	.43	4	5	56
	3-40	-20-	-54-	25-26- 35	1.30-1.60	0.42-1.41	0.14-0.20	3.0-5.9	1.0-2.0	.37	.37			
	40-60	-20-	-54-	25-26- 35	1.30-1.60	0.42-1.41	0.14-0.20	3.0-5.9	1.0-2.0	.37	.37			
Mf—Made land, sanitary land fill														
Udorthents, sanitary landfill	0-24	-38-	-36-	10-27- 60	1.20-1.80	0.00-14.11	0.08-0.18	3.0-5.9	0.0-4.0	.43	.43	3	8	0
	24-70	—	—	—	—	—	—	—	0.0-0.5					
MgB2—Manor loam, 3 to 8 percent slopes, moderately eroded														
Manor	0-8	-43-	-40-	10-18- 25	1.10-1.40	4.23-14.11	0.17-0.21	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	8-23	-43-	-40-	10-18- 25	1.20-1.50	4.23-14.11	0.14-0.20	0.0-2.9	0.0-0.5	.32	.37			
	23-60	-64-	-24-	5-13- 20	1.25-1.50	4.23-42.34	0.10-0.20	0.0-2.9	0.0-0.5	.49	.55			

Physical Soil Properties–Delaware County, Pennsylvania														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
MgC—Manor loam, 8 to 15 percent slopes														
Manor	0-7	-43-	-40-	10-18- 25	1.10-1.40	4.23-14.11	0.17-0.21	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	7-22	-43-	-40-	10-18- 25	1.20-1.50	4.23-14.11	0.14-0.20	0.0-2.9	0.0-0.5	.32	.37			
	22-60	-64-	-24-	5-13- 20	1.25-1.50	4.23-42.34	0.10-0.20	0.0-2.9	0.0-0.5	.49	.55			
MgC2—Manor loam, 8 to 15 percent slopes, moderately eroded														
Manor	0-7	-43-	-40-	10-18- 25	1.10-1.40	4.23-14.11	0.17-0.21	0.0-2.9	1.0-3.0	.37	.43	4	6	48
	7-21	-43-	-40-	10-18- 25	1.20-1.50	4.23-14.11	0.14-0.20	0.0-2.9	0.0-0.5	.32	.49			
	21-60	-64-	-24-	5-13- 20	1.25-1.50	4.23-42.34	0.10-0.20	0.0-2.9	0.0-0.5	.49	.64			
MgC3—Manor loam, 8 to 15 percent slopes, severely eroded														
Manor	0-7	-43-	-40-	10-18- 25	1.10-1.40	4.23-14.11	0.17-0.21	0.0-2.9	1.0-3.0	.37	.43	3	6	48
	7-21	-43-	-40-	10-18- 25	1.20-1.50	4.23-14.11	0.14-0.20	0.0-2.9	0.0-0.5	.32	.49			
	21-60	-64-	-24-	5-13- 20	1.25-1.50	4.23-42.34	0.10-0.20	0.0-2.9	0.0-0.5	.49	.64			

Physical Soil Properties–Delaware County, Pennsylvania														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
MgD—Manor loam, 15 to 25 percent slopes														
Manor	0-7	-43-	-40-	10-18- 25	1.10-1.40	4.23-14.11	0.17-0.21	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	7-20	-43-	-40-	10-18- 25	1.20-1.50	4.23-14.11	0.14-0.20	0.0-2.9	0.0-0.5	.32	.37			
	20-60	-64-	-24-	5-13- 20	1.25-1.50	4.23-42.34	0.10-0.20	0.0-2.9	0.0-0.5	.49	.55			
MgD2—Manor loam, 15 to 25 percent slopes, moderately eroded														
Manor	0-7	-43-	-40-	10-18- 25	1.10-1.40	4.23-14.11	0.17-0.21	0.0-2.9	1.0-3.0	.37	.43	4	6	48
	7-21	-43-	-40-	10-18- 25	1.20-1.50	4.23-14.11	0.14-0.20	0.0-2.9	0.0-0.5	.32	.49			
	21-60	-64-	-24-	5-13- 20	1.25-1.50	4.23-42.34	0.10-0.20	0.0-2.9	0.0-0.5	.49	.64			
MhE—Manor loam and channery loam, 25 to 35 percent slopes														
Manor	0-4	-43-	-40-	10-18- 25	1.10-1.40	4.23-14.11	0.17-0.21	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	4-19	-43-	-40-	10-18- 25	1.20-1.50	4.23-14.11	0.14-0.20	0.0-2.9	0.0-0.5	.32	.37			
	19-60	-64-	-24-	5-13- 20	1.25-1.50	4.23-42.34	0.10-0.20	0.0-2.9	0.0-0.5	.49	.55			

Physical Soil Properties–Delaware County, Pennsylvania														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
MhE3—Manor loam and channery loam, 25 to 35 percent slopes, severely eroded														
Manor	0-7	-43-	-40-	10-18- 25	1.10-1.40	4.23-14.11	0.17-0.21	0.0-2.9	1.0-3.0	.37	.43	3	6	48
	7-21	-43-	-40-	10-18- 25	1.20-1.50	4.23-14.11	0.14-0.20	0.0-2.9	0.0-0.5	.32	.49			
	21-60	-64-	-24-	5-13- 20	1.25-1.50	4.23-42.34	0.10-0.20	0.0-2.9	0.0-0.5	.49	.64			
MkF—Manor soils, 35 to 60 percent slopes														
Manor	0-3	-43-	-40-	10-18- 25	1.20-1.40	4.23-14.11	0.14-0.17	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	3-22	-43-	-40-	10-18- 25	1.20-1.50	4.23-14.11	0.14-0.20	0.0-2.9	0.0-0.5	.32	.37			
	22-60	-64-	-24-	5-13- 20	1.25-1.50	4.23-42.34	0.10-0.20	0.0-2.9	0.0-0.5	.49	.55			
Mn—Melvin silt loam														
Melvin	0-10	-14-	-71-	12-15- 17	1.20-1.60	4.23-14.11	0.18-0.23	0.0-2.9	0.5-3.0	.43	.43	5	4	86
	10-36	- 7-	-67-	18-27- 35	1.30-1.60	4.23-14.11	0.18-0.23	0.0-2.9	0.3-0.8	.43	.43			
	36-72	-11-	-68-	7-21- 35	1.40-1.70	4.23-14.11	0.16-0.23	0.0-2.9	0.1-0.5	.43	.43			
Qu—Quarries														
Pits, quarries	—	—	—	—	—	—	—	—	—					
W—Water														
Water	—	—	—	—	—	—	—	—	—					

Physical Soil Properties–Delaware County, Pennsylvania														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
We— Wehadkee silt loam														
Wehadkee	0-9	-30-	-55-	10-15- 20	1.20-1.40	4.23-14.11	0.16-0.22	0.0-2.9	2.0-4.0	.37	.37	5	5	56
	9-28	-21-	-55-	15-25- 35	1.20-1.40	4.23-14.11	0.16-0.20	0.0-2.9	0.0-0.5	.20	.20			
	28-60	-18-	-55-	10-28- 35	1.20-1.50	4.23-14.11	0.10-0.14	0.0-2.9	0.0-0.5	.20	.20			
	60-64	—	—	5-25- 45	1.10-1.60	14.11-42.34	0.04-0.08	0.0-2.9	0.0-0.5	.20	.20			

Data Source Information

Soil Survey Area: Delaware County, Pennsylvania
Survey Area Data: Version 7, Dec 14, 2013

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic group is a group of soils having similar runoff potential under similar storm and cover conditions. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Report—Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash.

Engineering Properties–Delaware County, Pennsylvania														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
Ch—Chewacla silt loam														
Chewacla	85	C	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	80-100	70-100	65-100	55-95	22-35	2-12
			9-60	Silt loam, loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	80-100	75-100	65-100	55-85	22-35	2-12
			60-64	Stratified sand to silt	GM, ML, SM	A-1, A-2, A-4	0	0	25-100	20-100	20-85	15-65	15-35	NP-7
Cn—Congaree silt loam														
Comus	90	B	0-12	Silt loam	CL, ML, SC, SM	A-2, A-4, A-6	0	0-5	85-100	80-100	55-100	30-90	30-40	6-15
			12-39	Silt loam, fine sandy loam, loam	CL, ML, SC, SM	A-2, A-4, A-6	0	0-5	85-100	80-100	55-100	30-90	30-40	6-15
			39-60	Stratified gravelly loamy sand to loam	CL, GM, ML, SM	A-1, A-2, A-4, A-6	0	0-20	55-100	45-100	25-100	15-95	15-40	NP-20

Engineering Properties–Delaware County, Pennsylvania														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
GeB2—Glenelg channery silt loam, 3 to 8 percent slopes, moderately eroded														
Glenelg	85	B	0-8	Channery silt loam	GM, ML, SM	A-2-4, A-2-6, A-4, A-6	0	0-10	60-100	50-75	40-75	30-70	32-40	7-12
			8-26	Channery silt loam, silty clay loam, loam	GM, ML, SM	A-4, A-6, A-7	0	0-10	60-100	50-100	45-100	35-95	34-46	9-15
			26-60	Loam, sandy loam, channery loam	GM, ML, SM	A-2, A-4	0	0-50	60-100	50-100	40-95	25-75	15-40	NP-6
GeC—Glenelg channery silt loam, 8 to 15 percent slopes														
Glenelg	85	B	0-8	Channery silt loam	GM, ML, SM	A-4, A-6, A-2-4, A-2-6	0	0-10	60-100	50-75	40-75	30-70	32-40	7-12
			8-29	Channery silt loam, silty clay loam, loam	ML, SM, GM	A-4, A-6, A-7	0	0-10	60-100	50-100	45-100	35-95	34-46	9-15
			29-50	Loam, sandy loam, very channery loam	GM, ML, SM	A-2, A-4	0	0-50	60-100	50-100	40-95	25-75	0-40	NP-6

Engineering Properties–Delaware County, Pennsylvania														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
GeC2—Glenelg channery silt loam, 8 to 15 percent slopes, moderately eroded														
Glenelg	85	B	0-8	Channery silt loam	GM, ML, SM	A-2-4, A-2-6, A-4, A-6	0	0-10	60-100	50-75	40-75	30-70	32-40	7-12
			8-26	Channery silt loam, silty clay loam, loam	GM, ML, SM	A-4, A-6, A-7	0	0-10	60-100	50-100	45-100	35-95	34-46	9-15
			26-60	Loam, sandy loam, channery loam	ML, SM, GM	A-2, A-4	0	0-50	60-100	50-100	40-95	25-75	15-40	NP-6
GeD—Glenelg channery silt loam, 15 to 25 percent slopes														
Glenelg	85	B	0-8	Channery silt loam	GM, ML, SM	A-2-4, A-2-6, A-4, A-6	0	0-10	60-100	50-75	40-75	30-70	32-40	7-12
			8-29	Channery silt loam, silty clay loam, loam	GM, ML, SM	A-4, A-6, A-7	0	0-10	60-100	50-100	45-100	35-95	34-46	9-15
			29-50	Loam, sandy loam, very channery loam	GM, ML, SM	A-2, A-4	0	0-50	60-100	50-100	40-95	25-75	0-40	NP-6

Engineering Properties–Delaware County, Pennsylvania														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
GeE—Glenelg channery silt loam, 25 to 35 percent slopes														
Glenelg	85	B	0-8	Channery silt loam	GM, ML, SM	A-2-4, A-2-6, A-4, A-6	0	0-10	60-100	50-75	40-75	30-70	32-40	7-12
			8-26	Channery silt loam, silty clay loam, loam	GM, ML, SM	A-4, A-6, A-7	0	0-10	60-100	50-100	45-100	35-95	34-46	9-15
			26-60	Loam, sandy loam, channery loam	GM, ML, SM	A-2, A-4	0	0-50	60-100	50-100	40-95	25-75	15-40	NP-6
GnB—Glenville silt loam, 3 to 8 percent slopes														
Glenville	90	C	0-9	Silt loam	ML, SM	A-4	0	0	85-100	85-100	70-95	45-80	25-35	3-10
			9-19	Silt loam, channery loam, channery silty clay loam	ML, CL, CL-ML, GM, SC	A-4, A-6	0	0-10	70-100	60-100	60-95	45-80	25-40	5-13
			19-39	Silt loam, channery loam, silty clay loam	ML, CL, CL-ML, GM, SC	A-4, A-6	0	0-10	65-100	60-100	55-95	45-80	25-40	5-13
			39-82	Channery loam, very channery sandy loam	CL-ML, GM, ML, SM, GC, SC	A-1, A-2, A-4, A-2-4	0	0-20	45-90	20-75	10-75	5-65	25-35	5-10

Engineering Properties–Delaware County, Pennsylvania														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
GnB2—Glenville silt loam, 3 to 8 percent slopes, moderately eroded														
Glenville	85	C	0-10	Silt loam	ML, SM	A-4	0	0	85-100	85-100	70-95	45-80	25-35	3-10
			10-16	Silt loam, channery loam, channery silty clay loam	ML, CL, CL-ML, GM, SC	A-4, A-6	0	0-10	70-100	60-100	60-95	45-80	25-40	5-13
			16-50	Silt loam, channery loam, silty clay loam	ML, CL, CL-ML, GM, SC	A-4, A-6	0	0-10	65-100	60-100	55-95	45-80	25-40	5-13
			50-70	Channery fine sandy loam, channery loam, very channery sandy loam	CL-ML, GM, ML, SM, GC, SC	A-1, A-2, A-4	0	0-20	45-90	20-75	10-75	5-65	25-35	5-10
Me—Made land, schist and gneiss materials														
Udorthents, schist and gneiss	95	B	0-3	Silt loam	CL, CL-ML, ML	A-4	0	0-5	85-100	80-100	70-95	50-75	25-35	5-10
			3-40	Loam, gravelly silt loam, clay loam	ML	A-6, A-7-6	0	0-5	90-100	80-100	70-100	55-95	35-45	10-15
			40-60	Loam, gravelly silt loam, clay loam	ML	A-6, A-7-6	0	0-5	90-100	80-100	70-100	55-95	35-45	10-15
Mf—Made land, sanitary land fill														
Udorthents, sanitary landfill	98	A	0-24	Gravelly loam, gravelly silty clay loam	CL, CL-ML, ML	A-4, A-6, A-7	0	0-5	60-100	55-100	55-100	50-95	0-45	5-25
			24-70	Variable	GP	A-1	—	—	—	—	—	—	—	—

Engineering Properties–Delaware County, Pennsylvania														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
MgB2—Manor loam, 3 to 8 percent slopes, moderately eroded														
Manor	95	B	0-8	Loam	ML	A-4, A-6	0	0	85-100	80-100	70-100	50-90	32-40	6-12
			8-23	Loam, silt loam, channery loam	GM, ML, SM	A-2-4, A-2-6, A-4, A-6	0	0-10	65-100	50-100	40-100	30-90	26-40	4-12
			23-60	Loam, very fine sandy loam, channery sandy loam	CL-ML, ML, SC-SM, SM	A-1, A-2, A-4, A-6	0	0-5	65-100	50-100	30-95	15-75	20-40	2-12
MgC—Manor loam, 8 to 15 percent slopes														
Manor	95	B	0-7	Loam	ML	A-4, A-6	0	0	85-100	80-100	70-100	50-90	32-40	6-12
			7-22	Loam, silt loam, channery loam	GM, ML, SM	A-2-4, A-2-6, A-4, A-6	0	0-10	65-100	50-100	40-100	30-90	26-40	4-12
			22-60	Loam, very fine sandy loam, channery sandy loam	CL-ML, ML, SC-SM, SM	A-1, A-2, A-4, A-6	0	0-5	65-100	50-100	30-95	15-75	20-40	2-12
MgC2—Manor loam, 8 to 15 percent slopes, moderately eroded														
Manor	90	B	0-7	Loam	ML	A-4, A-6	0	0	85-100	80-100	70-100	50-90	32-40	6-12
			7-21	Loam, silt loam, channery loam	GM, ML, SM	A-2-4, A-2-6, A-4, A-6	0	0-10	65-100	50-100	40-100	30-90	26-40	4-12
			21-60	Loam, sandy loam, channery sandy loam, very fine sandy loam	CL-ML, ML, SC-SM, SM	A-1, A-2, A-4, A-6	0	0-5	65-100	50-100	30-95	15-75	20-40	2-12

Engineering Properties–Delaware County, Pennsylvania														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
MgC3—Manor loam, 8 to 15 percent slopes, severely eroded														
Manor	90	B	0-7	Loam	ML	A-4, A-6	0	0	85-100	80-100	70-100	50-90	32-40	6-12
			7-21	Loam, silt loam, channery loam	GM, ML, SM	A-2-4, A-2-6, A-4, A-6	0	0-10	65-100	50-100	40-100	30-90	26-40	4-12
			21-60	Loam, sandy loam, channery sandy loam, very fine sandy loam	CL-ML, ML, SC-SM, SM	A-1, A-2, A-4, A-6	0	0-5	65-100	50-100	30-95	15-75	20-40	2-12
MgD—Manor loam, 15 to 25 percent slopes														
Manor	97	B	0-7	Loam	ML	A-4, A-6	0	0	85-100	80-100	70-100	50-90	32-40	6-12
			7-20	Loam, silt loam, channery loam	GM, ML, SM	A-2-4, A-2-6, A-4, A-6	0	0-10	65-100	50-100	40-100	30-90	26-40	4-12
			20-60	Loam, very fine sandy loam, channery sandy loam	CL-ML, ML, SC-SM, SM	A-1, A-2, A-4, A-6	0	0-5	65-100	50-100	30-95	15-75	20-40	2-12

Engineering Properties–Delaware County, Pennsylvania														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
MgD2—Manor loam, 15 to 25 percent slopes, moderately eroded														
Manor	90	B	0-7	Loam	ML	A-4, A-6	0	0	85-100	80-100	70-100	50-90	32-40	6-12
			7-21	Loam, silt loam, channery loam	ML, SM, GM	A-2-4, A-2-6, A-4, A-6	0	0-10	65-100	50-100	40-100	30-90	26-40	4-12
			21-60	Loam, sandy loam, channery sandy loam, very fine sandy loam	CL-ML, ML, SC-SM, SM	A-1, A-2, A-4, A-6	0	0-5	65-100	50-100	30-95	15-75	20-40	2-12
MhE—Manor loam and channery loam, 25 to 35 percent slopes														
Manor	98	B	0-4	Loam	ML	A-4, A-6	0	0	85-100	80-100	70-100	50-90	32-40	6-12
			4-19	Loam, silt loam, channery loam	SM, GM, ML	A-2-4, A-2-6, A-4, A-6	0	0-10	65-100	50-100	40-100	30-90	26-40	4-12
			19-60	Loam, very fine sandy loam, channery sandy loam	CL-ML, ML, SC-SM, SM	A-1, A-2, A-4, A-6	0	0-5	65-100	50-100	30-95	15-75	20-40	2-12

Engineering Properties–Delaware County, Pennsylvania														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
MhE3—Manor loam and channery loam, 25 to 35 percent slopes, severely eroded														
Manor	90	B	0-7	Loam	ML	A-4, A-6	0	0	85-100	80-100	70-100	50-90	32-40	6-12
			7-21	Loam, silt loam, channery loam	GM, ML, SM	A-2-4, A-2-6, A-4, A-6	0	0-10	65-100	50-100	40-100	30-90	26-40	4-12
			21-60	Loam, sandy loam, channery sandy loam, very fine sandy loam	CL-ML, ML, SC-SM, SM	A-1, A-2, A-4, A-6	0	0-5	65-100	50-100	30-95	15-75	20-40	2-12
MkF—Manor soils, 35 to 60 percent slopes														
Manor	100	B	0-3	Channery loam	GM, ML, SM	A-2-4, A-2-6, A-4, A-6	0	0-10	65-100	50-75	40-75	30-70	32-40	6-12
			3-22	Loam, silt loam, channery loam	GM, ML, SM	A-2-4, A-2-6, A-4, A-6	0	0-10	65-100	50-100	40-100	30-90	26-40	4-12
			22-60	Loam, very fine sandy loam, channery sandy loam	CL-ML, ML, SC-SM, SM	A-1, A-2, A-4, A-6	0	0-5	65-100	50-100	30-95	15-75	20-40	2-12
Mn—Melvin silt loam														
Melvin	85	D	0-10	Silt loam	CL-ML, ML	A-4	0	0	95-100	90-100	80-100	80-95	25-35	4-10
			10-36	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	80-100	80-95	25-40	5-20
			36-72	Silt loam, silty clay loam, loam	CL, CL-ML	A-4, A-6	0	0	85-100	80-100	70-100	60-95	25-40	5-20

Engineering Properties–Delaware County, Pennsylvania														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
We—Wehadkee silt loam														
Wehadkee	90	D	0-9	Silt loam	CL-ML	A-4	0	0	95-100	90-100	70-100	60-90	22-35	2-12
			9-28	Silt loam	CL-ML	A-4	0	0	85-100	80-100	70-95	55-85	22-35	2-12
			28-60	Sandy clay loam, silty clay loam	CL-ML	A-4	0	0	75-100	70-100	60-90	45-60	22-30	2-10
			60-64	Stratified clay	SC-SM	A-2	0	0	50-85	45-80	45-80	15-35	15-32	NP-14

Data Source Information

Soil Survey Area: Delaware County, Pennsylvania
Survey Area Data: Version 7, Dec 14, 2013

APPENDIX S-2: SMEDLEY COUNTY PARK ENVIRONMENTAL SURVEY

Delaware County Park Study
Smedley Park
Environmental Resource Survey

Smedley Park

Smedley Park is approximate 117 acres and located in Nether Province Township along Paper Mill Road. The park is primarily wooded and includes large open maintained turf grass meadows, sport facilities, a playground and associated parking lots. The park is bisected by transportation infrastructure. Intestate 476 runs north and south through the center of the park while the trolley line runs east and west through the southern portion of the park. Crum Creek drains south and meanders throughout the park. The lower elevation portions of the park are located within the 100 year floodplain. There is a reservoir immediately upstream of the park. The dominant land use surrounding the park consists primarily of medium to high density housing and highway infrastructure. This urbanized watershed is creating impairments within the watershed. As a result, this portion of Crum Creek is designated as a Warm Water Fishery (WWF) by the Pennsylvania Department of Environmental Protection (PADEP). Designated use of a WWF is defined as "Maintenance and propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat" according to PADEP's Chapter 93 guidelines. According to PADEP, Crum Creek's aquatic life is listed as impaired because of urban influence from urban runoff causing flow variation, siltation, thermal modifications and flow alterations.

An environmental survey was conducted to provide a preliminary inventory of and assess the existing environmental features within the park to assist future planning decisions. The survey divided Smedley Park into three distinct Areas based on geography, vegetation cover and uses. Area 1 consists of the mowed turf grass portion of the park located south of the trolley tracks. Area 2 is the wooded area north and south of the tracks that includes the Environmental Center and the Lewis House/Pennsylvania State University (PSU) Extension. Area 3 includes the playground and active sport fields and associated parking lots. Appendix A includes a map showing the boundaries of the 3 Areas.

Area 1 consists primarily of mowed turf grass and a few planted trees primarily along the top of the stream bank and a small parking area. This is the first area visitors see as they enter the park. Crum Creek bisects this area into two portions located north and south of a pedestrian bridge over Crum Creek. The banks and channel of Crum Creek is fairly stable. The banks are moderately steep and the channel is slightly entrenched. Eroded banks with exposed soils are visible but were limited to a small portion of the stream. The relative stability could be attributed to the upstream reservoir limiting upstream flows during storm events. The riparian buffer consists of mowed turf grass with a few planted trees (saplings). Recent sanitary sewer work has disturbed portions of the park along the sewer alignment. A majority of this area was stabilized with grass seed. However much of the alignment consisted of exposed soils where stabilization seeding has not been established. An abandoned baseball field is located in the southeast corner of this park.

Delaware County Park Study
Smedley Park
Environmental Resource Survey

Recommendations: It is recommended that a 50 foot portion of area along the top of bank be preserved as a forested riparian buffer. Riparian buffers have many benefits including a reduction of erosion, runoff, natural aesthetics, habitat and increased water quality. The existing tree plantings are an initial step in that direction. Future riparian efforts should include a no mow area and native plant seeding. Establishing native meadow areas has many benefits including creating wildlife habitat, increasing aesthetics and reducing maintenance by eliminating mowed areas. Meadows also present a unique opportunity for education and provide critical wildlife habitat that is rare in urban areas. The exposed soils from the replacement of sewer infrastructure present an opportunity to create pedestrian trails and paths. It is not recommended to plant trees along the sewer alignment due to potential conflict/infiltration of sewer structure from root zones.

Area 2 consists primarily of moderate to steep wooded slopes with hiking paths. The forest was a mix of primarily hardwood and softwood species. The majority of the trees are young with some specimen trees throughout. The forest ranges from a quality forest floor, shrub and sapling layer, canopy south of the trolley tracks, to a limited forest floor with a monoculture shrub layer dominated by honeysuckle and intact tree canopy north of the trolley tracks to the sport fields. The Smedley Yellow Trail runs north and south through this portion. Crum Creek flows through the lower portions of this area. Large portions of the riparian buffer in this area are dominated by a monoculture of lesser celandine (*Ficaria verna*). Japanese Knotweed (*Polygonum cuspidatum*) was also observed but limited to small portions of the stream bank primarily along the pedestrian bridge in this area. Oriental bittersweet (*Celastrus obiculatus*) and Japanese honeysuckle (*Lincera japonica*) were found throughout the forest. All four of these species are listed by the PA Department of Conservation and Natural Resources (DCNR) as invasive in PA. A parking lot serves the environmental education center, the PSU extension office and a pavilion.

Recommendations: The largest concern in this area is the invasive vegetation. The celandine is well established along the top of bank throughout the park. The celandine and the honeysuckle and bittersweet vines will take significant resources to eradicate. However, there is a high likelihood that if the knotweed is not addressed it will quickly take over the stream bank and out compete all other vegetation. It is recommended to remove the knotweed while it is still manageable. The honeysuckle and bittersweet will be difficult to eradicate. English ivy is choking some of the trees

downslope from the parking area. This can be relatively easy to control before it spreads to other trees throughout the forest.

Area 3 consists of active use areas such as playgrounds, sport fields and associated parking areas. There are several landscaped trees within the playground area. The sport fields consists of mowed turf grass. A pedestrian bridge is located near the baseball fields. There is an erosion issue with a tree located in the channel. The tree is causing erosion during high water events by forcing the velocity of the water into the bank. The northern parking lot includes a bioretention feature that is not fully functional. Sediment has accumulated at the base of the retention area smothering vegetation and reducing infiltration functions. Sediment is clogging the overflow culvert. This will result in a portion of the parking lot flooding once the reduced retention area is full.

Recommendations: Environmental resources are limited in this area due to the active park uses located within. The most significant issue is the erosion. There are several options to approach the issue including hard bank armoring/toe slope protection, bank grading and tree removal, or the use of a deflector structure to divert flow away from the bank and tree. The retention area needs maintenance to remove the accumulated sediment.

No wetlands were found within the park during the site visit or on National Wetland Inventory (NWI) mapping of the park. However the three parameter approach outlined in the 1987 United States Army Corps of Engineer Wetland Manual and corresponding regional supplement was not practical for the level of investigation that was required for this survey report and NWI often does not show smaller wetland pockets. Preliminary wetland investigation criteria used for the sake of this report consisted of hydrophytic vegetation, landform and visible signs of hydrology. It is recommended that prior to any park improvements including land disturbance that a wetland investigation and updated Pennsylvania Natural Diversity Inventory (PNDI) inquiry be conducted to the presence of potential rare, threatened, and/or endangered species. A wetland investigation and, if necessary, wetland delineation may be required to be submitted with PADEP and NPDES permits.

1. PROJECT INFORMATION

Project Name: **Smedley Park**
Date of review: **8/16/2011 11:42:14 AM**
Project Category: **Recreation,Other**
Project Area: **287.8** acres
County: **Delaware** Township/Municipality: **Springfield,Nether Providence**
Quadrangle Name: **LANSDOWNE** ~ ZIP Code: **19063,19064**
Decimal Degrees: **39.920071 N, -75.362606 W**
Degrees Minutes Seconds: **39° 55' 12.3" N, -75° 21' 45.4" W**

2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	No Known Impact	No Further Review Required
PA Department of Conservation and Natural Resources	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
PA Fish and Boat Commission	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
U.S. Fish and Wildlife Service	No Known Impact	No Further Review Required

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate there may be potential impacts to threatened and endangered and/or special concern species and resources within the project area. If the response above indicates "No Further Review Required" no additional communication with the respective agency is required. If the response is "Further Review Required" or "See Agency Response," refer to the appropriate agency comments below. Please see the DEP Information Section of this receipt if a PA Department of Environmental Protection Permit is required.

Note that regardless of PNDI search results, projects requiring a Chapter 105 DEP individual permit or GP 5, 6, 7, 8, 9 or 11 in certain counties (Adams, Berks, Bucks, Carbon, Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill and York) must comply with the bog turtle habitat screening requirements of the PASPGP.

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for one year** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jursidictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission

RESPONSE: No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Department of Conservation and Natural Resources

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send project information to this agency for review (see WHAT TO SEND).

DCNR Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below. After desktop review, if a botanical survey is required by DCNR, we recommend the DCNR Botanical Survey Protocols, available here: http://www.gis.dcnr.state.pa.us/hgis-er/PNDI_DCNR.aspx.)
Scientific Name: Alopecurus aequalis
Common Name: Short-awn Foxtail
Current Status: Special Concern Species*
Proposed Status: Threatened

Scientific Name: Polygonella articulata
Common Name: Eastern Jointweed
Current Status: Special Concern Species*
Proposed Status: Endangered

PA Fish and Boat Commission

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send project information to this agency for review (see WHAT TO SEND).

PFBC Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)
Scientific Name: Sensitive Species**
Common Name:
Current Status: Threatened
Proposed Status: Special Concern Species*

U.S. Fish and Wildlife Service

RESPONSE: No impacts to **federally** listed or proposed species are anticipated. Therefore, no further consultation/coordination under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.* is required. Because no take of federally listed species is anticipated, none is authorized. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other authorities.

* Special Concern Species or Resource - Plant or animal species classified as rare, tentatively undetermined or candidate as well as other taxa of conservation concern, significant natural communities, special concern populations (plants or animals) and unique geologic features.
** Sensitive Species - Species identified by the jurisdictinal agency as collectible, having economic value, or being susceptible to decline as a result of visitation.

WHAT TO SEND TO JURISDICTIONAL AGENCIES

If project information was requested by one or more of the agencies above, send the following information to the agency(s) seeking this information (see AGENCY CONTACT INFORMATION).

Check-list of *Minimum* Materials to be submitted:

____**SIGNED** copy of this Project Environmental Review Receipt
____Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted.
____Project location information (name of USGS Quadrangle, Township/Municipality, and County)
____USGS 7.5-minute Quadrangle with project boundary clearly indicated, and quad name on the map

The inclusion of the following information may expedite the review process.
____A basic site plan(particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)
____Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)
____Information about the presence and location of wetlands in the project area, and how this was determined (e.g., by a qualified wetlands biologist), if wetlands are present in the project area, provide project plans showing the location of all project features, as well as wetlands and streams

____The DEP permit(s) required for this project

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. For cases where a "Potential Impact" to threatened and endangered species has been identified before the application has been submitted to DEP, the application should not be submitted until the impact has been resolved. For cases where "Potential Impact" to special concern species and resources has been identified before the application has been submitted, the application should be submitted to DEP along with the PNDI receipt, a completed PNDI form and a USGS 7.5 minute quadrangle map with the project boundaries delineated on the map. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. DEP and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at http://www.naturalheritage.state.pa.us.

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a **preliminary** screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources

Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552, Harrisburg, PA. 17105-8552
Fax:(717) 772-0271

U.S. Fish and Wildlife Service

Endangered Species Section
315 South Allen Street, Suite 322, State College, PA. 16801-4851
NO Faxes Please.

PA Fish and Boat Commission

Division of Environmental Services
450 Robinson Lane, Bellefonte, PA. 16823-7437
NO Faxes Please

PA Game Commission

Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA. 17110-9797
Fax:(717) 787-6957

7. PROJECT CONTACT INFORMATION

Name:_____
Company/Business Name:_____
Address:_____
City, State, Zip:_____
Phone:(_____)_____Fax:(_____)_____
Email:_____

8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.

_____ _____
applicant/project proponent signature date