February 28, 2023

222 Church Road

Cheltenham Township, Montgomery Co., PA

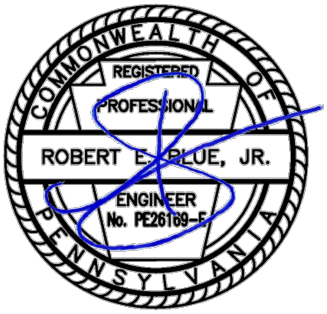
Revised:
May 26, 2023
June 29, 2023
September 12, 2023

EROSION & SEDIMENTATION POLLUTION CONTROL REPORT

REB No.: 2154-10

Prepared for:

222 Church Road, LLC
509 Cedarhill Road
Far Rockaway, NY 11691



Prepared by:

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C: References and Supporting Documents

1. **Soils Report**
2. **FEMA Flood Map**
3. **Wetland/Waters Investigation Report prepared by VW Consultants LLC dated April 21, 2023**

1.0 INTRODUCTION

This report has been prepared for the 222 Church Road project, a residential subdivision development located in Cheltenham Township, Montgomery County, PA. This report summarizes the Erosion and Sediment Pollution Control (E&S) design and calculations for the approval of the municipal land development application and procurement of the Pennsylvania Department of Environmental Protection's (PADEP) National Pollutant Discharge Elimination System (NPDES) Permit. This report shall accompany the E&S Plans (Plans) for the project ("E&S Plan" sheets contained within the "Final Subdivision & Land Development Plan for 222 Church Road". The plans and this report shall be considered the overall erosion and sediment pollution control plan for the project.

The **plans and report were prepared by** the staff of Robert E. Blue Consulting Engineers, P.C. under the direction of Robert E. Blue Jr., P.E. The measures shown have been designed in accordance with the guidelines of PADEP, the County Conservation District, and municipal regulations.

Formal Education

Associates Degree in Architectural Design from Temple University, 1970

Bachelors of Science: Civil Engineering from Temple University, 1972

Pennsylvania Licensed Professional Engineer since 1977 Lic.No.: PE26169-E

Pennsylvania Licensed Land Surveyor since 1982 Lic.No.: SU1323A

Most recently approved plans include:

- The Shoppes at South Abington
  (South Abington Township, Lackawanna County, PA 2020)
- 1950 Skippack Pike – Blue Bell Storage
  (Whitpain Township, Montgomery County, PA 2020)
- Royal Farms #195
  (Marple Township, Delaware County, PA 2019)
- Royal Farms #234
  (Collegeville Borough, Montgomery County, PA 2019)
- Kidz Konnect Daycare
  (Whitpain Township, Montgomery County, PA 2018)
- Royal Farm #132
  (Towamencin Township, Montgomery County, PA 2017)
- Dooley Residence
  (Whitemarsh Township, Montgomery County, PA, 2017)

2.0 PROJECT/SITE BACKGROUND INFORMATION

The site consists of land identified as 222 Church Road located in Cheltenham Township, Montgomery County, PA. The project proposes to subdivide the existing property into ten (10) separate parcels and includes an extension of Harrison Avenue to create a cul-de-sac. Lots 1 thru 4 and 6 thru 8 will be developed into proposed single-family dwellings that front the new extension of Harrison Avenue. Lot 5 will be developed into a proposed single-family dwelling that fronts Church Road (Sr 2023). Lot 9 will remain as an existing dwelling and include a proposed trail extension to connect to the existing Tookany Creek Trail. Lot 10 will remain as open space and be dedicated to Cheltenham Township. Each proposed dwelling includes a driveway for access to the attached garage, a lead walk from the driveway to the front door of the dwelling, and a patio at the rear of the dwelling. An above ground infiltration basin is proposed at the southern end of the development that spans across the rear of Lots 6 thru 8. The NPDES project site boundary and limits of earth disturbance for the project have been defined on the accompanying "E&S Plan" sheets contained within the "Final Subdivision & Land Development Plan for 222 Church Road".

The development site is within the Tacony Creek-Frankford Creed watershed (A.K.A. Tookany Creek), which is a tributary of the Delaware River. A portion of the development site drains overland directly to Tookany Creek which is located within the adjacent Township-owned property to the south of the subject development. The remainder of the development site drains overland to on-site wetlands which drain overland into the Tookany Creek. The receiving waters have a stream classification, pursuant to PA Chapter 93, of WWF (Warm Water Fishery) and MF (Migratory Fish). FEMA Flood Insurance Rate Maps indicate that the 100-year Floodplain of Tookany Creek extends into the southern portion of the property designated as Lot 10 and is fully outside of the development area with the exception of the proposed trail connection and sanitary sewer replacement.

Natural Resources – A site evaluation has been performed by a wetland scientist and determined that regulated waters, including wetlands, are present within the subject property. These surface waters have been depicted on the accompanying Land Development Plans and are located outside of any development and earth disturbance activities.

A Pennsylvania Natural Diversity Inventory (PNDI) report was prepared on June 27, 2023 and indicates that there are no known impacts.

Drainage Conditions – In general, the site drains in a southerly direction towards the Tookany Creek. The project has been determined to contain two (2) distinct study points, defined as Point of Discharge (POD) #1 and POD #2. POD #1 has been defined as the portion of the site that drains to Tookany Creek upstream of the recently constructed Township trail crossing of Tookany Creek and coincides with the discharge location of the proposed above ground infiltration basin (BMP ID 001) located along the rear of Lots 6 thru 8. POD #2 has been defined as the portion of the site that drains to the on-site wetland (Wetland A) and ultimately Tookany Creek downstream of the recently constructed Township trail crossing of Tookany Creek. In the existing conditions, both POD's receive primarily sheet flow and shallow concentrated flow from the upland residential properties. There are no distinct stormwater facilities or outfalls that drain to these POD's in the existing conditions.

In the proposed conditions, the same general drainage patterns are maintained to the greatest extent possible and the locations of POD #1 and POD #2 remain the same. Some of the area

that was tributary to POD #2 in the existing conditions will be directed towards the BMP ID 001 in the proposed conditions and subsequently POD #1. POD #2 will continue to receive primarily sheet flow and shallow concentrated flow from upland residential properties in the proposed conditions. The proposed stormwater management program provides an overall reduction in peak rate and volume of runoff to the receiving waters.

Infiltration and Geological Studies – Infiltration testing at the site was performed by Penn's Trail Environmental, LLC detailed in a report issued on February 2, 2022 which has been included as an appendix within this report. As part of the investigation, 6 test pits were dug across the site which yielded favorable conditions for infiltration. Test Pits (TP) #5 and #6, specifically, are located within the footprint of the proposed above ground infiltration basin (BMP ID 001) and yielded rates of 0.43 and 4.11 inches per hour, respectively. A factor of safety of 2 was applied to these raw test rates and the geomean was utilized in accordance with the PADEP BMP Manual which resulted in a design infiltration rate of 0.66 inches per hour. The infiltration tests performed in TP#5 and TP#6 were within 1 foot of the proposed infiltration elevation of BMP ID 001.

3.0 DISCUSSION OF BEST MANAGEMENT PRACTICES

The project proposes the use of various BMPs to meet the design requirements both during and post construction. Items of implementation include:

Erosion and Sediment Control BMPs:

- **Rock Construction Entrance:** Two rock construction entrances will be installed to provide a stabilized site access from both Church Road and Harrison Avenue.
- **Pumped Water Filter Bags:** Filter bags will be utilized as needed to pump water out of low areas during construction.
- **Concrete Washout:** All excess concrete products and mixed concrete will be contained within the washout area to prevent pollution during rain events.
- **Compost Filter Socks:** In areas where minimal runoff is expected, compost filter socks are proposed to intercept construction runoff and filter before discharge from the site. The perimeter of the disturbance areas will be installed with Compost Socks which are an ABACT device for use to control siltation concerns of the watersheds TMDL requirements.
- **Erosion Control Blanket:** All slopes at a grade of 3:1 or steeper will be installed with slope protection matting to prevent unnecessary erosion of graded areas. Matting will also be installed within the permanent emergency spillway of Sediment Trap #1/BMP ID 001 to prevent erosion should the spillway be activated.
- **Sediment Trap/Compost Filter Sock Sediment Trap:** A sediment trap is proposed to detain sediment laden runoff prior to discharging from the site. Detaining the runoff allows for sediment and other pollutants to settle out within the trap prior to the stormwater discharging from the site.
- **Riprap Aprons:** Riprap aprons will be installed at all pipe discharge locations to prevent accelerated erosion that would otherwise result from the concentrated runoff.

- **Temporary Topsoil Stockpile:** A topsoil stockpile has been provided on site to provide a location to store topsoil.

Post-Construction Stormwater Management

- **Raingarden/Bioretention Basin (BMP ID 001):** The proposed installation a bioretention basin will provide storage of runoff allowing for evapotranspiration and infiltration of runoff in accordance with volume, peak rate, and water quality requirements. This facility has been designed to infiltrate a specified volume of runoff while still dewatering sooner than 72 hours after the end of the design storm.

Design Methodologies – The project was designed in accordance with the local ordinance regulations for Cheltenham Township including, but not limited to, the Subdivision and Land Development Ordinance, the Zoning Ordinance and the Stormwater Management Ordinance; and the requirements of the Pennsylvania Department of Environmental Protection to procure the NPDES permit.

Erosion & Sediment Pollution Control – The following reference materials and manuals were used in the design of the erosion control measures.

- Erosion and Sediment Pollution Control Program Manual, Department of Environmental Protection, dated March 2012.

Stormwater Management – The following reference materials and manuals were used in the design of the stormwater management system.

- Cheltenham Township Stormwater Management Ordinance and SALDO
- Urban Hydrology for Small Watersheds – TR55, U.S. Sept of Agriculture, Natural Resources Conservation Service, Conservation Engineering Division, dated June 1986 (TR55)
- Erosion and Sediment Pollution Control Program Manual, Department of Environmental Protection – Bureau of Watershed Management, dated March 2012 (E&S Manual)
- Pennsylvania Stormwater Best Management Practices, Department of Environmental Protection – Bureau of Watershed Management, dated December 30, 2006 (BMP Manual)

Programs, Applications, and References – To perform the necessary calculations the following programs were utilized to generate the variables and outputs.

- Hydraflow Hydrographs Extension for Autodesk Civil 3D by Autodesk, Inc. v2023
- Stormwater Studio 2022 v3.0.0.29
- AutoCAD Civil3D 2023

Precipitation intensity and depth for the design storms used in the supporting calculations was obtained from NOAA Atlas 14, Volume 2, Version 3 for the area in question.

4.0 CONCLUSION

The report demonstrates target criteria for erosion and sedimentation control are met through the protection of resources and the installation of BMPs. As such, the proposed design complies with the regulations of Cheltenham Township and the PADEP NPDES Permit.

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APPENDIX A

OFF-SITE DISCHARGE ANALYSIS

Existing Conditions

The site drains in a southerly direction towards the Tacony Creek (A.K.A. Tookany Creek). The project has been determined to contain two (2) distinct study points, defined as Point of Discharge (POD) #1 and POD #2. POD #1 has been defined as the portion of the site that drains to Tookany Creek upstream of the recently constructed Township trail crossing of Tookany Creek and coincides with the discharge location of the proposed above ground infiltration basin (BMP ID 001) located along the rear of Lots 6 thru 8. POD #2 has been defined as the portion of the site that converges to the on-site wetland (Wetland A) and ultimately Tookany Creek downstream of the recently constructed Township trail crossing of Tookany Creek. In the existing conditions, both POD's receive primarily sheet flow and shallow concentrated flow from the upland residential properties. There are no distinct stormwater facilities or outfalls that drain to these POD's in the existing conditions and there are no signs of accelerated erosion resulting from drainage within the development area.

From POD #1, runoff converges at a berm just downstream of the recently constructed Township trail. Runoff then flows through an opening in the berm down a slope to low-lying area within the floodplain of Tookany Creek and ultimately into Tookany Creek itself. The flow path from POD#1 to Tookany Creek is fully on Township-owned land and the ground cover consists of the Township gravel trail and dense vegetation downslope of the trail. There are no signs of accelerated erosion in the existing conditions.

At POD #2, water converges within the upper portion of Wetland 'A' which is an area where small pools of surface water are present and bound by a berm that was previously part of a manmade water conveyance structure reported to have been a mill raceway. The mill raceway has since been abandoned and disconnected from the source of surface water. From the upper portion of Wetland 'A', surface water flows through an opening in the existing berm and travels downslope to the lower portion of Wetland 'A' along the Tookany Creek floodplain. There are no signs of accelerated erosion in the existing conditions.

Figure 1 - Photograph of the southern edge of the property facing towards the southwest corner. Looking towards POD #1 near the left portion of the photo.

Figure 2 - Photograph of the southern edge of the property in the vicinity of POD #1 facing towards the southeast corner.

Figure 3 - Photograph from the vicinity of POD #1 looking southeast towards the Township trail. The existing berm can be seen beginning at the bend in the trail. Runoff that crosses the trail gets redirected by the berm and flows to the southwest towards the opening in the berm.

Figure 4 - Photograph along the flow path to receiving waters downstream of POD #1. Standing along the existing berm looking southwest towards the opening in the berm.

Figure 5 - Photograph of the opening in the berm along the flow path from POD #1 to the receiving waters. Beyond this opening, runoff flows across densely vegetated low-lying land until reaching the Tookany Creek.

Figure 6 - Photograph of the abandoned & disconnected old mill race at the southern edge of the subject property, facing southeast towards POD #2 and the upper portion of Wetland 'A'.

Figure 7 - Photograph in the vicinity of POD #2 and the upper portion of Wetland 'A', looking south towards the opening in the berm that allows surface water to drain downslope to the lower portion of Wetland 'A' and ultimately Tookany Creek.

Proposed Conditions

In the proposed conditions, the same general drainage patterns are maintained to the greatest extent possible and the locations of POD #1 and POD #2 remain the same. Some of the area that was tributary to POD #2 in the existing conditions will be directed towards BMP ID 001 in the proposed conditions and subsequently POD #1. The discharge of BMP ID 001 will first drain to a level spreader (LS#1) prior to the outflow reaching POD #1. The level spreader has been designed to distribute the controlled runoff as sheet flow to the existing stabilized vegetated areas downstream of the subject development. POD #2 will continue to receive primarily sheet flow and shallow concentrated flow from upland residential properties in the proposed conditions.

Off-Site Discharge Comparison

The same general drainage patterns and Points of Discharge are maintained between the pre-development and post-development conditions. There is also a net reduction in the peak rate and volume of runoff draining to each POD. Since there are no signs of accelerated erosion as the site exists today (as documented in the photos above) and there is a reduction in peak rate and volume of runoff to each POD, there are no increase in erosion anticipated from this proposed development.

In addition, POD #2 coincides with Wetland ‘A’ as described in the Existing Conditions section of this analysis. Per the DEP Spreadsheet results for DP-002, there is a minor reduction in runoff volume and peak rate to DP-002 that results from the proposed development, and a decrease in pollutant loading that

results from the decrease in runoff volume. Therefore, the proposed development is not anticipated to degrade the quality of Wetland 'A'. Further, a Wetland/Waters Investigation has been prepared by VW Consultants LLC dated April 21, 2023 which has been included as Appendix C.5. of this report. This investigation documents that Wetland 'A' has two main portions, one being the small area of closed grading where surface water is present and the other being the lower portion downslope of the existing berm. For the upper portion that coincides with DP-002, it is believed to be fed by shallow groundwater and transmission of infiltrated water to this low point. The lower portion of the wetland is believed to be fed by regional groundwater discharge. Therefore, the slight reductions to surface runoff that will result from this development will have a de minimis impact on the source hydrology of the receiving wetland.

Permanent Erosion Control Measures

In addition to reducing the peak rate and volume of runoff draining to the receiving waters, the discharge of Sediment Trap #1/BMP ID 001 is proposed to have a level spreader to provide energy dissipation and distribute the basin outflow as sheet flow prior to reaching POD #1.

APPENDIX B

ROBERT E. BLUE CONSULTING ENGINEERS, P.C.

PROJECT:	**222 Church Road [2154-10]**
LOCATION:	**Cheltenham Township**
COUNTY:	**Montgomery County, PA**

COMPOST FILTER SOCK CALCULATIONS

FILTER SOCK ID / LOCATION	DIAMETER (IN)	SLOPE %	PROVIDED FLOW LENGTH (FT)	ALLOWABLE FLOW LENGTH (FT)
CFS-1 / Southwestern Corner	32	7.1%	491	545
CFS-2 / Southern Property Line	18	33.0%	26	76
CFS-3 / Southern Property Line	18	6.3%	144	268
CFS-4 / Southeastern Corner of LOD	18	6.1%	82	269
CFS-5 / Downstream of Level Spreader	18	33.0%	26	76

STANDARD E&S WORKSHEET #19
SEDIMENT TRAP DESIGN DATA

PROJECT NAME: 222 Church Road [2154-10]
LOCATION: CHELTENHAM TOWNSHIP, MONTGOMERY COUNTY PA

TRAP NUMBER		1	
DRAINAGE AREA (5 ACRES MAX)	AC	**4.60**	
REQ'D SED. STORAGE (700 CF/AC)	CF	3,220	
REQUIRED CAPACITY (2000 CF/AC)	CF	9,200	
CAPACITY PROVIDED AT ELEV h	CF	11,054	**OK**
SOIL TYPES IN DRAINAGE AREA		silty clay loam	
REQUIRED SURFACE AREA (5,300 x AC)[1]	SQ.FT	24,380	
* AVERAGE BOTTOM LENGTH	FT	**155'**	
* AVERAGE BOTTOM WIDTH	FT	**17'**	
* AVERAGE TRAP LENGTH AT ELEVATION h	FT	**160'**	
* AVERAGE TRAP WIDTH AT ELEVATION h	FT	**32'**	
SURFACE AREA AT ELEVATION h	SQ.FT	5,069	
BOTTOM ELEVATION	FT	131.00'	
CLEAN-OUT ELEVATION (@ 700CF/AC)[2]	FT	132.08	
MIN. TOP OF EMBANKMENT	FT	135.00	
ACTUAL TOP OF EMBANKMENT ELEVATION[3]	FT	136.50	**OK**
EMBANKMENT HEIGHT	FT	5.50	
CREST OF SPILLWAY ELEVATION[4] **(ELEV h)**	FT	**134.00**	
FLOW LENGTH AT ELEVATION h	FT	**106**	
SIDE SLOPES H:V		**3:1**	
FLOW LENGTH/WIDTH RATIO AT ELEV h[5]	(2:1 MIN)	2.2:1	**OK**

1 If sandy clays, silty clays, silty loams, clay loams, or clays predominate soil types.
2. Minimum 12" above bottom of trap
3. Minimum 12" above elevation at which 1.5 cfs/acre discharge capacity is provided.
4. Minimum 24" above bottom of trap.
5. 4:1 Flow Length:Width ratio required for HQ and EV watersheds.

EMBANKMENT SPILLWAYS

OUTLET WIDTH (2 x # ACRES MIN)[1]	FT	
SPILLWAY HEIGHT h	FT	
OUTLET SIDE SLOPES	(2:1 MIN)	
SPILLWAY OUTSIDE SLOPE Z1	(2 MIN)	
SPILLWAY INSIDE SLOPE Z2	(2 MIN)	

1. 6 x # Acres Min. if not discharging directly to a waterway

RISER PIPE SPILLWAYS

Dr (RISER DIAMETER[1], 8" MIN.)	IN	**15"**
Db (BARREL DIAMETER, 6" MIN.)	IN	**18"**
SPILLWAY CAPACITY WITH 12" FREEBOARD (CFS)		14.2
REQUIRED CAPACITY	(CFS)	6.90
BARREL OUTLET ELEVATION	FT	**132.13**
L (BARREL LENGTH	FT	**26'**
MAX WATER SURFACE ELEVATION (@ 1.5 CFS/AC. DISCHARGE) Q=6.90 cfs	FT	135.30

1. Equivalent Diameter is calculated for rectangular outlet structures

OUTLET BASIN

LENGTH (6 Db)	FT	
WIDTH (3 Db)	FT	
DEPTH (Db)	FT	
RIP-RAP PROTECTION	(SIZE)	

WATER SURFACE ELEVATON (FEET)	AREA (SQ.FT.)	CONIC AREA (SQ.FT.)	DIFF. IN ELEV. (FEET)	STORAGE VOLUME (CF.) INCREMENTAL	STORAGE VOLUME (CF.) TOTAL
131.00	**2,601**				0
		2,931	1.0	2,930	
132.00	**3,273**				2,930
		3,616	1.0	3,616	
133.00	**3,971**				6,546
		4,509	1.0	4,508	
134.00	**5,069**				11,054
		5,636	1.0	5,635	
135.00	**6,222**				16,689
		6,930	1.0	6,930	
136.00	**7,664**				23,619
		8,189	0.5	4,094	
136.50	**8,725**				27,713

ANTI-SEEP COLLAR DESIGN

Sed Trap		**1**			
RISER CREST ELEV.	(feet)	135.25			
INVERT OF OUTFLOW PIPE	(feet)	132.13			
DIAMETER OF PIPE / TYPE	(inches)	18 HDPE	RCP	RCP	RCP
LENGTH OF OUTFALL PIPE	(feet)	26			
PIPE SLOPE	(ft/ft)	**0.0050**			
EMBANKMENT SLOPE (X:1)	(ft/ft)	**3**			
Number of collars	(each)	**2**			
Permanent / Temporary		PERMANENT	PERMANENT	PERMANENT	PERMANENT
"Y"	(feet)	3.12			
SATURATED LENGTH, Ls	(feet)	22			
COLLAR PROJECTION, V	(feet)	1.00			
COLLAR SIZE	(feet)	3.50			
COLLAR SPACING	(feet)	7			
MAXIMUM COLLAR SPACING	(feet)	14			

ROBERT E. BLUE CONSULTING ENGINEERS, P.C.

PROJECT:	**222 Church Road [2154-10]**
LOCATION:	**Cheltenham Township**
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Level Spreader Calculations
Level Spreader #1

$V = 1.5 * Cw * H^{1/2}$

$H = (V / 1.5 * Cw)^2$

Down Slope Ground Cover Conditions
Grass/Thicket

V =	1.33 FT/SEC	- Max Allowable Velocity
Cw =	3.0	- Weir Coefficient (Rectangular Weir)
H =	0.09 FT	- Driving Head
H* =	0.70 IN	- Flow Depth over Level Spreader

Weir Equation

$Q_{100} = Cw * L * H^{3/2}$

$L = Q_{100} / Cw * H^{3/2}$

Q100 =	6.69 FT^3/SEC	- 100-yr Storm Flow (From Routing Calculations)
Cw =	3.0	- Weir Coefficient
H =	0.087 FT	- Driving Head (Calculated Above)
L =	86 FT	Minimum Length of Level Spreader

Underdrain Capacity Calculations

$Q = C_d A(2gh)^{1/2}$

$A = \pi r^2$

Cd =	0.6	- Orifice Coefficient

P =	2	- # of Perferations per Linear Foot
r =	0.5 IN	- Radius of Perforation Orifice
A =	0.011 SF	- Area of Orifice (SF)
A =	1.57 IN^2	- Area of Orifice (SQ.IN.)

g =	32.2 FT/SEC^2	Gravitational Constant
h =	0.5 FT	- Head
Q =	0.037 CFS	- Orifice Flow (CFS)
Q =	16.67 GPM	- Orifice Flow (GPM)

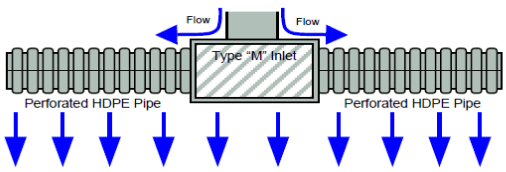
PennDOT Pub 408 Section 610.2(a)1.c Perforations - Area per Linear Foot

1.57 IN^2/LF Provided > 1.4 IN^2/LF Requirement

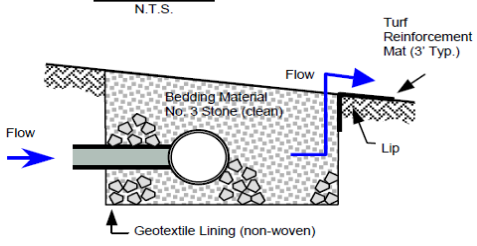
PADEP Design Standard

16.67 GPM/LF Provided > 10 GPM/LF Requirement

Plan View
N.T.S.



Profile View
N.T.S.



ROBERT E. BLUE CONSULTING ENGINEERS, P.C.

PROJECT:	222 Church Road [2154-10]
LOCATION:	Cheltenham Township
COUNTY:	Montgomery County, PA

Compost Filter Sock Sediment Trap Calculations

Compost Filter Sock Trap No.:	1	
Drainage Area:	0.37	Ac. (Max 5 Ac.)
Required Capacity:	740	CF (2,000 CF per Ac.)

Volume Storage Tabulation

Stage	Elevation	Contour Area (SF)	Incremental Storage (CF)	Total Storage (CF)
0.00	**140.75**	0	0	**0**
1.25	**142.00**	964	602	**602**
3.25	**144.00**	2,268	3,232	**3,834**

Compost Filter Sock Sediment Trap Depth

Total Depth of Filter Sock:	2.50	FT
Sump Depth:		FT
Total Depth of Trap =	2.50	FT

Compost Filter Sock Sediment Trap Volume

Bottom of Storage Elev.:	140.75	FT
Top of Trap Elev.:	143.25	FT
Provided Freeboard:	1.00	FT
Max. Elev. Of Provided Storage:	142.25	FT
Provided Storage Volume:	1,006	CF
Required Capacity:	740	CF
Cleanout Elev.:	141.58	FT (1/3 of Trap Height)

ROBERT E. BLUE CONSULTING ENGINEERS, P.C.

PROJECT:	222 Church Road [2154-10]
LOCATION:	Cheltenham Township
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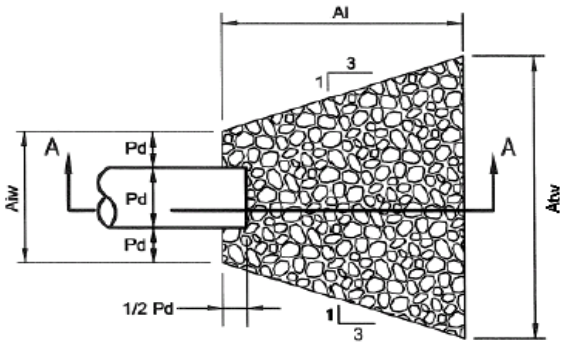
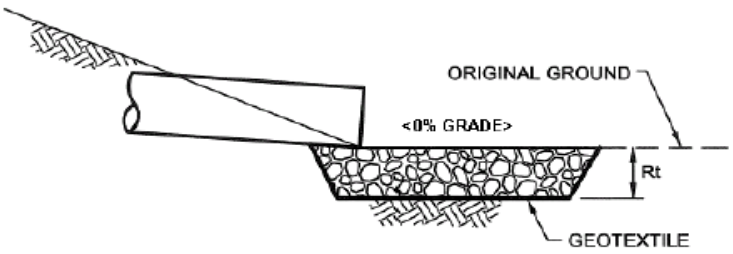
RIPRAP APRON SUMMARY CHART



PLAN VIEW



SECTION A - A

OUTLET NO.	PIPE DIA Pd (IN)	RIPRAP		APRON		
		SIZE (R-__)	THICKNESS Rt (IN)	LENGTH Al (FT)	INITIAL WIDTH Aiw (FT)	TERMINAL WIDTH Atw (FT)
FES#1	24	R-4	18.0	22.0	6.0	14.8

ROBERT E. BLUE CONSULTING ENGINEERS, P.C.

PROJECT:	**222 Church Road [2154-10]**
LOCATION:	**Cheltenham Township**
COUNTY:	**Montgomery County, PA**

RIPRAP APRON SIZING CALCULATIONS

FOR: FES#1

Design Inputs

Pipe Material:	HDPE	
Manning's **n**:	0.012	
Pipe Diameter, **D**:	24	IN
Pipe Slope, **S**:	0.0076	FT/FT
Design Discharge, **Qd**:	14.50	CFS
Design Velocity, **V**:	6.52	FPS
Pipe Inv. Elev. @ Discharge:	133.00	
Tailwater Elevation:	134.79	
Tailwater Condition, **Tw**:	MAX	
Full Flow Area of Pipe, A:	3.14	SF

Full Flow/Equivalency Calcs, Slopes <0.05 FT/FT

$$Q_f = \frac{0.464}{n} * D^{8/3} * S^{1/2}$$

Qf =	**21.40**	**CFS**

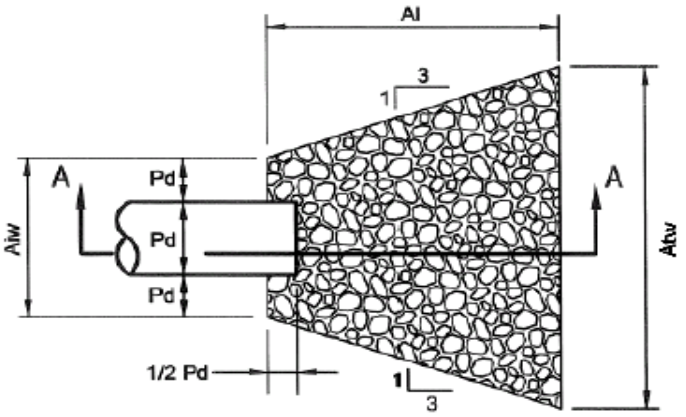
$$Discharge\ Ratio = {}^{d}/_{D} = {}^{Q_d}/_{Q_f}$$

Discharge Ratio =	**0.68**	
% Full =	**0.63**	
Area * Ratio =	**1.98**	**SF**
Equiv. Full-Flow Pipe Size =	**18**	**IN**

RIPRAP APRON SIZE

R-SIZE =	**R-4**		**INITIAL WIDTH, Aiw =**	**6.0**	**FT**
d50 =	**6.0**	**IN**	**TERMINAL WIDTH, Atw =**	**14.8**	**FT**
Rt =	**18.0**	**IN**	**LENGTH, La* =**	**22.0**	**FT**

* PER FIGURE 9.4 OF THE E&S MANUAL



PLAN VIEW

Robert E. Blue Consulting Engineers, P.C.

PROJECT: 222 Church Road [2154-10]
LOCATION: Cheltenham Township
COUNTY: Montgomery County, PA

Slope Condition (Minimum, Maximum, Entire)	Minimum	Maximum
Channel or Channel Section	**18" Diversion Sock**	**18" Diversion Sock**
Channel Condition (Temporary or Permanent)	**Temporary**	**Temporary**
Design Storm (2-Year or 10-Year)	2-Year	2-Year
Acres (Ac)	1.95	1.95
Multiplier (2.25 for HQ/EV Watersheds)	2.25	2.25
Q_r (Required Capacity, cfs)	4.39	4.39
Q (At Flow Depth d, cfs)	4.39	4.39
Protective Lining **	NAG S150	NAG S150
n (Manning's Coefficient) **	0.055	0.055
V_a (Allowable Velocity, fps)	6.00	6.00
V (At Flow Depth d, fps)	1.31	1.78
τ_a (Max. Allowable Shear Stress, lb/ft2)	1.75	1.75
τ_d (Shear Stress at Flow Depth d, lb/ft2)	N/A	N/A
Channel Bottom Width (ft)	1.00	1.00
Z1 Channel Side Slope (H:V)	0.00	0.00
Z2 Channel Side Slope (H:V)	25.00	25.00
D (Design Depth in ft)	1.50	1.50
Channel Top Width (ft) @D	38.50	38.50
d (Flow Depth in ft)	0.48	0.41
Channel Top Width (ft) @d	13.00	11.15
Bottom Width: Depth Ratio (12:1 max)	2.08	2.46
d_{50} Stone Size (in)	N/A	N/A
A (Area in s.f. at flow depth, d)	3.36	2.47
P (Wetted Perimeter in ft)	13.49	11.56
R (Hydraulic Radius (A/P))	0.25	0.21
S (Bed Slope, ft/ft) *	0.015	0.034
S_c (Critical Slope)	0.073	0.076
$0.7S_c$	0.051	0.054
$1.3S_c$	0.094	0.099
Stable Flow? (Y/N)	Y	Y
Freeboard Based on Unstable Flow, ft	N/A	N/A
Freeboard Based On Stable Flow, ft	0.12	0.10
Minimum Required Freeboard, ft ***	0.50	0.50
Minimum Required Depth, ft	0.98	0.91
Design Method for Protective Lining**** Permissible Velocity (V) or Shear Stress (S)	V	V
Vegetative Lining Retardance	N/A	N/A
Include Bend Analysis (Approx. Horizontal Radius, ft)		
Additional Depth Adjustment for Horizontal Bend	0.00	0.00

** Slopes may not be averaged.*

*** For vegetated channels, provide data for temporary linings and vegetated conditions in separate columns.*

****Minimum Freeboard, F, is 0.50 ft.*

*****Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater.*

*****Shear stress lining design method is recommended for channels with a bed slope of 10% or greater.*

*****Shear stress lining design method may be used for any channel bed slope.*

Robert E. Blue Consulting Engineers, P.C.

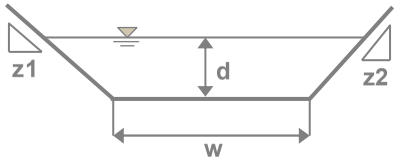
PROJECT: 222 Church Road [2154-10]
LOCATION: Cheltenham Township
COUNTY: Montgomery County, PA

Swale Name: 18" Diversion Sock

Input Channel Parameters

Channel Dimensions

z1	0.00	ft. (horiz to 1' vert.)
z2	25.00	ft. (horiz to 1' vert.)
w	1.00	ft. (bottom width)
d	1.50	ft. (design depth)



Slope Condition

Minimum	0.0150	ft/ft (capacity)
Maximum	0.0340	ft/ft (stability)
Entire		ft/ft

Evaluate Temporary & Permanent Conditions

Design Method: Velocity

☑ **Temporary**

Calculate Design Flow (Q)

2-yr storm		cfs
	OR	
Area	1.95	acres
x	2.25	cfs/acre
	4.39	cfs (design Q)

Select Lining Material

	Lining	Retardance (A, B, C, D)	d_{50} Stone Size (in.)	Initial n-value	Allowable Velocity	Allowable τ_d (lb/ft^2)
z1	**NAG S150**	N/A	N/A	0.055	**6.000**	1.750
z2	**NAG S150**	N/A	N/A	0.055	**6.000**	1.750
w	**NAG S150**	N/A	N/A	0.055	**6.000**	1.750

Results

	n-value	d	v (fps)	τ_d (lb/ft^2)
Min. slope	0.055	0.48	**1.31**	0.45
Max. slope	0.055	0.41	**1.78**	0.86
Entire slope	N/A	N/A	N/A	N/A

APPENDIX C

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Montgomery County, Pennsylvania

222 Church Road

June 3, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

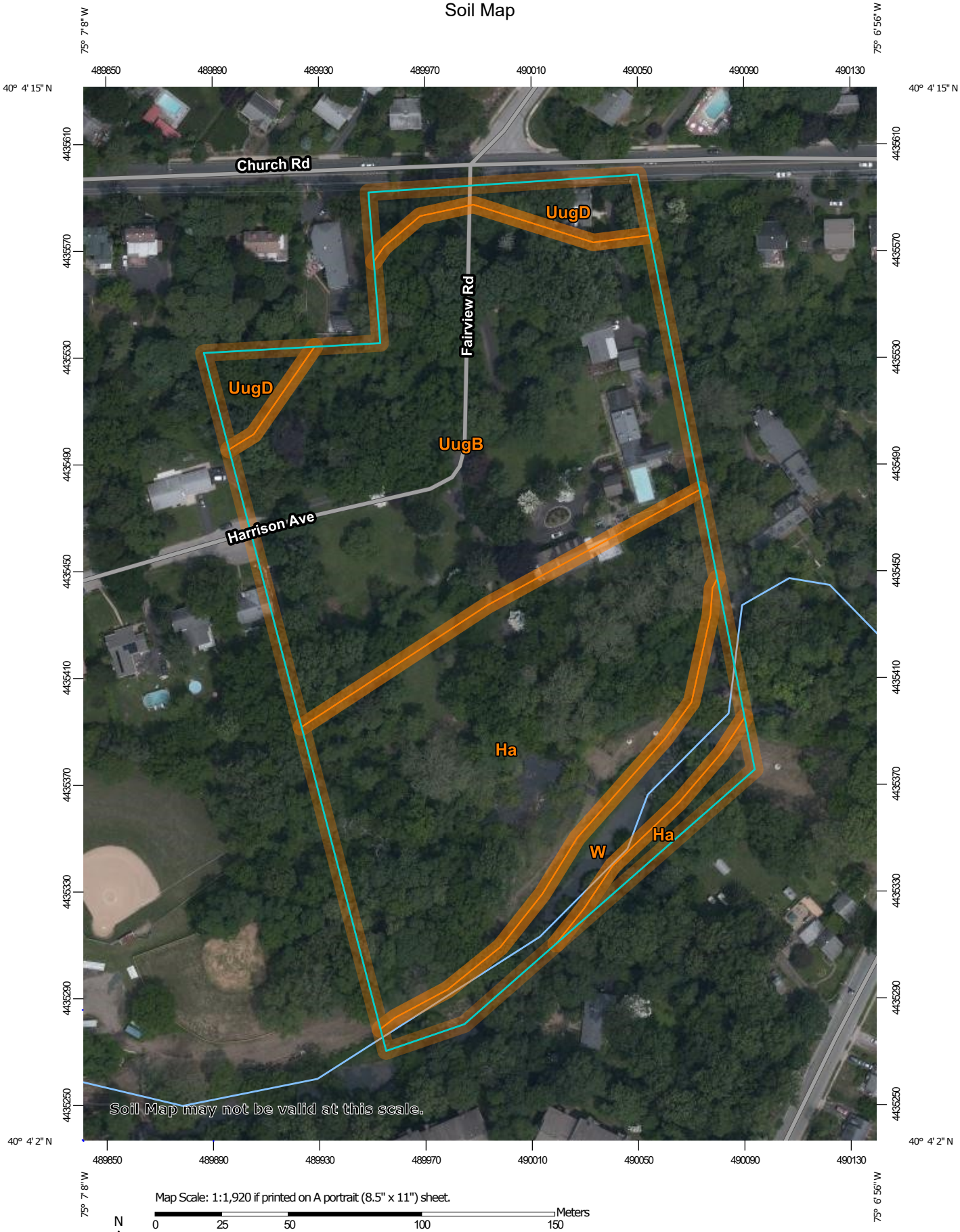
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,920 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
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: Montgomery County, Pennsylvania
Survey Area Data: Version 15, Jun 5, 2020

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

Date(s) aerial images were photographed: Jun 1, 2019—Aug 4, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ha	Hatboro silt loam	4.1	38.6%
UugB	Urban land-Udorthents, schist and gneiss complex, 0 to 8 percent slopes	5.1	47.9%
UugD	Urban land-Udorthents, schist and gneiss complex, 8 to 25 percent slopes	0.6	5.8%
W	Water	0.8	7.8%
Totals for Area of Interest		**10.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Montgomery County, Pennsylvania

Ha—Hatboro silt loam

Map Unit Setting

National map unit symbol: l54h
Elevation: 200 to 800 feet
Mean annual precipitation: 36 to 50 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 140 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Hatboro and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hatboro

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Alluvium derived from metamorphic and sedimentary rock

Typical profile

Ap - 0 to 9 inches: silt loam
Bg - 9 to 44 inches: silt loam
Cg - 44 to 56 inches: sandy clay loam
C - 56 to 70 inches: stratified gravelly sand to clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 60 to 99 inches to lithic bedrock
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Available water capacity: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Glenville

Percent of map unit: 5 percent
Landform: Hillslopes

Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Hydric soil rating: No

UugB—Urban land-Udorthents, schist and gneiss complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2dtz7
Elevation: 200 to 2,000 feet
Mean annual precipitation: 35 to 55 inches
Mean annual air temperature: 45 to 61 degrees F
Frost-free period: 110 to 235 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 80 percent
Udorthents, schist and gneiss, and similar soils: 15 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Pavement, buildings and other artifically covered areas

Typical profile

C - 0 to 6 inches: variable

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 10 to 99 inches to lithic bedrock
Available water capacity: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Description of Udorthents, Schist And Gneiss

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Interfluve, side slope, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Graded areas of schist and/or gneiss

Typical profile

Ap - 0 to 6 inches: loam
C - 6 to 40 inches: silty clay loam
R - 40 to 60 inches: bedrock

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 20 to 70 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 60 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Glenelg

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Edgemont

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountaintop
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Glenville

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Hydric soil rating: No

Baile

Percent of map unit: 1 percent
Landform: Depressions
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Gladstone

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

UugD—Urban land-Udorthents, schist and gneiss complex, 8 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2dtz8
Elevation: 200 to 2,000 feet
Mean annual precipitation: 35 to 55 inches
Mean annual air temperature: 45 to 61 degrees F
Frost-free period: 110 to 235 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 80 percent
Udorthents, schist and gneiss, and similar soils: 15 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Pavement, buildings and other artifically covered areas

Typical profile

C - 0 to 6 inches: variable

Properties and qualities

Slope: 8 to 25 percent
Depth to restrictive feature: 10 to 99 inches to lithic bedrock
Available water capacity: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Description of Udorthents, Schist And Gneiss

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Graded areas of schist and/or gneiss

Typical profile

Ap - 0 to 6 inches: loam
C - 6 to 40 inches: silty clay loam
R - 40 to 60 inches: bedrock

Properties and qualities

Slope: 8 to 25 percent
Depth to restrictive feature: 20 to 70 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 60 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Glenville

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Hydric soil rating: No

Baile

Percent of map unit: 1 percent
Landform: Depressions

Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Edgemont

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountaintop
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Gladstone

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Glenelg

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

W—Water

Map Unit Setting

National map unit symbol: 1nnv3
Mean annual precipitation: 36 to 50 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 120 to 214 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Setting

Parent material: Rivers streams ponds

Properties and qualities

Runoff class: Negligible
Frequency of ponding: Frequent

References

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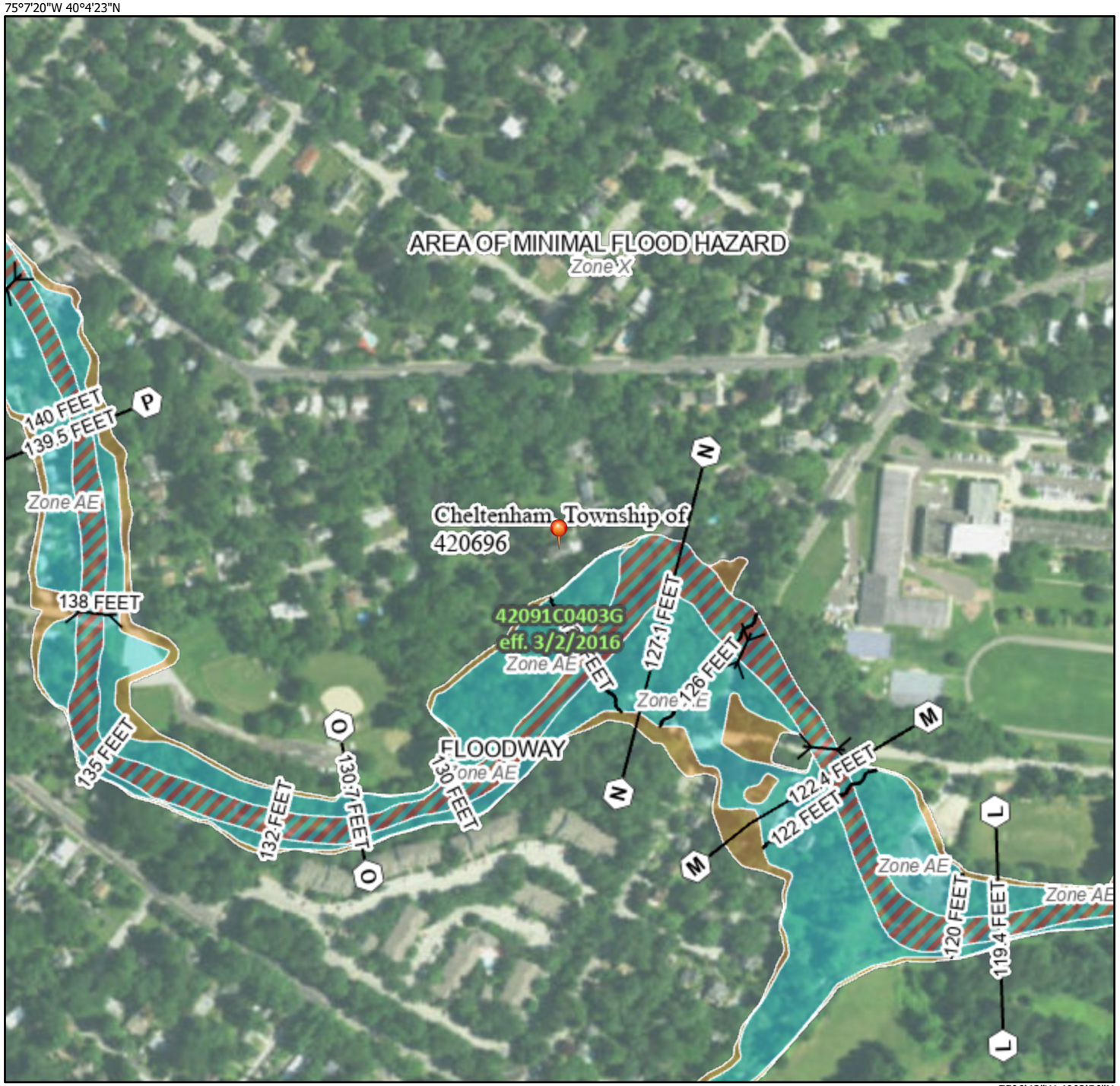
National Flood Hazard Layer FIRMette

FEMA

75°7'20"W 40°4'23"N



75°6'42"W 40°3'56"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/3/2021 at 11:13 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

1590 Canary Road, Quakertown, PA 18951 | 215-536-7006 | Fax: 215-538-6136

April 21, 2023

Steven N. Kline, AIA
Regan/Kline/Cross
7670 Queen Street, Suite 200
Wyndmoor, PA 19038
via email: s_kline@reganklinecrossllc.com

Re: Wetland/Waters Investigation
222 Church Road
Elkins Park, PA 19027
Cheltenham Township, Montgomery County
TM# 31-00-06637-001

Dear Mr. Kline,

VW Consultants, LLC (VW) is pleased to present this letter summarizing findings of a wetland evaluation completed on March 22, 2023 at the above referenced property. The purpose of the routine investigation was to identify and delineate wetlands and waters of the US and Commonwealth for a proposed residential land development project. This evaluation area was completed throughout the ±5.05 acres property. The property has frontage Church Road and Harrison Ave with paved driveways from each. The property currently contains a stone dwelling and associated outbuildings. The majority of the property is well maintained lawn with scattered mature trees. Site surface drainage is generally toward the south in the direction of Tookany Creek which traverses neighboring lots.

Methodology

The site was evaluated per routine procedures established by *Corps of Engineers Wetland Delineation Manual (1987)* and *Regional Supplement to the Corps of Engineers Wetland Manual: Eastern Mountains and Piedmont Region, (Version 2.0) (2012)*. To qualify as a wetland the manuals require the area to exhibit hydric soils, dominance of hydrophytic vegetation, and wetland hydrology.

VW traversed the project site to identify plant communities and wetland hydrology indicators. Samples points were located in and along low-lying sections of the site most likely to contain wetlands. The project site and delineated wetlands are depicted on the attached *Existing Features* plan, dated July 23, 2021, last revised April 10, 2023, prepared by Robert E. Blue Consulting Engineers, p.c. Locations of the sample points documented on the attached forms are also indicated on the site plan.

Desktop Resource Review and Setting

A review the U.S. Fish and Wildlife Services National Wetlands Inventory (NWI) Map revealed presence of riverine habitat associated with Tookany Creek and a forested wetland within the creeks floodway. Both mapped features are off site and down gradient of the project area.

The current Soil Survey of Montgomery County, Version 6, Sept. 17, 2019, published by the National Resource Conservation Service and accessed via Web Soil Survey indicates soils on the subject site are expected to be Hatboro silt loam (Ha) and Urban land-Udorthents of schist and gneiss (UugB & UugD). The Hatboro soil series is recognized as very deep and poorly drained Inceptisols formed in alluvium from metamorphic and crystalline rock. The Urban land-Udorthents mapping units indicate a combination of manmade impervious coverages and cut/fill lands. Given the site bedrock formation of Wissahickon schist and hillslope position the author would

expect to encountered well drained Glenelg type soil and moderately well Glenville type soil, with an urban component based on the developed condition. Evidence of significant and filling activity was not readily apparent in the upland portion of the project site based on our above grade observations.

Findings

The project site contains a manmade water conveyance structure reported to have been a mill raceway. This raceway is disconnected from the source of surface water as control structures have deteriorated and berms eroded allowing the outlet of water to Tookany Creek upgradient of the project site. A small on-site masonry structure is labelled as Spring House on the Existing Features Plan. During our site visit in late March following a warm wet winter no spring was present at the Spring House. Function of the spring house is likely impacted by changes to the local hydrologic regime as the result of extensive land development or it may have originally functioned as a root cellar.

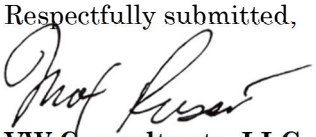
The raceway currently contains a small area of closed grading where surface water is present in small pools at the lowest points. This area meets the criteria of a wetland and was field delineated as such. It is unclear how much of the wetland's hydrology is the result of shallow groundwater or if the wetland is supported by transmission of infiltrated water transmitted via sediment deposits to this low point. To the east and west of the wetland feature the raceway plant communities become more neutral in their affinity for saturated soil conditions and hydrology and hydric soils become absent. The wettest portion of the wetland was unvegetated at the time of our site visit. Margin species include Eurasian buttercup (*Ficaria verna)*, boxelder maple (*Acer negundo)*, and Amur honeysuckle (*Lonicera maackii).*

A natural wetland located at the rear of the Tookany Creek floodplain is present along the toe of the raceway berm. This wetland extends off site to the south. A surface connection from the raceway wetland to the flooplain wetland is present in the form of an erosion channel through the berm. The hydrology source of the floodplain wetland is regional groundwater discharge. The connection with the raceway appears to have minimal impacts on the floodplain wetland hydrology and characteristics. Dominant plants include Eurasian butter cup and boxelder maple, along with skunk cabbage (*Symplocarpus foetidus)* in the most lowlying locations.

Conclusion

The project site includes a wetland regulated by the Commonwealth of Pennsylvania and under Federal jurisdiction administered by the Army Corps of Engineers. The wetland exhibits varying characteristic. The upper portion can be characterized as a manmade depressional wetland to vernal pool during wet springs. The remainder is a backswamp floodplain wetland with drainage channel. The abandoned mill raceway does not exhibit fluvial characteristics that support regulation as a water course. Final jurisdictional boundaries are dependent upon Federal and State field determinations. Should you need any assistance with permitting of disturbance of wetlands or waters please feel free to contact me at 267-498-8778 or by email at mrussick@vw-consultants.com.

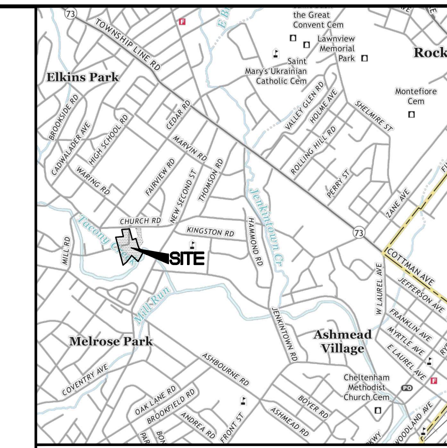
Respectfully submitted,



VW Consultants, *LLC*
Max Russick, CPSS
Soil Scientist

Enclosures: Existing Features Plan (reduced to 11"x17"), NWI Map Figure, Data Forms, NC DWQ Stream Identification Form, Photo Plates

CC: Robert Blue, P.E.- Robert E. Blue Consulting Engineers, P.C.
Michael Baginski, E.I.T.- Robert E. Blue Consulting Engineers, P.C.



LOCATION MAP
SCALE: 1"=2,000'

THE NATIONAL MAP BY U.S.G.S.
FRANKFORD PA 2019 QUADRANGLE

ZONING: R2 – RESIDENTIAL DISTRICT		
	REQUIREMENTS	EXISTING (222 E. CHURCH)
§295-602.A MINIMUM LOT AREA:	10,000 S.F.	5.0503 ACRES (219,992.75 S.F.)
§295-602.A MINIMUM LOT WIDTH:	70 FT.	172.14 FT.
§295-602.A SETBACKS:	FRONT YARD = 40 FT. SIDE YARD (AGG.) = 30 FT. SIDE YARD (MIN.) = 10 FT. REAR YARD = 25 FT.	FRONT YARD = 40 FT. SIDE YARD (AGG.) = 30 FT. SIDE YARD (MIN.) = 15 FT. REAR YARD = 25 FT.
§295-602.A MAX. BUILDING COVERAGE:	20%	1.4% (3,788 S.F.)
§295-602.A MAX. IMPERVIOUS COVERAGE:	40%	8.0% (21,590 S.F.)
§295-602.A MAX. BUILDING HEIGHT:	<40 FT.	<40 FT.
§295-602.A GARAGE SETBACK*	10 FT. BACK FROM FRONT FACADE	<10 FT.[1]
* ADDITIONAL REGULATIONS UNDER §295-603		
[1] EXISTING NON-CONFORMITY		

SURVEY NOTES:

1. THIS PLAN REPRESENTS AN ACTUAL FIELD SURVEY PERFORMED BY CHARLES E. SHOEMAKER, INC. COMPLETED IN FEBRUARY, 2021.
2. SITE DATA:

   CURRENT OWNER: 222 CHURCH ROAD LLC (C/O RABBI ZVI BLOOM)
   C/O RABBI ZVI BLOOM
   509 CEDARHILL ROAD

   SITE ADDRESS: 222 E. CHURCH ROAD
   ELKINS PARK, PA 19027
   TAX MAP: BLOCK 47 – UNIT 3
   TAX NUMBER: PARCEL 31-00-06637-001
   DB 6206 PG 272

   RECORDED DATA: CHELTENHAM TOWNSHIP, MONTGOMERY COUNTY, PENNSYLVANIA
3. THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CONFIRM THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE.
4. A PORTION OF THE PROJECT SITE SHOWN LIES WITHIN A SPECIAL FLOOD HAZARD AREA ("SFHA") – ZONE AE, AS DOCUMENTED ON THE FLOOD INSURANCE RATE MAP IDENTIFIED AS PANEL 403 OF 451, COMMUNITY NUMBER 420696, MAP NUMBER 42091C0403G; EFFECTIVE DATE: MARCH 2, 2016. THE DATUM FOR THIS MAP IS NAVD88.
5. THE VERTICAL DATUM FOR THIS SITE IS NAVD 1988 BASED ON GPS OBSERVATIONS.
6. PA ONE CALL SERIAL NUMBER: SERIAL #20212303507, DATED AUGUST 21, 2021
7. THE GROSS AND NET AREA OF 222 E. CHURCH ROAD IS 272,238 S.F. OR 6.2497 ACRES.
8. THIS PROPERTY HAS DIRECT ACCESS TO CHURCH ROAD (SR 2023), A PUBLIC STREET, THROUGH TWO (2) TWO-WAY MACADAM DRIVEWAYS. ADDITIONAL THIS PROPERTY HAS DIRECT ACCESS TO HARRISON AVENUE, A PUBLIC STREET.
9. AS OF THE DATE OF SURVEY (APRIL 10, 2020), THERE WAS NO EVIDENCE OF RECENT STREET OR SIDEWALK CONSTRUCTION OR REPAIRS, EARTH MOVING WORK, BUILDING CONSTRUCTION OR BUILDING ADDITIONS.
10. PLAN REFERENCES:

    10.1. SUBDIVISION PLAN FOR 216 & 222 E. CHURCH ROAD, PREPARED BY CHARLES E. SHOEMAKER, INC., DATED MARCH 1, 2021, LAST REVISED MARCH 31, 2021.

SOILS TABLE PER USDA NRCS						
MAP SYMBOL	SOIL NAME	SLOPES	HYDROLOGIC GROUP	DEPTH TO WATER TABLE	DRAINAGE CHARACTERISTICS	HYDRIC SOIL
Ha	HATBORO SILT LOAM	0 – 3	B / D	0" – 6"	POORLY DRAINED	YES
UugB	URBAN LAND – URDORTHENTS	0 – 8	C	> 60"	WELL DRAINED	NO
UugD	URBAN LAND – UDORTHENTS	8 – 25	C	> 60"	WELL DRAINED	NO
W	WATER	–	–	–	–	–

LEGEND

- STORM INLET TYPE 'C'
- STORM INLET TYPE 'M'
- STORM MANHOLE
- SANITARY MANHOLE
- U.P. UTILITY POLE
- L.P. LAMP POST
- F.H. FIRE HYDRANT
- W.V. WATER VALVE
- STEEP SLOPES (15%–25%)
- VERY STEEP SLOPES (>25%)
- STREAM
- FLOODPLAIN
- Wetland Sample Point (added by VW)
- FENCE
- WALL
- MACADAM EDGE
- CONC. CURB
- DEPRESSED CURB
- CONCRETE
- SLATE
- TREELINE
- PROPERTY CORNER
- IRON PIN FOUND
- RIPARIAN CORRIDOR – ZONE 1
- RIPARIAN CORRIDOR – ZONE 2
- TO BE DEMOLISHED
- WETLANDS 'A'
- WL-A11 WETLANDS FLAG DESIGNATION

REVISIONS
3) 2021-12-23; REV. PER TREE SURVEY
4) 2022-02-01; REV. PER TWP. REVIEW LETTERS
5) 2022-02-08; REV. PER MCCD COMMENTS
6) 2022-03-04; REV. PER ADD'L TREE SURVEY
7) 2022-04-14; REV. PER ADD'L TREE SURVEY
8) 2022-07-19; REV PER TWP. REVIEW
9) 2022-09-28; ISSUED FOR FINAL LD REVIEW
10) 2023-02-03; REV. PER TWP. REVIEWS
11) 2023-02-28; REV. PER NPDES SUBMISSION
12) 2023-04-10; REV WETLANDS DELINEATION & FLAGGING

GRAPHIC SCALE 0 50 100 150 200

robert e. blue
consulting engineers, p.c.
1149 Skippack Pike, Blue Bell, PA 19422
tel: (610)-277-9441 fax: (610)-277-9897
www.robertblue.com email: rblue@robertblue.com

REGISTERED PROFESSIONAL ENGINEER
ROBERT E. BLUE JR. (DATE) 4/11/2023
LICENSE NO. 26169-E

PROFESSIONAL LAND SURVEYOR
ROBERT E. BLUE JR. (DATE) 4/11/2023
LICENSE NO. SU1323A

FINAL PLAN
EXISTING FEATURES
222 CHURCH ROAD
CHELTENHAM TOWNSHIP
MONTGOMERY COUNTY
PENNSYLVANIA

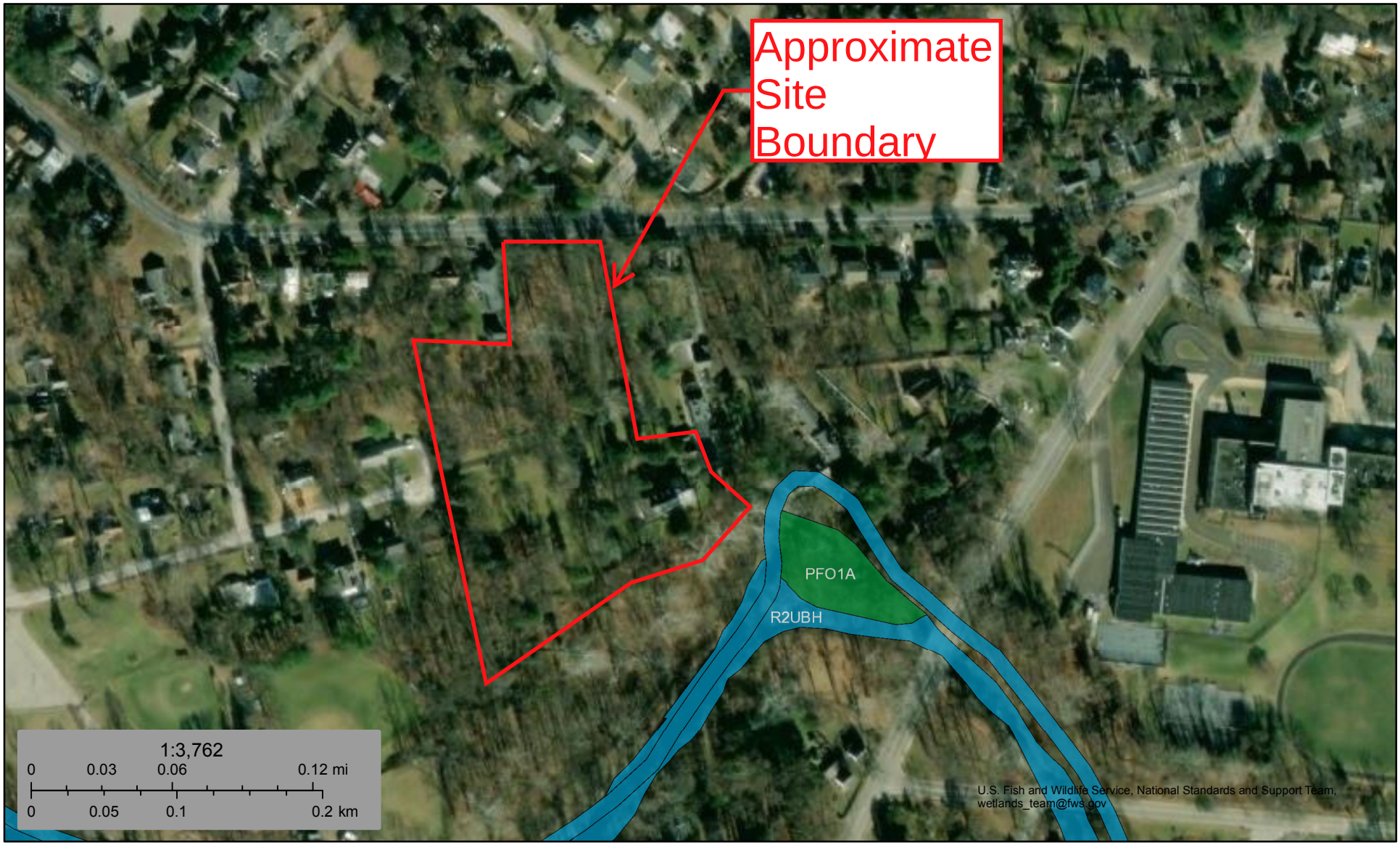
PREPARED FOR
222 CHURCH ROAD LLC
C/O RABBI ZVI BLOOM
509 CEDARHILL ROAD
FAR ROCKAWAY, NY 11691

DRAWN BY: DJG	CHECKED BY: REB	SCALE: 1"=50'
DATE: 2021-07-23	JOB NUMBER: 2154-10E	SHEET NUMBER: 4 of 31

LAST SAVED: M:\Proj\2154-10\dwg\Sets\LD\2154-10 EX FEATURES.dwg ON 4/11/2023 8:34 AM

U.S. Fish and Wildlife Service
National Wetlands Inventory

222 Church Road



April 20, 2023

Wetlands

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

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

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp:11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: 222 Church Road City/County: Montgomery Co. Sampling Date: 3/22/23

Applicant/Owner: 222 Church Road LLC State: PA Sampling Point: 1

Investigator(s): Max Russick Section, Township, Range: Cheltanham Twp.

Landform (hillside, terrace, etc.): Artificial Terrace Local relief (concave, convex, none): Concave Slope (%): 1-2

Subregion (LRR or MLRA): LRR S, MLRA 148 Lat: 40.06911 Long: -75.11680 Datum: WGS 84

Soil Map Unit Name: Hatboro NWI classification: Vernal Pool/PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ____ (If no, explain in Remarks.)

Are Vegetation X, Soil X, or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes ____ No X

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 1
Water Table Present?	Yes X	No ____	Depth (inches): 8
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Site Evaluated during seasonally wet conditions at beginning of growing season.

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: 1

Tree Stratum (Plot size: 30' Radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer negundo*	5	Yes	FAC
2. *Fraxinus americana*	1	No	FACU
3.			
4.			
5.			
6.			
7.			
	6	=Total Cover	
50% of total cover: 3		20% of total cover: 2	
Sapling/Shrub Stratum (Plot size: 15' Radius)			
1. *Lonicera maackii*	15	Yes	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	15	=Total Cover	
50% of total cover: 8		20% of total cover: 3	
Herb Stratum (Plot size: 5' Radius)			
1. *Ficaria verna*	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	10	=Total Cover	
50% of total cover: 5		20% of total cover: 2	
Woody Vine Stratum (Plot size: 30' Radius)			
1. *Vitis sp.*	2	No	
2. *Celastrus sp.*	2	No	
3.			
4.			
5.			
	4	=Total Cover	
50% of total cover: 2		20% of total cover: 1	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	15	x 3 =	45
FACU species	1	x 4 =	4
UPL species	15	x 5 =	75
Column Totals:	31 (A)		124 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

_X_ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	2.5Y 2.5/1	100					Loamy/Clayey	
3-16	2.5Y 3/1	92	7.5YR 4/6	5	C	PL/M	Loamy/Clayey	Prominent redox concentrations
			2.5Y 4/2	2	D	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: None Observed

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp:11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: 222 Church Road City/County: Montgomery Co. Sampling Date: 3/22/23

Applicant/Owner: 222 Church Road LLC State: PA Sampling Point: 2

Investigator(s): Max Russick Section, Township, Range: Cheltanham Twp.

Landform (hillside, terrace, etc.): Artificial Terrace Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR S, MLRA 148 Lat: 40.06898 Long: -75.11710 Datum: WGS 84

Soil Map Unit Name: Hatboro NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ____ (If no, explain in Remarks.)

Are Vegetation X, Soil X, or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes ____ No X

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ____	**Is the Sampled Area within a Wetland?** **Yes** ____ **No** X
Hydric Soil Present?	Yes ____	No ____	
Wetland Hydrology Present?	Yes ____	No ____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes X	No ____	Depth (inches): 14
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 13

Wetland Hydrology Present? **Yes** ____ **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Site Evaluated during seasonally wet conditions at beginning of growing season. Stream assessment data also collected at this location.

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: 2

Tree Stratum (Plot size: 30' Radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer negundo*	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	10 =Total Cover		
50% of total cover: 5	20% of total cover: 2		
Sapling/Shrub Stratum (Plot size: 15' Radius)			
1. *Lonicera maackii*	5	Yes	UPL
2. *Ligustrum sp.*	5	Yes	UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	10 =Total Cover		
50% of total cover: 5	20% of total cover: 2		
Herb Stratum (Plot size: 5' Radius)			
1. *Ficaria verna*	90	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	90 =Total Cover		
50% of total cover: 45	20% of total cover: 18		
Woody Vine Stratum (Plot size: 30' Radius)			
1. *Vitis sp.*	2	No	
2.			
3.			
4.			
5.			
	2 =Total Cover		
50% of total cover: 1	20% of total cover: 1		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	100	x 3 =	300
FACU species	0	x 4 =	0
UPL species	10	x 5 =	50
Column Totals:	110 (A)		350 (B)

Prevalence Index = B/A = 3.18

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 2/1	100					Loamy/Clayey	
14-20	2.5Y 3/2	90	7.5YR 5/6	5	C	PL/M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10) **(LRR N)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7)
___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
___ Thin Dark Surface (S9) **(MLRA 147, 148)**
___ Loamy Mucky Mineral (F1) **(MLRA 136)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
___ Umbric Surface (F13) **(MLRA 122, 136)**
___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) **(MLRA 147)**
___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
___ Very Shallow Dark Surface (F22)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: None Observed
Depth (inches): ____

Hydric Soil Present? **Yes** ____ **No** ____

Remarks:
Soil derived from deposition in mill raceway. No oxidized rhizospheres could be located along living roots.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp:11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: 222 Church Road City/County: Montgomery Co. Sampling Date: 3/22/23

Applicant/Owner: 222 Church Road LLC State: PA Sampling Point: 3

Investigator(s): Max Russick Section, Township, Range: Cheltanham Twp.

Landform (hillside, terrace, etc.): Floodplain Terrace Local relief (concave, convex, none): Linear Slope (%): 0-2

Subregion (LRR or MLRA): LRR S, MLRA 148 Lat: 40.069035 Long: -75.1167 Datum: WGS 84

Soil Map Unit Name: Hatboro NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes X	No ____	Depth (inches): 14
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 6

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Site Evaluated during seasonally wet conditions at beginning of growing season. Surface water only present in chanel traversing the wetland.

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: 3

Tree Stratum (Plot size: 30' Radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer negundo*	20	Yes	FAC
2. *Acer platanoides*	5	Yes	UPL
3.			
4.			
5.			
6.			
7.			
	25	=Total Cover	
50% of total cover: 13		20% of total cover:	5
Sapling/Shrub Stratum (Plot size: 15' Radius)			
1. *Acer negundo*	5	Yes	FAC
2. *Viburnum dentatum*	2	No	FAC
3. *Euonymus alatus*	10	Yes	UPL
4.			
5.			
6.			
7.			
8.			
9.			
	17	=Total Cover	
50% of total cover: 9		20% of total cover:	4
Herb Stratum (Plot size: 5' Radius)			
1. *Ficaria verna*	90	Yes	FAC
2. *Symplocarpus foetidus*	5	No	OBL
3. *Reynoutria japonica*	1	No	FACU
4. *Ligustrum sp.*	1	No	
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	97	=Total Cover	
50% of total cover: 49		20% of total cover:	20
Woody Vine Stratum (Plot size: 30' Radius)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	0	x 2 =	0
FAC species	117	x 3 =	351
FACU species	1	x 4 =	4
UPL species	15	x 5 =	75
Column Totals:	138 (A)		435 (B)

Prevalence Index = B/A = 3.15

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	100					Loamy/Clayey	
8-14	2.5Y 4/1	80	7.5YR 5/6	5	C	PL	Loamy/Clayey	Prominent redox concentrations
			10YR 4/2	5	D	M		
14-20	10YR 4/2	90	7.5YR 5/6	5	C	PL	Loamy/Clayey	Prominent redox concentrations
			10YR 4/2	5	D	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: None Observed

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

NC DWQ Stream Identification Form Version 4.11

Date: 3-22-2023	**Project/Site:** 222 Church Rd	**Latitude:**
Evaluator: Max Russick	**County:** Montgomery	**Longitude:**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 4.5	**Stream Determination (circle one)** Ephemeral Intermittent Perennial	**Other** *e.g. Quad Name:*

Abandoned / Disconnected Mill Raceway – not a water course

A. Geomorphology (Subtotal = 1)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	(1)	2	3
2. Sinuosity of channel along thalweg	(0)	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	(0)	1	2	3
4. Particle size of stream substrate	(0)	1	2	3
5. Active/relict floodplain	(0)	1	2	3
6. Depositional bars or benches	(0)	1	2	3
7. Recent alluvial deposits	(0)	1	2	3
8. Headcuts	(0)	1	2	3
9. Grade control	(0)	0.5	1	1.5
10. Natural valley	(0)	0.5	1	1.5
11. Second or greater order channel	(No = 0)		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 3.5)				
12. Presence of Baseflow	(0)	1	2	3
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	1.5	1	(0.5)	0
15. Sediment on plants or debris	(0)	0.5	1	1.5
16. Organic debris lines or piles	(0)	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

C. Biology (Subtotal = 0)				
18. Fibrous roots in streambed	3	2	1	(0)
19. Rooted upland plants in streambed	3	2	1	(0)
20. Macrobenthos (note diversity and abundance)	(0)	1	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	(0)	0.5	1	1.5
24. Amphibians	(0)	0.5	1	1.5
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = (0)			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Sample reach is centered around wetland Sample Point - 2. Raceway floor is blanketed by Eurasian buttercup, a terrestial facultative species.

Sketch:

See Existing Features plan by Robert E. Blue Consulting Engineers, P.C.

222 Church Road

Cheltenham Twp., Montgomery County

March 22, 2023

Photo 1: View of Raceway From Lawn; Facing South

Photo 2: View of Raceway at SP-2,Facing North-northeast

Photo 3: Typical Upland Lawn Condition

Photo 4: Wetland within Floodplain; Facing West