

NOTES TO USERS

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

To obtain more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

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

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 18. Horizontal datum was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

National Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the Information Service Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

BASE MAP SOURCE: Base map files were obtained in digital spatial data format from the Delaware Valley Regional Planning Commission and Delaware County. Road centerlines, streamlines, and township/borough boundaries were provided by Delaware County. The county boundary was downloaded from the 2005 TIGER/Line files. 2002 and 2005 digital orthophotographs were provided by the Delaware Valley Regional Planning Commission. Adjustments were made to specific base map features to align them to 1"=200' scale orthophotos.

Based on updated topographic information, this map reflects more detailed and up-to-date stream channel configurations and floodplain delineations than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unreviewed streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

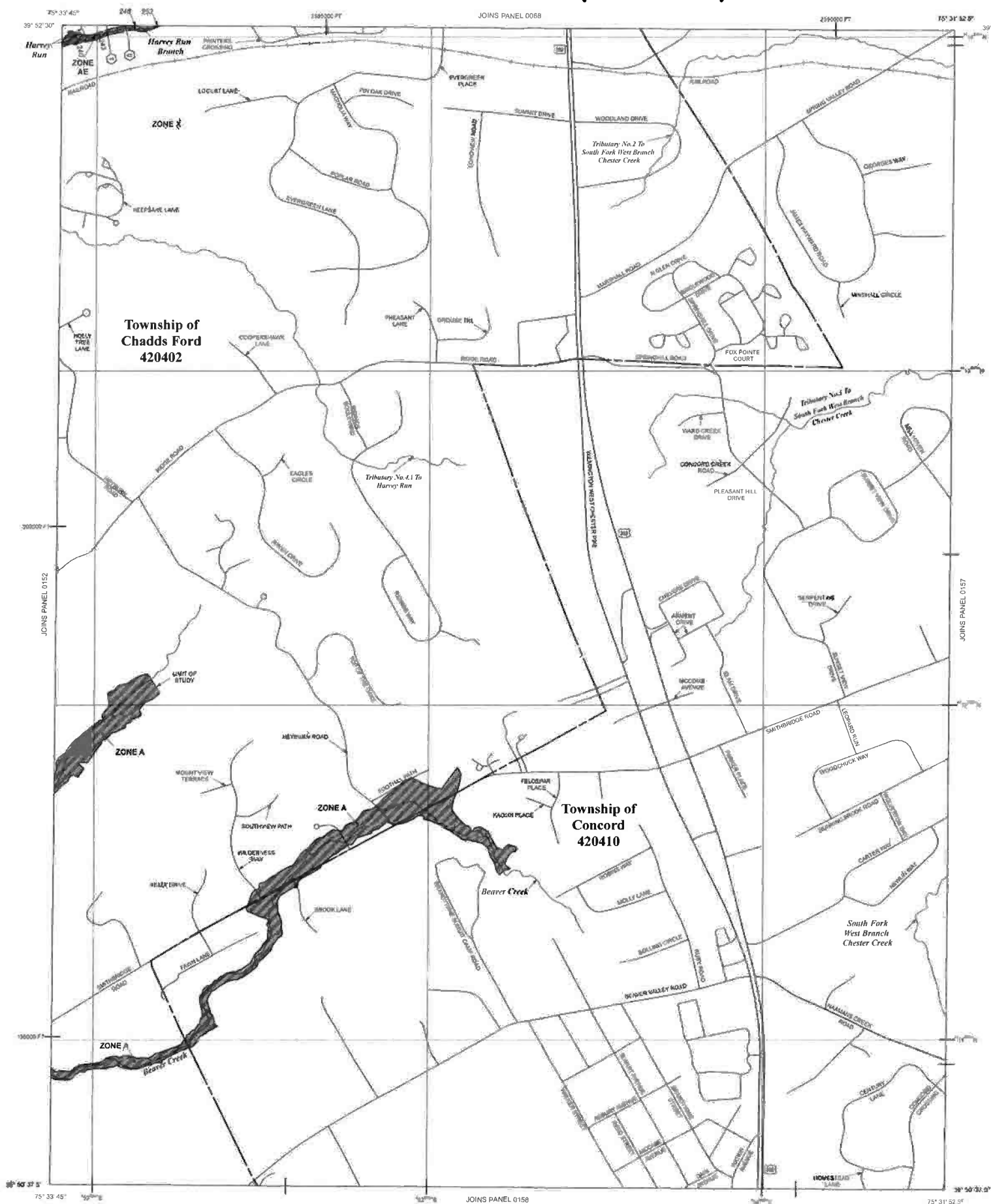
Please refer to the separately printed Map Index for an overview map of the county showing the layout of map panels; community map repository addresses; and a listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the FEMA Map Service Center at 1-800-358-8818 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://fmsc.fema.gov/>.

If you have questions about this map or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov>.

Stillwater elevations may be shown to the nearest tenth of a foot. Users should refer to the Flood Insurance Study (FIS) for detailed flood elevation information.

FEMA MAPS (5 OF 5)



LEGEND

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

The 1% annual chance flood (100 year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, APF, V, and VE. The base flood elevation is the water surface elevation of the 1% annual chance flood.

Base Flood Elevation Determination

ZONE AE Base Flood Elevation Determination. Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently determined. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE APF Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

Areas determined to be outside the 0.2% annual chance floodplain. Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

Base Flood Elevation and value, elevation in feet

Base Flood Elevation value where uniform within zone; elevation in feet

* Referenced to the North American Vertical Datum of 1988

Cross section line

Transect line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

1000-meter Universal Transverse Mercator grid values, zone 18

5000-foot grid ticks; Pennsylvania State Plane coordinate system (NAD 83), Lambert Conformal Conic projection

Bench mark (see explanation in Notes to Users section of this FIRM panel)

River Mile

MAP REPOSITORY

Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

SEPTEMBER 30, 1993

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

MAY 2, 1995

NOVEMBER 18, 2009 - to change Special Flood Hazard Areas, to delete Special Flood Hazard Areas, to reflect updated topographic information, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



MAP SCALE 1" = 600'

250 0 500 1000 FEET

150 0 150 300 METERS

PANEL 0156F

FIRM

FLOOD INSURANCE RATE MAP

DELAWARE COUNTY, PENNSYLVANIA (ALL JURISDICTIONS)

PANEL 156 OF 250

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY CHADDS FORD, TWP OF CONCORD, TWP OF

NUMBER 420402 0156

PANEL 420410 0156

SUFFIX F F

Notice to User: The Map Number shown below should be used when placing map orders. The Community Number shown above should be used on insurance application forms for the subject community.

MAP NUMBER 42045C0156F

MAP REVISED NOVEMBER 18, 2009

Federal Emergency Management Agency

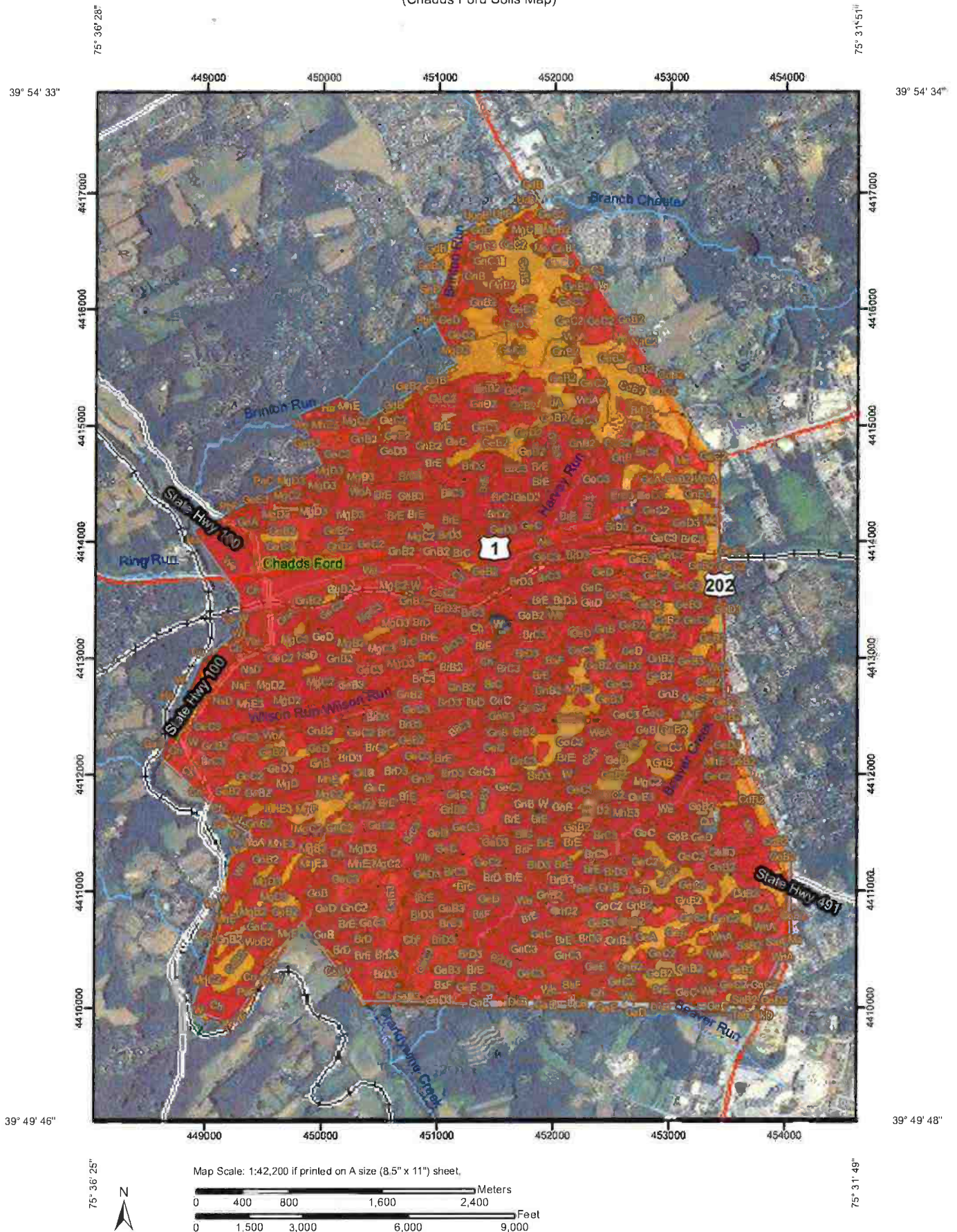
CHADDS FORD TOWNSHIP, DELAWARE COUNTY, PA

TABLE 1 - SUITABILITY OF SOILS FOR CONVENTIONAL SEPTIC SYSTEMS

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

97.2%

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



MAP LEGEND

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

MAP INFORMATION

Map Scale: 1:42,200 if printed on A size (8.5" x 11") sheet.
The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.
Please rely on the bar scale on each map sheet for accurate map measurements.
Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 18N NAD83
This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.
Soil Survey Area: Chester County, Pennsylvania
Survey Area Data: Version 3, Dec 3, 2008
Soil Survey Area: Delaware County, Pennsylvania
Survey Area Data: Version 6, Feb 24, 2009
Soil Survey Area: New Castle County, Delaware
Survey Area Data: Version 6, Sep 28, 2012
Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.
Date(s) aerial images were photographed: Data not available.
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

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

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

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

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

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

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

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

Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
BrC3	Brandywine loam, 8 to 15 percent slopes, severely eroded	Very limited	Brandywine (85%)	Too steep (1.00)	331.9	5.3%
				Fast percolation >12" (1.00)		
				Potential bedrock near 60" (0.17)		
BrD	Brandywine loam, 15 to 25 percent slopes	Very limited	Brandywine (85%)	Too steep (1.00)	33.8	0.5%
				Fast percolation >12" (1.00)		
				Potential bedrock near 60" (0.17)		
BrD2	Brandywine loam, 15 to 25 percent slopes, moderately eroded	Very limited	Brandywine (85%)	Bedrock, above 60" (1.00)	8.3	0.1%
				Too steep (1.00)		
BrD3	Brandywine loam, 15 to 25 percent slopes, severely eroded	Very limited	Brandywine (85%)	Too steep (1.00)	403.7	6.5%
				Fast percolation >12" (1.00)		
				Potential bedrock near 60" (0.17)		
BrE	Brandywine loam, 25 to 40 percent slopes	Very limited	Brandywine (85%)	Too steep (1.00)	363.2	5.8%
				Fast percolation >12" (1.00)		
				Potential bedrock near 60" (0.17)		
BsD	Brandywine very stony loam, 8 to 25 percent slopes	Very limited	Brandywine (85%)	Too steep (1.00)	0.6	0.0%
				Bedrock, above 60" (1.00)		
				Potential slow percolation >12" (0.01)		
BsF	Brandywine very stony loam, 25 to 50 percent slopes	Very limited	Brandywine (85%)	Too steep (1.00)	28.1	0.5%
				Bedrock, above 60" (1.00)		
				Potential slow percolation >12" (0.01)		
ByB2	Butlertown silt loam, 3 to 8 percent slopes, moderately eroded	Very limited	Butlertown (85%)	Seasonal high water table (1.00)	1.9	0.0%
				Slow percolation >12" (1.00)		
				Too steep (0.88)		
			Othello (5%)	Seasonal high water table (1.00)		
				Slow percolation >12" (0.94)		
				Slope (0.13)		

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

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

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

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

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

Septic System In-Ground Bed (Conventional) (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
NsB	Neshaminy very stony silt loam, 0 to 8 percent slopes	Very limited	Neshaminy, extremely bouldery (95%)	Slow percolation >12" (1.00)	4.5	0.1%
				Bedrock, above 60" (1.00)		
				Slope (0.50)		
			Towhee, extremely stony (5%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
				Slope (0.50)		
NsD	Neshaminy very stony silt loam, 8 to 25 percent slopes	Very limited	Neshaminy, extremely bouldery (97%)	Slow percolation >12" (1.00)	31.5	0.5%
				Too steep (1.00)		
				Bedrock, above 60" (1.00)		
			Towhee, extremely stony (3%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
				Slope (0.50)		
NsF	Neshaminy very stony silt loam, 25 to 45 percent slopes	Very limited	Neshaminy, extremely bouldery (97%)	Slow percolation >12" (1.00)	18.0	0.3%
				Too steep (1.00)		
				Bedrock, above 60" (1.00)		
			Towhee, extremely stony (3%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
				Slope (0.50)		
OtA	Othello silt loam	Very limited	Othello (90%)	Seasonal high water table (1.00)	8.7	0.1%
				Slow percolation >12" (0.94)		
				Slope (0.13)		
			Nanticoke (2%)	Seasonal high water table (1.00)		
				Slow percolation >12" (1.00)		
				Flooding (1.00)		
SaA	Sassafras loam, 0 to 3 percent slopes	Very limited	Sassafras (85%)	Fast percolation >12" (1.00)	7.8	0.1%
				Slope (0.13)		

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

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

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

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

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

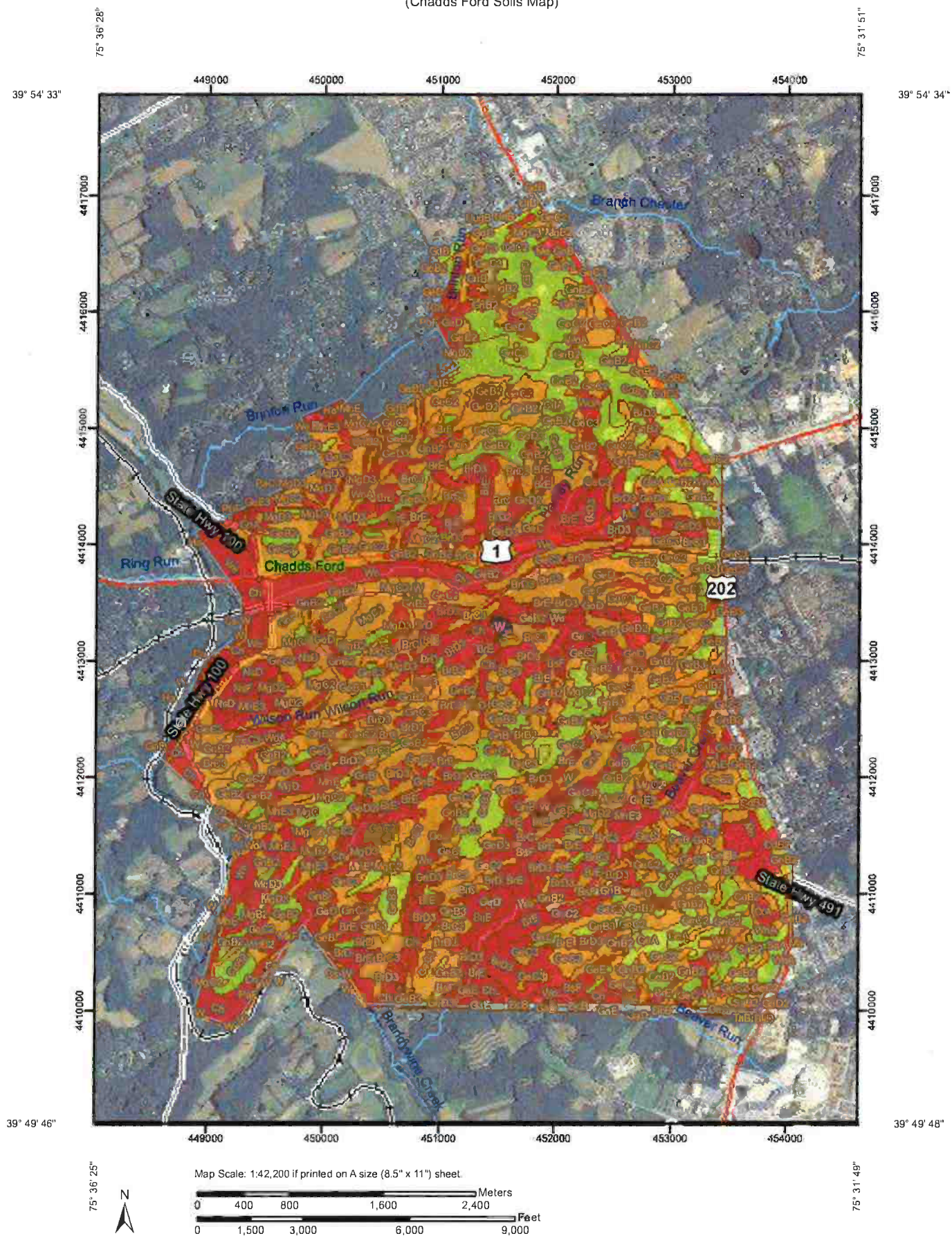
CHADDS FORD TOWNSHIP, DELAWARE COUNTY, PA

TABLE 2 - SUITABILITY OF SOILS FOR SAND MOUND SYSTEMS

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

97.2%

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



MAP LEGEND

- Area of Interest (AOI)

 Area of Interest (AOI)
- Soils

 Soil Map Units
- Soil Ratings

 Very limited

 Moderately limited

 Slightly limited

 Not limited

not rated or not available
- Political Features

 Cities
- Water Features

 Streams and Canals
- Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

MAP INFORMATION

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

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

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

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

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

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

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

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

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

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

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

Septic System Sand Mound Bed or Trench (PA)

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

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

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

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

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

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

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

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

Septic System Sand Mound Bed or Trench (PA)— Summary by Map Unit — Delaware County, Pennsylvania (PA045)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
Me	Made land, schist and gneiss materials	Very limited	Udorthents, schist and gneiss (95%)	Slow percolation 12-20" (1.00)	95.0	1.5%
				Miscellaneous area (1.00)		
				Slope (0.31)		
			Hatboro (1%)	Seasonal high water table (1.00)		
				Flooding (1.00)		
				Slope (0.18)		
MgB2	Manor loam, 3 to 8 percent slopes, moderately eroded	Slightly limited	Manor (95%)	Slope (0.40)	87.4	1.4%
MgC	Manor loam, 8 to 15 percent slopes	Moderately limited	Manor (95%)	Too steep (0.85)	5.6	0.1%
MgC2	Manor loam, 8 to 15 percent slopes, moderately eroded	Moderately limited	Manor (90%)	Too steep (0.85)	157.4	2.5%
MgC3	Manor loam, 8 to 15 percent slopes, severely eroded	Moderately limited	Manor (90%)	Too steep (0.85)	71.2	1.1%
MgD	Manor loam, 15 to 25 percent slopes	Very limited	Manor (97%)	Too steep (1.00)	15.3	0.2%
MgD2	Manor loam, 15 to 25 percent slopes, moderately eroded	Very limited	Manor (90%)	Too steep (1.00)	37.3	0.6%
MgD3	Manor loam, 15 to 25 percent slopes, severely eroded	Very limited	Manor (85%)	Too steep (1.00)	118.6	1.9%
MhE	Manor loam and channery loam, 25 to 35 percent slopes	Very limited	Manor (98%)	Too steep (1.00)	38.4	0.6%
MhE3	Manor loam and channery loam, 25 to 35 percent slopes, severely eroded	Very limited	Manor (90%)	Too steep (1.00)	80.6	1.3%
MkF	Manor soils, 35 to 60 percent slopes	Very limited	Manor (100%)	Too steep (1.00)	13.9	0.2%
MmF	Manor very stony loam, 25 to 60 percent slopes	Very limited	Manor, very stony (100%)	Too steep (1.00)	2.1	0.0%
NaB2	Neshaminy gravelly silt loam, 3 to 8 percent slopes, moderately eroded	Moderately limited	Neshaminy (85%)	Slow percolation 12-20" (0.50)	0.5	0.0%
				Slope (0.40)		

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

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

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

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

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

Description

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

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

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

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

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

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

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

Rating Options

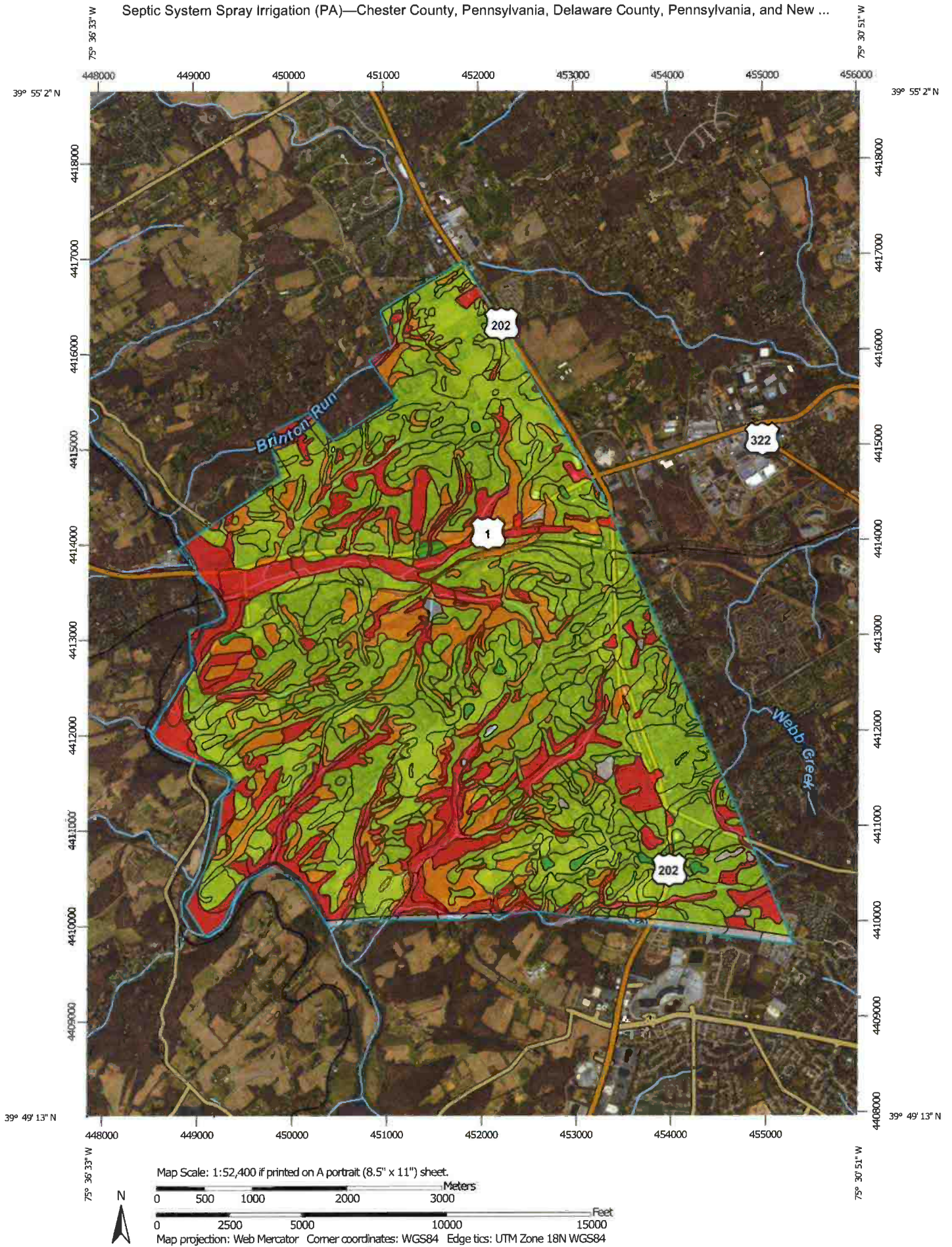
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

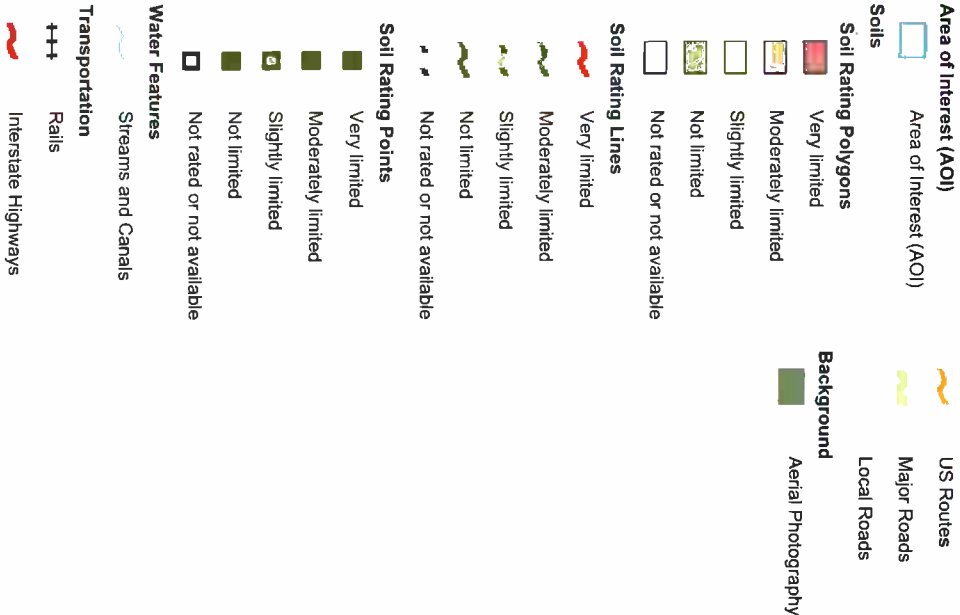
Tie-break Rule: Higher

CHADDS FORD TOWNSHIP, DELAWARE COUNTY, PA

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



MAP LEGEND



MAP INFORMATION

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

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

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

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

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

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

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

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

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

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

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

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

Septic System Spray Irrigation (PA)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Water-Data Report 2012

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA

Lower Delaware Basin
Brandywine-Christina Subbasin

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

DRAINAGE AREA.--287 mi².

SURFACE-WATER RECORDS

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

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

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

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

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

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

[e, estimated]

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

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

SUMMARY STATISTICS

Water Years 1911-1953, 1963-1973

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

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

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

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

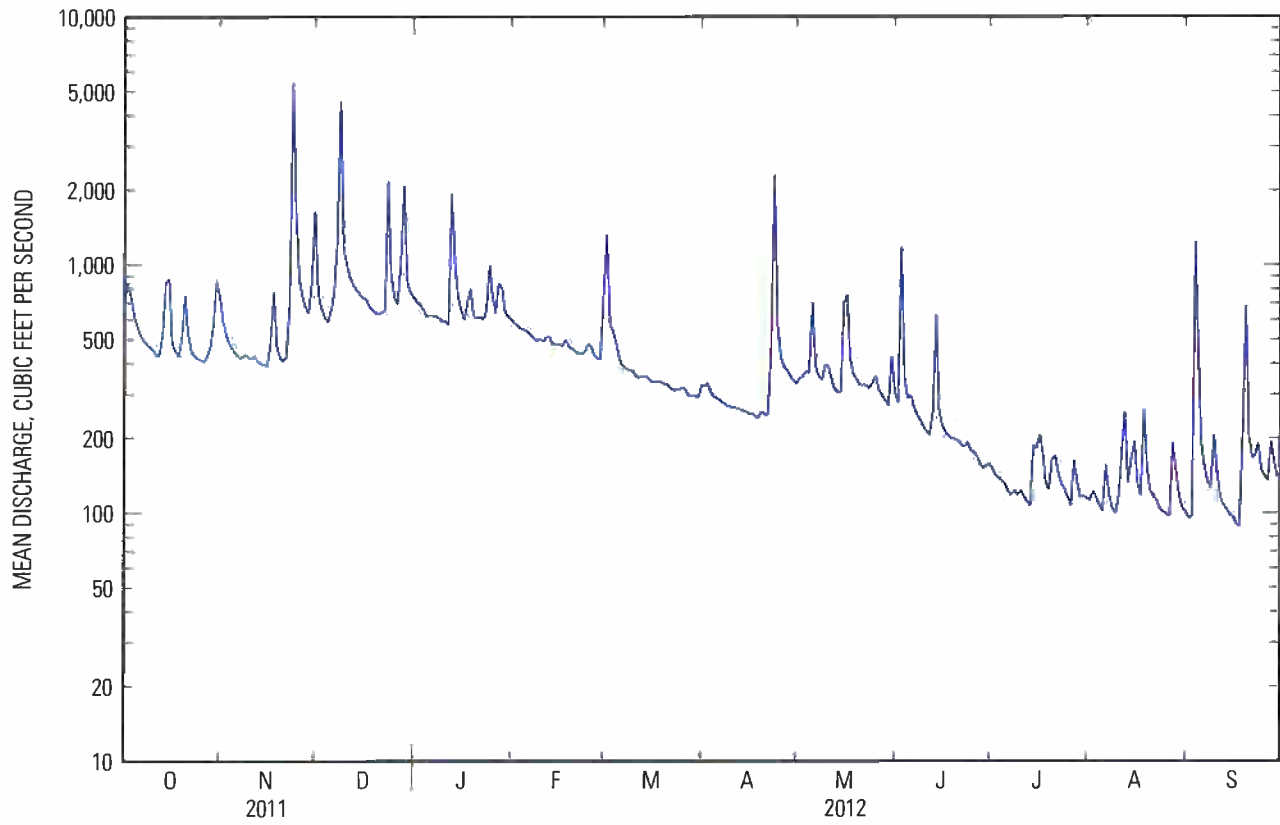
SUMMARY STATISTICS

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

^a Also Aug 13.

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued



01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued**WATER-QUALITY RECORDS**

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

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: October 1965 to current year.

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

WATER TEMPERATURES: October 1964 to current year.

DISSOLVED OXYGEN: October 1971 to current year.

TURBIDITY: October 2005 to current year.

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

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

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

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

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

EXTREMES FOR PERIOD OF DAILY RECORD.--

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

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

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

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

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

EXTREMES FOR CURRENT YEAR.--

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

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Part 1 of 6

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Part 2 of 6

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

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

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Part 3 of 6

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Part 4 of 6

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

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

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Part 5 of 6

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO
SEPTEMBER 2012

Part 6 of 6

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

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

WATER-QUALITY DATA
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

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

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

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

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

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

	Max	Min	Mean
Year	860	0.0	6.3

01481000 BRANDYWINE CREEK AT CHADDS FORD, PA—Continued

CLIMATOLOGICAL RECORDS

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

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

REMARKS.--Record is good.

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

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

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

APPENDIX III

Flow Charts

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

SPRINGHILL FARM
SUBDIVISION

GLEN EAGLE
SQUARE SHOPPING
CENTER

SPRINGHILL
FARM STP

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LN

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CFTP0570

SCALE:
N.T.S.

DATE:
11/22/13

SKETCH No.

F-1

CHADDS FORD TOWNSHIP ACT 537 PLAN UPDATE

SPRING HILL FARM SERVICE AREA

SMITHBRIDGE
PUMP STATION

ECKMAN
PUMP STATION

WOODLAND DRIVE
PUMP STATION

RIDINGS
STP

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SKETCH No.

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11/22/13

F-2

CHADDS FORD TOWNSHIP ACT 537 PLAN UPDATE

RIDINGS SERVICE AREA

CHADDS FORD
BUSINESS
CAMPUS

HENDERSON
PUMP STATION

VILLAGE AT
PAINTER'S CROSSING
SHOPPING CENTER

KNIGHTS
BRIDGE
STP

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N.T.S.

DATE:
11/22/13

SKETCH No.

F-3

CHADDS FORD TOWNSHIP ACT 537 PLAN UPDATE

KNIGHT'S BRIDGE SERVICE AREA

BALTIMORE PIKE
LOW PRESSURE
SEWER SYSTEM

ESTATES AT
CHADDS FORD
PUMP STATION

PAINTERS
CROSSING
PUMP STATION

TURNERS
MILL STP

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11/22/13

F-4

CHADDS FORD TOWNSHIP ACT 537 PLAN UPDATE

TURNERS MILL SERVICE AREA

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

APPENDIX IV

Chadds Ford Township Comprehensive Plan



CHADDS FORD TOWNSHIP COMPREHENSIVE PLAN



On the Cover:

TOP:

The stone mill built by Joseph Turner in 1868 was home to Howard Pyle's Summer School of Art at the end of the 19th Century where N.C. Wyeth spent "five glorious summers."

The building was used as a residence in the first half of the 20th Century until destroyed by fire in the 1950's.

The mill remained vacant for the next five decades.

BOTTOM:

Turner's Mill was reconstructed in the early part of the 21st Century by Chadds Ford Township and now serves as home to our municipal government. This building stands as a symbol of our community spirit integrating old and new.

The Heritage Commission of Delaware County recognized this landmark Adaptive Reuse at their annual Preservation Awards ceremony, May 2, 2006.

COMPREHENSIVE PLAN FOR CHADDS FORD TOWNSHIP
DELAWARE COUNTY, PENNSYLVANIA

Chadds Ford Township

10 Ring Road
Chadds Ford, PA 19317-9101
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**BOARD OF
SUPERVISORS**

Deborah Love - Chairman
George M. Thorpe - Vice Chairman
Garry Paul - Supervisor

**COMPREHENSIVE PLAN
TASK FORCE:**

Sam Haber – *Delaware County Planning Department*
Bob Hobbs – *Resident*
George Kobryn – *Delaware County Planning Department*
Bill Mock – *Planning Commission*
Lois Saunders – *Chadds Ford Township Open Space Committee*
Gary Sharp – *Historical & Architectural Review Board*
William Taylor – *Planning Commission*
Maurice Todd – *Planning Commission*
Paul Vernon – *Planning Commission*
Ed Wandersee – *Zoning Hearing Board*
Gary Whelan – *Planning Commission*

TOWNSHIP STAFF:

Joseph Barakat – *Township Manager*
Richard Jensen – *Building Inspector & Zoning Officer*

ADOPTED: May 5, 2010

RAY OTT & ASSOCIATES

TOWN and Land PLANNING
17 South Church Street • West Chester, PA 19382 • tel: 610.429.9993

in association with

DAVID SWEET

510 N. Walnut Street • West Chester, PA 19382 • tel: 610.436.6585
and

JACOBS ENGINEERING GROUP

1247 Ward Avenue, Suite 100 • West Chester, PA 19380 • tel: 610-701-7000

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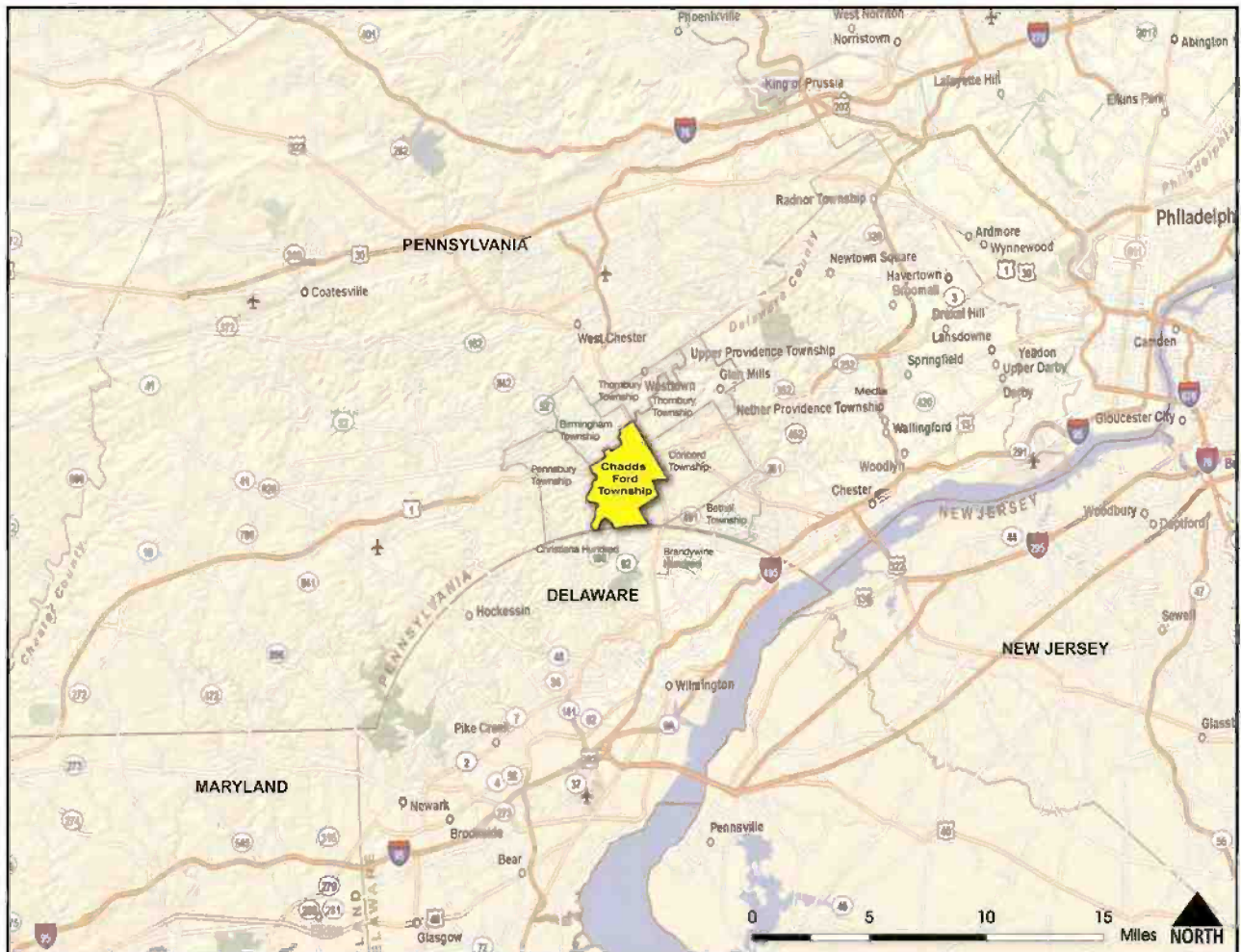
1. INTRODUCTION, GOALS & OBJECTIVES

Chadds Ford Township's last comprehensive plan was adopted in 1972. This update of the Chadds Ford Township Comprehensive Plan (Plan) makes Chadds Ford Township (CFT) consistent with the goals and objectives included in Delaware County policies, provides CFT with an opportunity to proactively implement policy objectives that positively influence its future, and seeks to promote responsible land use and environmental stewardship. In addition, this update incorporates the vision for the future development of CFT as expressed by Township residents. This chapter provides introductory information about CFT; the definition, history, purpose, content and adoption process of the Plan; and the goals and objectives of the Plan.

A. REGIONAL SETTING

Chadds Ford Township, Delaware County is approximately 8.8 square miles in area and is classified as a township of the second class with a population of 3,170 (according to the 2000 census). The Township is located approximately 28 miles southwest of Philadelphia, in the southwest portion of Delaware County (see Map 1 below).

Map 1: Regional Context



Chadds Ford is bordered on the northeast by Thornbury Township, Delaware County, to the east by Concord Township, and to the northwest by Birmingham Township, Chester County. The Brandywine Creek forms the western boundary between Chadds Ford and Pennsbury Township, Chester County and the southern boundary between Chadds Ford and Birmingham Township, Chester County. South of Chadds Ford is New Castle County, Delaware. Concord Township is located east of Chadds Ford. A major east-west transportation route, U.S. Rt. 1, passes through the northern portion of the Township. U.S. Route 202, another major Township corridor, traverses the east side of the Township. Routes 202 and 1 intersect at the Township's eastern border.

B. TOWNSHIP GOVERNANCE

As a township of the second class, Chadds Ford is governed by a three (3) member Board of Supervisors (BOS) elected to six (6) year staggered terms, with the assistance of an appointed Township Manager/Roadmaster and Secretary/Treasurer. The BOS appoints Solicitors to represent the Township, the Planning Commission, and the Zoning Hearing Board. Additional appointed professional consultants include a Township Engineer and a Code Enforcement Officer/Building Inspector. Other elected positions include Auditors and the Tax Collector.

Pennsylvania townships can be organized as first class, second class or home rule townships. There are currently 91 first class, 1,457 second class, and 27 home rule townships in Pennsylvania.

The primary difference between first and second class townships is structural. In townships of the first class, the governing body is made up of elected 'commissioners.' There are either five commissioners elected at large or up to 15 elected by wards. The commissioners have four-year overlapping terms. The governing body of second class townships is composed of three 'supervisors' who are elected at large. Two additional supervisors may be elected if approved by referendum. All are elected at large for six-year terms.

Home rule gives municipalities -- cities, boroughs and townships -- the power to determine the structure of their government and what services it will perform. A home rule municipality no longer has its powers and organization determined by the state legislature. A home rule municipality drafts and amends its own charter and can exercise any power or perform any function not denied by the state Constitution, the General Assembly or its home rule charter.

Other elected township officials may include a tax assessor, tax collector (second class), three auditors or controller, and a treasurer (first class). Appointive officers include the secretary, township manager if desired, chief of police, fire chief, engineer, solicitor and others.

To become a township of the first class, a second class township must have a population density of 300 persons per square mile (*Chadds Ford currently has 381 residents per square mile*), and voters must approve a change of classification in a referendum. Many townships meeting the density requirement have remained second class. Since 1972, twelve townships of the first class have adopted home rule charters.

C. COMPREHENSIVE PLAN

Comprehensive plans and their contents with regard to MPC requirements are generally described below.

1. Definition and Purpose

A comprehensive plan is a document that sets forth municipal goals, objectives and policies that guide future growth and development. The MPC requires that municipal comprehensive plans be “generally consistent” with the policies of county comprehensive plans.

2. Plan History

The existing Chadds Ford Township (formerly Birmingham Township) Comprehensive Plan was incorporated into the Township code in 1972 and contained recommendations for land use and infrastructure requirements intended to be “reviewed and updated periodically.”

3. Plan Content

The contents of the Plan are derived from several sources including MPC requirements, input from Township residents, and documented inconsistencies with county policy documents.

MPC Requirements

The MPC, Article III, “Comprehensive Plan,” Section 301 states that comprehensive plans should include maps, tables, and text regarding the following plan elements:

- A statement of community goals and objectives concerning the timing, location and character of future development;
- A plan for land use identifying the amount, intensity, character and timing of land use;
- A plan to meet the housing needs of present and future residents, as well as accommodating new housing in different dwelling types and at appropriate densities for households of all income levels;
- A transportation plan;
- A statement of the interrelationship of plan elements and of the plan to contiguous communities, including an assessment of the land use plans of adjacent municipalities;
- A community facilities plan;
- A discussion of short- and long-range implementation strategies;
- A plan for the protection of historic and natural resources; and
- A water facilities plan.

4. Public Participation

This Plan incorporates the vision for the future development of the Township as expressed by Township residents in a series of public meetings. Additional input was obtained from personal interviews with interested residents and members of the business community, and through a Township-wide resident survey. See Appendix F for more details of the public participation process and the results obtained.

5. Plan Adoption Process

In order for this Plan to be adopted and become Township policy, the Township must adhere to the following series of steps prescribed in the Municipalities Planning Code:

- The Chadds Ford Township Planning Commission presents the *Draft Plan* at a public meeting.

- The Planning Commission meets to discuss and approve changes to the *Draft Plan* to address comments at the Public Presentation and from the County review. The Planning Commission recommends the *Final Draft Plan* to the Board of Supervisors.
- At least forty-five (45) days prior to the public hearing, the Board of Supervisors distributes copies of the *Final Draft Plan* to the Delaware County Planning Department, adjacent municipalities [Birmingham, Pennsbury, Thornbury, and Concord Townships, and New Castle County, Delaware] and the Unionville-Chadds Ford School District for review and comment. Review comments from the County, School District and adjacent municipalities shall be made to the BOS within forty-five (45) days of receipt of the *Final Draft Plan*.
- The BOS holds a public hearing on the *Final Draft Plan* pursuant to public notice.
- The BOS votes to adopt the Plan by resolution.
- The BOS approves and publishes the Plan.

D. PLAN GOALS AND OBJECTIVES

The goal statements included in this Plan are utilized to formulate specific land use and infrastructure policies, objectives and implementation strategies. They are organized according to eight (8) categories that reflect the MPC technical requirements for Plans and specific areas of concern indicated during the public participation process:

1. Community Character

Preserve and enhance visual quality, streetscape development and general public space.

Goal	Objectives
Provide for the maintenance of the Township's streetscapes, public spaces and existing neighborhoods.	<ol style="list-style-type: none"> 1. Enhance and improve Chadds Ford Village. 2. Enhance and improve the US Rt. 202 corridor: <ol style="list-style-type: none"> a) Encourage the use of visual buffering and noise abatement from adjacent/nearby residential neighborhoods; b) Encourage a non-stop flow of US Rt. 202 traffic through the Township; c) Discourage the use of Township residential roads as alternatives to US Rt. 202. 3. Improve the Route 1 corridor through Chadds Ford Village. <ol style="list-style-type: none"> a) Enhance pedestrian circulation and the flow of local traffic. b) Preserve this existing Scenic Resource as the "Scenic Gateway to the Village of Chadds Ford" (as shown on Map 6-9 of the Township Open Space Plan). 4. Identify current significant landscapes and scenic areas in the Township. 5. Designate scenic roadways through the Township and develop criteria and tools to help ensure the maintenance of their scenic qualities. 6. Require development initiatives to relate lots and buildings to the specific conditions of the site, including both natural and man-made resources.

2. Environmental, Cultural and Historical Resources

Preserve and enhance the natural, cultural and architectural integrity of the Township, including parks and open space, historic structures and natural resources.

Goal 1	Objectives
<p>Permanently protect Chadds Ford's open spaces – its farm fields and meadows, woods, stream valleys, and other water resources, historic sites and structures and scenic resources – which, in combination, create the Township's unique community character, remaining rural atmosphere and quality of life.</p>	<p>A. Implement the Township's <i>2007 Open Space Plan</i> objectives, as set forth below:</p> <ol style="list-style-type: none"> 1. Promote and facilitate the placement of voluntary and permanent easements on Chadds Ford's critical and sensitive open spaces; utilize other appropriate tools for permanent protection as needed, including outright acquisition or identification as significant resources using applicable county, state or federal programs. 2. Work toward permanent conservation of extensive areas of prime and significant agricultural soils to assure the potential for a range of farm-based businesses. 3. Pursue permanent conservation of woodlands, especially those 50 years and older that have significant areas of forest interior. 4. Promote the permanent protection of significant wildlife habitats, unique natural areas, and those locales that support rare plant species. 5. Seek to permanently preserve continuous riparian or open space buffers along stream corridors, as well as in and around areas of wetlands and steep slopes; seek to restore woody vegetation to these areas where needed. 6. Facilitate creation of permanently protected greenway corridors to link existing protected open space areas through land preservation or purchase of easements and rights-of-way. 7. Pursue protective strategies for the natural and historic resources identified, assessed and prioritized in the Township Open Space Plan. 8. Encourage and facilitate the work of the Chadds Ford Historical and Architectural Review Board to fully implement and administer the Township's Act 167 Historic District ordinance. 9. Promote the permanent protection of historic <i>resources</i> and locally-significant landscape elements such as walls, hedgerows, meadows, large fields, and woodlands. 10. Encourage the cooperative efforts of the Brandywine Battlefield Task Force (BBTF) and surrounding municipalities to preserve lands within the Brandywine Battlefield National Historic Landmark, which is located within both Chester and Delaware Counties. 11. Broaden the appreciation and protection of Chadds Ford's historic resources through Township sponsorship of measures such as an historic preservation plan. 12. Pursue permanent protection of Chadds Ford's scenic areas and vistas, especially where those areas also contain other significant natural and/or cultural resources. 13. Seek to maintain the essential qualities of the Township's scenic roadways (e.g., width, curvature, roadside trees, walls, structures) while planning for needed improvements. 14. Encourage the cooperative efforts of the Brandywine Valley Scenic Byway Commission (BVSBC) to protect the scenic nature of the Brandywine Valley Scenic Byway. 15. Maintain and improve watershed and subwatershed water balances within and downstream of Chadds Ford to maintain flow levels, protect water supplies and shelter the integrity of aquatic life. 16. Educate Chadds Ford residents and taxpayers regarding the financial benefits of open space protection (i.e., schools and other services required of ongoing development of unprotected open space are not cost-effective). 17. Coordinate open space planning and protection with neighboring municipalities in Delaware County, Chester County, the State of Delaware, the Delaware Valley Regional Planning Commission, and Greenspace Alliance to protect shared

	<p>resources and achieve common goals.</p> <p>18. Strive to achieve consistency with and otherwise support development of County-level open space and greenway planning efforts.</p> <p>19. Fully utilize technical assistance, educational, and/or funding resources that may be available from governmental and nongovernmental organizations.</p> <p>20. Maximize use of Township open space protection revenue collected pursuant to the May 2005 referendum under PA Act 153 to leverage open space protection funds from county, state and other potential sources.</p> <p><u>New Objectives</u></p> <p>B. Promote cooperation and coordination among historical organizations.</p>
Goal 2	Objectives
Assure provision of an adequate level of recreational services and facilities to Township residents.	<ol style="list-style-type: none"> 1. Coordinate with other public, quasi-public, and private agencies to maximize use of recreational lands, facilities and programs that these organizations may provide and that may be available to Township residents. 2. Formalize a program and fund for acceptance of cash contributions to Township recreational efforts, including but not limited to, provisions for dedication of "fees in lieu thereof" (i.e., pursuant to the Municipalities Planning Code) for recreational lands from residential and nonresidential developers. 3. Consider the Township's growing population when planning future recreational facilities. 4. Work toward establishment of a Township trails system, addressing appropriate linkages, destinations, accessibility, general suitability, and appropriate uses (e.g., pedestrian, bicycling, equestrian, and cross-country ski) considerations. Specifically, seek to interconnect protected open spaces, recreational areas, and residential neighborhoods. 5. Consider applicable standards and criteria for recreational facilities for Township residents. 6. Pursue funding sources for recreational development through county, state and other potential funding sources. 7. Encourage the cooperative efforts of the BVSBC to improve the recreational attributes of the Brandywine Valley Scenic Byway.

3. Land Use

Review existing and future land development issues.

Goal	Objectives
Provide for future development in a manner that will protect and enhance the general welfare and quality of life in the Township.	<ol style="list-style-type: none"> 1. Guide the location and intensity of future development to protect existing neighborhoods and open space. 2. Coordinate future land development with the logical and efficient extension of public utilities and services. 3. Ensure that any commercial development along the U.S. Rt. 202 corridor does not detract from the quality of life in the adjacent residential neighborhoods. 4. Support and participate in regional planning efforts.

4. Transportation

Adopt the regional circulation plan and the need to address public transit alternatives, pedestrian and bicycle circulation, and traffic congestion.

Goal	Objectives
Provide and maintain a high quality, safe road network that serves the needs of all residents and encourages the development of alternative modes of transportation, including rail and bus service.	<ol style="list-style-type: none"> 1. Inventory existing transportation and road improvement needs. 2. Identify and recommend traffic calming techniques in the Township to ensure the safe movement of vehicles through residential areas. 3. Investigate opportunities to create pedestrian trail and bikeway linkages between residential neighborhoods and community facilities. 4. Prepare a pedestrian and bicycle circulation plan for the Township. 5. Implement mechanisms to require new development to accommodate pedestrian and bicycle circulation. 6. Coordinate planning with neighboring communities to enhance the flow of vehicular traffic through the region and provide for linkages of walking and bicycle paths. 7. Investigate alternative modes of public transportation.

5. Housing

Ensure that a range of affordable housing exists.

Goal	Objectives
Ensure that the Township has adequate housing options.	<ol style="list-style-type: none"> 1. Explore affordable housing options to address the needs of the Township's population. 2. Explore opportunities for regional planning of alternative housing.

6. Economic Development

Maintain the current level of existing businesses.

Goal	Objectives
Continue to provide for appropriate commercial activities in the Township.	<ol style="list-style-type: none"> 1. Maintain and improve the economic viability of the U.S. Rt. 202 Business District. 2. Improve the streetscape of the U.S. Rt., particularly in the Chadds Ford Village vicinity.

7. Community Facilities and Services

Identify current and future needs for police, emergency services, administrative, public works, and other services and facilities provided by the Township.

Goal	Objectives
Provide community facilities and services to meet current and future residential and business requirements in the Township.	<ol style="list-style-type: none"> 1. Investigate and prioritize the following community services and facilities, and make recommendations to address issues: <ol style="list-style-type: none"> a) Public water and sewer service. b) Police and emergency services. c) Township administration and code enforcement. d) Road maintenance and public works. e) Trash and recycling services. f) Park and recreational facilities and services.

8. Regional Coordination

Identify opportunities for coordination of planning issues with surrounding townships and Delaware County.

Goal	Objectives
Encourage and participate in regional planning activities.	<ol style="list-style-type: none">1. Participate in regional planning initiatives, such as the Oakland Road Corridor Scenic Easement Program and the Brandywine Valley Scenic Byway Study.2. Coordinate planning with neighboring communities to encourage the provision of public transportation.3. Coordinate planning with neighboring communities to enhance the flow of vehicular traffic through the region and provide for linkages of walking and bicycle paths.4. Coordinate planning with neighboring communities to ensure compatible land use for adjoining areas.5. Participate in multi-municipal planning initiatives for compatible development, continuation of historic community patterns, and coordination of infrastructure development.6. Coordinate with area communities and PennDOT regarding detailed plans for the US Rt. 202 improvement project.

2. PLAN RECOMMENDATIONS

Comprehensive plan recommendations are presented in this chapter. Plan recommendations are based on observations and concerns expressed at citizen participation meetings, Task Force workshops, the resident survey, and the goals and objectives set forth in Chapter 1.

It is recommended that this Plan be reviewed and updated by the Planning Commission every three (3) years to keep it current with land use and development changes. Moreover, it is recommended that progress against the tasks identified in Chapter 3 be reviewed each year and an annual plan for task completion be formulated at the beginning of each year. The ultimate time horizon for this Plan is ten (10) years; the implementation strategies set forth in Chapter 3 should be completed by this time, and the plan should be reviewed again in 2019, in accordance with the PA MPC requirements.

The Plan recommendations are presented according to the specific plan elements as required in Section 301 of the PA MPC, discussed in Chapter 1 of this plan.

A. PLAN FOR LAND USE

Goals and Objectives

The land use goal is to *“Provide for future development in a manner that will protect and enhance the general welfare and quality of life in the Township.”* Land use objectives include directing new development so that existing open space is protected and coordinating future land development with the logical and efficient extension of public utilities and services.

Background

Planning implications of the Existing Land Use Inventory and Zoning Analysis (see Appendix B) include the need for the reevaluation of Township zoning to accommodate the recommendations of Chadds Ford Open Space Plan (2008) and a determination of the appropriate density and intensity of development based on the results of the residential and commercial build-out analysis. As evidenced by the resident survey and interviews, it is very important to the Township to maintain its rural character and lifestyle. The preservation of open space in Chadds Ford is key to this objective.

The Future Land Use Map (Map 2) shows the areas of the Township where the following recommendations concerning land use, zoning and development should be implemented.

1. Zoning/Conservation Easement Analysis.











It is recommended that a detailed zoning/conservation easement analysis be pursued with the objective of evaluating the extent to which the Chadds Ford Township Open Space Plan (2008) “Open Space Focus Areas” can be protected. Objectives for this analysis are as follows:

Housing Needs. The analysis should seek to accommodate the development of approximately 800 new dwelling units, which will be the housing needs for the Township’s future population through the year 2025 as projected in the Open Space Plan.

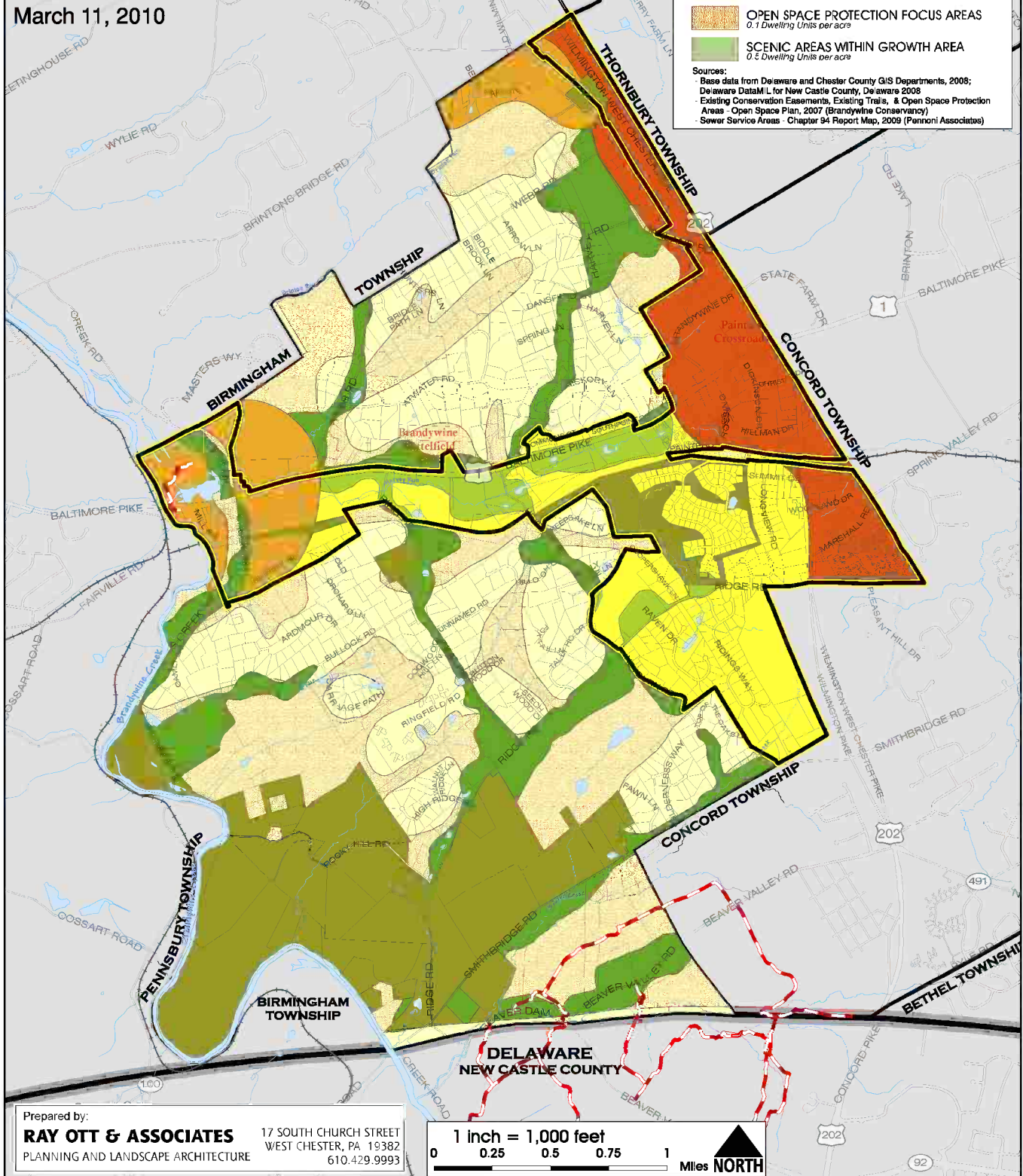
MAP 2: FUTURE LAND USE

March 11, 2010

LEGEND

-  SEWER SERVICE AREA
-  EXISTING CONSERVATION EASEMENTS
-  EXISTING TRAILS
- FUTURE LAND USE**
 -  GROWTH AREA
1 Dwelling Unit per acre
 -  COMMERCIAL/HIGH DENSITY RESIDENTIAL
70% Impervious Coverage / 10 Dwelling Units per acre
 -  HISTORIC VILLAGE - MIXED USE
40% Impervious Coverage / 5 Dwelling Units per acre
 -  SCENIC AREAS
Limited Development - up to 0.5 Dwelling Units per acre
 -  LOW DENSITY RESIDENTIAL
0.5 Dwelling Units per acre
 -  OPEN SPACE PROTECTION FOCUS AREAS
0.1 Dwelling Units per acre
 -  SCENIC AREAS WITHIN GROWTH AREA
0.5 Dwelling Units per acre

Sources:
 Base data from Delaware and Chester County GIS Departments, 2008;
 Delaware Data/M/L for New Castle County, Delaware 2008
 Existing Conservation Easements, Existing Trails, & Open Space Protection
 Areas - Open Space Plan, 2007 (Brandywine Conservancy)
 Sewer Service Areas - Chapter 94 Report Map, 2009 (Pannoni Associates)



Prepared by:

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1 inch = 1,000 feet







0 0.25 0.5 0.75 1

Miles NORTH

MAP 3: TRANSPORTATION RECOMMENDATIONS

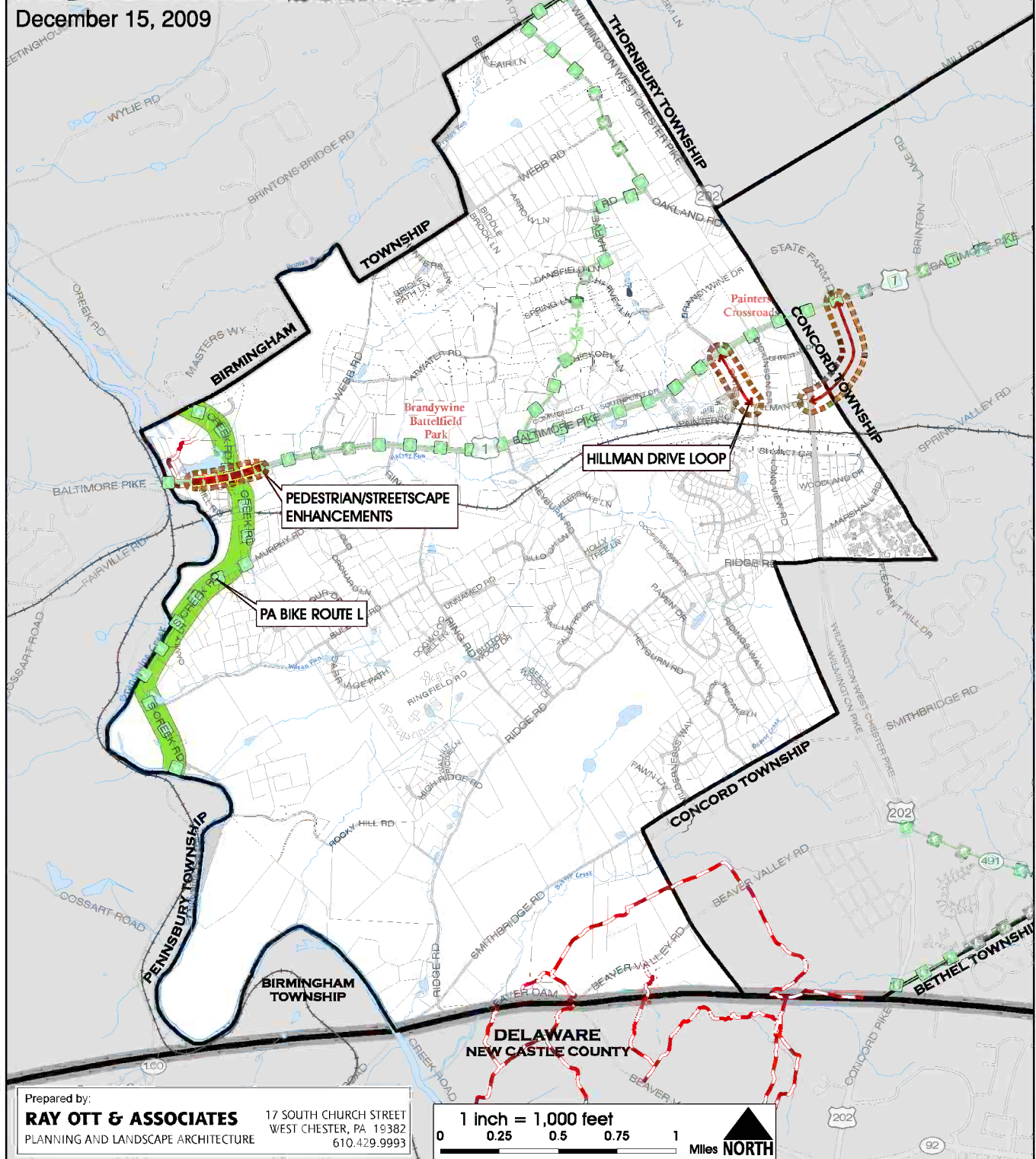
December 15, 2009

LEGEND

-  RECOMMENDED IMPROVEMENTS
-  PEDESTRIAN/STREETScape ENHANCEMENTS
-  HILLMAN DRIVE LOOP
-  SIGNED BIKE ROUTES: DELAWARE CO. BICYCLE PLAN*
-  BRANDYWINE VALLEY SCENIC BYWAY
-  EXISTING TRAILS

* BIKE ROUTES ARE ACKNOWLEDGED, BUT NOT ENDORSED BY CHADDS FORD TOWNSHIP.

Sources:
 - Base data from Delaware and Chester County GIS Departments, 2008;
 - Delaware DataMIL for New Castle County, Delaware 2008
 - 2009 DCPD Bicycle Plan



MAP 4: HISTORIC AND NATURAL RESOURCES PLAN RECOMMENDATIONS

December 15, 2009

LEGEND

EXISTING PROTECTED RESOURCES

-  NATIONAL REGISTER HISTORIC DISTRICT
-  HISTORIC DISTRICTS (HARB)

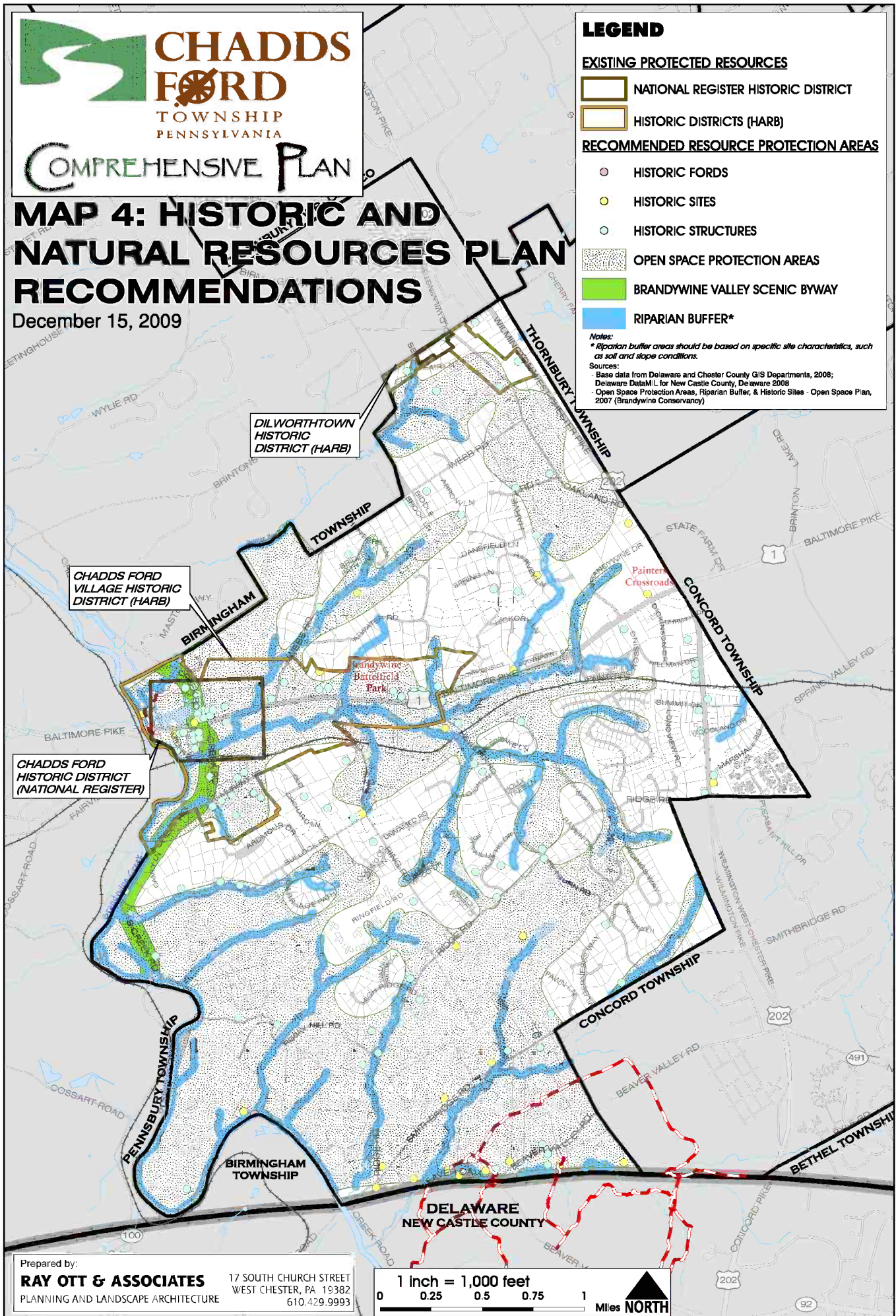
RECOMMENDED RESOURCE PROTECTION AREAS

-  HISTORIC FORDS
-  HISTORIC SITES
-  HISTORIC STRUCTURES
-  OPEN SPACE PROTECTION AREAS
-  BRANDYWINE VALLEY SCENIC BYWAY
-  RIPARIAN BUFFER*

Notes:
* Riparian buffer areas should be based on specific site characteristics, such as soil and slope conditions.

Sources:

- Base data from Delaware and Chester County GIS Departments, 2008;
- Delaware DataMIL for New Castle County, Delaware 2008
- Open Space Protection Areas, Riparian Buffer, & Historic Sites - Open Space Plan, 2007 (Brandywine Conservancy)



Open Space Focus Areas. The Open Space Focus Areas should form the basis for designating areas to be protected from future development. If necessary to provide areas for future development, a priority system should be used that excludes development from some resource areas, while allowing development in other resource areas according to specific guidelines to ensure basic protection goals for the resource. Scenic Resources and Greenway Corridors, as depicted on Maps 6-9 and 6-3 of the Open Space Plan, should be given first and second priority, respectively.

Conservation Easements. Because it is anticipated that development rights for some land parcels may be significantly diminished, the analysis should identify parcels for the purchase (or dedication) of conservation easements.

Transfer of Development Rights. The analysis should evaluate the feasibility of adopting a Transfer of Development Rights Ordinance in order to help compensate landowners for the preservation of their property. A market for the potential supply of TDRs from the preservation "sending areas" needs to be provided with an adequate TDR "receiving area." This analysis should therefore designate receiving areas sufficient in area and permitted development densities to ensure that there will be a market for the estimated number of TDRs in the sending areas.

Future Development Areas. Future development should be directed to areas within the current sewer service areas, the Rt. 202 corridor and to the Villages of Chadds Ford and Dilworthtown.

2. Future Land Use

Future land use should focus upon the preservation of the remaining rural character of the Township through active preservation of open space and protection of natural, scenic, and historic resources. Designations for future land use are shown on Map 2 and described below. Although not technically a 'land use,' all areas in the Township under Conservation Easement are also identified on the Future Land Use map, and it is assumed that no future development will occur on these lands.

Growth Area: This is shown as the Township's current sewer service area, and it is a recommendation of this plan that this area not be expanded. Future growth should be directed to this area, while respecting important historic and scenic features, as represented by Chadds Ford Village and the scenic landscapes along Route 1. Because the area is serviced with public water and sewer, it can support higher development densities – including residential densities of up to 1 dwelling unit per acre and impervious coverage limits of up to 40% for nonresidential development. The area also includes the Commercial/High Density Residential and Chadds Ford Village Mixed Use areas, which are discussed below.¹

Commercial/High Density Residential: This area is located along the Route 202 corridor and currently includes almost all of the Township's commercial office and retail development. All of this area is also within the recommended Growth Area. The plan recommends residential densities of up to 10 dwelling units per acre and impervious coverage limits for nonresidential development of up to 70% in this area.

Historic Village Mixed Use: These areas include Chadds Ford Village and the Chadds Ford Township portion of Dilworthtown Village. The plan recommends residential densities of up to 5 dwelling units per acre and impervious coverage limits for nonresidential development of up to 40% in these areas.

¹ Although this plan designates the current (2009) sewer service as a "Growth Area," this is not meant to imply that the sewer service should not be expanded if necessary to address future needs.



Figure 1: Chadds Ford Village

Chadds Ford Village

- a) Master Plan. A master plan should be prepared that illustrates how the Village should ultimately be developed. Key elements are:
 - Accommodate retail, office and residential uses.
 - Promote shared parking and interconnected vehicular and pedestrian circulation systems.
 - Provide design guidelines that promote new development within the context of a pedestrian scale village that complements the Village's historic architecture and development pattern.
 - Recommend design improvements along the Village section of Rt. 1 that accommodate a safe pedestrian crosswalk, slow traffic through the Village, and accommodate sidewalks and street trees. Popular terms for these design schemes include "traffic calming" and "complete streets."²
 - Accommodate development and land use limitation associated with the portions of Chadds Ford Village within the Brandywine Creek floodplain.
- b) Revise the zoning ordinance and map to create a new base zoning district, the Historic Village Mixed Use District. These ordinance and map changes should be based on the recommendations of the Chadds Ford Village Master Plan report.

² For more information about complete streets, see the National Complete Streets Coalition's website: www.completestreets.org. PennDOT provides an online Traffic Calming Handbook on its website: www.dot.state.pa.us/Internet/Bureaus/pdBHSTE.nsf/infoTrafficCalming.



Figure 2: Dilworthtown Village

Dilworthtown Village

- a) It is recommended that the zoning ordinance and map be revised to create a new base zoning district, the Historic Village Mixed Use District. This new district should accommodate commercial retail, office and residential uses.

Scenic Areas: These areas were identified in the Township Open Space Plan (2008) as viewshed corridors along scenic roadways through the Township, including the Brandywine Valley Scenic Byway. It is recommended that the integrity of the viewsheds and existing woodlands be protected in these areas. It is also recommended that limited development be accommodated within Scenic Areas, but only after careful site planning to preserve the integrity of these viewsheds. The average residential density in these areas should be no greater than 0.5 dwelling unit per acre. Scenic Areas should be high priority target areas for the acquisition of conservation easements or Transfer Development Rights to ensure their preservation.

Open Space Protection Focus Areas: These areas were identified in the Township Open Space Plan (2008) for the Township to 'focus' land conservation efforts. It is recommended that residential development in these areas be restricted to one dwelling unit per 10 acres (0.1 dwelling unit per acre).

Low Density Residential: These areas are composed of all lands not identified in other Future Land Use areas. They consist of most of the existing suburban development in the Township. It is recommended that residential development in these areas be restricted to one dwelling per 2 acres (0.5 dwelling unit per acre).

Future Land Use Build-Out Analysis

In order to estimate the number of dwelling units and commercial floor space accommodated in the Future Land Use Plan, the “build-out” capacity of the Township’s remaining undeveloped land was prepared using the dwelling unit density and impervious coverage limitations included in the above recommended plan. These results are shown in the following table by land use categories.

Table 1: Future Land Use Build-Out Analysis

FUTURE LAND USE AREAS	GROSS ACRES %	AVAILABLE ACRES [1] %	RECOMMENDED		POTENTIAL NEW DWELLING UNITS	NONRESIDENTIAL FLOOR AREA [3]
			UNITS/ ACRE	IMPERVIOUS COVERAGE [2]		
GROWTH AREA (net of other districts) [4]	650.4 12%	192.8 9%	1.0		193	
COMMERCIAL/HIGH DENSITY RESIDENTIAL [5]	501.9 9%	44.6 2%	10.0	70%	149	465,355 s.f.
HISTORIC VILLAGE - MIXED USE [6]	305.1 5%	60.0 3%	5.0	40%	200	178,708 s.f.
SCENIC AREAS	649.6 12%	213.1 10%	0.5		0 [7]	
SCENIC AREAS within Growth Area	157.6 3%	36.2 2%	0.5		18 [7]	
OPEN SPACE FOCUS AREAS	1,149.2 20%	1,274.1 61%	0.1		127	
LOW DENSITY RESIDENTIAL	1,298.5 23%	283.2 13%	0.5		142	
EXISTING CONSERVATION EASEMENTS	898.8 16%	0.0 0%	0.0		0	
TOTAL FUTURE DEVELOPMENT					829	644,063
EXISTING [8]					1,498	1,725,977
TOTAL	5,611.2 100%	2,104.1 100%			2,327	2,370,040

Notes:

[1] Based on an analysis of undeveloped parcels and parcels not developed at recommended Future Land Use densities.

[2] Recommended impervious coverage limit for area permitting nonresidential development.

[3] Nonresidential development potential floor area in square feet estimated as a function of recommended impervious coverage for 2 story buildings with 5 parking spaces per 1,000 s.f. of floor area.

[4] The Growth Area includes all areas within the current sewer service area, which also includes all of the Commercial/High Density Residential area and most of the Chadds Ford Village Mixed Use area. Portions of the Growth Area that are also within Scenic Areas have been excluded from this calculation.

[5] Analysis assumes 2/3rds of the Commercial/High Density Residential Area to be nonresidential development.

[6] Analysis assumes 1/3rd of the Historic Village Mixed Use area to be nonresidential development.

[7] This analysis anticipates the acquisition of conservation easements/development rights within Scenic Areas that are outside of the Growth Area boundary. It is estimated that this area could otherwise accommodate 88 additional dwelling units.

[8] Existing development based on 2006 Delaware County Tax Assessment data.

3. Open Space Protection Techniques

The Township should revise current development provisions of the zoning ordinance to better encourage and require the following objectives:

- a) **Open Space Protection Focus Areas.** Preserve significant natural, scenic and historic resources, according to the “Open Space Protection Focus Areas” shown on Map 8-1 of the Chadds Ford Township Open Space Plan of 2007. This can be accomplished with one or more of the following mechanisms:
 - Amend the zoning ordinance PRD provisions to require that at least 60% of the tract area be set aside as permanent open space.
 - Amend the zoning ordinance to require that areas within the “Open Space Protection Focus Areas” shown on Map 8-1 of the Chadds Ford Township Open Space Plan of 2007 be included in all designated open space areas for new development projects.
 - Prepare a Transfer of Development Rights (TDR) ordinance that includes the “Open Space Protection Focus Areas” in all development rights sending areas.

- b) Brandywine Valley Scenic Byway. Creek Road is included as a component of the current “Brandywine Valley Scenic Byway.” A Corridor Management Plan is currently being developed by the Brandywine Valley Scenic Byway Commission. When available, the recommendations of this project should be considered for incorporation into zoning and land development ordinance provisions to protect the scenic integrity of this corridor.



Figure 3: Brandywine Valley

- c) Baltimore Pike Overlay District. The Baltimore Pike Overlay District was adopted in 2005. Its primary objective is the preservation of natural, scenic and historic resources along properties adjacent to or near Route 1. This is achieved through a new definition of “Lot Area” which excludes certain percentages of resource areas and easements from development. Additionally, the Baltimore Pike Overlay District reduces the maximum permitted building coverage in the R-1 District to 12%. This overlay district also sets a maximum of 5,000 square feet of floor area within Historic Overlay Districts. It is recommended that the Baltimore Pike Overlay District Ordinance be reviewed and updated to ensure that it conforms to the recommended Historic Village Mixed Use District and other ordinance amendments resulting from this plan.

B. PLAN TO MEET HOUSING NEEDS

Goals and Objectives

The housing goal is to “*Ensure that the Township has adequate housing options.*” Housing objectives include providing affordable housing options and housing alternatives.

Background

The Demographic and Housing Inventory and Analysis (see Appendix A) includes the statistic that over one quarter of the Township population was over 55 in 2000. The residential build-out analysis prepared for this plan (see Appendix B) estimates that approximately 1,500 new dwelling units could be constructed in the Township under the provisions and requirements of the existing zoning ordinance. DVRPC’s 2035 population estimates include an increase of only 616 people in Chadds Ford, which equates to about 250 dwelling units, while the Township Open Space Plan (2008) population projections result in a need for approximately 800 new housing units by 2030. The permitted densities of Chadds Ford Township’s current zoning ordinance more than provide for the anticipated future housing needs in the Township.

1. **Variety of Housing Types.** Chadds Ford Township provides a wide variety of both owner-occupied and rental housing units, over half of which have been constructed since 1980. According to the 2000 Census data, the Township's renter-occupied housing accounted for 14% of all units. It is recommended that the Township continue policies to maintain this variety of housing opportunities.
2. **Future Housing Needs.** The residential build-out analysis prepared for the Future Land Use recommendations predicts that this Plan accommodates approximately 830 new dwelling units, which addresses the housing needs for the Township's projected population by 2030, as incorporated in the Township Open Space Plan (2008).

C. TRANSPORTATION AND CIRCULATION PLAN

Goals and Objectives

The transportation goal from Chapter 1 is *"Provide and maintain a high quality, safe road network that serves the needs of all residents and encourages the development of alternative modes of transportation, including rail and bus service."* Objectives include the development of pedestrian and bicycle routes that link to key destinations in the Township, as well as the implementation of traffic calming techniques within the Village of Chadds Ford.

Background

Planning implications for transportation and circulation (see Appendix C: Transportation and Circulation Inventory and Analysis) include the potential need for the extension of bus service within the Township, the need to provide connected trails for pedestrians and bicyclists, and the need to address traffic congestion, in part through the completion of the connection of Hillman Drive at US Route 1 and US Route 202.

The Circulation Map (Map 3) shows the areas of the Township where the following recommendations concerning roadway improvements, trails, and scenic roads should be implemented. Recommendations regarding scenic roads are also included in the Chadds Ford Township Open Space Plan of 2007.

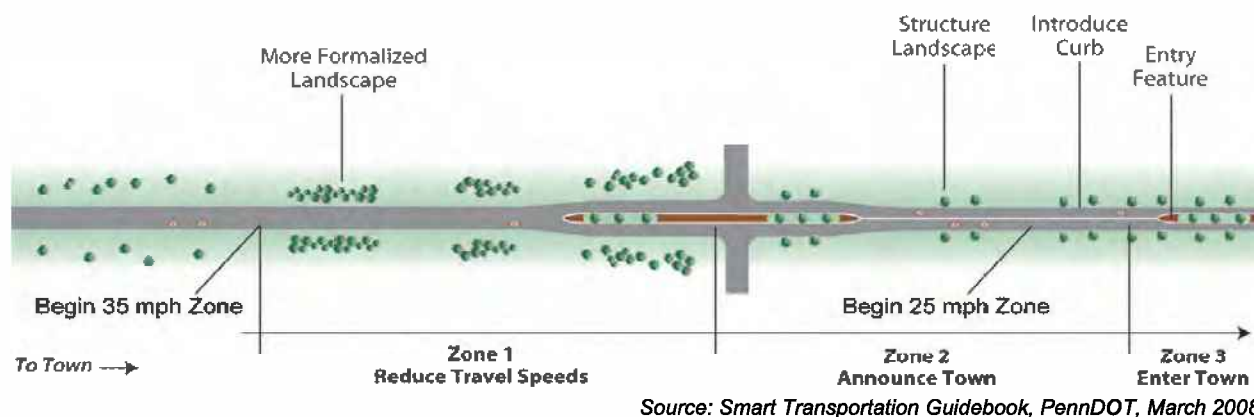


Figure 4: Traffic Speed Transitions Techniques

1. **Road Functional Classification.** It is recommended that the road functional classification systems shown on the Circulation Plan Map (see Appendix C, pages C-3 and C-4) be used to guide the maintenance and future improvements of this road system.



**CHADDS
FORD**
TOWNSHIP
PENNSYLVANIA

COMPREHENSIVE PLAN

MAP 3: TRANSPORTATION RECOMMENDATIONS

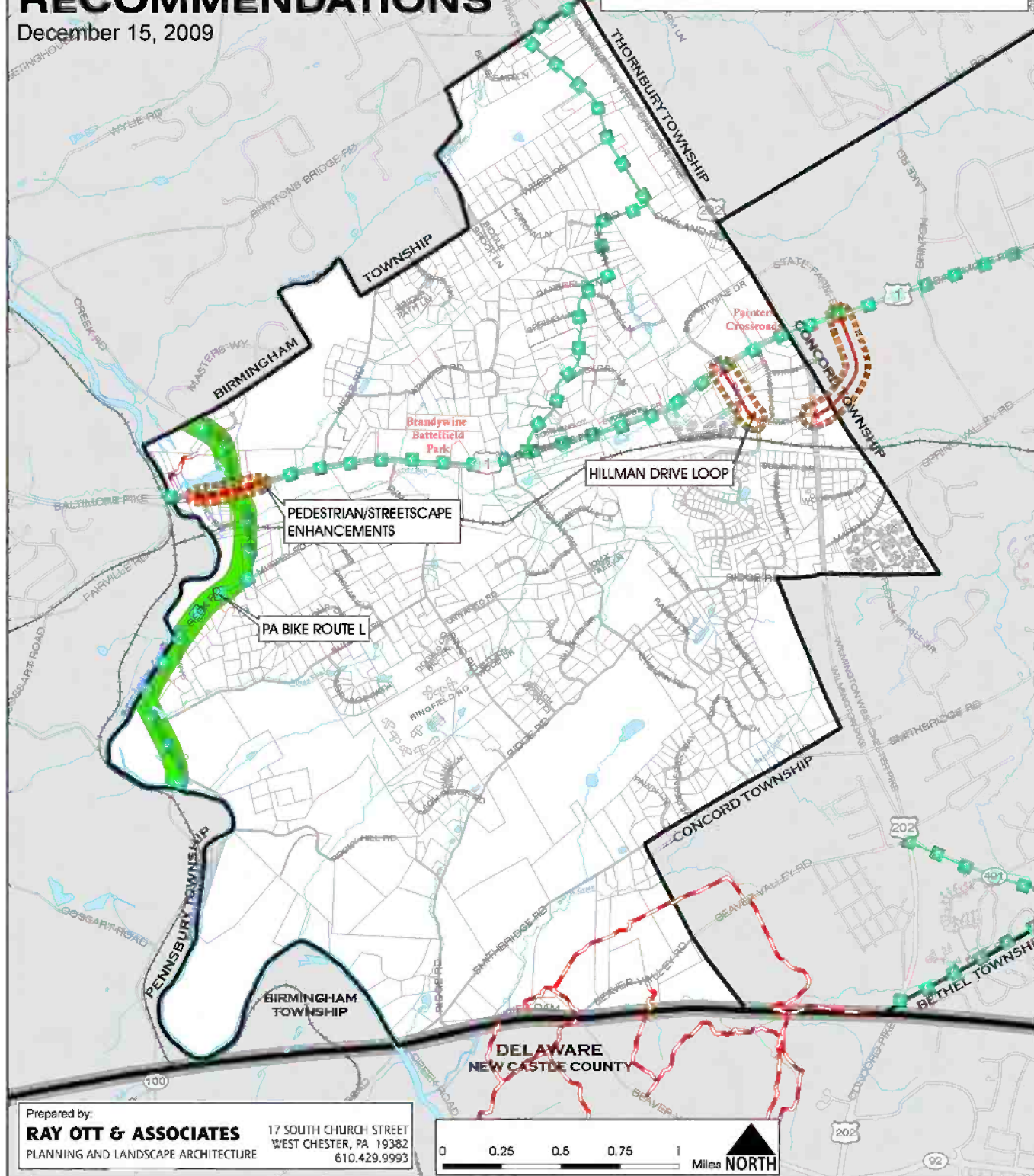
December 15, 2009

LEGEND

- RECOMMENDED IMPROVEMENTS
- PEDESTRIAN/STREETSCAPE ENHANCEMENTS
- HILLMAN DRIVE LOOP
- SIGNED BIKE ROUTES: DELAWARE CO. BICYCLE PLAN*
- BRANDYWINE VALLEY SCENIC BYWAY
- EXISTING TRAILS

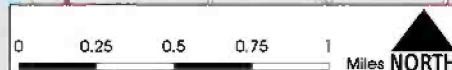
* BIKE ROUTES ARE ACKNOWLEDGED, BUT NOT ENDORSED BY CHADDS FORD TOWNSHIP.

Sources:
- Base data from Delaware and Chester County GIS Departments, 2008;
- Delaware DataMIL for New Castle County, Delaware 2008
- 2009 DCPD Bicycle Plan



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2. Scenic Byway. Recommendations concerning the Brandywine Valley Scenic Byway are included in the Chadds Ford Township Open Space Plan of 2007. A Corridor Management Plan is currently being developed by the Brandywine Valley Scenic Byway Commission. When available, the recommendations of this project should be considered for incorporation into zoning and land development ordinance provisions to protect the scenic integrity of this corridor.
3. Rt. 1 through Chadds Ford Village. Design improvements along the Chadds Ford Village section of Rt. 1 that incorporate “traffic calming” and “complete streets” techniques and provide for safe pedestrian crosswalks. This recommendation is included above under the Future Land Use Recommendation for a Chadds Ford Village Master Plan.



Figure 5: US Route 1 in Chadds Ford Village

4. Bicycle Routes. Acknowledge bicycle routes along existing public roads through the Township as designated in the 2009 Delaware County Planning Department (DCPD) Bicycle Plan, but not endorsed by the Township.
5. Township-wide Bicycle and Trail Plan. Prepare a Township-wide Bicycle and Trail Plan. The Township Open Space Committee is currently pursuing a grant to prepare a trail network plan. This plan should explore the feasibility of providing an effective pedestrian circulation system in the Township that provides opportunities for destination walking (such as to recreational and commercial areas), recreational walking and hiking, and access to the Brandywine Battlefield Historic Site. It should also incorporate the Bicycle Route recommendations discussed above. Public participation should be an important component of this project.
6. Traffic Impact Study. Major subdivision and land development applications should include a Traffic Impact Study. The Traffic Impact Study should identify the amount of traffic expected to be generated by development and how the traffic will be distributed over time to the surrounding roads. Traffic Impact Studies should also identify road improvements that would be needed to handle the increased traffic volumes. Based on this study, responsibility for implementation of needed improvements can be identified.
7. US Route 202 Section 100: Land Use and Coordination Study (2008). In 2008, the Delaware Valley Regional Planning Commission (DVRPC) prepared the US Route 202 Section 100: Land Use and Coordination Study, that includes recommendations from a 2001 report, the status of these recommendations as of 2007, as well as some new recommendations. All recommendations pertinent to Chadds Ford Township should be reviewed as to their current status/implementation. The Township should work with DVRPC and adjacent municipi-

palities to enhance the Route 202 functionality and streetscape in order to improve overall capacity.

8. Hillman Drive "Loop." Pursue the completion of the connection of Hillman Drive at US Route 1 and US Route 202, and work with Concord Township to complete the southeast quadrant of this loop drive.

D. PLAN FOR THE PROTECTION OF NATURAL AND HISTORIC RESOURCES

Goals and Objectives

Chapter 1's goals for natural and historic resources are [1] *"Permanently protect Chadds Ford's open spaces – its farm fields and meadows, woods, stream valleys, and other water resources, historic sites and structures and scenic resources – which, in combination, create the Township's unique community character, remaining rural atmosphere and quality of life; and [2] Assure provision of an adequate level of recreational services and facilities to Township residents."* Numerous objectives were set forth in the 2007 Open Space Plan, all of which were carried forward to this Comprehensive Plan. These objectives include the expanded protection and conservation of open space, natural, scenic and historic resources throughout the Township.

Background

Planning implications for natural and historic resources include the need for greater protection for all of the Township environmental, scenic and historic resources. (See Appendix D: Environmental, Cultural and Historic Resource Inventory and Analysis.)

The Chadds Ford Township Open Space Plan of 2007 was adopted as a component of the Comprehensive Plan, and as such, all open space and recreation recommendations and implementation strategies set forth in the Open Space Plan of 2007 should be considered to be the open space and recreation recommendations of this Comprehensive Plan. Map 4 shows Township resource areas to be protected. Historic resources inventories for the Open Space Plan are also shown on Map 4. A complete list of these resources is included in the Open Space Plan.

1. Open Space Protection Focus Areas. The protection of Open Space Focus areas is addressed in Section 2.A.3.a of the Plan for Land Use.
2. Water Supply and Water Quality.
 - **Riparian Buffer Zones.** Amend the zoning ordinance to require buffer areas along all streams in the Township. The actual buffer boundary should be based on site specific criteria, such as local slope and soil conditions.
 - **Stormwater Management.** The Pennsylvania Department of Environmental Protection (DEP) is responsible for administering the State's stormwater management programs. Act 167 requires municipalities in a watershed with an adopted stormwater management plan to adopt the plan's model ordinance. The Township has adopted Ordinance 104 for Chester Creek municipality-wide. Under a DEP directive, the County will be preparing a new model ordinance for Countywide use. Chadds Ford will need to adopt this new ordinance.

MAP 4: HISTORIC AND NATURAL RESOURCES PLAN RECOMMENDATIONS

December 15, 2009

LEGEND

EXISTING PROTECTED RESOURCES

-  NATIONAL REGISTER HISTORIC DISTRICT
-  HISTORIC DISTRICTS (HARB)

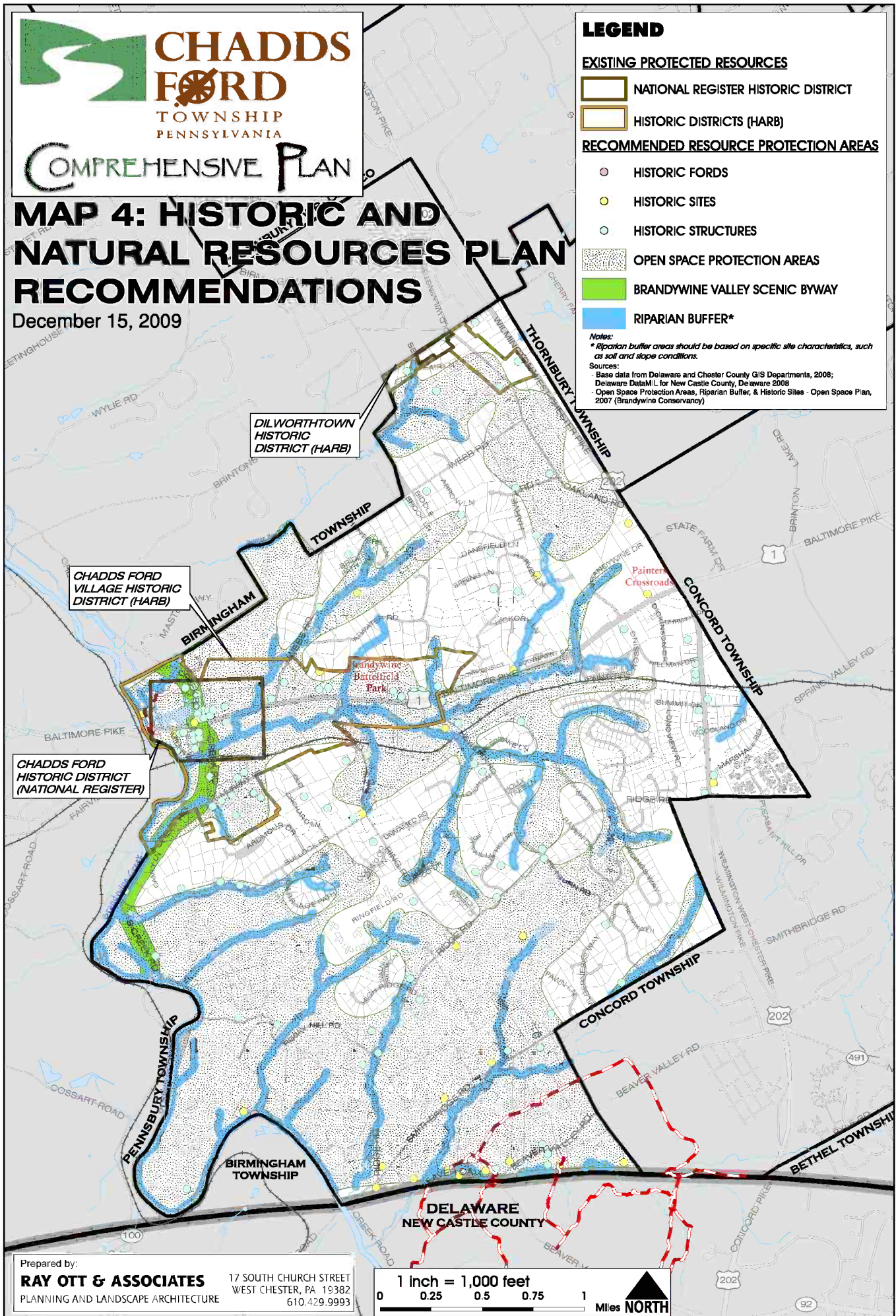
RECOMMENDED RESOURCE PROTECTION AREAS

-  HISTORIC FORDS
-  HISTORIC SITES
-  HISTORIC STRUCTURES
-  OPEN SPACE PROTECTION AREAS
-  BRANDYWINE VALLEY SCENIC BYWAY
-  RIPARIAN BUFFER*

Notes:
* Riparian buffer areas should be based on specific site characteristics, such as soil and slope conditions.

Sources:

- Base data from Delaware and Chester County GIS Departments, 2008;
- Delaware DataMIL for New Castle County, Delaware 2008
- Open Space Protection Areas, Riparian Buffer, & Historic Sites - Open Space Plan, 2007 (Brandywine Conservancy)



DEP also administers the federal NPDES program, which requires municipalities with municipal separate storm sewer systems (MS4s) to obtain a permit containing six minimum control measures. Chadds Ford has obtained a permit. In addition, the State's NPDES stormwater program establishes permitting requirements for earth disturbance over one acre and for industrial sites.

- Work with an engineering consultant to determine ways to improve flood conditions along roadways within the Township.
- 3. Historical Commission. Establish a Township Historical Commission to oversee the Township's individual historic resources. While the HARB currently reviews development projects within the Chadds Ford Village and Dilworthtown Historic Districts, there are no current mechanisms to protect individual historic structures.
- 4. Delaware County Natural Heritage Inventory. The Delaware County Planning Department is currently working on a Delaware County Natural Heritage Inventory. This report should be reviewed and considered by the Township when it is available.
- 5. Brandywine Battlefield National Historic Landmark. Work with the Brandywine Battlefield National Historic Landmark Task Force to help preserve this significant historic resource.

E. COMMUNITY FACILITIES AND SERVICES PLAN

Goals and Objectives

Chapter 1's goal for community facilities is "*Provide community facilities and services to meet current and future residential and business requirements in the Township.*"

Background

Planning implications for community facilities and services include the following: [1] Additional capacity is available at the Turners Mill and Ridings Wastewater Treatment Plants; [2] A line item should be included in the Township budget for parks and recreation; [3] and that the Township provides basic administrative and code enforcement services.³

The Community Facilities Plan consists of the following recommendations concerning public services.

1. Recycling. The Township should consider the November 2008 recommendations of the Township's Recycling Task Force in the development of a Township recycling program.

³ During the writing of this Comprehensive Plan, Chadds Ford Township's First Township Manager was appointed.

2. Parks and Recreation

- a. The recreational recommendations set forth in Chapter 9 of the Township Open Space Plan of 2007 should be incorporated herein.
- b. Prepare a Community Trails Feasibility Study and Master Plan.

3. Sanitary Sewer Service

- a. The Chadds Ford Township Sewer Authority contracts with the Delaware County Regional Water Quality Control Authority to operate and maintain both the Ridings and Turners Mill Wastewater Treatment Plants. The Ridings plant is permitted for 80,000 gallons per day (GPD) and is currently (2008) treating an average of 36,000 GPD, which in conjunction with an additional 23,870 GPD in committed usage, leaves 20,130 GPD available. The Turners Mill Plant is permitted for 140,000 GPD, and has an available capacity of 63,243 GPD. Together the two plants have 83,373 GPD in available capacity to serve future needs. At the current average daily usage rate of 217 GPD per household, this leaves a reserve capacity to service 384 households -- which is also known as an "equivalent dwelling units" or "EDUs."

An analysis of existing public sewer capacity and development accommodated in the Future Land Use recommendations of this plan is presented in Table 2. Based on a build-out analysis of the Future Land Use recommendations, this plan provides for 542 new dwelling units and 610,000 square feet of nonresidential development within these existing sewer service areas. This new growth would require approximately 823 EDUs in sewer capacity, which exceeds the existing available capacity by 439 EDUs. Sewer capacities should be evaluated, and existing infrastructure should be enhanced and upgraded as necessary to accommodate this planned growth when needed.

Table 2: Evaluation of Public Sewer Capacity

	Permitted Capacity [1]	Current Usage [1]	Committed Usage [2]	Available Capacity	Available EDUs [3]	Comprehensive Plan Future Land Use		
						Dwelling Units	Non-Residential Floor Area	EDUs [4]
Ridings Plant	80,000	36,000	23,870	20,130	93	122	435,000	322
Turners Mill Plant [5]	140,000	50,500	26,257	63,243	291	420	175,000	501
	220,000	86,500	50,127	83,373	384	542	610,000	823

[1] Current usage in gallons per day (GPD) for 2008. Township "Chapter 94 Report."

[2] Usage committed but not currently utilized for 2008. Township "Chapter 94 Report."

[3] EDU (Equivalent Dwelling Unit) = 217 GPD (gallon per day)

[4] EDUs calculated at 1 per dwelling unit and 100 gpd (0.46 EDUs) per 1,000 sq.ft. of floor area.

[5] The Turner's Mill sewer transmission system was designed and balanced to handle the planned load at the time of construction. While the plant is rated at 140,000 GPD, and significant development would require concurrent transmission capacity be provided.

F. INTERRELATIONSHIP OF PLAN ELEMENTS

The individual plan elements required by the MPC interrelate to comprise the Comprehensive Plan for the Township. This section discusses these interrelationships and how they affect plan recommendations.

Chapter 1 of the plan sets forth the goals and objectives formed by the Township and includes Township history and MPC requirements for the preparation of a Comprehensive Plan. Methods to effectively implement the objectives and meet the goals were considered throughout the

preparation of this plan and are directly addressed through the implementation schedule set forth in Chapter 3.

Appendix A of the Plan sets forth Census data and provides population and housing projections to 2020. The chapter also discusses current employment and housing characteristics in the Township. Ways to accommodate anticipated population increases and housing demands without compromising the Township's rural landscapes are discussed throughout the Plan. Specifically, Appendix B, Existing Land Use and Zoning, includes residential and commercial build-out analyses which estimate the number of new housing units and commercial square feet that could be built in the Township given available land and current zoning ordinance standards.

Appendix C, Transportation and Circulation, discusses the road network serving the Township, which relates to Appendix F, Community Facilities and Services, in that it indicates existing roads that require improvement. Transportation and circulation recommendations are provided in Chapter 3. The provision of community facilities and services directly relates to housing and population estimates, discussed in Appendix A.

Environmental, Cultural and Historic Resources, Appendix D, discusses Township natural and cultural resources in need of protection, and relates to Appendix B, Existing Land Use and Zoning.

G. STATEMENT OF DEVELOPMENT COMPATIBILITY WITH CONTIGUOUS MUNICIPALITIES

Issues and opportunities involving adjacent communities are discussed and analyzed throughout the plan. The populations of adjacent townships and projections for those townships are discussed in Appendix A. As noted in Appendix B, Existing Land Use and Zoning, the adjacent municipalities of Pennsbury Township and Birmingham Township, Chester County, Concord Township, Delaware County, and New Castle County, Delaware, all have generally compatible zoning along the borders of Chadds Ford Township. Appendix C, Transportation and Circulation, discusses transit facilities in the region that serve the Township, as well as the Brandywine Valley Scenic Byway, which includes multiple municipalities. The area roadway network is discussed which includes descriptions of arterial roadways which serve the region. Appendix D, Environmental, Cultural and Historic Resources, includes discussions of natural resources, which are not delineated by municipal boundaries. These resources include watersheds that are divided by topography and affect the drainage of stormwater in municipalities based on slope. Streams also transcend municipal boundaries; downstream townships are affected by the land development standards and practices of upstream neighbors. Appendix E, Community Facilities and Services, includes a discussion of services such as police, fire and emergency services, which are provided by various companies on a regional level.

H. RELATIONSHIP TO REGIONAL AND COUNTY PLANS AND TRENDS

The MPC requires that municipal comprehensive plans be somewhat consistent with county comprehensive plans. At this time, Delaware County has no formal Comprehensive or Policy Plan. However, individual studies and plans, such as the County Bicycle Plan, are referred to in this Township Comprehensive Plan.

3. STRATEGIC IMPLEMENTATION PLAN

The Comprehensive Plan Implementation Plan is shown in Table 3 on the following page, which provides a prioritized list of each recommendation described in the preceding chapter. According to Pennsylvania Municipalities Planning Code, the Plan should be reviewed again in 2019.

For each recommendation the table lists the following implementation strategies:

PRIORITY: Each recommendation is assigned a high, medium and low priority. This is not meant to imply that recommendations receiving a 'low' priority are not as important as those receiving a 'high' priority, but it rather a recommendation as to the order in which tasks should be pursued.

COMPLETION TIME FRAME: This is meant as an estimate of the time frame in which a specific task can be completed. Because some tasks will take longer to initiate and complete, the time frame does not necessarily relate to the task priority.

RESPONSIBILITY: This column identifies the Chadds Ford Township committees most responsible for overseeing the implementation of each recommendation, including the Board of Supervisors, Planning Commission, Open Space Committee or Sewer Authority.

IMPLEMENTATION METHOD: These methods identify whether the recommendation implementation will require a special study or plan, a new ordinance or physical improvement.

POTENTIAL FUNDING SOURCE: This column lists potential grant funding sources that could be used to supplement Township funds. These include state funding sources -- the Department of Conservation and Natural Resources (DCNR), the Department of Environmental Protection (DEP), the Department of Community & Economic Development (DCED); and other grants, such as federal Community Development funds administered by Delaware County.

While the Implementation Plan (Table 3) includes priorities and time frames, the Comprehensive Plan should be utilized as a dynamic document. The Township should use the Implementation Plan as a guide to track progress on the various Plan Recommendations. As such, it is envisioned that Implementation Plan should be reviewed periodically and updated to reflect current Township priorities.

Table 3: Implementation Plan

	RECOMMENDATION	PRIORITY [1]	COMPLETION TIME FRAME [1]	RESPON- SIBILITY [2]	METHOD OF IMPLEMENTATION	POTENTIAL FUNDING SOURCES [2]
A. PLAN FOR LAND USE						
1	Zoning/Conservation Easement Analysis	High	1 to 3 years	BOS, PC	Special Study	DCED, DelCo
2	Amend Zoning Ordinance to implement Future Land Use Recommendations	High	2 to 4 years	BOS, PC	Prepare zoning amendment	DCED, DelCo
3	Prepare Chadds Ford Village Master Plan.	Medium	2 to 4 years	BOS, PC	Special Project	PennDOT, DCED, DelCo
4	Incorporate / Implement the Brandywine Valley Scenic Byway study recommendations (as appropriate) when available.	Medium	2 to 4 years	PC, OS Committee	Prepare ordinance amendments	PennDOT
B. PLAN TO MEET HOUSING NEEDS						
1	Continue to accommodate current housing mix.	High	1 year	BOS, PC	Adopt Comprehensive Plan	N/A
C. TRANSPORTATION & CIRCULATION PLAN						
1	Adopt Road Functional Classification System	High	1 year	BOS, PC	Adopt Comprehensive Plan	N/A
2	Scenic Byway	Medium	2 to 4 years	BOS, PC	Possible zoning amendments	PennDOT, DCED, DelCo
3	Rt. 1 / Chadds Ford Pedestrian / Streetscape enhancements	Medium	2 to 4 years	BOS, PC	Design and construction	PennDOT, DCED, DelCo
4	Bicycle Routes	Low	3+ years	BOS, PC	Install signage	PennDOT, DCED, DelCo
5	Township-wide Trail Plan	Medium	2 to 4 years	Open Space Com.	Prepare plan	PA-DCNR
6	Traffic Impact Study	High	1 year	BOS, PC	Prepare/adopt ordinance	N/A
7	US Rt. 202 DVRPC Study	Low	3+ years	BOS, PC	Review study, participate in regional planning	N/A
8	Hillman Drive Loop	High	1 to 3 years	BOS, PC	Design and construction	PennDOT, private development funds
D. PLAN FOR THE PROTECTION OF HISTORIC & NATURAL RESOURCES						
1	Amend Zoning Ordinance to protect "Open Space Focus Area" recommended in the OS Plan.	High	2 to 4 years	BOS, PC	Prepare/adopt zoning amendment	DCED, DelCo
2	Water Quality - Riparian Buffer Zones	Medium	2 to 4 years	BOS, PC	Prepare/adopt zoning amendment	DCED, DelCo
3	Establish a Township Historical Commission.	High	1 to 3 years	PC, HARB	Prepare zoning amendment	N/A
E. COMMUNITY FACILITIES PLAN						
1	Implement recommendations of Township Recycling Task Force.	High	1 year	PC, BOS	ZO, SALDO, special projects	DEP
2	Parks and Recreation - Township Trail Plan	see C.5 above				
3	Sanitary Sewer Service	High	on-going	Sewer Authority	monitor capacity	

Notes:

[1] The Township should use the Implementation Plan as a guide to track progress on the various Plan Recommendations. As such, it is envisioned that Implementation Plan be reviewed periodically and updated to reflect current Township priorities.

[2] BOS=Board of Supervisors, PC=Planning Commission, ZO=Zoning Ordinance, SALDO=Subdivision and Land Development Ordinance; DEP: DCNR: Department of Conservation and Natural Resources; DEP: Department of DEP: Department of Environmental Protection; DCED: PA Department of Community & Economic Development; DelCo: Delaware County administered Community Development funds.

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APPENDIX A: DEMOGRAPHICS AND HOUSING INVENTORY AND ANALYSIS

Using 2000 Census data, the following section examines population forecasts and characteristics as well as housing and employment patterns for Chadds Ford Township and the region. These data provide a basis for many of the Township's land use, community services and transportation policy decisions to be made over the next decade, and will facilitate determination of Township resource allocations with respect to policy objectives.

1. POPULATION FORECASTS

Table 1: Population Trends

AREA							FORECASTS [1]		
		1960	1970	1980	1990	2000	2010	2020	2030
Chadds Ford	Population	1,093	1,281	2,057	3,118	3,170	3,317	3,352	3,704
	% Change		17.2%	60.6%	51.6%	1.7%	4.6%	1.1%	10.5%
C. F. Region*	Population	7,666	11,754	16,335	21,069	27,917	34,799	36,759	38,919
	% Change		53.3%	39.0%	29.0%	32.5%	24.7%	5.6%	5.9%
Delaware Co.	Population	553,154	603,646	555,023	547,651	550,864	556,117	557,795	559,288
	% Change		9.1%	-8.1%	-1.3%	0.6%	1.0%	0.3%	0.3%
New Castle Co., DE**	Population	307,446	385,856	398,115	441,946	500,265	539,987	556,766	594,978
	% Change		25.5%	3.2%	11.0%	13.2%	7.9%	3.1%	6.9%
Pennsylvania	Population	11,319,000	11,794,600	11,863,895	11,881,643	12,281,054	12,365,000	12,683,000	12,768,184
	% Change		4.2%	0.6%	0.1%	3.4%	0.7%	2.6%	0.7%

[1] Delaware Valley Regional Planning Commission, Regional, County & Municipal Population and Employment Forecasts, 2005-2035, August 2007.

* Includes Concord, Thornbury, and Chadds Ford, Delaware County, and Birmingham and Pennsbury Townships, Chester County.

Population **projection data for New Castle County, DE is provided from the Delaware Population Consortium - 2008 Delaware Population Projection Summary Table, 7/1/2008.

Source: U.S. Bureau of Census, Census Data for 1960, 1970, 1980, 1990 and 2000.

Population forecasts are a type of population projection that estimates future population based on past demographic trends using fertility (birth rates), mortality (death rates) and net migration rates. Unlike fertility and mortality rates, net migration depends more on economic factors and is more difficult to determine since it is affected by planning policies, housing prices and job availability.

Table 1 includes data for Chadds Ford, adjacent PA townships (the Chadds Ford Region), Delaware Co., New Castle Co., DE, and PA. Chadds Ford's 1973 Comprehensive Plan projected a 1990 population of 3,620 and a 2000 population of 4,700. As can be seen from Table 1-1, these projections overestimated the actual numbers.

- Chadds Ford Twp.'s population nearly tripled between 1960 and 1990.
- The Chadds Ford region (including Chadds Ford, Thornbury and Concord Townships in Delaware Co. and Pennsbury and Birmingham Twps., Chester Co.) had significant population increases between 1960 and 2000, with the regional population increasing almost a third from 1990 to 2000.
- Delaware Co. lost population from 1970 to 1990, and increased by only 0.6% from 1990 to 2000. South of Chadds Ford, in New Castle Co., DE, the population increased steadily from 1980 to 2000, from almost 400,000 people to over 500,000.

Table 2: Township Population and Housing Projections

		FORECASTS					INCREASE
		1990	2000	2010	2020	2030	2000 - 2030
DVRPC [1]	Population	3,118	3,170	3,317	3,352	3,704	534
	% Change		1.7%	4.6%	2.0%	10.5%	
Average Household Size			2.41	2.41	2.41	2.41	
Occupied Housing Units			1,315	1,376	1,391	1,537	222
					2025*		
OPEN SPACE PLAN [2]	Population		3,170	3,822	4,616	5,080	1,910
	% Change		1.7%	20.6%	20.8%	10.1%	
Average Household Size			2.41	2.41	2.41	2.41	
Occupied Housing Units			1,315	1,586	1,915	2,108	793
COMPREHENSIVE PLAN [3]	Population		3,170	3,822	4,616	5,169	1,999
	% Change		1.7%				
Average Household Size			2.41	2.41	2.41	2.41	
Occupied Housing Units			1,315	1,586	1,915	2,145	829

[1] Delaware Valley Regional Planning Commission, Regional, County & Municipal Population and Employment Forecasts, 2005-2035, August 2007.

[2] Projections based on the 'average' of three projection methodologies included in the Chadds Ford Township Open Space Plan, 2007, p. 4-3.

[3] The population projections from the Chadds Ford Open Space Plan are used in this plan. A build-out analysis of recommended Future Land Use Plan component of this Comprehensive Plan estimates that this plan will accommodate 829 new dwelling units.

Table 2 also presents population forecasts and projections for the Township included in the 2007 Township Open Space Plan and those published by the Delaware Valley Regional Planning Commission. The DVRPC projections foresee a population increase of 534 by the year 2030, which at the current average household size of 2.41 occupants per dwelling unit would result in a projected need of 222 new dwelling units by 2030. The projections used in the Open Space Plan foresee a population increase of 1,910 over the same period.

- Slight to modest growth is expected for CFT, with an increase of between 534 to 1,910 people from 2010 to 2030, depending on the statistic examined.
- This population increase will result in an additional 222-793 occupied housing units.

2. POPULATION CHARACTERISTICS

Township population characteristics are described below.

Age

Table 3 provides data from the 2000 Census regarding Township residents' ages.

- The average age of Twp. residents is relatively young, but six (6) years older than the County average.*
- The largest age groups are those between the ages of 25 and 54, which was 45.1% of the total population.*
- Residents aged 55 years and older comprised 27.9% of the population in 2000.*
- Only 18.7% of CFT's population was comprised of school-aged children (5 - 19 years old).*

Table 3: Age			
Age	2000	Twp.	County
Under 5	156	4.9%	6.2%
5-9	188	5.9%	7.0%
10-14	210	6.6%	7.3%
15-19	195	6.2%	7.3%
20-24	105	3.3%	5.9%
25-34	323	10.2%	12.5%
35-44	496	15.6%	16.2%
45-54	611	19.3%	13.4%
55-59	261	8.2%	4.7%
60-64	178	5.6%	3.7%
65-74	291	9.2%	7.6%
75-84	128	4.0%	5.9%
85+	28	0.9%	2.0%
Total	3,170		
Median Age (yrs.)		43.5	37.4
Source: 2000 U.S. Census.			

School Enrollment

Table 4 provides data regarding school enrollment in Chadds Ford.

- About ¼ of Twp. residents were enrolled in school.*
- Of those enrolled in school, 41.6% were in elementary school, 26.8% in high school and 15.5% in college or graduate school.*

Table 4: School Enrollment			
Grade/Level	2000	Twp.	County
Nursery school, preschool	72	9.8%	7.5%
Kindergarten	46	6.3%	5.1%
Elementary School (grades 1-8)	306	41.6%	41.2%
High School (grades 9-12)	197	26.8%	20.6%
College or Graduate school	114	15.5%	25.7%
Total	735		
Source: 2000 U.S. Census.			

Educational Attainment

Data about educational attainment in the Twp. for those residents 25 years of age and older are shown in Table 5.

- Twp. residents are well educated, with over 57% having at least a bachelor's degree as compared to 30% of County residents.*
- Over one-quarter (28.4%) of CFT residents have a graduate or professional degree, as compared to just 11.8% of the County.*

Table 5: Educational Attainment			
Level/Degree[1]	2000	Twp.	County
Less than 9th grade	16	0.7%	3.7%
9th to 12th grade, no diploma	40	1.7%	9.8%
High school graduate [2]	432	18.7%	33.1%
Some college, no degree	351	15.2%	17.3%
Associate degree	157	6.8%	6.1%
Bachelor's degree	667	28.8%	18.2%
Graduate or professional degree	658	28.4%	11.8%
	2,316		
Source: 2000 U.S. Census.			
Notes: [1] Over the age of 25.			
[2] Includes high school equivalency.			

Race / Ethnicity																																											
<p>Table 6 provides data regarding the race/ ethnicity of Township residents.</p> <ul style="list-style-type: none"> Similar to Delaware Co., Twp. residents are 95% Caucasian. Other racial groups are African-American, 1.1% of the Twp. population, and Asian and Hawaiian / Pacific Islands, 2.8%. 45 residents were listed as Hispanic or Latino of any race. 		<p>Table 6: Race & Ethnicity</p> <table> <tr> <th>Race/Ethnicity</th><th>2000</th><th>Twp.</th><th>County</th></tr> <tr> <td>White</td><td>3,020</td><td>95.3%</td><td>80.3%</td></tr> <tr> <td>African-American</td><td>34</td><td>1.1%</td><td>14.5%</td></tr> <tr> <td>Native-American</td><td>2</td><td>0.1%</td><td>0.1%</td></tr> <tr> <td>Asian</td><td>88</td><td>2.8%</td><td>3.3%</td></tr> <tr> <td>Native Hawaiian / Pacific Isl.</td><td>-</td><td>-</td><td>-</td></tr> <tr> <td>Some other race</td><td>15</td><td>0.5%</td><td>0.6%</td></tr> <tr> <td>Two or more races</td><td>11</td><td>0.3%</td><td>1.2%</td></tr> <tr> <td></td><td>3,170</td><td>100.0%</td><td>100.0%</td></tr> <tr> <td>Hispanic or Latino (any race)</td><td>45</td><td>1.4%</td><td>1.5%</td></tr> </table> <p>Source: 2000 U.S. Census.</p>		Race/Ethnicity	2000	Twp.	County	White	3,020	95.3%	80.3%	African-American	34	1.1%	14.5%	Native-American	2	0.1%	0.1%	Asian	88	2.8%	3.3%	Native Hawaiian / Pacific Isl.	-	-	-	Some other race	15	0.5%	0.6%	Two or more races	11	0.3%	1.2%		3,170	100.0%	100.0%	Hispanic or Latino (any race)	45	1.4%	1.5%
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Place of Birth																																											
<p>Table 7 provides data regarding the place of birth of Township residents.</p> <ul style="list-style-type: none"> 49.9% of Twp. residents were born in PA, less than the County (77%) and the average for PA (78%). Foreign-born residents account for 9.8% of the Twp., more than the County (6.7%) and for PA (4.1%). 		<p>Table 7: Place of Birth</p> <table> <tr> <th></th><th>2000</th><th>Twp.</th><th>County</th></tr> <tr> <td>Native</td><td></td><td></td><td></td></tr> <tr> <td>- State of residence</td><td>1,583</td><td>49.9%</td><td>77.0%</td></tr> <tr> <td>- Different state</td><td>1,264</td><td>39.9%</td><td>15.0%</td></tr> <tr> <td>- Born outside the U.S.</td><td>11</td><td>0.3%</td><td>0.7%</td></tr> <tr> <td>Foreign born</td><td>312</td><td>9.8%</td><td>6.7%</td></tr> <tr> <td>Total</td><td>3,170</td><td></td><td></td></tr> </table> <p>Source: 2000 U.S. Census.</p>			2000	Twp.	County	Native				- State of residence	1,583	49.9%	77.0%	- Different state	1,264	39.9%	15.0%	- Born outside the U.S.	11	0.3%	0.7%	Foreign born	312	9.8%	6.7%	Total	3,170														
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3. EMPLOYMENT AND INCOME CHARACTERISTICS

An overview of resident employment characteristics is presented in Table 8 below.

Table 8: Resident Employment and Income Characteristics

Industry	2000	Twp.	County	Occupation	2000	Twp.	County
Agriculture, forestry, etc.	-	-	0.2%	Managerial, professional	866	50.5%	39.3%
Construction	73	4.3%	5.7%	Services	106	6.2%	13.3%
Manufacturing	169	9.9%	9.9%	Sales and office	600	35.0%	29.3%
Wholesale trade	44	2.6%	3.1%	Farming, forestry...	-	-	0.1%
Retail trade	159	9.3%	11.2%	Construction, maintenance...	73	4.3%	8.4%
Transportation & warehousing	58	3.4%	5.7%	Production, transportation...	69	4.0%	9.7%
Information	83	4.8%	3.5%	Total	1,714		
Finance, insurance, & real estate	294	17.2%	8.9%				
Professional, scientific, management, etc.	280	16.3%	11.7%				
Education, health & social services	287	16.7%	25.5%	Income (1999)		Twp.	County
Arts, recreation, accommodation, food services	131	7.6%	6.2%	Per capita		\$52,974	\$50,092
Other services	88	5.1%	4.9%	Median household		\$84,100	\$61,590
Public administration	48	2.8%	3.5%	Median family		\$100,795	\$25,040
Total	1,714						

Source: U.S. Bureau of the Census, Census 2000, Profile of Selected Economic Characteristics.

Industry	Employment/Occupation	Income
<ul style="list-style-type: none"> • The top industries that CFT's residents are employed in are "finance, insurance, and real estate" (17.2%), "education, health and social services" (16.7%), and "professional, scientific, management, etc." (16.3%). At the County level, employment is somewhat concentrated in the "education, health & social services" sector (25.5%). • The industries with the lowest number of employees were wholesale trade (2.6%) and public administration (2.8%). • In 2000, no CFT resident reported being employed in agriculture or forestry. 	<ul style="list-style-type: none"> • Most CFT residents classified their occupation as "managerial and professional related" (50.5%) or "sales and office" (35.0%). • At a distant third was "services," at 6.2%. • No one in CFT reported an occupation in farming or forestry. 	<ul style="list-style-type: none"> • Per capita income for CFT was slightly higher than that for the County. • Median household income was significantly higher for CFT than the County income (\$84,100 versus \$61,590). • Median family income was 4 times higher in CFT than for the County.

4. HOUSING AND HOUSEHOLD CHARACTERISTICS

The Census records information for both "family households" and "non-family households."¹ Housing characteristics recorded in the 2000 Census are presented in Table 8 below.

Housing

Table 9: Housing Characteristics

Tenure / Occupancy	Units	Twp.	County	Year Built	Units*	Twp.	County
Occupied Units				1990 and later	172	12.9%	5.5%
Owner-occupied	1,129	85.9%	71.9%	1980-1989	528	39.5%	6.2%
Rental	185	14.1%	28.1%	1970-1979	325	24.3%	9.3%
	1,314			1960-1969	111	8.3%	13.2%
Vacant	24	1.8%	4.9%	1940-1959	119	8.9%	41.7%
Total	1,338			1939 and earlier	83	6.2%	24.2%
					1,338		

Unit Type	Units*	Twp.	County	Values / Rents	Twp.	County
Single-family detached	745	56.2%	60.7%	Owner-occupied, median	\$298,700	\$128,800
Row / townhouses / twins	328	24.7%	15.6%	Median rent	\$1,000	\$662
2 to 9 unit apartment	126	9.5%	9.2%			
10+ unit apartment	127	9.6%	9.5%			
Mobile homes	-	-	-			
Total	1,326					

* Unit types and age based on sample, so total units do not match actual figures.

Source: 2000 U.S. Census.

Housing Occupancy	Housing Unit Type	Housing Costs
<ul style="list-style-type: none"> The Census reported a total of 1,338 housing units in Chadds Ford Twp. Most households (85.9%) owned their home; 14.1% rented. The proportion of rental housing is significantly lower than the County, where 28.1% of the housing units were renter occupied. 	<ul style="list-style-type: none"> The majority of units were single-family detached units (745 units or 56.2%). Over 76% of the units have been built since 1970, which is also reflected in the 147% increase in population over the past 30 years 24% of housing unit types were attached, and 19% of units were described as apartments. 	<ul style="list-style-type: none"> The median home value is \$298,700, much higher than the \$128,800 for Delaware County. Median rents are also high, \$1,000 as compared to \$662 for all Delaware County municipalities.

¹ **Family Households:** includes a householder and one or more people living in the same household who are related to the householder by birth, marriage, or adoption. All people in a household who are related to the householder are regarded as members of his or her family. A family household may contain people not related to the householder, but those people are not included as part of the householder's family in census tabulations. Thus, the number of family households is equal to the number of families, but family households may include more members than do families. A household can contain only one family for purposes of census tabulations.

Non-family Households. Non-family households consist of a householder living alone or with non-relatives only.

Households. A household can refer to either a family or non-family household, and includes all of the people who occupy a housing unit. People not living in households are classified as living in "group quarters." In most cases, the "householder" is the person, or one of the people, in whose name the home is owned, being bought, or rented. If there is no such person in the household, any adult household member 15 years old and over could be designated as the householder.

Fair Share Analysis

In Pennsylvania, "fair share" generally refers to a municipality's obligation to accommodate local and regional housing needs. PA courts have developed the following three-part test for determining whether or not a municipality has accommodated these housing needs:

- 1) Is the community in a logical area for development and population growth?
- 2) Is the community in the path of development/population growth?
- 3) Is the percentage of land available under the zoning ordinance sufficient and appropriate considering development pressure and projected population growth?

In addition, Pennsylvania's fair share analysis focuses on whether or not a municipality is providing its fair share of housing types, and not on whether it is providing affordable housing.

Courts have rejected claims that a municipality is failing to meet its fair share requirements because lot size restrictions would not permit the construction of homes that could be afforded by those with low to moderate incomes.

Is Chadds Ford Township in a logical area for development and population growth?

Yes. Adjacent Concord Township, as well as Wilmington, DE and West Chester, PA are creating added development pressure for Chadds Ford Township, which has a significant amount of developable land. The Township is directly served by two major arterial routes (Rts. 1 and 202), but is not adequately served by transit.

Is the community in the path of development/population growth?

After significant growth in the 1970s and 1980s, the Township population only grew by 1.7% between 1990 and 2000 and is expected to grow by only 5.7% by 2020.

Is the percentage of land available under the zoning ordinance sufficient and appropriate considering development pressure, population growth and projected population growth?

Yes. According to a build-out analysis based on the Township's current zoning requirements, there is more than sufficient land available to more than double the existing Township population, while the Delaware Valley Regional Planning Commission projects that Chadds Ford Township population will increase 5.7% by 2020.

5. SUMMARY AND PLANNING IMPLICATIONS

- a. Over one quarter of the Township population was over 55 in 2000. CFT should consider the need for housing options for over 55 residents.
- b. Only slight to moderate population growth is anticipated to the year 2030.
- c. No residents reported being engaged in agriculture within the Township.

APPENDIX B: EXISTING LAND USE INVENTORY AND ZONING INVENTORY AND ANALYSIS

This section provides an inventory and analysis of current land uses and zoning districts that serve as a basis for accommodating and planning future development in the Township.

1. EXISTING LAND USE

Table 10 provides a summary of existing land uses and dwelling units in the Township, and the, Existing Land Use Map, shows distribution of land uses in the Township.

Table 10: Existing Land Use

Generalized Land Use	Parcels	Acres	Percent	Avg. Lot Size (acres)
Single-family Attached	387	15.92	0.3%	0.04
Single-family Detached	1,069	3,349.41	63.1%	3.13
Apartment	2	0.49	0.0%	0.25
Agricultural	1	141.20	2.7%	141.20
Commercial - Retail & Service	78	176.13	3.3%	2.26
Office & Storage	11	30.13	0.6%	2.74
Institutional	4	53.67	1.0%	13.42
Recreation	3	48.60	0.9%	16.20
Open Space	101	1,119.73	21.1%	11.09
Utility	6	5.54	0.1%	0.92
Vacant	172	370.61	7.0%	2.15
Total	1,834	5,311.42		

Sources: Delaware County Planning Department and ROA, 2008.

Residential Uses	Nonresidential Uses
<ul style="list-style-type: none"> 63.4% (3,364 acres) of CFT is in residential use Most residential land consists of 1,069 parcels containing single-family detached dwelling units These lots account for 96% of CFT's residential land, and 81% of the total dwelling units 	<ul style="list-style-type: none"> 1,945 acres (36.6%) of CFT are in non-residential use 176 acres of CFT are in commercial use 53.6 acres are in institutional use 5.5 acres are in utility uses 141.2 acres of CFT (2.7%) are classified as agricultural
Open Space & Recreational Uses	Vacant Land
<ul style="list-style-type: none"> 21.1% (1,119 acres) is open space 	<ul style="list-style-type: none"> 7% (370 acres) of CFT is described as vacant

1. 1973 Birmingham Township Comprehensive Plan - Land Use Plan

The existing Chadds Ford Township (formerly Birmingham Township) Comprehensive Plan was originally adopted in December 1972 and revised in May 1973. It provides documentation of conditions in the Township during the early 1970s using 1970 Census demographic data. The "Proposed Land Use Plan" section included several general recommendations:















CHADDS FORD

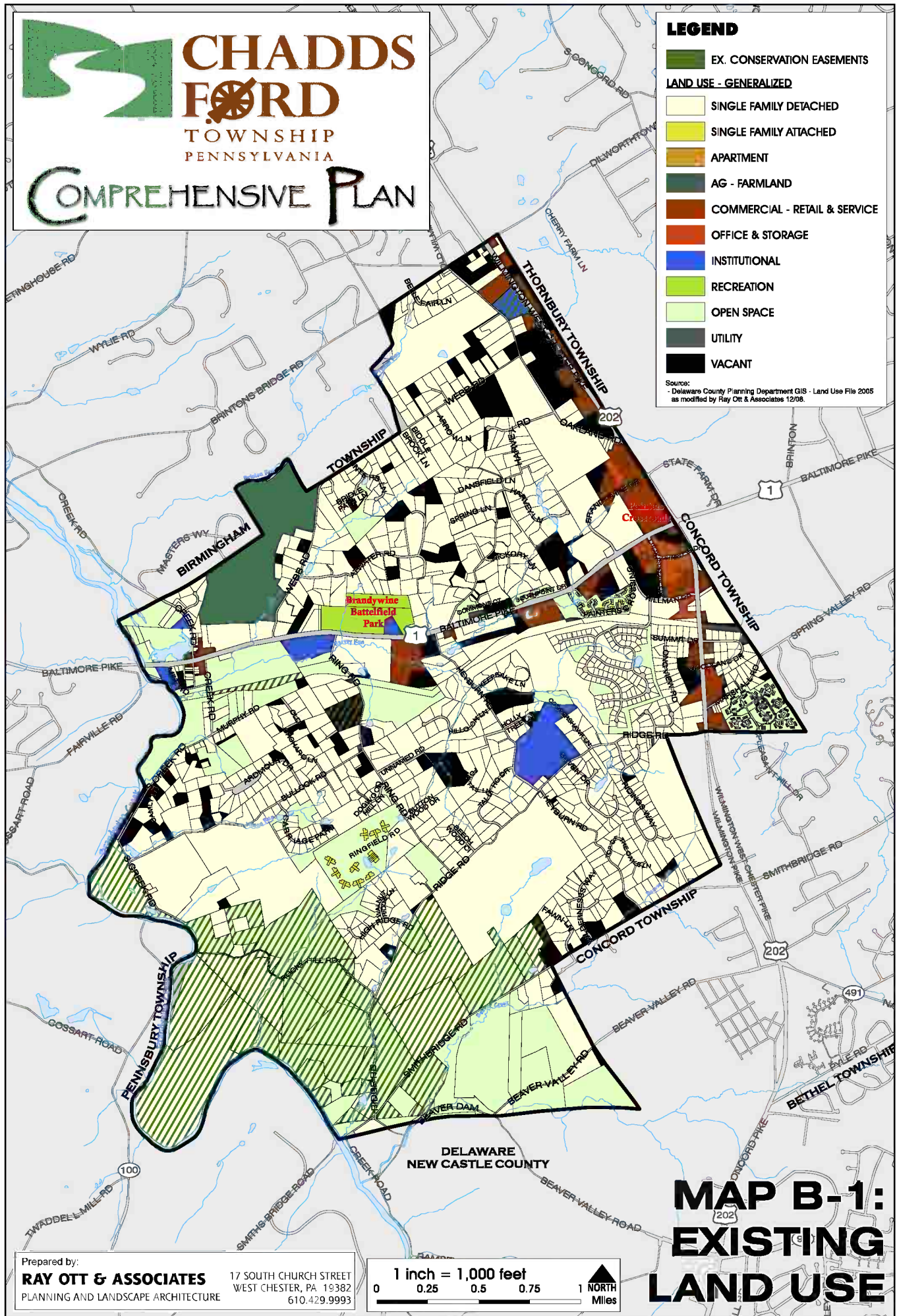
TOWNSHIP
PENNSYLVANIA

COMPREHENSIVE PLAN

LEGEND

-  EX. CONSERVATION EASEMENTS
- LAND USE - GENERALIZED**
 -  SINGLE FAMILY DETACHED
 -  SINGLE FAMILY ATTACHED
 -  APARTMENT
 -  AG - FARMLAND
 -  COMMERCIAL - RETAIL & SERVICE
 -  OFFICE & STORAGE
 -  INSTITUTIONAL
 -  RECREATION
 -  OPEN SPACE
 -  UTILITY
 -  VACANT

Source:
- Delaware County Planning Department GIS - Land Use File 2005
as modified by Ray Ott & Associates 12/08.



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PLANNING AND LANDSCAPE ARCHITECTURE

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1 inch = 1,000 feet
0 0.25 0.5 0.75 1
Miles

MAP B-1: EXISTING LAND USE

CHADDS FORD TOWNSHIP ZONING DISTRICTS									
Base Zoning Districts									
Zoning Abb.	Zoning Name	Section	Standards	Permitted Use	Min. Lot Area	Residential Density	Building Coverage	Impervious Coverage	Parking Requirement
B	Business	12.61	64	Office, Retail, General Commercial	1 ac		25%	85%	5/7,000 sq ft
B-1	Business	12.64	64n	Office, Retail, General Commercial, Auto	1 ac		25%	85%	4 to 10/7,000 sq ft
LI	Light Industrial	12.71	66, 66a	Office, Manufacturing & Assembly	3 ac		30%	not specified	2/7,000 sq ft
PBC	Planned Business Center	12.62	64c, 64q	Shopping/Retail, Service, Office	4 ac		25%	85%	4/7,000 sq ft
PBC-1	Planned Business Center	12.65	64n	Shopping/Retail, Service, Office, Auto	4 ac		25%	85%	4/7,000 sq ft
POC	Planned Office Center	12.63	64g, 64q	Office, Schools	4 ac		25%	85%	4/7,000 sq ft
R-1	Residence	12.81		RFD	2 ac	0.5 d u / Gross Acre	10%	not specified	2 per unit
R-2	Residence	12.36	681	RFD, SFA	1 ac	1 d u / Gross Acre	10%	not specified	2 per unit
R-A	Residence/Apartment	12.41		Apartment	2 ac	12 d u / Gross Acre	20%	not specified	2 per unit
R-M	Residence/Multi-Family	12.52	692	SF Detached, apartment, townhouse	2 ac	8 d u / Gross Acre	not specified	20%	1 per bedroom
Overlay Districts									
Overlay Abb.	Overlay Name	Ordinance	Standards	Permitted Use	Min. Lot Area	Residential Density	Building Coverage	Impervious Coverage	Parking Requirement
F-P	Floodplain Overlay	12.78	267, 36, 47, 54a, 68						
H	Historic Overlay (HARB)	12.125	699	All underlying zoning					
PRD-1	Planned Residential Development	12.51	64, 41, 63, 92	RFD, SFA	50 ac	2 d u / Gross Acre			2 per unit
PRD-2	Planned Residential Development	12.51	63, 92	RFD, SFA, Mobile Home, Retirement Com	50 ac	4 d u / Gross Acre			2 per unit
T	Towers - Cellular & Wireless	12.122		Communications Towers					
BPO	Baltimore Pike Overlay	12.78	110	All underlying zoning			12%		

LEGEND

ZONING DISTRICT BOUNDARIES

BASE ZONING DISTRICTS

- B - BUSINESS
- LI - LIGHT INDUSTRIAL
- PBC - PLANNED BUSINESS CENTER
- POC - PLANNED OFFICE CENTER
- R-1 - RESIDENCE
- R-2 - RESIDENCE
- R-A - RESIDENCE / APARTMENT
- R-M - RESIDENCE / MULTI-FAMILY
- F-P - FLOODPLAIN OVERLAY

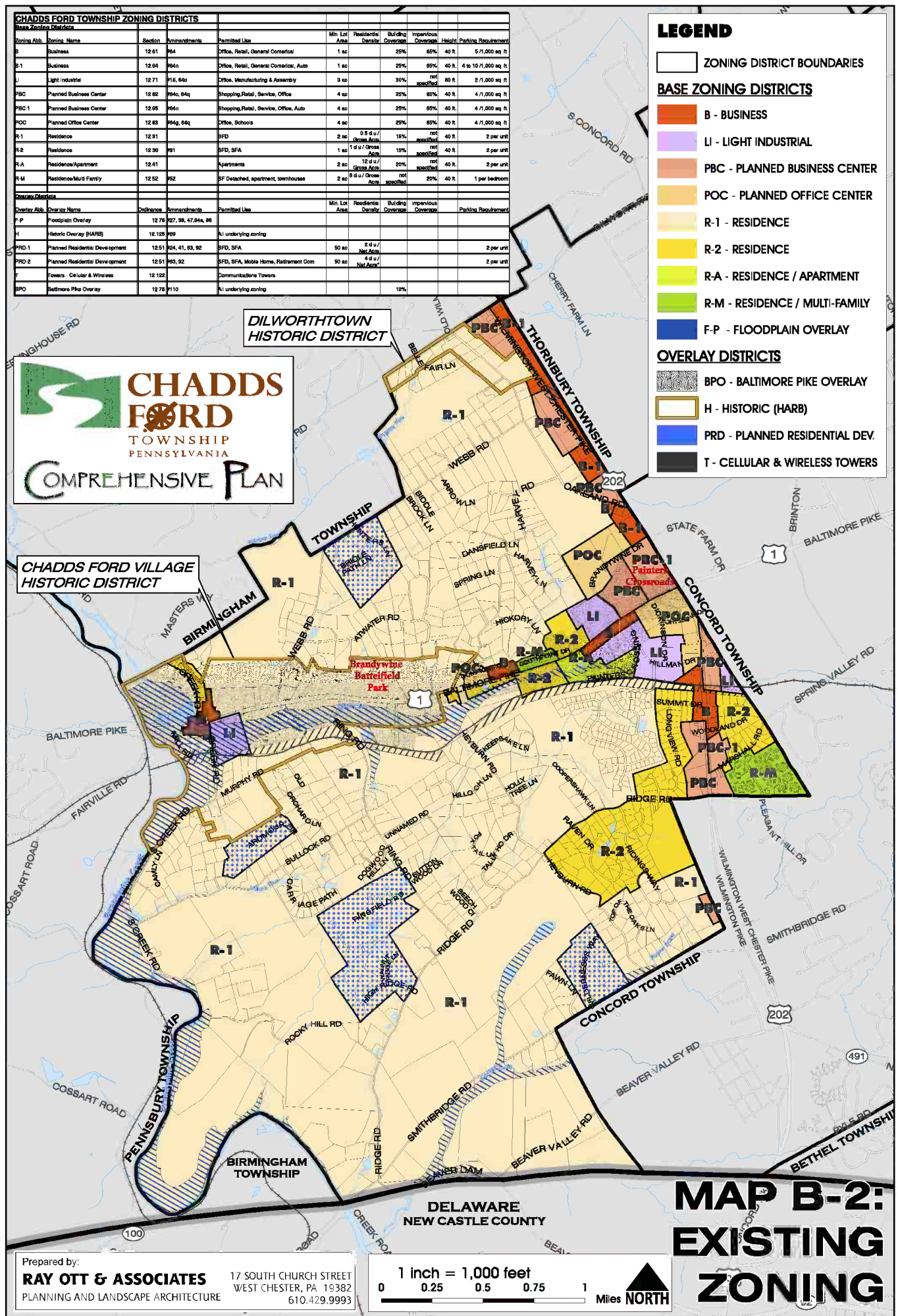
OVERLAY DISTRICTS

- BPO - BALTIMORE PIKE OVERLAY
- H - HISTORIC (HARB)
- PRD - PLANNED RESIDENTIAL DEV.
- T - CELLULAR & WIRELESS TOWERS



CHADDS FORD VILLAGE HISTORIC DISTRICT

DILWORTH TOWN HISTORIC DISTRICT



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1 inch = 1,000 feet

0 0.25 0.5 0.75 1 Miles



**MAP B-2:
 EXISTING
 ZONING**

Residential Development	Medium- and high-density residential development areas at the Township's eastern edge and medium density residential development north of Chadds Ford.
Commercial Development	The great bulk of the commercial development should be located at the eastern edge of the Township. Strip sprawl should be avoided.
Highways and Roads	Rt.1's major value to the Township is as a through route. Every effort should be made to preserve this arterial as a free-flowing expressway.
Parks, Recreation and Major Historic Sites	Additional open space areas should be acquired while land prices remain relatively low. A prime site for acquisition would be the right-of-way of the Octoraro Railway should that facility be abandoned.
Community Facilities	The current municipal building will eventually become inadequate as the Township grows. A decision will then have to be made about where the new building should be located.

2. CHADDS FORD TOWNSHIP ZONING

Chadds Ford Township's current zoning map is on the following page. Current zoning is described as follows:

Table 11: Current Zoning

Base Zoning Districts										
Zoning Abb.	Zoning Name	Section	Amendments	Permitted Use	Min. Lot Area	Residential Density	Building Coverage	Impervious Coverage	Height	Parking Requirement
B	Business	12.61	#64	Office, Retail, General Commercial	1 ac		25%	65%	40 ft.	5 /1,000 sq. ft.
B-1	Business	12.64	#64n	Office, Retail, General Commercial, Auto	1 ac		25%	65%	40 ft.	4 to 10 /1,000 sq. ft.
LI	Light Industrial	12.71	#15, 64o	Office, Manufacturing & Assembly	3 ac		30%	not specified	80 ft.	2 /1,000 sq. ft.
PBC	Planned Business Center	12.62	#64c, 64q	Shopping, Retail, Service, Office	4 ac		25%	65%	40 ft.	4 /1,000 sq. ft.
PBC-1	Planned Business Center	12.65	#64n	Shopping, Retail, Service, Office, Auto	4 ac		25%	65%	40 ft.	4 /1,000 sq. ft.
POC	Planned Office Center	12.63	#64g, 64q	Office, Schools	4 ac		25%	65%	40 ft.	4 /1,000 sq. ft.
R-1	Residence	12.31		SFD	2 ac	0.5 d.u./ Gross Acre	15%	not specified	40 ft.	2 per unit
R-2	Residence	12.36	#91	SFD, SFA	1 ac	1 d.u./ Gross Acre	15%	not specified	40 ft.	2 per unit
R-A	Residence/ Apartment	12.41		Apartments	2 ac	12 d.u./ Gross Acre	20%	not specified	40 ft.	2 per unit
R-M	Residence/ Multi-Family	12.52	#52	SF Detached, apartment, townhouses	2 ac	6 d.u./ Gross Acre	not specified	20%	40 ft.	1 per bedroom
Overlay Districts										
Overlay Abb.	Overlay Name	Ordinance	Amendments	Permitted Use	Min. Lot Area	Residential Density	Building Coverage	Impervious Coverage		Parking Requirement
F-P	Floodplain Overlay	12.76	#27, 38, 47, 64a, 86							
H	Historic Overlay (HARB)	12.125	#69	All underlying zoning						
PRD-1	Planned Residential Development	12.51	#24, 41, 63, 92	SFD, SFA	50 ac	2 d.u./ Net Acre				2 per unit
PRD-2	Planned Residential Development	12.51	#63, 92	SFD, SFA, Mobile Home, Retirement Com.	50 ac	4 d.u./ Net Acre*				2 per unit
T	Towers - Cellular & Wireless	12.122		Communications Towers						
BPO	Baltimore Pike Overlay	12.78	#110	All underlying zoning				12%		







CHADDS FORD

TOWNSHIP
PENNSYLVANIA

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LEGEND

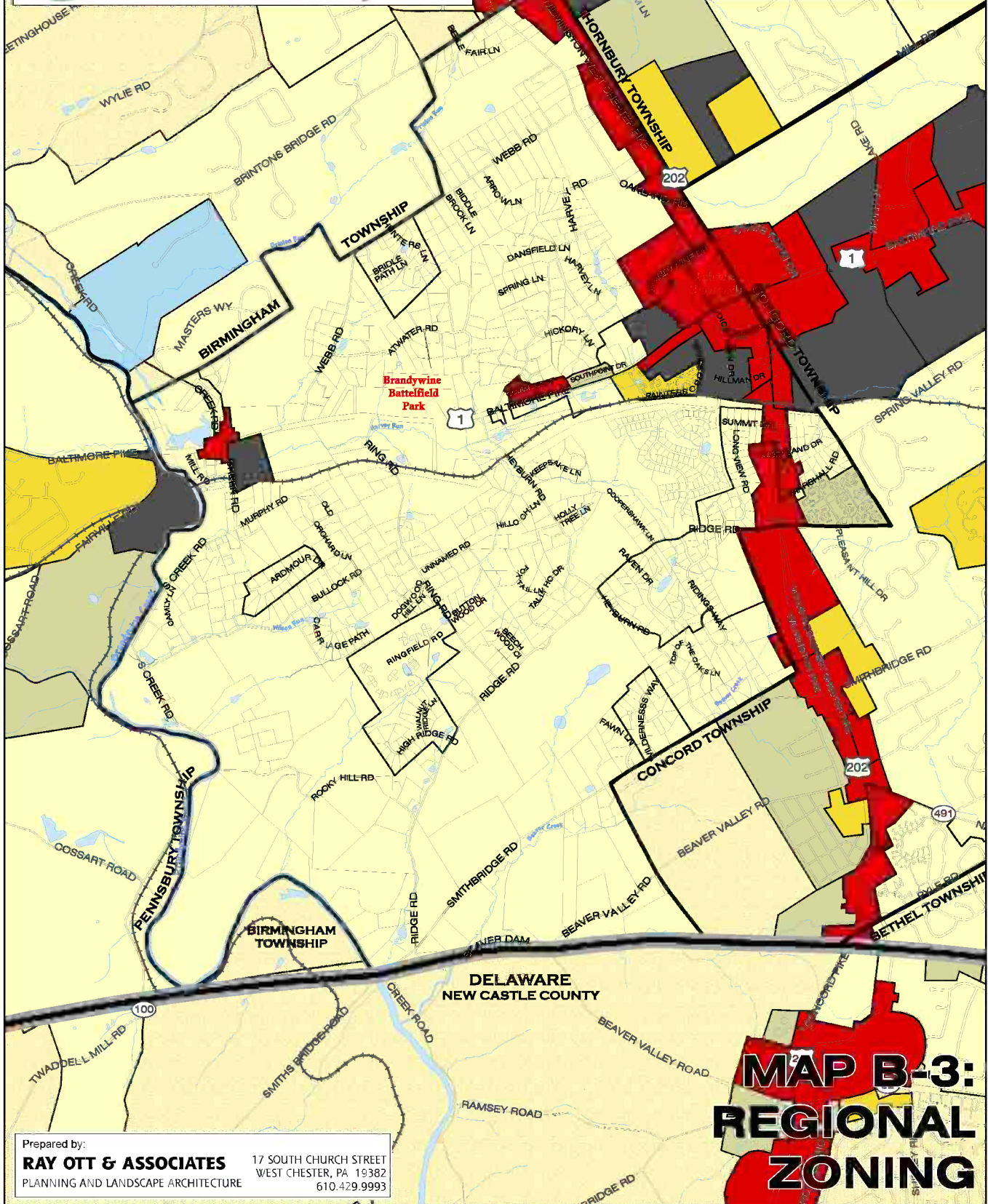
REGIONAL ZONING DESCRIPTION

-  RESIDENTIAL - VERY LOW DENSITY
-  RESIDENTIAL - LOW DENSITY
-  RESIDENTIAL - MEDIUM DENSITY
-  RESIDENTIAL - HIGH DENSITY

-  COMMERCIAL
-  HISTORIC
-  INDUSTRIAL
-  INSTITUTIONAL

1 inch = 1,000 feet

0 0.25 0.5 0.75 1 Miles



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3. ADJACENT MUNICIPAL ZONING

The Regional Zoning Map, represents the existing zoning districts in Chadds Ford and the adjacent townships of Thornbury and Birmingham, in Chester County, and in and Concord and Thornbury Township, Delaware County.

Thornbury Township, Delaware County

Thornbury Township borders Chadds Ford Township to the east. The residential zoning districts are compatible along this boundary, ranging from medium- to high-density residential uses and industrial uses.

Concord Township, Delaware County

Concord Township, Delaware County creates a portion of Chadds Ford's southern and eastern boundaries. To the south, Concord is zoned very low- and medium-density residential. To the east along Wilmington - West Chester Pike, it is zoned commercial and low-density residential. North of the rail line, Concord is zoned industrial, as are portions of Chadds Ford.

Birmingham Township, Chester County

Birmingham Township forms the entire northern border of Chadds Ford Township. The majority of Birmingham Township along the border is zoned low-density residential, except for one small area to the east, which is zoned commercial. A discontinuous portion of Birmingham Township is located along the southern border of Chadds Ford Township, north of the Delaware State line, and is zoned very low density residential.

Pennsbury Township, Chester County

Pennsbury Township lies west of Chadds Ford Township, on the opposite side of the Brandywine Creek. The northern half of the border is zoned industrial and medium-density residential. The southern half of the border is zoned low-density residential, as is Chadds Ford.

New Castle County, Delaware

New Castle County creates a portion of the Chadds Ford's southern border, and is zoned very low-density residential.

4. RESIDENTIAL BUILD-OUT ANALYSIS

Using the existing zoning parameters, a "build out" analysis was prepared to estimate the total capacity for new residential development (see the "Residential Build-Out Analysis Map" on the following page). The build-out analysis was prepared using current tax assessment files (2006) to calculate the size and number of tax parcels in each residential zoning district. The acreage of each parcel was then adjusted to exclude floodplains and hydric soils to estimate a net developable lot area. The zoned density requirements were then used to estimate the number of total dwelling units that could theoretically be built on each parcel, the sum of which is used estimate the total number of dwelling units that could be built in the Township according to the current zoning requirements. All publically owned, deed restricted and otherwise development-restricted land was excluded from these calculations. Based on this analysis, with 1,496 existing dwelling units, the Township is presently about 49% developed.

The results of the residential build-out analysis reveal that an additional 1,546 dwelling units can potentially be built in the Township, for a total of 3,042 units.

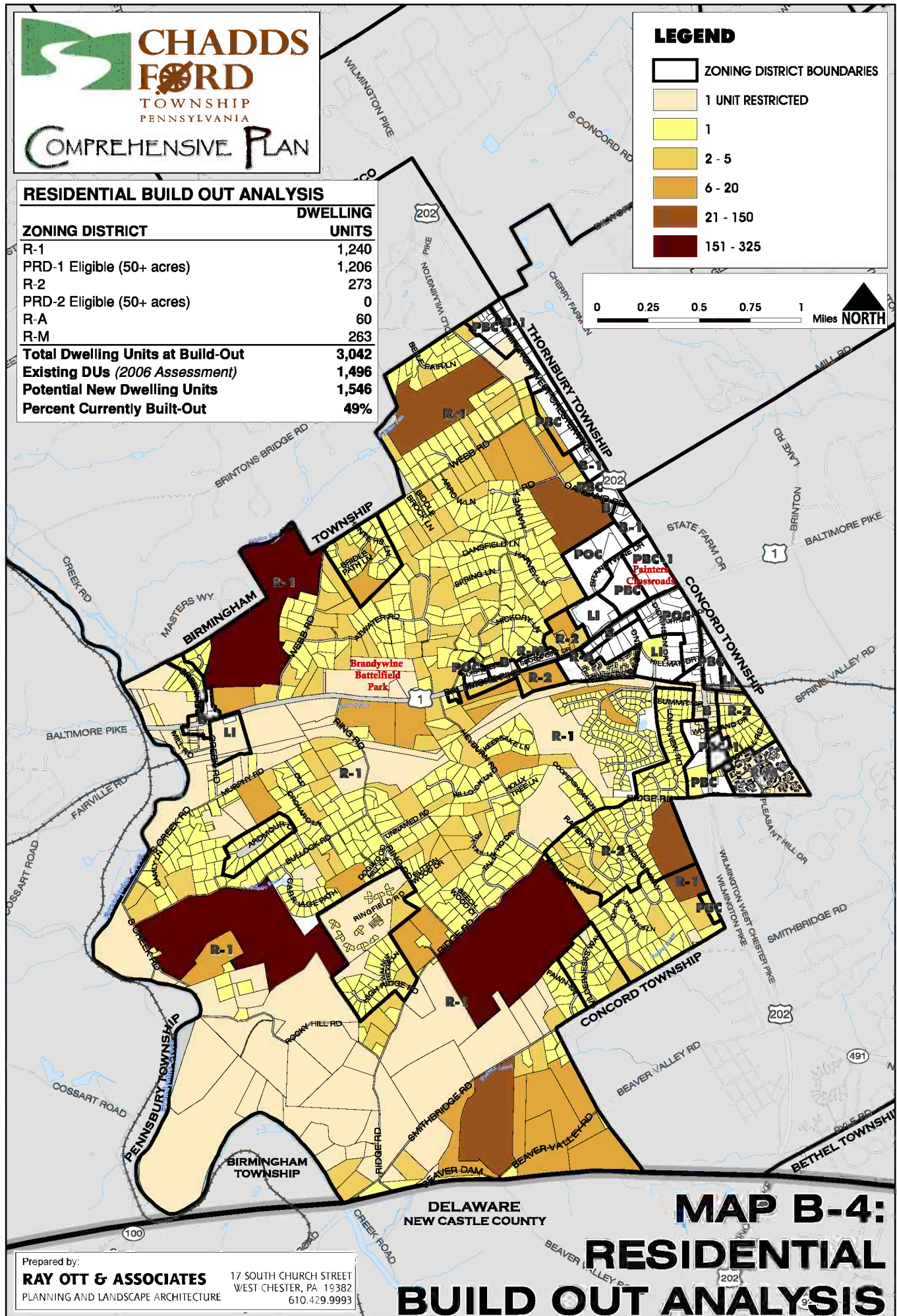
RESIDENTIAL BUILD OUT ANALYSIS

ZONING DISTRICT	DWELLING UNITS
R-1	1,240
PRD-1 Eligible (50+ acres)	1,206
R-2	273
PRD-2 Eligible (50+ acres)	0
R-A	60
R-M	263
Total Dwelling Units at Build-Out	3,042
Existing DUs (2006 Assessment)	1,496
Potential New Dwelling Units	1,546
Percent Currently Built-Out	49%

LEGEND

	ZONING DISTRICT BOUNDARIES
	1 UNIT RESTRICTED
	1
	2 - 5
	6 - 20
	21 - 150
	151 - 325

0 0.25 0.5 0.75 1 Miles **NORTH**



5. COMMERCIAL BUILD OUT ANALYSIS

The commercial build-out analysis also utilized 2006 tax assessment data and was prepared by estimating the total floor area that could be built on each parcel according to the building coverage limits required in each nonresidential zoning district (See the Commercial Build-out Map on the following page). It was also assumed that these buildings would be one-story. Chadds Ford has 1,725,977 square feet of commercial floor area, according to the 2006 County Assessment data.

The results of the commercial build out analysis reveal that an additional 2,483,178 square feet of commercial development could be potentially built within the Township, or 59% more than is currently developed in the Township. Total commercial square footage at full build out is estimated to 4,209,155 square feet.

6. SUMMARY AND PLANNING IMPLICATIONS

- a. With regard to the residential build-out analysis, using the average Township household size of 2.41 people from the 2000 Census, the Township's total population at full residential build-out could potentially reach 7,550, which is over double the 2000 Census population of 3,170.
- b. Nonresidential office and retail development could potentially increase by as much as 2,483,178 square feet, which is 59% more than currently exists in the Township.
- c. Based on these build-out estimates, it is apparent that the Township is currently zoned to provide for a significant increase in both residential and nonresidential development. This zoning should be evaluated to ensure that it meets Township development objectives and projections for the region.

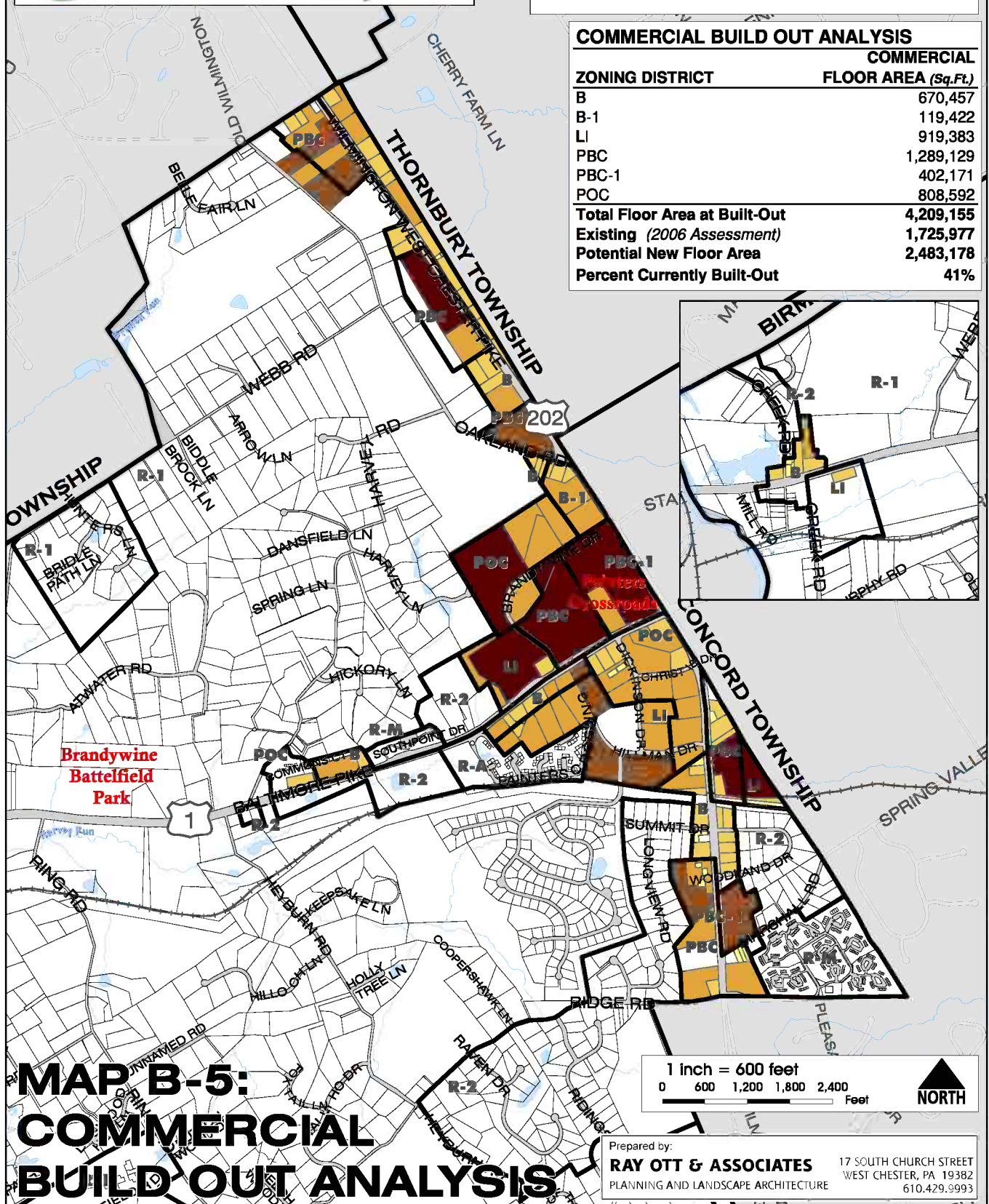
LEGEND

NON-RESIDENTIAL ZONING COMMERCIAL SQ FT YIELD

	< 5,000 SQ FT
	5,000 - 20,000 SQ FT
	20,000 - 60,000 SQ FT
	60,000 - 100,000 SQ FT
	100,000 - 275,000 SQ FT

COMMERCIAL BUILD OUT ANALYSIS

ZONING DISTRICT	COMMERCIAL FLOOR AREA (Sq.Ft.)
B	670,457
B-1	119,422
LI	919,383
PBC	1,289,129
PBC-1	402,171
POC	808,592
Total Floor Area at Built-Out	4,209,155
Existing (2006 Assessment)	1,725,977
Potential New Floor Area	2,483,178
Percent Currently Built-Out	41%



APPENDIX C: TRANSPORTATION AND CIRCULATION PLAN AND ANALYSIS

This chapter addresses the elements of existing transportation, road circulation, and bike routes and trail systems in the Township. A summary is provided at the end of the chapter.

1. COMMUTING TO WORK

Table C-1, Commuting to Work, illustrates how Township residents travel to work. While Delaware County residents reported that 75% of them drive alone to work, Chadds Ford Township residents report that 82.5% of workers drive to work alone. The Township has 13 residents who walk to work, and 35 residents report using public transportation as a means of traveling to work.

Table C- 1: Commuting to Work

	<i>2000</i>	<i>Twp.</i>	<i>County</i>
<u>Workers 16 years and older</u>	1,714	100.0%	100.0%
Drove alone (car, truck or van)	1,414	82.5%	75.0%
Carpooled (car, truck or van)	143	8.3%	9.7%
Public Transportation*	35	2.0%	7.8%
Walked	13	0.8%	3.7%
Other means	15	0.9%	0.7%
Worked At Home	94	5.5%	2.7%

Avg. travel time to work (minutes)		28.3	27.1

** Used public transit as part of commute.*

Source: 2000 U.S. Census.

2. PUBLIC TRANSPORTATION

As discussed above, only 35 of 1,714 working residents of the Township used public transportation to commute to work. The public transportation choices for the residents of the Township are both limited and inconvenient. This limited access to public transportation not only affects residents' commuting choices but also the choices of those who work in the Township but live outside the Township.

Rail Service

The Township does not have SEPTA regional rail service within the township limits. Residents desiring to use regional rail service must use roadways to access transit stations located in surrounding areas such as Marcus Hook (R2 Marcus Hook/Wilmington) or Elwyn (R3 Media/Elwyn); while both stations are in Delaware County, they are both a distance from the township. Both regional rail systems provide service between southern and central Delaware County to the City of Philadelphia, respectively. Townships residents can also access SEPTA regional rail in nearby eastern Chester County at the Exton Station (R5 Paoli/Thorndale). The Exton Station is also an Amtrak station stop servicing New York City, Washington D.C. and beyond.

Bus Service

Currently, SEPTA operates a single bus route which serves the Township. SEPTA Route 111 provides service to the Shopping Center at Painters Crossing and the Chadds Ford Business Campus. Route 111 terminates at the 69th Street Terminal Station providing access to multiple bus routes and the Market-Frankfort Line light rail service. On weekdays Route 111 service is provided during the AM/PM peak travel times and hourly on the weekends.

Trolley/Subway Service

There is no trolley or subway service to or between locations in the Township. There is service between Philadelphia and Media and Sharon Hill in Delaware County; however Township residents must travel to transit stations via alternate means to access this service.

ADA Paratransit Service

In accordance with the Americans with Disabilities Act (ADA), SEPTA provides comparable service for residents with disabilities who are functionally unable to use regular accessible fixed route bus service. This service would apply only to those eligible individuals needing to use the Route 111 service and beyond in SEPTA's coverage area.

Delaware County Transit Options

The Community Transit of Delaware County provides door-to-door transportation service for medically qualified and elderly qualified residents of Delaware County. The service requires an advanced reservation and operates on a first come, first served basis. The Community Transit services destinations within Delaware County and Philadelphia, and destinations within Montgomery and Chester Counties on a more limited basis.

3. CIRCULATION SYSTEM

The existing road network plays a significant role in providing transportation services to Township residents. In this section, the system is inventoried as follows:

- *Roadway Functional Classification*
- *Roadway Inventory (including traffic volumes, typical cross sections and traffic control devices)*

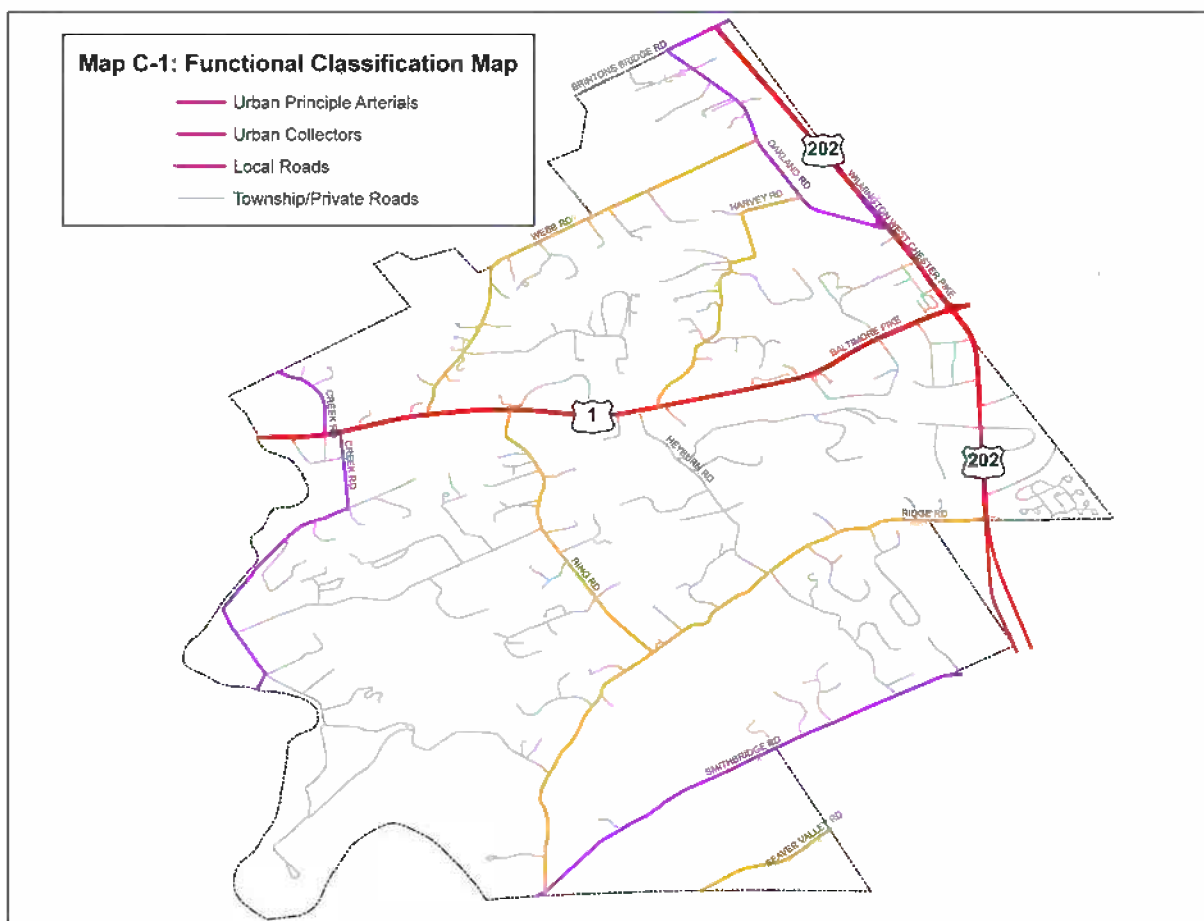
Roadway Functional Classification

Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide. Basic to this process is the recognition that individual roads and streets do not serve travel independently in any major way. Rather, most travel involves movement through a network of roads. The Functional Classifications presented in the following section were gathered using PennDOT Functional Classification Maps for Delaware County. Urbanized areas are designated as such by the Bureau of the Census. Delaware County has been designated as an urban area and

thus certain functional classifications apply. The four functional systems for urbanized areas are urban principal arterials, minor arterial streets, collector streets, and local streets.

The Township has a total of approximately 33.2 miles of roads within its boundaries, excluding privately owned and maintained roads. These roads are owned and maintained either by the Township or the State. The State owns approximately 19.2 miles, while the Township owns the remaining 14 miles. The remaining roads are privately owned roads which serve small groups of residences within the township. There are 10 traffic signals within, or on the boundaries of the Township.

The different classifications for roadways found within the township are shown on Map C-1. Details on road classifications and traffic count information are further described below.



Urban Principal Arterials

Roads in Township: US Route 202 (Wilmington Pike)
US Route 1 (Baltimore Pike)

The principal arterial system carries the major portion of trips entering and leaving urban areas, as well as the majority of through movements desiring to bypass an area. Because of the nature of the travel served by the principal arterial system, almost all fully and partially controlled access facilities will be part of this functional system. However, this system is not restricted to controlled access routes. There are approximately 6.2 miles of Urban Principal Arterials in the Township.

Urban Minor Arterials

Roads in Township: None in Township

The minor arterial street system should interconnect with and augment the urban principal arterial system and provide service to trips of moderate length at a somewhat lower level of travel mobility than principal arterials. This system also distributes travel to geographic areas smaller than those identified with the higher system.

Urban Collectors

Roads in Township: Brintons Bridge Road
Creek Road
Marshall Road
Oakland Road
Smith Bridge Road

The collector street system provides both land access service and traffic circulation within residential neighborhoods, commercial and industrial areas. It differs from the arterial system in that facilities on the collector system may penetrate residential neighborhoods, distributing trips from the arterials through the area to the ultimate destination. Conversely, the collector street also collects traffic from local streets in residential neighborhoods and channels it into the arterial system. There are approximately 6.5 miles of Urban Collectors in the Township.

Local Roads

Roads in Township: Remainder of public roads in the Township.

The local road system comprises all facilities not on one of the higher systems. It serves primarily to provide direct access to abutting land and access to the higher order systems. It offers the lowest level of mobility and usually contains no bus routes. Service to through traffic movement usually is deliberately discouraged. There are approximately 20.5 miles of Local Roads in the Township.

Private Roads

Roads in Township: Roads owned and maintained by Homeowners Associations or private individuals.

Private roads provide access to adjacent land, typically only for residential uses. They typically provide connectivity to the network at a single point as their intent is to serve at least three residences. There are 16.9 miles of private roads in the township.

Road Inventory

Atwater Road (T390)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.9 miles

Number of Lanes: 2

Lane Width: 11 feet

Shoulders: No

Center Median: No

Speed Limit: 25 mph



Atwater Road runs from Webb Road to a dead end, and intersects one state road. Intersections where only Atwater Road is stop controlled include Webb Road.

Beaver Valley Road (S.R. 3044)

Ownership: State

Func. Class: Local Road

ADT: 633

Year of ADT: 2007

Roadway Length: 0.6 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No

Center Median: No

Speed Limit: 40 mph



Roadway runs from the Delaware State line – just north of Beaver Dam Road - to the township line – just west of a private roadway, and intersects no state or township roads.

Beechwood Circle (T402)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.2 miles

Number of Lanes: 2

Lane Width: 12 feet

Shoulders: No, raised curbing along
both edges

Center Median: No

Speed Limit: Not posted



Beechwood Circle runs from Ridge Road to a dead end, and intersects one state road. Intersections where only Beechwood Circle is stop controlled include Ridge Road.

Bellefair Lane (T410)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.2 miles

Number of Lanes: 2

Lane Width: 12 feet

Shoulders: No, raised curbing along
both edges

Center Median: No

Speed Limit: Not available



Bellefair Lane runs from Brinton's Bridge Road to a dead end, and intersects one state road. Intersections where only Bellefair Lane is stop controlled include Brinton's Bridge Road.

Brandywine Drive (T419)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.6 miles

Number of Lanes: 2

Lane Width: 18 feet

Shoulders: No, raised curbing along
both edges and some sidewalk

Center Median: No

Speed Limit: Not posted



Brandywine Drive runs from US 1 to US 202, and intersects two state roads. Signalized intersections include US 1 and US 202.

Brinton's Bridge Road (S.R.4016)

Ownership: State

Func. Class: Urban Collector

ADT: 2,510

Year of ADT: 2002

Roadway Length: 0.9 miles

Number of Lanes: 2

Lane Width: 11 feet

Shoulders: No

Center Median: No

Speed Limit: 40 mph



Brinton's Bridge Road runs from South New Street to just west of Cherry Farm Lane, and intersects one state road and two township roads. Intersections where only the minor leg is stop controlled include Bellefair Lane. Intersections where all legs are stop controlled include Oakland Road. Signalized intersections include US 202.

Bullock Road (T326)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 1.3 miles

Number of Lanes: 2

Lane Width: 9 feet

Shoulders: No

Center Median: No

Speed Limit: 25 mph



Bullock Road runs from Ring Road to Creek Road, and intersects two state roads and one township road. Intersections where only the minor leg is stop controlled include Carriage Path. Intersections where only Bullock Road is stop controlled include Ring Road and Creek Road.

Buttonwood Drive (T395)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.1 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No

Center Median: No

Speed Limit: Not posted



Buttonwood Drive runs from Ring Road to a dead end, and intersects one state road. Intersections where only Buttonwood Drive is stop controlled include Ring Road.

Carnation Lane

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.1 miles

Number of Lanes: 2

Lane Width: 12 feet

Shoulders: No, low profile curb and
gutter along both edges

Center Median: No

Speed Limit: Not posted



Carnation Lane runs from Harvey Drive to a dead end, and intersects one state road. Intersections where only Carnation Lane is stop controlled include Harvey Drive.

Carriage Path (T404)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.4 miles

Number of Lanes: 2

Lane Width: 12 feet

Shoulders: No

Center Median: No

Speed Limit: Not posted



Carriage Path runs from Bullock Road to a dead end, and intersects one township road. Intersections where only Carriage Path is stop controlled include Bullock Road.

Cooper's Hawk Lane (T409)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.1 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No, low profile curb and
gutter along both edges

Center Median: No

Speed Limit: Not posted



Cooper's Hawk Lane runs from Ridge Road to a dead end, and intersects one state road. Intersections where only Cooper's Hawk Lane is stop controlled include Ridge Road.

Creek Road (S.R. 3101)

Ownership: State

Func. Class: Urban Collector

ADT: North of US 1: 3,537

South of US 1: 2,514

Year of ADT: 2007

2006

Roadway Length: 1.9 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No

Center Median: No

Speed Limit: 40 mph



Creek Road runs from Delaware State line just south of Rocky Hill Road to the Chester County line just north of Upper Bank Drive, and intersects two state roads and two township roads. Intersections where only the minor leg is stop controlled include Bullock Road and Station Way Road. Intersections where only the south leg of Creek Road is stop controlled include US 1. Signalized intersections include US 1 / Station Way Road.

Dogwood Hill Lane (T405)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.1 miles

Number of Lanes: 2

Lane Width: 12 feet

Shoulders: No

Center Median: No

Speed Limit: Not posted



Dogwood Hill Lane runs from Ring Road to a dead end, and intersects one state road. Intersections where only Dogwood Hill Lane is stop controlled include Ring Road.

Eagle Circle (T408)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.1 miles

Number of Lanes: 2

Lane Width: 12 feet

Shoulders: No, raised curb along both
edges

Center Median: No

Speed Limit: Not posted



Eagle Circle runs from Raven Drive to a dead end, and intersects one township road. Intersections where only Eagle Circle is stop controlled include Raven Drive.

Grouse Trail (T414)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.1 miles

Number of Lanes: 2

Lane Width: 12 feet

Shoulders: No, raised curb along both
edges

Center Median: No

Speed Limit: Not posted



Grouse Trail runs from Pheasant Lane to a dead end, and intersects one township road. Intersections where only Grouse Trail is stop controlled include Pheasant Lane.

Harvey Drive (S.R. 4020)

Ownership: State

Func. Class: Local Road

ADT: 442

Year of ADT: 2008

Roadway Length: 1.4 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No

Center Median: No

Speed Limit: 40 mph



Harvey Drive runs from US 1 to Oakland Road, and intersects one state road and three township roads. Intersections where only the minor leg is stop controlled include Spring Lane and Carnation Lane. Intersections where only Harvey Drive is stop controlled include US 1. Intersections where all legs are stop controlled include Oakland Road.

Heyburn Road (T304)

Ownership: Township

Func. Class: Local Road

ADT: 994

Year of ADT: 2009

Roadway Length: 1.8 miles

Number of Lanes: 2

Lane Width: 9 feet

Shoulders: No

Center Median: No

Speed Limit: 25 mph



Heyburn Road runs from Smith Bridge Road to US 1, and intersects three state roads and four township roads. Intersections where only the minor leg is stop controlled include Top of the Oaks, Tally Ho Drive, Holly Tree Lane, and Hilloch Lane. Intersections where only Heyburn Road is stop controlled include Smith Bridge Road and US 1. Intersections where all legs are stop controlled include Ridge Road.

High Ridge Road (T415)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.4 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No, low profile curb and
gutter along both edges

Center Median: No

Speed Limit: Not posted



High Ridge Road runs from Ridge Road to a dead end, and intersects one state road and one township road. Intersections where only the minor leg is stop controlled include Walnut Ridge Lane. Intersections where only High Ridge Road is stop controlled include Ridge Road.

Hilloch Lane (T397)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.4 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No, low profile curb and
gutter along both edges

Center Median: No

Speed Limit: Not posted



Hilloch Lane runs from Heyburn Road to a dead end, and intersects one township road. Intersections where only Hilloch Lane is stop controlled include Heyburn Road.

Hoffman's Mill Road (T302)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.2 miles

Number of Lanes: 2

Lane Width: 12 feet

Shoulders: No

Center Median: No

Speed Limit: Not posted



Hoffman's Mill Road runs from Station Way Road to US 1, and intersects one state road and one township road. Intersections where only Hoffman's Mill Road is stop controlled include Station Way Road and US 1.

Holly Tree Lane (T417)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.1 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No, low profile curb and
gutter along both edges

Center Median: No

Speed Limit: Not posted



Holly Tree Lane runs from Heyburn Road to a dead end, and intersects one township road. Intersections where only Holly Tree Lane is stop controlled include Heyburn Road.

Hunter's Lane (T398)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.3 miles

Number of Lanes: 2

Lane Width: 11 feet

Shoulders: No, low profile curb and
gutter along both edges

Center Median: No

Speed Limit: Not posted



Hunter's Lane runs from Webb Road to a dead end, and intersects one state road. Intersections where only Hunters Lane is stop controlled include Webb Road.

Kelly Drive

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.1 miles

Number of Lanes: 2

Lane Width: 12 feet

Shoulders: No, raised curbing along
both edges

Center Median: No

Speed Limit: Not posted



Kelly Drive runs from Smith Bridge Road to a dead end, and intersects one state road. Intersections where only Kelly Drive is stop controlled include Smith Bridge Road.

Longview Road (T394)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.3 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No

Center Median: No

Speed Limit: Not posted



Longview Road runs from Summit Drive to a dead end, and intersects one township road. Intersections where only Longview Road is stop controlled include Summit Drive.

Marshall Road (T325)

Ownership: Township

Func. Class: Urban Collector

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.4 miles

Number of Lanes: 2

Lane Width: 9 feet

Shoulders: No

Center Median: No

Speed Limit: 35 mph



Marshall Road runs from US 202 to the township line, and intersects one state road. Intersections where only Marshall Road is stop controlled include US 202.

Mountain View Trail (T401)

Ownership: Township
Func. Class: Local Road
ADT: Not available
Year of ADT: Not available
Roadway Length: 0.1 miles
Number of Lanes: 2
Lane Width: 10 feet
Shoulders: No, low profile curb and gutter along north edge
Center Median: No
Speed Limit: Not posted



Mountain View Trail runs from Wilderness Way to a dead end, and intersects one township road. Intersections where only Mountain View Trail is stop controlled include Wilderness Way.

Oakland Road (T389)

Ownership: Township
Func. Class: Urban Collector
ADT: 3,670
Year of ADT: 2006
Roadway Length: 1.3 miles
Number of Lanes: 2
Lane Width: 10 feet
Shoulders: No
Center Median: No
Speed Limit: 35 mph



Oakland Road runs from Brinton's Bridge Road to US 202, and intersects four state roads. Intersections where only the minor leg is stop controlled include the off ramp from US 202. Intersections where all legs are stop controlled include Brinton's Bridge Road, Webb Road, and Harvey Road. Signalized intersections include US 202.

Pheasant Lane (T413)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.1 miles

Number of Lanes: 2

Lane Width: 12 feet

Shoulders: No, raised curbing along
both edges

Center Median: No

Speed Limit: Not posted



Pheasant Lane runs from Ridge Road to a dead end, and intersects one state road and one township road. Intersections where only the minor leg is stop controlled include Grouse Trail. Intersections where only Pheasant Lane is stop controlled include Ridge Road.

Raven Drive (T407)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.5 miles

Number of Lanes: 2

Lane Width: 12 feet

Shoulders: No, raised curbing along
both edges

Center Median: No

Speed Limit: Not posted



Raven Drive runs from Ridge Road to a dead end, and intersects one state road and one township road. Intersections where only the minor leg is stop controlled include Eagle Circle. Intersections where only Raven Drive is stop controlled include Ridge Road.

Ridge Road (S.R. 3048)

Ownership: State

Func. Class: Local Road

ADT: 3,401

Year of ADT: 2004

Roadway Length: 2.8 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No

Center Median: No

Speed Limit: 40 mph



Ridge Road runs from US 202 to Smith Bridge Road, and intersects three state roads and nine township roads. Intersections where only the minor leg is stop controlled include Pheasant Lane, Ridings Boulevard, Cooper's Hawk Lane), Raven Drive, Tally Ho Drive, Beechwood Circle, Ring Road, High Ridge Road, and Rocky Hill. Intersections where only Ridge Road Drive is stop controlled include Smith Bridge Road. Intersections where all legs are stop controlled include Heyburn Road. Signalized intersections include US 202.

Ridings Boulevard (T411)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.1 miles

Number of Lanes: 2

Lane Width: 14 feet

Shoulders: No, raised curbing along
both edges

Center Median: Yes, raised grass and concrete

Speed Limit: Not posted



Ridings Boulevard runs from Ridge Road to Ridings Way, and intersects one state road and one township road. Intersections where only Ridings Boulevard is stop controlled include Ridge Road and Ridings Way.

Ridings Way (T412)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.8 miles

Number of Lanes: 2

Lane Width: 12 feet

Shoulders: No, raised curbing along
both edges

Center Median: No

Speed Limit: Not posted



Ridings Way runs from a dead end to Ridings Way, and intersects two township roads. Intersections where only the minor leg is stop controlled include Ridings Boulevard. Intersections where only Ridings Way is stop controlled include Ridings Way.

Ring Road (S.R. 3027)

Ownership: State

Func. Class: Local Road

ADT: 1,782

Year of ADT: 2004

Roadway Length: 1.4 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No

Center Median: No

Speed Limit: 40 mph



Ring Road runs from Ridge Road to US 1, and intersects two state and three township roads. Intersections where only the minor leg is stop controlled include Buttonwood Drive, Dogwood Hill Lane, and Bullock Road. Intersections where only Ring Road is stop controlled include Ridge Road. Signalized intersections include US 1.

Rocky Hill (T387)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.1 miles

Number of Lanes: 2

Lane Width: 9 feet

Shoulders: No

Center Median: No

Speed Limit: Not posted



Rocky Hill runs from Ridge Road to a dead end, and intersects one state road. Intersections where only Rocky Hill is stop controlled include Ridge Road.

Smith Bridge Road (S.R. 3046)

Ownership: State

Func. Class: Urban Collector

ADT: 1,146

Year of ADT: 2006

Roadway Length: 2.0 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No

Center Median: No

Speed Limit: 45 mph



Smith Bridge Road runs from Delaware State line – just west of Ridge Road - to just west of Feldspar Drive, and intersects one state road and three township roads. Intersections where only the minor leg is stop controlled include Heyburn Road, Wilderness Way, Kelly Drive, and Ridge Road.

South View Path (T400)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.1 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No, low profile curb and gutter along both edges

Center Median: No

Speed Limit: Not posted



South View Path runs from Wilderness Way to a dead end, and intersects one township road. Intersections where all legs are stop controlled include Wilderness Way – except northbound lane of Wilderness Way.

Spring Lane (T406)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.2 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No, raised curbing along both edges

Center Median: No

Speed Limit: Not posted



Spring Lane runs from Harvey Drive to a dead end, and intersects one state road. Intersections where only Spring Lane is stop controlled include Harvey Drive.

Springhill Drive (T403)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.2 miles

Number of Lanes: 2

Lane Width: 14 feet

Shoulders: No, raised curbing along
both edges

Center Median: No

Speed Limit: Not posted



Springhill Drive runs from US 202 / Ridge Road to Pleasant Hill Drive, and intersects one state road. Signalized intersections include US 202 / Ridge Road.

Station Way Road

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.2 miles

Number of Lanes: 2

Lane Width: 12 feet

Shoulders: No

Center Median: No

Speed Limit: Not posted



Station Way Road runs from Creek Road to US 1. The section of roadway between Hoffman's Mill Road and US 1 is a one way road running towards US 1, and intersects two state roads and one township road. Intersections where only the minor leg is stop controlled include Hoffman's Mill Road. Intersections where only Station Way is stop controlled include Creek Road. Signalized intersections include US 1.

Summit Drive (T393)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.2 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No

Center Median: No

Speed Limit: Not posted



Summit Drive runs from US 202 to a dead end, and intersects one state road and one township road. Intersections where only the minor leg is stop controlled include Longview Road. Intersections where only Summit Drive is stop controlled include US 202.

Tally Ho Drive (T396)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.4 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No

Center Median: No

Speed Limit: Not posted



Tally Ho Drive runs from Ridge Road to a dead end, and intersects one state road and one township road. Intersections where only Tally Ho Drive is stop controlled include Ridge Road and Heyburn Road.

Top of the Oaks (T418)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.3 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No

Center Median: No

Speed Limit: 25 mph



Top of the Oaks runs from Heyburn Road to a dead end, and intersects one township road. Intersections where only Top of the Oaks is stop controlled include Heyburn Road.

US 1; Baltimore Pike (S.R. 0001)

Ownership: State

Func. Class: Principal Arterial Highway

ADT: At US 202 At Chadd's Ford Village

NB: 21,682 NB: 15,539

SB: 14,151 SB: 14,214

Year of ADT: 2007

Roadway Length: 2.8 miles

Number of Lanes: 4

Lane Width: 12 feet

Shoulders: Yes, variable width

Center Median: Yes, raised concrete

Speed Limit: 45-55 mph



Baltimore Pike runs from just west of Hoffman's Mill Road to US 202, and intersects six state roads and three township roads. Intersections where only the minor leg is stop controlled include Hoffman's Mill Road, Creek Road south of US 1, Webb Road, Heyburn Road, and Harvey Road. Signalized intersections include Creek Road / Station Way Road, Ring Road, Brandywine Drive / Hillman Drive (private road), and US 202.

US 202; Wilmington / West Chester Pike (S.R. 0202)

Ownership: State

Func. Class: Principal Arterial Highway

ADT: North of US 1 South of US 1

NB: 21,888 NB: 18,944

SB: 20,937 SB: 18,661

Year of ADT: North of US 1: 2007

South of US 1: 2006

Roadway Length: 3.4 miles

Number of Lanes: 4

Lane Width: 12 feet

Shoulders: Yes, variable width

Center Median: Yes, raised concrete

Speed Limit: 45 mph



Wilmington / West Chester Pike runs from Brinton's Bridge Road to just north of Smith Bridge Road, and intersects three state roads and five township roadways. Intersections where only the minor leg is stop controlled include Summit Drive / Woodland Drive, Woodland Drive, and Marshall Road. Signalized intersections include Brinton's Bridge Road, Oakland Road, Brandywine Drive, US 1, Hillman Drive (private road), Applied Card Way (private road), and Ridge Road / Springhill Drive.

Walnut Ridge Lane (T416)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.1 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No, low profile curb and gutter along both edges

Center Median: No

Speed Limit: Not posted



Walnut Ridge Lane runs from High Ridge Road to a dead end, and intersects one township road. Intersections where only Walnut Ridge Lane is stop controlled include High Ridge Road.

Webb Road (S.R. 4022)

Ownership: State

Func. Class: Local Road

ADT: 1,949

Year of ADT: 2005

Roadway Length: 2.0 miles

Number of Lanes: 2

Lane Width: 9 feet

Shoulders: No

Center Median: No

Speed Limit: 40 mph



Webb Road runs from US 1 to Oakland Road, and intersects one state road and three township roads. Intersections where only the minor leg is stop controlled include Atwater Road and Hunters Lane. Intersections where only Webb Road is stop controlled include US 1. Intersections where all legs are shop controlled include Oakland Road.

Wilderness Way (T399)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.3 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No, raised curbing along
west edge

Center Median: No

Speed Limit: Not posted



Wilderness Way runs from Smith Bridge Road to a dead end, and intersects one state road and two township roadways. Intersections where only the minor leg is stop controlled include Mountain View Trail. Intersections where only Wilderness Way is stop controlled include Smith Bridge Road. Intersections where all legs are shop controlled include South View Path – except northbound leg of Wilderness Way.

Woodland Drive (T392)

Ownership: Township

Func. Class: Local Road

ADT: Not available

Year of ADT: Not available

Roadway Length: 0.5 miles

Number of Lanes: 2

Lane Width: 10 feet

Shoulders: No, low profile curb and
gutter along both edges

Center Median: No

Speed Limit: Not posted



Woodland Drive runs from US 202 to US 202, and intersects one state road and one township road. Intersections where only Woodland Drive is stop controlled include US 202 / Summit Drive and US 202.

4. ROADWAY CONDITIONS

Average Daily Traffic

Average Annual Daily Traffic (AADT) is the total 24-hour traffic volume, in both directions, on a road segment for a typical weekday. ADT data is be used to gauge both the use and performance of these roadways. Traffic volumes were gathered using PennDOTs Internet Traffic Monitoring System (iTMS) where available. The iTMS program is supported by PennDOT's Bureau of Planning and Research which is responsible for capturing, analyzing and reporting roadway data to various agencies and the public. This data was supplemented with a smaller data collection effort at specific sites helping to provide overall insight into circulation of vehicles within and through the Township.

Table C-2, Roadway Segment AADT contains the AADT volumes that were compiled and used for analysis in this study. Not surprisingly, US 202 (Wilmington/West Chester Pike) and US 1 (Baltimore Pike) carry the largest daily volumes through the township at roughly 43,000 and 36,000 vehicles, respectively. Oakland Road, Creek Road Ridge Road, Marshall Road and Brintons Bridge Road carry between 3,700 and 2,000 vehicles daily through and within the Township. Webb Road, Ring Road Smith Bridge Road, Heyburn Road, Beaver Valley Road Beaver Dam Road and Brandywine Drive carry 1,900 or less vehicles daily. For more details on the AADTs please see Table C-2; for roadway performance figures please see Table C-3 in the Roadway Performance section.

Table C-2: Roadway Segment AADT

Road Name	AADT¹
<i>Other Principal Arterial Highways</i>	
US-1; Baltimore Pike	
At Village of Chadds Ford	29,250
Near US-202	35,983
US-202; Wilmington / West Chester Pike	
North of US-1	43,005
South of US-1	37,763

<i>Urban Collector</i>	
Brinton's Bridge Road	2,521
Creek Road	
North of US-1	3,552
South of US-1	2,525
Marshall Road	3,251
Oakland Road	3,685
Smith Bridge Road	1,151

<i>Local Road</i>	
Beaver Valley Road	636
Harvey Road	442
Heyburn Road ²	1,071
Ridge Road	3,415
Ring Road	1,789
Webb Road	1,957

¹ Unless noted, AADT values from PennDOT iTMS

² AADT collected as part of this effort

Accident Reports

Crash data for Baltimore Pike & Heyburn Road and Ridge Road & Heyburn Road were retrieved utilizing PennDOT's database. At this time reportable crash data more recent than 2007 is not available, therefore this effort focused on data from 2003 to 2007. A review of the crash history at the intersection of US 1 & Heyburn Road and Ridge Road & Heyburn Road were conducted to determine if the type of crashes occurring at either intersection warranted installing a traffic signal or other modification of existing traffic control.

US 1 & Heyburn Road

The review of crash data at the intersection of US 1 & Heyburn Road was conducted to determine if the recent fatality that occurred in December 2008 was preceded by accidents within the intersection that could be corrected by a traffic signal. Crash data was provided by PennDOT for the past full five years, 2003 – 2007, for approximately 500 feet in each direction along US 1 where the intersection is located. During this time period there were a total of 9 reportable crashes involving 20 vehicles. Unfortunately the most recent fatality in December 2008 was not available from PennDOT's records, but further research of a police report may provide the cause of the crash.

Based on the review of crash data available for US 1 & Heyburn Road only 2 of the 9 accidents are correctable through the use of a traffic signal. The vehicle action that can be corrected by a traffic signal includes a car turning left at the intersection onto Heyburn Road and being hit by oncoming traffic.

Ridge Road & Heyburn Road

The review of crash data at the intersection of Ridge Road & Heyburn Road was conducted to determine if the stop controlled intersection would warrant modification of existing traffic control based on the accidents recorded along Ridge Road. Crash data was provided by PennDOT for the past full five years, 2003 – 2007. During this time period there were a total of 3 reportable crashes involving 4 vehicles.

Based on the review of the crash data for Ridge Road & Heyburn Road none of the reported accidents are correctable through modification of existing traffic control, including a traffic signal. The reported crashes at this intersection involve careless driving by the motorist traveling too fast and either hitting a fixed object or sideswiping a car traveling in the same direction.

Data Collection Effort

Data collection was performed at strategic sites within the Township to gain a better understanding of the circulation of vehicles throughout the Townships roadway network. This data collection effort was used to supplement the existing data available, details of the analysis can be found in the Roadway Performance section. The following sites were collected:

Turning Movement Counts

Intersection turning movement counts were performed from 7AM-9AM and 4PM-6PM on February 25, 2009. This data is used to generate intersection performance figures and can be used for signal warrant analysis. All intersection movements were captured at the following intersections.

- ❖ US 202 (Wilmington/West Chester Pike) & Marshall Road
- ❖ US 1 (Baltimore Pike) & Heyburn Road
- ❖ Ridge Road & Heyburn Road

Automatic Tube Recorders

Automatic Tube Recorders (ATR) were installed within the Township to gather roadway classification data. These ATRs gather both weekday and weekend data as well as vehicle classification providing insight into the type of vehicles using the Township roadways. The following sites were collected.

- ❖ Oakland Road – between Webb Road and Brinton's Bridge Road
- ❖ Webb Road – between Arrow Land and Oakland Road
- ❖ Heyburn Road – between US 1 (Baltimore Pike) and Ridge Road
- ❖ Ring Road – between US 1 (Baltimore Pike) and Ridge Road
- ❖ Ridge Road – between US 202 (Wilmington/West Chester Pike) and Pheasant Lane

Roadway Performance

Using both data available from PennDOT iTMS and data collected as part of this effort the following roadway performance figures were developed. Analysis was performed using Highway Capacity Manual (2000) standards and HCS 2000 software. Levels of Service (LOS) presented in the following table, Table C-3, are a quality measure describing operational conditions within the traffic stream. These measures relate to speed, travel time, freedom to maneuver, traffic interruptions and comfort and convenience. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. The LOS values in Table C-3 are capacity driven based on vehicle volumes and geometric parameters of the roadways.

Table C-3: Roadway Segment LOS

Road Name	LOS
<i>Other Principal Arterial Highways</i>	
US-1; Baltimore Pike	
At Village of Chadds Ford	NB: C
	SB: C
Near US-202	NB: E
	SB: C
US-202; Wilmington / West Chester Pike	
North of US-1	NB: C
	SB: C
South of US-1	NB: D
	SB: D
<i>Urban Collector</i>	
Brinton's Bridge Road	A
Creek Road	
North of US-1	A
South of US-1	A
Marshall Road	A
Oakland Road	A
Smith Bridge Road	A
<i>Local Road</i>	
Beaver Valley Road	A
Harvey Road	A
Heyburn Road	A
Ridge Road	A
Ring Road	A
Webb Road	A

Intersection turning movement counts also provide Level of Service indicators similar to roadway segments. Intersection levels of service are primarily driven by the type of traffic control present and the demand for the potential allowable movements. Table C-4: Intersection LOS details the LOS by approach for the intersections where turning movement counts were performed.

Table C-4: Intersection LOS

Road Name		LOS
US-1; Baltimore Pike & Heyburn Road		
	Westbound Lefts	C
AM	Northbound Lefts	E
	Northbound Rights	D
	Northbound Approach	D
PM	Westbound Lefts	B
	Northbound Lefts	D
	Northbound Rights	B
	Northbound Approach	C

US 202; Wilmington/West Chester Pike & Marshall Road		
	Southbound Lefts	C
AM	Westbound Lefts	F
	Westbound Rights	C
	Westbound Approach	F
PM	Southbound Lefts	C
	Westbound Lefts	F
	Westbound Rights	C
	Westbound Approach	F

Heyburn Road & Ridge Road		
	Eastbound	A
	Westbound	A
AM	Northbound	A
	Southbound	A
	Intersection LOS	A
PM	Eastbound	A
	Westbound	A
	Northbound	A
	Southbound	A
	Intersection LOS	A

Circulation Analysis

Understanding the circulation on the Townships Road Network can provide essential guidance to future planning decision. Using the data collected from the 5 ATR sites, some conclusions can be drawn about how vehicles are using the Townships roadways.

Oakland Road

During the AM peak travel time Oakland Road recorded 337 southbound vehicles, which are appear to be headed to US 202 (Wilmington/West Chester Pike). The evening peak travel time only recorded 241 of those vehicles returning, on the northbound direction. This gives the appearance that morning commuters are using Oakland Road as a through route to US 202 (Wilmington/West Chester Pike), bypassing the intersection of PA 926 & US 202 (Wilmington/West Chester Pike).

Ridge Road to Ring Road

During the AM peak travel time both Ring and Ridge Roads see modest volumes of 75 southbound and 171 eastbound vehicles, respectively. Comparing this to the PM peak travel time there is an increase to 248 westbound vehicles on Ridge Road and 153 northbound vehicles on Ring Road. It appears that this increase is caused by through vehicles wishing to avoid the signal at US 202 (Wilmington/West Chester Pike) & US 1 (Baltimore Pike). These vehicles are cutting through the township roads to access the less congested signal at US 1 (Baltimore Pike) & Ring Road to continue southbound on Baltimore Pike.

5. BIKE ROUTES AND TRAILS

As noted in the Chadds Ford Township Open Space Plan there is a high demand for improving the hiking / biking trail system in the Township. Currently the only designated trail in the Township is the Brandywine River Trail, which connects the Chadds Ford Historical Society building and the Brandywine Conservancy. These trails are valuable as a recreational resource for pedestrians, equestrians, bicyclists, cross-country skiers, etc., and they can be used as an alternative means of transportation in the Township.

The Open Space Plan recommends the connection of the Brandywine River Trail with a new trail that connects to the Chadds Ford Township building, and the potential for connecting this network of trails with existing / planned trails in Birmingham Township, Chester County. Other potential connections for the trail – as provided by the Open Space Plan – include: the Estates at Chadds Ford, Brandywine Battlefield Park, Brandywine Creek Park, Dilworthtown, and Painters Crossing. Additionally, the plan recommends working with the committees responsible for planning the Brandywine Valley Scenic Byway and the Brandywine Greenways to promote to preservation of open spaces along these routes and the inclusion of trails along these routes. The implementation of trail planning as noted in the Open Space Plan should be encouraged as it outlines a clear path for providing the desired comprehensive trail system in Chadds Ford Township.

Other bicycle trails within the Township include one of BicyclePA's designated bicycle routes, route L. This route follows Creek Road from the township line to township line. In future planning efforts, where feasible, steps should be considered to add bicycle compatibility along Creek Road.

6. SUMMARY AND PLANNING IMPLICATIONS

The purpose of the following observations and implications are to ensure that the Townships goals are both achieved and preserved in future planning efforts. the following observations were drawn from a combination of field views, traffic data collections and meetings with the Comprehensive Plan Task Force.

	Observation	Implication
Public Transportation	Public Transportation is limited to 2 stops at the eastern edge of the Township	Based on Township needs, expansion of service to Chadds Ford Village mat be appropriate. This will provide workers at Village businesses an alternative means of travel to work
Roadway Conditions	Degrading Levels of Service on US 202 & US 1	As Levels of Service along and at the intersection of US 202 & US 1 continue to degrade, traffic will continue to seek alternate paths through township roadways. The connection of Hillman Drive to the signal at Brandywine Drive & US 1 will give through traffic a better option reducing its impact on other township roadways
	The Township's existing circulation system functions and serves the township quite well	Adherence to context sensitive planning principles in accordance with Township goals and the requirement of traffic impact studies for future developments will preserve these levels of service
Bike Routes and Trails	The Chadds Ford Open Space Plan calls for a bicycle and trail system; BicyclePA designates Creek Road as a cross state bicycle trail	Future planning efforts should consider the creation of dedicated facilities for both hikers and bikers. This will also provide alternative modes for residents commuting to work

APPENDIX D: ENVIRONMENTAL, CULTURAL AND HISTORIC RESOURCES INVENTORY AND ANALYSIS

Chadds Ford Township adopted an Open Space Plan in 2007 that includes a detailed inventory, analysis and mapping of the Township's natural, cultural and historic resources. Information from this Plan is summarized in this section, and shown on the Biotic Resources Map (Map 6-1) of the Township's Open Space Plan.

1. ENVIRONMENTAL RESOURCES

The Township retains significant areas of natural resources, including woodlands, stream valleys, surface water and open space/meadow areas.

Woodlands	Woodlands comprise 36% (1,988 acres) of the Twp., most of which is located in areas of hydric soils, floodplains and steep slopes and have been somewhat protected from development encroachment. Only 230 acres (11%) of Twp. woodlands are forested interiors, which are measured as 300 feet from any outer edge.
Stream Valleys and Riparian Areas	<p>Stream valleys are areas containing stream channels (including creeks, streams and rivers) and associated banks that may contain slopes and woodlands. Floodplains, wetlands, and hydric soils form stream valleys and represent the most extensive and contiguous areas of undeveloped land in the Twp. This is due to the fact that these areas present major impediments for development. They frequently flood, and hydric soils areas are either seasonally covered with standing water or have high water tables that present problems for the construction of foundations and basements. These stream valleys are protected through floodplain and wetland regulations in the Twp. zoning and land development ordinances.</p> <p>The 2007 Open Space Plan included a riparian analysis that defined Township riparian areas as land within 100 feet of a stream. The analysis determined that 708 acres within the Township can be classified as riparian areas, and that half of this land is fully buffered.</p>
Watersheds	<p>Watersheds are areas of land that drain into a river or body of water; usually divided by topography or ridge lines. Chadds Ford Twp. is within the Brandywine Creek and Chester Creek major watersheds.</p> <p>The Brandywine Creek watershed accounts for 92% (5,104 acres) of the Twp., and the Chester Creek accounts for the other 8% (468 acres). Minor watersheds include: Harvey Run (2,449 acres, 44% of the Twp.), Brandywine Creek (1,192 acres, 21%), Beaver Creek (861 acres, 15%), Wilson Run (376 acres, 7%), West Branch Chester Creek (250 acres, 5%), Brinton Run (226 acres, 4%), Chester Creek (218 acres, 4%).</p>
Floodplains	The Twp. Open Space Plan states "a floodplain is defined by the boundary of land subject to flooding by an adjacent stream when that floodplain occurs within a storm event with a frequency of at least once every 100 years." The Township's primary water body associated with floodplains is Harvey Run, which flows through the middle portion of the Township.
Slopes and Woodlands	Most of the Township's steeply sloped areas (slopes of 15-25% and 25% or greater) are also wooded and adjacent to stream valleys. Sloped areas remain mostly wooded since they were also difficult to farm and develop, and they are now also protected by regulations in the Township's zoning and land development ordinances. In addition to their scenic landscape quality, woodlands also provide wildlife habitat and are extremely effective in enhancing groundwater recharge and limiting soil erosion. The Township has 1,038 acres of slopes between 15% and 25% (19% of the Twp.) and 452 acres of land over 25% slope (8% of the Township).

Wetlands and Hydric Soils	Wetlands are low-lying areas inundated by water at a frequency and duration sufficient to support wetland vegetation (wetlands include swamps, marshes and wet meadows). Wetlands remove pollutants through chemical, physical, and biological mechanisms. Wetlands recharge groundwater and help purify surface waters, serving many functions in the ecosystem. While the final determination must be made by a trained biologist or soil scientist on a site-by-site basis, several areas have been mapped from existing sources: the National Wetlands Inventory and hydric soils, mapped from the U.S. Department of Agriculture (USDA), Soil Conservation Service soil survey. The Open Space Plan counted 65 known individual wetland areas in Chadds Ford Twp., totaling 115 acres (2% of the Township). Hydric soils are generally unsuitable for development due to high water tables. These soils, as mapped from the USDA Soil Conservation Service Soil Survey, are shown on Map6-5 of the Township Open Space Plan. The Twp. contains 1,135 acres of hydric soils, which comprises roughly 20% of the Township. The largest area of hydric soils is located along Harvey Run.
Prime Agricultural Soils	Prime Agricultural Soils are soil types that are fertile and considered productive for agriculture. They consist of capability Classes I, II, and III soils, as defined by the US Dept. of Agriculture (USDA) Natural Resources Conservation Service. Capability classification is a grouping of soils that shows how suitable they are for most kinds of farming. Class I is the best-suited soils types for crop growing. Class II and III soils have limitations which reduce the choice of plants that can be successfully grown in them and may also require special conservation practices. ² Prime agricultural soils are located virtually in all areas outside of the stream valleys of the Township. The Open Space Plan indicates that CFT has 1,780 acres of prime agricultural soils, accounting for 32% of the Township.

2. CULTURAL AND HISTORIC RESOURCES

Historic Resources are shown on Map 6-7 of the Township Open Space Plan.

Cultural Resources	The Township's cultural landscape was shaped by several key factors, including the aftermath of the Battle of Brandywine (1777), post-war industrial activities including farming and clay mining, and the establishment and success of the local artist community as illustrated by the Wyeth family, the Brandywine School and the Brandywine River Museum.
Historic Properties	The Township contains many significant structures designated as "historic," including National Historic Landmarks and properties listed in the National Register of Historic Places (a list maintained by the U.S. Department of the Interior). While these designations provide a form of official recognition, none of these designations provide any significant degree of protection. Three (3) properties are National Landmarks including the Brinton 1704 House, the N.C. Wyeth Studio and homestead, and a large portion of the Brandywine Battlefield National Historic Landmark. The Twp. has two National Register Historic Districts, including the Chadds Ford Village Historic District and the Dilworthtown Historic District. Additionally, the Twp. has several individual buildings listed on the National Register, including the John Chads House, Twadels Mill and House, the William Painter Farm and the Gilpin Homestead. (A complete list of historic and archaeological resources and mapping is included in the Township's 2007 Open Space Plan.)
Scenic Resources	Scenic areas in the Township are shown on Map 6-9 of the Open Space Plan, and include areas along and adjacent to Route 1, Webb Road, Harvey Road, Ridge Road, Smithbridge Road, and Beaver Valley Road.

² *Soil Survey, Chester and Delaware Counties, USDA Soil Conservation Service, pp. 4-5.*

3. OPEN SPACE

Chadds Ford Township adopted its Open Space Plan in December 2007. Preparation of the Plan was partially funded through the PECO Green Region Program, administered by the Natural Lands Trust.

Map 7-1 "Recreational Open Space" of the Open Space Plan shows open space throughout the Chadds Ford region. Chadds Ford Township has no developed parkland, however the map shows one area of land classified as municipal open space, located south of Route 1 and east of Heyburn Road.

The Brandywine Battlefield Historic Site is state-owned and located on the north side of Route 1. A large area of land, located in the southwest portion of the Township is shown on Map 7-1 as "conservation easement" land. Approximately eight (8) residential developments in the Township have private open space owned by Homeowners Associations.

4. SUMMARY AND PLANNING IMPLICATIONS

- a. Greater protection should be provided for forests/woodlands through the Township zoning ordinance.
- b. Greater protection should be provided for riparian buffer areas through the Township zoning ordinance.
- c. Further protection and enhancement of riparian buffers and open space areas will protect/improve the Township's watersheds.
- d. Steep slopes must continue to be protected from development and woodland clearing.
- e. Hydric soils are typically unsuited for on-lot septic systems and these areas should be avoided for the placement of these facilities.
- f. Prime agricultural soils should be protected from future development through the Township zoning ordinance.
- g. Several resources have received a Determination of Eligibility (DOE) by the National Register, including: The Thomas Speakman House, Brandywine Baptist Church Parsonage, Ring-Kreuner Farm, Samuel Painter Farm, Philadelphia and Central Railroad, and the expansion of the Dilworthtown Historic District. National Register nominations should be pursued for these important resources.
- h. Scenic road designations can be used as a basis for guiding the future use and improvements to the road and for implementing controls via zoning and land development ordinances to help protect the landscapes along these roads.

APPENDIX E: COMMUNITY FACILITIES & SERVICES INVENTORY / ANALYSIS

Community facilities and services are provided by both the public and private sectors and include code enforcement, police protection, trash and recycling collection, schools, hospitals, and sewer and water service. This section inventories the services and facilities provided by Chadds Ford Township and other organizations and assesses the extent to which they meet existing and future needs.

1. TOWNSHIP FACILITIES AND INFRASTRUCTURE

Township facilities, services and infrastructure are described below.

Township Facilities	The Township administrative offices are located at 10 Ring Road, Chadds Ford, PA, Delaware County. There are no developed municipal parks in the Township.
Township Infrastructure Services	
Roads and Snow Removal	The Township contracts with private contractors for Township owned local road maintenance and snow removal. State highways, such as U.S. Rt. 202 and Rt. 1, are maintained by PennDOT. There are no road maintenance shops or storage facilities in the Township. Private roads are maintained by their respective homeowners associations. The Township currently has a volunteer Roadmaster.
Water and Sewer Service	While most CFT households use on-site wells and septic systems, several areas of the Township are serviced with public or community systems. These public and community water and sewer services areas are depicted on the Community Facilities and Services Map. Water supply for the Twp. is provided by a combination of public water through Chester Water Authority (CWA) and private, on-lot wells.
Public Water Supply	Public water supply in CFT is provided by CWA, a municipal authority established in 1939 serving Delaware and Chester Counties, PA and New Castle County, DE. CWA supplies residential, industrial, and commercial customers, and other water companies in PA and DE. Sources for CWA include the Conowingo Pool of the Susquehanna River and Octoraro Reservoir on Octoraro Creek, which are both surface water supplies. CWA has capacity at its Octoraro Treatment Plant to treat up to 60 million gallons per day (MGD), and in 2007 produced an average of 34 MGD. CWA is a not-for-profit water supplier with comprehensive plans for present-day facility operation and maintenance and future upgrades and expansions. All water quality standards set by the US Environmental Protection Agency (EPA) and PA Dept. of Environmental Protection (DEP) were met in 2007. CWA supplies water to Twp. residents, as well as to commercial and institutional development, in the village and around the Route 202/Route 1 intersection, including the Estates at Chadds Ford, Springhill Farm, and Painters Crossing Condominiums. CWA has no plans to extend public water within the Twp., but has indicated that it could if requested.
Private Water Supply	Private wells provide drinking water for many of the Township's residents.
Wastewater	<p>Sewer service is concentrated along the Route 1 and Route 202 corridors, with additional service area in the southeastern portion of the Township, along Ridings Way, Ridge Road, and Heyburn Road. Sewage collection systems in these areas include two systems owned by the Township and two private systems. Properties outside of the sewer service area are served by on-lot disposal systems.</p> <p>CFT created The Chadds Ford Township Sewer Authority (CFTSA) to manage the Township public sewer system. CFTSA consists of five board members appointed by the Township Board of Supervisors. Delaware County Regional Water Quality Control Authority (DELCORA) provides operation, monitoring, and preventative maintenance of the treatment facilities and collection systems on a contract basis, and Pennoni Associates provides engineering services. CFTSA-owned wastewater treatment plants (WWTP) include Ridings WWTP and Turners Mill WWTP. For planning purposes, CFTSA uses an equivalent dwelling unit (EDU) gallons per day (GPD) figure of 217. This is based on a flow per EDU of 90 gallons per capita per day. At 2.41 people per household in Chadds Ford Twp., each EDU is 217 GPD.</p>

Public Wastewater Treatment Plants	<p>Ridings WWTP: Located in the southeast portion of the Twp., Ridings WWTP began operations in October 1994 and discharges treated wastewater to an unnamed tributary of Harvey Run. The facility is permitted an average monthly flow of 80,000 GPD. Ridings WWTP is fed by a combination of gravity lines and force mains, which require three pumping stations in the collection system and one at the WWTP. The treatment process consists of a dual basin sequencing bath reactor discharging to an equalization basin, tertiary effluent disc filter, chlorination, and dechlorination prior to release to the receiving stream.</p> <p>Ridings WWTP treated an average of 40,000 GPD in 2007, with the majority (about 75%) of influent being domestic residential wastewater and the remainder nonresidential, including restaurants, shops, offices, and a school. The average daily flow of the highest three consecutive months was 51,400 GPD in 2007. Five-year flow projections by Pennoni Associates show that Ridings WWTP will be operating below the permit level for the average daily flow on a monthly basis.</p> <p>Problems with effluent quality and permit violations resulted in the execution of a Consent Order and Agreement (CO&A) between PA DEP and CFTSA in 2008. Issues were related to the performance of the plant's sand filter and inflow/infiltration (I/I), and in 2007 CFTSA implemented a systematic procedure for inspection and repairs.</p> <p>Turners Mill WWTP: Turners Mill WWTP was constructed by agreement between Toll Brothers and CFT, and serves Toll Brothers' Estates at Chadds Ford development and other areas in the Township, including the Village of Chadds Ford. Transfer of the Turners Mill WWTP to the CFTSA was completed in August 2008. The treatment plant is located adjacent to the Township Building, along Rt. 1, and discharges to Harvey Run.</p> <p>Turners Mill WWTP is permitted for 150,000 GPD, and is fed by a combination of gravity lines and force mains, including a low pressure sewer system (LPSS) along Rt. 1 that calls for a small pump on-site at each residence or business. Two pump stations are also part of the system: one at the Estates at Chadds Ford and one at the current site of the private Pantos WWTP. The Pantos WWTP was decommissioned and its flows redirected to the Turners Mill WWTP. The Turners Mill plant consists of two extended aeration treatment trains, mechanical screen with manual bar screen by-pass, concrete tanks with package treatment units, and ultraviolet disinfection. Discharge is a combination of stream and wet-land discharge for polishing and additional treatment. Initial connections to Turners Mill WWTP are still underway. Act 537 planning for Turners Mill WWTP projected 473.75 EDUs and flows of 102,804 GPD by the end of 2008. Five-year flow projections by Pennoni estimate 544.50 EDUs and flows of 118,156 GPD by the end of 2012, well below the permitted 150,000 GPD. These figures include the redirection of the private Pantos WWTP and its collection system to Turners Mill WWTP.</p> <p>As a new system, the Turners Mill WWTP is in good condition. The pump station located at the former site of the Pantos WWTP will be privately owned and maintained, as will the pump station located at the Estates at Chadds Ford (Sunset Hill Pump Station).</p>
Private Wastewater Treatment Plants	<p>There are currently two private wastewater treatment plants located in the Twp: Knights Bridge WWTP and Springhill Farm WWTP. A third private system, Pantos WWTP, has recently been decommissioned and its flows directed to Turners Mill WWTP. Knights Bridge WWTP is located along the Rt. 202 corridor, and primarily serves the commercial businesses located to the northwest of the Rt. 202/Rt. 1 intersection. The Springhill Farm WWTP is located southeast of the Rt. 202/Rt. 1 intersection, and serves primarily residences and a limited number of businesses in this area.</p>
On-lot Disposal Systems	<p>Outside of the Rt. 1 and Rt. 202 corridors, CFT is dominated by residential land uses, which primarily use on-lot disposal systems (OLDS) for wastewater disposal and treatment. CFT contracts with a certified Sewage Enforcement Officer (SEO) for regulation of these systems. According to the SEO, these systems typically perform well. New development is required to test for both a primary and alternate location, providing for a backup when the primary system fails. Typically, existing failing systems are not malfunctioning to the surface, but rather fail a certification process required by transfer of ownership. Systems are typically replaced following a certification failure. Finding an appropriate site for a replacement system is generally not a problem due to suitable soils and large lot sizes. Areas with</p>

	past problems, notably along Heyburn Road and in the Village of Chadds Ford, are being connected to public sewer (Turners Mill WWTP).
Storm Water Management	Stormwater management is required under Act 167 for all new development projects, as a component of the subdivision and land development ordinance. The design criteria generally require that stormwater systems be designed to permit no increase in the rate of runoff over that which currently exists at a site. Most of the existing stormwater management systems include retention basins that are maintained by homeowner's associations, and there are no Township owned stormwater management facilities.
Solid Waste	CFT does not provide trash and recycling collection. Property owners and HOA's must individually contract with private haulers for this service.

2. PUBLIC SAFETY AND EMERGENCY SERVICES

Township public safety and emergency services are described below.

Public Safety	Police services are provided by the Pennsylvania State Police. There are no police, fire or ambulance facilities in Chadds Ford Township. Code Enforcement services are provided by the Township.
Emergency Services	<u>Ambulance Service</u> : Ambulance service is provided by Concordville Fire and Protective Association, Ambulance Division, in Concordville, and Lima Volunteer Fire Company No. 1, located on Baltimore Pike. CFT makes regular contributions for this service. <u>Fire Service</u> : Fire protection is provided by Concordville Fire Company, and Lima Volunteer Fire Company No. 1. CFT participates in providing this protection with annual contributions to the fire company, and provides additional donations when requested for specific projects.

3. SCHOOLS, HOSPITALS AND LIBRARIES

Schools, medical and library facilities are described below.

Schools	CFT is within the Unionville – Chadds Ford School District. A private school, St. Cornelius, is located within CFT, at 160 Ridge Road.
Hospitals/Medical Centers	No hospitals are located within the Township. The closest hospital facilities to the Township are Chester County Hospital in West Chester and Riddle Memorial Hospital on Baltimore Pike in Media. Pioneer Urgent Care is located at 1572 Wilmington Pike in CFT. Additionally, a new hospital is planned for adjacent Concord Township.
Libraries	No public libraries are located in CFT. The closest library is the Rachel Kohl Library located at 687 Smithbridge Road in Glen Mills.

4. REVENUES AND EXPENDITURES

The Township's current budget is discussed below.

Revenues	Table 12 shows CFT's 2008 General Fund Budget, and includes the percentage each account represents in the budget. CFT operates with an annual general fund budget of about \$1,294,000. The majority of annual revenues (57%) are from local real estate, real estate transfer, emergency services and business privilege taxes. Other revenues are from permit and service fees, fines, rents and interest.
Expenditures	Community Development, Building Expenses and Engineering account for about fifty-eight percent (58%) of Township expenditures. Liquid fuels expenses accounted for 8% of the expenditure budget.

Table 12: Township General Fund Budget, 2008

GENERAL FUND		Percent
<u>Receipts:</u>		
Real Estate Taxes	\$382,165	30%
Real Estate Transfer, EMS & Business Privilege Tax	\$347,500	27%
Franchise Fees	\$52,000	4%
Fines and Forfeitures	\$3,208	0.25%
Interest Earned	\$22,390	2%
Miscellaneous Receipts	\$141,736	11%
General Fees	\$176,940	14%
Fees - Permit, Application and Recoverable	\$169,045	13%
Total Receipts	\$1,294,984	100%
<u>Expenditures:</u>		
Township Officials	\$27,405	2%
Tax Collection & Consulting Expenses	\$32,350	2%
Solicitor	\$54,000	4%
Township Secretary	\$36,112	3%
Office Expenses	\$26,925	2%
Engineer	\$225,000	17%
Building Expenses	\$276,261	21%
Inspections	\$82,822	6%
Zoning & Planning	\$8,895	1%
SEO	\$19,600	2%
Roadways, Snow Removal & Traffic Signals, Lights	\$90,550	7%
Storm Sewers	\$2,000	0.15%
Signage	\$2,500	0.19%
Other Roadways	\$15,800	1%
Liquid Fuels Expenses	\$102,000	8%
Fire Hydrants	\$13,700	1%
Community Development	\$249,114	19%
Miscellaneous	\$3,700	0%
Insurance Expenses	\$26,250	2%
Total Expenditures	\$1,294,984	100%

Source: 2008 Annual Budget , Chadds Ford Township, 2008

5. SUMMARY AND PLANNING IMPLICATIONS

- a. Both Ridings and Turners Mill Wastewater Treatment Plants are operating below the permitted maximum.
- b. Knights Bridge WWTP is not known to have any violations, and could expand if additional commercial development occurs in the vicinity.
- c. On lot disposal systems can continue to be used throughout CFT, except in the areas where problems have been documented in the past.
- d. CFT provides basic administrative and code enforcement services. Police, fire, and ambulance services are provided by other organizations. The Township uses outside contractors for road maintenance.
- e. The CFT budget does not currently include a line item for open space or recreation. CFT should consider enacting an ordinance for a fee in lieu of program for which could be used for the acquisition and protection of open space in the Township. Grant funding is one primary source than can be utilized to support acquisition, planning/design and development costs for new parks and recreation facilities. Significant funding is available through county and state programs.
- f. The Township passed a referendum for open space acquisition.
- g. The Township passed a fee-in-lieu ordinance for the provision of recreation facilities associated with new developments.

APPENDIX F: PUBLIC PARTICIPATION PROCESS

This section discusses the public participation process that was involved in the update of the Chadds Ford Township Comprehensive Plan. The results of the public participation process are described below.

1. COMPREHENSIVE PLAN TASK FORCE

A Comprehensive Plan Task Force consisting of local elected and appointed officials, volunteers and other interested parties was organized to oversee the Comprehensive Plan project. The Study Committee met regularly throughout the project to review project progress, discuss project issues and review project mapping. Additionally, key person interviews were held with local individuals to discuss issues relevant to the future planning of Chadds Ford Township. This process served to both inform the community of the Plan project and provide insight regarding community opinions about the quality of life in the Township and residents' concerns about future growth and development. Task Force members are listed below.

Joseph Barakat
Planning Commission
Gary Whelan
Planning Commission
George Kobryn/Sam
Haber
DelCo Planning Department

Maurice Todd
Planning Commission
Paul Vernon
Planning Commission
Lois Saunders
Open Space Committee

William Taylor
Planning Commission, Chair
Gary Sharp
HARB Chair

Ed Wandersee
ZHB Chair
Bob Hobbs
Resident

2. PUBLIC MEETINGS AND WORKSHOPS

A public meeting was held on June 5, 2008. The minutes of the meetings are set forth below.

Chadds Ford Comprehensive Plan Public Workshop

Meeting: Thursday, June 5, 2008 – 7:30 PM
Township Building

Minutes:

Attending:

Comprehensive Plan Task Force

William Taylor, Paul Vernon, Ed Wandersee, Maurice Todd, George Kobryn, Joe Barakat, Bob Hobbs, Gary Whelan

Workshop Participants

Approximately 42 residents

Others

Ray Ott & David Sweet, Project Consultants

1. Paul Vernon introduced the Task Force and gave a brief overview of the project.
2. Ray Ott presented some slides showing the legal framework for Comprehensive Plans, the scope and schedule for the project, and some demographic trends for Chadds Ford and adjacent municipalities. He then explained the objectives for the workshop and provided a handout that included the agenda, copies of the presentation slides and instructions for the workshop. The participants formed four workshop groups, and each were given a large

scale map of the Township to mark up as needed to illustrate the groups issues and concerns.

3. The four Workgroups discussed issues for about ½ hour, after which they presented their findings to the group as a whole and provided the consultants with a marked-up map and written list of planning issues.
4. In general discussion, the group expressed their desire to be able to access information about the Comprehensive Plan Update project and other planning documents – such as the recently adopted Chadds Ford Township Open Space Plan – via the Township’s website, <http://www.chaddsfordpa.net>. Ray explained that a website has been set up for the Task Force, but that this would be modified to provide a link via the Township’s website and to create a public information section for the site. He also said he would let the Township know of the group’s request for access to the Open Space Plan.
5. Ray explained that the results of the Workshop and the Household Survey (about 250 have been returned of about 1,500 sent out) will be presented at the next Task Force meeting on July 3, 2008 @ 6:30 PM.
6. Next Task Force Meeting: Thursday, July 3rd Task Force @ 6:30 PM
7. Meeting adjourned, 9:30 PM.

Respectfully submitted,
Ray Ott, Ray Ott & Associates
June 10, 2008
Corrected - June 23, 2008

3. COMMUNITY SURVEY

A total of 353 surveys were returned to the Township. Of the 1,314 households (2000 U.S. Census), that represents a return rate of approximately 26.8%. The results of the Community Survey are shown on the following page.

V. Improvement needs in Chadds Ford Township

Indicate what you feel could or should be done to improve the quality of living in Chadds Ford Township.

	Total	Importance					Avg.
		Less 1	2	3	4	More 5	
1. Better traffic circulation	350	18 5%	32 9%	62 18%	74 21%	164 47%	4.0
2. Open space preservation	332	6 2%	3 1%	26 8%	65 20%	232 70%	4.5
3. More housing opportunities							
a) Affordable housing	328	123 38%	55 17%	68 21%	41 13%	41 13%	2.5
b) Variety of housing types	330	95 29%	61 18%	91 28%	43 13%	40 12%	2.6
4. Business district / commercial opportunities							
a) More opportunities for dining out	339	97 29%	61 18%	88 26%	68 20%	25 7%	2.6
b) More/ better variety of shops	334	117 35%	63 19%	95 28%	39 12%	20 6%	2.3
c) More parking	324	138 43%	72 22%	76 23%	25 8%	13 4%	2.1
d) Special events	331	80 24%	63 19%	101 31%	63 19%	24 7%	2.7
e) Improve streetscape/lighting	329	96 29%	59 18%	81 25%	61 19%	32 10%	2.6
f) Increase size of business district	263	96 37%	85 32%	51 19%	18 7%	13 5%	2.1
g) Walk to work & shopping	360	145 40%	95 26%	62 17%	34 9%	24 7%	2.2
h) Don't need more comm. svcs.	331	62 19%	13 4%	61 18%	44 13%	151 46%	3.6
5. More health, safety & rec. svcs.							
a) More police protection	189	35 19%	17 9%	60 32%	33 17%	44 23%	3.2
b) Road maint. & snow removal	321	35 11%	26 8%	104 32%	82 26%	74 23%	3.4
c) Better access to Twp. admin. svcs.	339	50 15%	62 18%	113 33%	68 20%	46 14%	3.0
d) More parks / recreation opps.	319	54 17%	34 11%	81 25%	73 23%	77 24%	3.3
e) Opportunities for walking / biking	330	45 14%	32 10%	79 24%	65 20%	109 33%	3.5
f) Expanded access to public sewer	328	105 32%	46 14%	75 23%	50 15%	52 16%	2.7

4. KEY PERSON INTERVIEWS AND FOCUS GROUPS

Eleven (11) community members were interviewed, and two (2) focus group meetings were conducted as part of the public participation process. A list of the interviewees is set forth below.

Name	Organization	Position
<i>Richard Jensen</i>	<i>Chadds Ford Township</i>	<i>Zoning Officer</i>
<i>Ed Wandersee</i>	<i>Unionville-Chadds Ford SD School Board</i>	<i>Representative</i>
<i>Jim Leader</i>	<i>Chadds Ford Business Association</i>	<i>Member</i>
<i>Beth Rump</i>	<i>Brandywine Battlefield State Park</i>	<i>Site Administrator</i>
<i>Mary Kot</i>	<i>CF Twp Republican Party</i>	<i>Chairman</i>
<i>Peter Jesson</i>	<i>CF Twp Democratic Party</i>	<i>Chairman</i>
<i>Ron Coates</i>	<i>Painter's Crossing Subdivision</i>	<i>President, Condo Assoc.</i>
<i>Mary Walters</i>	<i>Spring Hill Subdivision, Sewer Authority</i>	<i>HOA</i>
<i>Ginger Tucker</i>	<i>Chadds Ford Historical Society</i>	<i>Director</i>
<i>Gary Sharp</i>	<i>Brandywine Battlefield Nat'l Historic Task Force & CFT HARB</i>	
<i>Garry Paul</i>	<i>Supervisor Liaison - Sewer Authority & Board of Supervisors</i>	<i>Supervisor</i>
<i>Group Meeting</i>	<i>Delaware County Planning Department</i>	
<i>Group Meeting</i>	<i>Township Open Space Committee</i>	

Summary of Key Person Interviews Responses

1. As you view current conditions in the Twp. [e.g., public services or facilities; trends in land use, auto and pedestrian movement], what things are:

a. Particularly positive, contribute to your interests/objectives, should continue:

Land use/Development:

- BOS doing a good job of managing development; traffic is biggest impact.
- The Township manages development and developers well; the Board is tough but effective, and pursues the community's best interests.
- '73 comp plan should have been adhered to. Small steps taken of late, but no tie between decisions and strategic impacts
- Land use changes are more gradual, less tumultuous than in a Township like Concord. After a relative boom in the 1980s, development has been of a smaller scale and controlled pace. Owners of large properties hold the key, and most do not seem bent on development; however, that is what the

comp plan update needs to stay ahead of. Conservancy has set a density-modifying tone since late 1960s; Woodlawn Trustees also a key owner.

- School Board might favor an increase in nonresidential tax base, but local impacts from that development argue against it. Also, no real commercial needs that cannot be met easily outside the Township.
- Supported unsuccessful move toward cluster development regulations, but happy with current predominant 1- and 2-acre lot pattern and remaining larger properties. Not really rural, but the roads have that character and should stay that way.
- Township is doing well on a limited tax base. Should aim to continue record of no tax increase, especially in the face of U/CF school taxes. Many long-term residents are land-poor.
- Positive negotiations have occurred with developers, e.g., the 58 acres of open space coming from Toll Bros. The density increase under PRD is justified.
- Spring Hill Farms would like to see no more development in the Township. Open space protection is good, but should include playgrounds and trails for the increasing # of families with young children.
- Emphasis on Chadds Ford Village as a town center would be positive; should seek more community-fostering businesses there. The Twp. Bldg./Museum trail also would enhance this goal.
- BoS seems to find Concord a good example re: land use and development; residents may disagree.
- From Zoning Officer view, concern about amount of ordinance change that could be coming, especially in response to possible growth stimulus from sewer plant.
 - Dilworthtown area quite sensitive
 - Other than Watkins tract, not much left on 202
 - Several smaller, but key, developable parcels on Rt. 1
- Chadds Ford Village would be nice as a village (two corners in one ownership), but several major constraints make a true village unlikely:
 - Rt. 1 as barrier
 - Need more regulatory control than just HARB process
 - North on Creek Rd., several residential buildings difficult to adapt
 - Station Way Rd. limited, and floodplain condition an obstacle
- Dilworthtown a more promising village area; ability to control traffic, could work collaboratively with Birmingham, adjust zoning toward a village concept

Trails/Open Space

- Trails are a positive but should not be at the expense of individual property rights; a loop connecting Chadds Ford Historical Society, Brandywine River Museum, Township Bldg., and Battlefield State Park could meet both objectives
- Open space and trails: the Township's approach here is excellent. A Township park would be a positive, although not sure how well it would be used. Any Rails-to-Trails proposal for the adjacent rail bed would be firmly opposed by PC. A possible connecting/loop trail within Chadds Ford Village is a good idea.
- Open space protection: important to achieve; loss of Girl Scout camp should not have happened
- Support trails, a good means for community interaction; just need to take proper account of private property rights
- Girl Scout camp will be a tax drain; it should have been protected open space.
- Preservation of open space and historic resources is the key objective. Township is not responsible for current amount of protected open space, rather the Conservancy and the state park. Suggests placing the state park in an Act 167 district.
- Supports trails, but more interested in open space.
- Girl Scout camp tract an aberration, but was well-handled, especially re: access and traffic.
- Trails are a benefit, and best suited within development open space, e.g., a PRD. Owners of large open ground may still feel threatened. Use of eminent domain to secure trail links is unlikely.
- Some additional public recreation/field space would be desirable. At eastern end of the school district, residents get less benefit from U-CF recreational facilities.

- More trails also desirable, another recreational asset. But need to be well-planned with ongoing management addressed. A subdivision ordinance requirement for trails on developing tracts would be positive.
- The trail connecting the Brandywine River Museum and CFHS is very positive.
- The Brandywine Battlefield Associates (friends group) positively contribute to an understanding of the history and significance. The Site (park) is the 'gateway' to the National Historic Landmark District.
- The new traffic light has been a great improvement.
- Open space referendum funds will enable open space preservation; landowners need to be advised that the Township is a player and can use open space funds.

Roads/Traffic:

- The PC Condo. Assoc. has some concerns about possible impacts from the proposed loop road; it could lead to a change to a gated community.
- PC has continued interest in the future of the Ciccarone parcel on the north side of Rt. 1; its development will have implications for PC.
- Traffic on Rt. 1 and Rt. 202 a major impact on community; a two-edged sword, good for business but increasing effects on Township population. CFBA has supported improvements to Rt. 202; overdue, delays unfortunate.
- Traffic: some of the increase can be attributed to increased development within the Township, as well as growth in Concord Twp.
- Traffic increases are from external forces. BoS has tried to control development on Rt. 202, but without much success. Real regulatory emphasis is on protection of historic resources, Chadds Ford Village, and Rt. 1 corridor.
- Loop road is progressing, but completion likely 2-5 years away

Township Services:

- Could use a Health Officer for restaurant inspection [perhaps joint municipal position]
- Sewer Authority doing good work, but sees eventual need for most of Township to be served by a public system
- Recycling program should be initiated by the Township, but not mandatory [in line with preference for limited government]
- Volunteer committee members have little knowledge of ordinance content; HARB also does not recognize its potential clout
- 681 Webb Rd. and PRD on Atwater Rd. are examples of deficient ordinance standards and administrative practice

Other

- CFHS has teamed with the Civic Assoc. of Chadds Ford Twp. in very positive activities, including Chadds Ford Community Days and two June events. These have not occurred recently, however.
- CFHS is a private nonprofit, and has received no funding from the County or Township. Conducts 3 fundraisers: Chadds Ford Days; pumpkin carve; and Christmas candlelight tour.

b. Troubling issues/obstacles that should be addressed

- Only have State Police service, which takes from 10 to 30 minutes to respond (although calls have only been for false alarms on their system).
- Could use public water. Their well water is frequently dirty. Also recently installed a fire suppression system that uses the well water.
- Tax revenues cannot keep up with infrastructure needs; this hurts the tax-payer base. Part of problem is Pa. unfunded mandates.

- Stormwater management: none prior to 1974. Now retain 10-yr. storm, release at 2-yr. rate, but still have stormwater and erosion/sedimentation problems. Often a spending choice between this or roads.
- Infrastructure costs will increase; attempting to establish capital reserve fund.
- DEP wants The Ridings sewer plant upgraded; this will cost more than \$0.5 million.
- With no County health inspection service, may join in a multi-municipal position.
- Relying too much on parttime staff and volunteers; Township role should be expanded. Need a Township Manager (only Del. Co. township without one) due to increased rules, growth impacts, need for grants and financial planning; an increase in paid staff will pay for itself.
- Post Office parking lot is too small, dangerous.
- Lack of pedestrian access in Chadds Ford Village, e.g., from Brandywine River Hotel to 1/100 intersection; also needed in front to Post Office, Leader's, and a Rt. 1 crosswalk
- Lack of vegetation at 1/100 intersection; should be a Township initiated plan to beautify, with trees, and employing landscape expertise. Build on Rt. 1 corridor protection.

8. Is the current Township role and functioning appropriate, too much, too little?

- The Township's current role and extent of operations is very appropriate. Expansion of the Board to 5 members and/or creation of a Township Manager position would be supported.
- The BOS and volunteer board members are doing good jobs. They are willing to listen; and have been actively seeking grants.
- Township services and policies generally ok. Some CFBA members may feel the Township undervalues the need for a strong and successful business community, which is integral to a strong and balanced community. Loss of Wawa a big blow. Township could improve its development approval process, avoid regulatory increases.
- Township's current role is appropriate, but likely will expand. Many property owners are accustomed to "self-regulation," but increase in Township regulation has not met with great resistance. Remains the "land of long driveways," and little demand to alter the level of municipal services.
- Recent ordinance amendments re: steep slopes and net-out provisions are good examples of gradual increase in Township's presence.
- HARB is expanding its focus, including review of signage and preparation of a public information brochure. Seeks to be a help, not a hindrance, and to let applicants know the requirements before the fact. Working to improve the quality of submissions.
- Aside from need for Township beautification plan noted above, generally pleased with level of Township government action; not too extensive.
- Spring Hill Farms owns its roads and sewer system, and is frustrated that this may be the reason for a lack of public services. As an example, the public road that serves the site does not get plowed.
- Township Bldg. should be accessible to all groups, even if a fee is required for its use. CF Civic Assoc. is able to meet there, but not the SHF Condo Assoc.
- SHF is looking into starting a recycling program with its private trash hauler (Openlaker), and would like to serve as a model for such a program. Approx. 10-20% of the residents have asked for this. The Township could provide containers for high-volume recyclable materials.
- Township government could work more closely with the Unionville/Chadds Ford School District. There was no apparent support from the Township, or from state legislators, for the high school referendum. The quality of schools is among the Township's biggest assets, and should be supported.
- Township could better explain animal control regulations and who has jurisdiction.
- Township could provide annually to residents a list of Board and Commission members, essential phone numbers; this need not be left to the Civic Association.
- The Township website could be improved.
- Certain committees, e.g., the Planning Commission, could have a dedicated seat for a SHF and/or Painters Crossing resident.

- Active recreational opportunities needed, but no good sites without major site work and topo change. Leary of a Township park that would need management, bureaucracy.
- Fee-in-lieu ordinance provisions: expects challenge to nonresidential portion.
- Recycling: Township could mandate private haulers provide curbside pick-up; igloo containers at Twp. Bldg. not a good idea
- Not convinced a Twp. Mgr. is needed; do-ers and staff are needed.
- Current zoning ordinance is good; catch-all language in L/I District makes provision for any conceivable use
- Could address 55-&-over communities prior to applications; now provided in L/I District
- Also should adjust zoning ordinance in advance of wind mill, solar interest, green technology
- Could power Twp. Bldg. with solar

9. What is your sense of "community" and level of communication, interaction?

- Plenty of volunteer opportunities; many would like to get involved but are too busy; Not a lot of success with community events
- As issues arise, there has been good communication with other HOA's, and there is not a feeling of isolation. The newsletter is a good vehicle. Community Day, pig roast, and Chadds Ford Days are good community unifiers.
- Good sense of community in the Township, in part the result of limited government functions. The Conservancy and CFBA are important supporters of community activities. Chadds Ford Village serves a limited village function, but very constrained physically by Rt. 1.
- Improving sense of community, despite Republican attempts to control Township positions and civic organizations. Recent Township cleanup a community success.
- Some community-building efforts of late, including those of the Civic Association, Brandywine Baptist Church. Sense of community hampered by physical barriers (e.g., major roads), no genuine village. Continuing scarcity of volunteers to fill Township positions.
- Township government: observing a trend toward too much sophistication, creating positions and services that may exceed what is needed, e.g., health inspection, fire inspection. Do not want to become Concord Township. Idea of mandatory recycling is troubling.
- Not a strong sense of community, but that is not a negative. Main tie is the cultural institutions and historical/cultural heritage. That character is what Chadds Ford connotes and what residents like.
- Good core group of volunteers, but need more. Chadds Ford Community Day died from a lack of participation.
- Good communication mechanisms: Civic Assoc. newsletter; website; mailings on specific issues. Quarterly Township newsletter coming.
- Strong sense of shared values and what is liked about Chadds Ford. Little political difference re: local issues.
- The three CFHS events are about the only community-unifying events at present.
- CFHS sees itself trying to promote sense of community; suggest an annual May mailing to all residents, noting openings on Twp. boards..
- Township could maintain a current Township mailing list and make available. CFCA is working to fill void.
- CFHS picnic tables and dog-walking opportunities on site. Township could support these functions.
- There is no sense of community, but more a sense of haves/have nots. Participation in Township affairs seems limited to the politically connected and upper incomes.
- Could use more mass mailings to communicate with residents; Township government remains a relatively small nucleus, although expanded over last 5 years

10. Trends that should continue [if other than #1]

- Prefers limited government and pleased that current tax rate remains low. Some concern that Township is trending toward more regulation and BoS interest in expanded government role, which will inevitably bring tax increase. No new tax-funded services needed, and growth in local government role could be slowed.
- Rt. 1 should not be expanded to resemble Rt. 202, and should not be a pedestrian route.
- A wonderful and attractive community. Comp plan need not make sweeping proposals, rather tweak current policies and ordinances.
- Traffic impacts are external; no point in a 209 study/fee.
- Currently no Township-owned property for public facilities, and no immediate interest. This will change: need more trails, passive recreation, land for parks (although no park construction likely for a while). Should buy land within 5 years.

11. Changes needed: additions or eliminations

- Taxes should be kept to a minimum
- HARB sees likely need to create an Historical Commission to address historic resources outside the 167 districts; possible creation of a zoning overlay district.
- Greater local police presence is needed. SHF has good relations with the State Police, but understands they have other priorities. The Township should investigate a regional police force. That is a service residents would be willing to pay for.
- Need to continue seeking mass transit opportunities; Octoraro rail line should be restored; rail line owners are retaining rights-of-way for future use
- Bus line on 202 not very healthy; Brandolini shopping center at 1/322 may draw riders

Delaware County Municipal Plan Consistency Review

Municipality	Chadds Ford Township
Comp. Plan	Comprehensive Plan for Chadds Ford Township
Date of Plan	May 5, 2010
Overall Vision Statement & Goals, Objectives and Recommendations	Pgs. 1-4 – 1-8
Contiguous Municipalities	Thornbury and Concord Townships; New Castle County, DE and Birmingham (Chester Cty)
Themes	8.8 sq. mi. with US1 and US202 as main access roads pg. 1-1; very rural, almost entirely White pg. A-3; 63.4 % is residential , 21.1 % open space pg. B-1; no rail C-1 (use Marcus Hook, Elwyn, in DELCO or Exton Station in Chester Cty pg. C-1; no police, fire or ambulance facilities, no library or hospital pg. E-3
Challenges	Preserving land through TDRs and Conservations Easements pg. 2-2; develop Chadds Ford Village Master Plan pg. 2-3; Historic Village Mixed Use District needed pg. 2-3; traffic calming on US1 pg. 2-8; establish Historic Commission pg 2-10 (it has a HARB); alleviate flooding with new stormwater management plan/ordinance 2-9, 10; existing sewer capacity insufficient to meet future growth based on build-out analysis pg. 2-11; aging/older population pg. A-2, A-7; majority of annual revenue from local taxes (57%) pg. E-3; protect prime agricultural soils, steep slopes and woodlands from development pg. D-3
Special Features	Brandywine Battlefield (National Historic Landmark); Brandywine Valley Scenic Byway; bike ad trail plan pg. 2-8; completion of Hillman Drive Loop pg. 2-9; Brandywine River Trail; many sites eligible for Nat'l Registry of Historic Places, use scenic road designations as a means to protect landscape pg. D-3
Other Plans & Studies	Birmingham Township Comprehensive Plan (1972, revised 1973); <i>Township Open Space Plan</i> (2007); Brandywine Valley Scenic Byway Study; Corridor Management Plan?; DVRPC – US202 Section 100: Land Use and Coordination Study (2008); County Bicycle Plan;
Community Indicators:	

- The Planning Commission meets to discuss and approve changes to the *Draft Plan* to address comments at the Public Presentation and from the County review. The Planning Commission recommends the *Final Draft Plan* to the Board of Supervisors.
- At least forty-five (45) days prior to the public hearing, the Board of Supervisors distributes copies of the *Final Draft Plan* to the Delaware County Planning Department, adjacent municipalities [Birmingham, Pennsbury, Thornbury, and Concord Townships, and New Castle County, Delaware] and the Unionville-Chadds Ford School District for review and comment. Review comments from the County, School District and adjacent municipalities shall be made to the BOS within forty-five (45) days of receipt of the *Final Draft Plan*.
- The BOS holds a public hearing on the *Final Draft Plan* pursuant to public notice.
- The BOS votes to adopt the Plan by resolution.
- The BOS approves and publishes the Plan.

D. PLAN GOALS AND OBJECTIVES

The goal statements included in this Plan are utilized to formulate specific land use and infrastructure policies, objectives and implementation strategies. They are organized according to eight (8) categories that reflect the MPC technical requirements for Plans and specific areas of concern indicated during the public participation process:

1. Community Character

Preserve and enhance visual quality, streetscape development and general public space.

Goal	Objectives
Provide for the maintenance of the Township's streetscapes, public spaces and existing neighborhoods.	<ol style="list-style-type: none"> 1. Enhance and improve Chadds Ford Village. 2. Enhance and improve the US Rt. 202 corridor: <ol style="list-style-type: none"> a) Encourage the use of visual buffering and noise abatement from adjacent/nearby residential neighborhoods; b) Encourage a non-stop flow of US Rt. 202 traffic through the Township; c) Discourage the use of Township residential roads as alternatives to US Rt. 202. 3. Improve the Route 1 corridor through Chadds Ford Village. <ol style="list-style-type: none"> a) Enhance pedestrian circulation and the flow of local traffic. b) Preserve this existing Scenic Resource as the "Scenic Gateway to the Village of Chadds Ford" (as shown on Map 6-9 of the Township Open Space Plan). 4. Identify current significant landscapes and scenic areas in the Township. 5. Designate scenic roadways through the Township and develop criteria and tools to help ensure the maintenance of their scenic qualities. 6. Require development initiatives to relate lots and buildings to the specific conditions of the site, including both natural and man-made resources.

2. Environmental, Cultural and Historical Resources

Preserve and enhance the natural, cultural and architectural integrity of the Township, including parks and open space, historic structures and natural resources.

Goal 1	Objectives
<p>Permanently protect Chadds Ford's open spaces – its farm fields and meadows, woods, stream valleys, and other water resources, historic sites and structures and scenic resources – which, in combination, create the Township's unique community character, remaining rural atmosphere and quality of life.</p>	<p>A. Implement the Township's 2007 <i>Open Space Plan</i> objectives, as set forth below:</p> <ol style="list-style-type: none"> 1. Promote and facilitate the placement of voluntary and permanent easements on Chadds Ford's critical and sensitive open spaces; utilize other appropriate tools for permanent protection as needed, including outright acquisition or identification as significant resources using applicable county, state or federal programs. 2. Work toward permanent conservation of extensive areas of prime and significant agricultural soils to assure the potential for a range of farm-based businesses. 3. Pursue permanent conservation of woodlands, especially those 50 years and older that have significant areas of forest interior. 4. Promote the permanent protection of significant wildlife habitats, unique natural areas, and those locales that support rare plant species. 5. Seek to permanently preserve continuous riparian or open space buffers along stream corridors, as well as in and around areas of wetlands and steep slopes; seek to restore woody vegetation to these areas where needed. 6. Facilitate creation of permanently protected greenway corridors to link existing protected open space areas through land preservation or purchase of easements and rights-of-way. 7. Pursue protective strategies for the natural and historic resources identified, assessed and prioritized in the Township Open Space Plan. 8. Encourage and facilitate the work of the Chadds Ford Historical and Architectural Review Board to fully implement and administer the Township's Act 167 Historic District ordinance. 9. Promote the permanent protection of historic <i>resources</i> and locally-significant landscape elements such as walls, hedgerows, meadows, large fields, and woodlands. 10. Encourage the cooperative efforts of the Brandywine Battlefield Task Force (BBTF) and surrounding municipalities to preserve lands within the Brandywine Battlefield National Historic Landmark, which is located within both Chester and Delaware Counties. 11. Broaden the appreciation and protection of Chadds Ford's historic resources through Township sponsorship of measures such as an historic preservation plan. 12. Pursue permanent protection of Chadds Ford's scenic areas and vistas, especially where those areas also contain other significant natural and/or cultural resources. 13. Seek to maintain the essential qualities of the Township's scenic roadways (e.g., width, curvature, roadside trees, walls, structures) while planning for needed improvements. 14. Encourage the cooperative efforts of the Brandywine Valley Scenic Byway Commission (BVSBC) to protect the scenic nature of the Brandywine Valley Scenic Byway. 15. Maintain and improve watershed and subwatershed water balances within and downstream of Chadds Ford to maintain flow levels, protect water supplies and shelter the integrity of aquatic life. 16. Educate Chadds Ford residents and taxpayers regarding the financial benefits of open space protection (i.e., schools and other services required of ongoing development of unprotected open space are not cost-effective). 17. Coordinate open space planning and protection with neighboring municipalities in Delaware County, Chester County, the State of Delaware, the Delaware Valley Regional Planning Commission, and Greenspace Alliance to protect shared

	<p>resources and achieve common goals.</p> <p>18. Strive to achieve consistency with and otherwise support development of County-level open space and greenway planning efforts.</p> <p>19. Fully utilize technical assistance, educational, and/or funding resources that may be available from governmental and nongovernmental organizations.</p> <p>20. Maximize use of Township open space protection revenue collected pursuant to the May 2005 referendum under PA Act 153 to leverage open space protection funds from county, state and other potential sources.</p> <p><u>New Objectives</u></p> <p>B. Promote cooperation and coordination among historical organizations.</p>
Goal 2	Objectives
Assure provision of an adequate level of recreational services and facilities to Township residents.	<ol style="list-style-type: none"> 1. Coordinate with other public, quasi-public, and private agencies to maximize use of recreational lands, facilities and programs that these organizations may provide and that may be available to Township residents. 2. Formalize a program and fund for acceptance of cash contributions to Township recreational efforts, including but not limited to, provisions for dedication of "fees in lieu thereof" (i.e., pursuant to the Municipalities Planning Code) for recreational lands from residential and nonresidential developers. 3. Consider the Township's growing population when planning future recreational facilities. 4. Work toward establishment of a Township trails system, addressing appropriate linkages, destinations, accessibility, general suitability, and appropriate uses (e.g., pedestrian, bicycling, equestrian, and cross-country ski) considerations. Specifically, seek to interconnect protected open spaces, recreational areas, and residential neighborhoods. 5. Consider applicable standards and criteria for recreational facilities for Township residents. 6. Pursue funding sources for recreational development through county, state and other potential funding sources. 7. Encourage the cooperative efforts of the BVSBC to improve the recreational attributes of the Brandywine Valley Scenic Byway.

3. Land Use

Review existing and future land development issues.

Goal	Objectives
Provide for future development in a manner that will protect and enhance the general welfare and quality of life in the Township.	<ol style="list-style-type: none"> 1. Guide the location and intensity of future development to protect existing neighborhoods and open space. 2. Coordinate future land development with the logical and efficient extension of public utilities and services. 3. Ensure that any commercial development along the U.S. Rt. 202 corridor does not detract from the quality of life in the adjacent residential neighborhoods. 4. Support and participate in regional planning efforts.

4. Transportation

Adopt the regional circulation plan and the need to address public transit alternatives, pedestrian and bicycle circulation, and traffic congestion.

Goal	Objectives
Provide and maintain a high quality, safe road network that serves the needs of all residents and encourages the development of alternative modes of transportation, including rail and bus service.	<ol style="list-style-type: none"> 1. Inventory existing transportation and road improvement needs. 2. Identify and recommend traffic calming techniques in the Township to ensure the safe movement of vehicles through residential areas. 3. Investigate opportunities to create pedestrian trail and bikeway linkages between residential neighborhoods and community facilities. 4. Prepare a pedestrian and bicycle circulation plan for the Township. 5. Implement mechanisms to require new development to accommodate pedestrian and bicycle circulation. 6. Coordinate planning with neighboring communities to enhance the flow of vehicular traffic through the region and provide for linkages of walking and bicycle paths. 7. Investigate alternative modes of public transportation.

5. Housing

Ensure that a range of affordable housing exists.

Goal	Objectives
Ensure that the Township has adequate housing options.	<ol style="list-style-type: none"> 1. Explore affordable housing options to address the needs of the Township's population. 2. Explore opportunities for regional planning of alternative housing.

6. Economic Development

Maintain the current level of existing businesses.

Goal	Objectives
Continue to provide for appropriate commercial activities in the Township.	<ol style="list-style-type: none"> 1. Maintain and improve the economic viability of the U.S. Rt. 202 Business District. 2. Improve the streetscape of the U.S. Rt., particularly in the Chadds Ford Village vicinity.

7. Community Facilities and Services

Identify current and future needs for police, emergency services, administrative, public works, and other services and facilities provided by the Township.

Goal	Objectives
Provide community facilities and services to meet current and future residential and business requirements in the Township.	<ol style="list-style-type: none"> 1. Investigate and prioritize the following community services and facilities, and make recommendations to address issues: <ol style="list-style-type: none"> a) Public water and sewer service. b) Police and emergency services. c) Township administration and code enforcement. d) Road maintenance and public works. e) Trash and recycling services. f) Park and recreational facilities and services.

8. Regional Coordination

Identify opportunities for coordination of planning issues with surrounding townships and Delaware County.

Goal	Objectives
Encourage and participate in regional planning activities.	<ol style="list-style-type: none">1. Participate in regional planning initiatives, such as the Oakland Road Corridor Scenic Easement Program and the Brandywine Valley Scenic Byway Study.2. Coordinate planning with neighboring communities to encourage the provision of public transportation.3. Coordinate planning with neighboring communities to enhance the flow of vehicular traffic through the region and provide for linkages of walking and bicycle paths.4. Coordinate planning with neighboring communities to ensure compatible land use for adjoining areas.5. Participate in multi-municipal planning initiatives for compatible development, continuation of historic community patterns, and coordination of infrastructure development.6. Coordinate with area communities and PennDOT regarding detailed plans for the US Rt. 202 improvement project.

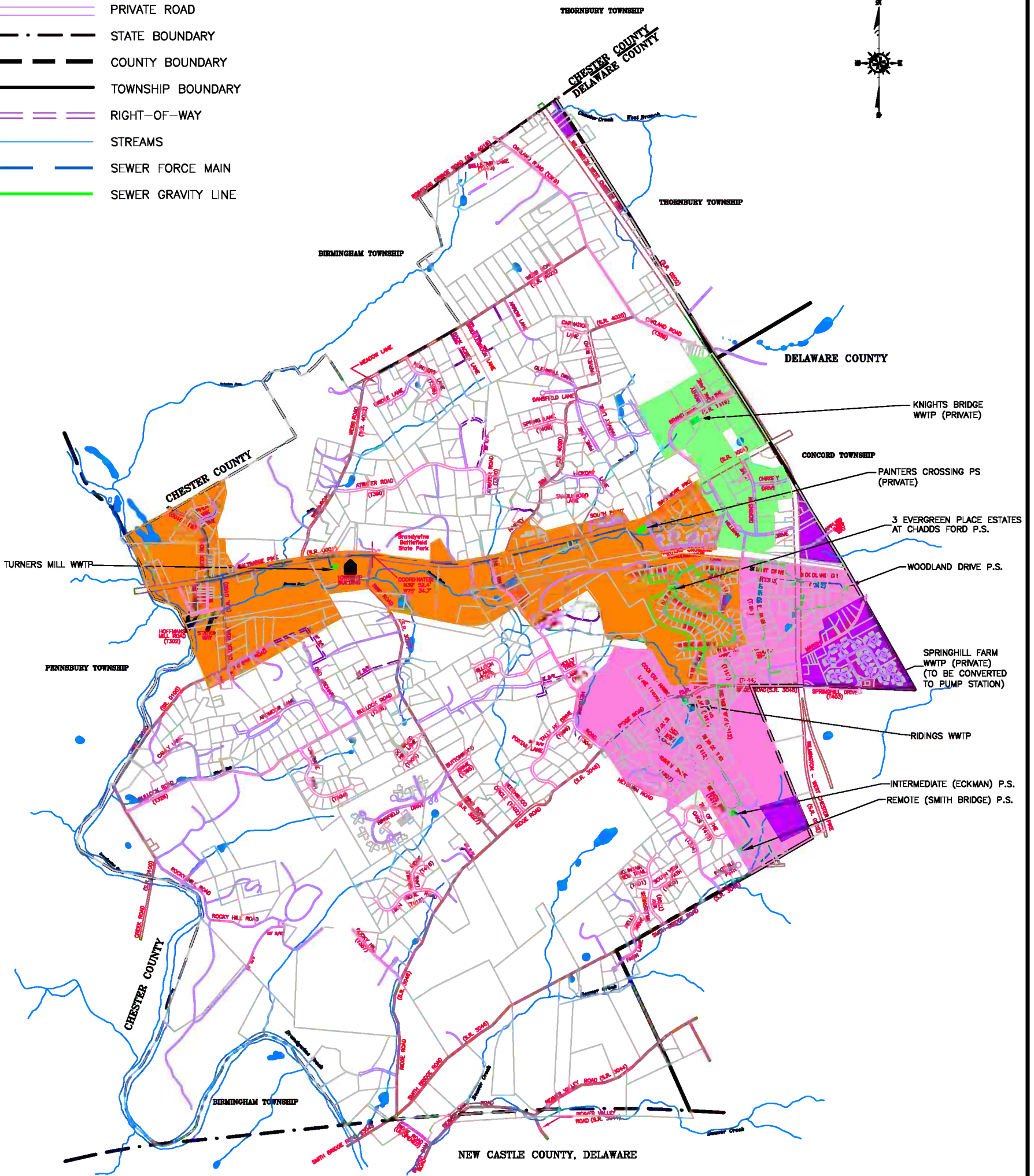
UPDATE REVISION TO CHADDS FORD TOWNSHIP'S
SEWAGE FACILITIES MANAGEMENT (ACT 537) PLAN

APPENDIX V

Alternative 1 – Sewer Service Map

LEGEND

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



SERVICE AREAS

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

Pennoni Associates Inc.
Engineers • Surveyors • Planners
ONE SOUTH CHURCH STREET, 2ND FLOOR
WEST CHESTER, PA 19382

ALTERNATIVE 1
CHADDS FORD TOWNSHIP SEWER AUTHORITY
CHADDS FORD, PENNSYLVANIA

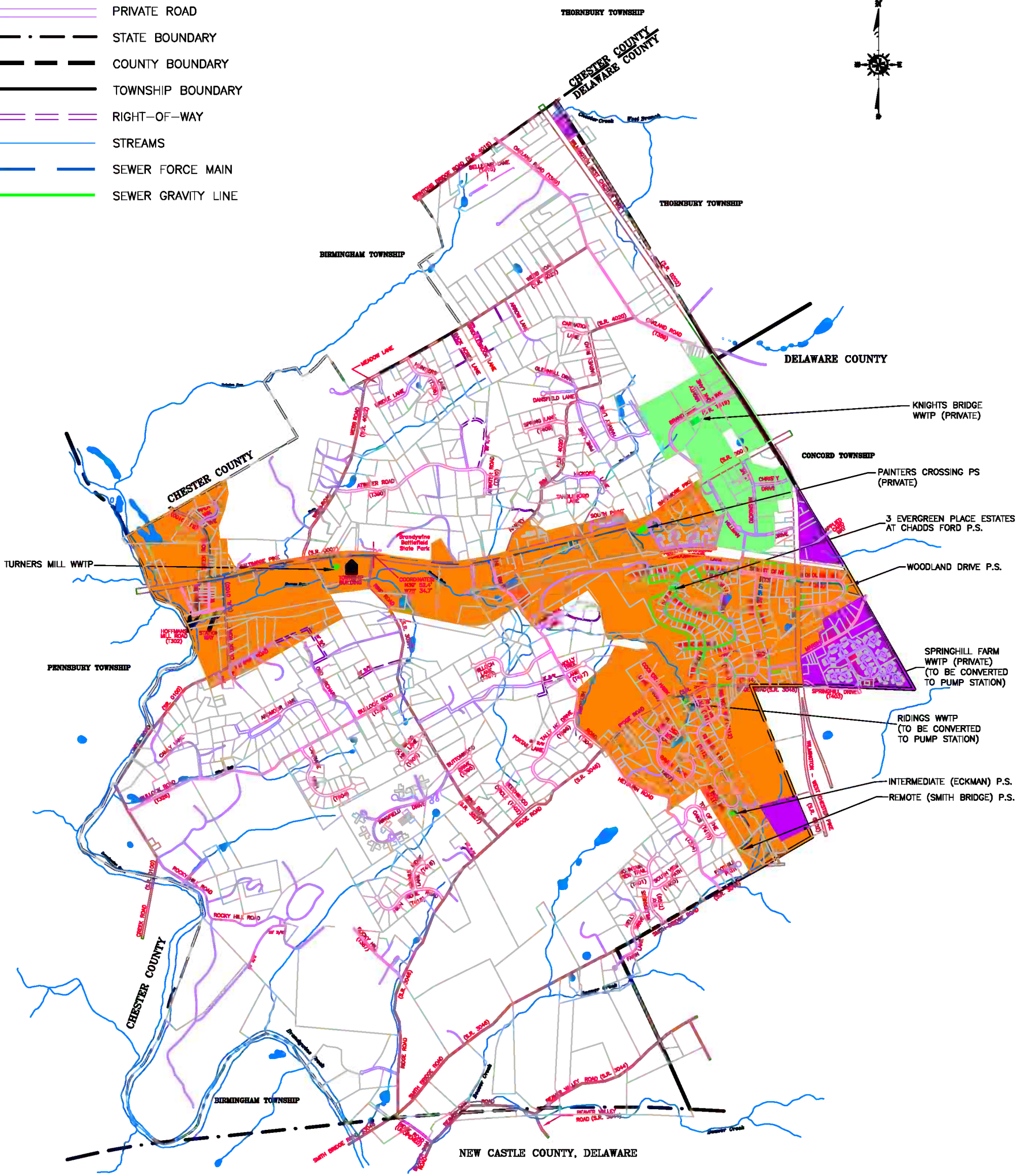
UPDATE REVISION TO CHADDS FORD TOWNSHIP'S
SEWAGE FACILITIES MANAGEMENT (ACT 537) PLAN

APPENDIX VI

Alternative 2 – Sewer Service Map

LEGEND

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



SERVICE AREAS

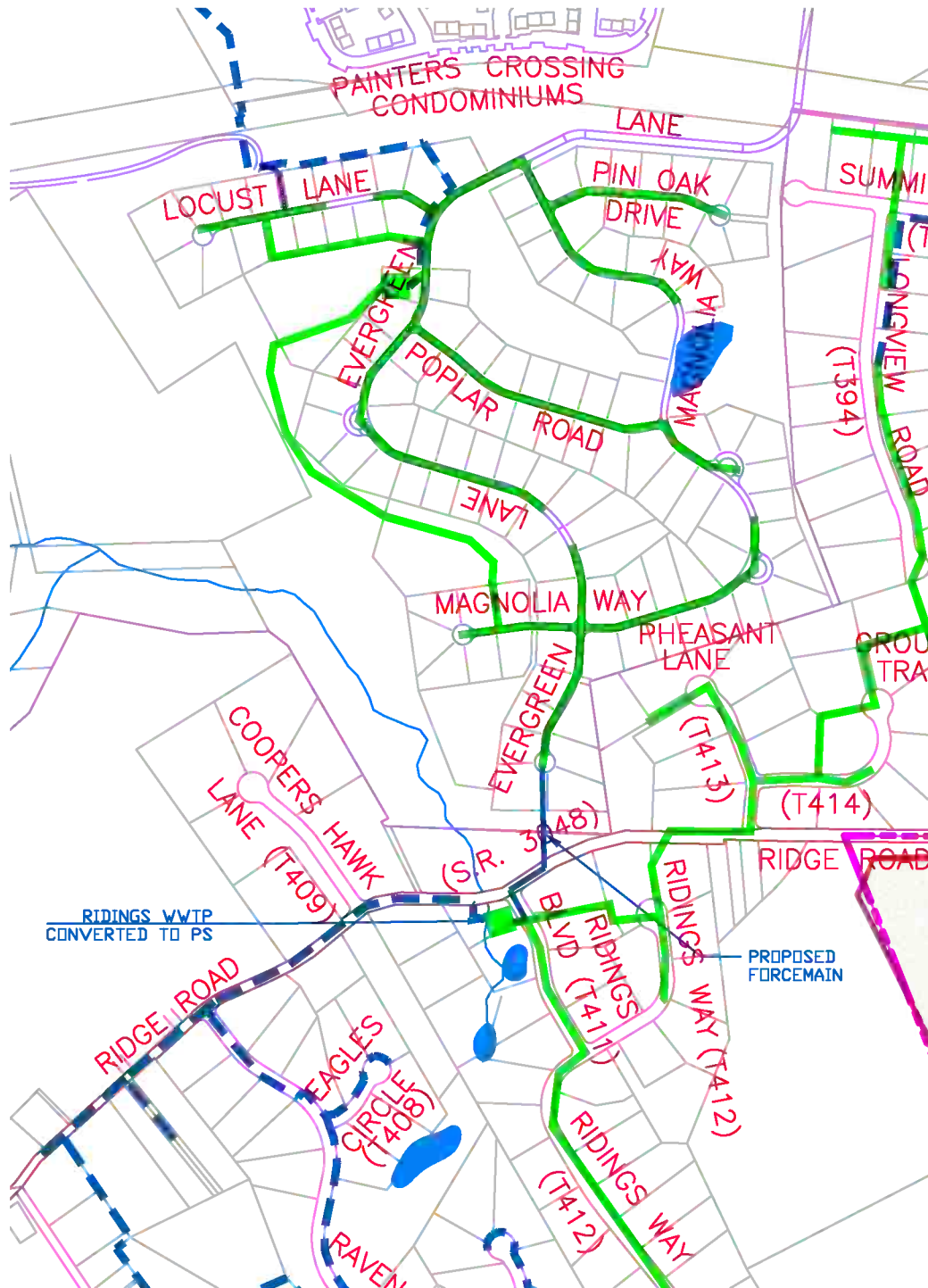
- KNIGHTS BRIDGE SERVICE AREA
- TURNERS MILL SERVICE AREA
- TO CONCORD SERVICE AREA

Pennoni Associates Inc.
Engineers • Surveyors • Planners
ONE SOUTH CHURCH STREET, 2ND FLOOR
WEST CHESTER, PA 19382

ALTERNATIVE 2
CHADDS FORD TOWNSHIP SEWER AUTHORITY
CHADDS FORD, PENNSYLVANIA

APPENDIX VII

Concept Plan for Ridings Pump Station Conversion Force Main



LEGEND

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

Pennoni Associates Inc.

Engineers • Surveyors • Planners
1 DREXEL PLAZA, 3001 MARKET STREET
PHILADELPHIA, PENNSYLVANIA 19104

CONVERSION CONCEPT

CHADDS FORD TOWNSHIP SEWER AUTHORITY
CHADDS FORD, PENNSYLVANIA

APPENDIX VIII

Planning Commission Adoption



July 13, 2016

Re: Planning Commission Act 537 Draft Review

To Whom It May Concern:

The Chadds Ford Township Planning Commission has completed its review of the Chadds Ford Township updated Act 537 Plan. This proposed update has no changes to the current land uses. The proposed plan is in complete compliance with the Township's Comprehensive Land Use Plan.

Regards,



Craig Huffman, Chairman
Chadds Ford Township Planning Commission
10 Ring Road
Chadds Ford, PA 19317
610-388-8800

APPENDIX IX

Resolution

CHADDS FORD TOWNSHIP
Delaware County, Pennsylvania

RESOLUTION NO. 2016-24

Sewage Facilities Management (Act 537) Plan Revision

WHEREAS, Section 5 of the Act of January 24, 1966, P.L. 1535, No.537, known as the "Pennsylvania Sewage Facilities Act," as amended, and the Rules and Regulations of the Department of Environmental Protection (Department) adopted thereunder, Chapter 71 of Title 25 Pennsylvania Code, requires the municipality to adopt an Official Sewage Facilities Plan providing for sewage services adequate to prevent contamination of waters and/or environmental health hazards with sewage wastes, and to revise said plan whenever it is necessary to meet the sewage disposal needs of the municipality; and

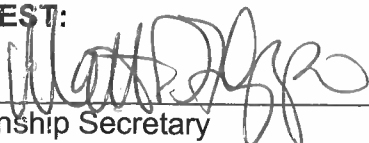
WHEREAS, the Board of Supervisors of Chadds Ford Township had Pennoni Engineering Firm prepare a revision to its Act 537 Plan which provides for sewage facilities in Chadds Ford Township. The alternative of choice to be implemented is Alternate 2 as found in the current Act 537 Plan update, which includes the expansion of the Turner's Mill Plant, decommissioning the Ridings Sewer Plant and converting it to a pump station that conveys sewage to the Turner's Mill Plant. The key implementation activities/dates include preparation of plans and specifications, obtaining permits and approvals, bidding, award, and construction as outlined in the current Act 537 Plan update.

WHEREAS, Chadds Ford Township finds that the Facility Plan described above conforms to applicable zoning, subdivision, other municipal ordinances and plans and to a comprehensive program of pollution control and water quality management.

NOW, THEREFORE, BE IT RESOLVED that the Supervisors of Chadds Ford Township hereby adopt and submit to the Department of Environmental Protection for its approval as a revision to the "Official Plan" of the municipality, the above referenced Facility Plan. The municipality hereby assures the Department of the complete and timely implementation of the said plan as required by law. (Section 5, Pennsylvania Sewage Facilities Act as amended).

Resolved this 5th day of October, 2016.

ATTEST:


Township Secretary

BOARD OF SUPERVISORS


Chairman


Vice Chairman


Supervisor

APPENDIX X

Publication

Copy of Notice or Publication

AD#

998684

Proof of Publication of Notice in Delaware County Daily Times

Under Newspaper Advertising Act. No. 587, Approved May 16, 1929

State of Pennsylvania,
County of Delaware,

}

SS.

Lynn D. Bettcher

designated agent of CENTRAL STATES

being duly sworn, deposes and says that the DELAWARE COUNTY DAILY TIMES, a daily newspaper as defined in the above-mentioned Act, published at Primos, Delaware County, Pennsylvania, was est 1876, and issued and published continuously thereafter for a period of 100 years and for a period of immediately prior hereto, (under the name Chester Times prior to November 2, 1959) in the City Delaware and further says that the printed notice or publication attached hereto is an exact copy of printed and published in the regular edition and issues of the DELAWARE COUNTY DAILY TIMES viz.....

May

5,

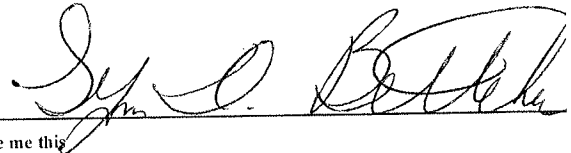
and that said advertising was inserted in all respects as ordered.

Affiant further deposes that he is the proper person duly authorized by

PUBLISHING, INC. publisher of said DELAWARE COUNTY DAILY TIMES, a newspaper of general

the foregoing statement under oath and that affiant is not interested in the subject matter of the

advertisement, and that all allegations in the foregoing statements as to time, place and character of publication

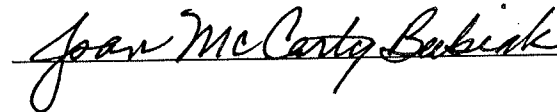


Sworn to and subscribed before me this

5th

day of

May



Notary Public

COMMONWEALTH OF PENNSYLVANIA

NOTARIAL SEAL

Joan McCarty Babiak, Notary Public
Upper Darby Twp., Delaware County
My Commission Expires April 19, 2020

MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

CHADDS FORD TOWNSHIP Delaware County, PA

The Chadds Ford Township Board of Supervisors' and the Township's Sewer Authority hereby give notice that the Township's Act 537 Plan, Sewage Facilities (Act 537 Plan), last revised in 2005, is being updated and is available for review and public comment. A copy of the Township's updated Act 537 Plan may be downloaded from the website, www.ChaddsFordPA.gov, or a copy may be reviewed at the Township Building, 10 Ring Road, Chadds Ford, PA 19317. The Act 537 Plan encompasses the entire Township, in Western Delaware County, covering an area of approximately 8.8 square miles, bordering four (4) other municipalities—Concord Township, Delaware County to the east, Thornbury Township, Delaware County to the north east, Pennsbury Township, Chester County to the west and Birmingham Township, Chester County to the north west. The majority of the Township is located within the Brandywine Creek drainage basin, with a small portion of the Township, along the US Route 202 Corridor, located within the Chester Creek basin. Both the Brandywine Creek and the Chester Creek basins discharge into the Delaware River. Currently, two municipally owned wastewater treatment plants (WWTP's), the Ridings WWTP and the Turner's Mill WWTP, empty into the Harvey Run tributary of the Brandywine Creek. The updated Act 537 plan has been drafted to address the need to upgrade existing sewage treatment plant facilities, address alternatives to transform existing sewage treatment plant facilities into pump stations, to update the Township's sewer service area map, and prepare the Township for future growth and development. The Act 537 Plan includes alternatives to convert the Ridings WWTP into a pump station and expand the Turner's Mill WWTP. A 30-day comment period has been established commencing on the date of this advertisement to allow the general public to comment on the proposed Act 537 Plan. The general public may review the proposed Act 537 Plan between the hours of 8:30AM and 5:30PM, Monday - Thursday, or download it from the Township's website. The general public may forward written comments to the Township at the address listed above. All written comments must be received prior to the end of the 30-day public comment period. The Township will address any written comments prior to submitting the Act 537 Plan to the Pennsylvania Department of Environmental Protection.

Amanda Serock
Manager

DCT, May 5, a-1

CHADDS FORD TOWNSHIP
Delaware County, PA

The Chadds Ford Township Board of Supervisors' and the Township's Sewer Authority hereby give notice that the Township's Act 537 Plan, Sewage Facilities (Act 537 Plan), last revised in 2005, is being updated and is available for review and public comment. A copy of the Township's updated Act 537 Plan may be downloaded from the website, www.ChaddsFordPA.gov, or a copy may be reviewed at the Township Building, 10 Ring Road, Chadds Ford, PA 19317. The Act 537 Plan encompasses the entire Township, in Western Delaware County, covering an area of approximately 8.8 square miles, bordering four (4) other municipalities—Concord Township, Delaware County to the east, Thornbury Township, Delaware County to the north east, Pennsbury Township, Chester County to the west and Birmingham Township, Chester County to the north west. The majority of the Township is located within the Brandywine Creek drainage basin, with a small portion of the Township, along the US Route 202 Corridor, located within the Chester Creek basin. Both the Brandywine Creek and the Chester Creek basins discharge into the Delaware River. Currently, two municipally owned wastewater treatment plants (WWTP's), the Ridings WWTP and the Turner's Mill WWTP, empty into the Harvey Run tributary of the Brandywine Creek. The updated Act 537 plan has been drafted to address the need to upgrade existing sewage treatment plant facilities, address alternatives to transform existing sewage treatment plant facilities into pump stations, to update the Township's sewer service area map, and prepare the Township for future growth and development. The Act 537 Plan includes alternatives to convert the Ridings WWTP into a pump station and expand the Turner's Mill WWTP. A 30-day comment period has been established commencing on the date of this advertisement to allow the general public to comment on the proposed Act 537 Plan. The general public may review the proposed Act 537 Plan between the hours of 8:30AM and 5:30PM, Monday – Thursday, or download it from the Township's website. The general public may forward written comments to the Township at the address listed above. All written comments must be received prior to the end of the 30-day public comment period. The Township will address any written comments prior to submitting the Act 537 Plan to the Pennsylvania Department of Environmental Protection.

Amanda Serock
Manager

APPENDIX XI

Consistency

Consistency Evaluation

Selected Alternative

Evaluation Category	Consistency		Comments
	Yes	No	
Clean Streams Law or Section 208 of Clean Water Act	X		The alternative is consistent with the Clean Streams Law.
Chapter 94- Municipal Wasteload Management Plans	X		The proposed plant expansion will provide adequate capacity for the next 5 years. The existing sewer system has adequate capacity for the next 5 years.
Title II – Clean Water Act	X		The alternative is consistent with the requirements of the 1985 201 Facilities Plan. (Refer to Section 1.0)
Township Comprehensive Plan	X		The alternative is consistent with the Township Comprehensive Plan for land use and sewer service.
Antidegradation Requirements of PA Chapters 93, 95, 102	X		The alternative will not adversely affect water quality.
State Water Plan	X		The alternative is consistent with the State Water Plan.
PA Prime Agricultural Land Policy	X		The alternative will have no impact on prime agricultural land.
County Stormwater Management Plan	X		The alternative is consistent with the County Stormwater Plan.
Chapter 105 – Wetland Protection	X		The alternative will not impact wetlands.
PNDI Review	X		No impact to rare, threatened or endangered species.
Historical and Archaeological Resource Protection	X		No impact to historical and archaeological resources.



One Drexel Plaza
3001 Market Street, Suite 200
Philadelphia, PA 19104
T: 215-222-3000
F: 215-222-3588

www.pennoni.com

MEMORANDUM

TO: Amanda Serock, Sewer Authority Manager
CHADDS FORD TOWNSHIP SEWER AUTHORITY

FROM: Thomas Leisse, PE, CME, Authority Engineer
PENNONI ASSOCIATES INC.

DATE: October 24, 2016

SUBJECT: **Consistency Determination**
Chadds Ford Township Act 537 Plan

Amanda,

As part of the current Act 537 Plan updates, the attached request for Preliminary Treatment Requirement (PTR) application was submitted for the potential expansion of the Turners Mill Treatment Plant.

The PaDEP issued the attached PTR response to the submitted application that provided the required effluent limits. After consultation with the Authority's Operational Manager, DELCORA, it was determined that the existing treatment process of the Turners Mill Plant can meet those future effluent limits.

In addition, please find attached copies of the agency comments which demonstrates consistency of the proposed alternative.

1. PROJECT INFORMATION

Project Name: **Chadds Ford Pump Station**

Date of Review: **3/20/2017 11:43:47 AM**

Project Category: **Waste Transfer, Treatment, and Disposal, Liquid waste/Effluent, Sewer line (new - construction in new location)**

Project Area: **0.74 acres**

County(s): **Delaware**

Township/Municipality(s): **CHADDS FORD**

ZIP Code: **19317**

Quadrangle Name(s): **WILMINGTON NORTH**

Watersheds HUC 8: **Brandywine-Christina**

Watersheds HUC 12: **Middle Brandywine Creek**

Decimal Degrees: **39.866013, -75.552821**

Degrees Minutes Seconds: **39° 51' 57.6465" N, 75° 33' 10.1554" W**

2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	No Known Impact	No Further Review Required
PA Department of Conservation and Natural Resources	No Known Impact	No Further Review Required
PA Fish and Boat Commission	No Known Impact	No Further Review Required
U.S. Fish and Wildlife Service	Avoidance Measure	See Agency Response

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

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

Chadds Ford Pump Station

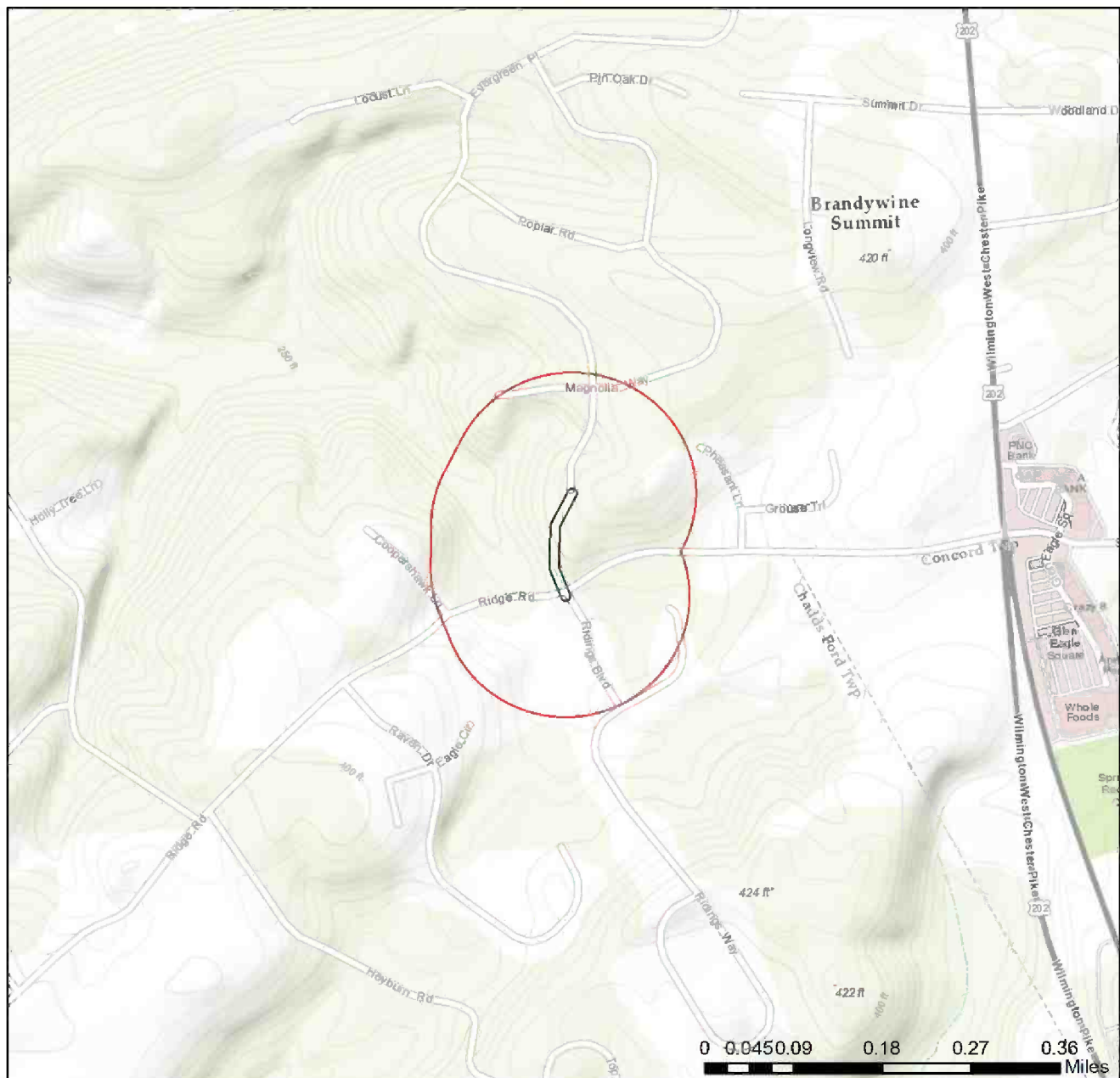


- Project Boundary
- Buffered Project Boundary



Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user

Chadds Ford Pump Station



- Project Boundary
- Buffered Project Boundary

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



RESPONSE TO QUESTION(S) ASKED

Q1: Will this project or any project-related activities require any in-stream work, or a permanent or temporary crossing of a waterway (stream, river, creek, tributary)?

Your answer is: No

Q2: Accurately describe what is known about wetland presence in the project area or on the land parcel by selecting ONE of the following. "Project" includes all features of the project (including buildings, roads, utility lines, outfall and intake structures, wells, stormwater retention/detention basins, parking lots, driveways, lawns, etc.), as well as all associated impacts (e.g., temporary staging areas, work areas, temporary road crossings, areas subject to grading or clearing, etc.). Include all areas that will be permanently or temporarily affected -- either directly or indirectly -- by any type of disturbance (e.g., land clearing, grading, tree removal, flooding, etc.). Land parcel = the lot(s) on which some type of project(s) or activity(s) are proposed to occur.

Your answer is: The specific project area (that is, project layout or "footprint") has not yet been identified, but the land parcel on which the project will occur has been investigated by someone qualified to identify and delineate wetlands, and no wetlands were located. (A written report from the wetland specialist should substantiate this.)

3. AGENCY COMMENTS

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

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

PA Game Commission

RESPONSE:

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

PA Department of Conservation and Natural Resources

RESPONSE:

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

PA Fish and Boat Commission

RESPONSE:

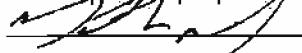
No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

U.S. Fish and Wildlife Service

RESPONSE:

Avoidance Measure: Do not conduct this project/activity within 50 feet of any streams, rivers, creeks, or tributaries. This includes both perennial and intermittent waterways.

As the project proponent or applicant, I certify that I will implement the above Avoidance Measure:

 (Signature)

SPECIAL NOTE: If you agree to implement the above Avoidance Measure, no further coordination with this agency regarding threatened and endangered species and/or special concern species and resources is required. If you are not able to comply with the Avoidance Measures, you are required to coordinate with this agency - please send project information to this agency for review (see "What to Send" section).

WHAT TO SEND TO JURISDICTIONAL AGENCIES

If project information was requested by one or more of the agencies above, upload* or email* the following information to the agency(s). Instructions for uploading project materials can be found [here](#). This option provides the applicant with the convenience of sending project materials to a single location accessible to all three state agencies. Alternatively, applicants may email or mail their project materials (see AGENCY CONTACT INFORMATION).

***Note:** U.S.Fish and Wildlife Service requires applicants to mail project materials to the USFWS PA field office (see AGENCY CONTACT INFORMATION). USFWS will not accept project materials submitted electronically (by upload or email).

Check-list of Minimum Materials to be submitted:

____ Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted.

____ A map with the project boundary and/or a basic site plan (particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)

In addition to the materials listed above, USFWS REQUIRES the following

____ **SIGNED** copy of a Final Project Environmental Review Receipt

The inclusion of the following information may expedite the review process.

____ Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)

____ Information about the presence and location of wetlands in the project area, and how this was determined (e.g., by a qualified wetlands biologist), if wetlands are present in the project area, provide project plans showing the location of all project features, as well as wetlands and streams.

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. Two review options are available to permit applicants for handling PNDI coordination in conjunction with DEP's permit review process involving either T&E Species or species of special concern. Under sequential review, the permit applicant performs a PNDI screening and completes all coordination with the appropriate jurisdictional agencies prior to submitting the permit application. The applicant will include with its application, both a PNDI receipt and/or a clearance letter from the jurisdictional agency if the PNDI Receipt shows a Potential Impact to a species or the applicant chooses to obtain letters directly from the jurisdictional agencies. Under concurrent review, DEP, where feasible, will allow technical review of the permit to occur concurrently with the T&E species consultation with the jurisdictional agency. The applicant must still supply a copy of the PNDI Receipt with its permit application. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. The applicant and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at <https://conservationexplorer.dcnr.pa.gov/content/resources>.

5. ADDITIONAL INFORMATION

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

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

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources

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

PA Fish and Boat Commission

Division of Environmental Services
450 Robinson Lane, Bellefonte, PA 16823
Email: RA-FBPACENOTIFY@pa.gov

U.S. Fish and Wildlife Service

Pennsylvania Field Office
Endangered Species Section
110 Radnor Rd; Suite 101
State College, PA 16801
NO Faxes Please

PA Game Commission


Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA 17110-9797
Email: RA-PGC_PNDI@pa.gov
NO Faxes Please

7. PROJECT CONTACT INFORMATION

Name: Michael W. Schneider, PE, Chadds Ford Township Engineer
Company/Business Name: Pennoni
Address: One South Church Street, 2nd Floor
City, State, Zip: West Chester, PA 19382
Phone: (610) 422-2461 Fax: (610) 429-8918
Email: MSchneider@pennoni.com

8. CERTIFICATION

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



applicant/project proponent signature

March 20, 2017

date



One Drexel Plaza
3001 Market Street, Suite 200
Philadelphia, PA 19104
T: 215-222-3000
F: 215-222-3588
www.pennoni.com

February 3, 2016

CFTA 1600

Sent via Overnight Mail

Pravin C. Patel, PE
Environmental Engineering Manager
Department of Environmental Protection
2 East Main Street
Norristown, PA 19401

Re: **PTR APPLICATION**
PERMIT # PA0244031
CHADDS FORD TOWNSHIP SEWER AUTHORITY
TURNERS MILL WASTEWATER TREATMENT PLANT

Dear Pravin:

On behalf of the Chadds Ford Sewer Authority, please find enclosed a completed PTR application for the expansion of the existing Turners Mill WWTP in the Chadds Ford collection system.

Please contact me if you have any questions or require additional information.

Sincerely,

PENNONI ASSOCIATES INC.

A handwritten signature in black ink, appearing to read "Thomas Leisse".

Thomas Leisse, PE, CME
Authority Engineer

Enclosure

cc: Amanda Serock, Authority Manager

P:\Projects\CFTA\CFTA1600 - 2016 Annual Services\Turners Mill PTR Application\PTR Transmittal.doc

WSWM-PTR-2004
Application

NPDES #: PA0244031

PRELIMINARY TREATMENT REQUIREMENT (Existing Plant)

Applicant/Consultant Name: Chadds Ford Township Sewer Authority

Mailing Address: 10 Ring Road, Chadds Ford PA 19317

Phone No./Contact Name: Amanda Serock, Authority Manager

Project Name: Turners Mill WWTP Plant Expansion

Project Location: 10 Ring Road, Chadds Ford PA 19317

Name of the Topo Map Quad.: Wilmington North, DEL-PA

(Attach a copy of the Topographical Map showing discharge location)

Latitude at the proposed discharge point: 39° 52' 23"

Longitude at the proposed discharge point: 75° 34' 52"

Municipality: Chadds Ford Township

County: Delaware

Average annual effluent discharge rate: 0.225 MGD Hydraulic Design Capacity

Name of the receiving stream: Harvey Run

Designated Water Use (WWF, CWF, HQ, EV): WWF, MF
(use website www.pacode.com)

Source of Wastewater (residential development/commercial/industrial): Residential/Commercial

List of pollutants believed to be present in the effluent
(e.g. typical sewage: CBOD5, TSS, NH3-N, phosphorus, residual chlorine, fecal coliform, dissolved oxygen & pH)

See Attached

Any background stream quality data (date, location etc.) for the pollutants believed to be present

Other Information needed to run the model (Optional)


Drainage area upstream of the discharge

River mileage Index

Stream Code

Stream bed elevation from topographical map

Low flow yield of the stream using USGS web site


Signature of the Applicant/Consultant
Date 2/3/16

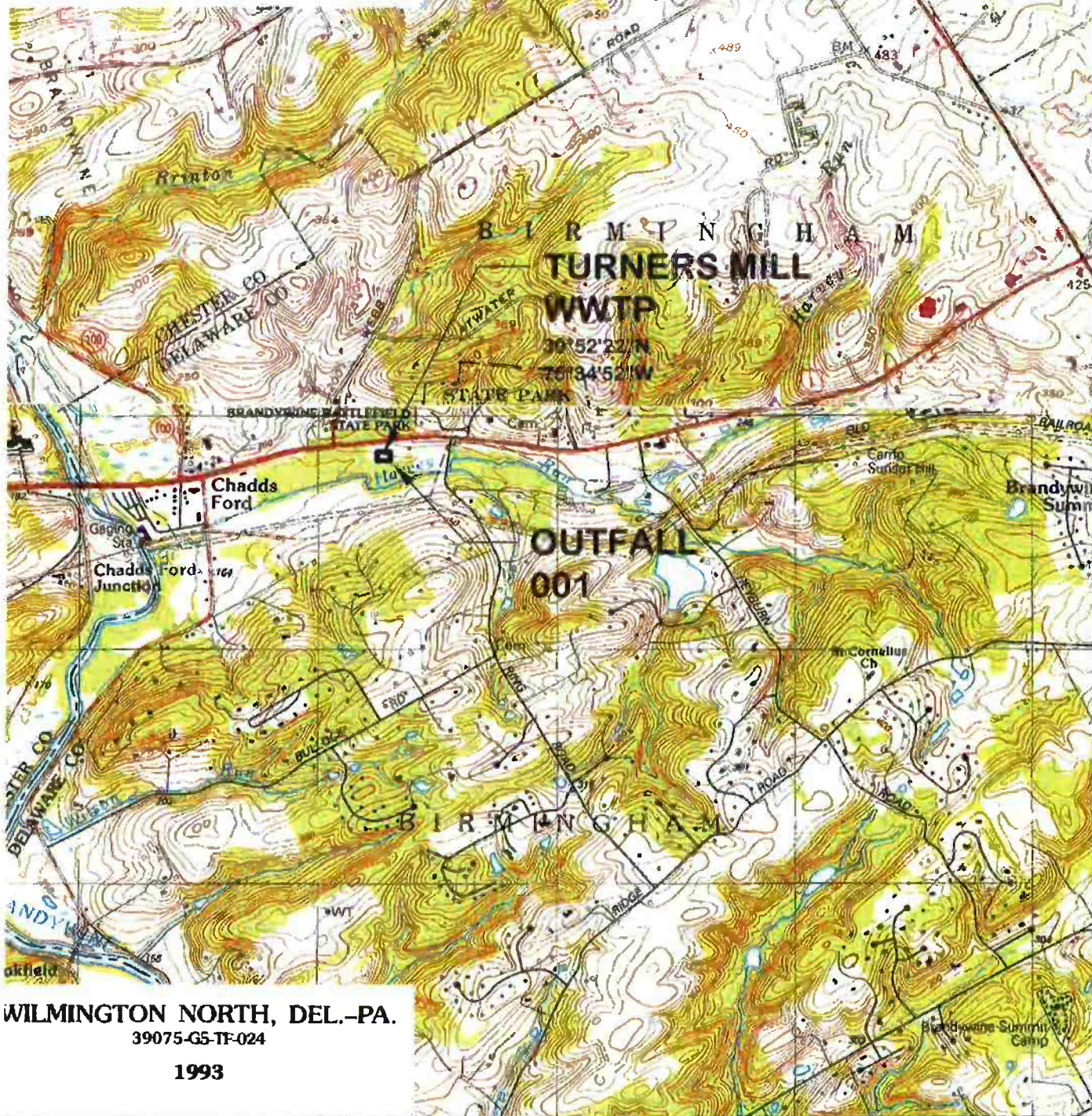
WEST CHESTER, PA.

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Pennoni Associates Inc.
One Drexel Plaza
3001 Market Street
Philadelphia, PA 19104

DRAWN BY:
JAS
CHECKED BY:
JCM
JOB No.
CFTA-1002

SCALE:
SCALE: 1"=2000'

DATE:
10/21/2010

SKETCH No.

1

USGS Topographic Map

Chadds Ford Township Sewer Authority

**Proposed Effluent Composition
Average Month**

Parameter

CBOD₅	<10 mg/l
TSS	<10 mg/l
Fecal Coliform	<50 mg/l
NH₃	<4.5 mg/l
TDS	<1000 mg/l
pH	6.0 – 9.0



pennsylvania
DEPARTMENT OF ENVIRONMENTAL
PROTECTION

RECEIVED
FEB 11 2016

PENNONI ASSOCIATES

February 5, 2016

Mr. Thomas Leisse, PE, CME
Authority Engineer
One Drexel Plaza
3001 Market Street, Suite 200
Philadelphia, PA 19104

Re: Preliminary Treatment Requirements
Turners Mill WWTP - PA0244031
Chadds Ford Township
Delaware County

Dear Mr. Leisse:

This is in response to your letter dated February 3, 2016, requesting Preliminary Treatment Requirements for a discharge of 225,000 gallons per day of treated sewage from Turners Mill WWTP to Harvey Creek, in Chadds Ford Township, Delaware County. The current permitted discharge flow is 140,000 gallons per day.


In order to assist consultants with the design of wastewater treatment facilities, the Department of Environmental Protection's (Department) Southeast Regional Office has developed effluent limits that will meet stream requirements using various criteria and are as follows:

CBOD₅ = 6.4 mg/l
TSS = 10.0 mg/l
NH₃-N (05/01-10/31) = 1.0 mg/l
NH₃-N (11/01-04/30) = 3.0 mg/l
Total Phosphorus = 0.64 mg/l
Total Nitrogen = 25 mg/l
DO = 6.0 mg/l, minimum
Fecal Coliform = 50/100 ml geometric mean
Total Residual Chlorine = 0.5 mg/l (UV Recommended)

Please use above limits for your decision making process regarding the expansion of the sewage treatment plant. If these limits are acceptable to you, a NPDES permit amendment application shall be required.

If you have any questions, please call Begay Omuralieva at 484-250-5189. You may also wish to contact the Sewage Planning Specialist for information on Act 537 sewage facilities planning requirements for this project.

Sincerely,

A handwritten signature in cursive script, appearing to read "Patel", written in dark ink.

Pravin Patel, P.E.
Environmental Engineer Manager
NPDES Permits Section
Clean Water Program

cc: Chad Fords Township
Operations Section
Ms. Serock- Authority Manager.
Planning Section
File



Chadds Ford Township would like its neighboring Townships to have a copy of its DRAFT update to its ACT 537 PLAN, Sewage Facilities Management. Please feel free to direct any comments or questions to Amanda Serock, Township Manager at 610-388-8800 x104 at your earliest convenience and no later than the end of August.

A handwritten signature in dark ink, appearing to read "Brenda L. Lamanna".

Ms. Brenda L. Lamanna, Township Manager
Concord Township
43 S. Thornton Road (off of Rt 1)
Glen Mills, PA 19342

A handwritten signature in dark ink, appearing to read "Quina P. Nelling".

Ms. Quina P. Nelling, Secretary/ Treasurer
Birmingham Township
1040 West Street Road (926)
West Chester, PA 19382

A handwritten signature in dark ink, appearing to read "Jeffrey T. Seagraves".

Mr. Jeffrey T. Seagraves, Township Manager
Thornbury Township
6 Township Drive
Cheyney, PA 19319

A handwritten signature in dark ink, appearing to read "Judy Jensen".

10 RING ROAD
CHADDS FORD, PA 19317-9101

PHONE 610.388.8800
FAX 610.388.5057
WEB WWW.CHADDSFORDPA.GOV



One Drexel Plaza
3001 Market Street, Suite 200
Philadelphia, PA 19104
T: 215-222-3000
F: 215-222-3588

www.pennoni.com

MEMORANDUM

TO: Amanda Serock, Manager
CHADDS FORD TOWNSHIP SEWER AUTHORITY

FROM: Thomas Leisse, PE, CME, Authority Engineer
PENNONI ASSOCIATES INC.

DATE: September 26, 2016

SUBJECT: Changes to the Act 537 Plan
CFTP 0570

The following changes have been made to the Act 537 Plan:

- References to the Spring Hill Farm's Home Owners Association has been changed to Springhill Farm Wastewater Treatment Facility Association.
- The financial and debt status information has been updated using 2015 operational costs.
- Update cost analysis of Riding conversion using 2015 costs.
- A conceptual plan showing the location of the proposed force main routing from the Ridings pumping station has been added to the Appendix.
- The note referring to Wawa and Audi on the sewer service map has been updated to reference "inter-municipal" agreements in lieu of "private".

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

Map 3 of Appendix II identifies the types of soils within Chadds Ford Township. The suitability of the soils for underground sewage systems are listed in Tables 1 thru 3 of Appendix II. As shown in the Tables, portions of the soils within the Township show some limitations to underground systems.

In addition to determining the site soils characteristics, the Pennsylvania Code Chapter 73 (PA Code), prohibits the construction of absorption areas and spray fields on fill unless the fill has remained in place for a minimum of four years. The PA Code also recommends that absorption and spray fields be located on undisturbed soils.

2. Prime Agricultural Soils

Prime agricultural soils are defined as those soils that are the most productive for food and feed crops. In general, these soils are deep, not prone to erosion, nearly level, well drained and generally devoid of rocks and stones. In accordance with the Chadds Ford Township Open Space Plan and the Brandywine Conservancy, the township contains approximately 1,780 acres of prime agricultural soils (see Map 4 of Appendix II).

3. Archeological and Historic Resources

Within Chadds Ford Township there are several historic and archeological landmark areas. Per Chadds Ford Township Open Space plan and the Brandywine Conservancy, these areas include; the Act 167 Historic District (Village of Chadds Ford and the Village of Dilworthtown), the Natural Register District, the Brandywine Battlefield Natural Historic Landmark, Gilpin House as well as areas along the Columbia Gas Line, as shown on Map 5 and 6 of Appendix II.

D. Geology Features within the Study Area

The underlying geology of an area can affect the suitability of a site for the successful operation of an underground wastewater disposal system. In accordance with the PA Code, the primary concern with geology and wastewater disposal is restrictive rock areas and areas underlain by limestone.

1. Restrictive Rock Layers:

Chadds Ford Township is located in the Wissahickon Formation of the Piedmont Upland Section of the Piedmont Physiographic Province of Pennsylvania (see Map 7, Appendix II). This area consists of broad, gently rolling hills and valleys. The geology of the area consists of metamorphic and igneous rocks (see Map 8, Appendix II). Table 1, Appendix II indicates limitations of the Township's soils due to the depth of underlying restrictive layers. As shown on Table I, 48% of the Township's is very limited for the use of conventional onlot sewer systems due to the location of the restrictive rock layer. (It is recommended that restrictive rock layers be located

→ SHOULD BE
TOWNSHIP

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

and other drinking-water organizations and water suppliers across the nation. The goal of the Partnership is to enhance the quality of drinking-water safety by optimizing treatment plant performance. In accordance with the EPA and the PA DEP regulations, CWA completes and posts online an annual water quality report.

The remaining parcels outside of the public water service area are served by private wells. The wells are installed in accordance with PA DEP guidelines. Chapter 73 of the PA Code establishes the minimum separation distances between an individual water supply and a septic system. Prior to construction, the location of the well and septic system are determined based on the recommended separation distance.

G. Wetlands within the Study Area

A wetland is defined as a low lying area such as a marsh or swamp that is saturated with moisture. The soils in these areas are saturated and have no additional space available for the absorption of sewage. According to the National Wetlands Inventory, approximately 2% of the Township is covered by wetlands. Map 12 of Appendix II, shows wetland areas located within Chadds Ford Township.

In addition, the PA Code prohibits the construction of an absorption area or spray field in floodways or within 50 feet of a stream. The primary water bodies associated with floodplains are Brandywine Creek and Harvey Run. Appendix II contains FEMA maps for Chadds Ford Township. The maps indicate floodplain areas within the Township as well as stream locations. Tables 1 thru 3 of Appendix II indicate the soil limitations for septic systems due to high water table and or flooding. As shown on Tables I-III, 21.5% of the Township is very limited for conventional onlot sewer systems, 22% is very limited for sand mounds and 11% is very limited for spray irrigation systems due to the flooding and/or the location of the water table.

III. Existing Wastewater Facilities in the Planning Area

There are two municipally owned sewage treatment plants (WWTP's) in Chadds Ford Township, Delaware County. The Ridings WWTP (NPDES Permit PA0055476) is located at the intersection of Ridge Road and Ridings Boulevard. The Turners Mill WWTP (NPDES Permit PA0244031) is located adjacent to the Township Building at the intersection of Baltimore Pike (Route 1) and Ring Road.

There are currently no tributary municipalities that send sewage to either of the wastewater treatment facilities in the Township. However, there are two private WWTP's in the Township. The Springhill Farm WWTP (NPDES Permit No. PA0052230) serves the Springhill Farms Development and Glen Eagle Shopping Center at Wilmington-West Chester Pike (Route 202) and Ridge Road in the south east corner of the Township (see Flow Chart F-1 located in Appendix III). The Knights Bridge WWTP (NPDES Permit No. PA0052663) serves properties owned by the Henderson Group at the intersection of Routes 202 and Route 1 (see Flow Chart F-3 located in Appendix III).

→ SHOULD BE
SPRINGHILL FARM

→ SHOULD BE
WWTPs

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

Condominium units (170 equivalent EDUs). There are no future connections proposed for this pump station. The pump station consists of two aboveground Smith & Loveless pumps rated at 220 gpm each, resulting in a peak design flow of 316,800 gpd. The force main from the pump station discharges into a combined forcemain that conveys the sewage directly to the Turners Mill WWTP.

The Painters Crossing Pump Station is in relatively good condition. No upgrades to the station are currently planned. The Painters Crossing Pump Station has an emergency generator for back-up power which is reportedly inspected and exercised on a regular basis.

2) Estates at Chadds Ford Pump Station

The Estates at Chadds Ford pump station is located at 3 Evergreen Place and serves the 120 single family detached residences in the Estates at Chadds Ford subdivision. There are no future connections proposed for this pump station as the subdivision is built out. The pump station consists of two aboveground Smith & Loveless pumps rated at 100 gpm each, resulting in a peak design flow of 144,000 gpd. The force main from the pump station discharges into a combined forcemain that conveys the sewage directly to the Turners Mill WWTP.

The EACF Pump Station is in relatively good condition. The pump station has an emergency generator for back-up power which is reportedly inspected and exercised on a regular basis.

B. Existing Privately Owned Wastewater Treatment System

a. Springhill Farm Wastewater Treatment Plant

Springhill Farm WWTP is located in eastern portion of Township near the intersection of Springhill Road and Springhill Drive. The treatment plant serves a 276 townhome community, a commercial shopping center, a restaurant and several residential properties. The Plant was constructed in 1985 (WQM Permit #2387434 and NPDES Permit # PA0052230). The Plant has a permitted hydraulic design capacity of 100,000 gallons/day. The Table below summarizes the results of Springhill Farms 2013 Discharge Monitoring Reports (DMRs). ✓

At this time, ~~Springhill Farm's Home Owner Association (SHFHOA)~~ is negotiating with Concord Township to connect to their sewage system. If ~~SHFHOA~~ obtains all necessary approvals to connect to Concord's system, they would be required to submit a special study/planning module to the PA DEP for review and approval.

→ SHOULD BE
SPRINGHILL FARM'S
→ SHOULD BE
SFWTFA

12 → REPLACE WITH
THE SPRINGHILL FARM WASTEWATER
TREATMENT FACILITY ASSOCIATION
(SFWTFA)

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

SPRINGHILL FARMS WWTP

SHOULD BE SPRINGHILL FARM WWTP

MONTH	DISSOLVED OXYGEN (mg/L)		pH (Instantaneous Maximum) (S.U.)		pH (Instantaneous Minimum) (S.U.)		Total Suspended Solids Average Monthly (lbs/day)		Total Suspended Solids Average Monthly (mg/L)		Ammonia-Nitrogen (Average Monthly) (lbs/day)		Ammonia-Nitrogen (Average Monthly) (mg/L)		Total Phosphorus (Average Monthly) (mg/L)	
	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT
JANUARY	6	5	7.5	9	6.6	6	7	25	15	30	0.2	5	0.5	6	3.5	---
FEBRUARY	6.3	5	7.6	9	6.6	6	9.2	25	20	30	0.1	5	0.1	6	3.2	---
MARCH	6.2	5	7.6	9	6.7	6	4	25	10	30	0.05	5	0.1	6	3.5	---
APRIL	5.7	5	7.2	9	6.7	6	4	25	10	30	0.1	5	0.1	6	3.8	---
MAY	6	5	7.6	9	6.7	6	3	25	7	30	0.04	5	0.1	6	3.6	---
JUNE	5.6	5	7.5	9	6.6	6	3	25	6	30	0.2	5	0.5	6	3.8	---
JULY	5.5	5	7.7	9	6.8	6	1	25	4	30	0.2	5	0.5	6	2.9	---
AUGUST	5	5	7.7	9	7	6	2	25	5	30	0.2	5	0.5	6	4.7	---
SEPTEMBER	5.8	5	7.6	9	7	6	3	25	8	30	0.2	5	0.5	6	3.7	---
OCTOBER	6.5	5	7.6	9	6.8	6	5	25	13	30	0.2	5	0.5	6	4.1	---
NOVEMBER	6.3	5	7.9	9	6.6	6	4	25	13	30	0.3	5	0.9	6	4.6	---
DECEMBER	6.5	5	7.5	9	6.5	6	7	25	18	30	0.2	5	0.5	6	4	---

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

→ SHOULD BE SPRINGHILL FARM WWTP

MONTH	Flow (Average Monthly) (mgd)		Flow (Daily Maximum) (mgd)		Total Residual Chlorine (TRC) (Average Monthly) (mg/L)		Total Residual Chlorine (TRC) (Instantaneous Maximum) (mg/L)		Fecal Coliform (Average Monthly) (CFU/100mL)		Fecal Coliform (Instantaneous Maximum) (CFU/100mL)		CBOD5 (Average Monthly) (lbs/day)		CBOD5 (Average Monthly) (mg/L)	
	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT
JANUARY	0.05452	---	0.06571	---	0.04	0.06	0.08	0.14	25	200	640	1000	7	21	16	25
FEBRUARY	0.05746	---	0.06555	---	0.04	0.06	0.12	0.14	32	200	87	1000	8	21	18	25
MARCH	0.05594	---	0.06554	---	0.02	0.06	0.08	0.14	10	200	17	1000	9	21	21	25
APRIL	0.05575	---	0.06826	---	0.03	0.06	0.09	0.14	29	200	63	1000	7	21	16	25
MAY	0.05527	---	0.09435	---	0.03	0.06	0.07	0.14	12	200	52	1000	7	21	17	25
JUNE	0.05894	---	0.09174	---	0.03	0.06	0.08	0.14	11	200	19	1000	6	21	13	25
JULY	0.05082	---	0.07134	---	0.03	0.06	0.08	0.14	8	200	25	1000	2	21	6	25
AUGUST	0.04862	---	0.05581	---	0.03	0.06	0.09	0.14	26	200	55	1000	1	21	4	25
SEPTEMBER	0.04695	---	0.06126	---	0.03	0.06	0.06	0.14	87	200	580	1000	1	21	4	25
OCTOBER	0.04903	---	0.07719	---	0.04	0.06	0.13	0.14	35	200	61	1000	2	21	5	25
NOVEMBER	0.04793	---	0.07724	---	0.03	0.06	0.07	0.14	88	200	188	1000	2	21	6	25
DECEMBER	0.04716	---	0.06796	---	0.04	0.06	0.11	0.14	7	200	12	1000	2	21	6	25

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

V. Alternatives Analysis and Evaluation

In order to provide collection and treatment options for current and future needs within Chadds Ford Township, following two alternatives were identified:

- Do nothing – Continue to maintain and operate existing sewage collection, conveyance and treatment systems.
- Ridings Conversion / Turners Mill Expansion – this option involves decommissioning the Ridings WWTP by converting the treatment plant to a pump station that conveys sewage flow to the Turner's Mill WWTP. The Turner's Mill WWTP would be expanded to accommodate the additional flow.

A. Alternative 1 – Continued Operation and Maintenance of Existing Public Sewer Collection, Conveyance and Treatment Systems (graphic representation provided in Appendix V)

1. Turner's Mill WWTP

The service area to Turner's Mill WWTP would remain relatively unchanged with the exception of removing a number of parcels along Baltimore Pike where collection/conveyance systems are not in place. An expansion of the Turner's Mill WWTP would not be required under this alternative. Turners Mill WWTP will continue to be maintained and repaired as required to meet the PA DEP permitting requirements.

2. Ridings WWTP

The service area to Ridings WWTP would remain relatively unchanged with the exception of removing 364 Wilmington-West Chester Pike which is expected to be treated in Concord Township. Ridings WWTP will continue to be maintained and repaired as required to meet the PA DEP permitting requirements.

3. Knight's Bridge WWTP (Private)

The service area to Knight's Bridge WWTP would be limited to properties currently connected to the plant, and properties under ownership of the Henderson Group (owner of the treatment plant).

4. Springhill Farm WWTP (Private)

At this time, the ~~Springhill Farms development Homeowners Association (SHFHOA)~~ and the ~~Springhill Farms Sewer Authority~~ is in the process of negotiating an Agreement with Concord Township allowing them to connect to their public sewer

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

system. For the purposes of this report, it is assumed that Springhill Farms will connect to Concord Township's system. Once SHFHOA obtains all of the necessary approvals, a separate special study/planning module will be submitted to the PA DEP for their review and approval.

SHOULD BE
SPRINGHILL
FARM

SHOULD BE
SFWTFA

5. Concord

A Concord Township service area has been established as a number of properties within Chadds Ford Township have connected, or plan to connect to the Concord Township WWTP.

B. Alternative 2 – Ridings Conversion / Turners Mill Expansion (graphic representation provided in Appendix VI)

1. Turner's Mill WWTP

The service area to Turner's Mill WWTP would be expanded to include the Ridings service area. Sewage flowing to the Ridings WWTP would be pumped to Turners Mill WWTP for treatment and disposal. A force main would be installed to convey sewage from the Ridings pump station to a gravity sewer system in the Estates at Chadds Ford Development (approximately 1,100 feet of force main). The existing gravity sewer system in the Estates of Chadds Ford development flows to the Estates pump station where the sanitary sewage is conveyed by force main to Turners Mill WWTP (approximately 2,600 feet of existing 4-inch diameter and 6,800 feet of existing 12-inch diameter force main).

Ridings WWTP's existing tank, equipment and influent pump station would be utilized to pump sewage flows to Turners Mill WWTP. The existing influent pump station pumps and controls would be upgraded and the existing wet well would be lined with epoxy coated to extent its useful life. The wet well will act as a tank and will equalize flow to the pump station at the Estates of Chadds Ford development. Flow equalization will create a consistent pump rate and will allow the existing 4-inch diameter force main from the Estates pump to Turners Mill WWTP to be used.

The Ridings pump station is currently owned and maintained by the Chadds Ford Sewer Authority. In order to accept the increased flows (existing and estimated flows) to the Ridings pump station, the station's pumping capacity will need to be increased from 100 gpm to approximately 225 gpm. The capacity of the wet well will also need to be increased, this can be accomplished through the installation of a 12-inch diameter wet well on site.

The estimated hydraulic loading projection thru 2030 from the Ridings and Turners Mill WWTP is 871 EDU's. Using a value of 217 GPD/EDU this equates to approximately 189,007 gpd. Turners Mill WWTP is permitted for 140,000 gpd. The Turners Mill WWTP will need to be upgraded to increase the permitted capacity of

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

4. Springhill Farm WWTP (Private)

At this time, the ~~Springhill Farms development Homeowners Association (SHFHOA)~~ and the ~~Springhill Farms Sewer Authority~~ is in the process of negotiating an Agreement with Concord Township allowing them to connect to their public sewer system. For the purposes of this report, it is assumed that Springhill Farms will connect to Concord Township's system. Once SHFHOA obtains all of the necessary approvals, a separate special study/planning module will be submitted to the PA DEP for their review and approval.

5. Concord

A Concord Township service area has been established as a number of properties within Chadds Ford Township have connected, or plan to connect to the Concord Township WWTP.

C. Analysis of Alternatives

A cost analysis was completed to evaluate the feasibility of the Alternatives, specifically for the Ridings Service Area.



July 13, 2016

Re: Planning Commission Act 537 Draft Review

To Whom It May Concern:

The Chadds Ford Township Planning Commission has completed its review of the Chadds Ford Township updated Act 537 Plan. This proposed update has no changes to the current land uses. The proposed plan is in complete compliance with the Township's Comprehensive Land Use Plan.

Regards,



Craig Huffman, Chairman
Chadds Ford Township Planning Commission
10 Ring Road
Chadds Ford, PA 19317
610-388-8800



THOMAS COMMITTA ASSOCIATES, INC.
Town Planners & Landscape Architects

Population Trends and Forecasts

Chadds Ford Township – Delaware County, PA

6-13-16; Revised: 6-14-16

<u>Population</u>	<u>DVRPC (March 2013)</u>	<u>Act 537 Draft</u>
	3,640 2010 Census	
	3,663 2015 Forecast	3,920
	3,730 2020 Forecast	
	3,887 2025 Forecast	4,760
<hr/>		
	4,044 2030 Forecast	
	4,111 2035 Forecast	
	4,134 2040 Forecast	
<hr/>		

Notes:

- If we use a 10-year growth projection, from 2016 to 2026, but calibrate to 2025, the CFT population could increase by 247 persons from 2010 to 2025 using DVRPC data.
- In 2010, there were 1,436 total Households, according to the U.S. Census, with an average persons per Household of 2.54.
- Using a 2.54 persons per Household, there may be 1,530 Households in 2025 ($3,887 \div 2.54 = 1530$). This would be an increase of 94 Households from 2010 to **2025**.

TO: Chadds Ford Township Planning Commission

FROM: Samantha Reiner, Township Supervisor

RE: Act 537 Plan - May 2016 draft - review comments

DATE: June 13, 2016

MEMORANDUM

Page 1: The Plan mentions the Township first approved and implemented its own Act 537 Plan in 1991. It then mentions in 2004 and 2005 the Township updated its Act 537 Plan. During its review of the 2005 Plan the PaDEP recommended additional studies be completed on two private WWTPs as well as the Ridings. Q: Were these studies ever completed? If so, consider adding a statement here that leads reviewer of Plan to the studies.

The plan only references those private WWTPs as part of the overall Authority system. Those studies do not impact the analysis of the current 537 update.

Page 2: The Plan, at II. B, describes Physical Characteristics within the Study Area.

Q: Should the description also include “developed areas”, wetlands and “heavily wooded rolling hills”?

Q: later in the Plan (Page 5 – Topography) there is discussion about large % of the Township that is very limited for conventional on-lot sewer systems due to slopes. Should the description of Physical Characteristics include reference to slopes?

Q: later in the Plan (Page 4 – Restrictive Rock Layers) there is discussion about % of the Township that is very limited for conventional on-lot sewer systems due to “Restrictive Rock Layers”. Should the Physical Characteristics include reference to the rock?

Q: later in the Plan (age 6 – Wetlands) there is discussion about % of the Township that is very limited for conventional on-lot sewer systems due to “wetlands”. Should the Physical Characteristics include reference to wetlands?

Physical Characteristics are covered later in the “Physical and Demographic Analysis” in Section II.

Page 12: Springhill Farms WWTF is mentioned here, as well as on pages 29 & 32. Is this the most recent information concerning its transitioning to a Pump Station and sending effluent to Concord Township?

The update was revised only to include the current description of the plant. The conversion has not been completed, it would be premature to include information until the agreements have been approved and construction completed.

Page 20: Comprehensive Plan is mentioned here and @ Appendix IV. The Township has appointed a Comp Plan Task Force to study and update its Comprehensive Plan. This should be completed in 2016. Q: Should reference to this update be made? Should a link to the existing Comp Plan be placed in the Appendix?

The existing Plan is included in the Appendix.

Page 21: Zoning is mentioned here. The Township has appointed a Zoning Task Force committee to study and make recommendations towards amending the Ordinances. This should be completed in 2016. Q: Should reference to this be made?

If the ordinances are updated, they will be contained in the referenced chapter.

Page 24: Build Out Plan is referenced here, and that data may be updated by the new Comp Plan study. Q: should there be a note here referencing the update?

No, we can only include the most current adopted Plan in the update.

Page 27: Growth Plan is referenced here, (same comment as above).

No, we can only include the most current adopted Plan in the update.

Page 30: Alternative #2 is mentioned here.

Q: Does the Township own the sewer infrastructure in the non-dedicated roadbeds and easements in Estates of Chadds Ford?

Q: Does the alternative need to discuss where the new force main will be located (as in existing easements or newly acquired easements)?

Q: Should a map showing the route of the new force main be included, pointing out any of the "problem" areas such as wetlands or stream crossings if applicable?

A concept map of the proposed force main routing is included within the update. Any specific construction information (easements, approvals) will be addressed during design.

Page 37: Operating Costs are indicated here.

Q: Are these current numbers?

Q: @ B Available Staff and administrative resources are discussed here; should the language be the same as it appears on Page 7 where it mentions Authority Manager and an Administrative Manager?

Yes, the costs have been updated to the most recent audited financial statement. The Admin Manager was added to the description of resources.

General Comment: I feel the Plan would benefit from an introductory page, that bridges the gap from the 2005 plan to today. Chadds Ford Township municipal representatives and professionals have met with staff from the PADEP and Concord Township in the time between the last Plan implementation and this Plan proposal, discussing other options to sewer the township. Perhaps a statement that tells why the Township no longer wishes to depend on Concord Township to accommodate growth could be included.

The update follows the format from previously completed plans and as recommended by the PaDEP. There is no requirement to describe the differences from 2005 only the status of the current system and the future plan. Statements including Concord Township may confuse the final plan as Concord is not included in the current implementation.

October 9, 2017

CFTP 0570

Douglas C. McLearen, Chief
Division of Archaeology & Protection
Pennsylvania Historical and Museum Commission
Bureau of Historic Preservation
400 North Street
Harrisburg, PA 17120-0093

**RE: Chadds Ford Township, Delaware County
Chadds Ford Sanitary Sewer Extension**

Dear Mr. McLearen:

On behalf of Chadds Ford Township, attached please find the following information:

1. Completed Cultural Resource Notice
2. Narrative Description
3. USGS Quadrangle, North Wilmington, DE
4. Location Plan

As part of the Township's Act 537 Plan update, the Township is proposing to convert the Ridings Waste Water Treatment Plant into a pump station which would connect to the existing gravity sewer system located in the Estates at Chadds Ford development. The conversion and connection will require the installation of approximately 1,100 feet of force main.

If you have any questions, please feel free to contact me.

Sincerely,

PENNONI

A handwritten signature in blue ink, appearing to read "Michael W. Schneider".

Michael W. Schneider, PE
Township Engineer



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

CULTURAL RESOURCE NOTICE

DEP USE ONLY

Date Received

Read the instructions before completing this form.

SECTION A. APPLICANT IDENTIFIER

Applicant Name Chadds Ford Township, Delaware County

Street Address 10 Ring Road

City Chadds Ford State PA Zip 19317

Telephone Number (610) 388-8800

Project Title Chadds Ford Township Force Main Installation

SECTION B. LOCATION OF PROJECT

Municipality Chadds Ford Township County Name Delaware DEP County Code 23

SECTION C. PERMITS OR APPROVALS

Name of Specific DEP Permit or Approval Requested: Sewage Facilities Planning Module Approval

Anticipated federal permits:

- | | |
|--|---|
| <input type="checkbox"/> Surface Mining | <input type="checkbox"/> 404 Water Quality Permit |
| <input type="checkbox"/> Army Corps of Engineers | <input type="checkbox"/> Federal Energy Regulatory Commission |
| <input type="checkbox"/> 401 Water Quality Certification | <input type="checkbox"/> Other: _____ |

SECTION D. GOVERNMENT FUNDING SOURCES

- | | |
|--|---|
| <input type="checkbox"/> State: (Name) _____ | <input checked="" type="checkbox"/> Local: (Name) <u>Chadds Ford Township</u> |
| <input type="checkbox"/> Federal: (Name) _____ | <input type="checkbox"/> Other: (Name) _____ |

SECTION E. RESPONSIBLE DEP REGIONAL, CENTRAL, DISTRICT MINING or OIL & GAS MGMT OFFICE

- DEP Regional Office Responsible for Review of Permit Application ☐ Central Office (Harrisburg)
- | | |
|--|--|
| <input checked="" type="checkbox"/> Southeast Regional Office (Norristown) | <input type="checkbox"/> Northeast Regional Office (Wilkes-Barre) |
| <input type="checkbox"/> Southcentral Regional Office (Harrisburg) | <input type="checkbox"/> Northcentral Regional Office (Williamsport) |
| <input type="checkbox"/> Southwest Regional Office (Pittsburgh) | <input type="checkbox"/> Northwest Regional Office (Meadville) |
| <input type="checkbox"/> District Mining Office: _____ | <input type="checkbox"/> Oil & Gas Office: _____ |

SECTION F. RESPONSIBLE COUNTY CONSERVATION DISTRICT, if applicable.

County Conservation District _____ Telephone Number, if known _____

Delaware County Conservation District (610) 892-9484

SECTION G. CONSULTANT

Consultant, if applicable Pennoni Associates Inc. - Attn: Michael W. Schneider, PE

Street Address 1 South Church Street, Second Floor

City West Chester State PA Zip 19382

Telephone Number (610) 422-2461

SECTION H. PROJECT BOUNDARIES AND DESCRIPTION**REQUIRED**

Indicate the total acres in the property under review. Of this acreage, indicate the total acres of earth disturbance for the proposed activity.

Attach a 7.5' U.S.G.S. Map indicating the defined boundary of the proposed activity.

Attach photographs of any building over 50 years old. Indicate what is to be done to all buildings in the project area.

Attach a narrative description of the proposed activity.

Attach the return receipt of delivery of this notice to the Pennsylvania Historical and Museum Commission.

REQUESTED

Attach photographs of any building over 40 years old.

Attach site map, if available.

SECTION I. SIGNATURE BLOCK

Applicant's Signature



Date of Submission of Notice to PHMC

CFTP 0570

October 9, 2017

NARRATIVE DESCRIPTION

CHADDS FORD TOWNSHIP FORCE MAIN INSTALLATION

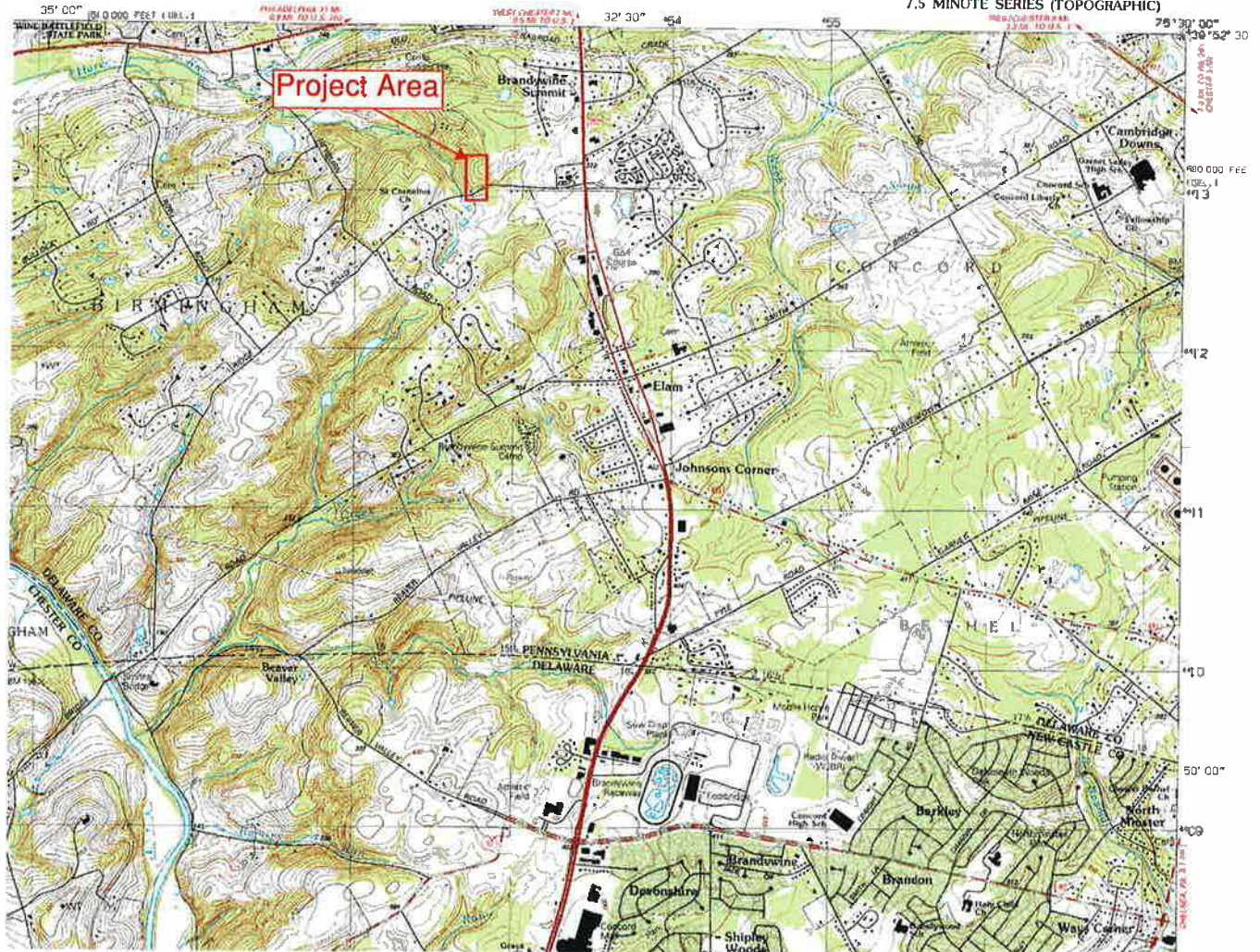
CHADDS FORD TOWNSHIP, DELAWARE COUNTY

Chadds Ford Township proposes to convert the Ridings WWTP to a pump station with sewage being pumped to Turners Mill WWTP for treatment and disposal. A force main would be installed to convey sewage from the Ridings pump station to a gravity sewer system in the Estates at Chadds Ford Development (approximately 1,100 feet of force main). The existing gravity sewer system in the Estates of Chadds Ford development flows to the Estates pump station where the sanitary sewage is conveyed by force main to Turners Mill WWTP.

The proposed force main would cross Ridge Road and traverse a wooded area consisting of Township and HOA owned open space to tie into the existing gravity system on Evergreen Place within the Estates at Chadds Ford.

STATE OF DELAWARE
DELAWARE GEOLOGICAL SURVEY

WILMINGTON NORTH QUADRANGLE
DELAWARE-PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)

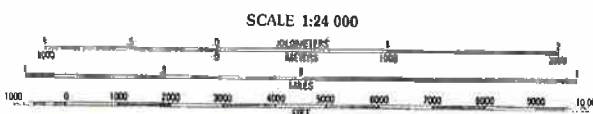
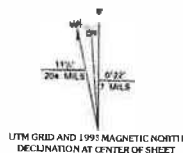


Produced by the United States Geological Survey
Control by USGS and NOS/NOAA
Compiled from aerial photographs taken 1989
Field checked 1991. Map edited 1993
North American Datum of 1983 (NAD 83). Projection and
1:000-meter grid; Universal Transverse Mercator, zone 18
10 000-foot ticks: Delaware Coordinate System of 1983 and
2 500-meter ticks: Pennsylvania Coordinate System of 1983
south zone
1927 North American Datum (NAD 27) is shown by dashed corner ticks
The values of the shift between NAD 83 and NAD 27 for 7.5-minute
intersections are given in USGS Bulletin 1875
There may be private inholdings within the boundaries of
the National or State reservations shown on this map
Grey tint indicates areas in which only landmark buildings are shown
Fine red dashed lines indicate selected fence and field lines where
generally visible on aerial photographs. This information is unchecked

Primary highway, hard surface Light-duty road, hard or improved surface ...
Secondary highway, hard surface Unimproved road ...
Interstate Route U. S. Route State Route

WILMINGTON NORTH, DEL.-PA.
39075-GS-TF-024

1993



CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 29)
(TO CONVERT ELEVATIONS TO THE NORTH AMERICAN VERTICAL DATUM OF 1988, SUBTRACT 1 FOOT)

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY
DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST



1	2	3	1 Unifonville
4	5	6	2 West Chester
			3 Media
			4 Kennett Square
			5 Marcus Hook
			6 Newark East
			7 Wilmington South
			8 Penns Grove

ADJOINING 7.5' QUADRANGLE NAMES

Chadds Ford Township Force Main



- ☐ Project Boundary
- ☐ Buffered Project Boundary

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user



OCT 12 '17

Pennsylvania State
Historic Preservation Office

One South Church Street
Second Floor
West Chester, PA 19382
T: 610-429-8907
F: 610-429-8918

www.pennoni.com

October 9, 2017

CFTP 0570

Douglas C. McLearen, Chief
Division of Archaeology & Protection
Pennsylvania Historical and Museum Commission
Bureau of Historic Preservation
400 North Street
Harrisburg, PA 17120-0093

RE: Chadds Ford Township, Delaware County
Chadds Ford Sanitary Sewer Extension

ER No. 2018-0070-045-A

There are NO HISTORIC PROPERTIES
in the area of potential effect

Date 10/16/17

Reviewer B. Gredner

Dear Mr. McLearen:

On behalf of Chadds Ford Township, attached please find the following information:

1. Completed Cultural Resource Notice
2. Narrative Description
3. USGS Quadrangle, North Wilmington, DE
4. Location Plan

As part of the Township's Act 537 Plan update, the Township is proposing to convert the Ridings Waste Water Treatment Plant into a pump station which would connect to the existing gravity sewer system located in the Estates at Chadds Ford development. The conversion and connection will require the installation of approximately 1,100 feet of force main.

If you have any questions, please feel free to contact me.

Sincerely,

PENNONI



Michael W. Schneider, PE
Township Engineer

ER No.

There are NO HISTORIC PROPERTIES
in the area of potential effect

Date

APPENDIX XII

Agency Comments



DELAWARE COUNTY PLANNING DEPARTMENT

COURT HOUSE/GOVERNMENT CENTER
201 W. Front St. Media, PA 19063

COUNCIL

MARIO J. CIVERA, JR.
CHAIRMAN

COLLEEN P. MORRONE
VICE CHAIRMAN

JOHN P. McBLAIN
DAVID J. WHITE
MICHAEL F. CULP

Office Location: Toal Building, 2nd & Orange Sts., Media, PA 19063

Phone: (610) 891-5200

FAX: (610) 891-5203

E-mail: planning_department@co.delaware.pa.us

LINDA F. HILL
DIRECTOR

September 22, 2016

Amanda Serock, Municipal Manager
Chadds Ford Township
10 Ring Rd
Chadds Ford, PA 19317

RE: Act 537 Review
Chadds Ford Township Act 537 Update

Dear Ms. Serock:

The Delaware County Planning Department (DCPD) has completed its review of the Chadds Ford Township Act 537 Plan Update. The proposed plan calls for the service area at Turner's Mill Waste Water Treatment Plant (WWTP) to be expanded to include the Ridings service area. The Ridings WWTP would be converted to a pump station and 1,100 feet of force main will be added to connect to the gravity sewer system in Evergreen Place at the Estates at Chadds Ford development. Sewage would then be pumped to Turners Mill WWTP for treatment and disposal. The Estates at Chadds Ford's pump station capacity would need to be upgraded to 225 gpm with an increase in wet well size. Turners Mill WWTP would need to add a third treatment train to accommodate the extra flow.

It is to be noted that the area of the proposed force main from the Ridings WWTP will cut through a section of "core habitat" according to the Delaware County National Heritage Program. This is located along the north side of Ridge Road. There is also a high potential for underground archaeological resources in the project area. However, due to the fact that the proposed improvements will take place in a highly developed area, it is likely underground resources have already been disturbed. DCPD has no objection to the proposed method of wastewater disposal.

If you have any questions or require additional information, please do not hesitate to contact me at (610) 891-5218.

Sincerely,

Will Brugger
Environmental Planner

Cc: PA Department of Environmental Protection
✓ Pennoni Associates, Inc.
Chadds Ford Township





Chadds Ford Township would like its neighboring Townships to have a copy of its DRAFT update to its ACT 537 PLAN, Sewage Facilities Management. Please feel free to direct any comments or questions to Amanda Serock, Township Manager at 610-388-8800 x104 at your earliest convenience and no later than the end of August.

A handwritten signature in dark ink, appearing to read "Brenda L. Lamanna".

Ms. Brenda L. Lamanna, Township Manager
Concord Township
43 S. Thornton Road (off of Rt 1)
Glen Mills, PA 19342

A handwritten signature in dark ink, appearing to read "Quina P. Nelling".

Ms. Quina P. Nelling, Secretary/ Treasurer
Birmingham Township
1040 West Street Road (926)
West Chester, PA 19382

A handwritten signature in dark ink, appearing to read "Jeffrey T. Seagraves".

Mr. Jeffrey T. Seagraves, Township Manager
Thornbury Township
6 Township Drive
Cheyney, PA 19319

A handwritten signature in dark ink, appearing to read "Judy Jensen".

10 RING ROAD
CHADDS FORD, PA 19317-9101

PHONE 610.388.8800
FAX 610.388.5057
WEB WWW.CHADDSFORDPA.GOV



One Drexel Plaza
3001 Market Street, Suite 200
Philadelphia, PA 19104
T: 215-222-3000
F: 215-222-3588

www.pennoni.com

MEMORANDUM

TO: Amanda Serock, Manager
CHADDS FORD TOWNSHIP SEWER AUTHORITY

FROM: Thomas Leisse, PE, CME, Authority Engineer
PENNONI ASSOCIATES INC.

DATE: September 26, 2016

SUBJECT: Changes to the Act 537 Plan
CFTP 0570

The following changes have been made to the Act 537 Plan:

- References to the Spring Hill Farm's Home Owners Association has been changed to Springhill Farm Wastewater Treatment Facility Association.
- The financial and debt status information has been updated using 2015 operational costs.
- Update cost analysis of Riding conversion using 2015 costs.
- A conceptual plan showing the location of the proposed force main routing from the Ridings pumping station has been added to the Appendix.
- The note referring to Wawa and Audi on the sewer service map has been updated to reference "inter-municipal" agreements in lieu of "private".

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

Map 3 of Appendix II identifies the types of soils within Chadds Ford Township. The suitability of the soils for underground sewage systems are listed in Tables 1 thru 3 of Appendix II. As shown in the Tables, portions of the soils within the Township show some limitations to underground systems.

In addition to determining the site soils characteristics, the Pennsylvania Code Chapter 73 (PA Code), prohibits the construction of absorption areas and spray fields on fill unless the fill has remained in place for a minimum of four years. The PA Code also recommends that absorption and spray fields be located on undisturbed soils.

2. Prime Agricultural Soils

Prime agricultural soils are defined as those soils that are the most productive for food and feed crops. In general, these soils are deep, not prone to erosion, nearly level, well drained and generally devoid of rocks and stones. In accordance with the Chadds Ford Township Open Space Plan and the Brandywine Conservancy, the township contains approximately 1,780 acres of prime agricultural soils (see Map 4 of Appendix II).

3. Archeological and Historic Resources

Within Chadds Ford Township there are several historic and archeological landmark areas. Per Chadds Ford Township Open Space plan and the Brandywine Conservancy, these areas include; the Act 167 Historic District (Village of Chadds Ford and the Village of Dilworthtown), the Natural Register District, the Brandywine Battlefield Natural Historic Landmark, Gilpin House as well as areas along the Columbia Gas Line, as shown on Map 5 and 6 of Appendix II.

D. Geology Features within the Study Area

The underlying geology of an area can affect the suitability of a site for the successful operation of an underground wastewater disposal system. In accordance with the PA Code, the primary concern with geology and wastewater disposal is restrictive rock areas and areas underlain by limestone.

1. Restrictive Rock Layers:

Chadds Ford Township is located in the Wissahickon Formation of the Piedmont Upland Section of the Piedmont Physiographic Province of Pennsylvania (see Map 7, Appendix II). This area consists of broad, gently rolling hills and valleys. The geology of the area consists of metamorphic and igneous rocks (see Map 8, Appendix II). Table 1, Appendix II indicates limitations of the Township's soils due to the depth of underlying restrictive layers. As shown on Table I, 48% of the Township's is very limited for the use of conventional onlot sewer systems due to the location of the restrictive rock layer. (It is recommended that restrictive rock layers be located

→ SHOULD BE
TOWNSHIP

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

and other drinking-water organizations and water suppliers across the nation. The goal of the Partnership is to enhance the quality of drinking-water safety by optimizing treatment plant performance. In accordance with the EPA and the PA DEP regulations, CWA completes and posts online an annual water quality report.

The remaining parcels outside of the public water service area are served by private wells. The wells are installed in accordance with PA DEP guidelines. Chapter 73 of the PA Code establishes the minimum separation distances between an individual water supply and a septic system. Prior to construction, the location of the well and septic system are determined based on the recommended separation distance.

G. Wetlands within the Study Area

A wetland is defined as a low lying area such as a marsh or swamp that is saturated with moisture. The soils in these areas are saturated and have no additional space available for the absorption of sewage. According to the National Wetlands Inventory, approximately 2% of the Township is covered by wetlands. Map 12 of Appendix II, shows wetland areas located within Chadds Ford Township.

In addition, the PA Code prohibits the construction of an absorption area or spray field in floodways or within 50 feet of a stream. The primary water bodies associated with floodplains are Brandywine Creek and Harvey Run. Appendix II contains FEMA maps for Chadds Ford Township. The maps indicate floodplain areas within the Township as well as stream locations. Tables 1 thru 3 of Appendix II indicate the soil limitations for septic systems due to high water table and or flooding. As shown on Tables I-III, 21.5% of the Township is very limited for conventional onlot sewer systems, 22% is very limited for sand mounds and 11% is very limited for spray irrigation systems due to the flooding and/or the location of the water table.

III. Existing Wastewater Facilities in the Planning Area

There are two municipally owned sewage treatment plants (WWTP's) in Chadds Ford Township, Delaware County. The Ridings WWTP (NPDES Permit PA0055476) is located at the intersection of Ridge Road and Ridings Boulevard. The Turners Mill WWTP (NPDES Permit PA0244031) is located adjacent to the Township Building at the intersection of Baltimore Pike (Route 1) and Ring Road.

There are currently no tributary municipalities that send sewage to either of the wastewater treatment facilities in the Township. However, there are two private WWTP's in the Township. The Springhill Farm WWTP (NPDES Permit No. PA0052230) serves the Springhill Farms Development and Glen Eagle Shopping Center at Wilmington-West Chester Pike (Route 202) and Ridge Road in the south east corner of the Township (see Flow Chart F-1 located in Appendix III). The Knights Bridge WWTP (NPDES Permit No. PA0052663) serves properties owned by the Henderson Group at the intersection of Routes 202 and Route 1 (see Flow Chart F-3 located in Appendix III).

→ SHOULD BE
SPRINGHILL FARM

→ SHOULD BE
WWTPs

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

Condominium units (170 equivalent EDUs). There are no future connections proposed for this pump station. The pump station consists of two aboveground Smith & Loveless pumps rated at 220 gpm each, resulting in a peak design flow of 316,800 gpd. The force main from the pump station discharges into a combined forcemain that conveys the sewage directly to the Turners Mill WWTP.

The Painters Crossing Pump Station is in relatively good condition. No upgrades to the station are currently planned. The Painters Crossing Pump Station has an emergency generator for back-up power which is reportedly inspected and exercised on a regular basis.

2) Estates at Chadds Ford Pump Station

The Estates at Chadds Ford pump station is located at 3 Evergreen Place and serves the 120 single family detached residences in the Estates at Chadds Ford subdivision. There are no future connections proposed for this pump station as the subdivision is built out. The pump station consists of two aboveground Smith & Loveless pumps rated at 100 gpm each, resulting in a peak design flow of 144,000 gpd. The force main from the pump station discharges into a combined forcemain that conveys the sewage directly to the Turners Mill WWTP.

The EACF Pump Station is in relatively good condition. The pump station has an emergency generator for back-up power which is reportedly inspected and exercised on a regular basis.

B. Existing Privately Owned Wastewater Treatment System

a. Springhill Farm Wastewater Treatment Plant

Springhill Farm WWTP is located in eastern portion of Township near the intersection of Springhill Road and Springhill Drive. The treatment plant serves a 276 townhome community, a commercial shopping center, a restaurant and several residential properties. The Plant was constructed in 1985 (WQM Permit #2387434 and NPDES Permit # PA0052230). The Plant has a permitted hydraulic design capacity of 100,000 gallons/day. The Table below summarizes the results of Springhill Farms 2013 Discharge Monitoring Reports (DMRs). ✓

At this time, ~~Springhill Farm's Home Owner Association (SHFHOA)~~ is negotiating with Concord Township to connect to their sewage system. If ~~SHFHOA~~ obtains all necessary approvals to connect to Concord's system, they would be required to submit a special study/planning module to the PA DEP for review and approval.

→ SHOULD BE
SPRINGHILL FARM'S
→ SHOULD BE
SFWTFA

12 → REPLACE WITH
THE SPRINGHILL FARM WASTEWATER
TREATMENT FACILITY ASSOCIATION
(SFWTFA)

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

SPRINGHILL FARMS WWTP

SHOULD BE SPRINGHILL FARM WWTP

MONTH	DISSOLVED OXYGEN (mg/L)		pH (Instantaneous Maximum) (S.U.)		pH (Instantaneous Minimum) (S.U.)		Total Suspended Solids Average Monthly (lbs/day)		Total Suspended Solids Average Monthly (mg/L)		Ammonia-Nitrogen (Average Monthly) (lbs/day)		Ammonia-Nitrogen (Average Monthly) (mg/L)		Total Phosphorus (Average Monthly) (mg/L)	
	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT
JANUARY	6	5	7.5	9	6.6	6	7	25	15	30	0.2	5	0.5	6	3.5	---
FEBRUARY	6.3	5	7.6	9	6.6	6	9.2	25	20	30	0.1	5	0.1	6	3.2	---
MARCH	6.2	5	7.6	9	6.7	6	4	25	10	30	0.05	5	0.1	6	3.5	---
APRIL	5.7	5	7.2	9	6.7	6	4	25	10	30	0.1	5	0.1	6	3.8	---
MAY	6	5	7.6	9	6.7	6	3	25	7	30	0.04	5	0.1	6	3.6	---
JUNE	5.6	5	7.5	9	6.6	6	3	25	6	30	0.2	5	0.5	6	3.8	---
JULY	5.5	5	7.7	9	6.8	6	1	25	4	30	0.2	5	0.5	6	2.9	---
AUGUST	5	5	7.7	9	7	6	2	25	5	30	0.2	5	0.5	6	4.7	---
SEPTEMBER	5.8	5	7.6	9	7	6	3	25	8	30	0.2	5	0.5	6	3.7	---
OCTOBER	6.5	5	7.6	9	6.8	6	5	25	13	30	0.2	5	0.5	6	4.1	---
NOVEMBER	6.3	5	7.9	9	6.6	6	4	25	13	30	0.3	5	0.9	6	4.6	---
DECEMBER	6.5	5	7.5	9	6.5	6	7	25	18	30	0.2	5	0.5	6	4	---

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

SPRINGHILL FARM WWTP

MONTH	Flow (Average Monthly) (mgd)		Flow (Daily Maximum) (mgd)		Total Residual Chlorine (TRC) (Average Monthly) (mg/L)		Total Residual Chlorine (TRC) (Instantaneous Maximum) (mg/L)		Fecal Coliform (Average Monthly) (CFU/100mL)		Fecal Coliform (Instantaneous Maximum) (CFU/100mL)		CBOD5 (Average Monthly) (lbs/day)		CBOD5 (Average Monthly) (mg/L)	
	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT	DMR VALUE	PERMIT LIMIT
JANUARY	0.05452	---	0.06571	---	0.04	0.06	0.08	0.14	25	200	640	1000	7	21	16	25
FEBRUARY	0.05746	---	0.06555	---	0.04	0.06	0.12	0.14	32	200	87	1000	8	21	18	25
MARCH	0.05594	---	0.06554	---	0.02	0.06	0.08	0.14	10	200	17	1000	9	21	21	25
APRIL	0.05575	---	0.06826	---	0.03	0.06	0.09	0.14	29	200	63	1000	7	21	16	25
MAY	0.05527	---	0.09435	---	0.03	0.06	0.07	0.14	12	200	52	1000	7	21	17	25
JUNE	0.05894	---	0.09174	---	0.03	0.06	0.08	0.14	11	200	19	1000	6	21	13	25
JULY	0.05082	---	0.07134	---	0.03	0.06	0.08	0.14	8	200	25	1000	2	21	6	25
AUGUST	0.04862	---	0.05581	---	0.03	0.06	0.09	0.14	26	200	55	1000	1	21	4	25
SEPTEMBER	0.04695	---	0.06126	---	0.03	0.06	0.06	0.14	87	200	580	1000	1	21	4	25
OCTOBER	0.04903	---	0.07719	---	0.04	0.06	0.13	0.14	35	200	61	1000	2	21	5	25
NOVEMBER	0.04793	---	0.07724	---	0.03	0.06	0.07	0.14	88	200	188	1000	2	21	6	25
DECEMBER	0.04716	---	0.06796	---	0.04	0.06	0.11	0.14	7	200	12	1000	2	21	6	25

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

V. Alternatives Analysis and Evaluation

In order to provide collection and treatment options for current and future needs within Chadds Ford Township, following two alternatives were identified:

- Do nothing – Continue to maintain and operate existing sewage collection, conveyance and treatment systems.
- Ridings Conversion / Turners Mill Expansion – this option involves decommissioning the Ridings WWTP by converting the treatment plant to a pump station that conveys sewage flow to the Turner's Mill WWTP. The Turner's Mill WWTP would be expanded to accommodate the additional flow.

A. Alternative 1 – Continued Operation and Maintenance of Existing Public Sewer Collection, Conveyance and Treatment Systems (graphic representation provided in Appendix V)

1. Turner's Mill WWTP

The service area to Turner's Mill WWTP would remain relatively unchanged with the exception of removing a number of parcels along Baltimore Pike where collection/conveyance systems are not in place. An expansion of the Turner's Mill WWTP would not be required under this alternative. Turners Mill WWTP will continue to be maintained and repaired as required to meet the PA DEP permitting requirements.

2. Ridings WWTP

The service area to Ridings WWTP would remain relatively unchanged with the exception of removing 364 Wilmington-West Chester Pike which is expected to be treated in Concord Township. Ridings WWTP will continue to be maintained and repaired as required to meet the PA DEP permitting requirements.

3. Knight's Bridge WWTP (Private)

The service area to Knight's Bridge WWTP would be limited to properties currently connected to the plant, and properties under ownership of the Henderson Group (owner of the treatment plant).

4. Springhill Farm WWTP (Private)

At this time, the ~~Springhill Farms development Homeowners Association (SHFHOA)~~ and the ~~Springhill Farms Sewer Authority~~ is in the process of negotiating an Agreement with Concord Township allowing them to connect to their public sewer

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

system. For the purposes of this report, it is assumed that Springhill Farms will connect to Concord Township's system. Once SHFHOA obtains all of the necessary approvals, a separate special study/planning module will be submitted to the PA DEP for their review and approval.

SHOULD BE
SPRINGHILL
FARM

SHOULD BE
SFWTFA

5. Concord

A Concord Township service area has been established as a number of properties within Chadds Ford Township have connected, or plan to connect to the Concord Township WWTP.

B. Alternative 2 – Ridings Conversion / Turners Mill Expansion (graphic representation provided in Appendix VI)

1. Turner's Mill WWTP

The service area to Turner's Mill WWTP would be expanded to include the Ridings service area. Sewage flowing to the Ridings WWTP would be pumped to Turners Mill WWTP for treatment and disposal. A force main would be installed to convey sewage from the Ridings pump station to a gravity sewer system in the Estates at Chadds Ford Development (approximately 1,100 feet of force main). The existing gravity sewer system in the Estates of Chadds Ford development flows to the Estates pump station where the sanitary sewage is conveyed by force main to Turners Mill WWTP (approximately 2,600 feet of existing 4-inch diameter and 6,800 feet of existing 12-inch diameter force main).

Ridings WWTP's existing tank, equipment and influent pump station would be utilized to pump sewage flows to Turners Mill WWTP. The existing influent pump station pumps and controls would be upgraded and the existing wet well would be lined with epoxy coated to extent its useful life. The wet well will act as a tank and will equalize flow to the pump station at the Estates of Chadds Ford development. Flow equalization will create a consistent pump rate and will allow the existing 4-inch diameter force main from the Estates pump to Turners Mill WWTP to be used.

The Ridings pump station is currently owned and maintained by the Chadds Ford Sanitary Authority. In order to accept the increased flows (existing and estimated flows) to the Ridings pump station, the station's pumping capacity will need to be increased from 100 gpm to approximately 225 gpm. The capacity of the wet well will need to be increased, this can be accomplished through the installation of a 12-inch diameter wet well on site.

The estimated hydraulic loading projection thru 2030 from the Ridings and Turners Mill WWTP is 871 EDU's. Using a value of 217 GPD/EDU this equates to approximately 189,007 gpd. Turners Mill WWTP is permitted for 140,000 gpd. The Turners Mill WWTP will need to be upgraded to increase the permitted capacity of

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

4. Springhill Farm WWTP (Private)

At this time, the ~~Springhill Farms development Homeowners Association (SHFHOA)~~ and the ~~Springhill Farms Sewer Authority~~ is in the process of negotiating an Agreement with Concord Township allowing them to connect to their public sewer system. For the purposes of this report, it is assumed that Springhill Farms will connect to Concord Township's system. Once SHFHOA obtains all of the necessary approvals, a separate special study/planning module will be submitted to the PA DEP for their review and approval.

5. Concord

A Concord Township service area has been established as a number of properties within Chadds Ford Township have connected, or plan to connect to the Concord Township WWTP.

C. Analysis of Alternatives

A cost analysis was completed to evaluate the feasibility of the Alternatives, specifically for the Ridings Service Area.



July 13, 2016

Re: Planning Commission Act 537 Draft Review

To Whom It May Concern:

The Chadds Ford Township Planning Commission has completed its review of the Chadds Ford Township updated Act 537 Plan. This proposed update has no changes to the current land uses. The proposed plan is in complete compliance with the Township's Comprehensive Land Use Plan.

Regards,



Craig Huffman, Chairman
Chadds Ford Township Planning Commission
10 Ring Road
Chadds Ford, PA 19317
610-388-8800



THOMAS COMMITTA ASSOCIATES, INC.
Town Planners & Landscape Architects

Population Trends and Forecasts

Chadds Ford Township – Delaware County, PA

6-13-16; Revised: 6-14-16

<u>Population</u>	<u>DVRPC (March 2013)</u>	<u>Act 537 Draft</u>
	3,640 2010 Census	
	3,663 2015 Forecast	3,920
	3,730 2020 Forecast	
	3,887 2025 Forecast	4,760
<hr/>		
	4,044 2030 Forecast	
	4,111 2035 Forecast	
	4,134 2040 Forecast	
<hr/>		

Notes:

- If we use a 10-year growth projection, from 2016 to 2026, but calibrate to 2025, the CFT population could increase by 247 persons from 2010 to 2025 using DVRPC data.
- In 2010, there were 1,436 total Households, according to the U.S. Census, with an average persons per Household of 2.54.
- Using a 2.54 persons per Household, there may be 1,530 Households in 2025 ($3,887 \div 2.54 = 1530$). This would be an increase of 94 Households from 2010 to **2025**.

TO: Chadds Ford Township Planning Commission

FROM: Samantha Reiner, Township Supervisor

RE: Act 537 Plan - May 2016 draft - review comments

DATE: June 13, 2016

MEMORANDUM

Page 1: The Plan mentions the Township first approved and implemented its own Act 537 Plan in 1991. It then mentions in 2004 and 2005 the Township updated its Act 537 Plan. During its review of the 2005 Plan the PaDEP recommended additional studies be completed on two private WWTPs as well as the Ridings. Q: Were these studies ever completed? If so, consider adding a statement here that leads reviewer of Plan to the studies.

The plan only references those private WWTPs as part of the overall Authority system. Those studies do not impact the analysis of the current 537 update.

Page 2: The Plan, at II. B, describes Physical Characteristics within the Study Area.

Q: Should the description also include “developed areas”, wetlands and “heavily wooded rolling hills”?

Q: later in the Plan (Page 5 – Topography) there is discussion about large % of the Township that is very limited for conventional on-lot sewer systems due to slopes. Should the description of Physical Characteristics include reference to slopes?

Q: later in the Plan (Page 4 – Restrictive Rock Layers) there is discussion about % of the Township that is very limited for conventional on-lot sewer systems due to “Restrictive Rock Layers”. Should the Physical Characteristics include reference to the rock?

Q: later in the Plan (age 6 – Wetlands) there is discussion about % of the Township that is very limited for conventional on-lot sewer systems due to “wetlands”. Should the Physical Characteristics include reference to wetlands?

Physical Characteristics are covered later in the “Physical and Demographic Analysis” in Section II.

Page 12: Springhill Farms WWTF is mentioned here, as well as on pages 29 & 32. Is this the most recent information concerning its transitioning to a Pump Station and sending effluent to Concord Township?

The update was revised only to include the current description of the plant. The conversion has not been completed, it would be premature to include information until the agreements have been approved and construction completed.

Page 20: Comprehensive Plan is mentioned here and @ Appendix IV. The Township has appointed a Comp Plan Task Force to study and update its Comprehensive Plan. This should be completed in 2016. Q: Should reference to this update be made? Should a link to the existing Comp Plan be placed in the Appendix?

The existing Plan is included in the Appendix.

Page 21: Zoning is mentioned here. The Township has appointed a Zoning Task Force committee to study and make recommendations towards amending the Ordinances. This should be completed in 2016. Q: Should reference to this be made?

If the ordinances are updated, they will be contained in the referenced chapter.

Page 24: Build Out Plan is referenced here, and that data may be updated by the new Comp Plan study. Q: should there be a note here referencing the update?

No, we can only include the most current adopted Plan in the update.

Page 27: Growth Plan is referenced here, (same comment as above).

No, we can only include the most current adopted Plan in the update.

Page 30: Alternative #2 is mentioned here.

Q: Does the Township own the sewer infrastructure in the non-dedicated roadbeds and easements in Estates of Chadds Ford?

Q: Does the alternative need to discuss where the new force main will be located (as in existing easements or newly acquired easements)?

Q: Should a map showing the route of the new force main be included, pointing out any of the "problem" areas such as wetlands or stream crossings if applicable?

A concept map of the proposed force main routing is included within the update. Any specific construction information (easements, approvals) will be addressed during design.

Page 37: Operating Costs are indicated here.

Q: Are these current numbers?

Q: @ B Available Staff and administrative resources are discussed here; should the language be the same as it appears on Page 7 where it mentions Authority Manager and an Administrative Manager?

Yes, the costs have been updated to the most recent audited financial statement. The Admin Manager was added to the description of resources.

General Comment: I feel the Plan would benefit from an introductory page, that bridges the gap from the 2005 plan to today. Chadds Ford Township municipal representatives and professionals have met with staff from the PADEP and Concord Township in the time between the last Plan implementation and this Plan proposal, discussing other options to sewer the township. Perhaps a statement that tells why the Township no longer wishes to depend on Concord Township to accommodate growth could be included.

The update follows the format from previously completed plans and as recommended by the PaDEP. There is no requirement to describe the differences from 2005 only the status of the current system and the future plan. Statements including Concord Township may confuse the final plan as Concord is not included in the current implementation.

APPENDIX XIII

I&I Ordinance

**CHADDS FORD TOWNSHIP
DELAWARE COUNTY, PENNSYLVANIA
ORDINANCE NO. 145
SEWER INFLOW & INFILTRATION PROHIBITION**

AN ORDINANCE OF THE TOWNSHIP OF CHADDS FORD, DELAWARE COUNTY, PENNSYLVANIA AMENDING CHAPTER 95, SEWERS, BY CONSOLIDATING DEFINITIONS INTO ONE SECTION, AMENDING ARTICLE III, SEWAGE FACILITIES AND ARTICLE IV, PROHIBITED DISCHARGES OF THE TOWNSHIP CODE, PROVIDING FOR THE PROHIBITION OF STORM WATER DISCHARGES INTO THE SANITARY SEWER SYSTEM; PROVIDING FOR PROPERTY OWNER RESPONSIBILITY OF MAINTENANCE OF PRIVATE SEWER LATERAL; PROVIDING FOR INSPECTION OF SANITARY SEWER LATERALS AND THE REPAIR OF ANY DEFECTS AND/OR REMOVAL OF ANY ILLEGAL INFLOW CONNECTIONS TO SUCH LATERALS; EMPOWERING THE TOWNSHIP OFFICIALS TO INSPECT THE SANITARY SEWER LATERALS; REPEALING ALL ORDINANCES INCONSISTENT HERewith.

WHEREAS, the discharge, Inflow and Infiltration of Storm Water into the Chadds Ford Township municipal Sewer Authority's Sanitary Sewer System unnecessarily increases the cost of wastewater treatment to Township residents; and

WHEREAS, the Chadds Ford Township Board of Supervisors in conjunction with the Chadds Ford Township Sewer Authority desires to prohibit the Inflow of Storm Water into the municipal authority's Sanitary Sewer System and seeks to take all necessary and appropriate measures to reduce Infiltration.

NOW, THEREFORE, BE IT ENACTED AND ORDAINED THAT:

SECTION 1. DEFINITIONS.

- A. Unless the context specifically and clearly indicates otherwise, the meaning of terms used in this Chapter shall be as follows:

1. **ACT 537 PLAN** - A municipality's official plan as defined in the Pennsylvania Sewage Facilities Act, Act of January 24, 1966, P.L. 1535 (1965), No. 537, as amended, 35 P.S. §§ 750.1 to 750.20a ("Sewage Facilities Act" or "Act 537").
2. **AUTHORITY** - The Sewer Authority of Chadds Ford Township, Delaware County, Pennsylvania, or such individuals or agents who it may designate.
3. **COMMUNITY SEWAGE DISPOSAL SYSTEM**—Any system, whether publicly or privately owned, providing for the collection, treatment and/or disposal of sewage:
 - a. From two or more lots or commercial buildings;
 - b. From a single commercial building with more than one business occupant;
 - or
 - c. With a volume of more than 2,500 gallons of sewage daily.
4. **COMMUNITY ONLOT SEWAGE SYSTEM** — A community sewage system which uses a system of piping, tanks or other facilities for collecting, treating and disposing of sewage into a subsurface soil absorption area or retaining tank.
5. **COMMUNITY SEWAGE SYSTEM** — A sewage facility, whether publicly or privately owned, for the collection of sewage from two or more lots, or two or more equivalent dwelling units, and the treatment or disposal, or both, of the sewage on one or more of the lots or at another site.
6. **COMMUNITY SEWERAGE SYSTEM** — A community sewage system which uses a method of sewage collection, conveyance, treatment and disposal other than renovation in a subsurface absorption area, or retention in a retaining tank.
7. **DEPARTMENT or DEP** — The Pennsylvania Department of Environmental Protection.
8. **DESIGN STANDARDS** — Refers to those provisions for holding tanks (retaining tanks) as established by DEP at 25 Pa. Code § 73.61 et. seq. as well as all relevant installation standards and relevant locational standards established by such regulations. Said design standards are incorporated herein by reference as fully as though set forth at length. As used herein, the term "design standards" shall be deemed to include "installation standards" and "locational standards."
9. **GRINDER PUMP**—Any electric, motor-driven, submersible, centrifugal pump capable of macerating all material found in normal domestic sanitary sewage, including reasonable amounts of objects, such as plastics, sanitary napkins, disposable diapers, rubber and the like, to a fine slurry, and pumping this material through a small diameter discharge.
10. **HOLDING TANK** — A watertight receptacle which receives and retains sewage and is designed and constructed to facilitate ultimate disposal of the sewage at another site. Holding tanks include but are not limited to the following:

- a. **CHEMICAL TOILET** — A toilet using chemicals that discharge to a holding tank.
 - b. **RETENTION TANK**—A holding tank where sewage is conveyed to it by a water carrying system.
 - c. **VAULT PIT PRIVY** — A holding tank designed to receive sewage where water under pressure is not available.
 - d. **INTERIM HOLDING TANK**—A tank employed with the Authority's approval to hold sewage only until such time as a Pennsylvania DEP operating permit can be obtained for a permanent sewage disposal system.
 - e. **REPAIR HOLDING TANK** — A tank used to hold sewage when no other approved method of disposing of sewage is available on the site of an existing, but ineffective, system.
11. **IMPROVED PROPERTY** — Any property within the municipality upon which there is erected a structure intended for continuous or periodic habitation, occupancy or use by human beings or animals and from which structure sanitary sewage and/or industrial wastes shall or may be discharged.
12. **INDIVIDUAL ONLOT SEWAGE SYSTEM** — An individual sewage system which uses a system of piping, tanks or other facilities for collecting, treating and disposing of sewage into a subsurface absorption area or a retaining tank.
13. **INDIVIDUAL SEWAGE SYSTEM** — A sewage facility, whether publicly or privately owned, located on a single lot and serving one equivalent dwelling unit and collecting, treating and disposing of sewage in whole or in part into the soil or into waters of this commonwealth or by means of conveyance of retaining tank wastes to another site for final disposal.
14. **INDIVIDUAL SEWERAGE SYSTEM** — An individual system which uses a method of sewage collection, conveyance, treatment and disposal other than a renovation in subsurface absorption area, or retention in a retaining tank.
15. **INDUSTRIAL WASTE** — Any solid, liquid or gaseous substance or waterborne wastes or form of energy rejected or escaping from any industrial, manufacturing, trade or business process or from the development, recovery or processing of natural resources, as distinct from domestic strength sanitary sewage. Industrial sewage to be treated by owner to domestic waste strength and composition.
16. **INFILTRATION** - Groundwater that enters sanitary sewer systems through cracks and/or leaks in the sanitary sewer pipes. Cracks or leaks in sanitary sewer pipes may be caused by age related deterioration, loos joints, poor design, installation or maintenance errors, damage or root infiltration. Groundwater can enter these cracks or leaks wherever sanitary sewer systems lie beneath water tables or the soil above the sewer systems becomes saturated.
17. **INFLOW** - Stormwater that enters into sanitary sewer systems at points of direct connection to the systems. Various other sources contribute to inflow, including

footing/foundation drains, roof drains or leaders, downspouts, drains from window wells, outdoor basement stairwells, drains from driveways, groundwater/basement sump pumps, HVAC condensate lines and even streams and underground springs. These sources are typically improperly or illegally connected to sanitary sewer systems, via either direct connections or discharge into sinks or tubs that are directly connected to the sewer system. An improper connection lets water from sources other than sanitary fixtures and drains to enter the sanitary sewer system.

18. **MUNICIPALITY** — Chadds Ford Township, Delaware County, Pennsylvania.
19. **OFFICIAL PLAN REVISION**—A change in the municipality's Act 537 Plan to provide for additional or newly identified future or existing sewage facilities needs, as defined fully in Section 1 of the Sewage Facilities Act, 35 P.S. § 750.1.
20. **OWNER**—Any person vested with ownership, legal or equitable, sole or partial, of any property of any property.
21. **PERSON** – Any individual, legal entity, partnership, business, corporation or company.
22. **PROPERTY** – Any real property located within the boundaries of Chadds Ford Township.
23. **PUBLIC SEWER SYSTEM** — A community sewerage system owned or operated by the Township or the Authority.
24. **SANITARY SEWAGE** — The liquid-carrying household and toilet wastes from residences, business buildings, institutions, and commercial and industrial establishments.
25. **SANITARY SEWER SYSTEM** – Pumps, piping, lines, sewers, laterals and connections thereto, which transport wastewater to the Chadds Ford Township Sewer Authority's destination for wastewater treatment.
26. **SEWAGE** — Any substance that contains any of the waste products or excrement or other discharge from the bodies of human beings or animals and any noxious or deleterious substance being harmful or inimical to the public health, or to animal or aquatic life or to the use of water for domestic water supply or for recreation or any substance which constitutes pollution under the Clean Streams Law, 35 P.S. §§ 691.1 to 691.1001, as amended.
27. **SEWER LATERAL** -- That part of the sewer system extending from a sewer to the curblin or, if there shall be no curblin, then to the property line; or, if no such lateral shall be provided, then "lateral" shall mean that portion of or place in a sewer which is provided for connection of any building sewer.
28. **STORMWATER** – All stormwater, rain water, surface water, roof run-off or surface

drainage.

29. **STREAM DISCHARGE SYSTEM** — means any Sewage Disposal System discharging into a stream after treatment.
30. **TOWNSHIP** — The municipal government known as "Chadds Ford Township, Delaware County, Pennsylvania."
- B. Other definitions. All other words and terms, when used in this chapter, shall have the meanings set forth in Title 25, Chapter 73, Standards for Sewage Disposal Facilities, of the Pennsylvania Department of Environmental Protection (DEP), unless the context clearly indicates otherwise.

THE FOLLOWING DEFINITIONS SHALL BE DELETED:

Section 95-2:

IMPROVED PROPERTY — Any property within the Township upon which there is erected a structure intended for continuous or periodic habitation, occupancy or use by human beings or animals and from which structure sewage is discharged.

OWNER—Any person vested with ownership, legal or equitable, sole or partial, of any property located in the Township.

PERSON — Any individual, partnership, company, association, corporation or other group or entity.

SEWAGE — Any substance other than toxic or hazardous waste that contains any of the waste products, excrement or other discharge from the bodies of human beings or animals and any noxious or deleterious substance being harmful or inimical to the public health, to animal or aquatic life or to the use of water for domestic water supply or recreation (excluding farm animal waste).

Section 95-27:

LATERAL—That part of the sewer system extending from a sewer to the curblin or, if there shall be no curblin, then to the property line; or, if no such lateral shall be provided, then "lateral" shall mean that portion of or place in a sewer which is provided for connection of any building sewer.

Section 95-42:

AUTHORITY — The Chadds Ford Township Sewer Authority, an authority organized and existing pursuant to the Municipality Authorities Act of 2001 (2001, June 19, P.L.287, No. 22, and as amended thereafter, 53 Pa.C.S.A. § 5601 et seq.).

Said Authority shall mean the authority authorized by law to adopt resolutions regarding sewage conveyance, treatment and disposal in Chadds Ford Township.

PROPERTY OWNER — Any person vested with ownership, legal or equitable, sole or partial, of any property located in the municipality.

THE FOLLOWING SECTIONS SHALL BE DELETED:

Section 95-2 Definitions.

Section 95-16 Definitions.

Section 95-27 Definitions.

Section 95-42 Definitions.

SECTION 2. STORMWATER INFLOW & INFILTRATION REGULATIONS

Section 95-34(T) shall be amended as follows:

T. It shall be unlawful for any Person to discharge any Storm Water into the municipal authority's Sanitary Sewer System, or sanction the Inflow of Storm Water from any property owned by such a Person into the Sanitary Sewer System. Any discharge or Inflow of Storm Water into the Sanitary Sewer System shall be deemed to have been allowed by the owner of the Property upon which or within which such Storm Water enters the Sanitary Sewer System.

- 1) No Person who owns any Property serviced by the Sanitary Sewer System shall connect any sump pump, roof drain, foundation drain, HVAC condensate line or other surface or subsurface water drain, or sanction any such drains to remain connected, to the Sanitary Sewer System.
- 2) It shall be the responsibility of the Property owner to perform all

maintenance and to keep the Sewer Lateral(s) in good condition, by which:

- i. The Sewer Lateral and vent cleanouts shall be kept free from roots, grease deposits, and other solids which may impede the flow or obstruct the transmission of waste.
 - ii. All joints shall be tight and all pipes shall be sound to prevent filtration by waste or Infiltration by Storm Water.
 - iii. The Sewer Lateral shall be free of any structural defects, cracks, breaks, or missing portions and the grade shall be uniform without sags or offsets.
 - iv. The Sewer Lateral shall have a two way cleanout located at the property line or at the sewer main easement. All cleanouts shall be securely capped with a proper cap at all times.
- 3) All Sewer Lateral work on private property must be performed by a licensed professional and any applicable Township permits must be obtained and approved by a Township Official.
- 4) The Township of Chadds Ford and/or its agents, employees, designees, or assigns, may upon thirty (30) days' notice, undertake such inspection or test as it may deem appropriate to determine the condition of any Sewer Lateral. Any such inspection or test may only take place during the hours of 8:00 A.M. and 5:00 P.M., Monday through Friday. The owner of the affected property shall make all

areas to be inspected or tested available to the Township or its designee, upon request.

- 5) If, in the sole opinion of the inspector, any illegal Storm Water Inflow connections are found, or the Sewer Lateral is determined to be in unsatisfactory condition, the Sewer Lateral shall be repaired or replaced by the owner of the Property at such owner's expense within thirty (30) days or at the expiration of any such extension as outlined above of the date the Township notifies such owner of the condition.
- 6) The Township shall re-inspect the Property upon notice from the Property owner that the deficiency has been repaired, or ninety (90) days after the notice of deficiency was first sent by the Township, whichever occurs first.
- 7) If a violation exists, the Property owner will be responsible for reimbursing the Township for all inspection fees.
- 8) Plumbing codes and other applicable regulations, adopted or amended by the Township of Chadds Ford, the Chadds Ford Township Sewer Authority and the Pennsylvania Department of Environmental Protection shall govern the construction of private lateral maintenance, connection, repair and inspection.

SECTION 3. REPEALER.

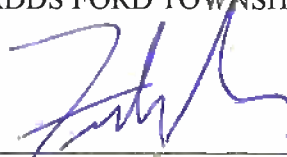
Any and all prior ordinances, resolutions and/or portions of prior ordinances or resolutions in conflict with this Ordinance are hereby repealed to the extent of such conflict, including

specifically Chapter 95 of the Chadds Ford Township Code in their entirety.

SECTION 4. EFFECTIVE DATE. This Ordinance shall take effect five (5) days after adoption by the Board of Supervisors.

ENACTED and ORDAINED by the Chadds Ford Township Board of Supervisors this 7th day of September, 2016.

CHADDS FORD TOWNSHIP



Frank Murphy, Chairman


Samantha Reiner, Vice Chairman
Noelle Barbone, Supervisor
Matthew DiFilippo, Secretary

I & I STUDY

*Chadds Ford Township
Delaware County, Pennsylvania*

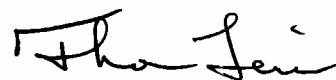


Submitted To:

Chadds Ford Township Sewer Authority
10 Ring Road
Chadds Ford, PA 19317

Submitted By:

Pennoni Associates Inc.
One Drexel Plaza
3001 Market Street
Philadelphia, Pennsylvania 19104

A handwritten signature in black ink, reading "Thomas Leisse". The signature is written in a cursive style and is positioned above a horizontal line.

Thomas Leisse, PE, CME
Authority Engineer

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SECTION I

INTRODUCTION

Infiltration and Inflow (I/I) studies are becoming more popular as municipalities continue to look for ways to identify and reduce unwanted flows entering the sanitary sewer systems. Infiltration is the introduction of groundwater into a sewer system through leaks in the sanitary sewer pipes and manholes. Inflow is rain water that enters the sanitary sewer system directly through illegal connections of storm drains, roof leaders, and sump pumps or cleanouts and manhole covers that are not properly sealed.

The extra flow in the sewer systems can cause problems downstream if the system is not capable of handling the increased flow. The I/I can lead to sewer systems backing up into homes or onto roadways. The increased flow also needs to be treated along with the wastewater putting extra stress on sewage conveyance/treatment systems and increasing the cost to the municipalities including the potential for sanitary sewer overflows to nearby water bodies.

Flow monitoring is one of three ways to identify I/I in a sewer system. I/I can also be identified through videotaping and smoke testing. Flow monitoring uses an Area Velocity Flow Meter to sense both the depth and velocity inside a pipe at manholes strategically chosen throughout the study area. The depth and velocity are then downloaded to a laptop and the flow in the pipe is calculated. Through analyzing the flow alongside rainfall data it can be determined how an increase in rainfall affects the flow in the sewer system.

A. PURPOSE

At the request of the Chadds Ford Township Sewer Authority, Pennoni Associates Inc. ("Pennoni") conducted a flow study of the sewer service area in Chadds Ford Township.

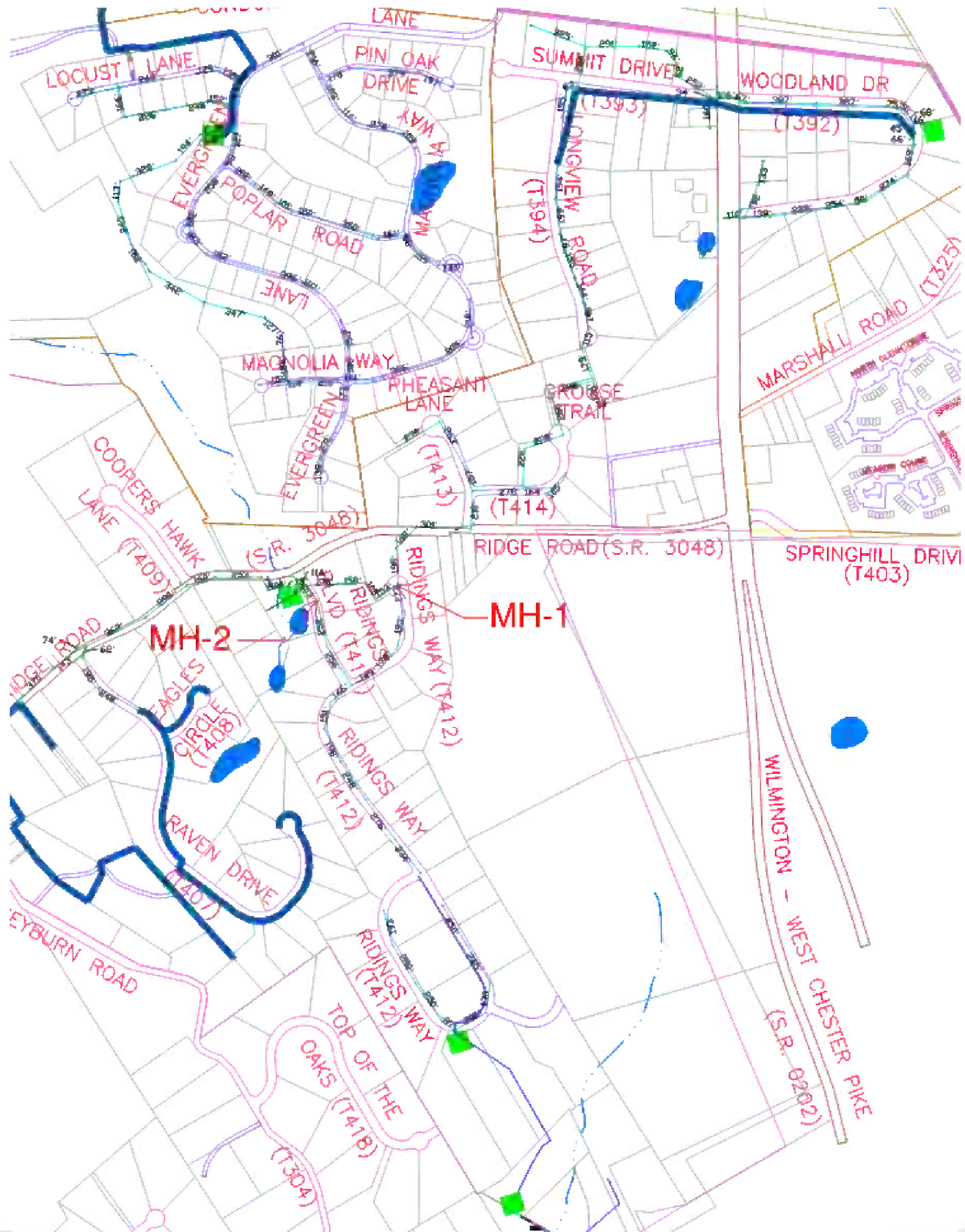
The study was conducted through flow meter data provided by CSL Services, Inc. A 2-month flow monitoring study of the Ridings collection system was conducted. The data was collected from April 21, 2016 to June 15, 2016 by CSL Services. The data was analyzed by Pennoni Associates and recommendations for improvements to the system are provided in this report.

The purpose of this report is to provide the Chadds Ford Township Sewer Authority with a recommendation of the sewer service areas to focus on when developing a sewer rehabilitation program. For the purpose of this study the Ridings Collection System was broken into two (2) sections through the strategic placement of flow monitors. The recommendations provided in this report can be used to assist the Authority in developing a sewer rehabilitation program to reduce I/I within the collection system. Through reduction of the I/I into the sewer system, the Authority will reduce the flow in the collection and treatment system.

B. FLOW METER LOCATIONS

As part of this study, flow meters were placed in manholes at two (2) locations in the Ridings Collection System. A summary of the meter locations and anticipated flows are as follows:

- MH 1- Ridings Way.
 - Approximately 9,500 LF of 8" sewer main exists upstream of this location.
- MH 2- Ridings Blvd.
 - Approximately 3,600 LF of 8" sewer main exists upstream of this location.



SECTION II

RESULTS AND ANALYSIS

A. FLOW METER RESULTS

Flow meter and rainfall data were gathered at two (2) sites in the Ridings Collection System from April 21, 2016 to June 15, 2016. The flow meters calculate sewer flow based on a pressure transducer to measure depth and a Doppler sensor to measure flow velocity. The results are presented below:

Figures 1 -4 below shows the average daily flow and the average flow during low flow (12:00 am through 5:00 am) for MH 1 & 2. The periods of low flow are impacted least by daily household activities so it is easiest to see the impact of rainfall, if present, during this time period.

FIGURE 1 – MH 1 Daily Average

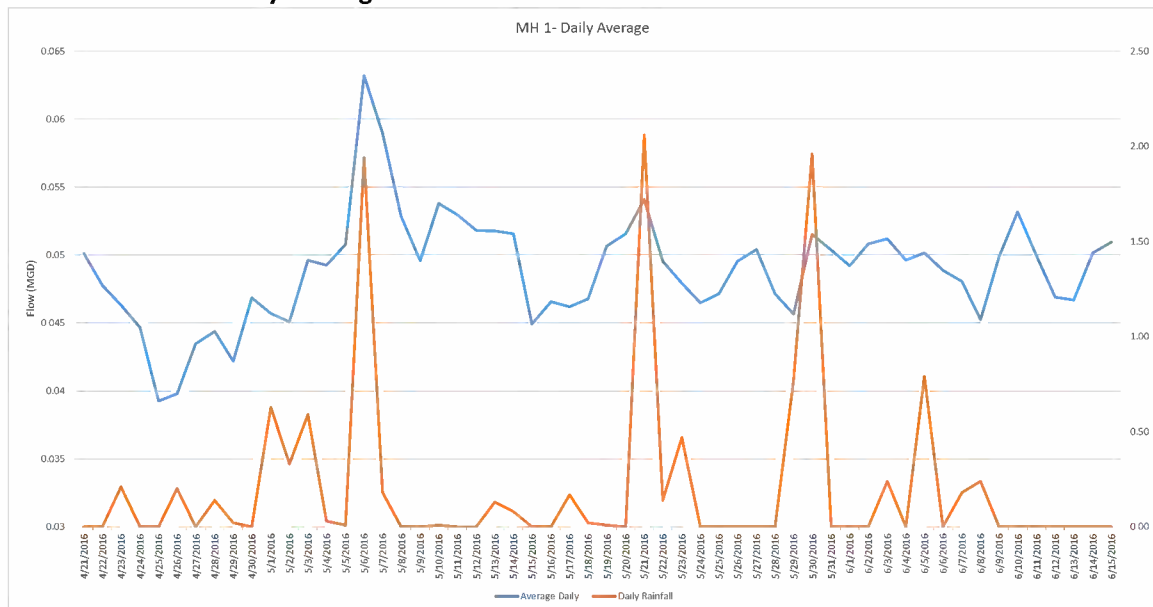


FIGURE 2 – MH 1 Daily Average Low Flow Period

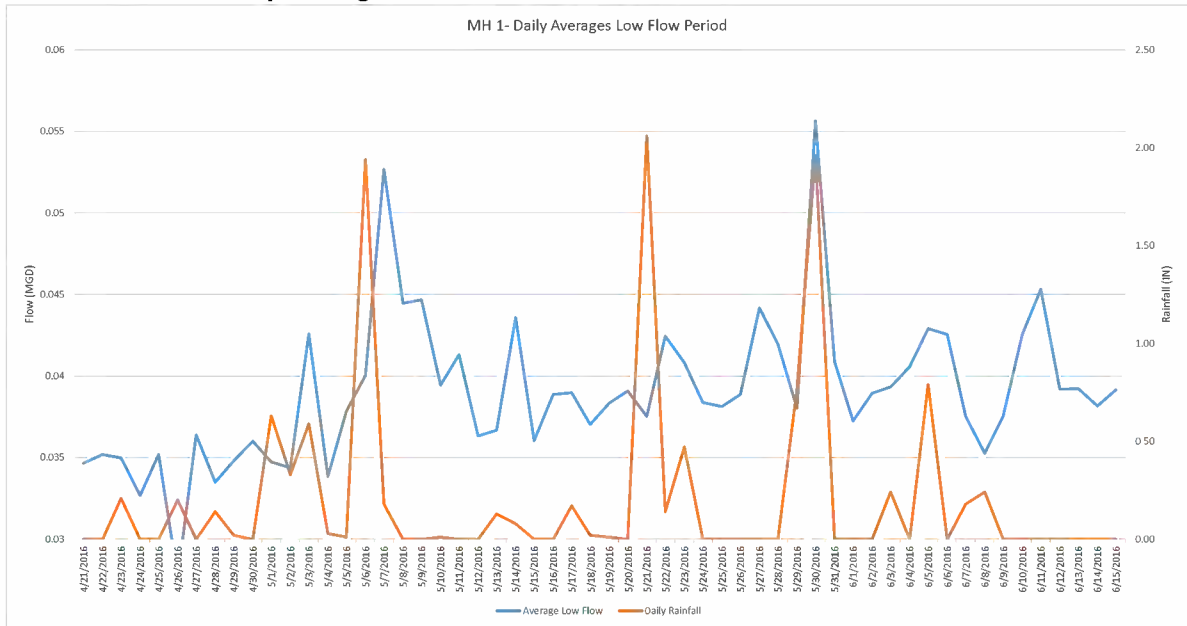


FIGURE 3 – MH 2 Daily Average

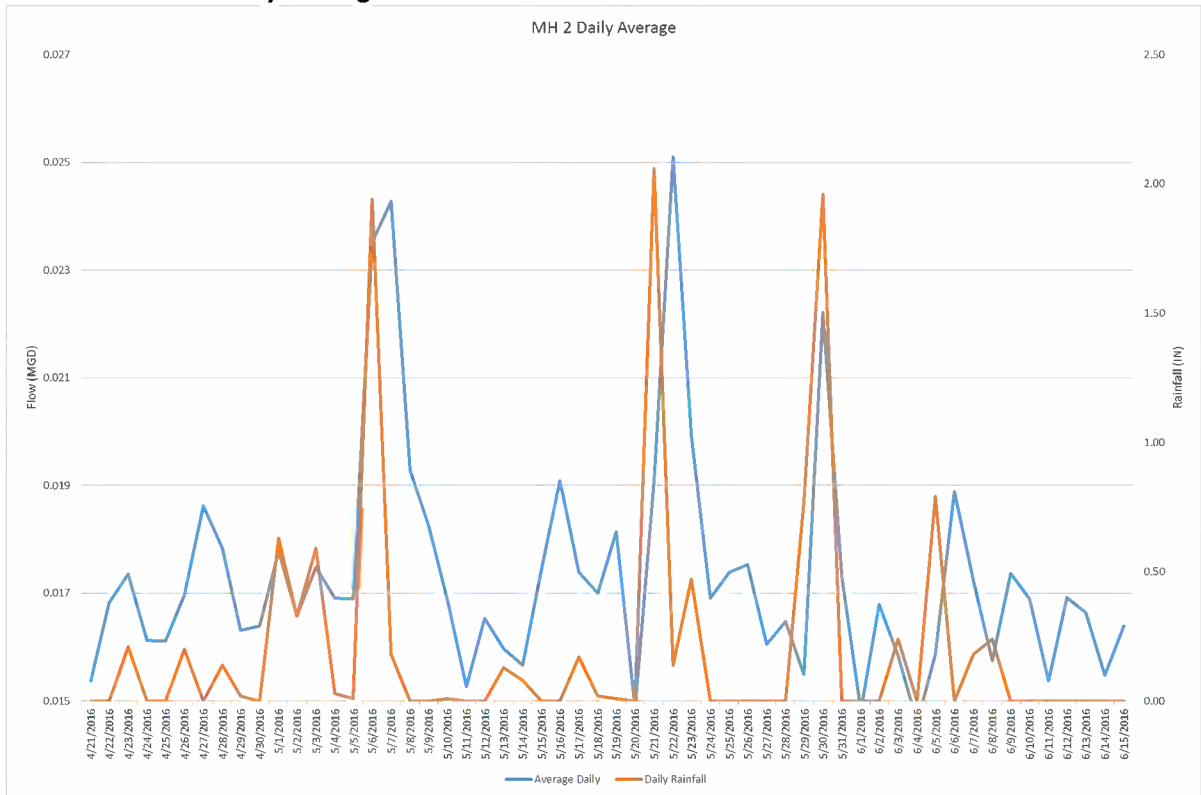
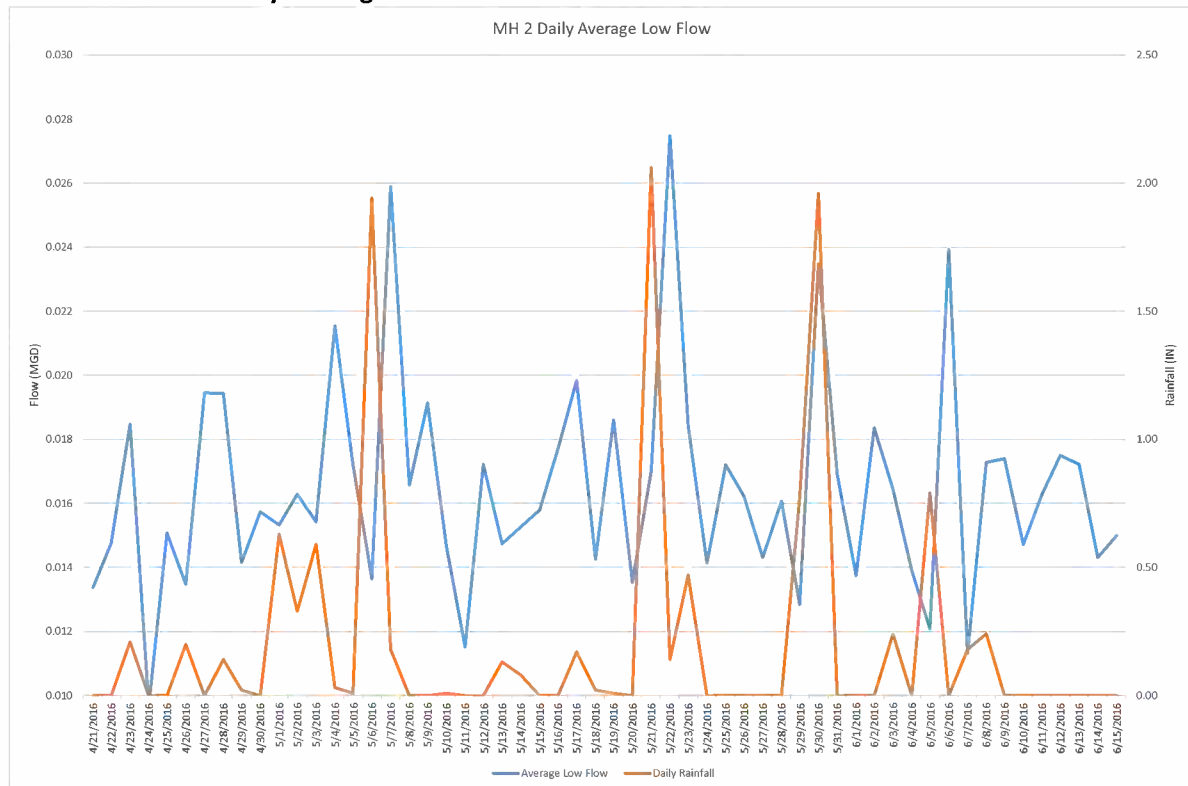


FIGURE 4 – MH 2 Daily Average Low Flow Period

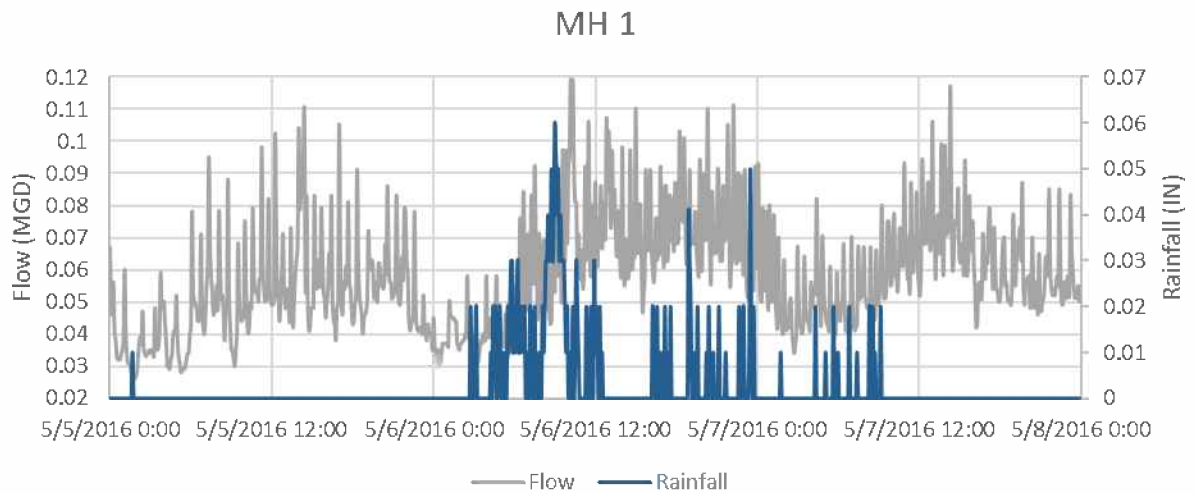


MH 1:

MH 1 recorded its greatest averages flows at 0.063 MGD with 24hr rainfall total of 1.94". Figure 5 below shows the instantaneous flow and rainfall reading for the days preceding and following the May 6th rainfall event. The average flow through MH 1 during the study period was 0.0489 MGD. Through Infiltration and Inflow into the system the daily flow increased by approximately 28%.

More flow was evident in early May after a generally rainy period. The increased flow also appeared to linger for a couple days after the rain ended. It appears that infiltration may be present. Due to the nature of infiltration through indirect sources (cracks and leaks in the pipe), the effects of infiltration can be sustained over longer periods than inflow.

FIGURE 5: MH 1 rainfall versus flow for the May 6, 2016 rainfall event.

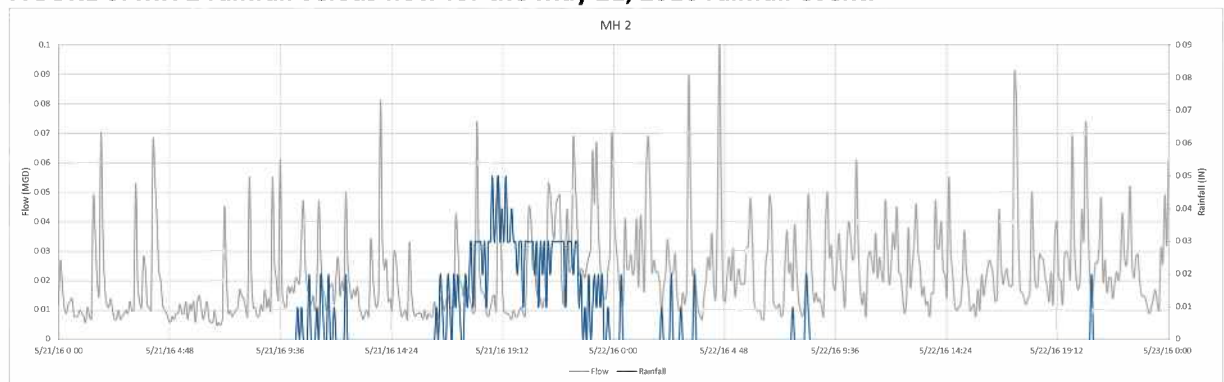


MH 2:

MH 2 recorded its highest average daily flow of 0.026 MGD with a 24hr rainfall of 2.06". Figure 6 shows the instantaneous flow and rainfall reading for the days preceding and following the May 21st rainfall event. The average flow through MH 2 during the study period was 0.017 MGD. Through Infiltration and Inflow into the system the daily flow increased by approximately 53%.

The peak flows appear to coincide with the rain events and quickly dissipate after the rain ends. This pattern may be an indication that inflow is present in this portion of the system. Since inflow is a direct connection to the system, the effects are typically immediate and not sustained over a long period.

FIGURE 6: MH 2 rainfall versus flow for the May 21, 2016 rainfall event.



SECTION III

RECOMMENDATIONS

Given the findings of this study it is likely that infiltration and/or inflow is present in several areas in the Township. Infiltration is groundwater that enters the sanitary sewer system through cracks, leaks, or misaligned joints in the pipes or manholes. Groundwater can come from nearby bodies of water or saturated soil from heavy rain storms. Inflow is the stormwater that enters the sanitary sewer system through direct connections to the system. Such connections can be roof drains, sump pumps, yard drains, missing or vented sewer cleanout caps, or manhole covers that are not properly sealed.

We recommend that several courses of action be taken to identify and address I/I concerns found within the system. The following summarizes the suggested tasks:

- Televising and clean all of the collection lines within the Ridings collection system. Video of the lines may allow the Authority to discover misaligned/leaking joints in the main and laterals, cracks within the mains, the existence of illicit connections, root intrusion, integrity of the sanitary manholes, etc. Rehabilitation may be necessary to address any issues discovered.
- Investigation and Inspection of existing properties for the presence of unauthorized connections. This could be accomplished via external inspection of downspouts and sump pump discharges. The Authority can explore the potential of inspection during property transfer for internal connections.
- Additional flow monitoring may be required to help pinpoint the areas with greatest I&I. There are approximately 15,400 linear feet of gravity sewer main in the Ridings collection area. A more extensive study could be conducted at multiple locations for a longer study period to obtain more representative data. We would also recommend the installation of groundwater level monitors to allow the data to correlate with the saturation of the soils.
- Obtain data from the pumping stations within the system and analyze the pump run times with recorded rain events to determine the I/I potential of those individual collection systems.
- Provide public education of the ramifications of illegal connections in relation to the operation of the WWTP and potential for overflows or additional efforts required to keep the plants in permit compliance.
- The Authority assembles the necessary data including location, size, material, depth to create a master sewer map.

In conclusion, we recommend that the Authority continues their efforts to identify sources of infiltration and inflow into the system and prepare a long range plan to mitigate such sources.

Appendix A



Customized Solutions to your Flow Metering Needs

To: Thomas Leisse
Pennoni
515 Grove Street, Suite 1B
Haddon Heights, NJ 08035

From: Brandon Cohen
Project Manager

Date: July 5, 2016

RE: Chadds Ford, PA Temporary Flow and Rainfall Monitoring

Enclosed is the data for 4/21 through 6/15/2016. The data provided for each site is as follows:

- Flow, Level & Velocity Hydrograph
- Level vs. Velocity Scattergraph
- Tabular Flow Summary Report
- Site Report

During the study period, the rain gauge recorded 11.5" of rain. Please feel free to contact me should you have any questions.



Customized Solutions to your Flow Metering Needs

Monitoring Summary:

Overview:

Two locations were monitored by area/velocity flow meters installed between April 21, 2016 and June 15, 2016. The flow meter is essentially a computer designed to operate in a sewer environment. Sensors provide depth (from which area is calculated) and velocity measurements which are used to determine flow rate. Every 5 minutes, the meter takes a depth and velocity measurement. The flow meter utilizes pressure and/or ultrasonic sensors to measure depth, and a continuous wave Doppler sensor to measure velocity.

MH-1

The flow meter provided 100% uptime during the monitoring period.

The sensor was installed in the downstream 8" pipe in the 6:00 clock position. As evidenced by the hydrograph and scattergraph, this site exhibited typical open channel, free flow. During the wet weather events, the flow generally remained in pipe and maintained free flow conditions.

The following table summarizes the data collected at this site:

	Depth (in)	Velocity (fps)	Flow Rate (MGD)
Average	1.795	1.274	0.049
Minimum	1.333	0.709	0.020
Maximum	3.164	1.983	0.132

MH-2

The flow meter provided 100% uptime during the monitoring period.

The sensor was installed in the upstream 8" pipe in the 6:00 clock position. As evidenced by the hydrograph and scattergraph, this site exhibited typical open channel, free flow. During the wet weather events, the flow generally remained in pipe and maintained free flow conditions.

The following table summarizes the data collected at this site:

	Depth (in)	Velocity (fps)	Flow Rate (MGD)
Average	1.016	0.964	0.017
Minimum	0.495	0.531	0.004
Maximum	2.534	3.391	0.109



Customized Solutions to your Flow Metering Needs

Summary

The conditions at the metering location was suitable for flow monitoring and based on the quality of the depth and velocity data, the continuity equation ($Q = V \cdot A$) was used to calculate flow. CSL's review of the flow data, the meter calibrations, field maintenance logs have verified that the flow meters have provided accurate, reliable and repeatable flow data.

Chadds Ford MH-1 - 50 Ridings Way
Pipe Diameter (in): 8 - (04/21/16 to 06/16/16)

Time	Velocity (f/s)	Level (in)	Flow (MGD)
04/21/16 00:00:00	1.242	1.853	0.050
04/22/16 00:00:00	1.227	1.795	0.047
04/23/16 00:00:00	1.213	1.786	0.047
04/24/16 00:00:00	1.192	1.746	0.045
04/25/16 00:00:00	1.106	1.686	0.039
04/26/16 00:00:00	1.162	1.671	0.040
04/27/16 00:00:00	1.247	1.659	0.043
04/28/16 00:00:00	1.268	1.684	0.045
04/29/16 00:00:00	1.238	1.651	0.042
04/30/16 00:00:00	1.280	1.728	0.047
05/01/16 00:00:00	1.266	1.695	0.045
05/02/16 00:00:00	1.281	1.716	0.046
05/03/16 00:00:00	1.314	1.750	0.049
05/04/16 00:00:00	1.334	1.753	0.050
05/05/16 00:00:00	1.337	1.770	0.051
05/06/16 00:00:00	1.460	1.973	0.064
05/07/16 00:00:00	1.399	1.909	0.058
05/08/16 00:00:00	1.371	1.804	0.053
05/09/16 00:00:00	1.313	1.772	0.049
05/10/16 00:00:00	1.342	1.847	0.054
05/11/16 00:00:00	1.356	1.822	0.053
05/12/16 00:00:00	1.301	1.840	0.052
05/13/16 00:00:00	1.313	1.835	0.052
05/14/16 00:00:00	1.304	1.834	0.051
05/15/16 00:00:00	1.218	1.745	0.045
05/16/16 00:00:00	1.248	1.774	0.047
05/17/16 00:00:00	1.232	1.769	0.046
05/18/16 00:00:00	1.235	1.793	0.047
05/19/16 00:00:00	1.315	1.796	0.050
05/20/16 00:00:00	1.313	1.825	0.052
05/21/16 00:00:00	1.315	1.885	0.055
05/22/16 00:00:00	1.294	1.792	0.049
05/23/16 00:00:00	1.256	1.790	0.048
05/24/16 00:00:00	1.227	1.786	0.046
05/25/16 00:00:00	1.252	1.784	0.047
05/26/16 00:00:00	1.280	1.812	0.050
05/27/16 00:00:00	1.285	1.830	0.050
05/28/16 00:00:00	1.270	1.764	0.047
05/29/16 00:00:00	1.254	1.739	0.046
05/30/16 00:00:00	1.316	1.823	0.051
05/31/16 00:00:00	1.310	1.802	0.050
06/01/16 00:00:00	1.275	1.804	0.049
06/02/16 00:00:00	1.301	1.813	0.051
06/03/16 00:00:00	1.310	1.830	0.051
06/04/16 00:00:00	1.304	1.797	0.050
06/05/16 00:00:00	1.304	1.794	0.050
06/06/16 00:00:00	1.284	1.791	0.049
06/07/16 00:00:00	1.229	1.819	0.048
06/08/16 00:00:00	1.217	1.760	0.045
06/09/16 00:00:00	1.243	1.850	0.050
06/10/16 00:00:00	1.251	1.941	0.053
06/11/16 00:00:00	1.246	1.860	0.050
06/12/16 00:00:00	1.246	1.762	0.047

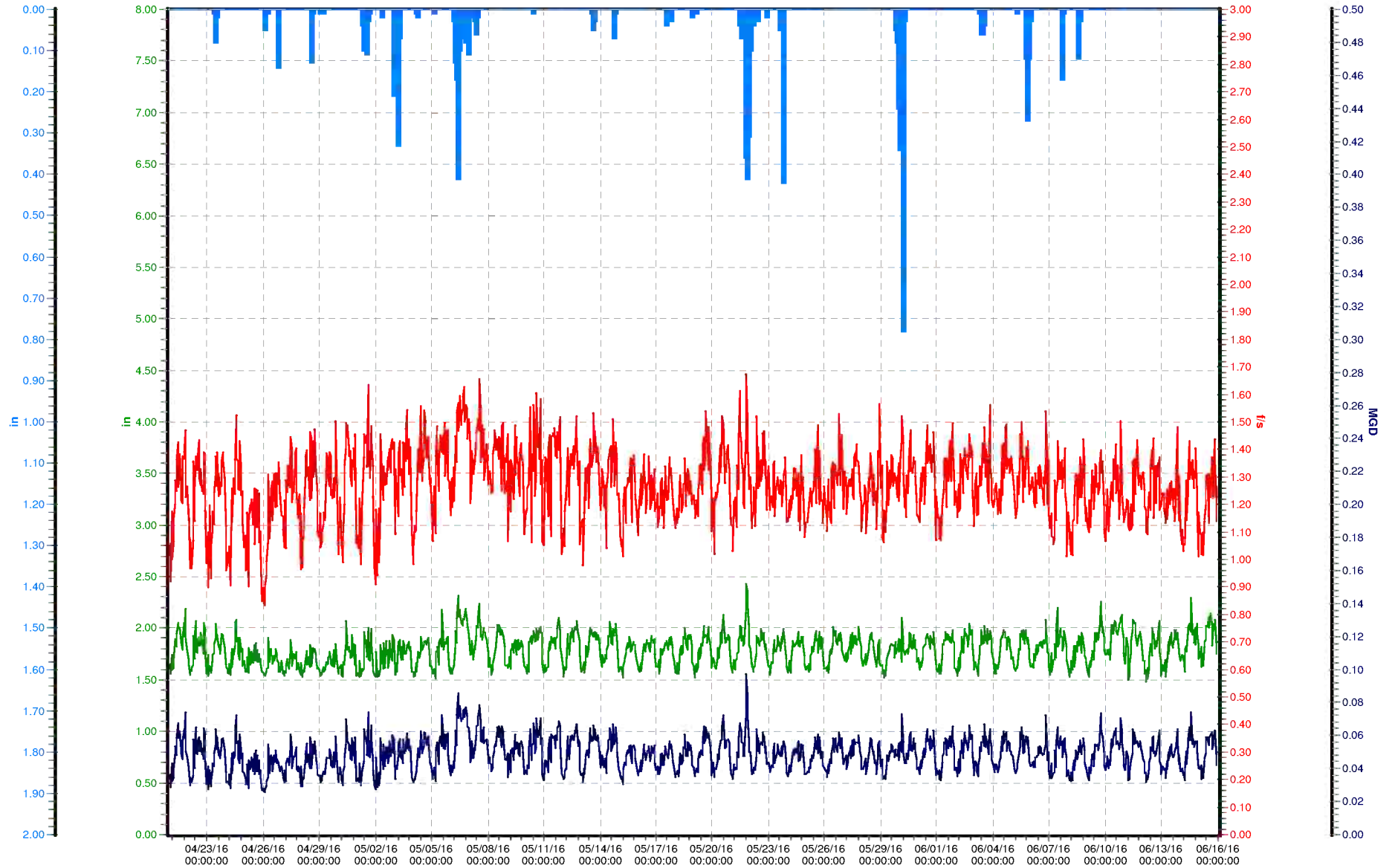
Chadds Ford MH-1 - 50 Ridings Way
Pipe Diameter (in): 8 - (04/21/16 to 06/16/16)

Time	Velocity (f/s)	Level (in)	Flow (MGD)
06/13/16 00:00:00	1.225	1.799	0.047
06/14/16 00:00:00	1.221	1.887	0.050
06/15/16 00:00:00	1.218	1.921	0.051
Minimum	1.106	1.651	0.039
Average	1.274	1.795	0.049
Maximum	1.460	1.973	0.064
Total		100.516	2.740 (mg)
Time of Min	04/25/16 00:00:00	04/29/16 00:00:00	04/25/16 00:00:00
Time of Max	05/06/16 00:00:00	05/06/16 00:00:00	05/06/16 00:00:00

Chadds Ford MH-1 - 50 Ridings Way

Pipe Diameter (in): 8 - 04/21/16 to 06/16/16

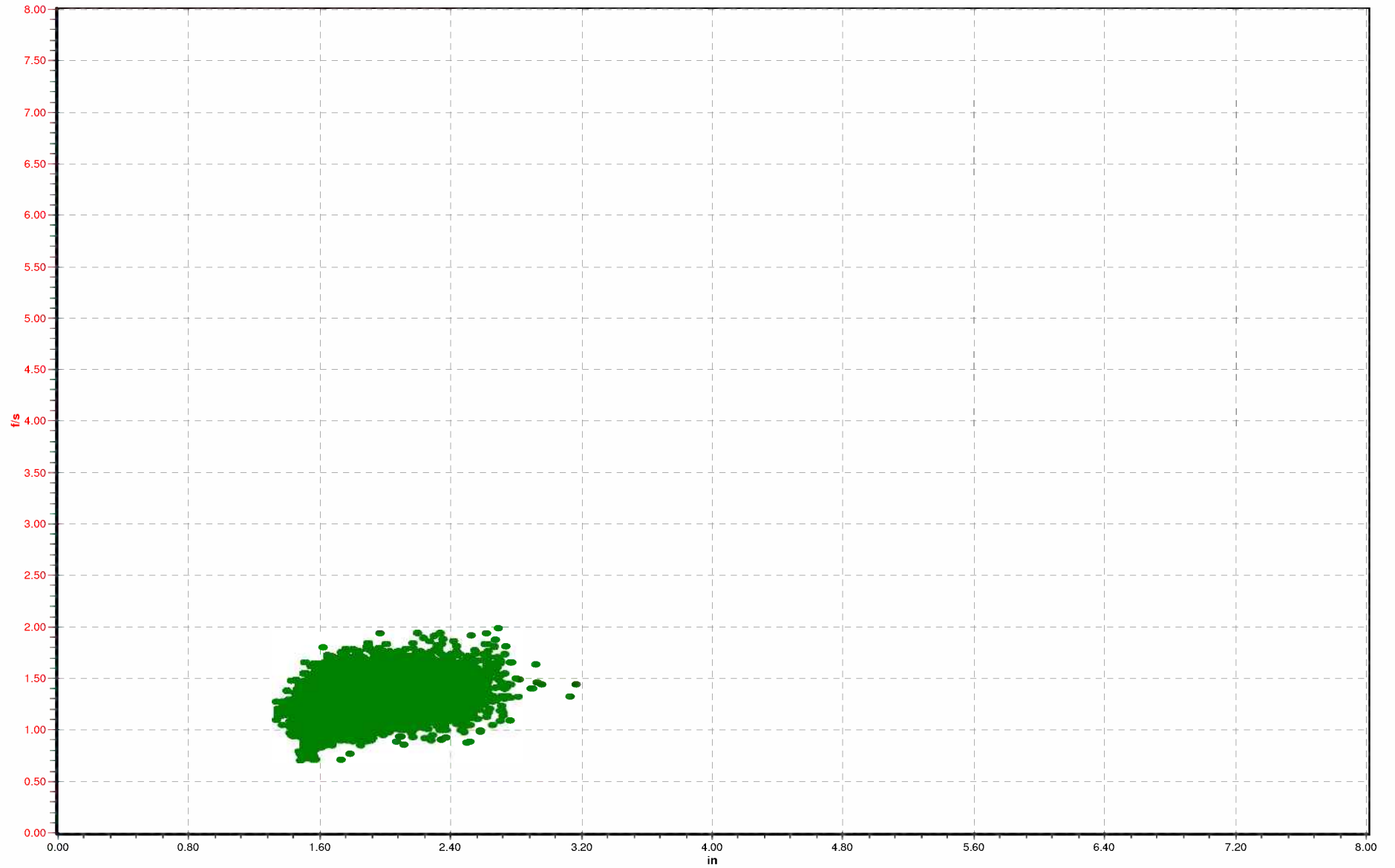
☒ Level (in) ☒ Velocity (f/s) ☒ Flow (MGD) ☒ Chadds Ford RG.Rainfall (in)



Chadds Ford MH-1 - 50 Ridings Way

Pipe Diameter (in): 8 - (04/21/16 to 06/16/16)

☒ ● Velocity (f/s)



Chadds Ford MH-2 -103 Ridings Blvd.
Pipe Diameter (in): 8 - (04/21/16 to 06/16/16)

Time	Level (in)	Velocity (f/s)	Flow (MGD)
04/21/16 00:00:00	0.977	0.929	0.015
04/22/16 00:00:00	1.013	0.957	0.017
04/23/16 00:00:00	1.031	0.929	0.017
04/24/16 00:00:00	1.009	0.932	0.016
04/25/16 00:00:00	0.998	0.924	0.016
04/26/16 00:00:00	1.007	0.977	0.017
04/27/16 00:00:00	0.988	1.127	0.019
04/28/16 00:00:00	1.045	0.981	0.018
04/29/16 00:00:00	0.973	0.963	0.016
04/30/16 00:00:00	0.970	0.986	0.016
05/01/16 00:00:00	1.053	0.975	0.018
05/02/16 00:00:00	1.021	0.929	0.017
05/03/16 00:00:00	1.048	0.990	0.018
05/04/16 00:00:00	0.997	0.958	0.016
05/05/16 00:00:00	1.001	0.941	0.017
05/06/16 00:00:00	1.188	1.034	0.024
05/07/16 00:00:00	1.203	1.045	0.024
05/08/16 00:00:00	1.072	0.976	0.019
05/09/16 00:00:00	1.043	0.955	0.018
05/10/16 00:00:00	0.990	0.975	0.017
05/11/16 00:00:00	0.951	0.925	0.015
05/12/16 00:00:00	0.979	0.945	0.016
05/13/16 00:00:00	0.975	0.930	0.016
05/14/16 00:00:00	0.980	0.920	0.016
05/15/16 00:00:00	1.017	0.951	0.017
05/16/16 00:00:00	1.054	0.978	0.019
05/17/16 00:00:00	0.976	1.013	0.017
05/18/16 00:00:00	0.991	0.985	0.017
05/19/16 00:00:00	1.032	0.982	0.018
05/20/16 00:00:00	0.925	0.929	0.015
05/21/16 00:00:00	1.070	0.979	0.020
05/22/16 00:00:00	1.255	1.023	0.025
05/23/16 00:00:00	1.055	1.020	0.020
05/24/16 00:00:00	1.022	0.942	0.017
05/25/16 00:00:00	1.021	0.961	0.017
05/26/16 00:00:00	1.021	0.984	0.018
05/27/16 00:00:00	0.960	0.950	0.016
05/28/16 00:00:00	0.992	0.925	0.016
05/29/16 00:00:00	1.005	0.912	0.016
05/30/16 00:00:00	1.168	0.993	0.022
05/31/16 00:00:00	1.031	0.935	0.017
06/01/16 00:00:00	0.952	0.909	0.015
06/02/16 00:00:00	1.010	0.948	0.017
06/03/16 00:00:00	0.985	0.922	0.016
06/04/16 00:00:00	0.923	0.913	0.015
06/05/16 00:00:00	0.989	0.921	0.016
06/06/16 00:00:00	1.026	1.049	0.019
06/07/16 00:00:00	0.990	1.090	0.018
06/08/16 00:00:00	0.961	0.935	0.015
06/09/16 00:00:00	1.027	0.963	0.018
06/10/16 00:00:00	1.008	0.935	0.017
06/11/16 00:00:00	0.996	0.897	0.015
06/12/16 00:00:00	0.998	0.976	0.017

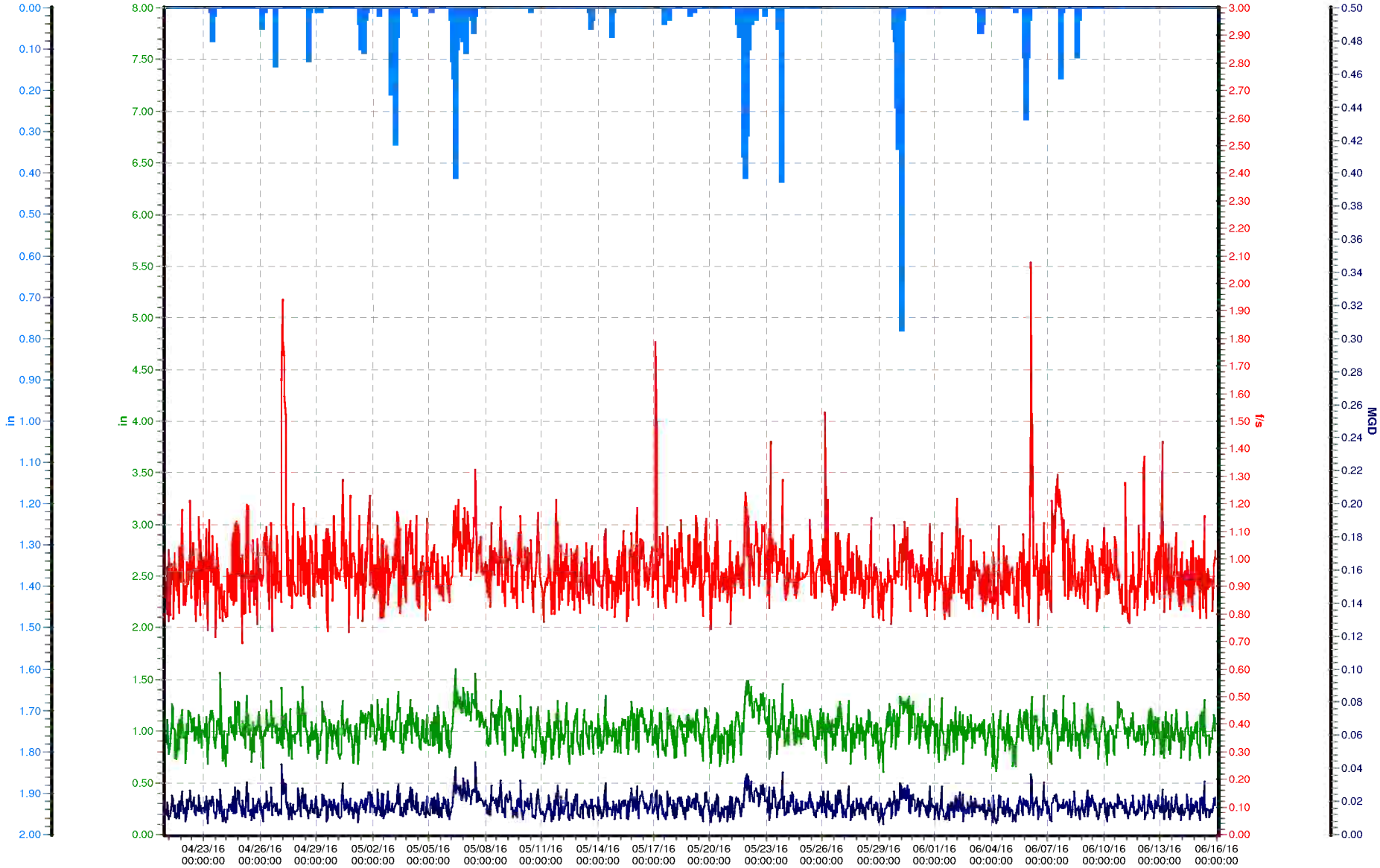
Chadds Ford MH-2 -103 Ridings Blvd.
Pipe Diameter (in): 8 - (04/21/16 to 06/16/16)

Time	Level (in)	Velocity (f/s)	Flow (MGD)
06/13/16 00:00:00	0.979	0.971	0.017
06/14/16 00:00:00	0.964	0.926	0.016
06/15/16 00:00:00	0.994	0.934	0.017
Minimum	0.923	0.897	0.015
Average	1.016	0.964	0.017
Maximum	1.255	1.127	0.025
Total	56.907		0.972 (mg)
Time of Min	06/04/16 00:00:00	06/11/16 00:00:00	06/04/16 00:00:00
Time of Max	05/22/16 00:00:00	04/27/16 00:00:00	05/22/16 00:00:00

Chadds Ford MH-2 - 103 Ridings Blvd.

Pipe Diameter (in): 8 - 04/21/16 to 06/16/16

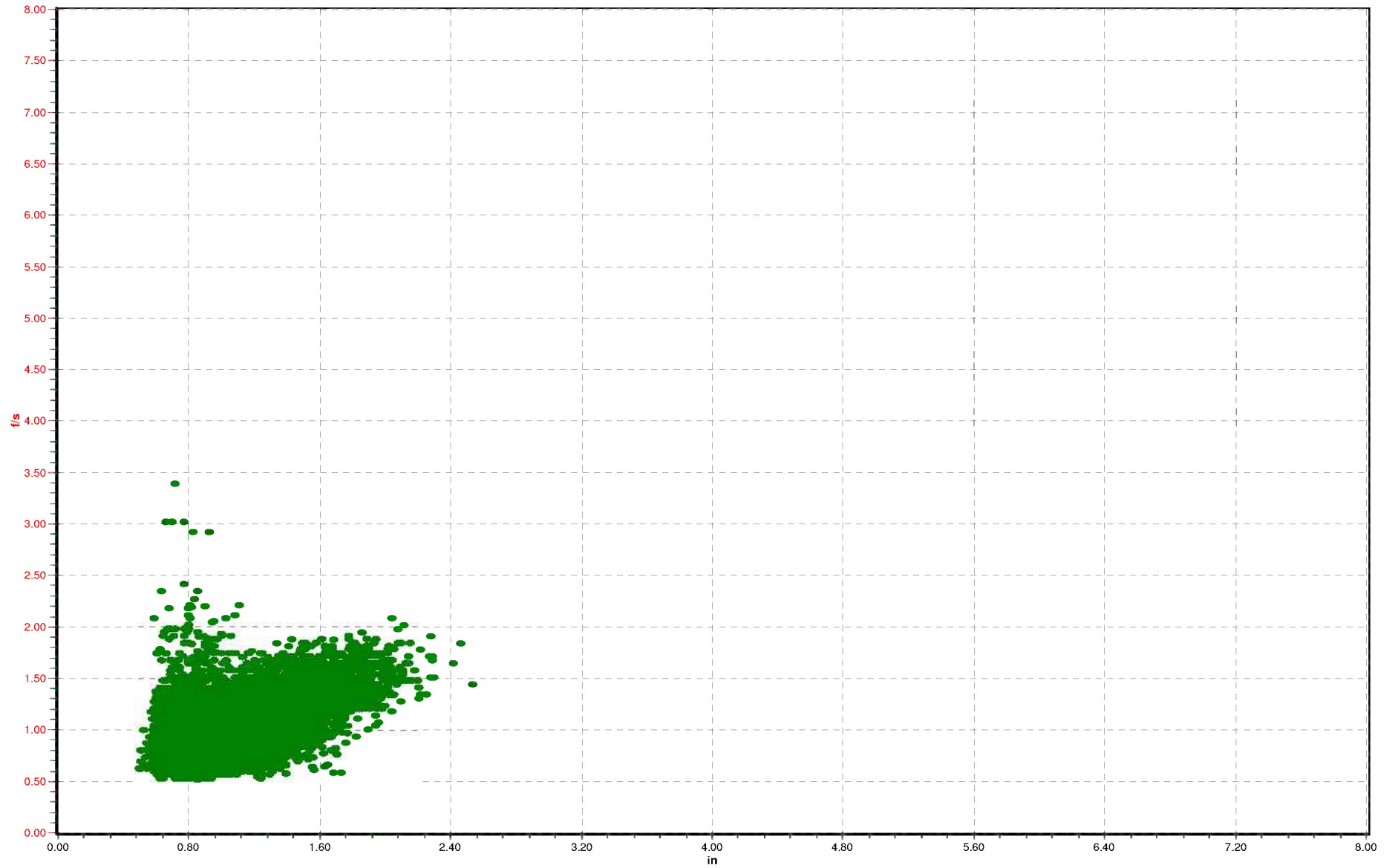
☒ Level (in) ☒ Velocity (f/s) ☒ Flow (MGD) ☒ Chadds Ford RG.Rainfall (in)



Chadds Ford MH-2 -103 Ridings Blvd.

Pipe Diameter (in): 8 - (04/21/16 to 06/16/16)

☒ ● Velocity (f/s)



APPENDIX XIV

On-Lot Disposal System Ordinance

**CHADDS FORD TOWNSHIP
DELAWARE COUNTY, PENNSYLVANIA**

ORDINANCE NO. 84B - 2007

AN ORDINANCE REPEALING AND SUBSTANTIALLY REENACTING ORDINANCE NO. 84 OF 2001, AS AMENDED, PROVIDING FOR THE CONNECTION TO AND USE OF THE CHADDS FORD TOWNSHIP SEWER AUTHORITY SEWER SYSTEM (PUBLIC SEWER) AND REGULATING THE USE OF OTHER INTERIM SEWAGE SYSTEMS; PROVIDING DESIGN PARAMETERS FOR SUCH SEWER AND SEWAGE SYSTEMS; PROVIDING FOR THE REGISTRATION, REGULATION, MAINTENANCE AND REPLACEMENT OF ON-LOT SEWAGE DISPOSAL SYSTEMS; REQUIRING AND REGULATING THE USE AND MAINTENANCE OF GREASE TRAPS AND SEPARATORS; PROVIDING FOR THE LICENSING OF SEPTAGE TRANSPORTERS; AND PROVIDING FOR PENALTIES FOR THE VIOLATION OF SAID ORDINANCE.

WHEREAS, the Board of Supervisors of Chadds Ford Township, Delaware County, Pennsylvania deems it to be in the best interest and general welfare of the citizens and the residents of the Township to provide for residences and businesses located in the Township to be connected to the Chadds Ford Township Sewer Authority's sewer system; and

WHEREAS, the Board of Supervisors of Chadds Ford Township, Delaware County, Pennsylvania deems it to be in the best interest and general welfare of the citizens and the residents of the Township to provide certain time frames within which such connections must be made; to provide procedures for such connections; to regulate private sewage disposal systems and provide for their eventual discontinuance; and to provide requirements for the installation, maintenance, design and inspection of the sewer system, and other private sewage systems; and

WHEREAS, the Board of Supervisors of Chadds Ford Township, Delaware County, Pennsylvania desires to protect and believes it is in the best interest of the citizens of Chadds Ford Township to protect the Township Sewer Authority's sewer system from damage as a result of the introduction of oil, grease, sand or other detrimental materials into the sanitary sewer system, and to set forth procedures dealing with grease traps and separators and to provide requirements for the installation, maintenance, and inspection of said grease traps and separators; and

WHEREAS, the Board of Supervisors of Chadds Ford Delaware County, Pennsylvania, deems it to be in the best interest and general welfare of the citizens and residents of the Township to protect the public health and welfare by ensuring the long term proper operation and maintenance of all on-lot sewage disposal systems in the Township so as to the protect the surface and ground waters of the Township by identifying marginal and failing on-lot sewage disposal systems and facilitating their replacement, and by providing for the licensing and registration of all septage transporters operating in the Township; and

WHEREAS, Section 1506 of the Second Class Township Code, Act of May 1, 1933, P.L. 103, No. 69, as amended, 53 P.S. Section 66506, "General Powers", authorizes the Board of Township Supervisors to make and adopt ordinances necessary for the proper management, care and control of the Township and the maintenance of the health and welfare of the Township and its citizens; and

WHEREAS, Section 1522 of the said Second Class Township Code, 53 P.S. Section 66522, "Sewage Treatment Facilities Regulations", authorizes the Board of Supervisors by Ordinance to make regulations respecting individual and community sewage treatment facilities under the Act of January 24, 1966, P.L. 1535, No. 537, known as the "Pennsylvania Sewage Facilities Act", 35 P.S. Sections 750.1 et seq.; and

WHEREAS, Section 1527 of the said Second Class Township Code, 53 P.S. Section 66527, "Public Safety", authorizes the Board of Supervisors to adopt ordinances to secure the safety of persons or property within the Township;

NOW, THEREFORE, BE IT ORDAINED AND ENACTED by the Board of Supervisors of Chadds Ford Township, Delaware County, Pennsylvania, and it is hereby ordained and enacted by the authority of the same, to wit, former Ordinance _____ of _____, as amended, is repealed and replaced by the following:

ARTICLE I Operation and Maintenance of Sanitary Sewers

136-1. Definitions; word usage.

Unless the context specifically and clearly indicates otherwise, the meaning of terms used in this article shall be as follows:

A.

ABSORPTION AREA — A component of an individual or community sewage disposal system where liquid from a treatment tank seeps into the soil.

AUTHORITY — Chadds Ford Township Sewer Authority.

BAFFLE — The treatment tank appurtenance serving the purpose of slowing the incoming sewage flow to facilitate solids settling.

BUILDING SEWER — The portion of the sewage drainage system of any structure to a point five feet outside the structure.

BUILDING SEWER CLEANOUT — A cleanout on the building sewer just inside or outside the building wall through which the sewer may be cleaned.

BUILDING TRAP — A device, fitting or assembly of fittings installed on the building drain to prevent circulation of air between the drainage system of the building and the building sewer.

CESSPOOL — A hole dug or container installed on improved property below the surface of the ground which is designed to collect and to disperse and dispose of all liquids collected by the structure's on-site sewage collection system.

CLEAN STREAMS LAW — The Pennsylvania Clean Streams Law, 35 P.S. §§ 691.1 through 691.101.

CODE ENFORCEMENT OFFICER — The Township employee(s) charged with the enforcement of all Township ordinances, codes and regulations relating to health, safety and the appearance and maintenance of properties throughout the Township, and the inspection of properties in the Township

for purposes of the issuance of permits, licenses and certificates of occupancy.

COMMERCIAL ESTABLISHMENT — Any structure intended to be used wholly or in part for the purposes of carrying on a trade, business or profession or for social, amusement, religious, educational, charitable or public uses.

COMMUNITY ON-LOT SEWAGE SYSTEM (COLDS) — A system of piping, tanks or other facilities, whether publicly or privately owned, serving two or more lots and collecting, treating and disposing of sewage into a soil absorption area or retaining tank.

COMMUNITY SEWAGE SYSTEM — A sewage facility, whether publicly or privately owned, for the collection, treatment and/or disposal of sewage from two or more lots or two or more equivalent dwelling units.

Chadds Ford Township SEWER AUTHORITY - INSTALLED SEWER LINES — Sewer lines installed by Chadds Ford Township Sewer Authority as distinguished from those sewer lines, mains, laterals, pumps stations, etc., installed by developers and subsequently accepted for dedication by Chadds Ford Township Sewer Authority.

DOMESTIC STRENGTH WASTE — Sewage of the strength that is normally discharged from a residence, i.e., toilet wastes and kitchen wastes. All other wastes of any form will be considered "industrial wastes" and are subject to rules and regulations covering industrial waste.

EATING OR DRINKING PLACE — Any establishment where food, foodstuff or beverages are served or provided for human consumption, with or without charge, including among others, hotels, restaurants, cafes, cafeterias, clubs, boardinghouses, ice cream parlors, soda water or soft drink fountains, and bars or taverns.

FOOD OR BEVERAGE MANUFACTURING, PROCESSING AND MERCHANDISING ESTABLISHMENTS — Any establishment where food, food products and beverages are manufactured, processed, packaged or bottled, or sold for consumption off the premises of the seller, including among others, bakeries, beverage distributors, bottlers, candy and confectionery manufacturers, dairies, frozen-food-locker plants, wholesalers and retailers, and operators of vending machine services.

FRESH-AIR VENT — A direct connection leading from the building trap to the outer air.

GREASE TRAP — A device installed in a sanitary waste pipe for the purpose of collecting grease and preventing it from continuing to travel in the waste piping system. Grease traps may be installed internally, in the inside of a building at the various grease-producing plumbing fixtures and equipment, or they may be installed externally, outside of the building.

GRINDER PUMP — A submersible, electric motor-driven pump capable of macerating all material found in normal domestic sanitary sewage, including reasonable amounts of objects such as plastics, sanitary napkins, disposable diapers and the like, to a fine slurry and pumping this material through a small-diameter discharge pipe. The grinder pump shall be housed in a vented, watertight enclosure.

IMPROVED PROPERTY — Any property located within the Township upon which there is erected a structure intended for continuous or periodic habitation, occupancy or use by human beings or animals and from which structure sanitary sewage and/or industrial wastes shall be or may be discharged.

INDIVIDUAL ON-LOT SEWAGE DISPOSAL SYSTEM — A collection of piping, tanks and other facilities privately owned, for collecting, treating and disposing of sewage from one lot. These facilities shall include retaining tanks, soil absorption areas, individual spray fields and individual stream discharge systems and all appurtenances.

INDIVIDUAL RESIDENTIAL SPRAY IRRIGATION SYSTEM — An individual sewage system which serves a single dwelling and which treats and disposes of sewage using a system of piping, treatment tanks and soil renovation through spray irrigation.

INDIVIDUAL SEWAGE SYSTEM — A system of piping, tanks or other facilities serving a single lot and collecting and disposing of sewage in whole or in part into the soil or into waters of this Commonwealth or by means of conveyance to another site for final disposal.

INDUSTRIAL ESTABLISHMENT — Any structure intended to be used wholly or in part for the manufacturing, fabricating, processing, cleaning, laundering or assembly of any product, commodity or article, or from which any process waste, as distinct from domestic strength sewage, shall be discharged.

INDUSTRIAL WASTE — Any solid, liquid or gaseous substance or water borne wastes or form of energy rejected or escaping from any industrial, manufacturing, trade or business enterprise or from the development, recovery or processing of natural resources, as distinct from domestic strength sanitary sewage. Industrial sewage must be treated by the owner of the premises to domestic waste strength and composition.

INSTITUTIONAL ESTABLISHMENT — Any room, group of rooms, building(s) or other enclosure which does not constitute a commercial establishment, a dwelling unit, or an industrial establishment.

LATERAL, AUTHORITY-OWNED — The piping extending from the public sewer to the right-of-way or easement line adjacent to any property. This lateral is owned and maintained by the Authority.

LATERAL, PRIVATELY OWNED — That portion of piping extending between the point of connection at the Authority-owned lateral and the building sewer. This lateral is and shall be owned and maintained by the property owner.

LIQUID WASTE — Sewage pumped from septic tank cesspools, holding tanks, privies and nontoxic biodegradable industrial waste liquids.

MALFUNCTION — The failure of any part, component or appurtenance of a sewage disposal system which results in the backup of sewage into a building or the discharge of untreated or partially treated sewage to the surface of the ground or the waters of the Commonwealth.

MUNICIPALITY — The Township of Chadds Ford..

OFFICIAL PLAN — The current comprehensive Act 537 Editor's Note: See 35 P.S. 750.1 et seq. sewage facilities plan of Chadds Ford Township as adopted by the Board of Supervisors and as may be amended and revised from time to time.

OWNER — Any person vested with ownership, legal or equitable, sole or partial, of any property located in Chadds Ford Township.

PLUMBING INSPECTOR — The person or persons appointed or designated by the Township for the purpose of enforcing Township ordinances, codes and regulations as related to plumbing.

PRIVATE DWELLING OR LIVING UNIT — A any structure intended to be occupied as a whole by one family or an apartment intended to be occupied by one family or any other one-family living unit.

PUBLIC SEWER — All facilities owned and operated by the Authority for the collection, transportation, treatment or disposal of sanitary sewage.

RETAINING TANK — A watertight receptacle, whether temporary or permanent, which receives and retains sewage and is designed and constructed to facilitate ultimate disposal of the sewage at another site. The term includes but is not limited to: Editor's Note: See also Art. II, Retaining Tanks.

(1)

CHEMICAL TOILET — A permanent or portable nonflushing toilet using chemical treatment in the retaining tank for odor control.

(2)

HOLDING TANK — A tank, whether permanent or temporary, to which sewage is conveyed by a water-carrying system.

(3)

PRIVY — A tank designed to receive sewage where water under pressure is not available.

(4)
INCINERATING TOILET — A device capable of reducing waste materials to ashes.

(5)
COMPOSTING TOILET — A device for holding and processing human and organic kitchen waste, employing the process of biological degradation through the action of microorganisms to produce a stable, humus-like material.

(6)
RECYCLING TOILET — A device in which the flushing medium is restored to a condition suitable for reuse in flushing.

SANITARY SEWAGE — The liquid carrying domestic-strength household and toilet wastes from residences, business buildings, institutions, and commercial and industrial establishments.

SEPARATOR — A device installed in a sanitary waste pipe for the purpose of separating and collecting oily and/or flammable wastes, sands, heavy solids, glass, rags, feathers and/or other similar materials, which may have a detrimental effect on the operation of the sewer system or sewage treatment facility and preventing them from continuing to travel in the waste piping system.

SEPTAGE TRANSPORTER — An individual, company or corporation licensed to and engaged in the business of removing liquid sewage waste as defined herein and disposing of said waste in an approved manner.

SEWER MANAGER — Any person who may, from time to time, be placed in general charge of the sewer system.

SEWER SYSTEM — All facilities owned and operated by the Authority for the collection, transportation, treatment or disposal of sanitary sewage.

SPRAY IRRIGATION SYSTEM — Any system, whether publicly or privately owned, designed, constructed and operated for the purpose of collecting, treating and disposing of sewage using a system of piping, treatment tanks and soil renovation utilizing spray land application.

STREAM DISCHARGE SYSTEM — Any system designed and permitted to collect and treat sewage and discharge treated effluent to a watercourse, swale or storm sewer.

TOWNSHIP — The Township of Chadds Ford, Delaware County, Pennsylvania.

TREATMENT TANK — A watertight tank designed to retain sewage long enough for satisfactory bacterial decomposition of the solids to take place; the term includes but is not restricted to the following:

(1)
SEPTIC TANK — A treatment tank that provides for anaerobic decomposition of sewage prior to its discharge to an absorption area.

(2)
AEROBIC SEWAGE TREATMENT TANK — A mechanically aerated treatment tank that provides aerobic biochemical stabilization of sewage prior to its discharge to a stream or absorption area.

WATERS OF THE COMMONWEALTH — Rivers, streams, creeks, improvements, ditches, watercourses, storm sewers, lakes, dammed water, ponds, springs and other bodies or channels of conveyance of surface and underground water or any of their parts.

- B. Word usage. All other words and terms, when used in this chapter, shall have the meanings set forth in the Pennsylvania Code, Title 25, Chapter 73, Standards for Sewage Disposal Facilities, of the

Pennsylvania Department of Environmental Protection (DEP), unless the context clearly indicates otherwise.

§ 136-2. Sanitary sewer system and appurtenances.

This section applies to all facilities for collecting, pumping, transporting, treating and/or disposing of sanitary sewage and industrial wastes, situated in or adjacent to the Township of Chadds Ford and owned, maintained and operated by the Township or the Chadds Ford Township Sewer Authority.

- A. Any and all sanitary sewer systems and appurtenances in the Township of Chadds Ford shall be designed, installed, operated and maintained in accordance with and pursuant to rules and regulations adopted, from time to time, by Chadds Ford Township, the Chadds Ford Township Sewer Authority, the Pennsylvania Department of Environmental Protection, and the United States Environmental Protection Agency.
- B. A certified copy of all such rules and regulations adopted by the Chadds Ford Township Sewer Authority shall be filed with the Township for informational purposes within 30 days after their adoption by the Authority and available for review during business hours.

§ 136-3. Community sewerage systems.

This section applies to all community sewerage systems located in the Township of Chadds Ford, including systems privately owned and publicly owned and including stream discharge systems and community on-lot systems.

- A. Any and all community sewerage systems located in the Township of Chadds Ford, now existing or hereafter established, shall be designed, installed, operated and maintained in accordance with and pursuant to rules and regulations adopted from time to time by Chadds Ford Township, the Chadds Ford Township Sewer Authority and the Pennsylvania Department of Environmental Protection and the United States Environmental Protection Agency.
- B. A certified copy of all such rules and regulations adopted by the Chadds Ford Township Sewer Authority shall be filed with the Township for informational purposes, within 30 days after their adoption by the Authority and available for review during business hours.

§ 136-4. Water conservation.

- A. No water shall be provided for internal or external use to any residential, commercial, industrial, agricultural, recreational, governmental or public building or structure of any kind which is constructed or remodeled, and in which plumbing, water piping or water fixtures are to be installed, extended or altered in any way, and for which construction a permit is required to be obtained from Chadds Ford Township (or would be required but for an exemption from a permit requirement for public or governmental agencies) unless the new, extended or altered plumbing, water piping and other water using fixtures therein conform to the requirements and standards of this article.
- B. All persons shall be encouraged not to permit any water furnished by Chester Water Authority or other purveyor of water to run to waste in any gutter or other impervious surface.
- C. Each resident or property owner of the Township of Chadds Ford not subject to the application of this article is urged to install fixtures which will reduce the quantity of water required to flush toilets and to reduce the flow rates of showers and faucets by employing measures and observing the standards set forth in Subsection D herein.
- D. Buildings or structures which are subject to the application of this article shall be bound by the following specifications:
 - (1) Water closets operated by flush tanks (water-saving water closets) having an average consumption over 6.0 Lpf (1.6 gpf), but not exceeding 13.2 Lpf (3.5 gpf) when tested per the test procedures contained in ASME A112.19.6.

(2)

Water closets and urinals operated by flushometers:

(a)

Low-consumption water closets having an average consumption of 6.0 Lpf (1.6 gpf) or less when tested per the test procedures contained in ASME A112.19.6.

(b)

Low-consumption urinals having an average consumption of 3.8 Lpf (1.0 gpf) or less when tested per the test procedures contained in ASME A112.19.6.

(3)

Showerheads. Showerhead discharge rates shall not exceed 2.5 gpm when tested per the test procedures contained in ASME A112.18.1-2000.

(4)

Sink faucets.

(a)

Kitchen sink faucet discharge rates must comply with the maximum flow rates as indicated within table 4 of ASME A112.18.1-2000 when tested per the test procedures set forth in table 4 of ASME A112.18.1-2000.

(b)

Residential lavatory sink faucet discharge rates must comply with the maximum flow rates as indicated within table 4 of ASME A112.18.1-2000 when tested per the test procedures set forth in table 4 of ASME A112.18.1-2000.

(c)

Nonresidential lavatory faucets shall be either self-closing or metering faucets as described below:

[1]

Self-closing faucets must comply with the maximum flow rates as indicated within table 4 of ASME A112.18.1-2000 when tested per the test procedures set forth in table 4 of ASME A112.18.1-2000.

[2]

Metering faucets shall be field adjustable and set so that the discharge quantity complies with the maximum flow rates as indicated within table 4 of ASME A112.18.1-2000 when tested per the test procedures set forth in table 4 of ASME A112.18.1-2000.

(5)

Blowout toilets and urinals. Replacement of blowout toilet and urinal fixtures with like-type fixtures may be granted by the Township upon request where adequate justification of special need is provided.

(6) Pressure-reducing valve. Where the service water pressure to a building is expected to exceed 60 psi, a water-pressure-reducing valve with strainer shall be installed just downstream of the building's main valve so as to be accessible. The valve shall provide for pressure adjustment within the range of 40 to 60 psi. The valve shall conform to the requirements of product standard ASSE 1003. Exemptions to this subsection are service lines to sill cocks, outside hydrants and main supply risers to buildings where pressure from the mains does not exceed 60 psi at the fixture branches or at individual fixtures.

E. Any person(s) may apply to the Township of Chadds Ford for an exception from the terms of this subsection, which exception may be granted in the discretion of the Board of Supervisors upon proof

that some other device, system or procedure will save as much or more water as those set forth herein, or that those set forth herein cannot be complied with without undue hardship.

- F. The Board of Supervisors may, from time to time, modify, add to or remove from the standards and restrictions set forth herein.

§ 136-5. Design and installation of capped sewers.

All owners of land intended to be improved and developed shall, as part of final approval of the improvement or development, agree to design and install a capped sewer system for connection to and becoming part of the sewer system of the Chadds Ford Township Sewer Authority if the sewer system has not yet been completed in the area of the development.

- A. Capped sewers shall be required to be installed in accordance with all Authority regulations. The sewers shall be installed in their entirety, including capped laterals for each lot extended to the right-of-way or easement line. When capped sewers are provided, on-site sewage facilities shall also be provided. Capped sewers shall be accepted for dedication at such time as the Authority deems practical. Until such time, capped sewers shall remain privately owned by the developer or homeowners' association pursuant to the rules and regulations of the Chadds Ford Township Sewer Authority.
- B. The capped sewer system shall be in accordance with the applicable Township and Sewer Authority specifications and standards. Routing and limits of the sewer to be installed shall be as approved by the Authority. Laterals will be a minimum of four inches in diameter and will be installed to the right-of-way line. All laterals will have a cleanout installed at the end. A manufactured cap of the type intended for use with the type of pipe being installed will be used to seal the end of the lateral. The developer will submit to the Authority a sketch of each lateral showing the location and depth of the end of each lateral.
- C. A certified copy of all specifications and standards for capped sewers adopted by the Chadds Ford Township Sewer Authority shall be filed with the Township for informational purposes and shall be available for review during business hours.

§ 136-6. Use of sewers required.

- A. Connection requirements.

(1) The owner of any property, adjoining or adjacent to, or whose principal building is within 150 feet from the sanitary sewer of the Chadds Ford Township Sewer Authority - installed sewer lines shall connect with and use the sewer system in such manner as the Authority may require within 60 days after notice to such owner from the Township and/or Authority, to make such connection, for the purpose of discharge of all normal domestic-strength sanitary waste from such property, subject to such limitations and restrictions as shall be established herein or otherwise shall be established by this Township or the Authority from time to time,

(a)

Any residential property owner who is directed to connect to the Township sewer system may, within 30 days of receipt of the notice to connect, apply in writing to the Board of Supervisors of Chadds Ford Township for permission to delay the required connection.

(b) The Board of Supervisors of Chadds Ford Township will, upon receipt of a timely written request for a delay in connecting to the Chadds Ford Township Sewer Authority sewer system, promptly schedule a public hearing to consider the residential property owner's request.

(c) The Board of Supervisors of Chadds Ford Township may, by majority vote at the conclusion of the public hearing, grant a residential property owner's request to delay, for a specified period not to exceed two years, the mandatory connection to the Township sewer system referred to in subsection A(1) above until the happening of one of the following:

[1] Sale or voluntary or involuntary transfer of the property or any portion of the property;

[2] Failure or malfunction of the property's on-site sewage system, or

[3] The expiration of the extension period granted to the property owner by the Board of Supervisors by majority vote at the public hearing on the extension request.

(d) In considering the request for an extension filed by a residential property owner, the Board of Supervisors shall take into consideration:

[1] Any recent major expenditures to an on-site sewage system;

[2]

The financial holdings of the residential owners; and

[3] The financial burden an extension would place on the Chadds Ford Township Sewer Authority.

(e) The Board of Township Supervisors may, after a hearing, if the owner of the improved property establishes substantial hardship precluding immediate connection to the sewer system and establishes that the current on-site sewage disposal system is functioning properly, extend the period within which the connection to the sewer system must be made for up to 24 months. Any such extension granted by the Board of Supervisors shall be applicable only to the original applicant and shall be rendered void upon the sale or transfer of the property or any portion thereof.

(2) No privy vault, cesspool, sinkhole, septic tank or similar receptacle shall be used or maintained at any time upon any improved property which has been connected to the sewer system or which is required under this section to be connected to the sewer system. Every such privy vault, cesspool, sinkhole, septic tank or similar receptacle in existence shall be abandoned and shall be cleansed and filled, and any such privy vault, cesspool, sinkhole, septic tank or similar receptacle not so abandoned and cleansed and filled shall constitute a nuisance, and such nuisance may be abated by the Township as provided by law, at the expense of the owner of such improved property, such expense to include the Township's attorney fees.

(3) All such holding vessels or receptacles shall be decommissioned at or before the time that the connection is made to the sewer system and shall be accomplished as follows:

(a) All existing residue shall be pumped out by a licensed septage transporter and be removed for off-site disposal. Under no circumstances may the residue be introduced into the new sewer line.

(b) The vessel or receptacle's bottom shall be broken after all residue has been removed and its lid collapsed into the vessel or receptacle. The volume must then be filled with A-1 type stone mix.

(c) All conduits leading from the vessel or receptacle shall be disconnected and all openings shall be similarly filled.

(d) All existing fields shall then be abandoned, but no structures of any kind, including sheds, garages or other accessory uses, may be erected over the filled vessels or abandoned fields.

(4) No privy vault, cesspool, sinkhole, septic tank or similar receptacle may at any time be connected with the sewer system.

(5) The notice to an owner by the Township and/or Sewer Authority to make a connection to the sewer system shall consist of a written or printed document or letter addressed to the record owner of the improved property requiring connection in accordance with the provisions of this chapter and specifying that such connection shall be made within 60 days from the date such notice is given. Such notice may be issued at any time after a sewer is in place which can receive and convey normal domestic strength waste for treatment and disposal from the particular property. Such notice shall be served upon the

owner either by personal service or by registered mail or by such method as at the time may be provided by state law.

(6) If the owner of any property, adjoining or adjacent to, or whose principal building is within 150 feet from the sanitary sewer, after 60 days notice in accordance with this section, shall fail to connect such property and/or fail to pay the required fees and/or fail to use the sewer system as required, the Township and Sewer Authority may cause such property to be entered upon and connected to the sewer system as provided by law. The Township and Sewer Authority shall collect from such owner the actual costs and expenses incurred in such work.

(7) Where connection to the sewer system is made by the Township and/or Authority after notice to the owner, the Township shall immediately upon completion of the work send an itemized bill for the cost of the construction of such connection to the owner of the improved property to which such connection has been made. Such bill shall be payable within 30 days of receipt. In case of neglect or refusal by the owner of such improved property to pay such bill within such time, or to enter into a written installment agreement with the Township and/or Authority to pay such bill in 12 monthly or four quarterly installment payments, the Township and/or authority shall, within six months of the completion of the sewer connection, file a municipal lien against the property for all costs associated with the sewer connection, the same to be subject in all respects to the general law provided for the filing and recovery of municipal liens.

- B. Any and all connections of improved property to the sewer system pursuant to the requirements of this chapter shall be in accordance with and pursuant to the rules and regulations adopted from time to time by the Authority.
- C. A certified copy of all such rules and regulations adopted by the Authority shall be filed with the Township, for informational purposes, within 30 days after adoption by the Authority, and available for review during business hours.

§ 136-7. YGrinder pump connections.

A. General.

(1) The owner of any improved property that will utilize a grinder pump to discharge sanitary sewage to the sewer system as a replacement of an existing grinder pump facility or as an initial installation must receive permission from the Chadds Ford Township Sewer Authority prior to installing the grinder pump.

(2) Installation shall be performed only by qualified personnel who shall be named in the Chadds Ford Township Sewer Authority application for the connection permit.

(3) The owner of the improved property that will utilize a grinder pump shall obtain a plumbing permit from Chadds Ford Township and shall provide evidence that the following information has been supplied to the Sewer Authority for review and approval:

(a)

The manufacturer's detail sheet for the proposed grinder pump;

(b) A pump curve for the proposed grinder pump;

(c) A copy of the manufacturer's installation instructions; and

(d) A plan of the proposed connection, which depicts all information that would be required for the Sewer Authority to determine if the grinder pump would function as it is intended, including but not limited to the location of the building or structure that is being connected, the elevation of the existing building sewer and the lateral and the proposed routing of the discharge piping.

(4) The design, installation, repair and maintenance of the grinder pump shall be in accordance with the

requirements prescribed by the Chadds Ford Township Sewer Authority.

- B. Maintenance of grinder pump. The property owner shall be responsible for maintenance and repair of the grinder pump system from the pump to the cleanout at the Authority-owned lateral.

§ 136-8. Separators and grease traps.

- A. Application to existing and future owners.

(1) The provisions of this section are intended to apply to all existing and future users of the sewer system. Existing users shall have 90 days from the adoption of this article to construct such facilities and take such measures as may be necessary to bring their establishments in conformance with this article.

(2) Future users of the sewer system shall be in compliance with this article at the time connection is allowed to the system.

- B. Separators and grease traps not required. Neither separators nor grease traps are required for residences. If, however, groups of residences utilize a common kitchen facility or dining facility, then the provisions of this section shall be applied.
- C. Information. All users currently connected to the sewer system and all future users who apply for connection to the sewer system in the future are required to provide information and documentation to the Authority sufficient so that the Authority may determine whether a separator or grease trap is required.
- D. Prohibited wastes. The following wastes are prohibited from being deposited into any sewer system:
 - (1) Solid or viscous substances which may cause obstruction to the flow in a sewer or other interference with the operation of the wastewater treatment facilities such as, but not limited to, grease, garbage with particles greater than 1/2 inch in any dimension, animal guts or tissues, paunch, manure, bones, hair, hides, spent lime, stone or marble dust, metal, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, waste paper, wood, plastics, solvents, gasoline, antifreeze, oil-based paints, tar, asphalt, residues, residues from refining or processing of fuel, lubricating oil, mud, glass grindings, polishing wastes, fur, ashes, incinerator residue, dredged spoil, solid waste, construction materials, rock, sand, cellar dirt, feathers, wood, tar, cinders, medical waste or any other harmful chemicals.

(2) No residential, commercial or industrial property which is connected to the sewer system may discharge any surface water from sump pumps, gutters, drains, downspouts, air-conditioning condensate lines, or any other similar source into the sewer system. All privately owned laterals must be maintained so as to minimize the infiltration of groundwater into the sewer system.

- E. Grease trap.

(1) Grease traps shall be provided pursuant to the Authority's specification rules and regulations when, in the opinion of the Authority, they are necessary for the proper handling of liquid wastes containing floatable grease in such amounts as to cause obstruction to the flow in a sewer or other interference with the operation of any public or private wastewater treatment facilities. In general, grease traps shall be required at all eating and drinking places and food or beverage manufacturing, processing and merchandising establishments.

(2) All interceptors shall be of a type and capacity approved by the Authority and shall be located as to be readily and easily accessible for cleaning and inspection. All systems shall be designed, constructed and operated in accordance with the manufacturer's specifications.

(3) Grease traps shall be equipped with devices to control the rate of water flow so that the manufacturer's rating is not exceeded. The minimum capacity of a grease trap shall be such that the

grease retention capacity measured in pounds of grease shall be at least two times the total flow-through rating measured in gallons per minute.

(4) All grease traps shall be from a manufacturer with a minimum of five years of experience in the manufacturing of grease traps and/or shall conform to the Plumbing and Drainage Institute (PDI) standard G101.

F. Separators.

(1) Separators shall be provided when, in the opinion of the Authority, they are necessary for the proper handling of liquid wastes containing oil, sand, any flammable wastes, or any other harmful ingredients in such amounts as to cause obstruction to the flow in a sewer or other interference with the operation of the wastewater treatment facilities.

(2) At separators shall be of a type and capacity approved by the Authority and shall be located as to be readily and easily accessible for cleaning and inspection. All systems shall be designed, constructed and operated in accordance with the manufacturer's specifications.

(3) Separators required. At repair garages, gasoline stations with grease racks, grease pits, or work racks, and at factories where oily and flammable liquid wastes are produced, separators shall be installed into which all oil-bearing, grease-bearing, or flammable wastes shall be discharged before emptying in the building drainage system or other point of disposal.

(4) Separation of liquids. A mixture of treated or untreated light and heavy liquids having various specific gravities shall be separated in an approved receptacle.

(5) Design of oil and liquid separators. Separators shall be designed as provided below:

(a) Overall requirements. Oil separators shall have a depth of not less than two feet below the invert of the discharge drain. The outlet opening of the separator shall have not less than an eighteen-inch water seal.

(b) Garages and service stations. Where automobiles are serviced, greased, repaired, washed or where gasoline is dispensed, separators shall have a minimum capacity of six cubic feet for the first 100 square feet of area to be drained into the separator. Parking garages in which servicing, repairing, or washing is not done, and in which gasoline is not dispensed, shall not require a separator. Areas of commercial garages which are used for storage of automobiles only are not required to be drained through a separator.

(6) Sand separators. Separators for sand, grit, and similar heavy solids shall be so designed and located as to be readily accessible for cleaning and shall have a water seal of not less than six inches. Sand and grit separators shall be required at all locations where cars or trucks are washed and shall have a minimum capacity of 500 gallons at such locations.

7) Laundries. Commercial laundries shall be equipped with separators having a wire basket or similar device, removable for cleaning, that will prevent passage into the drainage system of solids 1/2 inch or larger in size, string, rags, buttons, or other materials detrimental to the public sewage system.

(8)

Bottling establishments. Bottling plants shall discharge their process wastes into a separator which will provide for the separation of sugar, broken glass or other solids, before discharging waste into the drainage system.

(9)

Slaughterhouses. Slaughtering room and dressing room drains shall be equipped with approved separators. The separator shall prevent the discharge into the drainage system of feathers, entrails, and any other materials that could potentially cause clogging.

(10)

Venting of separators. Separators shall be so designed that they will not become air bound if tight covers are used. Each interceptor or separator shall be vented when subject to loss of trap seal.

G. Costs.

(1)

The owner of each improved property shall be responsible for all costs associated with the installation, operation, maintenance and replacement of separators and/or grease traps. These costs shall include the cost of properly disposing of the accumulated material.

(2)

If a separator or grease trap at an improved property was not installed or malfunctions due to lack of maintenance, lack of cleaning or for any other reason and such lack of installation or failure shall cause blockages, sewage back-ups, sewage overflows or in any other manner damages or interferes with the operation of the sewer system, then the owner of the improved property shall be responsible to pay for all costs required to repair and clean the Authority's sewer system. Such costs shall include, but shall not be limited to cleaning costs, pumping costs, engineering costs, legal fees and administrative costs.

H. Inspection.

(1)

The Authority shall have the right to inspect the grease traps and/or separators to ensure that the systems are in working order and that the systems are being properly maintained and cleaned. The Authority shall have the right to inspect the cleaning records at the time the inspection occurs.

I. Maintenance and records. The owner of an improved property which utilizes a grease trap and/or separator shall at all times keep the system in good working condition. The traps or separators shall be cleaned periodically to keep them in good working order. All traps and separators shall be cleaned at least once every three months. The records shall include the date of disposal, the means of disposal, the name and signature of the person responsible for supervising the cleaning of the separators and grease traps and the proper disposal of the accumulated material. Annually the owner shall transmit a copy of the cleaning records to the Authority. Records of each cleaning shall be maintained by the establishment for a period of three years.

J. Disposal of accumulated material. All materials which are accumulated by the separators and/or grease traps shall be properly disposed of by the owner. Under no circumstances shall accumulated material be allowed to enter into the sewer system. Any removal and hauling of the collected materials not performed by owner's (owners') personnel must be performed by currently licensed waste disposal firms.

§ 136-9. Maintenance of individual on-lot sewage disposal systems.

In accordance with and pursuant to the requirements of the Pennsylvania Sewage Facilities Act, as amended, 35 P.S. § 750.1 et seq., the Pennsylvania Solid Waste Management Act, as amended, 35 P.S. § 6018.101 et seq., and Title 25, Chapter 73, of the Pennsylvania Code, "Standards for On-Lot Sewage Treatment Facilities, and regulations of the Pennsylvania Department of Environmental Protection, the Township of Chadds Ford has determined that registration and regular maintenance of individual on-site sewage disposal systems will help prevent malfunctions, extend the life of such system(s), reduce the necessity for installation of community sewer systems thus saving expense to the homeowner and the Township, and protect the waters of the Commonwealth.

- A. All owners of individual on-site sewage disposal systems with a stream discharge, now in existence or hereafter installed, shall, within 60 days of the effective date of this article, register with Chadds Ford Township and secure a permit. No such permit shall be issued except upon receipt by the Township from the owner of evidence that the owner possesses a valid permit from the Pennsylvania Department of Environmental Protection for a stream discharge and copies of all sewage tests conducted of the system during the preceding year.
- B. All owners of existing individual on-site sewage disposal systems with no stream discharge shall register with Chadds Ford Township within six months of the effective date of this article on forms to be provided by the Township, registering as a minimum the precise location on the lot of all elements of the sewer system and the name and address of the last septage transporter used by the owner to pump the sewer system.
- C. All owners of individual on-site sewage disposal systems with no stream discharge installed after the effective date of this article shall obtain a valid permit from the Township prior to and as a requirement for the issuance of a certificate of occupancy.
- D. All owners of single-family residences utilizing an individual on-lot sewage disposal system shall have the septic tank(s) pumped at least once every two years. This service must be performed only by a septage transporter licensed by Chadds Ford Township.
- E. All owners of multifamily residences utilizing an on-lot sewage disposal system shall have the septic tank pumped at least once every year. This service must be performed only by a septage transporter licensed by Chadds Ford Township.
- F. All other property owners utilizing an on-lot sewage disposal system shall have the septic tank(s) pumped at least once a year or on a schedule approved in writing by the Chadds Ford Township Sewage Enforcement Officer. The service must be performed only by a septage transporter licensed by Chadds Ford Township.
- G. Where an on-lot sewage disposal system, in the opinion of the Township Sewage Enforcement Officer, exhibits signs of malfunction, the owner shall cause the septic tank(s) to be immediately pumped by a licensed septage transporter. The property owner shall contact the Chadds Ford Township Sewage Enforcement Officer to coordinate the repair, if possible, of the malfunction or the replacement of the system with a new, on-lot sewage disposal system if repair is not feasible. Failure of a property owner to promptly have a septic tank(s) pumped after notice by the Township Sewage Enforcement Officer shall constitute a violation of this article.

§ 136-10. Septage transporters.

All septage transporters serving customers within the boundaries of Chadds Ford Township shall be registered and licensed by the Township of Chadds Ford.

- A. Registration shall consist of annually completing and submitting an application form to the Township together with the required insurance documentation and a check payable to Chadds Ford Township in the amount set forth in the Township fee schedule.
- B. Any septage transporter who fails to file the quarterly reports required by this article shall have 10 days after notice by the Township to cure the failure to file a timely report. If the failure is not cured within the

ten-day period, the septage transporter's license shall be immediately revoked.

- C. All vehicles used for pumping of liquid waste shall be equipped so as to insure that each tank or receptacle pumped shall be thoroughly cleaned to remove all solids and scum.
- D. No septage transporter registered as such in Chadds Ford Township shall alter, repair, replace or enlarge any part of any on-lot sewage disposal system without a permit issued by the Chadds Ford Township Sewage Enforcement Officer.
- E. All septic tanks must be pumped out by a licensed septage transporter through the main tank access. No person shall pump the contents of any tank out through the inspection port nor shall they alter or enlarge the inspection port to create a larger diameter opening.

§ 136-11. Septage transporter reporting requirements.

All septage transporters shall maintain written records of all properties serviced in Chadds Ford Township.

- A. The required records shall include the property owner(s) name and address, the site address, the date of service and the amount of gallons pumped.
- B. All registered septage transporters shall file with the Township a quarterly report listing all properties serviced within the Township during the period, which reported shall include the information required by § 136-11A.

§ 136-11.1. Permits; fees.

Charges to property owners, who desire to and/or are required to connect to the sewer system, will be imposed by the Township and/or Sewer Authority. Such charges may include a connection fee, a tapping fee and other similar fees and/or permits in an amount established by the Township or the Authority, as applicable, from time to time.

§ 136-11.2. Retaining tanks.

The owner of an improved property that is approved to and does utilize a retaining tank shall:

- A. Maintain the retaining tank in conformance with all Township ordinances, the provisions of any applicable laws and the rules and regulations of the Authority and any administrative agency of the Commonwealth of Pennsylvania; and
- B. Permit only licensed septage transporters to collect, transport and dispose of the contents of any retaining tank.

§ 136-11.3. Violations and penalties.

- A. Any person who shall violate any provision of this article or who permits the violation of any provision of this article shall be subject to a fine of \$1,000 for each violation.
- B. Each violation for each separate day after notice from the Township and/or Sewer Authority and each violation of any provision of this article shall constitute a separate and distinct violation, subjecting the owner(s) of the property to fines of \$1,000 for each day the violation(s) continues.
- C. Any person who violates or permits the violation of any provision of this article shall, upon being found liable therefor in enforcement proceedings commenced by Chadds Ford Township and Sewer Authority, pay the fines prescribed by this article, plus all court costs, including all reasonable attorney fees, incurred by Chadds Ford Township or the Sewer Authority.
- D. Enforcement of this article shall be the responsibility of the Code Enforcement Officer, Sewage Enforcement Officer, Public Works Director, Fire Marshal, or the designated Township agent as appropriate.
- E. Enforcement of this article may also be accomplished by an action in equity brought in the Court of Common Pleas of Delaware County. The defendant(s) in such an action shall be liable for all court costs, including all reasonable attorney fees incurred by Chadds Ford Township or the Sewer Authority.

§ 136-11.4. Abatement of nuisances.

In addition to any other remedies provided in this article, any violation of this article shall constitute a nuisance and may be abated by the Township or the Authority by either seeking appropriate equitable or legal relief from a court of competent jurisdiction. The Township or the Authority shall be entitled to an award of all counsel fees incurred in such civil action to abate the nuisance.

§ 136-11.5. Severability.

If any sentence, clause, section or part of this article is for any reason found to be unconstitutional, illegal or invalid, such unconstitutionality, illegality, or invalidity shall not affect or impair any remaining provisions, sentences, clauses, sections, or parts of this article. It is hereby declared as the intent of the Board of Supervisors that such remainder shall be and shall remain in full force and effect.

§ 136-11.6. Repealer.

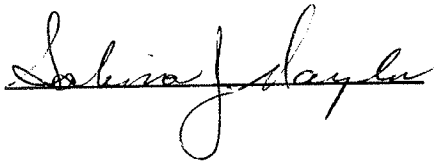
All Township ordinances, including the prior Ordinance No. 166 of 1988, Editor's Note: Said ordinance adopted former Ch. 136, Art. I. as amended, and parts of ordinances inconsistent with the provisions hereof, are hereby repealed and rescinded.

§ 136-11.7. When effective.

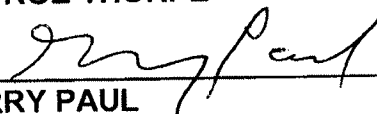
This article shall take effect five days after the date of its enactment by the Board of Supervisors of Chadds Ford Township.

ENACTED AND ORDAINED, this 16th day of August, 2007.

ATTEST:



BOARD OF SUPERVISORS
CHADDS FOR TOWNSHIP


DEBORAH LOVE D'ELIA
GEORGE THORPE
GARRY PAUL

APPENDIX XV

Chapter 94 Reports

**CHAPTER 94
MUNICIPAL WASTELOAD MANAGEMENT
ANNUAL REPORT**

**2015
CHADDS FORD TOWNSHIP
SEWER AUTHORITY**

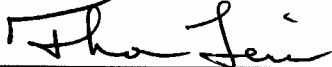
**RIDINGS WASTEWATER
TREATMENT FACILITY**

**DELAWARE COUNTY
PENNSYLVANIA**

Prepared by:
PENNONI ASSOCIATES, INC.
3001 Market Street, 2nd Floor
Philadelphia, PA 19104

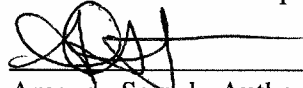
Prepared for:
CHADDS FORD TOWNSHIP SEWER AUTHORITY
Ridings of Chadds Ford Wastewater Treatment Facility
P.O. Box 816
Chadds Ford, PA 19317-0628

Preparer:
Pennoni Associates, Inc.



Thomas Leisse, P.E.

Permittee:
Chadds Ford Township Sewer Authority



Amanda Sereck, Authority Manager

**2015 Chapter 94 Report for the Ridings WWTP
Chadds Ford Township Sewer Authority, Delaware County, Pennsylvania**

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**2015 Chapter 94 Report for the Ridings WWTP
Chadds Ford Township Sewer Authority, Delaware County, Pennsylvania**

1.0 INTRODUCTION

This report is provided to comply with the Title 25, Chapter 94 Municipal Wasteload Management regulations of the Pennsylvania Department of Environmental Protection (PADEP) concerning wastewater facilities. This subject of this report is the municipally owned sewage collection and treatment system flowing to the Ridings Wastewater Treatment Facility in Chadds Ford Township, Delaware County.

1.1 Treatment Plant Description

There are two municipally owned sewage treatment plants (WWTP's) in Chadds Ford Township, Delaware County. The Ridings WWTP is located at the intersection of Ridge Road and Ridings Boulevard. The Turners Mill WWTP is located adjacent to the Township Building at the intersection of Baltimore Pike (Route 1) and Ring Road.

There are currently no tributary municipalities that send sewage to either of the wastewater treatment facilities in the Township. However, there are two private WWTP's in the Township. The Springhill Farm WWTP (NPDES Permit No. PA0052230) serves the Springhill Farms Development and the shopping center at Wilmington-West Chester Pike (Route 202) and Ridge Road in the south east corner of the Township. The Knights Bridge WWTP (NPDES Permit No. PA0052663) serves properties owned by the Henderson Group at the intersection of Routes 202 and Route 1.

Operation and maintenance responsibilities for the Ridings and Turners Mill WWTPs as well as the municipally owned sewage pump stations are provided on a contract basis by the Delaware County Regional Water Quality Control Authority (DELCORA). Management and administrative duties are carried out by the Board of Directors of the Chadds Ford Township Sewer Authority, the Authority Manager, and an administrative manager.

Ridings WWTP

The Ridings WWTP started operation in October 1994 in accordance with National Pollution Discharge Elimination System (NPDES) Permit No. PA0055476. The current permit has an expiration date of September 30, 2017. The facility discharges treated wastewater to an unnamed tributary of Harvey Run in the Brandywine Creek watershed.

The Ridings WWTP is permitted for an average daily flow of 80,000 gpd. The Water Quality Management Permit No. 2393404 Amendment 2 does not specify a maximum Organic Loading. However, the plant was designed around an assumed organic concentration of 220 mg/l which equates to an organic loading of 147 lbs/day at 0.080 MGD.

The treatment plant consists of an influent lift station, a fine screen, an influent equalization tank, a dual basin sequencing batch reactor, post treatment equalization basin, filtration of the effluent, chlorination, and then de-chlorination prior to release to

**2015 Chapter 94 Report for the Ridings WWTP
Chadds Ford Township Sewer Authority, Delaware County, Pennsylvania**

the receiving stream. Removed bio-solids are aerobically digested and periodically hauled offsite to a disposal facility.

2.0 HYDRAULIC AND ORGANIC LOADING

2.1 Condition of the Ridings Treatment Plant

The Ridings WWTP is regularly maintained by DELCORA and the pumps, tanks, and other mechanical equipment are functioning properly. In an effort to reduce the effluent Total Suspended Solids (TSS), the Authority installed a Siemens Forty-X disc filter in February 2008 to replace the existing sand filter. The disc filter is intended to improve the effluent quality of the WWTP. The disc filter suffered start-up issues which led the Authority to continue operation of the sand filter and filter a portion of the SBR effluent in parallel with the disc filter. Those issues have been resolved. Other improvements to the treatment plant were completed in early 2011 which included influent wastewater screening and flow equalization.

2.2 Current Hydraulic Loading

As per the Water Quality Management Permit No. 2393404 Amendment 2, the Ridings Treatment Plant has a Hydraulic Design (Annual Average) Capacity of 0.080 MGD. The Annual Average Flow in 2015 at the Ridings Plant was 0.0399 MGD. The maximum average month was 0.046 MGD in March 2015. The 3-Month Average Max flow was 0.044 MGD average from January through March 2015. These flows are within the permitted Annual Average Capacity of the treatment facility. The treatment plant did not experience a hydraulic overload condition in 2015.

Due to the installation of the new EQ put on line in March 2011, the Ridings Plant does not experience higher than average flows during wet weather periods. Since this time, the peak influent flows have been substantially mitigated which in some instances has eliminated the need for the Storm Mode operation of the plant.

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Table 1 outlines the Ridings WWTP's historic 5-year hydraulic loading data and the current year's rainfall.

Table 1						
Hydraulic Loading (MGD)						Rainfall (inches)
Month	2011	2012	2013	2014	2015	2015
January	0.035	0.035	0.034	0.035	0.045	3.20
February	0.040	0.030	0.035	0.038	0.041	1.20
March	0.0451	0.052	0.033	0.040	0.046	3.50
April	0.035	0.028	0.033	0.041	0.039	2.80
May	0.032	0.027	0.034	0.049	0.035	1.30
June	0.028	0.029	0.037	0.038	0.039	8.00
July	0.024	0.026	0.032	0.033	0.040	6.20
August	0.037	0.028	0.030	0.033	0.035	2.20
September	0.037	0.029	0.029	0.034	0.033	4.00
October	0.032	0.032	0.035	0.043	0.044	7.50
November	0.033	0.030	0.040	0.040	0.040	4.10
December	0.038	0.034	0.048	0.039	0.041	8.20
Annual Average (AA)	0.0347	0.0316	0.0350	0.0386	0.0399	4.35
3 Month Max. Average	0.040	0.039	0.041	0.043	0.044	
Ratio (3 Month Max to AA Ratio)	1.16	1.24	1.17	1.12	1.11	
5-Year Average Hydraulic Ratio =					1.16	

2.3 Current Organic Loading

As stated previously, the Water Quality Management Permit No. 2393404 Amendment 2 does not specify a maximum Organic Loading. However, the plant was designed around an assumed organic concentration of 220 mg/l which equates to an organic loading of 147 lbs/day.

The Annual Average loading at the Ridings WWTP was 123.7 lbs/day. The maximum month was reported in July 2015 with an average loading of 222.9 lbs per day. The facility recorded a higher than normal organic loading in July, however, the effluent quality remained within the permitted limits during that time.

Influent samples are taken twice per month from the lift station at the head of the Ridings Treatment Plant. 24-hour composite samples are collected and tested for BOD₅, TSS, and pH. Starting in April of 2011, the backwash from the two tertiary filters was directed to the new equalization tank which prevented any return/recycle flows from being included in the influent sampling. The Ridings WWTP does not accept hauled-in septage from outside sources.

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Chadds Ford Township Sewer Authority, Delaware County, Pennsylvania

Table 2 outlines the influent loading calculations for 2015. Calculations were based on the influent BOD₅ concentration and the flow on the day that the sample was taken. The daily loadings were then averaged to determine the monthly average organic loading at the WWTP. Because the treatment facility is not permitted for and does not receive flows in excess of 0.100 MGD, there is no influent flow monitoring. Effluent flow measurements as reported in the monthly DMRs were used in all calculations.

Table 2				
Organic Loading Sampling Data				
	A	B	C = A x B x 8.34	
Date of Sample	BOD5 (mg/l)	Flow (MGD)	Daily BOD5 (lbs/day)	Monthly Average (lbs/day)
1/8/2015	253	0.0487	102.8	
1/22/2015	563	0.0378	177.4	140.1
2/5/2015	199	0.0417	69.2	
2/19/2015	331	0.0348	96.1	82.6
3/5/2015	180	0.0655	98.4	
3/19/2015	598	0.0389	193.8	146.1
4/1/2015	435	0.0399	144.6	
4/16/2015	206	0.0417	71.7	108.1
5/7/2015	239	0.0342	68.1	
5/21/2015	260	0.0334	72.4	70.3
6/4/2015	121	0.0405	40.9	
6/18/2015	243	0.0431	87.3	64.1
7/2/2015	265	0.0400	88.4	
7/16/2015	900	0.0476	357.4	222.9
8/6/2015	633	0.0409	215.9	
8/20/2015	417	0.0386	134.4	175.1
9/3/2015	460	0.0343	131.4	
9/17/2015	348	0.0353	102.5	117.0
10/1/2015	240	0.0369	73.9	
10/15/2015	321	0.0342	91.6	82.7
11/5/2015	360	0.0441	132.3	
11/19/2015	224	0.0506	94.5	113.4
12/3/2015	668	0.0396	220.5	
12/17/2015	232	0.0535	103.6	162.0

Annual Average = 123.7

Table 3 outlines the historic 5-year organic loading data including calculations of the Annual Average, Maximum Month, Maximum Month to Annual Average Ratio, and the 5-year Average Organic Ratio.

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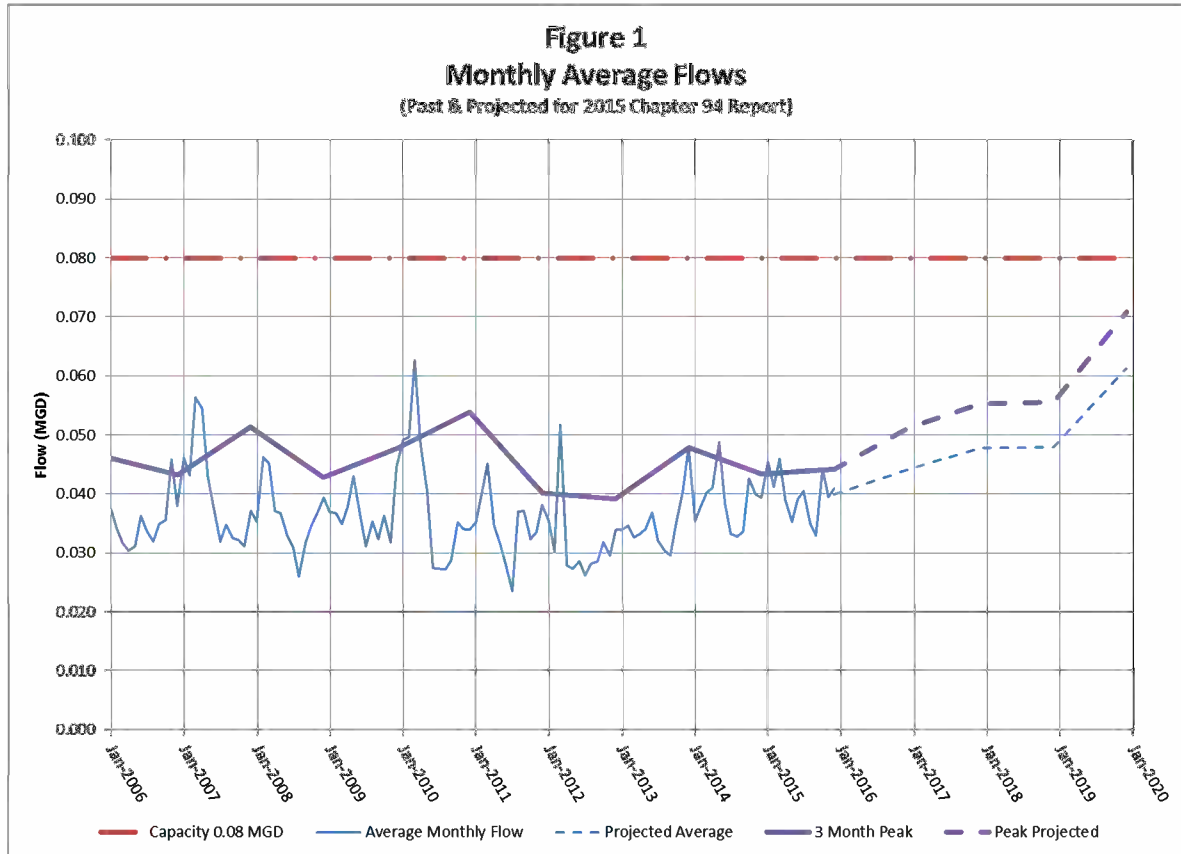
Table 3					
Organic Loading (lbs/day)					
Month	2011	2012	2013	2014	2015
January	82.33	83.60	47.73	83.65	140.07
February	75.68	77.20	55.57	59.15	82.63
March	63.98	119.50	51.97	48.49	146.10
April	75.42	48.60	117.61	96.40	108.12
May	72.15	70.90	62.27	76.42	70.28
June	67.58	64.10	58.31	82.88	64.07
July	43.74	49.80	69.14	57.19	222.93
August	47.38	51.30	64.15	60.65	175.12
September	65.44	58.20	73.52	38.69	116.96
October	69.35	58.70	47.01	76.03	82.73
November	70.47	70.60	80.46	341.68	113.43
December	61.07	64.60	87.15	87.59	162.04
Annual Average (AA)	66.22	68.09	67.91	92.40	123.71
Max Month	82.33	119.50	117.61	341.68	222.93
Ratio (Month Max to AA Ratio)	1.24	1.75	1.73	3.70	1.80
5-Year Average Organic Ratio =					2.05

3.0 5-YEAR HYDRAULIC AND ORGANIC LOADING PROJECTIONS

Hydraulic Loading

The Ridings Wastewater Treatment Plant currently has a permitted hydraulic capacity of 0.080 MGD. There were approximately 241 connections to the Ridings Collection System in 2015 yielding an annual average flow of 0.040 MGD. There are 120 projected connections in the next 5 years. At approximately 183 gpd/EDU, this equates to an expected increase in flow of 0.022 MGD. The expected hydraulic loading in 2020 is approximately 0.061 MGD with a project maximum monthly flow of 0.071 MGD. These flow projections were calculated based on the guidance provided in the Department's Annual Report Template. The supporting tables and calculations can be found in Appendix A. A graph showing the past and projected hydraulic loading can be found on Figure 1.

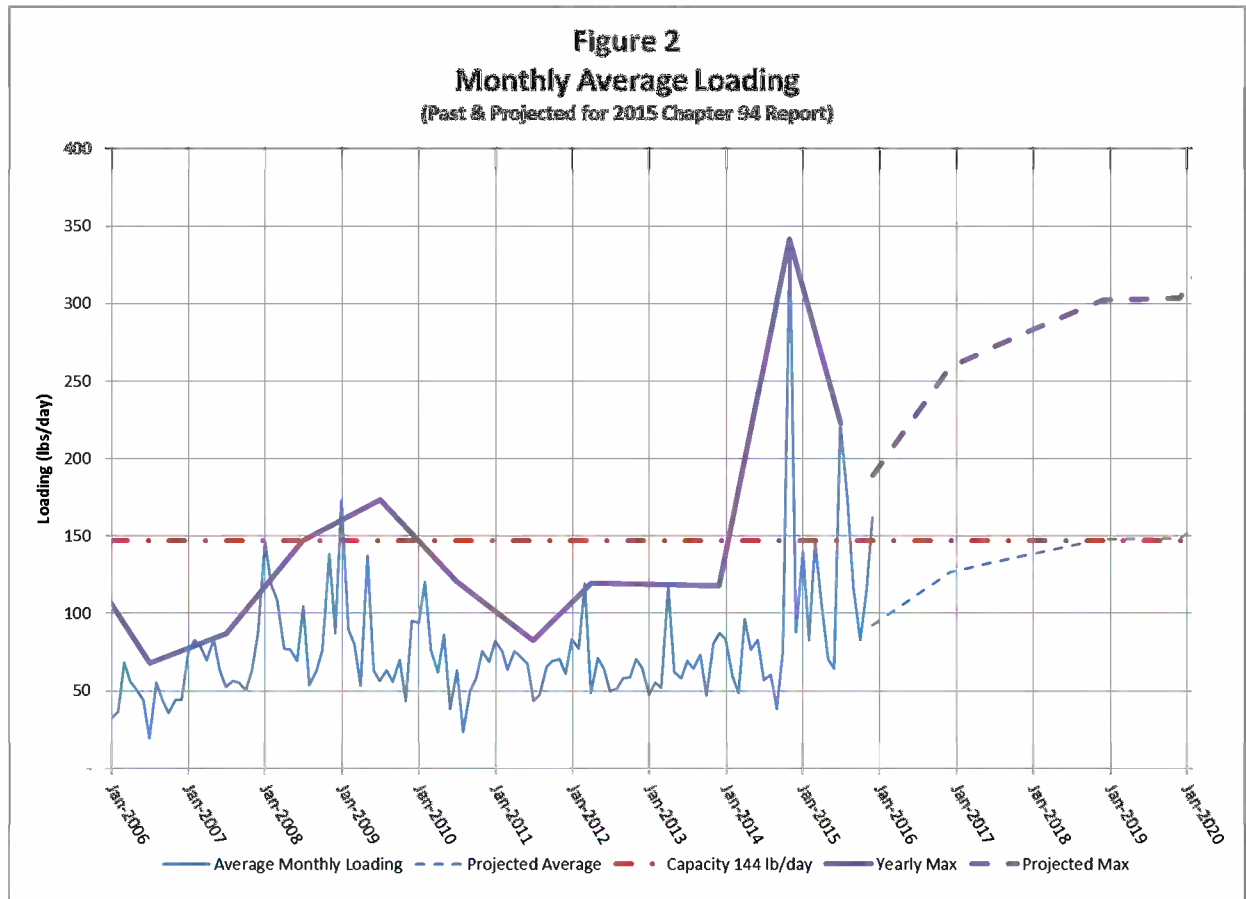
**2015 Chapter 94 Report for the Ridings WWTP
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Organic Loading

The Ridings Wastewater Treatment Plant has a calculated organic capacity of 161 lbs BOD₅/day based on an assumed design loading of 220 mg/l of BOD/day. There were approximately 241 connections to the Ridings Collection System in 2015 yielding an annual average loading of 0.51 lbs BOD₅/day/edu. There are 120 projected connections in the next 5 years. This equates to an expected increase in loading of 61.60 lbs BOD₅/day. The expected Annual Average organic loading in 2020 is approximately 185.3 lbs BOD₅/day with a project maximum monthly loading of 379.1 lbs BOD₅/day. These projections were calculated based on the guidance provided in the Department's Annual Report Template. The supporting tables and calculations can be found in Appendix B. A graph showing the past and projected Organic loading can be found on Figure 2.

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Chadds Ford Township Sewer Authority, Delaware County, Pennsylvania



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4.0 SEWER EXTENSIONS

There were no sewer extensions constructed in the Ridings WWTP service area in 2015. A map showing the known proposed projects which will require public sewers but are in the conceptual or preliminary planning stages can be found in Appendix F.

Below is a list outlining each projected extension projects within the next 5 years. A detailed list of projected future connections can be found in Appendix C:

Table 4		
Project	EDUs	Date
Ridge Associates	21	2016-2020
1792, 1794, 1796, 1798 Wilmington Pike	19	2016-2020
205 Heyburn Road	1	2019
182 Ridge Road	1	2018
183 Ridge Road	1	2016
191 Ridge Road	1	2016
Joann Toanone to Varriale	4	2016
Pileggi Option from Grace	59	2020
Grace Left Capacity	8	2020
1 Coopers Hawk Lane	1	2020
3 Coopers Hawk Lane	1	2020
4 Coopers Hawk Lane	1	2020
5 Coopers Hawk Lane	1	2020

5.0 PROGRAM FOR SANITARY SEWER MONITORING, MAINTENANCE, AND REPAIR

The Ridings Collection System is a relatively small collection system and consists of 8-inch PVC gravity collection sewers, a low pressure sewer system, and three (3) sewage pumping stations. The locations of these facilities are depicted on the map in Appendix F.

a. Monitoring

The Authority contracts with DELCORA to monitor the collection systems in conjunction with their operations at their treatment facilities. DELCORA makes bi-weekly inspections of each pump station and records the run-times for each pump at each station.

b. Maintenance

Maintenance to the sewage collection system is made on an as-needed basis. When required, maintenance is performed by DELCORA or a local contractor that has a master-services agreement with the Authority. Regular maintenance services to the pump station equipment and backup generators include checking oil levels, changing oil, refilling fuel, and removing grease and general cleaning of the pump station wet-wells. The following maintenance was performed:

1. February- Changed oil and filters on 5 blowers.
2. April – Cleaned the disc filter panels.

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3. June- Rebuilt spare Flygt pump, removed grease and sediment from Woodlands Pump Station.
 4. July- Cleaned disc filters.
 5. August- Chemically cleaned disc filters.
 6. September- Chemically cleaned disc filters.
 7. October – Chemically cleaned disc filters.
 8. November – Chemically cleaned disc filters.
- c. Repair
- Repairs to the sewage collection system are made on an as-needed basis. When required, repairs are performed by DELCORA or a local contractor that has a master-services agreement with the Authority. The following repairs were made at the plant and in the collection system:
1. January – Repaired vacuum regulator piping to filter feed tank.
 2. February- Replaced failed pH probe, changed out final effluent tank blower motor.
 3. March- Repaired impeller to filter feed pump.
 4. June- Replaced Filter Feed Pump.
 5. October- Installed new disks and backwash pump in disk filter.
 6. November- Constructed and installed tank covers for post EQ and final tanks.
- d. Rehabilitation
- No major rehabilitations were performed in the Ridings collection system in 2015.
- e. Routine and Special Activities
- DELCORA personnel routinely inspect the sewage pumping stations in the collection system, perform maintenance, make repairs, and record pump run times for each pump station.
1. DELCORA used a vacuum truck for semi-annual removal of grease at the Woodlands Pump Station.
 2. There were no Special Activities performed in the Ridings collection system in 2015.
- f. Personnel and Equipment Used
- DELCORA provides a number of staff and a variety of equipment on an as-needed basis to the Authority. The staff provided includes licensed operators, technicians, electricians, mechanics and office personnel to operate and maintain the collection and treatment facilities and to prepare and submit monthly reports to the Authority and DEP.
- g. Sampling Frequency
- Regular sampling of the sewage within the collection system is not conducted on a regular basis. Sampling at the Ridings Treatment Plant is conducted in accordance with the NPDES Permit. Most constituents are sampled on a weekly basis and some on a bi-weekly basis.
- h. Quality Assurance
- All testing is conducted by accredited laboratories – DELCORA (Lab ID 23-00671) and Atlantic Coast Laboratories (68-335).
- i. Data Analysis

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A detailed analysis of the flows to each pump station based on pump run times are included in Appendix D.

j. Infiltration/Inflow (I/I) Monitoring

The Authority conducted flow monitoring at three (3) locations in the Ridings Collection System in 2007, 2008, and 2009. The latest metering conducted in 2009 showed no indications of surcharging during precipitation events in excess of 1.0 inches. Without significant system extensions or connections in 2015, additional monitoring was not conducted.

k. The Authority does not maintain any combined sewers in their system.

6.0 CONDITION OF THE SEWER SYSTEM

The Ridings Collection System is generally in good condition. It currently operates within its design and permitted capacity and is projected to do so over the next 5 years. This conclusion is based on the flow metering data collected in 2009 and the projected connections included in this Annual Report. There are no hydraulic overloads projected or known areas with surcharging within the Ridings Collection System.

The Ridings Collection System is relatively new with the oldest portions being constructed in 1994. The gravity system was constructed with 8-inch PVC pipe. There are no known portions of the system that are in need of repair, replacement, or rehabilitation. An 8-inch pipe installed at the minimum slope of 0.40 feet per 100 feet has a hydraulic capacity of 0.494 MGD. This is well in excess of the expected peak flows within the Ridings Collection System (<0.201 MGD). Therefore, the existing sewer lines are sized properly for the connected population.

There were no Sanitary Sewer Overflows reported at the Ridings Plant, however, there was a Sanitary Sewer Overflow reported at the Woodlands Pump Station on March 14th due to equipment failure. The equipment has since been repaired.

There are no permanent flow meters in the Ridings Collection System. Flows from the discharge of the Ridings WWTP are recorded and as expected, the wet-weather flow is higher than dry-weather flow. The older gravity portion of the collection system was cleaned and video inspected between 2007 and 2009 by DELCORA. At that time, several point repairs were made and manhole inserts were placed in low-lying locations in the system.

The Authority conducted flow monitoring at three (3) locations in the Ridings Collection System from March 11, 2009 until November 30, 2009. These were same locations monitored from June 2007 through April 2008. The metering conducted in 2009 showed no indications of surcharging during precipitation events in excess of 1.0 inches. Due to the small size of the collection system and the lack of sewer extensions made since the 2009 study, no additional metering or monitoring was conducted in 2015.

2015 Chapter 94 Report for the Ridings WWTP
Chadds Ford Township Sewer Authority, Delaware County, Pennsylvania

7.0 SEWAGE PUMPING STATIONS

The Ridings Collection System includes three (3) sewage pumping stations and a small low pressure sewer system. The pump stations are continuously monitored and regularly inspected and maintained by DELCORA. Table 5 summarizes the permitted, present and projected flows for each station.

Table 5							
Pump Stations							
		Permitted Capacities		Present Flows			Projected Flows
Pump Station Name	Numer of Pumps	AA Permitted Capacity (gpd)	Hydraulic Design Capacity (gpm)	Annual Average Flows (gpd)	Peak Day Flow (gpd)	Peak Hourly Flow* (gpm)	2-Year Projected Max Flow (gpd)
Remote PS	2	1,400	38	1,603	3,420	10	3,420
Intermediate PS	2	5,950	35	4,356	9,660	28	9,660
Woodland PS	2	27,500	120	6,790	16,200	45	16,200

*Peak hourly flows are estimated based on a peaking factor applied to the Peak Day flow. For Smith Bridge and Eckman, a factor of 4.2 was used and a factor of 4.0 was used for Woodland PS. Additional capacity and attenuation of the peak flows is provided in the "storage" volume of the wetwells of both the Smith Bridge and Eckman pump stations. Both of these pump stations were designed to hold a minimum of 24 hours of flow providing adequate attenuation of the peak instantaneous flows.

Remote (Smith Bridge) Pump Station

The Remote Pump Station is located at the southern end of the Ridings System off of Smith Bridge Road. The station services 6 single family residences. It has 2 submersible pumps rated at 38 gpm each. The average and peak design flows, as proposed in the June 30, 1995 WQM Permit Application, are 1,400 gpd and 4,200 gpd respectively. The force main from the pump station discharges to the Intermediate Pump Station.

The Smith Bridge pump station is in good condition with only routine maintenance required in 2015. No additional connections are planned in the next 2 years, so no upgrades are currently planned. The Remote Pump Station does not have an emergency generator for back-up power however it does have added storage capacity intended to provide emergency wastewater storage for a minimum of 24 hours. This station does not have an influent flow meter. Peak day flows have been calculated based on the recorded run times of the pumps. The peak instantaneous flows have been estimated by applying a peaking factor to the peak day flows. A copy of the calculated flow data is provided in Appendix D. Additionally, the extra storage capacity in the wetwell provides adequate attenuation of any peak flows and ensures that the pump station has adequate capacity with only one pump in operation.

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Intermediate (Eckman) Pump Station

The Intermediate Pump Station is located at the southern end of the Ridings neighborhood in an easement on the south side of Ridings Way. The pump station receives flow via gravity from 17 single family homes in the Ridings Development in addition to the flow from the Remote Pump Station. The Intermediate Pump Station is equipped with 2 submersible pumps rated at 35 gpm each. The average and peak design flows in the June 30, 1995 WQM Permit Application, are 5,950 gpd and 17,850 gpd respectively. The force main from the pump station discharges into MH 11 in Ridings Way and then flows by gravity to the Ridings WWTP.

The Intermediate Pump Station is in good condition with only routine maintenance required in 2015. No additional connections are planned in the next 2 years, so no upgrades are currently planned. The Intermediate Pump Station does not have an emergency generator for back-up power however it does have added storage capacity intended to provide emergency wastewater storage for a minimum of 24 hours. This station does not have an influent flow meter. Peak day flows have been calculated based on the recorded run times of the pumps. The peak instantaneous flows have been estimated by applying a peaking factor to the peak day flows. A copy of the calculated flow data for the pump station is provided in Appendix D. Additionally; the extra storage capacity in the wetwell provides adequate attenuation of any peak flows and ensures that the pump station has adequate capacity with only one pump in operation.

Woodland Pump Station

The Woodland Pump Station is located on Woodland Drive on the east side of Route 202. The Woodland Pump Station services approximately 82 EDU's, including approximately 35 single family homes on Woodland Drive, Summit Drive, and Longview Road as well as a number of commercial facilities on Route 202. The pump station consists of two aboveground Smith & Loveless pumps rated at 120 gpm each. The average design flow is 27,500 gpd. The station does not have an influent flow meter. However, there were no recorded instances where both pumps came on due to high flows in 2015. The force main from the pump station discharges into a terminal gravity manhole in Longview Road and then flows via gravity to the Ridings WWTP.

The Woodland Pump Station is in good condition with only routine maintenance required in 2015 including periodic cleaning and removing of grease and debris from the wetwell. No upgrades to the station are currently planned. The Woodland Pump Station has an emergency generator for back-up power which is regularly inspected and exercised.

Low Pressure Sewers

There is a low pressure sewer system serving the Raven Crest Development and certain properties along Heyburn Road south of Ridge Road. The low pressure force main discharges into a gravity sewer along Ridge Road to the west of the Ridings WWTP. This gravity sewer enters the treatment plant lift station independent of the gravity collection system from the Ridings Development described above.

**2015 Chapter 94 Report for the Ridings WWTP
Chadds Ford Township Sewer Authority, Delaware County, Pennsylvania**

8.0 INDUSTRIAL WASTES

There are no industrial dischargers into the Ridings sewer system. Connection specifications have been provided by the Authority, and connections are inspected by the Township Code Enforcement Officer. The Township has a grease trap ordinance which is monitored and enforced by the Township Code Enforcement Officer. All connections are limited to discharging domestic strength wastewater.

9.0 CORRECTIVE ACTION PLAN

There is no current or projected hydraulic or organic overload condition identified with the Ridings WWTP or for any portion of the collection and conveyance system within the WWTP's sewer service area.

10.0 CALIBRATION REPORTS

Calibration Reports for the effluent flow meter at the Ridings WWTP can be found in Appendix E.

11.0 TRIBUTARY MUNICIPALITY REPORTS

Chadds Ford Township does not receive tributary flows from any other municipality or authority.

Appendix A

Projected Hydraulic Loading Calculations

Table A1 – Historical Connections				
Year	# EDUs Connected	Flow Rate (gpd/EDU)	Additional Flow (MGD)	Total # EDUs Connected
2007	15	183	0.0027	208
2008	-	183	-	208
2009	4	183	0.0007	212
2010	4	183	0.0007	216
2011	1	183	0.0002	217
2012	-	183	-	217
2013	1	183	0.0002	218
2014	6	183	0.0011	224
2015	17	183	0.0031	241

Table A2 – Adjusted Annual Average Flow									
Year	AA Flow (MGD)	MM Flow (MGD)	MM/AA Ratio	Connections					Adjusted AA Flow (MGD)
				2011	2012	2013	2014	2015	
2011	0.035	0.040	1.15		-	0.0002	0.0011	0.0031	0.0391
2012	0.032	0.039	1.23		-	0.0002	0.0011	0.0031	0.0360
2013	0.035	0.041	1.17				0.0011	0.0031	0.0392
2014	0.039	0.0433	1.12					0.0031	0.0417
2015	0.040	0.0442	1.11						0.0399
Total	0.180								0.1959
5 Yr Avg	0.036		1.158						0.0392

Table A3 – Adjusted Projections					
Year	AA Flow (MGD)	New EDUs	Increased Flow (MGD)	Projected AA Flow (MGD)	Projected Max Month (MGD)
2016	0.0392	6	0.0011	0.0403	0.0466
2017	0.0403	21	0.0038	0.0441	0.0511
2018	0.0441	20	0.0037	0.0478	0.0553
2019	0.0478	1	0.0002	0.0480	0.0555
2020	0.0480	72	0.0132	0.0612	0.0708

Calculated 2015 EDU Rate: 183 gpd/edu

Appendix B

Projected Organic Loading Calculations

Year	Previous Years AA Loading (lb/day)	Projected New EDUs	Increased Loading (lb/day)	Projected AA Loading (lb/day)	Projected Peak Loading (lb/day)
2015	92.4			92.4	189.1
2016	123.7	6	3.08	126.8	259.4
2017	126.8	21	10.78	137.6	281.5
2018	137.6	20	10.27	147.8	302.5
2019	147.8	1	0.51	148.3	303.5
2020	148.3	72	36.96	185.3	379.1

Average 2015 Loading 123.7 lb/day
 Total EDU's in 2015 241 EDU's
 Average Loading 0.51 lb/day/EDU
 5 Year Avg Ratio 2.05

Appendix C

Projected Future Connections

CONNECTIONS	EDUs					
		2016	2017	2018	2019	2020+
Currently Connected						
Residential	165					
Non-Residential	76					
Total Currently Connected	241					
Properties Assessed but not Connected						
Residential						
205 Heyburn Road	1				1	
183 Ridge Road	1	1				
191 Ridge Road	1	1				
182 Ridge Road	1			1		
Total Assessd but not Connected	4	2	0	1	1	0
Dedicated Connections						
Residential						
1 Coopers Hawk Lane	1					1
2 Coopers Hawk Lane	1					1
3 Coopers Hawk Lane	1					1
4 Coopers Hawk Lane	1					1
5 Coopers Hawk Lane	1					1
Non-Residential						
1792, 1794, 1796, 1798 Wilmington Pike	19		11	8		
Ridge Associates	21		10	11		
Joann Toanone to Varriale	4	4				
Pileggi Option from Grace	59					59
Grace Left Capacity	8					8
Total Dedicated Connections	116	4	21	19	0	72
TOTAL PROJECTED CAPACITY	361					
PROJECTED NEW CONNECTIONS		6	21	20	1	72
TOTAL CONNECTIONS	241	247	268	288	289	361

Appendix D

Pump Station Flow Data

Ridings Service Area

Eckman Pump Station

2011 Operating Data

Single Pump Flow Rate

35 gpm

Date	Pump 1	Pump 2	Pump 1	Pump 2	Daily
			Hrs/Day	Hrs/Day	Average Flow
1/3/2011	2866	3208	1.17	1.00	4,550
1/10/2011	2874	3215	1.14	1.00	4,500
1/17/2011	2880	3224	0.86	1.29	4,500
1/24/2011	2890	3231	1.43	1.00	5,100
1/27/2011	2892	3233	0.67	0.67	2,800
2/2/2011	2895	3241	0.50	1.33	3,850
2/17/2011	2910	3257	1.00	1.07	4,340
2/22/2011	2914	3263	0.80	1.20	4,200
3/1/2011	2921	3272	1.00	1.29	4,800
3/8/2011	2929	3281	1.14	1.29	5,100
3/22/2011	2947	3299	1.29	1.29	5,400
3/28/2011	2952	3305	0.83	1.00	3,850
4/1/2011	2960	3305	2.00	-	4,200
4/13/2011	2984	3305	2.00	-	4,200
4/19/2011	2994	3305	1.67	-	3,500
4/22/2011	2996	3307	0.67	0.67	2,800
4/26/2011	3000	3312	1.00	1.25	4,725
4/29/2011	3003	3315	1.00	1.00	4,200
5/3/2011	3007	3320	1.00	1.25	4,725
5/6/2011	3010	3323	1.00	1.00	4,200
5/9/2011	3013	3328	1.00	1.67	5,600
5/19/2011	3022	3339	0.90	1.10	4,200
5/23/2011	3026	3343	1.00	1.00	4,200
5/31/2011	3033	3353	0.88	1.25	4,463
6/3/2011	3035	3356	0.67	1.00	3,500
6/14/2011	3045	3367	0.91	1.00	4,009
6/17/2011	3047	3370	0.67	1.00	3,500
6/20/2011	3050	3372	1.00	0.67	3,500
6/27/2011	3055	3378	0.71	0.86	3,300
7/1/2011	3058	3382	0.75	1.00	3,675
7/11/2011	3065	3390	0.70	0.80	3,150
7/13/2011	3067	3392	1.00	1.00	4,200
7/25/2011	3076	3403	0.75	0.92	3,500
7/27/2011	3080	3405	2.00	1.00	6,300
8/1/2011	3081	3408	0.20	0.60	1,680
8/11/2011	3088	3416	0.70	0.80	3,150
8/19/2011	3098	3429	1.25	1.63	6,038