HOUSTON CREEK STORMWATER STUDY SCOPE

IDENTIFY CURRENT DRAINAGE ISSUES

- Creek Flooding (FEMA 100-year Floodplain, Zone A)
- Localized Neighborhood Flooding (Roadways, Driveways, Yards, Basements). Issues came to light during neighborhood site walk.

DELINEATE DRAINAGE AREA / EXISTING FEATURES

- Existing Plans, LiDar, On-site Survey, TV storm sewer inspections
- NOAA Precipitation Frequency Estimates (2-year, 24-hour storm = 3.3 inches) (100-year, 24-hour storm = 7.5 inches)

STUDY ANALYSIS

- Conveyance Capacity @ Creek Obstructions (culverts, bridges, etc.)
- Rate / Volume Reduction (How much reduction can various improvement provide?)
- Investigate Localized Flooding Issues

IDENTIFY / EVALUATE POTENTIAL IMPROVEMENTS

RECOMMENDATIONS & PRIORITIES

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.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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:

NGS Information Services
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3242

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

BASE MAP SOURCE: Road centerlines were obtained in digital spatial data format from the Delaware Valley Regional Planning Commission. County and township/borough boundaries were downloaded from the Pennsylvania Spatial Data Access website. Soils and soils digital orthophoto were provided by the Delaware Valley Regional Planning Commission. Streamlines were digitized based on the orthophotos. Adjustments were made to specific base map features to align them to the 2007 Soils Orthophoto.

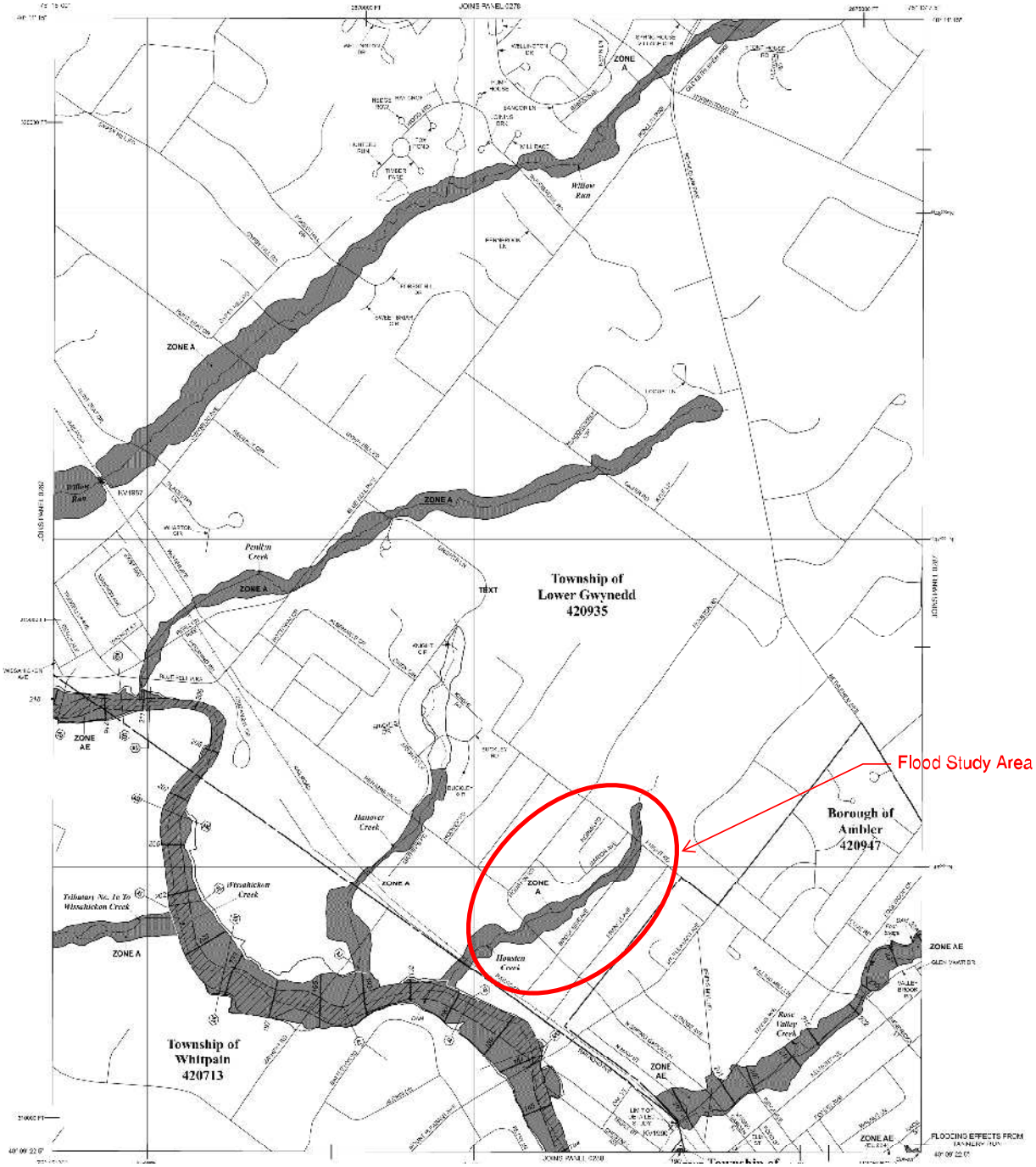
Based on updated topographic information, this map reflects more detailed and up-to-date stream channel configurations and floodplain delineations than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables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

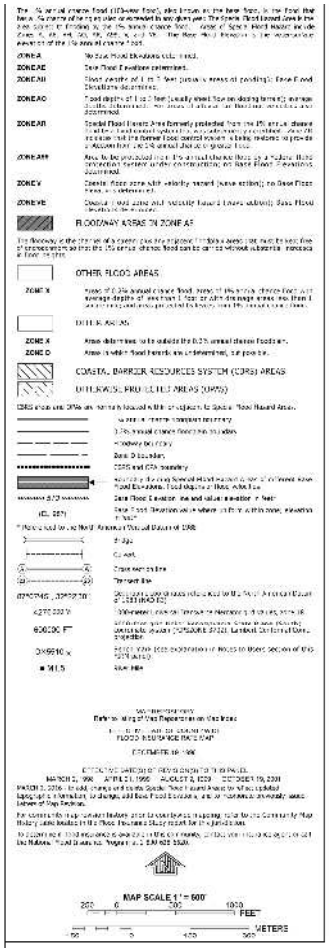
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

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.

For information on available products associated with this FIRM visit the Map Service Center (MSC) website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have questions about this map, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange (FMIX) at 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.





NFIP

PANEL 0286G

FIRM
FLOOD INSURANCE RATE MAP

MONTGOMERY COUNTY, PENNSYLVANIA
(ALL JURISDICTIONS)

PANEL 286 OF 451

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

MAP NUMBER
42091C0286G
MAP REVISED

EXHIBIT

BROOKSIDE AVE. FLOOD STUDY

LOWER GWYNEDD TOWNSHIP, MONTGOMERY COUNTY, PENNSYLVANIA

BROOKSIDE AVE. FLOOD STUDY PLAN – EXISTING

REV.	DESCRIPTION	DATE	BY

GILMORE & ASSOCIATES, INC.

PROJECT No.:	2021-02081
OWNERS INFO:	LOWER GWYNEDD TOWNSHIP 1130 N. BETHLEHEM PIKE SPRING HOUSE, PA 19477 (215) 646-5302
MUNICIPAL FILE No.:	N/A
TAX MAP PARCEL No.:	MULTIPLE
TOTAL AREA:	205 AC.
TOTAL LOTS:	180
DATE:	11/22/2022
SCALE	1"=250'
DRAWN BY:	BMS
CHECKED BY:	JJH
SHEET NO.:	1 OF 2

DAM ON SCHOOL DISTRICT PROPERTY

Knight Road Culvert - Upstream

Knight Road - Downstream

Box Culvert in Knight Road						
Open-Channel Flow Calculations - Rectangle						
Q =	Av					
=	(1.49/n)AR^(2/3)S^(1/2)					
n =	0.013	concrete or RCP				
d =	2.667	ft =	32	in (depth of rectangle)		
w =	8.000	ft =	96	in (width of rectangle)		
A =	21.33	ft^2 (Area of rectangle)				
P =	21.33	ft (Wetted Perimeter)				
R =	1.000	ft (Hydraulic Radius)				
S =	0.0565	=	5.65%			
	Length =	55	ft			
	Top Elev =	242.02				
	Bottom Elev =	238.91				
Q =	**581.43**	**cfs**				
v =	Q/A =	**27.25**	**ft/s**			

PED BRIDGE 450 MARION AVE.

4’ high x 10’ wide opening available for flow.

SLAB BRIDGE 448 MARION AVE.

Box Culvert Driveway Bridge

Open-Channel Flow Calculations - Rectangle					
Q =	Av				
=	(1.49/n)AR^(2/3)S^(1/2)				
n =	0.013	concrete or RCP			
d =	4.333	ft =	52	in (depth of rectangle)	
w =	11.000	ft =	132	in (width of rectangle)	
A =	47.67	ft^2 (Area of rectangle)			
P =	30.67	ft (Wetted Perimeter)			
R =	1.554	ft (Hydraulic Radius)			
S =	0.0575	=	5.75%		
	Length =	12	ft		
	Top Elev =	236.55			
	Bottom Elev =	235.86			
Q =	**1,757.88**	**cfs**			
v =	Q/A =	**36.88**	**ft/s**		

DRIVEWAY BRIDGE 446 MARION AVE.

2 RCP Pipe Culvert Driveway Bridge				
Open-Channel Flow Calculations - Full or 1/2 Full Circle				
Q =	Av			
=	(1.49/n)AR^(2/3)S^(1/2)			
n =	0.013	concrete or RCP		
d = D =	3.667	ft =	44	in (depth of water = diameter of pipe)
A =	5.28	ft^2 (Area of pipe)		
P =	9.43	ft (Wetted Perimeter)		
R =	0.560	ft (Hydraulic Radius)		
S =	0.0567	=	5.67%	
Length =	12	ft		
Top Elev =	234.71			
Bottom Elev =	234.03			
Q =	**97.88**	**cfs**		
v =	Q/A =	**18.54**	**ft/s**	
Total Flow Capacity =		**195.8**	**cfs**	

RECOMMENDATION TO EXPLORE REPLACEMENT OR REMOVAL TO INCREASE FLOW CAPACITY

Spring Garden – Culvert (2) 68”x42” Elliptical Pipes transition to 8’x4’ Box Culvert

S

Second Stretch of Culvert in Spring Garden Street:
One 8'x4' RCP Box

Open-Channel Flow Calculations - Rectangle				
Q =	Av			
=	(1.49/n)AR^(2/3)S^(1/2)			
n =	0.013	concrete or RCP		
d =	4.000	ft =	48	in (depth of rectangle)
w =	8.000	ft =	96	in (width of rectangle)
A =	32.00	ft^2 (Area of rectangle)		
P =	24.00	ft (Wetted Perimeter)		
R =	1.333	ft (Hydraulic Radius)		
S =	0.0227	=	2.27%	
	Length =	391	ft	
	Top Elev =	210.00		
	Bottom Elev =	201.13		
Q =	**669.20**	**cfs**		
v =	Q/A =	**20.91**	**ft/s**	

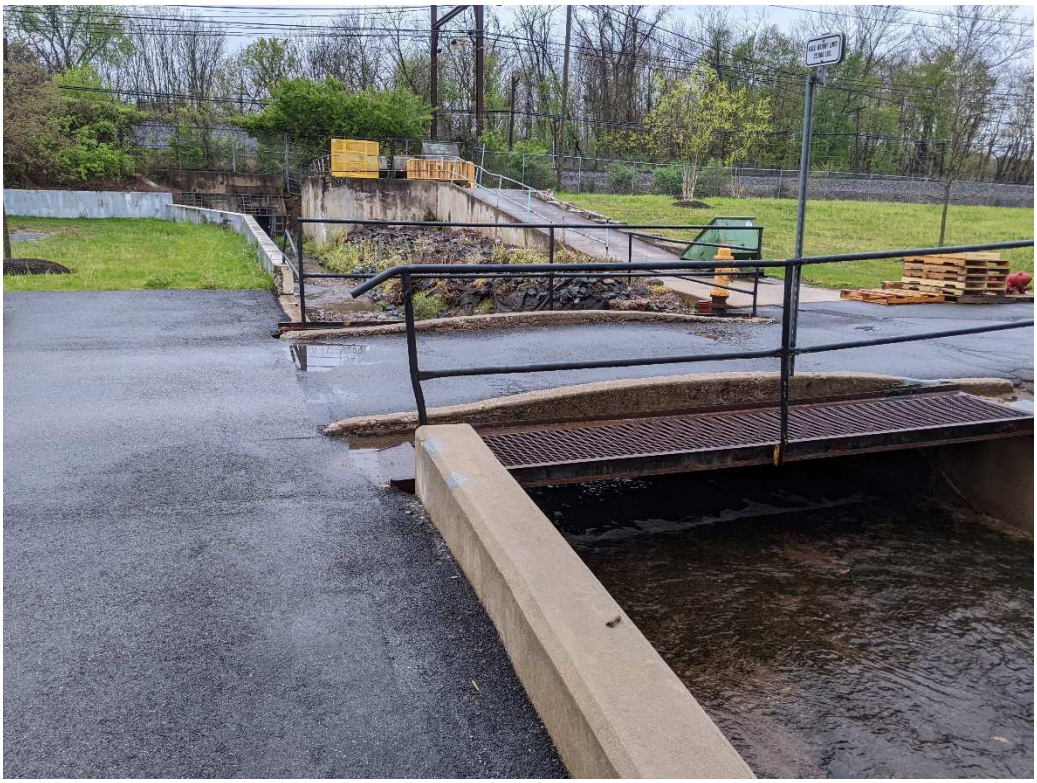
*Capacity reduced to 250 CFS if assume rock / silted bottom.

RECOMMENDATION TO ENGAGE WITH PENNDOT REGARDING ROUTINE MAINTENANCE TO REMOVE SEDIMENT / DEBRIS.

36” PIPES UNDER BUILDING 19 @ AMBLER YARDS

(3) 36" PIPES UNDER BUILDING #19				
Open-Channel Flow Calculations - Full or 1/2 Full Circle				
Q =	Av			
=	(1.49/n)AR^(2/3)S^(1/2)			
n =	0.013	concrete or RCP		
d = D =	3.000	ft =	36	in (depth of water = diameter of pipe)
A =	7.07	ft^2 (Area of pipe)		
P =	9.42	ft (Wetted Perimeter)		
R =	0.750	ft (Hydraulic Radius)		
S =	0.0152	=	1.52%	
	Length =	165	ft	
	Top Elev =	202.50		
	Bottom Elev =	200.00		
Q =	**82.32**	**cfs**		
v =	Q/A =	**11.65**	**ft/s**	
Total Flow Capacity =		**247**	**cfs**	

RECOMMENDATION TO AMBLER YARDS. EXPLORE REPLACEMENT OF PIPES WITH BOX CULVERT TO INCREASE CAPACITY TO MATCH DOWNSTREAM SEPTA CULVERT



Looking from Building 19 toward SEPTA

SEPTA CULVERT @ AMBLER YARDS

SEPTA CULVERT - AMBLER YARDS

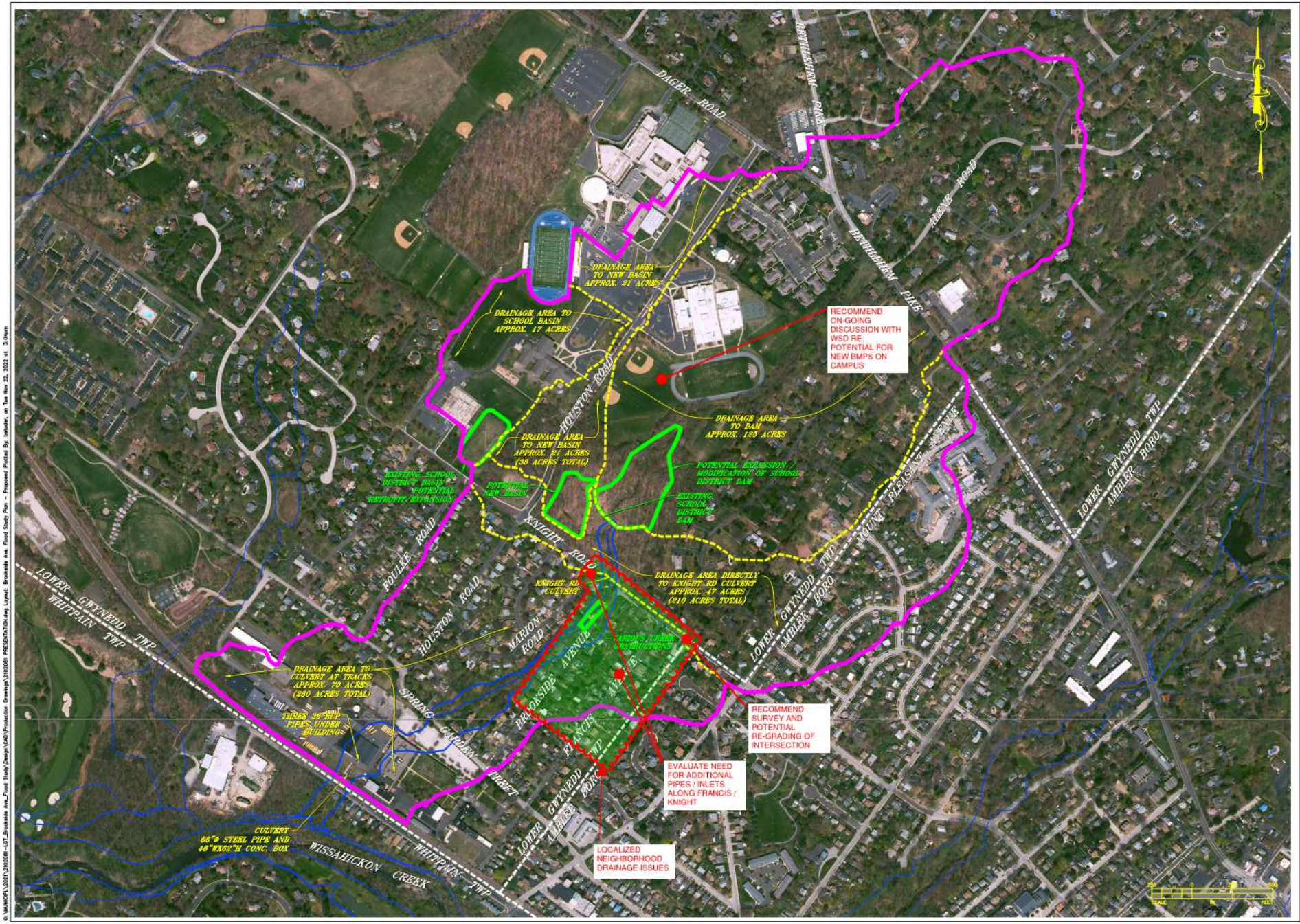
Open-Channel Flow Calculations - Full or 1/2 Full Circle				
Q = Av				
= (1.49/n)AR^(2/3)S^(1/2)				
n =	0.025	corrugated metal		
d = D =	5.667	ft =	68	in (depth of water = diameter of pipe)
A =	25.22	ft^2 (Area of pipe)		
P =	17.80	ft (Wetted Perimeter)		
R =	1.417	ft (Hydraulic Radius)		
S =	0.0229	=	2.29%	
Length =	52	ft		
Top Elev =	196.39			
Bottom Elev =	195.20			
Q =	286.82	cfs		
v = Q/A =	11.37	ft/s		

Open-Channel Flow Calculations - Rectangle				
Q = Av				
= (1.49/n)AR^(2/3)S^(1/2)				
n =	0.013	concrete or RCP		
d =	5.167	ft =	62	in (depth of rectangle)
w =	4.000	ft =	48	in (width of rectangle)
A =	20.67	ft^2 (Area of rectangle)		
P =	18.33	ft (Wetted Perimeter)		
R =	1.127	ft (Hydraulic Radius)		
S =	0.0165	=	1.65%	
Length =	51	ft		
Top Elev =	197.46			
Bottom Elev =	196.62			
Q =	329.27	cfs		
v = Q/A =	15.93	ft/s		

Total Flow = Q = 616.09 cfs

	= input value
	= calculated value

Manning's n Values:	
0.010	PVC
0.012	HDPE
0.013	concrete or RCP
0.025	corrugated metal
0.035	rip-rap and natural channels with stones and weeds



NOT APPROVED FOR CONSTRUCTION

REV.	DESCRIPTION	DATE	BY

EXHIBIT

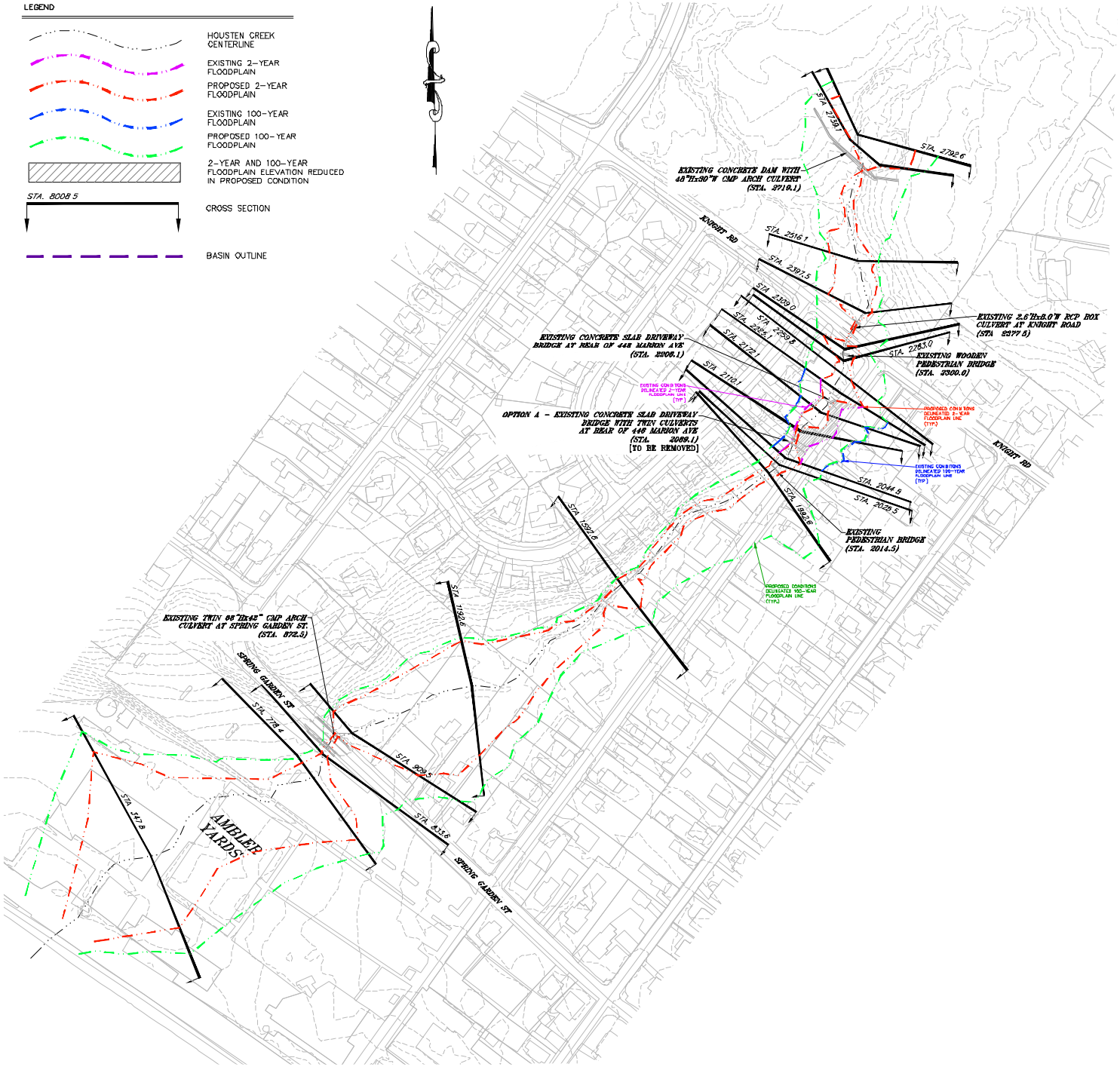
BROOKSIDE AVE. FLOOD STUDY

LOWER GWYNEDD TOWNSHIP, Mmontgomery COUNTY, PENNSYLVANIA

BROOKSIDE AVE. FLOOD STUDY PLAN – PROPOSED

GILMORE & ASSOCIATES, INC.

PROJECT No.:	2021-02081
OWNERS INFO:	LOWER GWYNEDD TOWNSHIP 1130 N. BETHLEHEM PIKE SPRING HOUSE, PA 19477 (215) 646-5302
MUNICIPAL FILE No.:	N/A
TAX MAP PARCEL No.:	MULTIPLE
TOTAL AREA: 205 AC.	TOTAL LOTS: 180
DATE: 11/22/2022	SCALE: 1"=250'
DRAWN BY: BMS	CHECKED BY: JJH
SHEET NO.:	2 OF 2



2-YEAR FLOODPLAIN WATER SURFACE ELEVATIONS – OPTION A

Cross-Section	Existing Conditions 2-Yr W.S.E. (ft)	Proposed Conditions 2-Yr W.S.E. (ft)	Elevation Change from Existing to Proposed Conditions (ft)
2792.6	258.85	258.85	0.00
2739.1	258.85	258.85	0.00
2516.1	245.88	245.88	0.00
2397.5	244.38	244.38	0.00
2309.0	242.12	242.12	0.00
2283.0	240.51	240.51	0.00
2259.8	240.07	240.07	0.00
2225.1	240.25	240.25	0.00
2172.1	238.56	237.81	-0.75
2110.1	237.66	235.77	-1.89
2044.5	235.04	235.04	0.00
2025.5	234.79	234.79	0.00
1992.6	233.77	233.77	0.00
1592.6	228.25	228.25	0.00
1192.6	220.04	220.04	0.00
909.5	217.75	217.75	0.00
833.6	215.09	215.09	0.00
778.4	214.65	214.65	0.00
347.8	205.56	205.56	0.00

100-YEAR FLOODPLAIN WATER SURFACE ELEVATIONS – OPTION A

Cross-Section	Existing Conditions 100-Yr W.S.E. (ft)	Proposed Conditions 100-Yr W.S.E. (ft)	Elevation Change from Existing to Proposed Conditions (ft)
2792.6	260.54	260.54	0.00
2739.1	260.54	260.54	0.00
2516.1	246.90	246.90	0.00
2397.5	245.51	245.51	0.00
2309.0	243.77	243.77	0.00
2283.0	242.37	242.37	0.00
2259.8	241.78	241.78	0.00
2225.1	242.15	242.15	0.00
2172.1	239.89	239.69	-0.20
2110.1	239.00	238.78	-0.22
2044.5	237.09	237.09	0.00
2025.5	237.21	237.21	0.00
1992.6	235.90	235.90	0.00
1592.6	229.63	229.63	0.00
1192.6	221.17	221.17	0.00
909.5	221.02	221.02	0.00
833.6	216.47	216.47	0.00
778.4	215.48	215.48	0.00
347.8	206.40	206.40	0.00

GILMORE & ASSOCIATES, INC.
ENGINEERING & CONSULTING SERVICES

BY | DATE | DESCRIPTION | REV

EXHIBIT

LOWER GWYNEDD TOWNSHIP – HOUSTEN CREEK FLOODPLAIN STUDY

LOWER GWYNEDD TOWNSHIP, MONTGOMERY COUNTY, PENNSYLVANIA

OPTION A – REMOVE DRIVEWAY BRIDGE AT STA. 2088.1

PROJECT No.: 2021-02081

OWNER'S INFO:
—

MUNICIPAL FILE No.:
—

TAX MAP PARCEL No.:
—

TOTAL AREA: — —

TOTAL LOTS: —

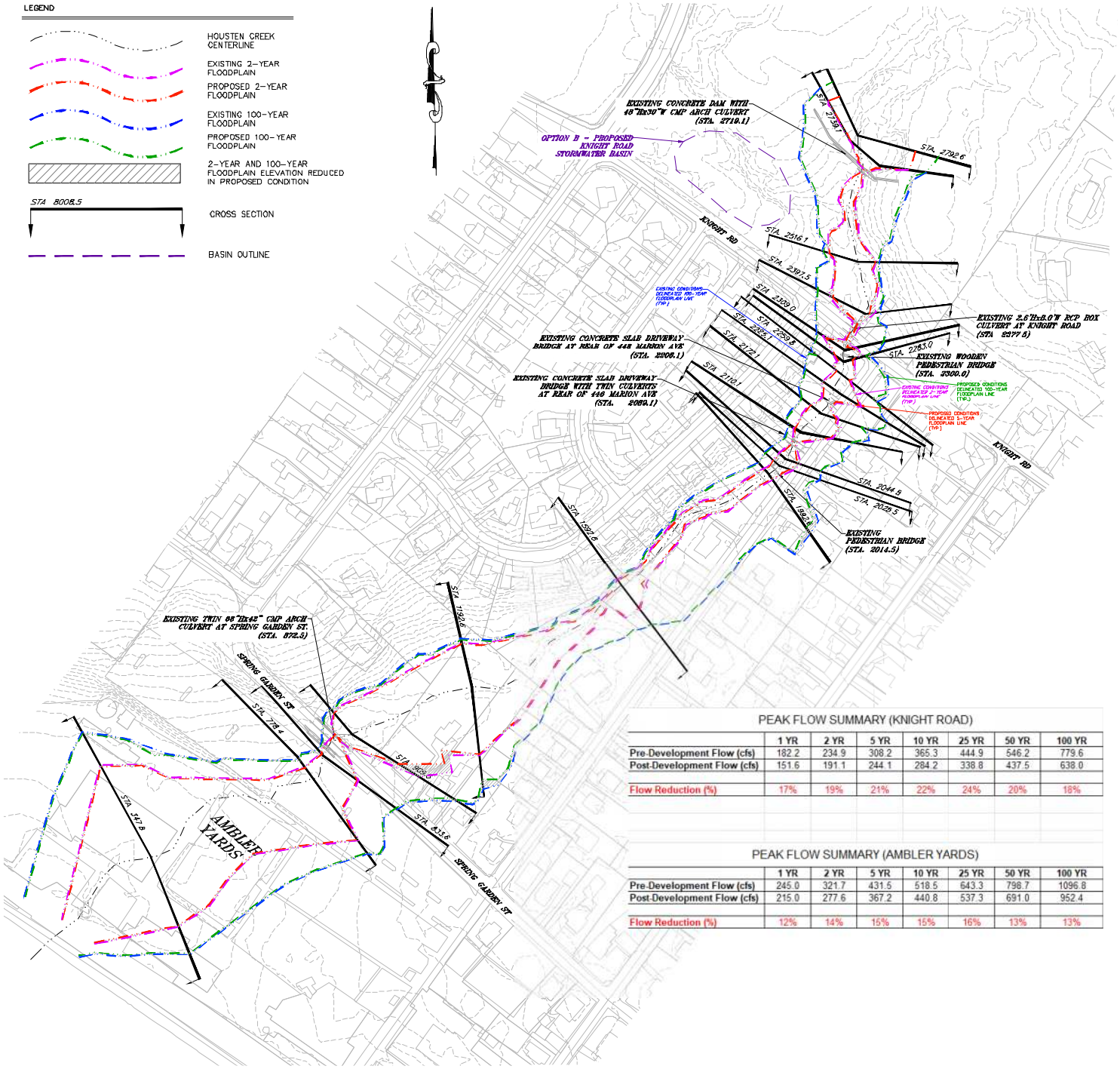
DATE: 03/17/23

SCALE: 1"=80'

DRAWN BY: BH

CHECKED BY: DFB

SHEET NO.: 1 OF 4



PEAK FLOW SUMMARY (KNIGHT ROAD)

	1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
Pre-Development Flow (cfs)	182.2	234.9	308.2	365.3	444.9	546.2	779.6
Post-Development Flow (cfs)	151.6	191.1	244.1	284.2	338.8	437.5	638.0
Flow Reduction (%)	17%	19%	21%	22%	24%	20%	18%

PEAK FLOW SUMMARY (AMBLER YARDS)

	1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
Pre-Development Flow (cfs)	245.0	321.7	431.5	518.5	643.3	798.7	1096.8
Post-Development Flow (cfs)	215.0	277.6	367.2	440.8	537.3	691.0	952.4
Flow Reduction (%)	12%	14%	15%	15%	16%	13%	13%

2-YEAR FLOODPLAIN WATER SURFACE ELEVATIONS - OPTION B

Cross-Section	Existing Conditions 2-Yr W.S.E. (ft)	Proposed Conditions 2-Yr W.S.E. (ft)	Elevation Change from Existing to Proposed Conditions (ft)
2792.6	258.85	258.85	0.00
2739.1	258.85	258.85	0.00
2516.1	245.88	245.78	-0.10
2397.5	244.38	243.86	-0.52
2309.0	242.12	241.70	-0.42
2283.0	240.51	240.33	-0.18
2259.8	240.07	239.77	-0.30
2225.1	240.25	239.92	-0.33
2172.1	238.56	238.41	-0.15
2110.1	237.66	237.54	-0.12
2044.5	235.04	234.77	-0.27
2025.5	234.79	234.55	-0.24
1992.6	233.77	233.60	-0.17
1592.6	228.25	228.08	-0.17
1192.6	220.04	219.93	-0.11
909.5	217.75	216.89	-0.86
853.6	215.09	214.98	-0.11
778.4	214.65	214.58	-0.07
347.8	205.56	205.49	-0.07

100-YEAR FLOODPLAIN WATER SURFACE ELEVATIONS - OPTION B

Cross-Section	Existing Conditions 100-Yr W.S.E. (ft)	Proposed Conditions 100-Yr W.S.E. (ft)	Elevation Change from Existing to Proposed Conditions (ft)
2792.6	260.54	260.54	0.00
2739.1	260.54	260.54	0.00
2516.1	246.90	246.67	-0.23
2397.5	245.51	245.30	-0.21
2309.0	243.77	243.57	-0.20
2283.0	242.37	242.13	-0.24
2259.8	241.78	241.43	-0.35
2225.1	242.15	242.00	-0.15
2172.1	239.89	239.71	-0.18
2110.1	239.00	238.83	-0.17
2044.5	237.09	237.03	-0.06
2025.5	237.21	237.09	-0.12
1992.6	235.90	235.57	-0.33
1592.6	229.63	229.51	-0.12
1192.6	221.17	220.83	-0.34
909.5	221.02	220.75	-0.27
853.6	216.47	216.26	-0.21
778.4	215.48	215.35	-0.13
347.8	206.40	206.29	-0.11

EXHIBIT

LOWER GWYNEDD TOWNSHIP - HOUSTEN CREEK FLOODPLAIN STUDY

LOWER GWYNEDD TOWNSHIP, MONTGOMERY COUNTY, PENNSYLVANIA

OPTION B - HOUSTEN/KNIGHT ROAD BASIN

GILMORE & ASSOCIATES, INC.

PROJECT No.: 2021-02081

OWNERS INFO:

MUNICIPAL FILE No.:

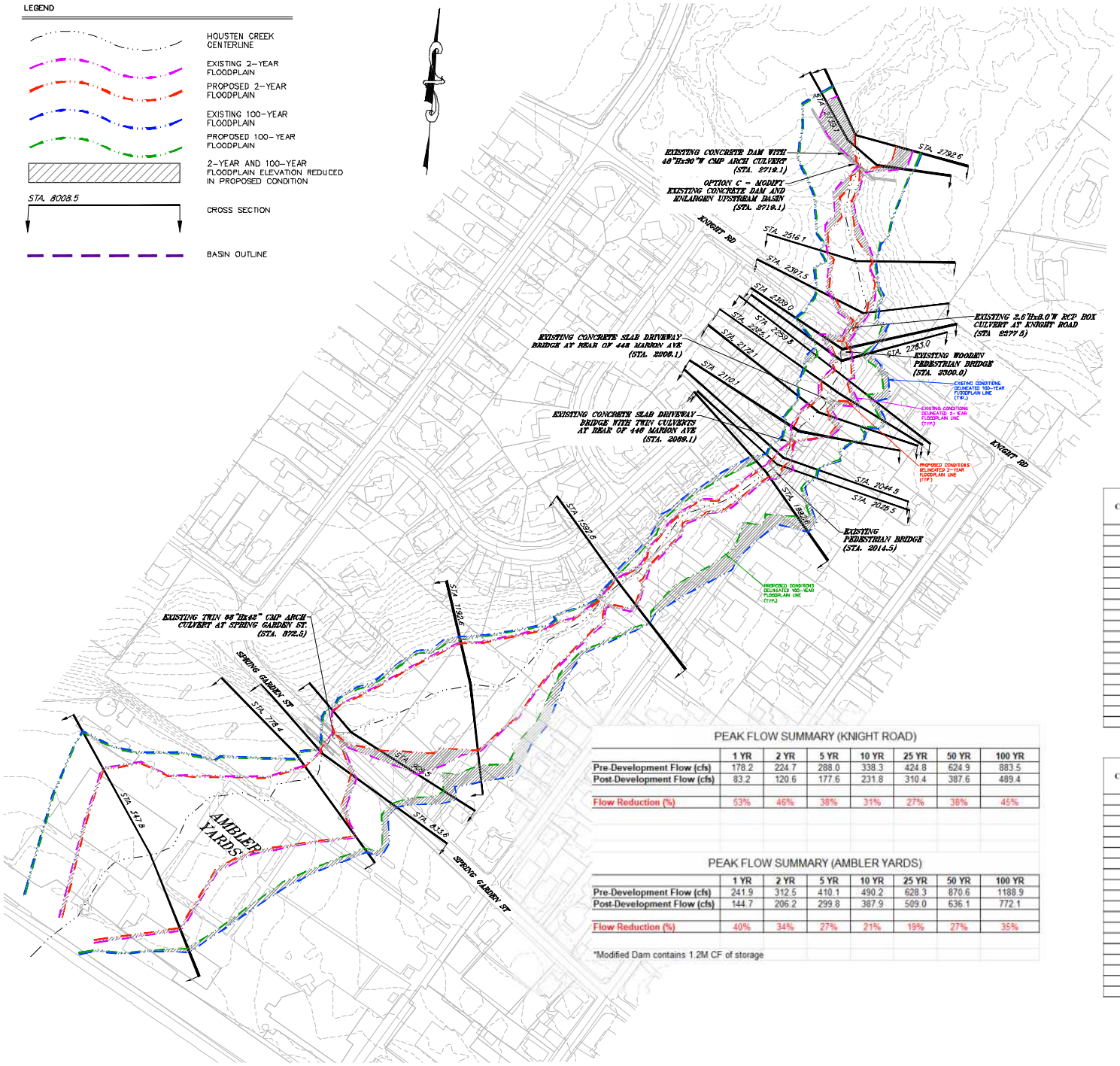
TAX MAP PARCEL No:

TOTAL AREA | TOTAL LOTS

DATE: 03/17/23 | SCALE: 1"=80'

DRAWN BY: BH | CHECKED BY: DFB

SHEET NO.: 2 OF 4



PEAK FLOW SUMMARY (KNIGHT ROAD)

	1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
Pre-Development Flow (cfs)	178.2	224.7	288.0	338.3	424.8	624.9	883.5
Post-Development Flow (cfs)	83.2	120.6	177.6	231.8	310.4	387.6	489.4
Flow Reduction (%)	53%	46%	38%	31%	27%	38%	45%

PEAK FLOW SUMMARY (AMBLER YARDS)

	1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
Pre-Development Flow (cfs)	241.9	312.5	410.1	490.2	628.3	870.6	1188.9
Post-Development Flow (cfs)	144.7	206.2	299.8	387.9	509.0	636.1	772.1
Flow Reduction (%)	40%	34%	27%	21%	19%	27%	35%

*Modified Dam contains 1.2M CF of storage

2-YEAR FLOODPLAIN WATER SURFACE ELEVATIONS - OPTION C

Cross-Section	Existing Conditions 2-Yr W.S.E. (ft)	Proposed Conditions 2-Yr W.S.E. (ft)	Elevation Change from Existing to Proposed Conditions (ft)
2792.6	258.85	250.62	-8.23
2739.1	258.85	249.93	-8.92
2516.1	245.88	245.61	-0.27
2397.5	244.38	242.98	-1.40
2309.0	242.12	241.21	-0.91
2283.0	240.51	240.07	-0.44
2259.8	240.07	239.34	-0.73
2225.1	240.25	239.45	-0.80
2172.1	238.56	238.15	-0.41
2110.1	237.66	237.49	-0.17
2044.5	235.04	234.40	-0.64
2025.5	234.79	234.20	-0.59
1992.6	233.77	233.33	-0.44
1592.6	228.25	227.84	-0.41
1192.6	220.04	219.81	-0.23
909.5	217.75	216.02	-1.73
833.6	215.09	214.83	-0.26
778.4	214.65	214.49	-0.16
347.8	205.56	205.40	-0.16

100-YEAR FLOODPLAIN WATER SURFACE ELEVATIONS - OPTION C

Cross-Section	Existing Conditions 100-Yr W.S.E. (ft)	Proposed Conditions 100-Yr W.S.E. (ft)	Elevation Change from Existing to Proposed Conditions (ft)
2792.6	260.54	259.89	-0.65
2739.1	260.54	259.89	-0.65
2516.1	246.90	246.44	-0.46
2397.5	245.51	245.12	-0.39
2309.0	243.77	243.36	-0.41
2283.0	242.37	241.83	-0.54
2259.8	241.78	241.24	-0.54
2225.1	242.15	241.83	-0.32
2172.1	239.89	239.51	-0.38
2110.1	239.00	238.62	-0.38
2044.5	237.09	236.95	-0.14
2025.5	237.21	236.96	-0.25
1992.6	235.90	235.01	-0.89
1592.6	229.63	229.62	-0.01
1192.6	221.17	220.42	-0.75
909.5	221.02	220.42	-0.60
833.6	216.47	216.02	-0.45
778.4	215.48	215.21	-0.27
347.8	206.40	206.14	-0.26

EXHIBIT

LOWER GWYNEDD TOWNSHIP - HOUSTEN CREEK FLOODPLAIN STUDY

LOWER GWYNEDD TOWNSHIP, MONTGOMERY COUNTY, PENNSYLVANIA

OPTION C - MODIFY EXISTING DAM/ENLARGE BASIN AT STA. 2719.1

GILMORE & ASSOCIATES, INC.
ENGINEERING & CONSULTING SERVICES

PROJECT No.: 2021-02081

OWNER'S INFO:

MUNICIPAL FILE No.:

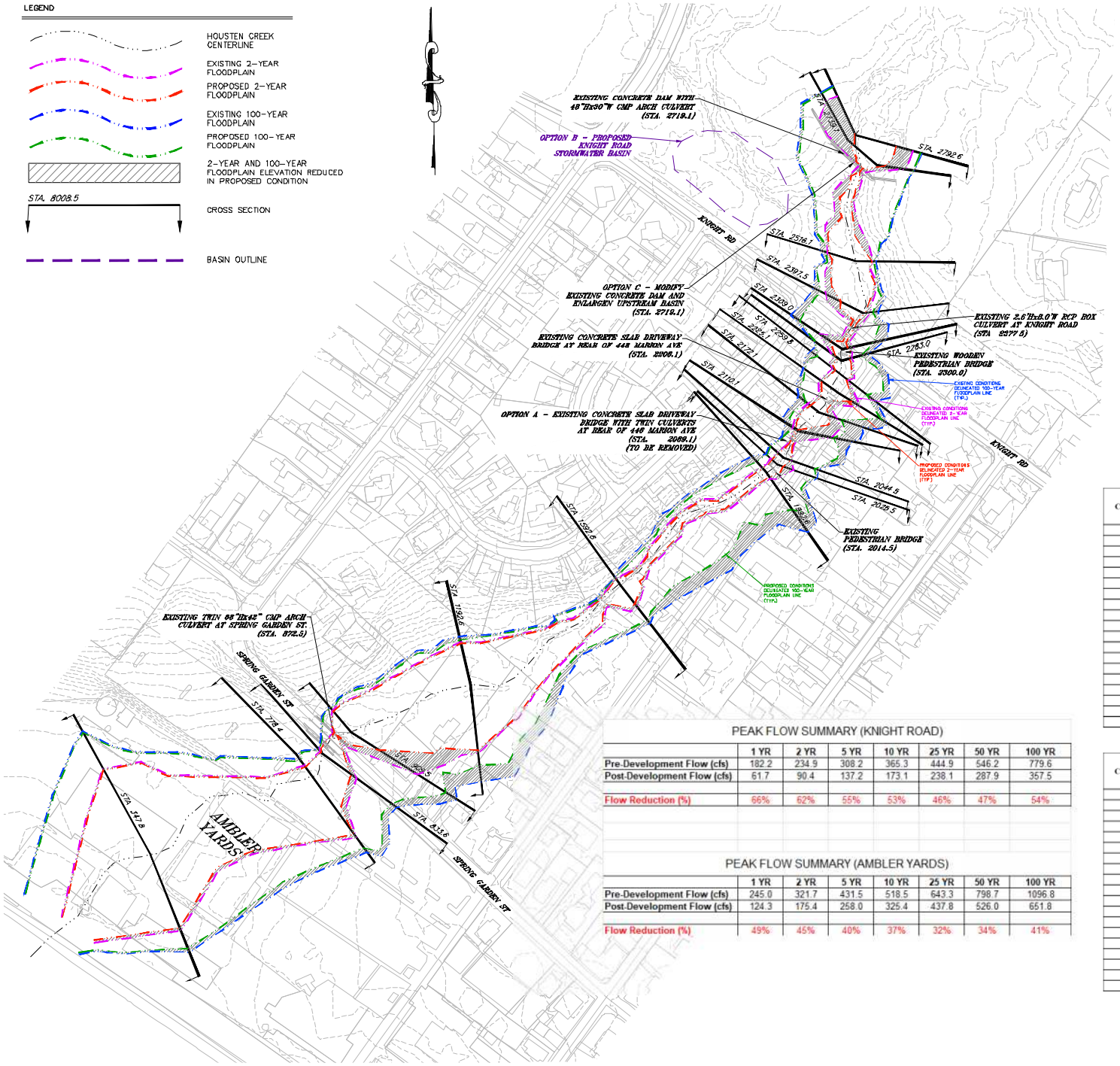
TAX MAP PARCEL No.:

TOTAL AREA: TOTAL LOTS:

DATE: 03/17/23 SCALE: 1"=80'

DRAWN BY: BH CHECKED BY: DPB

SHEET NO.: 3 OF 4



PEAK FLOW SUMMARY (KNIGHT ROAD)

	1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
Pre-Development Flow (cfs)	182.2	234.9	308.2	365.3	444.9	546.2	779.6
Post-Development Flow (cfs)	61.7	90.4	137.2	173.1	238.1	287.9	357.5
Flow Reduction (%)	66%	62%	55%	53%	46%	47%	54%

PEAK FLOW SUMMARY (AMBLER YARDS)

	1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
Pre-Development Flow (cfs)	245.0	321.7	431.5	518.5	643.3	798.7	1096.8
Post-Development Flow (cfs)	124.3	175.4	258.0	325.4	437.8	526.0	651.8
Flow Reduction (%)	49%	45%	40%	37%	32%	34%	41%

2-YEAR FLOODPLAIN WATER SURFACE ELEVATIONS - OPTION D

Cross-Section	Existing Conditions 2-Yr W.S.E. (ft)	Proposed Conditions 2-Yr W.S.E. (ft)	Elevation Change from Existing to Proposed Conditions (ft)
2792.6	258.85	250.62	-8.23
2739.1	258.85	249.93	-8.92
2516.1	245.88	245.47	-0.41
2397.5	244.38	242.01	-2.37
2309.0	242.12	240.83	-1.29
2283.0	240.51	239.87	-0.64
2259.8	240.07	239.00	-1.07
2225.1	240.25	239.07	-1.18
2172.1	238.56	237.22	-1.34
2110.1	237.66	234.79	-2.87
2044.5	235.04	234.11	-0.93
2025.5	234.79	233.92	-0.87
1992.6	233.77	233.15	-0.62
1592.6	228.25	227.62	-0.63
1192.6	220.04	219.72	-0.32
909.5	217.75	215.48	-2.27
833.6	215.09	214.71	-0.38
778.4	214.65	214.42	-0.23
347.8	205.56	205.32	-0.24

100-YEAR FLOODPLAIN WATER SURFACE ELEVATIONS - OPTION D

Cross-Section	Existing Conditions 100-Yr W.S.E. (ft)	Proposed Conditions 100-Yr W.S.E. (ft)	Elevation Change from Existing to Proposed Conditions (ft)
2792.6	260.54	259.89	-0.65
2739.1	260.54	259.89	-0.65
2516.1	246.90	246.16	-0.74
2397.5	245.51	244.85	-0.66
2309.0	243.77	243.14	-0.63
2283.0	242.37	241.51	-0.86
2259.8	241.78	241.27	-0.51
2225.1	242.15	241.64	-0.51
2172.1	239.89	238.79	-1.10
2110.1	239.00	237.50	-1.50
2044.5	237.09	236.69	-0.40
2025.5	237.21	236.64	-0.57
1992.6	235.90	234.68	-1.22
1592.6	229.63	229.28	-0.35
1192.6	221.17	220.31	-0.86
909.5	221.02	220.08	-0.94
833.6	216.47	215.77	-0.70
778.4	215.48	215.06	-0.42
347.8	206.40	205.98	-0.42

EXHIBIT

LOWER GWYNEDD TOWNSHIP - HOUSTEN CREEK FLOODPLAIN STUDY

LOWER GWYNEDD TOWNSHIP, MONTGOMERY COUNTY, PENNSYLVANIA

OPTION D - OPTION A, B, & C COMBINED

GILMORE & ASSOCIATES, INC.

PROJECT No.: 2021-02081

OWNERS INFO:

MUNICIPAL FILE No.:

TAX MAP PARCEL No.:

TOTAL AREA: TOTAL LOTS:

DATE: 03/17/23 SCALE: 1"=80'

DRAWN BY: BH CHECKED BY: DFB

SHEET NO.: 4 OF 4

Township Recommendations

- Explore potential for replacement of private driveway bridge (serves 446 Marion) to increase flow capacity. This is a private driveway on private property. Installation of box culvert in place of existing structure would significantly increase capacity at this location. **(Priority Level 1)**

- Explore roadway drainage improvements (inlets, pipes, re-grading intersections, etc.) within area of Knight, Francis, Brookside to alleviate street / yard flooding. Evaluate and potentially re-contour Knight/Francis Intersection. **(Priority Level 1)**

- Explore partnership with Wissahickon School District for construction of new basin at corner of Houston & Knight Road and retrofit of existing basin near admin building. These improvements have rate / volume reduction and water quality potential making them eligible for many grants. **(Priority Level 2)**

- Explore partnership with Wissahickon School District for expansion of existing dam or development of additional stormwater detention, volume reduction, or water quality BMPs elsewhere on WSD campus. **(Priority Level 3)**

- Engage PennDOT regarding ongoing maintenance of Spring Garden Street culvert **(Priority Level 3)**