Pre-countywide Analyses

This FIS was prepared by compiling flooding information for communities within Allegheny County. For approximate and detailed study streams, revised hydrologic analyses will be prepared as a part of this study however, for streams which will be redelineated, no hydrologic analysis will be performed.

Each community within Allegheny County, with the exception of the Boroughs of Avalon, Bellevue, Braddock Hills, Bradford Woods, Churchill, Crafton, Forest Hills, Franklin Park, Munhall, North Braddock, Sewickley Heights, Sewickley Hills, Swissvale, Wall, and West View; the Townships of Aleppo, Frazer, Pine, and Richland; and the Municipality of Mount Lebanon, has a previously printed FIS report. The hydrologic analyses described in those reports have been compiled and are summarized below. For streams that flow through two or more communities, each methodology described applies only to that portion of the stream studied by detailed methods within that particular community.

Hydrology for the following streams was developed using the log-Pearson Type III method as outlined by the Water Resources Council's Bulletins 15, 17, 17A, and 17B (References 16, 21 – 24).

Borough of Aspinwall:	Allegheny River
Borough of Baldwin:	Becks Run
Borough of Blawnox:	Allegheny River
Borough of Brackenridge:	Allegheny River
Borough of Bridgeville:	Chartiers Creek, Chartiers Creek - Diversion Channel
Borough of Carnegie:	Campbells Run, Chartiers Creek
Borough of Cheswick:	Allegheny River
City of Clairton:	Peters Creek
Township of Collier:	Campbells Run, Chartiers Creek, Chartiers Creek - Diversion Channel, Robinson Run
Township of East Deer:	Allegheny River
Township of Elizabeth:	Boston Hollow Run, Boyds Hollow Run, Douglass Run, Douglass Run Tributary No. 1, Douglass Run Tributary No. 2, Fallen Timber Run, Gillespie Run, Happy Hollow Run, Pidgeon Hollow Run, Pitt Street Tributary, Wildcat Run, Wylie Run, Youghiogheny River
Borough of Emsworth:	Lowries Run
Borough of Etna:	Allegheny River
Township of Hampton:	Crouse Run, Crouse Run Tributary
Township of Harmar:	Allegheny River
Township of Harrison:	Allegheny River, Bull Creek
Borough of Heidelberg:	Chartiers Creek
Borough of Jefferson Hills:	Lewis Run, Lobbs Run, Peters Creek
Township of Kennedy:	Chartiers Creek, Ohio River Back Channel
Township of Kilbuck:	Lowries Run

Township of Leet:	Big Sewickley Creek
Borough of Liberty:	Youghiogheny River
Borough of Lincoln:	Wylie Run, Youghiogheny River
Town of McCandless:	Lowries Run, Wittmer Run
Borough of McDonald:	Robinson Run
City of McKeesport:	Crooked Run, Long Run, Youghiogheny River
Borough of McKees Rocks:	Chartiers Creek
Borough of Millvale:	Allegheny River, Girty's Run
Municipality of Monroeville:	Abers Creek, Dirty Cam p Run, East Thompson Run, Leak Run, Piersons Run, Turtle Creek, Unnamed Stream along Moss Side Boulevard
Township of North Fayette:	North Branch Robinson Run, Robinson Run
Township of North Versailles:	Crooked Run, Thompson Run, Turtle Creek
Borough of Oakdale:	North Branch Robinson Run, Robinson Run
Borough of Oakmont:	Allegheny River
Township of O'Hara:	Allegheny River
Township of Ohio:	Lowries Run
Municipality of Penn Hills:	Allegheny River
Borough of Pitcairn:	Dirty Camp Run
City of Pittsburgh:	Allegheny River, Chartiers Creek
Borough of Plum:	Abers Creek, Allegheny River, Humms Run
Borough of Port Vue:	Youghiogheny River
Township of Robinson:	Campbells Run, Chartiers Creek
Borough of Rosslyn Farms:	Chartiers Creek
Township of Scott:	Chartiers Creek
Township of Shaler:	Allegheny River, Girty's Run
Borough of Sharpsburg:	Allegheny River
Township of South Fayette:	Chartiers Creek, Millers Run, Robinson Run
Township of South Park:	Peters Creek
Township of South Versailles:	Youghiogheny River
Borough of Springdale:	Allegheny River
Township of Springdale:	Allegheny River
Borough of Tarentum:	Allegheny River
Borough of Trafford:	Turtle Creek
Borough of Turtle Creek:	Turtle Creek
Township of Upper St. Clair:	Chartiers Creek
Borough of Verona:	Allegheny River
Borough of Versailles:	Long Run, Youghiogheny River
Borough of White Oak:	Youghiogheny River
Township of Wilkins:	Chalfant Run, Sawmill Run
Borough of Wilmerding:	Turtle Creek

Hydrology for the following streams was de veloped using the regional frequency method PSU III, which assumes flows for the selected recu rrence intervals using data obtained from other streams in the same hydrologic region (Reference 25). The flows are th en adjusted in accord ance with the m ethod outlined in th is

analysis. PSU III was judged to be the m ost applicable method to analyze these streams on the basis of the accuracy of its predictions in watersheds of this size.

Borough of Baldwin:	Streets Run
Municipality of Bethel Park:	Graesers Run, Piney F ork, Tributary 1 to Piney Fork
Borough of Coraopolis:	Montour Run
Township of Elizabeth:	Boston Hollow Run, Boyds Hollow Run, Douglass Run, Douglass Run Tributary No. 1, Douglass Run Tributary No. 2, Gillesp ie Run, Happy Hollow Run, Pidgeon Hollow Run, Pitt Street Tribu tary, Wildcat Run, Wylie Run
Township of Forward:	Fallen Timber Run
Borough of Fox Chapel:	Squaw Run, Squaw Run Tri butary No. 1, Squaw Run Tributary No. 2, Squaw Run Tributary No. 4
Borough of Lincoln:	Wylie Run
Borough of Plum:	Pucketa Creek

Hydrology for the Ohio River was devel oped using natural discharge-frequency curves developed in accordance with m ethods presented in a publication by Leo R. Beard, Statis tical Methods in Hydrology, in the following communities : Boroughs of Ben Avon, Coraopolis, E dgeworth, Emsworth, Glen Osborne, Glenfield, Haysville, Leetsdale, McKees Rocks, and Sewickley; the Townships of Crescent, Kilbuck, Mo on, Neville, and Stowe; and the City of Pittsbu rgh (Reference 26). For th e Ohio River Back Channel, natural discharge-frequency curves were used for the Townships of Kennedy, Neville, Robinson, and Stowe.

Hydrology for th e following streams was developed using multiple reg ression formulae for rural watersheds with draina ge areas between 0 and 25 square m iles (Reference 27).

Borough of Bell Acres:	Big Sewickley Creek
Municipality of Bethel Park:	Graesers Run, Piney F ork, Tributary 1 to Piney Fork
Borough of Bridgeville:	McLaughlin Run
Township of Fawn:	Bull Creek, Tributary to Bull Creek
Township of Findlay:	Montour Run, McClarens Run, North Fork Montour Run, South Fork Montour Run
Township of Harrison:	Little Bull Creek
Township of Indiana:	Little Deer Creek
Borough of Jefferson Hills:	Lick Run
Borough of Leetsdale:	Big Sewickley Creek
Township of Marshall:	Brush Creek 2
Township of North Fayette:	Montour Run, South Fork Montour Run
Township of North Versailles:	Thompson Run
Township of Ohio:	Bear Run
Township of Ross:	Girty's Run, Lowries Run, Rochester Run

Township of South Park:	Lick Run
Borough of Turtle Creek:	Thompson Run
Township of Upper St. Clair:	McLaughlin Run
Township of West Deer:	Deer Creek, Little Deer Creek, West Branch Deer Creek
Borough of White Oak:	Jacks Run, Long Run
Township of Wilkins:	Thompson Run

Hydrology for the following streams was developed using Technical Release No. 55 (Reference 28). The procedure outlined in this release provides a systematic method for evaluating essential drainage and climatologic data for small watersheds. The variables that this method incorporated include daily rainfall data, soil permeability, degree of urbanization, channel velocity and slope, swampy and ponding areas, and the geometry of the watershed.

Borough of Baldwin:	Lick Run
Municipality of Bethel Park:	Graesers Run, Piney Fork, Tributary 1 to Piney Fork

In the Township of Reserve, hydrology for Hoffman Run and Spring Garden Run was developed using the rational method (Reference 29).

Hydrology for the following streams was developed using regional flood-flow frequency equations, developed by the USACE (Reference 30). This set of equations relates discharge to drainage area, channel slope, and watershed shape and is applicable to rural watersheds with drainage areas between 0 and 25 square miles.

Borough of Green Tree:	Whiskey Run
Borough of Oakmont:	Plum Creek
Municipality of Penn Hills:	Plum Creek, Sandy Creek
City of Pittsburgh:	Saw Mill Run
Borough of Plum:	Little Plum Creek, Plum Creek
Township of Robinson:	Montour Run, Moon Run, Tributary A
Township of Scott:	Georges Run, Painters Run, Scrubgrass Run, Whiskey Run
Borough of Verona:	Plum Creek

The following standard equation was used to transform the flows from the Abers Creek watershed to predict peak flows for the Becks Run, Big Sewickley Creek, Campbells Run, Chalfant Run, Crooked Run, Dirty Camp Run, Lewis Run, Lobbs Run, Lowries Run, Sawmill Run, Thompson Run, Turtle Creek, and Wittmer Run watersheds.

$$Q_1 = Q_2 \left(\frac{A_1}{A_2} \right)^a$$

where Q = peak discharge
A = drainage area
a = exponent

In the Township of Le et, the equation above was also used to transf orm flows from the Raccoon Creek watershed to predict peak flows for Big Sewickley Creek.

October 4, 1995, Countywide Analyses

Frequency flood flows for the Monongahela River at the mouth were based on statistical analyses of s tage discharge records covering 118-year record at the Pittsburgh "Point" gaging station located at th e confluence of the Monongahela and Allegheny Rivers. This gaging sta tion was operated jointly by the USACE, the USGS, and the National W eather Service (NWS). Gage r eadings have been obtained since 1762. During the period 1762 to 1854, the gage that was established on the Monongahe la River at the confluen ce of the two rivers was read by various personnel resulting in incomplete records. From May 1854 to May 1873, the Pittsburgh gage was read by the USACE personnel. In May 1873, the U.S. Weather Bureau (now the NWS) began reading the gage and made it the official Pittsburgh gage. These records are now maintained by the NWS.

Upstream of the m outh, stage-discharge records have been m aintained at Lock and Dam No. 2 located at Braddock, Pe nnsylvania, river m ile 11.2, c overing a 66-year period. The gaging station is jointly operated by the USGS and the USACE. Actual lower gage readings have been recorded at L ock and Dam No. 2 since 1905 and are generally affected by b ackwater from the Ohio River. All stage discharge records are maintained by the Pittsburgh District of the USACE. The actual peak flows at Lock and Dam No. 2 were adjus ted for the effect of upstream reservoirs that were constr ucted between 1938 and 1989 to compute a natural peak flow for each flood event.

The analyses of the natural peak discharge-frequency curves on the Monongahela River followed a standard log-Pearson Type III m ethod (Reference 24). The resulting flood flow frequencies devel oped at the m outh and at Lock and Da m No. 2 were modified by m eans of an average reduction curve in order to reflect flow reduction by the present upstream flood control reservoirs.

March 16, 1998, Countywide Analyses

Hydrology for the following streams was developed using the Penn State Runoff Model (Reference 31).

Borough of Etna:	Pine Creek, Little Pine Creek West
Borough of Franklin Park:	Pine Creek
Township of Hampton:	Pine Creek, Harts Run, Gourdhead Run, McCaslin Run, Montour Run No. 1
Township of Indiana:	Little Pine Creek East

Town of McCandless:	Pine Creek, Little Pine Creek West
Township of O'Hara:	Little Pine Creek East
Township of Ross:	Little Pine Creek West
Township of Shaler:	Pine Creek, Little Pine Creek East, Little Pine Creek West

July 5, 2000, Countywide Analyses

The Allegheny River was restudied through water year 1995 for the peak discharge-frequency relationships for the selected recurrence intervals. The flood frequency program was developed by the USACE based on a log-Pearson Type III analysis of the peak flood event partial series flow records. The program follows the methods outlined by the USGS Bulletin 17B (Reference 24).

Natural flows were calculated using the Reservoir Reduction Program for the Allegheny River and used to develop the peak-discharge frequencies. Average reduction curves were then developed from the difference between the natural flow and actual flow. The natural flood-flow frequencies developed were modified by means of the average reduction curves to reflect the reduction caused by existing upstream flood control reservoirs.

September 21, 2001, Countywide Revision

No new hydrologic analysis was performed as a part of this revision.

May 15, 2003, Countywide Revision

Peak flows for Chartiers Creek were obtained from the FIS for the City of Pittsburgh (Reference 32). A standard log-Pearson Type III analysis, using the recorded data at the USGS gaging station in Carnegie and estimates of the major floods prior to the installation of the gage, was employed to establish the discharge-frequency relationship.

September 26, 2014, Countywide Revision

Hydrologic analyses prepared for approximate and detailed study streams within Allegheny County were performed using Pennsylvania Regression Equations and the National Urban Regression Equations.

The peak discharge computation procedure for using Pennsylvania Regression Equations is presented in the publication 'Regression Equations for Estimating Flood Flows at selected Recurrence Intervals for Ungaged Streams in Pennsylvania' (Reference 33). Based on physiography, elevation, and geologic characteristics, the publication divided the state of Pennsylvania into four hydrologic regions. The eastern half of Allegheny County falls under hydrologic Region Four and western half of the county falls under Region Three.

A summary of the drainage area-peak discharge relationships for all the streams studied by detailed methods is shown in Table 6, "Summary of Discharges."

No discharge info is available for the following streams: Boston Hollow Run, Breakneck Creek, Boyds Hollow Run, Dougl as Run, Douglas Run Tributary 1,

Douglas Run Tributary 2, Fourteen Mile Island Back Channel, Gillespie Run, Happy Hollow Run, Herrs Island Back Channel, Hoffman Run, Pidgeon Hollow Run, Pitt S treet, Spring Garden Run, Squaw Run Tributary 1, S quaw Run Tributary 2, Squaw Run Tributary 4, Twel ve Mile Island Back Channel, Wildcat Run.

TABLE 6 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
ABERS CREEK					
At confluence with Turtle Creek	10.60	2,150	3,700	4,450	6,500
At confluence of East Thompson Run	7.94	1,670	2,900	3,500	5,100
At confluence of Piersons Run	4.86	1,060	1,830	2,200	3,200
At Borough of Plum downstream corporate limits	4.60	1,050	1,800	2,150	3,200
At the confluence of Humms Run	1.70	450	800	950	1,450
ALLEGHENY RIVER					
At Borough of Verona upstream corporate limits	11,620	162,500	232,000	258,000	320,000
At Municipality of Penn Hills upstream corporate limit	11,560	162,500	232,000	258,000	320,000
At Lock and Dam No. 4, Natrona, Pennsylvania	11,410	170,000	227,000	253,000	317,000
BEAR RUN					
At confluence with Lowries Run	5.37	*	*	1,740	*

*Data not available

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
BECKS RUN					
At mouth	2.60	690	1,165	1,190	1,250
Approximately 0.18 mile upstream of confluence with the Monongahela River[1]	2.50	690	1,185	1,290	1,485
At upstream side of bridge near junction of Becks Run Road and Susquehanna Street	2.40	690	1,200	1,430	2,090
Approximately 0.12 mile upstream from centerline of Bajo Street bridge	1.80	525	905	1,080	1,600
BIG SEWICKLEY CREEK					
At confluence with the Ohio River	30.20	2,670	4,570	5,630	8,780
At Borough of Bell Acres downstream corporate limits	29.80	2,590	4,325	5,360	8,575
At Borough of Bell Acres upstream corporate limits	13.20	1,400	2,560	3,365	5,950
BREAKNECK CREEK					
At downstream Corporate limits	4.1	*	*	*	900
BRUSH CREEK 1					
At confluence with Turtle Creek	57.20	5,400	8,500	10,100	15,000
BRUSH CREEK 2					
At Township of Marshall downstream corporate limits	8.30	1,490	2,320	2,790	3,950
At confluence of Tributary No. 1 to Brush Creek 2	6.30	1,350	2,100	2,500	3,560
At Interstate Route 79 culvert	5.00	1,250	1,930	2,300	3,270
At Northgate Drive	3.40	1,070	1,680	2,000	2,850

[1]Discharges lowered due to flow on Becks Run Road

*Data not available

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
BULL CREEK					
At Township of Harrison downstream corporate limits	48.80	4,060	5,890	6,700	8,600
Above confluence of Little Bull Creek	37.20	3,460	5,010	5,700	7,540
At confluence of McDowell Run	*	3,300	5,570	6,900	10,650
At confluence of Lardintown Run	*	2,220	3,750	4,660	6,580
At confluence of Tributary to Bull Creek	*	2,070	3,500	4,360	6,580
CAMPBELLS RUN					
At confluence with Chartiers Creek	5.62	1,300	2,230	2,700	3,990
At Township of Robinson downstream corporate limits	5.40	1,260	2,170	2,620	3,875
At upstream end of culvert under Interstate Route 79	2.80	725	1,250	1,510	2,230
Upstream of parkway exit of Campbells Run Road	1.70	485	830	1,010	1,490
At intersection of McMichael Road and Campbells Run Road	0.90	300	510	615	910
CHARTIERS CREEK					
At Township of Robinson downstream corporate limits	269.00	9,800	17,000	21,500	37,000
At Borough of Rosslyn Farms downstream corporate limits	268.00	9,800	17,000	21,500	37,000
At Township of Scott downstream corporate limits	264.00	9,800	17,000	21,500	37,000
At Borough of Carnegie downstream corporate limits	263.00	9,800	17,000	21,500	37,000
At Township of Collier downstream corporate limits	257.00	9,800	17,000	21,500	37,000

*Data not available

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
CHARTIERS CREEK (continued)					
At confluence of Robinson Run	216.00	8,800	16,800	21,200	33,600
At confluence of Thoms Run	192.00	8,600	16,100	20,000	31,500
At confluence of Millers Run	163.80	8,050	15,000	18,700	29,200
At Township of Upper St. Clair downstream corporate limits	163.20	8,050	15,000	18,700	29,200
Downstream of McLaughlin Run	*	2,620	3,990	4,880	7,750
Upstream of McLaughlin Run	*	1,500	2,200	2,475	7,750
CHARTIERS CREEK – DIVERSION CHANNEL					
At inlet	*	7,300	14,600	18,725	25,865
CHALFANT RUN					
At confluence of Thompson Run	4.45	1,070	1,850	2,210	3,270
CROOKED RUN					
At mouth	3.50	885	1,530	1,835	2,680
Above confluence of unnamed tributary	2.60	690	1,190	1,430	2,085
At Township of North Versailles downstream corporate limits	2.01	560	980	1,170	1,710
At Arcannia Street bridge	1.59	470	810	970	1,420
CROUSE RUN					
At confluence with Pine Creek	4.32	1,040	1,810	2,180	3,200
Downstream of South Pioneer Road	2.39	640	1,110	1,330	1,980
At confluence of Crouse Run Tributary	1.31	400	690	830	1,210
CROUSE RUN TRIBUTARY					
At confluence with Crouse Run	1.08	340	590	710	1,040

*Data not available

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
DEER CREEK (continued)					
At Township of West Deer downstream corporate limits	17.31	3,380	4,790	6,000	9,290
Upstream of confluence of Dawson Run	12.61	2,280	3,270	4,070	6,340
At confluence of West Branch Deer Creek	3.84	720	1,030	1,350	2,100
DIRTY CAMP RUN					
At confluence with Turtle Creek	3.18	810	1,410	1,690	2,500
Near intersection of Wall Avenue and School Street	2.44	600	1,030	1,240	1,930
At Municipality of Monroeville downstream corporate limits	2.15	600	1,030	1,240	1,930
EAST THOMPSON RUN					
At confluence with Abers Creek	2.51	670	1,180	1,400	2,060
Approximately 1,550 feet above U.S. Route 22 bridge	1.80	520	850	1,070	1,570
FALLEN TIMBER RUN					
At Township of Forward downstream corporate limits	4.80	620	940	1,100	1,400
GEORGES RUN					
At confluence with Chartiers Creek	1.40	600	1,100	1,300	2,000
Approximately 600 feet downstream of Swallow Hill Road	1.10	510	935	1,105	1,700
GIRTY'S RUN					
At confluence with the Allegheny River	13.40	1,830	3,150	3,850	5,800
At Township of Shaler downstream corporate limits	11.10	1,830	3,150	3,850	5,800

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
GIRTY'S RUN (continued)					
At confluence of Wible Run	9.50	1,690	2,870	3,510	5,290
Upstream of confluence of Nelson Run	7.68	1,560	2,650	3,240	4,880
Upstream of confluence of Thompson Run	6.27	1,250	2,120	2,590	3,900
Upstream of confluence of McKnight Run	4.43	790	1,350	1,650	2,490
Upstream of confluence of Cemetery Run	3.66	640	1,090	1,330	2,000
Upstream of confluence of Rochester Run	2.15	390	660	810	1,220
Upstream of Three Degree Road	0.66	210	360	440	660
GOURDHEAD RUN					
At confluence with Pine Creek[1]	4.03	1,122	1,911	2,342	3,357
Upstream of confluence of McCaslin Run	2.46	694	1,168	1,433	2,064
GRAESERS RUN					
At confluence with McLaughlin Run	2.02	335	566	680	994
Approximately 50 feet upstream of Walther Lane	1.95	325	550	661	966
Approximately 570 feet downstream of Brookside Blvd	0.77	157	270	327	485
HARTS RUN					
At confluence with Gourdhead Run	1.16	374	659	817	1,194
HUMMS RUN					
At confluence with Abers Creek	2.50	650	1,100	1,350	2,000
Approximately 0.5 mile upstream of confluence with Abers Creek	2.20	570	965	1,185	1,755
Approximately 0.9 mile upstream of confluence with Abers Creek	2.00	530	890	1,100	1,625

[1]Discharges reduced due to flow on State Route 8

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding			
		10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
HUMMS RUN (continued)					
Approximately 1.2 miles upstream of confluence with Abers Creek	1.60	440	745	915	1,355
Approximately 1.7 miles upstream of confluence with Abers Cree	0.50	185	315	385	570
At confluence with Abers Creek	2.50	650	1,100	1,350	2,000
Approximately 0.5 mile upstream of confluence with Abers Creek	2.20	570	965	1,185	1,755
Approximately 0.9 mile upstream of confluence with Abers Creek	2.00	530	890	1,100	1,625
Approximately 1.2 miles upstream of confluence with Abers Creek	1.60	440	745	915	1,355
Approximately 1.7 miles upstream of confluence with Abers Creek	0.50	185	315	385	570
JACKS RUN					
At confluence with Long Run	4.37	675	1,235	1,555	2,545
LEAK RUN					
At confluence with Thompson Run	1.81	520	900	1,080	1,590
Approximately 770 feet upstream of Union Railroad tunnel	1.81	520	705[1]	765[1]	975[1]
Approximately 2,210 feet downstream of Old William Penn Highway bridge	1.81	520	900	1,080	1,590
Downstream side of Old William Penn Highway bridge	1.43	460	740	890	1,310

[1]Discharges reduced for out-of-bank divided flow

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
LEWIS RUN					
At confluence with Peters Creek	5.87	1,030	1,790	2,180	3,200
Approximately 1.51 miles upstream of confluence with Peters Creek	4.09	790	1,360	1,660	2,490
LICK RUN					
At confluence with Peters Creek	8.59	1,890	2,780	3,160	4,220
At McElhaney Road	7.46	1,760	2,610	2,920	3,870
At 2nd crossing of CSX Transportation	5.47	1,510	2,200	2,450	3,160
At Wilson Road	3.84	1,260	1,810	1,950	2,490
At Borough of Baldwin downstream corporate limits[1]	2.40	990	1,380	1,490	1,780
At upstream side of Norfolk and Western Railway bridge	2.20	1,080	1,610	1,780	2,360
At confluence of Lick Run Tributary	1.40	550	840	930	1,260
LITTLE BULL CREEK					
At confluence with Bull Creek	11.60	1,490	2,520	3,070	4,670
At limit of detailed study near Birdville	8.90	1,170	2,040	2,500	3,740
LITTLE DEER CREEK					
At Township of Indiana downstream corporate limits	13.40	2,120	2,950	3,555	5,850
At Township of West Deer downstream corporate limits	9.11	1,730	2,350	2,900	4,690
At confluence of unnamed tributary at stream mile 5.3	6.87	1,520	2,050	2,460	3,970

[1]Discharges reduced due to regulation by Norfolk and Western Railway culvert

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding			
		10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
LITTLE DEER CREEK (continued)					
Upstream of Bessemer and Lake Erie Railroad bridge	4.48	1,520	2,400[1]	2,970[1]	4,200[1]
LITTLE PINE CREEK EAST					
At confluence with Pine Creek	6.10	1,611	2,780	3,400	4,869
At Township of O'Hara downstream corporate limits	5.63	1,562	2,628	3,189	4,580
At Township of Indiana downstream corporate limit	3.89	1,047	1,902	2,339	3,371
LITTLE PINE CREEK WEST					
At confluence with Pine Cree	6.81	1,545	2,533	3,076	4,352
At Township of Shaler downstream corporate limits	6.60	1,532	2,512	3,048	4,327
Upstream of Vilsack Road	5.10	1,271	2,105	2,570	3,668
At Township of Ross downstream corporate limits	4.22	1,166	1,929	2,355	3,356
At confluence with Tributary No. 3	1.90	384	655	812	1,212
At Remington Drive	0.80	268	459	568	854
LITTLE PLUM CREEK					
At confluence of Plum Creek	8.0	1,100	1,800	2,200	3,350
Approximately 1.0 mile upstream of confluence with Plum Creek	7.1	1,000	1,650	2,025	3,075
LOBBS RUN					
At confluence with Monongahela River	3.92	760	1,320	1,610	2,410

[1]Flows downstream of the Bessemer and Lake Erie Railroad bridge are less than upstream flows due to bridge acting as a dam

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
LONG RUN					
At confluence with Youghiogheny River	13.20	1,690	2,805	3,395	4,960
Above confluence of unnamed tributary	12.40	1,625	2,705	3,280	4,805
At Borough of White Oak downstream corporate limits	11.63	1,540	2,625	3,210	4,625
At confluence of Jacks Run	6.03	920	1,575	1,910	2,870
At a point approximately 0.23 mile upstream of Rankin Road	3.8	660	1,145	1,395	2,095
LOWRIES RUN					
At USACE gage in Emsworth, at mile 0.571	16.96	2,250	4,400	5,780	10,300
At Township of Ohio downstream corporate limits	14.80	*	*	5,780	*
Upstream of confluence of Bear Run	7.83	*	*	2,440	*
At Township of Ross downstream corporate limits	7.00	910	1,870	2,440	4,440
At Town of McCandless corporate limits	3.10	400	830	1,080	1,970
At confluence of Wittmer Run	1.90	250	510	660	1,190
McCASLIN RUN					
At confluence with Gourdhead Run	*	326	547	678	978
McCLARENS RUN					
At confluence with Montour Run	6.50	*	*	2,020	*

*Data not available

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
McLAUGHLIN RUN					
At the confluence with Chartiers Creek	7.53	955	1,567	1,866	2,677
Approximately 610 feet downstream of Baldwin Street	7.30	937	1,540	1,835	2,635
Approximately 0.6 mile upstream of Baldwin St	6.90	892	1,467	1,748	2,511
Approximately 0.6 miles downstream of Lesnett Road	6.50	842	1,387	1,653	2,376
Approximately 250 feet downstream of Lesnett Road	5.51	742	1,225	1,462	2,106
Approximately 0.3 miles upstream of Morrow Road	4.61	644	1,068	1,276	1,842
Approximately 30 feet upstream of Old Washington Road	4.40	619	1,027	1,227	1,774
Approximately 0.20 miles downstream of Bethel Church Road	1.55	275	467	563	827
Approximately 0.1 miles upstream of Bethel Church Road	1.02	198	339	410	606
MILLERS RUN					
At confluence with Chartiers Creek	28.1	2,400	4,300	5,300	8,100
Above confluence with Tributary at Morgan Hill Road	24.6	2,130	3,800	4,700	7,100
Above confluence with Fishing Run	1.9	1,750	3,100	3,850	5,800
MONONGAHELA RIVER					
At confluence to Lock and Dam No. 2, at river mile 11.2	7,388 5,668[1]	168,500	212,000	231,000	275,000

[1]Reduced due to the Tygart, Stonewall Jackson, and Youghiogheny Dams

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
MONTOUR RUN					
At confluence with the Ohio River	36.5	6,000	9,100	10,700	14,900
Approximately 0.1 mile downstream of Beaver Grade Road	29.6	5,100	7,700	9,050	12,600
At Township of North Fayette downstream corporate limits	25.9	4,470	7,180	8,580	12,600
Upstream of confluence of McClarens Run	17.9	3,160	4,890	5,740	8,120
MONTOUR RUN NO. 1					
At confluence with Pine Creek	*	1,039	1,925	2,421	3,627
MOON RUN					
At confluence with the Ohio River	5.4	1,050	1 ,800	2,200	3,350
NORTH BRANCH ROBINSON RUN					
At Township of North Fayette downstream corporate limits	12.9	1,170	2,200	2,700	4,200
NORTH FORK MONTOUR RUN					
Upstream of confluence with South Fork Montour Run	2.30	*	*	1,010	*
OHIO RIVER					
At Dashields Lock and Dam, at river mile 13.3	19,522	282,000	362,000	394,000	480,000
At river mile 11.23	19,550	282,000	362,000	394,000	480,000
At river mile 10.0	19,480	186,120	238,920	260,000	316,800
At Emsworth Lock and Dam	19,428	186,000	242,000	262,000	324,000
	186,120[1]	238,900[1]	260,000[1]	316,800[1]	

*Data not available
[1]Computation includes modified upstream reservoirs

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
OHIO RIVER (continued)					
At river mile 4.25	19,400	282,000	362,000	394,000	480,000
At confluence of Allegheny and Monongahela Rivers	19,132	282,000	362,000	394,000	480,000
OHIO RIVER-BACK CHANNEL					
At Township of Robinson downstream corporate limits	19,500	95,880	123,080	134,000	163,200
At river mile 10.0	19,480	96,000	123,100	134,000	163,200
At Emsworth Dam, river	19,435	96,000	122,000	132,000	156,000
At Township of Stowe downstream corporate limits, river mile 6.5	19,430	96,000	122,000	132,000	156,000
At Emsworth Back Channel Dam	19,428	96,000 95,880[1]	122,000 123,100[1]	132,000 134,000[1]	156,000 163,200[1]
PAINTERS RUN					
At Township of Scott corporate limits	4.2	1,350	2,300	2,800	4,300
PETERS CREEK					
At downstream limit of detailed study in City of Clairton	50.82	4,200	7,400	9,300	14,000
Above confluence with Lewis Run	44.81	3,700	6,500	8,100	12,600
Above confluence with Beam Run	41.89	3,400	6,000	7,500	11,700
At confluence of Lick Run	31.84	2,700	4,800	6,000	9,100
At confluence of Piney Fork	17.60	1,600	2,850	3,450	5,200
PIERSONS RUN					
At confluence with Abers Creek	2.04	570	990	1,190	1,730

[1]Computation includes modified upstream reservoirs

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
PINE CREEK					
At confluence with Allegheny River	67.30	4,750	8,245	10,104	14,477
At Township of Shaler downstream corporate limits	59.60	4,346	7,548	9,274	13,332
At confluence of Little Pine Creek East	53.30	4,263	7,317	8,957	12,813
At Township of Hampton downstream corporate limits	47.44	4,060	6,959	8,521	12,204
Upstream of confluence of Gourdhead Run	43.06	3,636	6,289	7,719	11,114
Upstream of confluence of Crouse Run	37.10	2,855	4,961	16,261	9,690
At Town of McCandless downstream corporate limits	14.00	1,992	3,661	4,799	7,391
Upstream of confluence of Wexford Run	5.40	1,209	2,116	2,628	3,849
PINEY FORK					
At Municipality of Bethel Park downstream corporate limits	4.3	1,020	1,480	1,690	2,190
At confluence of Tributary 1 to Piney Fork	2.00	350	520	600	800
PLUM CREEK					
At confluence with Allegheny River	20.66	1,936	3,266	3,956	5,916
Approximately 0.30 miles Downstream of Allegheny River Blvd	20.32	1,910	3,225	3,906	5,843
Approximately 0.3 miles downstream of Plum Street	19.03	1,812	3,065	3,714	5,561
Approximately 0.7 miles downstream of Plum St	18.70	1,786	3,022	3,663	5,487
Approximately 1.6 miles downstream of Hulton Road	18.00	1,734	2,937	3,561	5,337

TABLE 6- SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
PLUM CREEK (continued)					
Approximately 0.7 miles downstream of Hulton Run	16.91	1,650	2,799	3,395	5,093
Approximately 0.4 miles downstream of Steurnagel Lane	16.66	1,631	2,767	3,357	5,037
Approximately 400 feet upstream of Boda Road	14.29	1,443	2,459	2,986	4,490
Approximately 0.31 feet upstream of Boda Road	13.99	1,419	2,419	2,938	4,420
Approximately of 0.4 miles downstream Mary Street	13.49	1,378	2,352	2,858	4,301
Approximately 60 feet downstream of Mary Street	12.31	1,281	2,191	2,655	4,016
Approximately 0.2 miles downstream of Leechburg	3.52	472	835	1,026	1,574
Approximately 310 feet downstream of Universal Road	2.39	347	620	763	1,178
Approximately 0.4 miles upstream of Millers Lane	1.61	253	457	565	877
Approximately 1.2 mile upstream of Millers Lane	0.77	141	259	322	505
PUCKETA CREEK					
At confluence with Allegheny River	36.50	3,400	5,160	6,000	8,100
At confluence of Little Pucketa Creek	25.60	2,700	4,050	4,725	5,940
ROBINSON RUN					
At confluence with Chartiers Creek	40.00	3,350	6,100	7,500	11,500
At confluence of Scotts Run	37.60	3,100	5,600	7,000	10,800
Approximately 0.2 mile downstream of confluence of Pinkertons Run	33.90	2,900	5,100	6,300	9,900
At confluence of Pinkertons Run	30.30	2,600	4,700	5,800	8,800
Above confluence of Fink Run	13.80	1,350	2,370	2,900	4,330

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
ROBINSON RUN (continued)					
Above confluence with unnamed tributary at Sturgeon Road	11.20	1,170	2,050	2,500	3,750
At downstream Borough of McDonald corporate limits	10.40	1,170	2,050	2,500	3,750
ROCHESTER RUN					
At confluence with Girty's Run	1.42	250	430	520	780
SANDY CREEK					
At confluence with Allegheny River	3.40	1,000	1,750	2,250	3,850
Approximately 0.8 mile upstream of confluence with Allegheny River	2.90	885	1,500	1,990	3,405
Approximately 1.1 miles upstream of confluence with Allegheny River	1.20	440	775	995	1,700
SAW MILL RUN					
At Alexander Street bridge	19.20	5,680	8,650	10,100	14,600
SAWMILL RUN					
At downstream Township of Wilkins corporate limits	1.89	540	930	1,110	1,640
Approximately 50 feet upstream of Moss Street	1.64	480	830	1,000	1,460
Approximately 200 feet upstream of second private road bridge	1.40	440	730	880	1,290
Approximately 150 feet Downstream of intersection Of Kingsdale road and Beulah Road	0.91	*	*	652	*
At the intersection of Thornbury Drive and Beulah Road	0.80	*	*	584	*

*Data not available

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
SAWMILL RUN (continued)					
Upstream of the Intersection Of Lewin Lane with Beulah Road	0.22	*	*	141	*
SCRUBGRASS RUN					
At confluence with Chartiers Creek	1.50	700	1,150	1,400	2,150
At confluence with tributary near intersection of Scrubgrass Road and Old Scrubgrass Road	0.8	430	700	850	1,310
SOUTH FORK MONTOUR RUN					
Upstream of confluence of North Fork Montour Run	2.6	930	1,320	1,480	2,020
STREETS RUN					
Approximately 0.23 mile downstream from downstream Borough of Baldwin corporate limits	6.2	1,220	1,830	2,130	2,680
Approximately 0.07 mile downstream from confluence of Streets Run with stream along Brentwood Road	4.8	965	1,450	1,690	2,125
Approximately 0.17 mile upstream from confluence of Streets Run with stream along Brentwood Road	3.2	670	1,010	1,175	1,480
Approximately 0.26 mile downstream from centerline of bridge near junction of Streets Run Road and Prospect Road	2.4	530	800	930	1,170
THOMPSON RUN					
At confluence with Turtle Creek	17.9	2,890	5,000	6,000	8,820

*Data not available

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
THOMPSON RUN (continued)					
At downstream Township of Wilkins corporate limits	15.42	2,890	3,905[1]	4,280[1]	5,850[1]
Approximately 50 feet upstream of the Union Railroad Spur bridge	15.42	2,890	5,000	6,000	8,820
At confluence of Chalfant Run	10.39	2,100	3,650	4,400	6,480
At U.S. Route 22	8.90	1,850	3,210	3,880	5,680
At confluence of Leak Run	5.81	1,320	2,300	2,750	4,080
At downstream side of Thompson Run Road bridge upstream of Frey Road	2.39	640	1,120	1,340	1,980
TRIBUTARY A					
At confluence with Chartiers Creek	1.10	300	550	700	1,150
TRIBUTARY TO BULL CREEK					
At confluence with Bull Creek	1.40	525	900	1,090	1,650
TRIBUTARY 1 TO PINEY FORK					
At confluence with Piney Fork	2.30	670	960	1,090	1,410
At tributary near Beagle Drive	1.90	550	790	900	1,150
TURTLE CREEK					
At East Pittsburgh gage n	146.00	9,550	13,800	15,500	20,500
At downstream Municipality of Monroeville corporate limits	120.00	9,550	13,800	15,500	20,500
At confluence of Brush Creek	155.90	4,600	6,500	7,400	9,400
Approximately 650 feet downstream of confluence of Abers Creek	41.60	3,600	5,200	5,820	7,400

[1]Discharges reduced for out-of-bank divided flow

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
TURTLE CREEK (continued)					
At confluence of Abers Creek	31.20	2,920	4,140	4,700	5,880
UNNAMED STREAM ALONG MOSS SIDE BOULEVARD					
At confluence with Turtle Creek	1.34	410	710	850	1,250
WEST BRANCH DEER CREEK					
At confluence with Deer Creek	7.54	1,570	2,130	2,730	4,230
WHISKEY RUN					
At downstream Township of Scott corporate limits	1.60	650	1,150	1,400	2,150
At downstream Borough of Green Tree corporate limits	1.20	650	1,150	1,400	2,150
Approximately 0.27 mile upstream of downstream Borough of Green Tree corporate limits	1.00	460	820	990	1,520
Approximately 0.45 mile upstream of downstream Borough of Green Tree corporate limits	0.60	280	500	610	930
WITTMER RUN					
At confluence with Lowries Run	1.10	140	290	380	690
WYLIE RUN					
At confluence with Monongahela River	3.97	580	860	1,000	1,250
Approximately 1,400 feet upstream from McKeesport-Glassport Road	3.80	550	830	960	1,200
At confluence of Happy Hollow Run	3.75	380	560	660	840

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
WYLIE RUN (continued)					
Approximately 400 feet downstream from Mill Hill Road	2.17	290	430	510	640
At Lovedale Road	1.59	280	420	490	620
YOUGHIOGHENY RIVER					
At confluence with Monongahela River	1,763.00	65,000	93,000	108,000	145,000
At downstream Township of South Versailles corporate limits	1,735.00	65,000	93,000	108,000	145,000
At Sutersville gage in the City of McKeesport	1,715.00	65,000	93,000	108,000	145,000

3.2 Hydraulic Analyses

Analyses of the hydrauli c characteristics of flooding from the source studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the FIRM represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data tables in the FIS report. For construction and/or floodplain management purposes, users are encouraged t o use the flood elevation data presented in t his FIS in c onjunction with the data shown on t he FIRM.

Locations of selected cross sections used in the hydraulic anal yses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-se ction locations are also show n on the FIRM (Exhibit 2).

The hydraulic analyses for this county wide study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

Pre-countywide Analyses

Each community within A llegheny County, with the exception of the Boroughs of Avalon, Bellevue, Braddock Hills, Bradford Woods, Churchill, Crafton, Forest Hills, Franklin Park, M unhall, North Braddock, Sewickley Heights, Sewickley Hills, Swissvale, Wall, and West View; the Townships of Aleppo, Frazer, Pine

and Richland; and the Municipality of Mount Lebanon, has a previously printed FIS report. The hydraulic analyses described in those reports have been compiled and are summarized below.

Cross section and bridge data for the following streams were obtained by field survey and aerial photogramm etry: Ab ers Creek in the Borough of Plum ; Campbells Run and Robinson Run in th e Township of Collier; Humms Run, Little Plum Creek, Painters Run, Plum Creek, and Pucketa Creek in the Borough of Plum; Sandy Creek in th e Municipality of Penn Hills; Georges Run and Scrubgrass Run in the Township of Sco tt; and Whiskey Run in the To wnship of Scott and the Borough of Green Tree.

Cross sections for Bear R un were obtained from field checks and topographic maps at a scale of 1:1,200 (References 34 and 35).

In the Borough of Bell Acres, cross sect ions were obtained from topographic maps compiled from aerial photographs (Reference 36).

Cross sections for Bull Creek and Tributa ry to Bull Creek in the Township of Fawn were obtained from topographic m aps compiled from aerial photographs (Reference 37).

Cross section and bridge data for the following streams were obtained from field measurement and aerial photographs co mpiled by photogrammetric m ethods at a scale of 1:2,400 (Referen ce 36): Ca mpbells Run, Ch artiers Creek, Moon Run, Montour Run, and Tributary A in the Township of Robinson.

The channel cross section and bridge data for Chartiers Creek in the Boroughs of Carnegie, Crafton, Heidelberg, Rossl yn Farms, and Thornburg, and the Townships of Collier, Scott, and S outh Fayette; and Char tiers Creek-Diversion Channel in the Township of Collier were obtained from construction drawings for the Chartiers Creek F lood Protection Pr oject (Reference 38). The overbank stations and elevations of the cross sections were d etermined by aerial photogrammetry.

For the following streams, cross-section data were obtained from aerial photographs (Reference 39). Chartiers Creek, in the Bo rough of Bridgeville and the Townships of South Fayette and U pper St. Clair; a nd Millers Run and Robinson Run in the Township of South Fayette.

For the following stream s, cross sections were obtained from field surveys and topographic maps: Crooked Run, Thom pson Run, and Turtle Creek in the Township of North Versailles; and Brush Creek and Turtle Creek in the Borough of Trafford.

Cross sections for Deer Creek, Little Deer Creek, and West Branch Deer Creek in the Township of W est Deer were ta ken from soundings and topographic m aps (Reference 40).

For Dirty Camp Run in the Borough of Pitcairn, cross sections were obtained using field surveys and topographic maps at a scale of 1:1,200 (Reference 41).

Cross-section data for Girty's Run in the Borough of Millvale were supplied by the USACE by use of design drawings, and by field survey.

For Graesers Run, Piney Fork, and Tributary 1 to Piney Fork, cross-section data were obtained from aerial photography flown in December 1978 at a scale of 1:800.

Cross sections for Little Deer Creek were obtained from soundings, topographic maps, and field checks (Reference 40).

Cross-section data for Lowries Run in the Township of Ohio were obtained from USACE field surveys and topographic maps at a scale of 1:1,200 (Reference 34).

For McLaughlin Run, cross-section data were taken from maps compiled from aerial photographs flown in September 1981 (Reference 42).

Cross-section data for the following streams were obtained from soundings, topographic maps, and field checks (References 42 and 43): Montour Run in the Townships of Findlay and North Fayette, South Fork Montour Run, North Branch Robinson Run, and Robinson Run in the Township of North Fayette, and South Fork Montour Run in the Township of Findlay.

In the Borough of Coraopolis, cross sections for Montour Run were obtained from field surveys and topographic maps at a scale of 1:2,400 with a contour interval of 5 feet (Reference 44).

Cross sections for the following streams were taken from soundings and topographic maps prepared by the USACE dated March 1964 (Reference 43): the Ohio River in the Boroughs of Ben Avon, Emsworth, Glenfield, Haysville, Leetsdale, Sewickley, and the Township of Crescent, Neville, and Stowe; Ohio River Back Channel in the Township of Neville.

Cross sections for the Ohio River in the Townships of Kilbuck and Moon and the Boroughs of Coraopolis and Glen Osborne, and cross sections for Montour Run in the Borough of Coraopolis were determined using topographic maps at a scale of 1:2,400 with a contour interval of 5 feet (Reference 44).

For the Ohio River in the City of Pittsburgh and Saw Mill Run, cross sections were obtained from USACE maps, City of Pittsburgh maps, USGS maps, and plane-table surveys conducted by the USACE (References 44, 45, 46, and 47).

Cross sections for the Ohio River Back Channel in the Townships of Robinson, Kennedy, and Stowe were taken from USACE topographic maps dated March 1964 (Reference 44).

Cross-section data for Peters Creek were taken from the USACE Floodplain Information Report (Reference 15). In the City of Clairton and the Township of South Park, cross sections for Peters Creek were obtained from field surveys and the USACE.

Dimensions for the Milltown Road bridge over Plum Creek, in Milltown, were obtained from construction drawings furnished by the Bridge Division of the Pennsylvania Department of Transportation.

Cross-section data for Robinson Run in the Borough of McDonald were taken from soundings and aerial photographs (Reference 43).

Cross sections for the following streams were obtained from field surveys, topographic maps at a scale of 1:1,200 with a contour interval of 2 feet, and USACE channel plans at a scale of 1:3,600 (References 41 and 48): Thompson Run in the Borough of Turtle Creek, and Turtle Creek in the Boroughs of Turtle Creek and Wilmerding and the Municipality of Monroeville.

Cross sections for the Youghiogheny River were obtained from the USACE and from topographic maps furnished by the USACE (Reference 49).

Cross-section data for all other flooding sources and for the backwater analyses were field surveyed. Cross sections for all the streams were located at close intervals above or below bridges and culverts in order to compute the significant backwater effects of these structures. All bridges and culverts were surveyed to obtain elevation data and structural geometry.

Water-surface elevations of floods of the selected recurrence intervals were computed using the USACE HEC-2 step-backwater computer program (Reference 50).

There is one reach on Campbells Run, three reaches on Unnamed Stream along Moss Side Boulevard, one reach on Leak Run, two reaches on Sawmill Run, and one reach on Turtle Creek where supercritical flow occurs. This is a rapid flow (a high velocity) which is sometimes highly turbulent, and usually occurs in steep parts of a stream. Subcritical flow, the more common type, has a relatively low velocity, as it usually occurs on streams with low slopes.

The supercritical reach on Campbells Run occurs where the channel's hydraulic efficiency and steep slope enable the water to flow into Chartiers Creek quickly, thus reducing flood levels on Campbells Run. The supercritical reaches on Unnamed Stream along Moss Side Boulevard are:

1. From approximately 1,000 feet upstream of the CONRAIL bridge to the downstream side of State Route 130 bridge;

2. From approximately 250 feet upstream of the State Route 130 bridge to the downstream side of the private drive bridge; and

3. From approximately 50 feet upstream of the private drive bridge to the limit of detailed study.

The supercritical reach on Leak Run extends from approximately 200 feet upstream of the Union Railroad tunnel to the downstream side of the Old William Penn Highway culvert.

The supercritical reaches on Sawmill Run are:

1. From the downstream side of the Ivy Street bridge to the downstream corporate limit; and

2. From approximately 200 feet upstream of the culvert under State Route 130, between Sections D and E to the next private road bridge.

The supercritical reach on Turtle Creek occurs from approximately 1,560 feet upstream of the CONRAIL spur bridge to approximately 2,540 feet upstream of the CONRAIL spur bridge.

The flow transition between a supercritical and a subcritical region usually involves turbulence with an accompanying loss of energy. Furthermore, the length of this turbulent transition, called a hydraulic jump, is unpredictable, and is different for each flow. An effort has been made to define this transition length according to known lengths (Reference 51). However, an in-depth study of the length, position, and depths of this transition are, especially in a natural channel with a non-uniform shape, appears fruitless, and outside the scope of this report.

According to an accepted engineering procedure involving the velocity and depth of the upstream supercritical section, the hydraulic jumps that occur during the four floods for these streams are either the undular or weak type, which involve a relatively small turbulent energy loss, and represent a somewhat gradual transition between the two regimes (Reference 52). Therefore, a linear assumption between the subcritical elevation and the supercritical elevation of the next section upstream is a reasonable one.

In some of the more violent hydraulic jumps, the water-surface elevation decreases going upstream. In general, even though these decreases may occur in the channel, the elevations of the water surface of any overbank flow would be relatively unaffected; therefore, the elevations shown in the flood profiles in these areas have been adjusted to represent a more gradual transition.

Out-of-bank subcritical flow occurs only at two places on Sawmill Run for the 1% annual chance flood. This occurs at the second and the fourth private road bridges. Otherwise, sheet flow less than one foot deep will flow as out-of-bank flow, since there are no downstream controls to create subcritical flow. This situation is caused by the steepness of the stream and the valley, the presence of State Route 130 which runs along the stream for its entire length within the township, and the presence of three long culverts and a bridge on the stream.

The elevations of the 1% and 0.2% annua l chance floods on the first long culvert (between Cross Section s D and E) reflec t that sheet flow will occu r. Thes e elevations have been calculated by assu ming normal flow down the road, and the profile elevations have been used in the calculation of reaches.

The elevations of the second long culvert (between Cross Sections J and K) for the 2% and 1% annual chance floods have been assum ed to be at the top of the opening of the culvert. The lower p art of this culvert cannot carry the full 1% chance annual flow as d etermined by a backwater analysis, but the d epth of the sheet flow over the top of the culvert would not exceed one foot. Therefore, th e 1% annual chance floodplain of this cu lvert is non-applic able, and the 0.2% annual chance floodplain on top of the culver t has been delineated by the use of field surveys and field experi ence. This culvert has not been treated in the same manner as the first lon g culvert because the cross sections over the top of the second culvert are not uniform , and the de pth of the sheet flow over the top will not be the same across the whole cross section.

Sheet flow areas along S awmill Run will occur when the water overtop s culverts and a bridge. There will be no appreciabl e depths generated because of the steep slope of the valley and because there is insufficient flow over the culverts and the bridge, provided they are unobstructed. Mu ch of this sheet flow area is on State Route 130, but there are other areas upstr eam and downstream of the Moss Street bridge and over the first, second, and third culverts where sheet flow occurs.

A shallow flooding area occurs along th e Old William Penn Highway near Leak Run because of overflow from that stream at a low bank area abou t 2,150 feet upstream of the Union Railroad tunnel. The channel contains about a 10% annual chance flood, but for flows greater than this, a significant am ount of water escapes the channel and flows down the road. The depth on the road, as indicated by a supercritical flow analysis, is slightly less than one foot for the 1% annual chance flood. The flow which leaves the channel was com puted by using the standard weir flow equation with a transve rse weir f low coefficient (Reference 53).

As part of the Chartiers Creek Flood C ontrol Project, drop structures were constructed at the m ouths of George s Run and Scrubgrass Run. Flooding on Georges Run upstream of the CONRAIL em bankment near its m outh was found to be controlled by the culvert beneat h the railroads and State Route 50. However, the hydraulic analysis showed that only the 10% annual chance discharge would pass through the culver t, while the 2%, 1%, and 0.2% annual chance flows overtopped the e mbankment. A backwater analysis was perform ed to establish flood elevations along the em bankment. This analysis indicated that the average depth of flooding caused by the 10% annual chance flood was less than 2.0 feet. Therefore, this portion of the st ream was identified as a shallow flooding area. A separate analysis was al so required for Scrubgrass Run in order to determine the flood elevations above the culvert at Green Tree Road.

Flooding on Chartiers Creek between the inlet and outle t of the Chartiers Creek-Diversion Channel has been significantl y altered by the construction of the

diversion channel. The HEC-2 ana lysis on Chartiers Creek-Diversion Channel show that the 0.2% annual chance flood is contained within the banks. The flooding adjacent to the Char tiers Creek-Diversion Channe l at its inlet is caused by overflow from Chartiers Creek. The flood water em pties into the diversion channel via the two culverts.

The upstream junction of Chartiers Creek and the diversion channel, located approximately 850 feet downstream of Pres tley Road, was designed to divide the flow as follows (Reference 38):

Total Discharge (cfs)	Chartiers Creek Discharge (cfs)	Chartiers Creek-Diversion Channel Discharge (cfs)
21,200	2,475	18,725
18,500	2,200	16,300
12,500	1,800	10,700
6,200	1,200	5,000
1,500	500	1,000
120	120	0

These flow divisions were achieved by placing a sm all weir in the diversion channel to divert low flows into Chartiers Cre ek and constructing a large culvert in Chartiers Creek to divert high flows into the diversion channel. In the analysis for this study, the flow division for each flood (10%, 2%, 1 %, and 0.2% annual chance) was determ ined by perform ing a backwater analysis for both the Chartiers Creek-Diversion Channel and Ch artiers Creek. The resu lting flow divisions at the upstream junction are:

Recurrence Interval (Years)	Total Discharge (cfs)	Chartiers Creek Discharge (cfs)	Chartiers Creek-Diversion Channel Discharge (cfs)
10	8,800	1,500	7,300
50	16,800	2,200	14,600
100	21,200	2,475	18,725
500	33,600	7,750	25,850

Hydraulic analyses determ ined that the 1% and 0.2% annual chance floods on Turtle Creek in the Borough of Turtle Creek are contained within the channel.

Flows for the Ohio River over Lock and Da m No. 3 were com puted to obtain elevations on the upstream side for the continuation of the backwater profiles. Variable weir coefficien ts were bas ed on head-breadth relationships and were corrected for subm ergence, when appropriate, using methods for "ungated" conditions (Reference 54).

Reliable rating curves were also a vailable for the Ohio River at the Dashields Lock and Dam and at the Em sworth Lock and Dam to ensure that all computed

frequency profiles were reasonable and consistent with the calibrated historical floods mentioned.

Aside from the exceptions noted below, starting water-surface elevations for the streams studied by detailed methods were determined using the slope/area method.

Starting water-surface elevations for the following streams were based on the coincident flow of the receiving stream: Allegheny River in the City of Pittsburgh, Big Sewickley Creek in the Borough of Leetsdale, Chartiers Creek, Chartiers Creek-Diversion Channel, and Rochester Run in the Township of Ross, and Tributary to Bull Creek and West Branch Deer Creek in the Township of West Deer.

Starting water-surface elevations for Campbells Run in the Borough of Carnegie were calculated assuming supercritical flow.

For the following streams, starting water-surface elevations were determined using the standard backwater analysis: Crooked Run; Tributary 1 to Piney Fork; and the Youghiogheny River in the Boroughs of Liberty, Lincoln, Port Vue, and Versailles; and the City of McKeesport.

Starting water-surface elevations for the following streams were based on stage-discharge rating curves, which were obtained from high-water marks and by a continuation of profile computations: the Allegheny River; Campbells Run in the Township of Collier; Girty's Run; Little Plum Creek; Lowries Run in the Town of McCandless and the Township of Ross; the Ohio River, except in the Boroughs of Coraopolis and Glen Osborneand the Township of Moon; Ohio River Back Channel, except in the Township of Robinson; Peters Creek; Plum Creek; and Tributary A.

Starting water-surface elevations for the following streams were calculated assuming critical depth: Bear Run, Deer Creek, Little Deer Creek, McLaughlin Run, and Sawmill Run in the Township of Wilkins.

In the Borough of Glen Osborne and the Township of Moon, starting water-surface elevations for the Ohio River were determined using a discharge-frequency curve.

For Lowries Run in the Borough of Emsworth and the Townships of Kilbuck and Ohio and Sawmill Run in the City of Pittsburgh, the starting water-surface elevations were based on combined frequency analyses with the Ohio River (Reference 55).

In the Township of Robinson, starting water-surface elevations for Ohio River Back Channel were taken from the FIS for the Borough of Coraopolis (Reference 56).

Starting water-surface elevations for the Youghiogheny River in South Versailles were derived by interp olating the river elevation for each flood at th e stream mouth. The stream analysis was then started by slope/area method below this elevation.

October 4, 1995, Countywide Analyses

Cross sections for the Monongahela River were obtained from a digital 3-dimensional terrain model created by ut ilizing an Intergraph /Inroads (I/I) software design package with the digita l design map files and hydrographic data developed in 1990 (Reference 57).

Water-surface elevations of floods of th e selected recurrence in tervals were computed using the USACE HEC-2 st ep-backwater computer program (Reference 50).

Starting water-surface elevations for the Monongahela River were obtained from the FIS for the City of Pittsburgh (Reference 32). The elev ations at the head of the Ohio River for the same recurrence intervals were used.

Roughness coefficients (Manning's "n") us ed in the hydraulic com putations for the Monongahela River were chosen by cal ibration to high-w ater marks from actual floods.

March 16, 1998, Countywide Revision

Cross sections and bridge data for the following streams were determined from field measurement and use of a Digita l Terrain Model (DTM) developed from aerial photographs compiled by photogramm etric methods at a scale of 1:6,000: Gourdhead Run in the Township of Ha mpton; Harts Run in the Township of Hampton; Little Pine Creek East in the Townships of Indiana, O 'Hara, and Shaler; Little Pine Creek West in the Borough of Etna, Town of McCandless, and Townships of Ross and Shaler ; McCaslin Run in th e Township of Hampton; Montour Run No. 1 i n the Township of Ham pton; and Pine Creek in the Boroughs of Etna and Franklin Park, To wn of McCandless, and Townships of Hampton and Shaler.

Water-surface elevations of floods of th e selected recurrence in tervals were computed using the USACE HEC-2 st ep-backwater computer program (Reference 49).

Starting water-surface elevations for Pine Creek in the Bo rough of Etna were based on the coincident flow of the receiving stream, the Allegheny River.

For Little Pine Creek East in the To wnship of Shaler; Little Pine Creek W est in the Borough of Etna; and Gourdhead Run, Harts Run, McCaslin Run, and Montour Run No. 1 in the To wnship of Ha mpton, starting water-su rface elevations were developed assuming critical depth.

July 5, 2000, Countywide Revision

Water-surface elevations of floods of th e selected recurrence in tervals were computed using the US ACE HEC-2 computer program (Reference 3 0). The HEC-2 model for the Allegheny River included tributary stream profiles for Herrs Island Back Channel, Twelve Mile Isla nd Back Channel, and Fourteen Mile Island Back Channel. Cr oss sections for the analyses of the Allegheny River were obtained from a digital 3-dim ensional terrain model created by the aforementioned I/I software design packag e. The model used digital design map files and hydrographic data developed during 1995 and 1996 (Reference 57).

Starting water-surface elevations for Em sworth pond of the Allegheny River at the "Point" in Pittsburgh were obtained from the FIS for the City of Pittsburgh (Reference 30). The starting water-surface elevations for Pool 2 of the Allegheny River were obtained from discharge rati ngs developed at D am 2. The starting elevations for Pool 3 were obtained from discharge ratings developed at Da m 3. The elevations at the head of the Ohio River (mouth of the Allegheny River) for the same recurrence intervals were used.

September 21, 2001, Countywide Revision

No new hydraulic analysis was perf ormed as a part of this revision. Floodplain boundaries were remapped for Squaw Run, Squaw Run Tributary Nos. 1, 2, and 4, Glade Run, and Stony Cam p Run based on updated topographic inf ormation for Borough of Fox Chapel.

May 15, 2003, Countywide Revision

Water-surface profiles of floods of the selected recurrence intervals were developed using the USACE HEC-2 computer program (Reference 50). Starting elevations on Chartiers Creek were based on coincidental flooding with the Ohio River.

This Countywide Revision

The analyses consisted of determ ining water surface elevations for the 50-, 20-, 10-, 2-, 1-, and 0.2-percen t-annual-chance flood events and floodways for detailed studies, and 1-percent-annu al-chance flood events for approxim ate studies within the County. The hydraulic m ethods used for this analysis include steady flow analysis using HEC-RAS version 4.0.0 (Reference 58). Cross-sections derived from state LiDAR data or field survey data were used to prepare the hydraulic analyses using RAMPP's GeoRAMPP software, for both detailed and approximate streams within an ESRI ArcMap GIS platform (Reference 59).

Channel roughness factors (Manning's "n") used in the hydraulic com putations were chosen by engineering judgment and field inspection of the floodplain areas. Roughness coefficients used in the hydrau lic computations for all stream s are listed in Table 7, "Summary of Roughness Coefficients."

TABLE 7 – SUMMARY OF ROUGHNESS COEFFICIENTS

Stream	Channel "n"	Overbank "n"
Abers Creek	0.022-0.050	0.035-0.120
Allegheny River	0.023-0.027	0.045-0.060
Allegheny River- Herrs Island Back Channel	*	*
Allegheny River- Fourteen Mile Island Back Channel	*	*
Allegheny River- Twelve Mile Island Back Channel	*	*
Bear Run	0.018-0.040	0.080
Becks Run	0.029-0.044	0.080
Big Sewickley Creek	0.035-0.040	0.045-0.120
Boston Hollow Run	0.040-0.050	0.080-0.100
Boyds Hollow Run	0.061	0.080-0.100
Breakneck Creek	0.045	0.080
Brush Creek 1	0.027-0.050	0.100-0.150
Brush Creek 2	0.018-0.045	0.050-0.100
Bull Creek	0.030-0.040	0.060-0.100
Campbells Run	0.011-0.045	0.035-0.090
Chalfant Run	0.030-0.052	0.023-0.100
Chartiers Creek	0.023-0.045	0.031-0.800
Chartiers Creek-Diversion Channel	0.030-0.036	0.045-0.080
Crooked Run	0.015-0.055	0.020-0.080
Crouse Run	0.020-0.050	0.060-0.120
Crouse Run Tributary	0.040	0.070-0.100
Deer Creek	0.035	0.080
Dirty Camp Run	0.025-0.045	0.020-0.150
Douglass Run	0.045-0.050	0.080-0.100
Douglass Run Tributary No. 1	0.045-0.050	0.080-0.100
Douglass Run Tributary No. 2	0.040-0.050	0.080-0.140
East Thompson Run	0.040-0.050	0.050-0.100
Fallen Timber Run	0.040	0.070-0.100
Georges Run	0.013-0.045	0.040-0.070
Gillespie Run	0.035-0.055	0.040-0.080
Girty's Run	0.012-0.048	0.020-0.080
Gourdhead Run	0.020-0.060	0.040-0.120
Graesers Run	0.031-0.040	0.030-0.12
Happy Hollow Run	0.045-0.048	0.080-0.100
Harts Run	0.035-0.040	0.020-0.080
Hoffman Run	0.020-0.045	0.070-0.100
Humms Run	0.035-0.040	0.035-0.120
Jacks Run	0.040	0.050-0.100
Leak Run	0.028-0.050	0.020-0.300
Lewis Run	0.030-0.055	0.020-0.110
Lick Run	0.025-0.060	0.020-0.130
Little Bull Creek	0.045-0.055	0.060-0.100
Little Deer Creek	0.035-0.040	0.080
Little Pine Creek East	0.032-0.047	0.055-0.200

*Data Not Available

TABLE 7 – SUMMARY OF ROUGHNESS COEFFICIENTS – (continued)

Stream	Channel "n"	Overbank "n"
Little Pine Creek West	0.020-0.060	0.040-0.150
Little Plum Creek	0.025-0.035	0.035-0.065
Lobbs Run	0.020-0.060	0.016-0.150
Long Run	0.015-0.045	0.040-0.120
Lowries Run	0.025-0.050	0.040-0.10
McCaslin Run	*	*
McClarens Run	0.035	0.080
McLaughlin Run	0.032-0.036	0.03-0.20
Millers Run	0.020-0.040	0.025-0.200
Monongahela River	0.025-0.028	0.060
Montour Run	0.025-0.045	0.050-0.100
South Fork Montour Run	0.035	0.080
Montour Run No. 1	0.05	0.1
Moon Run	0.013-0.040	0.040-0.075
North Branch Robinson Run	0.038	0.080
North Fork Montour Run	0.035	0.080
Ohio River	0.025-0.035	0.025-0.080
Ohio River Back Channel	0.025-0.035	0.025-0.160
Painters Run	0.037-0.040	0.050-0.085
Peters Creek	0.033-0.040	0.020-0.100
Pidgeon Hollow Run	*	*
Piersons Run	0.035-0.040	0.015-0.060
Pine Creek	0.020-0.060	0.030-0.400
Piney Fork	0.035-0.055	0.060-0.100
Pitt Street Tributary	*	*
Plum Creek	0.037-0.050	0.040-0.200
Pucketa Creek	0.030-0.035	0.055-0.150
Robinson Run	0.025-0.038	0.045-0.150
Rochester Run	0.040	0.080
Sandy Creek	0.025-0.038	0.030-0.150
Saw Mill Run	0.021-0.060	0.025-0.080
Sawmill Run	0.033-0.045	0.045-0.100
Scrubgrass Run	0.028-0.040	0.050-0.070
Spring Garden Run	0.012-0.050	0.070-0.100
Squaw Run	0.025-0.059	0.080-0.120
Squaw Run Tributary No. 1	0.055-0.059	0.070-0.120
Squaw Run Tributary No. 2	0.015-0.055	0.100-0.120
Squaw Run Tributary No. 4	0.055-0.059	0.070-0.120
Streets Run	0.046	0.120
Thompson Run	0.014-0.045	0.030-0.120
Tributary A	0.038	0.060-0.100
Tributary to Bull Creek	0.035-0.040	0.070-0.080
Tributary 1 to Piney Fork	0.035-0.040	0.050-0.080
Turtle Creek	0.014-0.055	0.022-0.150

*Data not available

TABLE 7 – SUMMARY OF ROUGHNESS COEFFICIENTS – (continued)

Stream	Channel "n"	Overbank "n
Unnamed Stream Along Moss Side Boulevard	0.028-0.035	0.060-0.100
West Branch Deer Creek	0.035	0.080
Whiskey Run	0.028-0.040	0.030-0.150
Wittmer Run	0.045	0.110
Wildcat Run	0.045	0.100
Wylie Run	0.048	0.070-0.100
Youghiogheny River	0.035	0.060

For FIRM panels, bench m arks within a given jurisdiction that are cataloged by the National Geodetic Survey (NGS) and entered in to the Nation al Spatial Reference System (NSRS) as First or S econd Order Vertical and have a vertical stability classification o f A, B, or C are shown and labeled on the FIRM with their 6-character NSRS Permanent Identifier.

Bench marks cataloged by the NGS and ente red into the NSRS vary widely in vertical stability classification. NSRS ve rtical stability classifications are as follows:

- Stability A: Monum ents of the most reliable nature, expected to hold position/elevation well (e.g., mounted in bedrock)
- Stability B: Monum ents which genera lly hold their position/elevation well (e.g., concrete bridge abutment)
- Stability C: Monuments which may be affected by surface ground movements (e.g., concrete monument below the frost line)
- Stability D: Mark of questionable or unknown vertical stability (e.g., concrete monument above frost line, or steel witness post)
- In addition to NSRS bench m arks, the FIRM may also show vertical control monuments established by a local jurisd iction; these m onuments will be shown on the FIRM with the appropriate designations. Local monuments will only be placed on the FIRM if the co mmunity has requested that they be included, and if the m onuments meet the aforementioned NSRS inclusion criteria.

  To obtain elevation, description, and /or location information for bench marks shown on the FIRM for this jurisdic tion, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their W eb site at www.ngs.noaa.gov.

It is im portant to note that tem porary vertical m onuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical cont rol. Although these m onuments are not shown on the FIRM, they m ay be f ound in the Technical Support Data Notebook associated with this FIS and FIRM. Interested individuals m ay contact FEMA to access this data

3.3 Vertical Datum

All FISs and FIRMs are referenced to a specific vertical datum . The vertical datum provides a starting point ag ainst which flood, gr ound, and structure elevations can be referenced and compared. Until recently, the standard vertical datum in use for newly created or re vised FISs and FIRMs was NGVD 29. W ith the finalization of the North Am erican Vertical Datum of 1988 (NAVD 88) , many FIS reports and FIRMs are bei ng prepared using NAVD 88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD 88. Structure and ground elevations in the county must, therefore, be referenced to NAVD 8 8. It is im portant to note that adjace nt counties m ay be referenced to NGVD 29. This may result in differences in BFEs across the county boundaries between the counties.

The average datum shift from NGVD 29 to NAVD 88 for Allegheny County used was -0.52 feet.

For information regarding conversion between the NGVD2 9 and NAVD88, visit the National Geodetic Survey web site at www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3242

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. To assist in this endeavor, each FIS provides 1-percent annual chance floodplain data, which m ay include a combination of the following: 10-, 2-, 1- , and 0.2-percent-annual-chance fl ood elevations; de lineations of the 1- and 0.2-percent annual chance floodplains; and 1-percent annu al chance floodway. This inform ation is presented on the FIRM and in m any components of the FIS, including Flood Profiles,

and Floodway Data Tables. Users should refere nce the data presented in the FIS as well as additional inform ation that m ay be avai lable at the loc al community map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national sta ndard without regional di scrimination, the 1-percent annual chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance flood is em ployed to indicate additional areas of flood risk in the community. For the stream s studied in detail, the 1-percent and 0.2-percent annual chan ce floodplains have been delineated using the flood elevations determined at each cross section.

For this countywide F IS, flood boundaries were interpolat ed using LiDAR acquired from Pennsylvania Map that was used to de velop a DTM (Reference 56).

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the FIRM. On this m ap, the 1-per cent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zon es A, AE, X), and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of moderate flood hazard s. In cases where the 1- and 0.2-percent-annual-chance floodplain boundari es are close together, only the 1-percent-annual-chance floodplain bounda ry has been shown. Small areas within the floodplain boundaries m ay lie above the flood elevations, but cannot be shown due to lim itations of the m ap scale and/or lack of detailed topographic data.

For the stream s studied by approxim ate methods, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM (Exhibit 2).

4.2 Floodways

Encroachment on floodplains, su ch as stru ctures and fill, red uces flood-carrying capacity, increases flood heights and velo cities, and increases flood hazards in areas beyond the encroachm ent itself. One aspect of floodplain m anagement involves balancing the econom ic gain fr om floodplain develop m ent against the resulting increase in flood hazard. Fo r purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain m anagement. Under this concept, the ar ea of the 1-percent annual chance floodplain is divided into a floodway and a floodway fringe. Th e floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachm ent so that the 1-percent annual chance flood can be ca rried without substantial increases in flood heights. Minim um Federal standard s limit such incr eases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study

are presented to local agencies as a minimum standard that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections in Table 8, "Floodway Data" (located in Volume 2). The computed floodways are shown on the FIRM (Exhibit 2). In cases where the floodway and 1-percent annual chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway widths for the Allegheny River, Big Sewickley Creek, the Monongahela River, Pucketa Creek, Turtle Creek, and the Youghiogheny River extend beyond the county boundary.

The floodway for all or portions of the following streams are contained within their channel banks: the Allegheny River, Boston Hollow Run, Boyds Hollow Run, Chartiers Creek, Dirty Camp Run, Douglass Run, Douglass Run Tributary No. 1, Fallen Timber Run, Gillespie Run, Happy Hollow Run, Hoffman Run, Pidgeon Hollow Run, Pitt Street Tributary, Pucketa Creek, Spring Garden Run, Squaw Run, Squaw Run Tributary No. 1, Squaw Run Tributary No. 2, Squaw Run Tributary No. 4, Turtle Creek, Wildcat Run, and Wylie Run.

Floodway data was not computed for all or portions of the Allegheny River, Squaw Run, Chartiers Creek-Diversion Channel, Lowries Run, McClarens Run, North Fork Montour Run, and Bear Run.

No cross section data is available for the floodways along Allegheny River – Twelve Mile Island Back Channel, Allegheny River – Fourteen Mile Island Back Channel, and a portion of Chartiers Creek within the Borough of Bridgeville and the Township of Collier. Therefore information for these flooding sources is not included in Table 8, "Floodway Data" (located in Volume 2).

Encroachment into areas subject to inundation by floodwaters having hazardous velocities aggravates the risk of flood damage, and heightens potential flood hazards by further increasing velocities. A listing of stream velocities at selected cross sections is provided in Table 8, "Floodway Data" (located in Volume 2). To reduce the risk of property damage in areas where the stream velocities are high, the community may wish to restrict development in areas outside the floodway.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 8 (located in Volume 2) for certain downstream cross sections of the following streams are lower than the regulatory flood elevations in that area, which must take into account the 1-percent annual chance flooding due to backwater from other sources: Becks Run, Big

Sewickley Creek, Boston Hollow Run, Boyds Hollow Run, Campbells Run, Gourdhead Run, Lewis Run, Little Pine Creek East, Little Pine Creek West, Little Plum Creek, Lobbs Run, Long Run, Millers Run, Montour Run, Montour Run No. 1, Moon Run, Piersons Run, Pine Creek, Pucketa Creek, Robinson Run, Sandy Creek, Scrubgrass Run, Thompson Run, Wylie Run, and the Youghiogheny River.

The area between the floodway and 1-percent annual chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 1-percent annual chance flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1, "Floodway Schematic."

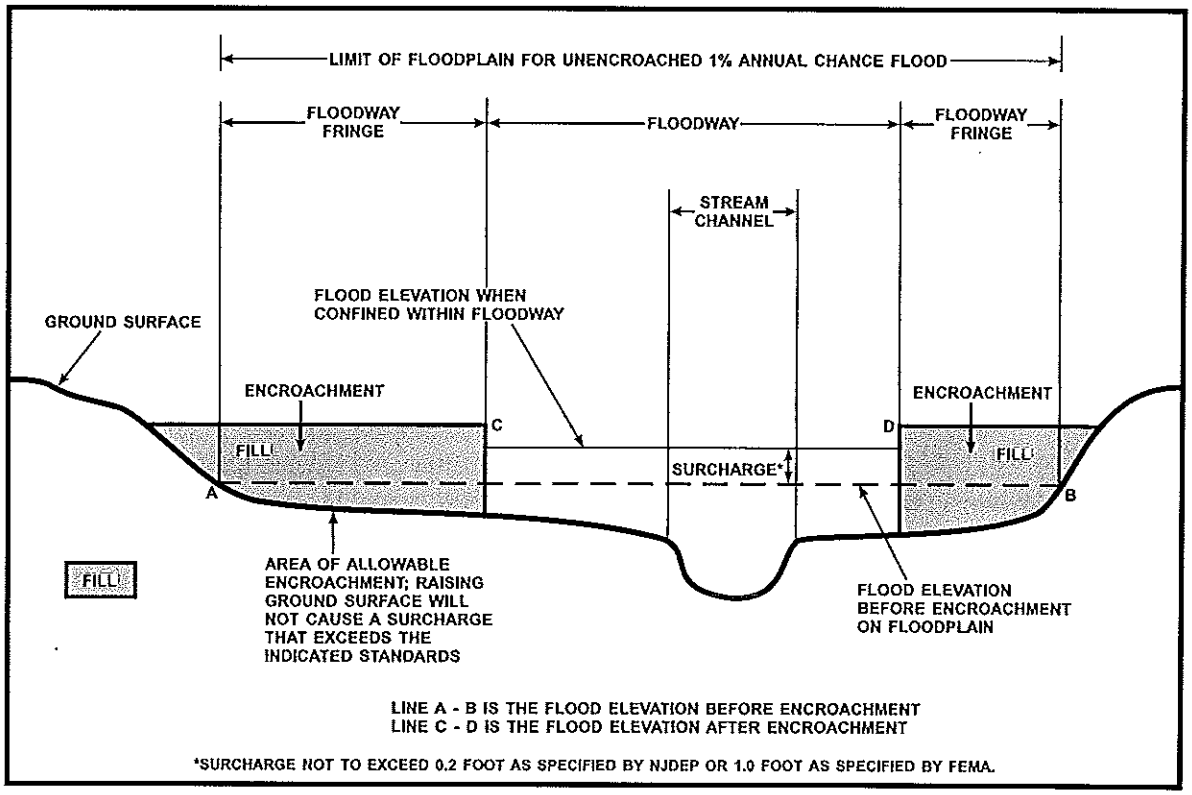

Figure 1: FLOODWAY SCHEMATIC

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insura nce zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 1-percent-annual-chance floodplains that are determ ined in the FI S report by approxim ate methods. Because detailed hydraulic analyses are not perform ed for such ar eas no BFEs, or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS report by detailed methods. Whole-foot BFEs derived from the detailed hydraulic analyses ar e shown at selected in tervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 0.2-percent-annual-chance floodplain, areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile (sq. mi.), and areas pr otected from the base flood by levees. No BFEs or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the m ap designates flood insurance rate zones as described in Section 5.0 and, in the 1-pe rcent-annual-chance floodplains that were studied by detailed m ethods, shows selected whole-foot BFEs or average depths. Insurance agents use zones and BFEs in conj unction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and sym bols, the 1- and 0.2-percent-annual-chance floodpl ains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

The current FIRM presents flooding information for the entire geographic area of Allegheny County. Historical map dates relating to the maps prepared for each community prior to the October 4, 1995 initial countywide FIS are presented in Table 9, "Community Map History."

7.0 OTHER STUDIES

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Allegheny County has been compiled into this FIS. Therefore, this FIS supersedes all previously printed FIS reports, and FIRMs for all of the incorporated jurisdictions within Allegheny County.

This is a multi-volume FIS. Each volume may be revised separately, in which case it supersedes the previously printed volume. Users should refer to the Table of Contents in Volume 1 for the current effective date of each volume; volumes bearing these dates contain the most up-to-date flood hazard data.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting Federal Insurance and Mitigation Division, FEMA Region III, One Independence Mall, Sixth Floor, 615 Chestnut Street, Philadelphia, PA 19106-4404.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Aleppo, Township of	May 10, 1974	April 23, 1976	September 1, 1986	
Aspinwall, Borough of	December 28, 1973	May 14, 1976	December 18, 1979	
Avalon, Borough of	February 1, 1974	January 2, 1976	December 15, 1978	
Baldwin, Borough of	December 17, 1976	None	August 15, 1978	
Baldwin, Township of[1]				
Bell Acres, Borough of	June 7, 1974	April 23, 1976	May 1, 1985	
Bellevue, Borough of	December 28, 1973	April 2, 1976	December 15, 1978	
Ben Avon, Borough of	December 28, 1973	June 4, 1976	July 16, 1981	
Ben Avon Heights, Borough of*[1]				
Bethel Park, Municipality of	December 10, 1976	None	June 15, 1981	
Blawnox, Borough of	June 14, 1974	May 7, 1976	September 3, 1980	
Brackenridge, Borough of	February 15, 1974	June 4, 1976	August 15, 1980	
Braddock, Borough of	March 29, 1974	June 18, 1976	September 30, 1980	
Braddock Hills, Borough of*	May 10, 1974	April 9, 1976	August 10, 1979	

*No Special Flood Hazard Areas Identified
[1]This community did not have a FIRM prior to the first countywide FIRM for Allegheny County

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

ALLEGHENY COUNTY, PA
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Bradford Woods, Borough of	January 3, 1975	None	November 6, 1981	
Brentwood, Borough of[1]				
Bridgeville, Borough of	February 8, 1974	April 9, 1976	January 5, 1984	
Carnegie, Borough of	February 8, 1974	May 7, 1976	May 1, 1978	
Castle Shannon, Borough of[1]				
Chalfant , Borough of*[1]				
Cheswick, Borough of	February 1, 1974	August 6, 1976	June 18, 1980	
Churchill, Borough of	December 10, 1976	None	December 15, 1978	
Clairton, City of	January 4, 1974	January 16, 1976	October 16, 1979	
Collier, Township of	July 19, 1974	April 30, 1976	March 15, 1982	
Coraopolis, Borough of	March 8, 1974	April 9, 1976	June 15, 1979	
Crafton, Borough of	February 1, 1974	April 30, 1976	December 19, 1980	

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ALLEGHENY COUNTY, PA
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Crescent, Township of	May 31, 1974	June 4, 1976	July 16, 1981	
Dormont , Borough of*[1]				
Dravosburg, Borough of	December 28, 1973	June 18, 1976	June 15, 1979	
Duquesne, City of	April 12, 1974	April 16, 1976	September 14, 1979	
East Deer, Township of	September 20, 1974	May 14, 1976	August 15, 1980	
East McKeesport, Borough of*[1]				
East Pittsburgh, Borough of [1]				
Edgewood, Borough of*[1]				
Edgeworth, Borough of	March 15, 1974	May 28, 1976	May 1, 1980	
Elizabeth, Borough of	January 9, 1974	April 16, 1976	July 16, 1981	
Elizabeth, Township of	March 29, 1974	June 18, 1976	March 15, 1977	March 16, 1979
Emsworth, Borough of	February 8, 1974	None	September 30, 1980	
Etna, Borough of	July 26, 1974	October 24, 1975	September 1, 1978	
Fawn, Township of	November 29, 1974	February 5, 1982	January 18, 1984	

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[1]This community did not have a FIRM prior to the first countywide FIRM for Allegheny County

TABLE 9

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ALLEGHENY COUNTY, PA
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Findlay, Township of	September 20, 1974	June 4, 1976	November 18, 1988	
Forest Hills, Borough of	May 10, 1974	September 10, 1976	September 1, 1986	
Forward, Township of	July 19, 1974	May 7, 1976	February 1, 1980	
Fox Chapel, Borough of	July 26, 1974	August 6, 1976	April 15, 1977	
Franklin Park, Borough of	July 30, 1976	None	January 1, 1982	
Frazer, Township of	November 5, 1976	None	December 19, 1980	
Glassport, Borough of	December 7, 1973	June 18, 1976	June 15, 1979	
Glen Osborne, Borough of	June 1, 1973	May 21, 1976	November 15, 1979	
Glenfield, Borough of	March 29, 1974	May 7, 1976	March 18, 1980	
Green Tree, Borough of	June 21, 1974	May 14, 1976	July 16, 1981	
Hampton, Township of	March 15, 1974	May 28, 1976	May 1, 1978	
Harmar, Township of	September 6, 1974	July 30, 1976	July 2, 1980	

TABLE 9

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ALLEGHENY COUNTY, PA
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Harrison, Township of	November 2, 1973	June 4, 1976	September 29, 1978	July 2, 1982
Haysville, Borough of	August 9, 1974	August 6, 1976	March 18, 1980	
Heidelberg, Borough of	February 1, 1974	June 4, 1976	June 15, 1981	
Homestead, Borough of[1]				
Indiana, Township of	September 6, 1974	May 14, 1976	October 18, 1983	
Ingram, Borough of*[1]				
Jefferson Hills, Borough of	June 14, 1974	June 25, 1976	April 1, 1980	
Kennedy, Township of	September 20, 1974	May 21, 1976	February 15, 1980	
Kilbuck, Township of	September 13, 1974	July 16, 1976	February 1, 1980	
Leet, Township of	May 31, 1974	May 28, 1976 November 12, 1976	September 14, 1979	
Leetsdale, Borough of	June 21, 1974	May 7, 1976	November 19, 1980	
Liberty, Borough of	December 28, 1973	May 14, 1976	November 1, 1979	

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TABLE 9

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ALLEGHENY COUNTY, PA
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Lincoln, Borough of	December 28, 1973	April 23, 1976	September 28, 1979	
Marshall, Township of	September 20, 1974	September 24, 1976	November 4, 1981	
McCandless, Town of	September 20, 1974	June 4, 1976	June 18, 1980	
McDonald, Borough of	July 26, 1974	May 7, 1976	August 15, 1983	
McKeesport, City of	December 28, 1973	May 28, 1976	January 3, 1979	
McKees Rocks, Borough of	August 31, 1973	June 18, 1976	May 16, 1977	January 1, 1982
Millvale, Borough of	December 28, 1973	April 23, 1976	July 16, 1979	
Monroeville, Municipality of	July 26, 1974	May 28, 1976	August 1, 1979	
Moon, Township of	September 6, 1974	June 4, 1976	August 15, 1979	
Mount Oliver, Borough of*[1]				
Mt. Lebanon, Municipality of	September 6, 1974	January 2, 1976	June 30, 1976	
Munhall, Borough of	January 9, 1974	June 25, 1976	April 24, 1981	

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TABLE 9

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ALLEGHENY COUNTY, PA
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Neville, Township of	March 24, 1971	None	July 7, 1972	July 1, 1974 September 5, 1975 September 30, 1988
North Braddock, Borough of	April 12, 1974	June 4, 1976	February 16, 1979	
North Fayette, Township of	September 20, 1974	June 18, 1976	October 18, 1983	
North Versailles, Township of	September 6, 1974	May 14, 1976	April 1, 1981	
Oakdale, Borough of	December 7, 1973	August 6, 1976	August 15, 1983	
Oakmont, Borough of	March 8, 1974	May 28, 1976	January 16, 1981	
O'Hara, Township of	September 20, 1974	November 14, 1975	July 2, 1980	
Ohio, Township of	September 20, 1974	June 4, 1976	November 4, 1988	

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

ALLEGHENY COUNTY, PA
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Penn Hills, Municipality of	September 20, 1974	December 26, 1975	June 15, 1981	
Pennsbury Village, Borough of*[1]				
Pine, Township of	August 2, 1974	July 2, 1976	September 22, 1978	
Pitcairn, Borough of	July 30, 1976	None	April 1, 1980	
Pittsburgh, City of	March 8, 1974	August 20, 1976	December 15, 1981	
Pleasant Hills, Borough of[1]				
Plum, Borough of	June 28, 1974	May 21, 1976	September 16, 1981	
Port Vue, Borough of	January 19, 1974	May 21, 1976	September 28, 1979	
Rankin, Borough of	March 15, 1974	June 18, 1976	July 2, 1980	
Reserve, Township of	April 15, 1977	None	April 15, 1977	
Richland, Township of	August 2, 1974	May 28, 1976	September 22, 1978	
Robinson, Township of	September 20, 1974	August 20, 1976	February 3, 1982	
Ross, Township of	June 7, 1974	October 3, 1975	December 18, 1979	

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ALLEGHENY COUNTY, PA
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Rosslyn Farms, Borough of	January 4, 1974	May 21, 1976	May 19, 1981	
Scott, Township of	September 13, 1974	July 9, 1976	May 3, 1982	
Sewickley, Borough of	January 9, 1974	May 28, 1976	September 14, 1979	
Sewickley Heights, Borough of	March 22, 1974	May 17, 1974 June 4, 1976	May 1, 1986	
Sewickley Hills, Borough of	November 26, 1976	None	September 1, 1986	
Shaler, Township of	May 31, 1974	July 16, 1976	March 18, 1980	
Sharpsburg, Borough of	December 28, 1973	June 4, 1976	September 29, 1978	
South Fayette, Township of	September 13, 1974	January 2, 1976	February 3, 1982	April 3, 1989
South Park, Township of	June 28, 1974	August 6, 1976	November 5, 1980	

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

ALLEGHENY COUNTY, PA
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
South Versailles, Township of	August 2, 1974	July 2, 1976	August 1, 1979	
Springdale, Borough of	February 8, 1974	July 16, 1976	July 16, 1980	
Springdale, Township of	May 24, 1974	May 14, 1976	July 16, 1980	
Stowe, Township of	November 29, 1974	June 18, 1976	February 15, 1980	
Swissvale, Borough of	June 14, 1974	June 4, 1976	June 30, 1976	
Tarentum, Borough of	February 15, 1974	May 14, 1976	August 15, 1980	
Thornburg, Borough of[1]				
Trafford, Borough of[2]	August 30, 1974	December 19, 1975	September 28, 1979	
Turtle Creek, Borough of	February 1, 1974	May 28, 1976	November 19, 1980	
Upper St. Clair, Township of	May 31, 1974	June 18, 1976 May 23, 1980	March 15, 1984	April 17, 1989
Verona, Borough of	May 31, 1974	June 4, 1974	January 16, 1981	
Versailles, Borough of	March 29, 1974	May 28, 1976	October 18, 1988	

[1] This community did not have a FIRM prior to the first countywide FIRM for Allegheny County

[2]This community was not part of the October 4, 1995, countywide Flood Insurance Study. It became part of the countywide Flood Insurance Study in the August 5, 1997, revision.

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

ALLEGHENY COUNTY, PA
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

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