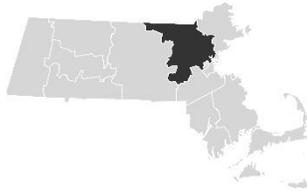# FLOOD INSURANCE STUDY
FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 2 OF 15

MIDDLESEX COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
ACTON, TOWN OF	250176	MARLBOROUGH, CITY OF	250203
ARLINGTON, TOWN OF	250177	MAYNARD, TOWN OF	250204
ASHBY, TOWN OF	250178	MEDFORD, CITY OF	250205
ASHLAND, TOWN OF	250179	MELROSE, CITY OF	250206
AYER, TOWN OF	250180	NATICK, TOWN OF	250207
BEDFORD, TOWN OF	255209	NEWTON, CITY OF	250208
BELMONT, TOWN OF	250182	NORTH READING, TOWN OF	250209
BILLERICA, TOWN OF	250183	PEPPERELL, TOWN OF	250210
BOXBOROUGH, TOWN OF	250184	READING, TOWN OF	250211
BURLINGTON, TOWN OF	250185	SHERBORN, TOWN OF	250212
CAMBRIDGE, CITY OF	250186	SHIRLEY, TOWN OF	250213
CARLISLE, TOWN OF	250187	SOMERVILLE, CITY OF	250214
CHELMSFORD, TOWN OF	250188	STONEHAM, TOWN OF	250215
CONCORD, TOWN OF	250189	STOW, TOWN OF	250216
DRACUT, TOWN OF	250190	SUDBURY, TOWN OF	250217
DUNSTABLE, TOWN OF	250191	TEWKSBURY, TOWN OF	250218
EVERETT, CITY OF	250192	TOWNSEND, TOWN OF	250219
FRAMINGHAM, TOWN OF	250193	TYNGSBOROUGH, TOWN OF	250220
GROTON, TOWN OF	250194	WAKEFIELD, TOWN OF	250221
HOLLISTON, TOWN OF	250195	WALTHAM, CITY OF	250222
HOPKINTON, TOWN OF	250196	WATERTOWN, TOWN OF	250223
HUDSON, TOWN OF	250197	WAYLAND, TOWN OF	250224
LEXINGTON, TOWN OF	250198	WESTFORD, TOWN OF	250225
LINCOLN, TOWN OF	250199	WESTON, TOWN OF	250226
LITTLETON, TOWN OF	250200	WILMINGTON, TOWN OF	250227
LOWELL, CITY OF	250201	WINCHESTER, TOWN OF	250228
MALDEN, CITY OF	250202	WOBURN, CITY OF	250229

REVISED:

REVISED
PRELIMINARY
06/08/2023

FLOOD INSURANCE STUDY NUMBER
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FEMA

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Flood Insurance Rate Map (FIRM)

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Aberjona River	Above confluence with Mill Brook 3	28.0	700	*	1,370	1,820	3,910
Aberjona River	At Mid Lake Dam	27.7	700	*	1,380	1,930	3,710
Aberjona River	At USGS gaging station	24.8	730	*	1,380	1,830	3,510
Aberjona River	Below confluence with Horn Pond Brook	24.3	710	*	1,350	1,800	3,560
Aberjona River	Above confluence with Horn Pond Brook	14.5	600	*	930	1,190	2,410
Aberjona River	At Washington Street	12.5	560	*	900	1,150	2,160
Aberjona River	Below confluence with Sweetwater Brook	11.5	520	*	870	1,080	1,970
Aberjona River	Above confluence with Sweetwater Brook	9.0	400	*	640	820	1,560
Aberjona River	Below confluence with Schneider Brook	8.4	380	*	610	790	1,260
Aberjona River	Above confluence with Schneider Brook	7.0	330	*	520	670	1,030
Aberjona River	Below confluence with Halls Brook	5.5	270	*	460	550	810
Aberjona River	Above confluence with Halls Brook	2.5	200	*	370	480	640

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Aberjona River	Below confluence with Aberjona River North Spur	2.0	110	*	190	200	250
Aberjona River	Above confluence with Aberjona River North Spur	1.4	40	*	100	110	120
Aberjona River	At West Street/ Willow Street culvert	0.9	20	*	50	80	130
Aberjona River North Spur	At Holding Pond at Woburn Industrial Park	1.9	20	*	30	38	140
Alewife Brook (Little River)	At Cambridge/ Somerville corporate limits	8.3	230	*	360	460	410
Angelica Brook	At confluence with Reservoir No. 3	1.6	90	*	140	160	220
Assabet Branch No. 3	At confluence with Assabet River	1.1	60	*	72	99	134
Assabet Branch No. 4	At confluence with Assabet River	1.0	72	*	104	118	159
Assabet River	At confluence with Concord River/ Sudbury River	177.5	2,990	*	4,560	5,330	6,460
Assabet River	At confluence with Dakins Brook	176.8	2,980	*	4,550	5,310	6,450

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Assabet River	At confluence with Spencer Brook 1	169.0	2,890	*	4,400	5,140	6,320
Assabet River	About 2,000 feet below Concord Turnpike	168.0	2,880	*	4,380	5,120	6,310
Assabet River	At confluence with Nashoba Brook	120.5	2,310	*	3,500	4,070	5,540
Assabet River	At confluence with Tributary 2 to Assabet River	120.3	2,310	*	3,500	4,060	5,540
Assabet River	About 240 feet below Main Street	117.8	2,280	*	3,450	4,010	5,460
Assabet River	About 800 feet below Powdermill Road	116.7	2,260	*	3,430	3,980	5,430
Assabet River	About 0.8 mile below Acton Street	116.0	2,250	*	3,410	3,960	5,400
Assabet River	About 10 feet below Acton Street	115.2	2,240	*	3,400	3,950	5,380
Assabet River	About 1,400 feet above Florida Road	114.6	2,240	*	3,380	3,930	5,360
Assabet River	About 190 feet below Great Road	114.2	2,230	*	3,380	3,930	5,350
Assabet River	About 1,300 feet above Great Road	109.5	2,170	*	3,290	3,820	5,200

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Assabet River	About 1,400 feet above White Pond Road	90.1	1,910	*	2,890	3,360	4,570
Assabet River	About 2,400 feet below Sudbury Road	88.7	1,890	*	2,860	3,320	4,530
Assabet River	At confluence with Boons Pond	86.6	1,860	*	2,810	3,270	4,460
Assabet River	At confluence with Fort Meadow Brook	79.5	1,760	*	2,660	3,090	4,210
Assabet River	About 0.9 mile below Gleansondale Road	78.8	1,750	*	2,640	3,070	4,190
Assabet River	At confluence with Branch of Assabet River	75.6	1,700	*	2,570	2,990	4,080
Assabet River	About 1.0 mile below Cox Street	75.1	1,690	*	2,560	2,980	4,060
Assabet River	At confluence with Assabet River Branch No. 3	74.0	1,670	*	2,540	2,950	4,020
Assabet River	About 1,800 feet above Main Street	72.9	1,660	*	2,510	2,920	3,980
Assabet River	At confluence with Mill Brook	64.5	1,580	*	2,320	2,740	3,600
Assabet River	At confluence with Hog Brook	61.5	1,580	*	2,310	2,730	3,570

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Assabet River	About 800 feet above Chapin Road	60.1	1,460	*	2,140	2,530	3,320
Assabet River	About 400 feet below Interstate 495	59.0	1,370	*	2,020	2,380	3,130
Assabet River	About 250 feet below Bridge Road	57.4	1,350	*	1,990	2,350	3,080
Assabet River	At confluence with North Brook	40.2	380	*	560	660	870
Assabet River	About 100 feet below Interstate 290	40.1	350	*	520	620	810
Assabet River	About 375 feet above Robin Hill Street	39.5	1,650	*	2,420	2,860	3,760
Assabet River	About 900 feet below Boundary Street	35.3	1,500	*	2,210	2,610	3,440
Assabet River	About 400 feet above Boundary Street	35.2	1,500	*	2,210	2,610	3,430
Assabet River	About 2,500 feet above Boundary Street	30.3	1,320	*	1,950	2,310	3,040
Assabet River	About 2,550 feet above Boundary Street	29.9	1,260	*	1,870	2,210	2,920
Baddacook Brook	At confluence with Whitney Pond	2.1	190	*	520	590	1,080

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Baiting Brook	At confluence with Sudbury River	3.6	288	*	425	488	625
Baiting Brook	At Constance M. Fiske Dam	1.9	68	*	77	80	87
Bear Meadow Brook	At confluence with Ipswich River	4.7	160	*	270	330	500
Bear Meadow Brook	Approximately 1,200 feet below Haverhill Street	4.0	140	*	230	280	430
Bear Meadow Brook	Approximately 680 feet above Haverhill Street	2.3	100	*	160	190	290
Bear Meadow Brook	Approximately 2,700 feet above Haverhill Street	1.4	57	*	96	120	180
Beaver Brook 1	At confluence with Charles River	11.5	1,020	*	1,370	1,800	2,450
Beaver Brook 1	Above confluence with Chester Brook	7.8	670	*	900	1,180	1,600
Beaver Brook 1	Above Beaver Street Bridge	6.9	570	*	760	1,000	1,375
Beaver Brook 1	Above Beaver Street Bridge	5.9	570	*	760	1,000	1,375
Beaver Brook 1	Approximately 15 feet below Linden Street/ State Route 60	1.8	129	*	234	289	477

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Beaver Brook 2	At confluence with River Meadow Brook	5.7	470	*	700	830	1,090
Beaver Brook 2	About 1,200 feet below High Street	3.4	320	*	480	570	760
Beaver Brook 2	About 970 feet below Hunt Road	2.6	270	*	410	490	640
Beaver Brook 2	About 330 feet above Garrison Road	2.1	220	*	340	400	530
Beaver Brook 3	At confluence with Merrimack River	94.4	2,690	3,420	4,020	4,740	6,430
Beaver Brook 3	Above confluence with Peppermint Brook	92.0	2,620	3,330	3,920	4,620	6,260
Beaver Brook 3	Above confluence with Double Brook	86.7	2,490	3,180	3,730	4,400	5,980
Beaver Brook 3	Above confluence with Gumpas Pond Brook	81.7	2,390	3,050	3,590	4,230	5,750
Beaver Brook 4	At inlet to Forge Pond	13.6	420	*	690	845	1,280
Beaver Brook 4	Downstream of Westford/ Littleton corporate limits	11.8	380	*	620	760	1,150
Beaver Brook 4	Approximately 200 feet above King Street	9.8	339	*	563	686	1,045

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Beaver Brook 4	Above Mill Pond	7.9	296	*	494	601	920
Beaver Brook 4	At State Route 2	5.8	241	*	403	493	756
Beaver Brook 4	At Boxborough/ Littleton corporate limits	4.3	145	*	215	250	330
Beaver Brook 4	Approximately 7,280 feet above Captain Isaac Davis Highway/ State Route 2	3.0	92	*	140	160	220
Beaver Brook 4	Approximately 3,260 feet below West Whitcomb Road	1.9	66	*	100	120	150
Beaver Brook 4	At Interstate 495	1.4	55	*	84	98	120
Beaver Brook 5	At State Route 2	2.1	147	*	269	334	554
Beaver Brook 5	At Cross Section H	1.8	129	*	234	289	477
Beaver Dam Brook	At River Mile 0.0	5.6	221	*	369	450	690
Beaver Dam Brook	At River Mile 1.733	3.5	183	*	309	378	586
Beaver Dam Brook	At the Framingham/ Natick corporate limits	5.5	180	*	310	380	590
Beaver Dam Brook	At the Ashland/ Framingham corporate limits	1.0	180	*	310	380	590
Bennetts Brook	At the Ayer/ Littleton corporate limits	4.9	180	*	280	330	440

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Bennetts Brook	Approximately 1,500 feet below Shaker Mille Pond	2.8	120	*	180	210	280
Birch Meadow Brook	At confluence with East Outlet	1.0	50	*	80	99	149
Black Brook	At confluence with Merrimack River	2.69	178	239	290	344	486
Black Brook	At Westford Street	2.26	150	202	245	291	411
Bogastow Brook- Jar Brook	At county boundary	12.4	690	*	1,000	1,400	2,200
Bogastow Brook- Jar Brook	Above confluence with Dirty Meadow Brook	9.7	540	*	770	1,050	1,600
Bogastow Brook- Jar Brook	Above confluence with Dopping Brook	6.7	450	*	610	800	1,170
Bogastow Brook- Jar Brook	Above Factory Pond	2.9	270	*	420	540	800
Bogastow Brook- Jar Brook	Above Houghton Pond	2.5	250	*	400	500	750
Bogastow Brook- Jar Brook	At Meadowbrook Lane	0.4	50	*	80	100	150
Bogle Brook 1	At county boundary	1.9	50	*	82	99	151
Bogle Brook 1	At State Route 9	1.0	32	*	54	65	101
Bogle Brook 2	At county boundary	3.6	325	*	490	630	1,000

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Bogle Brook 2	Above confluence with Tributary 4 to Bogle Brook 2	3.1	325	*	490	630	930
Bogle Brook 2	At Nonesuch Pond Outlet	2.8	300	*	460	600	890
Bogle Brook 2	At Nonesuch Pond Inlet	2.4	280	*	430	560	840
Bogle Brook 2	Above confluence with Tributary 3 to Bogle Brook 2	1.4	200	*	260	350	510
Bogle Brook 2	At Pine Street	1.1	150	*	200	270	400
Boons Pond and Branch	At Barton Road	2.3	120	*	285	350	667
Boutwell Brook	At confluence with Stony Brook 2	1.3	90	*	150	280	280
Bow Brook	At confluence with Catacoonamug Brook	2.4	110	*	180	200	280
Branch of Assabet River	Approximately 1,380 feet below Hudson Road/ Walcott-Randall Road	4.2	186	*	294	347	505
Branch of Assabet River	At Hudson Road/ Walcott-Randall Road	1.5	78	*	118	135	188
Branch of Assabet River	At Goshen Lane	1.1	60	*	91	104	145

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Branch of Assabet River	At Athens Street	1.0	57	*	78	98	136
Branch of Elizabeth Brook 1	At confluence with Ministers Pond	1.1	84	*	113	125	175
Broad Meadow Brook	At confluence with Sudbury Reservoir	1.1	70	*	100	110	150
Brook A of Shawsheen River	At confluence with Shawsheen River	0.7	65	*	120	150	255
Brook from Waushakum Pond	At confluence with Beaver Dam Brook	2.9	30	*	40	50	60
Butter Brook	At confluence with Nashoba Brook	3.1	105	*	180	225	440
Butter Brook	At Acton/ Westford corporate limits	1.4	65	*	110	140	275
Butter Brook	At Concord Road	1.0	60	*	120	160	270
Butter Brook	At Griffin Road	0.4	30	*	50	70	110
Catacoonamug Brook	At confluence with Nashua River	20.3	670	*	1,150	1,400	2,080
Charles River	At corporate boundary between Cambridge and Watertown	278	2,640	3330	3,880	4,460	5,990
Charles River	At USGS streamgage 01104500	250	2,430	3060	3,570	4,110	5,520
Charles River	Above Stony Brook	223	2,230	2800	3,270	3,770	5,060

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Charles River	At diversion from Mother Brook	200.0	1,780	*	2,480	3,200	4,270
Charles River	At confluence with Mother Brook	200.0	2,650	*	3,610	4,680	6,210
Charles River	At Charles River Village/ Dover Gage (No. 01103500)	184.0	2,500	*	3,500	4,500	6,000
Charles River	At Natick/ Sherborn corporate limits	176.0	2,500	*	3,500	4,500	6,000
Charles River	At Medfield	156.0	2,450	*	3,430	4,410	5,925
Cheese Cake Brook	At Eddy Street	2.0	410	*	680	800	1,080
Cherry Brook	At confluence with Stony Brook 1	3.2	400	*	500	700	1,080
Chester Brook	At confluence with Beaver Brook 1	3.7	300	*	460	600	850
Chester Brook	At confluence with West Chester Brook	1.7	200	*	300	400	450
Chester Brook	At lower end of Lexington Street culvert	0.5	100	*	150	200	300
Chicken Brook	Above unnamed tributary about 600 feet below Marian Way	3.07	189	254	308	366	519

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Chicken Brook	Above unnamed tributary about 100 feet below Cross Street	2.32	149	202	245	291	413
Chicken Brook	Above unnamed tributary about 1,800 feet below Prentice Street	1.53	106	143	174	207	295
Cochituate Brook	At confluence with Sudbury River	18.2	420	*	690	800	1,100
Cold Brook	At confluence with Pantry Brook	2.1	120	*	190	230	345
Cold Brook	Above confluence with Tributary A to Cold Brook	0.4	40	*	65	80	125
Cold Spring Brook	At confluence with Merrimack River	400.7	4,120	*	5,490	6,060	7,340
Cold Spring Brook	About 40 feet below Rogers Street	400.5	4,120	*	5,490	6,050	7,340
Cold Spring Brook	At confluence with River Meadow Brook	372.6	3,930	*	5,240	5,770	7,000
Cold Spring Brook	About 130 feet above Lawrence Street	372.5	3,930	*	5,240	5,770	6,990
Cold Spring Brook	At confluence with Marginal Brook	371.0	3,920	*	5,220	5,760	6,970

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Cold Spring Brook	About 115 feet below Interstate 495	370.8	3,920	*	5,220	5,760	6,970
Cold Spring Brook	About 0.8 miles above Interstate 495	369.8	3,910	*	5,210	5,740	6,960
Cold Spring Brook	About 1,900 feet below Faulkner Street	368.8	3,900	*	5,200	5,730	6,950
Cold Spring Brook	About 870 feet above Pollard Street	368.3	3,900	*	5,200	5,730	6,940
Cold Spring Brook	About 700 feet below Boston Road	367.2	3,890	*	5,190	5,720	6,930
Cold Spring Brook	About 1,900 feet above Boston Road	366.7	3,890	*	5,180	5,710	6,920
Cold Spring Brook	About 3,600 feet below River Street	365.9	3,880	*	5,170	5,700	6,910
Cold Spring Brook	About 1,600 feet above River Street	365.1	3,880	*	5,170	5,700	6,900
Cold Spring Brook	About 1,000 feet below U.S. Route 3	362.5	3,860	*	5,140	5,670	6,870
Cold Spring Brook	About 10 feet below U.S. Route 3	362.4	3,860	*	5,140	5,670	6,870
Cold Spring Brook	About 1,400 feet below Nashua Road	361.6	3,850	*	5,130	5,660	6,860
Cold Spring Brook	At confluence with Pages Brook	357.2	3,820	*	5,090	5,610	6,800

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Cold Spring Brook	About 1.0 mile below Bedford Road	356.2	3,820	*	5,080	5,600	6,790
Cold Spring Brook	About 0.9 mile below Bedford Road	353.3	3,800	*	5,050	5,570	6,750
Cold Spring Brook	About 0.5 mile below Bedford Road	351.4	3,780	*	5,040	5,550	6,730
Cold Spring Brook	About 0.2 mile below Bedford Road	351.1	3,780	*	5,030	5,550	6,730
Cold Spring Brook	About 1,250 feet above Bedford Road	350.3	3,770	*	5,030	5,540	6,720
Cold Spring Brook	About 2,500 feet above Bedford Road	350.3	3,770	*	5,030	5,540	6,710
Cold Spring Brook	About 3,600 feet above Bedford Road	349.6	3,770	*	5,020	5,540	6,710
Cold Spring Brook	About 1.0 mile above Bedford Road	349.0	3,770	*	5,010	5,530	6,700
Cold Spring Brook	About 1.2 mile above Bedford Road	348.7	3,760	*	5,010	5,530	6,690
Cold Spring Brook	About 1.8 mile below Monument Street	347.3	3,750	*	5,000	5,510	6,680
Cold Spring Brook	At confluence with Sawmill Brook 2	345.5	3,740	*	4,980	5,490	6,650
Cold Spring Brook	About 1,800 feet below Monument Street	344.8	3,740	*	4,970	5,480	6,650

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Cold Spring Brook	About 1,050 feet below Lowell Road	340.6	3,710	*	4,930	5,440	6,590
Coles Brook	At School St	1.8	275	*	455	530	655
Coles Brook	At Brucewood Road	1.5	275	*	455	530	655
Coles Brook	At confluence with Tributary 1 to Coles Brook	1.1	225	*	370	430	530
Collins Brook	At confluence with Sutton Brook	0.5	55	*	100	130	220
Collins Brook	At Pringle Street	0.2	40	*	65	85	145
Conant Brook	At confluence with Nashoba Brook	2.2	290	*	490	550	630
Conant Brook	At Nagog Hill Road	1.2	200	*	330	370	430
Concord River	At Billerica/ Tewksbury corporate limits	372.6	3,930	*	5,240	5,770	6,990
Concord River	At Talbot Mill Dam	369.8	3,910	*	5,210	5,740	6,960
Concord River	At U.S. Route 3	362.5	3,860	*	5,140	5,670	6,870
Concord River	At the Billerica/ Carlisle corporate limits	361.6	3,850	*	5,130	5,660	6,860
Concord River	At Concord/ Carlisle corporate limits	351.4	3,780	*	5,030	5,550	6,730

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Content Brook-Middlesex Canal	At confluence with Shawsheen River	3.3	145	*	260	330	560
Content Brook-Middlesex Canal	At Billerica/ Tewksbury corporate limits	5.8	205	*	370	455	585
Content Brook-Middlesex Canal	At Gray Street	4.9	180	*	330	400	520
Content Brook-Middlesex Canal	Just above confluence of Content Brook with Middlesex Canal	2.2	95	*	175	210	275
Course Brook	About 1,400 feet below Pond Street	3.3	190	*	310	380	510
Course Brook	About 1,450 feet downstream of Coolidge Street	2.8	170	*	280	340	460
Course Brook	At confluence with Tributary A to Course Brook	1.9	130	*	220	260	360
Course Brook	About 190 feet above Merchant Road	1.2	100	*	170	200	280
Cow Pond Brook	At abandoned railroad	9.3	210	*	510	570	980
Cow Pond Brook	At outlet from Whitney Pond	7.3	50	*	100	110	195

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Cow Pond Brook	At outlet from Lost Lake	4.8	30	*	50	50	70
Cranberry Brook	At confluence with Hop Brook	1.8	105	*	170	205	310
Cummings Brook	Above confluence with Shakers Glen Brook	3.4	120	*	230	330	690
Cummings Brook	Below confluence with Little Brook	2.8	90	*	190	260	600
Cummings Brook	Above confluence with Little Brook	1.5	40	*	110	140	320
Cummings Brook	At Winn Street	1.2	30	*	70	90	170
Dakins Brook	At Lowell Road	0.5	120	*	215	250	275
Danforth Brook	At confluence with Assabet River	6.4	236	*	379	450	664
Danforth Brook	At county boundary	4.9	176	*	274	320	458
Darby Brook	At confluence with Marshall Brook	0.6	35	*	70	90	145
Davis Brook	At confluence with Charles River	1.9	109	*	185	227	353
Dirty Meadow Brook	At confluence with Bogastow Brook	2.5	140	*	230	340	570
Dopping Brook	At confluence with Bogastow Brook	2.1	130	*	180	240	350

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Dudley Brook/ Tributary to Dudley Brook	At confluence with Hope Brook	2.3	110	*	160	190	250
Dudley Brook/ Tributary to Dudley Brook	Approximately 1,000 feet below Bent Road	1.1	75	*	125	150	225
Dudley Brook/ Tributary to Dudley Brook	At U.S. Route 20	0.3	30	*	50	60	100
East Outlet	At confluence with Sudbury River	2.2	121	*	192	237	356
Elizabeth Brook 1	Approximately 1,500 feet below Box Mill Road	18.3	473	*	803	967	1,390
Elizabeth Brook 1	At Fletcher Road	17.9	462	*	787	949	1,367
Elizabeth Brook 1	At Gleasondale Road	17.8	446	*	760	918	1,324
Elizabeth Brook 1	At Wheeler Dam	16.8	367	*	632	768	1,113
Elizabeth Brook 1	At Great Road	15.9	289	*	487	588	844
Elizabeth Brook 1	At Hiley Brook Road	15.4	244	*	397	478	759
Elizabeth Brook 1	At Delaney Road	14.9	200	*	308	371	674
Elizabeth Brook 2	At county boundary	1.6	100	*	160	190	290
Elizabeth Brook 2	Approximately 140 feet below Rushwood Road	1.1	80	*	130	155	235

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Elizabeth Brook 2	Approximately 470 feet below Massachusetts Avenue/ State Route 111	0.7	60	*	100	120	180
Elm Brook	At confluence with Shawsheen River	4.6	200	*	270	355	527
Farley Brook	At confluence with River Meadow Brook	1.1	140	*	220	260	340
Farley Brook	About 775 feet below Smokerise Drive	0.3	60	*	90	110	150
Farrar Pond/ Pole Brook	At Sudbury River	2.2	100	*	147	169	237
Farrar Pond/ Pole Brook	At confluence of Farrar Pond with Pole Brook	1.0	54	*	80	92	129
Farrar Pond/ Pole Brook	At Concord Road	0.5	38	*	57	65	91
Farrar Pond Brook	At confluence with Farrar Pond	1.1	51	*	75	85	110
Fort Meadow Brook	At Chestnut Street	4.6	245	*	385	450	649
Fort Meadow Brook	At Fort Meadow Reservoir	3.3	169	*	252	289	399
Fort Pond Brook	At confluence with Nashoba Brook	24.6	570	*	850	975	1,250

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Fort Pond Brook	At Laws Brook Road	24.7	570	*	850	980	1,250
Fort Pond Brook	At Merriam Dam	24.3	565	*	850	975	1,245
Fort Pond Brook	At Erikson Dam	20.5	555	*	840	965	1,235
Fort Pond Brook	At confluence with Heath Hen Meadow Brook	19.8	545	*	835	955	1,220
Fort Pond Brook	At Boston & Maine Railroad near Elm Street	10.1	375	*	650	790	1,210
Fort Pond Brook	Above confluence with Inch Brook	4.4	130	*	230	285	520
Fort Pond Brook	At Boxborough/ Acton corporate limits	2.8	97	*	148	175	235
Fort Pond Brook	Approximately 990 feet above Littlefield Road	2.6	90	*	138	165	220
Fort Pond Brook Branch 1	About 500 feet above High Street	1.2	160	*	240	280	370
Fort Pond Brook Branch 1	About 280 feet above Main Street	0.5	90	*	140	160	210
Fort Pond Brook Branch 2	At confluence with Fort Pond Brook	4.3	143	*	215	260	350
Fort Pond Brook Branch 2	At Boston and Maine Railroad, southern crossing	4.2	140	*	213	255	340

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Fort Pond Brook Branch 2	At Sargent Road	3.0	103	*	165	190	255
Grassy Pond Brook	At confluence with Fort Pond Brook	1.6	70	*	120	150	290
Graves Pond Brook	At outlet of Graves Pond	1.5	90	*	150	170	240
Great Road Tributary	At confluence with Beaver Brook 4	0.4	46	*	81	100	159
Great Road Tributary	At Great Road	0.1	17	*	30	37	58
Great Road Tributary	Approximately 290 feet above Interstate 495	0.1	9	*	16	20	32
Greens Brook	At confluence with Varnum Brook	0.5	50	*	80	100	155
Guggins Brook	At confluence with Inch Brook	4.6	140	*	240	295	540
Guggins Brook	At Boxborough/ Acton corporate limits	2.2	77	*	118	143	190
Guggins Brook	Approximately 3,340 feet below Liberty Square Road	2.1	74	*	115	135	185
Guggins Brook	At Liberty Square Road	1.8	64	*	98	120	160

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Guggins Brook	At eastern crossing of Massachusetts Avenue	1.5	59	*	84	100	135
Guggins Brook	Approximately 560 feet above Massachusetts Avenue	1.0	39	*	60	73	98
Gumpas Pond Brook	At Dracut/ Pelham corporate limits	3.7	200	*	345	425	715
Hales Brook	At confluence with River Meadow Brook	1.8	65	*	90	102	130
Halls Brook	Above confluence with Aberjona River	3.0	70	*	90	80	170
Halls Brook	Below Boston and Maine Railroad	2.6	100	*	180	240	370
Halls Brook	Above Boston and Maine Railroad	2.1	70	*	130	170	270
Halls Brook	At Merrimac Street and School Street	0.3	20	*	40	50	90
Hayward Brook	At confluence with Pine Brook	3.4	161	*	260	312	442
Hayward Brook	At Boston Post Road	2.3	83	*	140	175	272
Hayward Brook	At private drive	1.5	62	*	104	130	202
Heath Hen Meadow Brook	At confluence with Fort Pond Brook	5.8	280	*	450	540	730

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Heath Hen Meadow Brook	About 1.7 mile below West Acton Road	5.0	160	*	290	370	560
Hobbs Brook 1	At confluence with Stony Brook 1	24.7	300	*	400	525	775
Hobbs Brook 1	At inlet to pond above North Avenue	8.6	280	*	380	500	730
Hobbs Brook 1	At Weston/ Waltham corporate limits	7.2	150	*	200	260	390
Hobbs Brook 2	At Lexington Road	2.4	97	*	145	167	221
Hog Brook	At confluence with Assabet River	3.5	214	*	341	400	583
Hop Brook	At confluence with Landham-Allowance Brook	15.6	470	*	770	920	1,300
Hop Brook	Above confluence with Dudley Brook	11.7	390	*	630	750	1,050
Hop Brook	Above confluence with Run Brook	9.2	320	*	530	630	890
Hop Brook	At Dutton Road	3.5	160	*	260	310	440
Hop Brook	At Sudbury/ Framingham corporate limits	2.0	180	*	280	320	440
Hop Brook	At the Marlborough/ Sudbury corporate limits	1.3	160	*	260	310	435

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Horn Pond Brook/ Fowle Brook	At confluence with Aberjona River	9.8	200	*	430	610	1,240
Horn Pond Brook/ Fowle Brook	At Horn Pond Dam	8.8	180	*	400	570	1,080
Horn Pond Brook/ Fowle Brook	Below confluence with Cummings Brook and Shakers Glen Brook	6.2	170	*	350	490	910
Inch Brook	At confluence with Fort Pond Brook	5.7	155	*	270	335	615
Ipswich River	At USGS streamgage 01101500	44.5	809	1,060	1,270	1,500	2,130
Ipswich River	Above confluence with Eisenhaures Pond outflow	38.2	792	1,040	1,240	1,460	2,040
Ipswich River	Above confluence with Martins Brook	23.9	695	916	1,100	1,290	1,770
Ipswich River	Above confluence with Bear Meadow Brook	18.9	682	901	1,080	1,270	1,760
Ipswich River	Above confluence with unnamed tributary about 200 feet above Interstate 93	14.5	576	763	917	1,080	1,500
Ipswich River	Above confluence with Lubbers Brook	8.54	378	502	605	712	994

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Ipswich River	Above confluence with Maple Meadow Brook	2.44	157	211	256	303	427
James Brook	At confluence with Nashua River	4.9	180	*	290	340	460
James Brook	At the Ayer/ Groton corporate limits	2.9	130	*	210	240	340
James Brook	At Old Ayer Road	2.6	110	*	170	240	340
James Brook	At Indian Hill Road	1.7	80	*	120	140	200
James Brook	At Ayer Road	1.1	50	*	80	100	140
Jenny Dugan Brook	At confluence with Sudbury River	1.7	120	*	200	250	340
Jenny Dugan Brook	About 1,300 feet below Williams Road	0.9	80	*	130	160	230
Jenny Dugan Brook	About 3,000 feet above Williams Road	0.2	30	*	50	60	80
Jones Brook	At confluence with Shawsheen River	1.7	215	*	380	450	540
Jones Brook	At golf course culvert	1.6	195	*	355	425	510
Jones Brook	At Baldwin Road	1.3	160	*	290	345	415
Kiln Brook	Approximately 2,700 feet below Interstate 95	1.7	177	*	350	450	803

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Kiln Brook	At State Route 128/ Interstate 95	1.1	125	*	243	312	550
King Street Tributary	At confluence with Beaver Brook 4	0.5	49	*	85	104	166
King Street Tributary	Approximately 1,500 feet above King Street	0.3	39	*	68	84	136
Landham-Allowance Brook	At Landham Road	21.0	580	*	940	1,130	1,590
Landham-Allowance Brook	At Sudbury/ Framingham corporate limits	2.0	180	*	280	330	450
Lawrence Brook	At confluence with Merrimack River	3.4	110	*	170	200	305
Lawrence Brook	Above confluence with Mascuppic Brook	0.7	65	*	110	135	210
Little Brook	Above confluence with Cummings Brook	1.4	50	*	100	140	360
Little Brook	At Bedford Road	1.1	40	*	80	120	230
Locke Brook	At confluence with Willard Brook	4.7	340	*	540	640	890
Lower Spot Pond Brook	At intake to Winter Street	6.0	640	*	900	1,060	1,480
Lubbers Brook	Above confluence with Ipswich River	5.5	160	*	220	270	410

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Lubbers Brook	Above Middlesex Avenue	4.5	140	*	200	240	360
Lubbers Brook	Above Boston & Maine Railroad bridge at Lawrence Street	3.4	180	*	270	310	450
Lubbers Brook	At Glen Road	3.2	135	*	215	250	350
Lubbers Brook	At State Route 38 (Main Street)	2.8	80	*	115	130	180
Lubbers Brook	At State Route 129 (Shawsheen Avenue)	2.0	90	*	135	150	290
Lubbers Brook	Approximately 2,200 feet above Shawsheen Avenue/ State Route 29	1.5	90	*	150	180	275
Lubbers Brook	At Billerica/ Wilmington corporate limits	1.3	63	*	106	129	200
Lubbers Brook	At Billerica/ Burlington corporate limits	0.7	47	*	80	98	153
Malden River	At upstream side of Amelia Earhart Dam	61.9	4,000	*	4,000	4,000	4,000
Malden River	At Medford/ Everett corporate limits	9.2	850	*	1,200	1,410	1,890
Maple Meadow Brook	Above confluence with Ipswich River	5.7	230	*	360	430	620

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Maple Meadow Brook	Above tributary approximately 525 feet northeast of Paddock Street	5.6	190	*	290	350	520
Maple Meadow Brook	Above Main Street	4.1	160	*	260	310	460
Maple Meadow Brook	Approximately 1,300 feet above Middlesex Canal	1.5	30	*	50	60	90
Marginal Brook	At confluence with Concord River	1.2	70	*	115	140	220
Marshall Brook	At confluence with Strong Water Brook	4.0	180	*	295	350	515
Marshall Brook	Above confluence with Darby Brook	3.2	150	*	240	290	425
Marshall Brook	Above tributary at station 1.075	2.6	105	*	170	205	300
Martins Brook	At Wilmington/ North Reading corporate limits	10.9	460	*	700	830	1,190
Martins Brook	Approximately 2,000 feet below State Route 62 (Salem Street)	10.3	370	*	570	670	980
Martins Pond Brook	At confluence with Lost Lake	2.1	90	*	130	150	200

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Mascuppic Brook	At confluence with Lawrence Brook	2.4	50	*	70	80	115
Mason Brook	At confluence with Walker Brook 2	7.4	320	*	540	660	940
Meadow Brook	At confluence with Strong Water Brook	5.1	260	*	425	510	760
Meadow Brook	Above tributary at station 1.145	2.6	145	*	240	285	425
Meadow River Branch	At Lowell Street	7.9	266	*	441	537	819
Meadow River Branch	At Curve Street	4.4	177	*	296	361	554
Merrimack River	At mouth	4,180.0	54,000	*	85,000	102,000	145,000
Merrimack River	At Andover/ Tewksbury corporate limits	4,635.0	58,000	*	90,000	111,000	156,000
Merrimack River	At Dracut/ Methuen corporate limits	4,644.0	58,000	*	90,000	111,000	156,000
Merrimack River	At Nashua, New Hampshire (State Route 111)	3,982.0	53,000	*	85,000	102,000	148,000
Mill Brook 1	At confluence with Pine Brook	5.0	70	*	90	100	130

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Mill Brook 1	At Lexington/ Wayland corporate limits	1.3	132	*	225	322	558
Mill Brook 1	At Fottler Avenue	1.0	107	*	208	264	461
Mill Brook 2	At Lang Street	3.8	275	*	495	570	670
Mill Brook 2	At Main Street	2.4	151	*	180	188	200
Mill Brook 2	At Cambridge Turnpike (State Route 2A)	0.2	108	*	125	128	150
Mill Brook 3	At Mystic Valley Parkway	5.5	210	*	370	480	900
Mill Brook 3	At Mill Street	5.0	150	*	310	450	730
Mill Brook 3	At Brattle Street	4.3	120	*	210	260	820
Mill Brook 3	At Park Avenue	3.6	80	*	150	200	390
Mill Pond Tributary	At confluence with Beaver Brook 4	0.9	37	*	62	76	117
Mill Pond Tributary	Above Boston & Maine Railroad	0.5	18	*	29	36	55
Mill River	At confluence with Saugus River	3.6	150	*	260	300	350
Mill River	At Water Street above Crystal Lake Storm Drain	0.8	75	*	130	145	170
Mill River	At Salem Street	0.4	34	*	58	66	78

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Mineway Brook	At confluence with Pantry Brook	1.5	100	*	160	190	285
Mineway Brook	Approximately 1,500 feet above confluence with Pantry Brook	1.3	85	*	140	165	250
Mineway Brook	Approximately 1,500 feet above Morse Road	0.9	70	*	115	140	210
Mineway Brook	Approximately 3,100 feet above Morse Road	0.7	60	*	100	120	180
Mineway Brook	At abandoned railroad	0.4	40	*	65	80	125
Mineway Brook	At Concord Road and Candy Hill Road intersection	0.3	30	*	50	60	95
Mongo Brook	At confluence with Elm Brook	0.6	26	*	41	50	63
Morse Brook	At confluence with Nashua River	1.0	50	*	70	80	100
Mowry Brook	At confluence with Sudbury Reservoir	1.6	50	*	70	80	110
Mud Pond Brook	At confluence with Shawsheen River	0.3	45	*	80	100	175

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Muddy Brook	At confluence with Heath Hen Meadow Brook	0.5	90	*	140	170	220
Mulpus Brook	At confluence with Nashua River	15.9	720	*	1,740	1,950	3,440
Mulpus Brook	At Townsend Road	14.0	810	*	1,920	2,140	3,820
Munroe Brook	At Lexington/ Arlington corporate limits	2.2	179	*	345	434	754
Munroe Brook	At Lilian Road	2.0	165	*	313	399	665
Munroe Brook	At Trail	1.5	130	*	242	302	511
Munroe Brook	At Bryant Road	1.0	100	*	188	238	359
Mystic River	At confluence with Malden River	62.9	1,150	*	2,130	2,530	3,700
Mystic River	Below confluence with Alewife Brook (Little River)	43.7	990	*	1,840	2,110	3,520
Mystic River	Above confluence with Alewife Brook (Little River)	34.8	800	*	1,560	2,040	4,250
Nagog Brook	At confluence with Nashoba Brook	2.4	70	*	120	155	310
Nagog Brook	At Nagog Pond outlet	1.2	12	*	16	18	27
Nashoba Brook	At confluence of Fort Pond Brook	20.3	450	*	710	845	1,140

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Nashoba Brook	At State Route 27	11.8	410	*	695	840	1,340
Nashoba Brook	Above confluence with Butter Brook	8.7	340	*	590	715	1,130
Nashua River	Above confluence with Flints Brook	512	8,860	11,700	14,200	17,000	25,200
Nashua River	Above confluence with Unkety Brook	499	8,610	11,400	13,800	16,600	24,600
Nashua River	Above confluence with Nissitissit River	435	7,330	9,720	11,800	14,200	21,200
Nashua River	At East Pepperell gage 01096500	434	7,310	9,690	11,800	14,200	21,100
Nashua River	Above confluence with Nod Brook	429	7,280	9,660	11,700	14,100	21,100
Nashua River	Above confluence with Robinson Brook	424	7,250	9,630	11,700	14,100	21,000
Nashua River	Above confluence with James Brook	414	7,200	9,580	11,700	14,000	21,000
Nashua River	Above confluence with Squannacook River	341	6,730	9,080	11,100	13,400	20,100
Nashua River	Above confluence with Mulpus Brook	325	6,610	8,950	11,000	13,300	19,900
Nashua River	Above confluence with Nonacoicus Brook	306	6,460	8,780	10,800	13,100	19,600

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Nashua River	Above confluence with Catacoonamug Brook	281	6,240	8,550	10,600	12,800	19,200
Nissitissit River	At confluence with Nashua River	60.7	2,410	3,190	3,840	4,520	6,330
Nissitissit River	Above confluence with unnamed tributary about 1,600 feet above Hollis Street	59.0	2,360	3,130	3,770	4,440	6,220
Nissitissit River	Above confluence with Mine Brook	56.3	2,280	3,020	3,640	4,290	6,010
Nissitissit River	Above confluence with Sucker Brook	51.8	2,160	2,870	3,460	4,080	5,720
Nissitissit River	Above confluence with Beaver Brook	48.3	2,060	2,740	3,310	3,900	5,480
Nissitissit River	Above confluence with Gulf Brook	43.8	1,950	2,590	3,130	3,690	5,200
Nonacoicus Brook 1	At confluence with Nashua River	18.4	840	*	2,120	2,370	4,160
Nonacoicus Brook 1	At Main Street	16.7	400	*	670	720	1,070
Nonacoicus Brook 2	At confluence with Nonacoicus Brook 1	11.0	370	*	980	1,120	2,230
North Lexington Brook	At Bedford/ Lexington corporate limits	4.9	396	*	817	1,072	1,986

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
North Lexington Brook	At Hartwell Avenue	3.2	273	*	548	708	1,217
North Lexington Brook	Approximately 1,260 feet below Interstate 95 interchange	1.7	168	*	330	421	746
North Lexington Brook	At Interstate 95 interchange	1.0	100	*	183	235	395
Pages Brook	At confluence with Concord River	4.0	171	*	286	349	538
Pages Brook	At Maple Street	1.8	95	*	162	199	309
Pages Brook Branch	At Brook Street	1.4	265	*	350	384	472
Pages Brook Branch	At East Street	0.8	230	*	300	334	410
Pantry Brook	At confluence with Sudbury River	6.0	240	*	380	450	670
Pantry Brook	Above confluence with Mineway Brook	1.1	75	*	125	150	225
Pantry Brook	Above confluence with Tributary A to Pantry Brook	0.3	35	*	55	70	105
Pear Hill Brook	At confluence with Walker Brook 2	7.0	280	*	460	550	790
Peppermint Brook	At confluence with Beaver Brook 3	2.05	149	201	244	289	410
Peppermint Brook	At Hildreth Street	1.85	137	184	223	265	376

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Peppermint Brook	At outlet of unnamed pond	1.13	100	135	164	196	279
Peppermint Brook	At Cross Road	0.62	62	84	102	122	175
Pine Brook	At confluence with Mill Brook 1	5.8	220	*	340	440	540
Pine Brook	At confluence with Hayward Brook	4.0	160	*	251	294	400
Pratts Brook	At confluence with Fort Pond Brook	1.9	210	*	320	380	500
Putnam Brook	At confluence with River Meadow Brook	0.9	120	*	190	220	300
Reedy Meadow Brook	At confluence with Nashua River	2.03	103	139	169	200	283
Reedy Meadow Brook	Above confluence with unnamed tributary above Leighton Street	1.67	87.5	118	144	170	241
Reedy Meadow Brook	Above confluence with unnamed tributary approximately 2,500 feet below Nashua Road	1.26	61.7	83.6	102	121	171
Reedy Meadow Brook	Above confluence with unnamed tributary above Nashua Road	1.03	48.5	65.7	79.9	95.1	134

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Reedy Meadow Brook	Above confluence with tributary from Wattles Pond	0.80	36.3	49.4	60.1	71.6	101
Reedy Meadow Brook	At outlet of Reedy Meadow	0.76	32.8	44.5	54.2	64.5	91.2
Reservoir No. 1- North Branch and Reservoir No. 3	At Salem End Road	27.7	1,220	*	2,130	2,490	3,420
Reservoir No. 1- North Branch and Reservoir No. 3	At outlet of Reservoir No. 3	27.7	1,220	*	2,130	2,490	3,420
Reservoir No. 1- North Branch and Reservoir No. 3	At county boundary	22.3	1,170	*	2,020	2,360	3,200
Richardson Brook	At confluence with Merrimack River	4.5	210	*	330	390	570
Richardson Brook	Above confluence with Trout Brook 1	1.7	90	*	150	180	260
River Meadow Brook	At Chelmsford/ Lowell corporate limits	22.0	555	*	870	1,030	1,450
River Meadow Brook	At confluence with Beaver Brook 2	13.2	400	*	625	740	1,015
River Meadow Brook	At confluence with Putnam Brook	12.4	380	*	600	715	980
River Meadow Brook	At confluence with Farley Brook	11.1	355	*	560	665	910

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Run Brook	At confluence with Hop Brook	0.6	50	*	80	100	150
Run Brook	Below Hudson Road	0.4	40	*	70	85	130
Run Brook	Below Fairbank Road	0.1	20	*	35	45	70
Salmon Brook	At Dunstable/ Nashua, New Hampshire, corporate limits	22.4	550	*	920	1,120	1,620
Salmon Brook	Above confluence with Joint Grass Brook	17.7	190	*	320	390	605
Salmon Brook	Above confluence with Hauk Brook	13.4	180	*	300	365	575
Sandy Brook	At Sandy Brook Road	1.0	360	*	680	900	1,300
Sandy Brook	At Maude Graham Circle	0.7	215	*	420	545	790
Sandy Brook	At Bedford Street	0.5	140	*	275	365	575
Saugus River	Above Hawkes Brook	16.7	601	819	1,000	1,190	1,710
Saugus River	Above Mill River	12.3	438	580	697	819	1,140
Saugus River	Above Pillings Pond outflow	7.99	290	386	464	546	760
Saugus River	Above Beaverdam Brook	5.37	238	318	383	452	631

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Saugus River	Above Reading Drainage Canal	1.43	62	84	102	121	171
Saunders Brook	At confluence with Shawsheen River	2.7	130	*	235	300	515
Saunders Brook	At Wilmington/ Burlington corporate limits	1.5	95	*	175	220	380
Sawmill Brook 1	At Wilmington/ Tewksbury corporate limits	1.6	354	*	595	743	1,250
Sawmill Brook 1	At Mill Street	1.5	350	*	585	732	1,220
Sawmill Brook 2	At Monument Street	2.5	285	*	500	550	600
Schneider Brook	Above confluence with Aberjona River	1.4	60	*	110	140	260
Schneider Brook	At Forbes Street	0.7	30	*	50	60	110
Shakers Glen Brook	Above confluence with Cummings Brook	2.7	60	*	130	180	340
Shakers Glen Brook	Above Russell Street	2.5	50	*	110	160	290
Shawsheen River	At northern Andover/ Tewksbury corporate limits	60.8	1,854	*	2,618	3,093	3,898
Shawsheen River	Below confluence with Strong Water Brook	55.6	1,768	*	2,501	2,954	3,734

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Shawsheen River	Above confluence with Strong Water Brook	43.7	1,494	*	2,114	2,495	3,157
Shawsheen River	Below confluence with Content Brook	38.1	1,408	*	1,991	2,348	2,979
Shawsheen River	At State Road (State Route 129)	36.6	1,388	*	1,964	2,317	2,946
Shawsheen River	At the Billerica/ Tewksbury corporate limits	35.5	1,411	*	1,995	2,356	2,998
Shawsheen River	At Boston Road (State Route 3A)	31.2	1,244	*	1,763	2,087	2,642
Shawsheen River	At Bedford/ Billerica corporate limits	27.2	1,265	*	1,794	2,114	2,712
Shawsheen River	Above confluence with Vine Brook	16.3	948	*	1,354	1,593	2,059
Shawsheen River	Above confluence with Spring Brook	13.8	865	*	1,233	1,450	1,883
Shawsheen River	Above confluence with Elm Brook	7.2	516	*	738	867	1,122
Skug River	At confluence with Martins Pond	6.9	557	*	991	1,171	1,642
Skug River	At Central Street	6.2	535	*	909	1,082	1,525
Snake Brook	At confluence with Lake Cochituate	2.5	120	*	180	210	280

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
South Meadow Brook- Paul Brook	At Tower Road	2.8	605	*	1,045	1,265	1,620
South Meadow Brook- Paul Brook	At Dedham Street	2.0	480	*	835	1,015	1,315
South Meadow Brook- Paul Brook	At Mildred Road	0.9	285	*	520	615	845
Spencer Brook	About 870 feet above Barrets Mill Road	7.2	320	*	520	620	840
Spencer Brook	About 2,000 feet below Lindsay Pond Road	6.3	300	*	480	570	770
Spencer Brook	About 1,050 feet above Lindsay Pond Road	5.5	270	*	440	520	710
Spencer Brook	About 60 feet below Spencer Brook Road	4.5	240	*	380	460	630
Spencer Brook	About 2,400 feet above Westford Road	3.5	200	*	330	390	540
Spencer Brook	About 350 feet above Russel Street	2.2	150	*	240	290	400
Spring Brook	At confluence with Shawsheen River	2.7	110	*	125	130	150
Spring Brook	Above Alcott Street	0.6	34	*	45	60	70
Squannacook River	At confluence with Nashua River	62.8	3,540	*	6,880	8,840	15,160

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Squannacook River	At Elm Street	51.5	2,950	*	5,740	7,380	12,650
Squannacook River	At Mason Road	42.3	2,620	*	5,090	6,550	11,230
Stony Brook	At confluence with Angelica Brook	24.0	1,290	*	1,900	2,250	2,950
Stony Brook	About 1,400 feet below Stony Brook Reservoir Dam	22.5	1,240	*	1,820	2,150	2,830
Stony Brook	About 1.0 mile above Stony Brook Reservoir Dam	12.7	760	*	1,130	1,340	1,770
Stony Brook	About 1,900 feet below Boston Road	12.0	750	*	1,120	1,320	1,750
Stony Brook	About 1,600 feet above Boston Road	11.2	720	*	1,070	1,260	1,670
Stony Brook	About 1,200 feet below White Bagley Road	10.5	680	*	1,020	1,210	1,600
Stony Brook	About 470 feet below Cordaville Road	9.7	670	*	1,000	1,180	1,550
Stony Brook	About 830 feet below Parkerville Road	7.9	580	*	870	1,030	1,360
Stony Brook 1	At confluence with Charles River	24.6	300	*	400	500	700
Stony Brook 1	At inlet to Stony Brook Reservoir	22.6	1,140	*	1,520	2,000	2,950

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Stony Brook 1	Above confluence with Hobbs Brook 1	11.4	890	*	1,200	1,560	2,300
Stony Brook 1	At confluence with Iron Mine Brook	2.3	95	*	144	167	230
Stony Brook 1	At Tower Road	1.2	54	*	82	95	131
Stony Brook 1	At Brooks School	1.0	45	*	68	79	96
Stony Brook 2	At confluence with Merrimack River	43.2	915	*	1,320	1,490	1,835
Strong Water Brook	At confluence with Shawsheen River	10.2	345	*	515	595	840
Sudbury Reservoir	About 1.0 mile above Stony Brook Reservoir Dam	8.9	630	*	940	1,110	1,470
Sudbury Reservoir	About 2.0 mile above Stony Brook Reservoir Dam	4.8	420	*	620	740	970
Sudbury Reservoir	About 0.7 mile below Marlboro Road	0.7	100	*	160	190	250
Sudbury Reservoir	About 160 feet below Marlboro Road	0.2	30	*	50	60	80
Sudbury River	About 850 feet above Lowell Road	162.9	2,380	*	4,070	4,250	6,090
Sudbury River	About 570 feet above Main Street	162.0	2,370	*	4,050	4,240	6,070

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Sudbury River	About 1,400 feet below State Route 2A/ Concord Turnpike	161.7	2,370	*	4,040	4,240	6,060
Sudbury River	About 1,550 feet above State Route 2A/ Concord Turnpike	159.3	2,340	*	3,980	4,210	6,000
Sudbury River	About 0.5 mile above Sudbury Road	158.4	2,340	*	3,960	4,190	5,980
Sudbury River	About 0.9 mile below Great Road	157.1	2,320	*	3,930	4,180	5,940
Sudbury River	About 260 feet above Great Road	155.8	2,310	*	3,900	4,160	5,910
Sudbury River	At confluence with Pole Brook	153.3	2,300	*	3,700	4,130	5,880
Sudbury River	At confluence with Pantry Brook	146.8	2,250	*	3,440	4,050	5,730
Sudbury River	About 0.5 mile below Lincoln Road	145.8	2,230	*	3,430	4,030	5,700
Sudbury River	About 1,100 feet above Sherman Bridge Road/ Lincoln Road	143.8	2,210	*	3,400	4,000	5,650
Sudbury River	About 1.1 mile below Old Sudbury Road	142.1	2,200	*	3,370	3,960	5,610
Sudbury River	About 0.6 mile below Old Sudbury Road	140.8	2,180	*	3,350	3,940	5,570

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Sudbury River	About 150 feet above Old Sudbury Road	139.8	2,170	*	3,330	3,920	5,550
Sudbury River	At confluence with Wash Brook	116.2	1,920	*	2,950	3,470	4,910
Sudbury River	At confluence with Pine Brook	110.8	1,870	*	2,860	3,360	4,760
Sudbury River	About 0.8 mile above Pelham Island Road	110.4	1,860	*	2,850	3,360	4,740
Sudbury River	About 1.9 mile below Stonebridge Road	110.1	1,860	*	2,850	3,350	4,740
Sudbury River	About 1.8 mile below Stonebridge Road	108.3	1,840	*	2,820	3,310	4,690
Sudbury River	About 200 feet above Stonebridge Road	107.3	1,830	*	2,800	3,290	4,660
Sudbury River	About 1,300 feet above Stonebridge Road	106.5	1,820	*	2,790	3,280	4,630
Sudbury River	About 50 feet below Danforth Street	106.2	1,810	*	2,780	3,270	4,630
Sudbury River	About 500 feet below Concord Street	84.7	1,560	*	2,390	2,820	3,980
Sudbury River	About 250 feet above Central Street Dam	84.5	1,560	*	2,390	2,810	3,980
Sudbury River	About 0.5 mile above Central Street Dam	84.1	1,550	*	2,380	2,800	3,960

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Sudbury River	About 220 feet below Interstate 90	83.2	1,540	*	2,370	2,780	3,940
Sudbury River	About 2,200 feet above Interstate 90	81.2	1,520	*	2,330	2,740	3,870
Sudbury River	At confluence with East Outlet	80.1	1,510	*	2,310	2,720	3,840
Sudbury River	About 850 feet below Union Avenue	79.0	1,490	*	2,290	2,690	3,810
Sudbury River	About 990 feet below Winter Street	77.5	1,470	*	2,260	2,660	3,760
Sudbury River	About 30 feet below Winter Street	74.2	1,430	*	2,190	2,580	3,650
Sudbury River	About 500 feet above Reservoir No. 1 Dam	45.9	1,430	*	2,130	2,520	3,310
Sudbury River	About 0.6 mile above Reservoir No. 2 Dam	45.4	1,990	*	2,920	3,450	4,530
Sudbury River	About 1,400 feet above Fountain Street	44.2	1,960	*	2,870	3,390	4,440
Sudbury River	About 400 feet below Union Street	35.3	1,620	*	2,390	2,820	3,710
Sudbury River	About 100 feet above Myrtle Street	34.2	1,580	*	2,330	2,760	3,630
Sudbury River	About 460 feet below Cordaville Road	33.1	1,550	*	2,290	2,700	3,550

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Sudbury River	About 1,800 feet above Cordaville Road	31.5	1,560	*	2,290	2,700	3,540
Sudbury River	About 1,050 feet below Howe Street	23.8	1,290	*	1,890	2,240	2,940
Sudbury River	About 190 feet below Cordaville Street	21.4	1,150	*	1,700	2,010	2,650
Sudbury River	About 750 feet above Fay Court	19.7	1,130	*	1,670	1,970	2,590
Sudbury River	About 140 feet above Fruit Street	18.4	1,080	*	1,590	1,880	2,470
Sutton Brook	At confluence with Shawsheen River	2.7	130	*	235	300	515
Sutton Brook	At Wilmington/ Tewksbury corporate limits	1.5	95	*	175	220	380
Sweetwater Brook	Above confluence with Aberjona River	2.4	210	*	400	530	970
Sweetwater Brook	At Interstate 93	2.3	200	*	400	530	960
Sweetwater Brook	At Lindenwood Road	1.9	170	*	350	470	840
Tadmuck Brook	At confluence with Stony Brook 2	2.1	120	*	210	250	400
Tadmuck Brook	At Main Street	1.6	90	*	160	190	300
Tadmuck Brook	At Providence Road	1.0	50	*	90	110	170

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Tadmuck Swamp Brook	At Westford/ Chelmsford corporate limits	1.8	110	*	190	230	360
Tadmuck Swamp Brook	At Interstate 495	1.2	90	*	150	180	290
Taylor Brook	At confluence with Assabet River	4.6	102	*	136	152	200
Tributary 1 to Coles Brook	At Arborwood Road	0.1	50	*	95	115	155
Tributary 1 to Sudbury River	At Coolidge Road	0.3	65	*	126	145	175
Tributary 2 to Assabet River	At Baker Avenue	0.1	45	*	85	100	120
Tributary 2 to Tributary 1 to Coles Brook	At Fernwood Road	0.2	120	*	180	200	215
Tributary 3 to Bogle Brook 2	At confluence with Bogle Brook 2	1.0	120	*	175	240	380
Tributary 4 to Bogle Brook 2	At confluence with Bogle Brook 2	0.5	80	*	120	170	250
Tributary A to Cold Brook	At confluence with Cold Brook	0.6	55	*	90	110	165
Tributary A to Cold Brook	At abandoned railroad	0.3	35	*	60	75	110

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Tributary A to Course Brook	At confluence with Course Brook	0.7	90	*	140	180	270
Tributary A to Hop Brook	At confluence with Hop Brook	0.6	50	*	90	105	160
Tributary A to Hop Brook	At Firecut Lane	0.1	20	*	35	45	70
Tributary A to Squannacook River	At confluence with Squannacook River	2.5	130	*	200	230	310
Tributary B to Hop Brook	At confluence with Hop Brook	0.4	40	*	60	75	115
Tributary B to Squannacook River	At confluence with Squannacook River	0.4	30	*	50	50	70
Tributary B to Vine Brook	At Middlesex Street	0.7	425	*	590	685	960
Tributary B to Vine Brook	At Third Avenue	0.6	100	*	130	150	195
Tributary B to Vine Brook	At U.S. Route 3	0.5	70	*	85	95	115
Tributary C to Vine Brook	At Wheeler Road	0.7	195	*	300	360	560
Tributary C to Vine Brook	At Muller Road	0.5	170	*	340	465	780
Tributary to Beaver Brook 3	At confluence with Beaver Brook 3	1.2	80	*	140	175	275

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Tributary to Cold Spring Brook	At confluence with Cold Spring Brook	1.2	80	*	110	130	170
Tributary to Martins Brook	At confluence with Martins Brook	1.5	94	*	153	185	250
Tributary to Mill Brook	At confluence with Mill Brook	1.1	60	*	80	105	155
Tributary to Nonacoicus Brook 1/ Long Pond Brook	At confluence with Nonacoicus Brook 1	4.1	120	*	150	160	240
Tributary to Nonacoicus Brook 1/ Long Pond Brook	At Snake Hill Road	2.2	30	*	60	70	120
Tributary to Waushakum Pond	At south end of Waushakum Pond	1.5	100	*	140	150	200
Trout Brook	At confluence with Hop Brook	1.9	110	*	180	215	325
Trout Brook 1	At confluence with Richardson Brook	2.6	140	*	220	270	390
Trout Brook 2	At confluence with Nashua River	0.6	40	*	50	60	70
Trull Brook	At confluence with Merrimack River	4.4	200	*	300	355	475
Trull Brook	Above River Road	4.1	175	*	250	285	335

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Trull Brook	Above tributary at station 1.145	2.3	125	*	170	200	235
Trull Brook Tributary	At Nesmith Street	0.6	40	*	60	70	95
Unkety Brook	At Groton/ Dunstable corporate limits	2.6	110	*	160	190	250
Unnamed Tributary to Mill Brook 2	At Lexington Road	0.4	*	*	*	77	*
Valley Pond	At Valley Pond Outlet	1.8	77	*	116	133	185
Varnum Brook	At confluence with Nashua River	0.9	70	*	110	135	210
Vine Brook	At confluence with Shawsheen River	9.54	454	605	730	860	1,200
Vine Brook	Above confluence with Sandy Brook	6.67	340	454	548	648	910
Vine Brook	Above confluence with Long Meadow Brook	5.15	286	383	464	548	772
Vine Brook	At Middlesex Turnpike	3.26	208	280	339	402	569
Vine Brook	At East Street	2.59	176	237	288	342	484
Walker Brook 1	At confluence with Nashua River	1.1	60	*	90	100	130
Walker Brook 2	At confluence with Squannacook River	41.8	1,470	*	2,760	3,520	5,600

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Walker Brook 2	Above confluence with Willard Brook	15.1	750	*	1,410	1,800	2,830
Walker Brook 2	Above confluence with Mason Brook	6.6	310	*	520	630	910
Walker Brook 3	At confluence with Sudbury Reservoir	1.9	100	*	160	190	260
Walkers Brook	Downstream Reading corporate limits	2.6	140	*	230	280	420
Walkers Brook	Approximately 2,900 feet below John Street	1.7	120	*	200	240	350
Walkers Brook	Approximately 900 feet below John Street	1.2	96	*	150	180	280
Wellington Brook	At Boston and Maine Railroad	1.7	70	*	130	180	320
West Chester Brook	At confluence with Chester Brook	1.1	120	*	160	200	290
Whitehall Brook	At confluence with Sudbury River	7.2	660	*	990	1,130	1,470
Willard Brook	At confluence with Walker Brook No. 2	26.9	1,330	*	2,360	2,920	4,440
Winthrop Canal	Above Linden Pond	2.5	115	*	355	450	760
Winthrop Canal	Above Arch Street	2.3	45	*	60	70	115

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Witch Brook	At confluence with Squannacook River	3.5	150	*	240	280	380

*Not calculated for this Flood Risk Project

Figure 7: Frequency Discharge-Drainage Area Curves

[Not Applicable to this Flood Risk Project]

Table 10: Summary of Non-Coastal Stillwater Elevations

Flooding Source	Location	Elevations (feet NAVD88)				
		10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Charles River Basin	Cambridge, City of	3.0	3.1	3.2	3.5	5.2
Ell Pond	Melrose, City of	47.0	*	49.1	49.9	52.6
Flints Pond	Lincoln, Town of	236.6	*	236.7	236.7	237.0
Forge Pond	Littleton, Town of; Westford, Town of	205.6	*	206.9	207.4	208.2
Hardy Pond	Waltham, City of	199.9	*	202.2	202.9	203.0
Lake Quannapowitt	Wakefield, Town of	82.5	*	82.8	83.0	83.1
Lake Shirley	Shirley, Town of	299.9	*	300.7	301.4	301.8
Lake Winthrop (northwest of railroad)	Holliston, Town of	185.9	*	186.9	188.7	190.8
Lake Winthrop (southeast of railroad)	Holliston, Town of	182.9	*	183.9	184.7	186.5

Table 10: Summary of Non-Coastal Stillwater Elevations

Flooding Source	Location	Elevations (feet NAVD88)				
		10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Lost Lake/Knops Pond	Groton, Town of	214.7	214.7	214.7	214.7	214.7
Lower Baddacook Pond	Groton, Town of	224.5	*	225.6	225.8	226.9
Mascuppic Lake	Dracut, Town of; Tyngsborough, Town of	154.2	*	154.3	154.4	154.5
New Meadow	Dracut, Town of	138.4	138..4	139.5	141.8	143.9
Upper Massapoag Pond	Dunstable, Town of; Groton, Town of; Tyngsborough, Town of	166.5	*	167.2	167.6	168.7

*Not calculated for this Flood Risk Project

Table 11: Stream Gage Information used to Determine Discharges

Flooding Source	Gage Identifier	Agency that Maintains Gage	Site Name	Drainage Area (Square Miles)	Period of Record	
					From	To
Beaver Brook	010965852	USGS	Beaver Brook at North Pelham, NH	47.8	1987	2015
Charles River	01104500	USGS	Charles River at Waltham, MA	251	1932	2015
Ipswich River	01101500	USGS	Ipswich River at South Middleton, MA	44.5	1938	2015
Ipswich River	01102000	USGS	Ipswich River near Ispwich, MA	125	1931	2015
Nashua River	01095500	USGS	Nashua River at Clinton, MA	108	2003	2007
Nashua River	01095503	USGS	Nashua River, Water Street Bridge, at Clinton, MA	110	2012	2016
Nashua River	01095505	USGS	Nashua River, 0.4 mi upstream of Route 110, at Clinton, MA	125	2008	2011
Nashua River	01096500	USGS	Nashua River at East Pepperell, MA	435	1936	2016
Saugus River	01102345	USGS	Saugus River at Saugus Ironworks at Saugus, MA	20.8	1994	2015

5.2   Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Base flood elevations on the FIRM represent the elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations. These whole-foot elevations may not exactly reflect the elevations derived from the hydraulic analyses. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM. The hydraulic analyses for this FIS 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.

For streams for which hydraulic analyses were based on cross sections, locations of selected cross sections are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 6.3), selected cross sections are also listed on Table 23, "Floodway Data."

A summary of the methods used in hydraulic analyses performed for this project is provided in Table 12. Roughness coefficients are provided in Table 13. Roughness coefficients are values representing the frictional resistance water experiences when passing overland or through a channel. They are used in the calculations to determine water surface elevations. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Aberjona River	Confluence with Mystic River	Confluence of Aberjona River North Spur	HEC-HMS 2.2.2	HEC-RAS 3.1.3 (USACE 2002)	6/1/2005	AE w/ Floodway	Essentially an upstream continuation of Mystic River. Sub-basin areas and characteristics for the hydrologic model were determined using automated GIS methods. The NRCS Runoff Curve Number (RCN) method was used for computing loss rate. To compute the RCN, surficial soils group information was read from paper maps, and landcover data was taken from IKONOS satellite imagery from 2001 and 2002. The RCN for each sub-basin was reduced as appropriate to account for impervious area. The Clark unit hydrograph was used as the transform method. The storage coefficient for each sub-basin was computed from the drainage area. Precipitation statistics were from the Northeast Regional Climate Center. The hydraulic model used unsteady flow. Cross-sections were from a seamless topo-bathy digital terrain model constructed from above-water lidar and underwater field-transect bathymetry. Structures were from field surveys or, where available, construction plans. Roughness factors were from GIS analysis of landcover data.
Aberjona River	Confluence with Aberjona River North Spur	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Aberjona River North Spur	Confluence with Aberjona River	Approximately 275 feet upstream of Willow Street	HEC-HMS 2.2.2	HEC-RAS 3.1.3 (USACE 2002)	6/1/2005	AE w/ Floodway	Sub-basin areas and characteristics for the hydrologic model were determined using automated GIS methods. The NRCS Runoff Curve Number (RCN) method was used for computing loss rate. To compute the RCN, surficial soils group information was read from paper maps, and landcover data was taken from IKONOS satellite imagery from 2001 and 2002. The RCN for each sub-basin was reduced as appropriate to account for impervious area. The Clark unit hydrograph was used as the transform method. The storage coefficient for each sub-basin was computed from the drainage area. Precipitation statistics were from the Northeast Regional Climate Center. The hydraulic model used unsteady flow. Cross-sections were from a seamless topo-bathy digital terrain model constructed from above-water lidar and underwater field-transect bathymetry. Structures were from field surveys or, where available, construction plans. Roughness factors were from GIS analysis of landcover data.
Aberjona River Tributary A	Confluence with Aberjona River	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (FEMA 2011, USGS 2011, USGS 2014b). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel geometries were calculated from regional bankfull equations (Bent 2006). Roughness was estimated from drainage area. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable. Unless otherwise noted, these special considerations apply to all riverine Zone A flooding sources in this table dated 4/30/2018, 6/4/2019, and 11/1/2019.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Alewife Brook	Confluence with Mystic River	Confluence with Wellington Brook	HEC-HMS 2.2.2	HEC-RAS 3.1.3 (USACE 2002)	6/1/2005	AE w/ Floodway	Sub-basin areas and characteristics for the hydrologic model were determined using automated GIS methods. The NRCS Runoff Curve Number (RCN) method was used for computing loss rate. To compute the RCN, surficial soils group information was read from paper maps, and landcover data was taken from IKONOS satellite imagery from 2001 and 2002. The RCN for each sub-basin was reduced as appropriate to account for impervious area. The Clark unit hydrograph was used as the transform method. The storage coefficient for each sub-basin was computed from the drainage area. Precipitation statistics were from the Northeast Regional Climate Center. The hydraulic model used unsteady flow. Cross-sections were from a seamless topo-bathy digital terrain model constructed from above-water lidar and underwater field-transect bathymetry. Structures were from field surveys or, where available, construction plans. Roughness factors were from GIS analysis of landcover data.
Alewife Brook	Confluence with Wellington Brook	Spy Pond	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.
Althea Lake	Confluence with Mascuppic Brook	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Angelica Brook	Confluence with Stony Brook	Approximately 0.1 mile above Angelica Drive	Regression equations (Johnson and Tasker 1974)	HEC-2 (USACE 1984)	11/1/1979	AE	Regression equations were used to compute 10-, 2-, and 1-percent-annual-chance discharges. The 0.2-percent-annual-chance discharges were obtained graphically from the other discharges. Overbank portions of cross-sections were from photogrammetric maps (Teledyne 1977). Underwater portions and all structures were from field surveys. Roughness factors were estimated based on field inspections and aerial imagery (Teledyne 1977). Starting water-surface elevations were from known water-surface elevations on Sudbury River.
Ashley Street ponding	Entire shoreline	Entire shoreline	none	none	11/1/2019	A	Analysis of lidar DEM (FEMA 2011, USGS 2011, USGS 2014b), guided by shape of existing waterbody feature (e.g., effective FIRM, National Wetland Inventory, or National Hydrography Dataset), if extant, was used to determine a stillwater elevation corresponding to the expected 1-percent-annual-chance floodplain (347.9 feet NAVD88).
Assabet Branch No. 3	Confluence with Assabet River	Cox Street	Regression equations (Johnson and Tasker 1974)	HEC-2 (USACE 1984)	12/1/1977	AE w/ Floodway	All geometry data were from field surveys. Roughness factors were from field investigations and aerial photographs. Starting water-surface elevations were from known water-surface elevations on Assabet River.
Assabet Branch No. 4	Hudson/ Stow corporate limits	Boston and Maine Railroad	Regression equations (Johnson and Tasker 1974)	HEC-2 (USACE 1984)	12/1/1977	AE w/ Floodway	All geometry data were from field surveys. Roughness factors were from field investigations and aerial photographs. Starting water-surface elevations were from the slope-area method.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Assabet River	Confluence with Sudbury River	County boundary	Regression equations	HEC-RAS 4.1	10/1/2012	AE w/ Floodway	Rural regression equations (Wandle 1983) were used to compute discharges for most locations. Locations with more than 10% impervious area used urban regression equations (Sauer et al. 1983) instead. Streamgage statistics, updated through 2010 using log-Pearson type III analysis (IACWD 1982) and either weighted skew coefficients or station skew (if gages were affected by urbanization or regulation), were compared to the statistics for the same gages from the 1983 reports to determine if the regression equations would predict well discharges from additional periods of record. The base-flood-frequency discharges increased 123% from 1983 to 2010, on average, which was applied as an adjustment factor to results from the regression equations. Computed discharges were reduced below flood-storage reservoirs based on average reduction of outflow compared to inflow as determined by flood-routing computations. Flood-routing computations were obtained from the NRCS or are original to this study. A HEC-HMS rainfall-runoff model was used to validate the results of the regression equations. The HEC-HMS model used the NRCS Curve Number method to compute runoff and the NRCS Unit Hydrograph method to transform it. The meteorological input was from a type III storm. Five-minute time-steps were used. The HEC-HMS model was calibrated to precipitation and streamflow data from the 2007 storm event. The regression equation discharges were adjusted at several locations based on comparison to the HEC-HMS model. Cross-sections were from a blend of field survey data and lidar data. Structures were from field surveys or, where available for large structures, construction plans. Roughness factors were from engineering judgment and field observations. Starting water-surface elevations were from known water-surface elevations at Concord River.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Baddacook Brook	Mouth at Whitney Pond	Just below Lowell Road	Rainfall-runoff routing (SCS 1972a)	HEC-2 (USACE 1984)	1/1/1978	AE w/ Floodway	10-, 2-, 1-, and 0.2-percent-annual-chance rainfall depths were applied to each sub-basin, from which runoff was calculated and discharge routed through reaches and control structures. Overbank portions of cross-sections were from topographic maps (Teledyne 1977). Underwater portions and all structures were from field surveys. Roughness factors were from field inspections and aerial imagery (Teledyne 1977). Starting water-surface elevations were from normal depth.
Baddacook Brook	Just below Lowell Road	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Baddacook Brook Tributary A	Confluence with Baddacook Brook	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Baiting Brook	Confluence with Sudbury River	Approximately 3.3 miles above confluence with Sudbury River	TR-20 (SCS 1965)	WSP-2 (SCS 1976)	7/1/1989	AE w/ Floodway	All geometry data were provided by the SCS and the Town of Framingham. Roughness factors were estimated based on field inspections and aerial imagery (Teledyne 1977). Starting water-surface elevations were determined by TR-20.
Bancroft Brook	Confluence with Nashua River	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	11/1/2019	A	See special considerations for Aberjona River Tributary A.
Bartlett Brook	County boundary	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Bartlett Brook Tributary B	County boundary	County boundary	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Bartlett Brook Tributary B1	Confluence with Bartlett Brook Tributary B	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Bartlett Brook Tributary C	Confluence with Bartlett Brook	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Bayberry Hill Brook	Confluence with Squannacook River	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	11/1/2019	A	See special considerations for Aberjona River Tributary A.
Bear Meadow Brook	Confluence with Ipswich River	Subterranean pipeline crossing near intersection of Haverhill Street and Rustic Lane	Regression equations (Wandle 1977)	HEC-2 (USACE 1984)	8/1/1978	AE w/ Floodway	Results from regression equations were adjusted where necessary to account for impervious land surface area resulting from urbanization. Overbank portions of cross-sections were from topographic maps (Sewall 1974, USGS various). Underwater portions were from field surveys. Structures were from construction plans where available or field surveys otherwise. Roughness factors were from field inspection. Starting water-surface elevations were from the slope-area method.
Bear Meadow Brook Tributary A	Confluence with Bear Meadow Brook	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.
Bear Meadow Brook Tributary A1	Confluence with Bear Meadow Brook Tributary A	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.
Bear Meadow Brook Tributary B	Confluence with Bear Meadow Brook	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Bear Meadow Brook Tributary B1	Confluence with Bear Meadow Brook Tributary B	County boundary	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.
Beaver Brook 1	Confluence with Charles River	Trapelo Road	Unit hydrograph theory	HEC-2 (USACE 1984)	4/1/1978	AE w/ Floodway	Unit hydrograph theory was selected because the basin is ungaged, has natural storage flow regulation, and has high urbanization. Synthetic triangular unit hydrographs were developed using data from Wandle 1977, adjusted for slopes and local inflows, and compared to results of regression equations (Wandle 1977). Cross-section data were from the City of Waltham (Waltham 1976) or field surveys otherwise. Structures were from field surveys. Roughness factors were informed by field inspection and chosen from Chow 1959. Starting water-surface elevations were from known water-surface elevations on Charles River.
Beaver Brook 1	Trapelo Road	State Route 2	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Beaver Brook 2	Confluence with River Meadow Brook	Littleton Road/ State Route 110	Regression equations	HEC-RAS 4.1	10/1/2012	AE w/ Floodway	Rural regression equations (Wandle 1983) were used to compute discharges for most locations. Locations with more than 10% impervious area used urban regression equations (Sauer et al. 1983) instead. Streamgage statistics, updated through 2010 using log-Pearson type III analysis (IACWD 1982) and either weighted skew coefficients or station skew (if gages were affected by urbanization or regulation), were compared to the statistics for the same gages from the 1983 reports to determine if the regression equations would predict well discharges from additional periods of record. The base-flood-frequency discharges increased 123% from 1983 to 2010, on average, which was applied as an adjustment factor to results from the regression equations. Computed discharges were reduced below flood-storage reservoirs based on average reduction of outflow compared to inflow as determined by flood-routing computations. Flood-routing computations were obtained from the NRCS or are original to this study. A HEC-HMS rainfall-runoff model was used to validate the results of the regression equations. The HEC-HMS model used the NRCS Curve Number method to compute runoff and the NRCS Unit Hydrograph method to transform it. The meteorological input was from a type III storm. Five-minute time-steps were used. The HEC-HMS model was calibrated to precipitation and streamflow data from the 2007 storm event. The regression equation discharges were adjusted at several locations based on comparison to the HEC-HMS model. Cross-sections were from a blend of field survey data and lidar data. Structures were from field surveys or, where available for large structures, construction plans. Roughness factors were from engineering judgment and field observations. Starting water-surface elevations were from normal depth.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Beaver Brook 2 - Split 1	Confluence with Beaver Brook 2	Diversion from Beaver Brook 2	none	HEC-RAS 4.1	10/1/2012	AE w/ Floodway	The mainstem HEC-RAS model was used to determine the amount of flow that can be conveyed by the mainstem. Overflow discharge was diverted into a side channel in a separate HEC-RAS model that covers the side channel from diversion to confluence downstream. The outputs of the two models were merged together at junctions.
Beaver Brook 2 - Split 2	Confluence with Beaver Brook 2	Diversion from Beaver Brook 2	none	HEC-RAS 4.1	10/1/2012	AE w/ Floodway	The mainstem HEC-RAS model was used to determine the amount of flow that can be conveyed by the mainstem. Overflow discharge was diverted into a side channel in a separate HEC-RAS model that covers the side channel from diversion to confluence downstream. The outputs of the two models were merged together at junctions.
Beaver Brook 2 - Split 3	Confluence with Beaver Brook 2	Diversion from Beaver Brook 2	none	HEC-RAS 4.1	10/1/2012	AE w/ Floodway	The mainstem HEC-RAS model was used to determine the amount of flow that can be conveyed by the mainstem. Overflow discharge was diverted into a side channel in a separate HEC-RAS model that covers the side channel from diversion to confluence downstream. The outputs of the two models were merged together at junctions.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Beaver Brook 3	Confluence with Merrimack River	County boundary	Log-Pearson type III flood frequency analysis	HEC-RAS 5.0 (USACE 2016)	6/4/2019	AE w/ Floodway	Bulletin 17B flood-frequency analyses (IACWD 1982), modified with the expected moments algorithm (Cohn 1997, Cohn 2001, Griffis 2004), were performed on USGS streamgage 010965852 with data from water years 1987 to 2015. Estimated at-site discharges were weighted with regression estimates (Olson 2009). Peak flows upstream or downstream of the streamgage were adjusted for drainage area, and the weight of at-site estimates decreased with distance from the streamgage until regression equations controlled completely at locations with +/-50% of the drainage area of the streamgage. Roughness factors were estimated using field notes, photographs, and orthoimagery. Overbank portions of cross sections were taken from lidar topography (USGS 2011, 2014). Structures and underwater portions of cross sections were from field surveys. Starting water-surface elevations were from normal depth.
Beaver Brook 4	Forge Pond	Boxborough/ Littleton corporate limits	Regression equations (Wandle 1977)	HEC-2 (USACE 1984)	10/1/1980	AE w/ Floodway	Overbank portions of cross-sections were from aerial photographs (Quinn 1978a). Underwater portions and all structures were from field survey. Roughness factors were from field observations and engineering judgment. Starting water-surface elevations were from normal depth at Forge Pond.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Beaver Brook 4	Boxborough/ Littleton corporate limits	State Route 111	Regression equations (Johnson and Tasker 1974)	HEC-2 (USACE 1984)	4/1/1977	AE w/ Floodway	Regression equations were used to compute 10-, 2-, and 1-percent-annual-chance discharges. The 0.2-percent-annual-chance discharges were computed from a log-Pearson type III distribution of the three lower floods using regional skew coefficients (WRC 1976). Results were compared with discharges from a downstream study of Beaver Brook (USACE 1975) and with log-Pearson type III analysis (WRC 1976) of streamgage records on USGS gages 01100600 (Shawsheen River at Wilmington, 11 years of record extended by correlation with 01102000) and 01102000 (Ipswich River at Ipswich, 45 years of record). Comparisons supported a drainage-area ratio method on Beaver Brook with an exponent of 0.73. Cross-sections and structures were from field surveys. Roughness factors were from field observation and aerial photographs (ASS 1970). Starting water-surface elevations were from the downstream study (USACE 1975). The hydraulic model was calibrated to the August 1955 historic flood.
Beaver Brook 4	State Route 111	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Beaver Brook 4 Tributary A	Confluence with Beaver Brook 4	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Beaver Brook 4 Tributary A1	Confluence with Beaver Brook 4 Tributary A	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Beaver Brook 4 Tributary B	Confluence with Beaver Brook 4	County boundary	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Beaver Brook 4 Tributary C	Confluence with Beaver Brook 4	County boundary	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Beaver Brook 4 Tributary D	Confluence with Beaver Brook 4	County boundary	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Beaver Brook 4 Tributary E	Confluence with Beaver Brook 4	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Beaver Brook 4 Tributary E1	Confluence with Beaver Brook 4 Tributary E	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Beaver Brook 5	State Route 2	Approximately 200 feet below access road to Bowman Elementary School	Regression equations (Johnson and Tasker 1974)	HEC-2 (USACE 1984)	4/1/1977	AE w/ Floodway	The 10-year record of the downstream USGS streamgage on Beaver Brook in Belmont was extended by correlation with the 44-year record of the Charles River streamgage in Waltham (WRC 1976). A log-Pearson type III analysis was performed on the 10-year and the extended record using a regionalized skew coefficient. These streamgage statistics were divided by results of the regression equations (Johnson and Tasker 1974) at the streamgage for the 10-, 2-, and 1-percent-annual-chance discharges to obtain multiplication factors for regression equation results upstream of the gage. At upstream locations, the 10-, 2-, and 1-percent-annual-chance discharges were computed from the regression equations, multiplied by the streamgage factors, and used to extrapolate the 0.2-percent-annual-chance discharge. Discharges for two distant upstream locations were determined from a drainage-area ratio formula. Overbank portions of cross-sections were from topographic maps (Sewall 1972). Underwater portions and structures were from field surveys. Roughness factors were from field inspections and aerial photographs (ASS 1970). Starting water-surface elevations were from the slope-area method.
Beaver Brook 5	Approximately 200 feet below access road to Bowman Elementary School	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.
Beaver Brook 6	Confluence with Hopping Brook	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Beaver Brook 6 Tributary A	Confluence with Beaver Brook 6	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.
Beaver Brook 6 Tributary B	Confluence with Beaver Brook 6	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.
Beaver Brook 6 Tributary C	Confluence with Beaver Brook 6	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.
Beaver Dam Brook	Mouth at Fisk Pond	Approximately 2,000 feet above Ashland/ Framingham corporate limits	Regression equations (Johnson and Tasker 1974)	HEC-2 (USACE 1984)	5/1/1978	AE w/ Floodway	Regression equations were used to compute 10-, 2-, and 1-percent-annual-chance discharges. The 0.2-percent-annual-chance discharges were obtained graphically from the other discharges using linear extrapolation of a log-Pearson type III distribution (WRC 1976). Overbank portions of cross-sections were from topographic maps (Avis 1977). Underwater portions and structures were from field surveys. Roughness factors were from field inspections and aerial imagery (Avis 1977). Starting water-surface elevations were from known water-surface elevations on Lake Cochituate. The hydraulic model was calibrated to high-water marks from the August 1955 historic flood.
Beaver Pond Brook	Confluence with Mulpus Brook	County boundary	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	11/1/2019	A	See special considerations for Aberjona River Tributary A.
Bennetts Brook	Forge Pond	Approximately 0.1 mile above Spectacle Pond	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Bennetts Brook	Approximately 0.1 mile above Spectacle Pond	County boundary	Regression equations (Johnson and Tasker 1974)	HEC-2 (USACE 1984)	1/1/1978	AE w/ Floodway	Regression equations were used to compute 10-, 2-, and 1-percent-annual-chance discharges. The 0.2-percent-annual-chance discharges were obtained graphically from the other discharges. Overbank portions of cross-sections were from photogrammetric maps (Teledyne 1977, MADNR 1976). Underwater portions were from field surveys or existing data. Structures were from field surveys. Roughness factors were from field inspections and aerial imagery. Starting water-surface elevations were from normal depth.
Bennetts Brook Tributary A	Confluence with Bennetts Brook	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Bennetts Brook Tributary B	Confluence with Bennetts Brook	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Bennetts Brook Tributary C	Confluence with Bennetts Brook	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Bennetts Brook Tributary D	Confluence with Bennetts Brook	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Bennetts Brook Tributary E	Confluence with Bennetts Brook	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Bennetts Brook Tributary F	Confluence with Bennetts Brook	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Bennetts Brook Tributary F1	Confluence with Bennetts Brook Tributary F	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Bennetts Brook Tributary G	Confluence with Bennetts Brook	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Bennetts Brook Tributary H	Confluence with Bennetts Brook	County boundary	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Bennetts Pond Brook	County boundary	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.
Birch Meadow Brook	Confluence with East Outlet	Approximately 90 feet above Weston Aqueduct	TR-20 (SCS 1965)	WSP-2 (SCS 1976)	7/1/1989	AE w/ Floodway	All geometry data were provided by the SCS and the Town of Framingham. Roughness factors were estimated based on field inspections and aerial imagery (Teledyne 1977). Starting water-surface elevations were determined by TR-20.
Bixby Brook	Confluence with Squannacook River	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	11/1/2019	A	See special considerations for Aberjona River Tributary A.
Bixby Brook Tributary A	Confluence with Bixby Brook	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	11/1/2019	A	See special considerations for Aberjona River Tributary A.
Black Brook	Confluence with Merrimack River	Approximately 250 feet below Chelmsford/ Lowell corporate limits	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	AE w/ Floodway	Roughness factors were estimated using field notes, photographs, and orthoimagery. Overbank portions of cross sections were taken from lidar topography (USGS 2011, 2014). Structures and underwater portions of cross sections were from field surveys. Starting water-surface elevations were from normal depth.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Black Brook 4	Confluence with Salmon Brook	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Black Brook 4 Tributary A	Confluence with Black Brook 4	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Black Brook 4 Tributary B	Confluence with Black Brook 4	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Black Brook 4 Tributary B1	Confluence with Black Brook 4 Tributary B	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Black Brook 4 Tributary C	Confluence with Black Brook 4	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.
Black Pond	Entire shoreline	Entire shoreline	none	none	6/4/2019	A	Analysis of lidar DEM (FEMA 2011, USGS 2011, USGS 2014b), guided by shape of existing waterbody feature (e.g., effective FIRM, National Wetland Inventory, or National Hydrography Dataset), if extant, was used to determine a stillwater elevation corresponding to the expected 1-percent-annual-chance floodplain (218.6 feet NAVD88).
Blue Brook	Confluence with Gilson Brook	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Bogastow Brook	County boundary	Houghton Pond	Regional frequency method (SCS 1972a)	HEC-2 (USACE 1984)	12/1/1978	AE w/ Floodway	Essentially a downstream continuation of Jar Brook. Due to large standard errors from the regional frequency method, discharges were also computed by rainfall-runoff techniques based on synthetic triangular unit hydrographs (SCS 1972a), and final discharges were a blend of the two methods resulting in a smooth curve. Cross-sections were from field surveys and aerial photogrammetry. Structures were from field surveys. Roughness factors were based on field inspections and informed by Chow 1959. Starting water-surface elevations were from the slope-area method.
Bogastow Brook Tributary A	County boundary	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.
Bogastow Brook Tributary C	County boundary	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.
Bogle Brook 1	Culvert below corporate limits	State Route 9	Regression equations (Johnson and Tasker 1974)	HEC-2 (USACE 1984)	5/1/1978	AE w/ Floodway	Regression equations were used to compute 10-, 2-, and 1-percent-annual-chance discharges. The 0.2-percent-annual-chance discharges were obtained graphically from the other discharges using linear extrapolation of a log-Pearson type III distribution (WRC 1976). Overbank portions of cross-sections were from topographic maps (Avis 1977). Underwater portions and structures were from field surveys. Roughness factors were from field inspections and aerial imagery (Avis 1977). Starting water-surface elevations were from the slope-area method. The hydraulic model was calibrated to high-water marks from the August 1955 historic flood.
Bogle Brook 1	State Route 9	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Bogle Brook 2	County boundary	Highland Street	Unit hydrograph theory	HEC-2 (USACE 1984)	5/1/1978	AE w/ Floodway	Unit hydrograph theory was selected because the basin is ungaged, has natural storage flow regulation, and has high urbanization. Synthetic triangular unit hydrographs were developed using data from Wandle 1977, adjusted for slopes and local inflows, and compared to results of regression equations (Wandle 1977). Cross-section data were from photogrammetric maps (NE Air 1977) or field surveys otherwise. Structures were from field surveys. Roughness factors were informed by field inspection and chosen from Chow 1959. Starting water-surface elevations were from the slope-area method.
Boons Pond Branch	Confluence with Assabet River	Barton Road	TR-55 (SCS 1986)	HEC-2 (USACE 1984)	12/1/1977	AE w/ Floodway	Water-surface elevations for Lake Boon are determined by the elevations for this model at the upstream end. Urban hydrology equations were used to compute 10-, 2-, and 1-percent-annual-chance discharges. The 0.2-percent-annual-chance discharges were obtained graphically from the other discharges using linear extrapolation. Overbank portions of cross-sections were from topographic maps (Teledyne 1976). Underwater portions and structures were from field surveys. Roughness factors were from field inspections and aerial photographs (Teledyne 1976). Starting water-surface elevations were from known water-surface elevations on Assabet River.
Boston Harbor	Coastal flooding along Mystic River and Charles River	Coastal flooding along Mystic River and Charles River	none	none	5/30/2015	AE	Coastal stillwater elevations were taken from Suffolk County's FIS.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Boutwell Brook	Confluence with Stony Brook	Hartford Road	Regression equations (Wandle 1977)	HEC-2 (USACE 1984)	1/1/1981	AE w/ Floodway	Results of the regression equations were verified against streamgage statistics from nearby streamgages with similar basin characteristics. Overbank portions of cross-sections were from topographic maps (Teledyne 1979). Underwater portions and structures were from field surveys. Roughness factors were from field inspection and engineering judgment. Starting water-surface elevations were from known water-surface elevations on Stony Brook.
Bow Brook	Confluence with Catacoonamug Brook	Approximately 2,870 feet above confluence with Catacoonamug Brook	Regression equations (Johnson and Tasker 1974)	HEC-2 (USACE 1984)	1/1/1978	AE w/ Floodway	Essentially an upstream continuation of Catacoonamug Brook. Regression equations were used to compute 10-, 2-, and 1-percent-annual-chance discharges. The 0.2-percent-annual-chance discharges were obtained graphically from the other discharges. Overbank portions of cross-sections were from topographic maps (Teledyne 1977). Underwater portions were from field surveys or existing data. Structures were from field surveys. Roughness factors were from field inspection and photographs. Starting water-surface elevations were from known water-surface elevations on Catacoonamug Brook.
Bow Brook	Approximately 2,870 feet above confluence with Catacoonamug Brook	County boundary	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	11/1/2019	A	See special considerations for Aberjona River Tributary A.
Bow Brook Tributary A	Confluence with Bow Brook	County boundary	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	11/1/2019	A	See special considerations for Aberjona River Tributary A.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Branch of Assabet River	Confluence with Assabet River	Approximately 0.5 mile north of Goshen Lane	Regression equations (Johnson and Tasker 1974)	HEC-2 (USACE 1984)	12/1/1977	AE w/ Floodway	Regression equations were used to compute 10-, 2-, and 1-percent-annual-chance discharges. The 0.2-percent-annual-chance discharges were obtained graphically from the other discharges using linear extrapolation. Overbank portions of cross-sections were from topographic maps (Teledyne 1976). Underwater portions and structures were from field surveys. Roughness factors were from field inspections and aerial photographs (Teledyne 1976). Starting water-surface elevations were from the slope-area method.
Branch of Elizabeth Brook 1	Confluence with Elizabeth Brook	Ministers Pond	TR-20 (SCS 1965)	HEC-2 (USACE 1984)	12/1/1977	AE w/ Floodway	Discharges were calculated by the SCS in the Elizabeth Brook study (SCS 1975). The 10-, 2-, and 1-percent-annual-chance discharges were computed by TR-20. The 0.2-percent-annual-chance discharges were obtained by extrapolation from the other profiles. Overbank portions of cross-sections were from topographic maps (Teledyne 1976). Underwater portions and structures were from field surveys. Roughness factors were from field inspections and aerial photographs (Teledyne 1976). Starting water-surface elevations were from the slope-area method.
Broad Meadow Brook	Mouth at Sudbury Reservoir	Approximately 190 feet above U.S. Route 20	Regression equations (Johnson and Tasker 1974)	HEC-2 (USACE 1984)	11/1/1979	AE w/ Floodway	Regression equations were used to compute 10-, 2-, and 1-percent-annual-chance discharges. The 0.2-percent-annual-chance discharges were obtained graphically from the other discharges. Discharges were compared against existing data where possible. Overbank portions of cross-sections were from photogrammetric maps (Marlborough undated). Underwater portions and structures were from field surveys. Roughness factors were from field inspection and aerial photography. Starting water-surface elevations were from known water-surface elevations on Sudbury Reservoir.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Brook A	Confluence with Shawsheen River	Approximately 400 feet above South Street	Drainage-area ratio	HEC-2 (USACE 1984)	12/1/1978	AE w/ Floodway	Discharges were calculated using a drainage-area ratio (Johnstone and Cross 1949), with an exponent between 0.5 and 0.8, proportional to discharges computed on Content Brook. Roughness factors were from field inspection. Starting water-surface elevations were from known water-surface elevations on Shawsheen River.
Brook from Washakum Pond	Confluence with Beaver Dam Brook	Approximately 0.8 mile above confluence with Beaver Dam Brook	Regression equations (Johnson and Tasker 1974)	HEC-2 (USACE 1984)	11/1/1979	AE w/ Floodway	Essentially a downstream continuation of Tributary to Waushakum Pond. Water-surface elevations for Waushakum Pond are determined by the elevations for this model at the upstream end. Regression equations were used to compute 10-, 2-, and 1-percent-annual-chance discharges. The 0.2-percent-annual-chance discharges were obtained graphically from the other discharges. Overbank portions of cross-sections were from photogrammetric maps (Teledyne 1977). Underwater portions and all structures were from field surveys. Roughness factors were estimated based on field inspections and aerial imagery (Teledyne 1977). Starting water-surface elevations were from known water-surface elevations on Beaver Dam Brook.
Brookhaven Pond	Entire shoreline	Entire shoreline	none	none	4/30/2018	A	Analysis of lidar DEM (FEMA 2011, USGS 2011, USGS 2014b), guided by shape of existing waterbody feature (e.g., effective FIRM, National Wetland Inventory, or National Hydrography Dataset), if extant, was used to determine a stillwater elevation corresponding to the expected 1-percent-annual-chance floodplain (227.1 feet NAVD88).
Brooks Pond	Entire shoreline	Entire shoreline	none	none	4/30/2018	A	Analysis of lidar DEM (FEMA 2011, USGS 2011, USGS 2014b), guided by shape of existing waterbody feature (e.g., effective FIRM, National Wetland Inventory, or National Hydrography Dataset), if extant, was used to determine a stillwater elevation corresponding to the expected 1-percent-annual-chance floodplain (32.5 feet NAVD88).

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Butter Brook	Acton/ Westford corporate limits	Approximately 350 feet above Griffin Road	Regression equations (Wandle 1977)	HEC-2 (USACE 1984)	1/1/1981	AE w/ Floodway	Results of the regression equations were verified against streamgage statistics from nearby streamgages with similar basin characteristics. Overbank portions of cross-sections were from topographic maps (Teledyne 1979). Underwater portions and structures were from field surveys. Roughness factors were from field inspection and engineering judgment. Starting water-surface elevations were from normal depth.
Butter Brook	Confluence with Nashoba Brook	Acton/ Westford corporate limits	Regression equations (Wandle 1983)	HEC-2 (USACE 1984)	12/1/1985	AE w/ Floodway	Regression equations were used to compute 10-, 2-, and 1-percent-annual-chance discharges. The 0.2-percent-annual-chance discharges were computed from regression analyses of the other discharges. Discharges were compared with weighted-average discharges computed from log-Pearson type III analyses (WRC 1976) of streamgage records from Nashoba Brook and Heath Hen Meadow Brook, which have similar basin characteristics. Overbank portions of cross-sections were from aerial photographs (Sewall 1984a). Underwater portions and structures were from field surveys. Roughness factors were based on field inspections and informed by Barnes 1967. Starting water-surface elevations were from known water-surface elevations on Nashoba Brook.
Catacoonamug Brook	Confluence with Nashua River	Confluence with Bow Brook	Regression equations (Johnson and Tasker 1974)	HEC-2 (USACE 1984)	1/1/1978	AE w/ Floodway	Essentially a downstream continuation of Bow Brook. Regression equations were used to compute 10-, 2-, and 1-percent-annual-chance discharges. The 0.2-percent-annual-chance discharges were obtained graphically from the other discharges. Overbank portions of cross-sections were from topographic maps (Teledyne 1977). Underwater portions were from field surveys or existing data. Structures were from field surveys. Roughness factors were from field inspection and photographs. Starting water-surface elevations were from normal depth.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Catacoonamug Brook	Confluence with Bow Brook	County boundary	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	11/1/2019	A	See special considerations for Aberjona River Tributary A.
Charles River	Cambridge/ Watertown corporate limits	Newton Lower Falls Dam	Log-Pearson type III flood frequency analysis	HEC-RAS 5.0 (USACE 2016)	6/1/2017	AE w/ Floodway	Bulletin 17B flood-frequency analysis (IACWD 1982), modified with the expected moments algorithm (Cohn 1997, Cohn 2001, Griffis 2004), was performed on USGS streamgage 01104500 with data from water years 1932 to 2015. Estimated at-site discharges were not weighted by regression estimates because peak flows are affected by upstream diversion to Mother Brook. Peak flows upstream or downstream of the gage were computed using a drainage-area-ratio method (Johnstone and Cross 1949). The Stony Brook watershed (23.7 square miles) was included in the contributing drainage area because annual peak flows on Stony Brook occurred within a few days of those on Charles River every year from 2000 to 2015. Roughness factors were estimated using field notes, photographs, and orthoimagery. Overbank portions of cross sections were taken from lidar topography (USGS 2014b). Structures and underwater portions of cross sections were from field surveys. Starting water-surface elevations were the known water surface at New Charles River Dam.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Charles River	Newton Lower Falls Dam	County boundary	Log-Pearson type III flood frequency analysis	HEC-2 (USACE 1984)	5/1/1978	AE	Discharges were taken from an existing study (SCS 1972b). Discharges were originally computed from streamgage statistics for USGS streamgage 01103500 (Charles River Village) using a log-Pearson type III distribution. Discharges upstream or downstream of the gage were computed from the gage discharges using a discharge-frequency-drainage area relationship. Overbank portions of cross-sections were from topographic maps (Avis 1977). Underwater portions and structures were from field surveys. Roughness factors were from field inspections and aerial imagery (Avis 1977). Starting water-surface elevations were from known water-surface elevations on existing downstream studies. The hydraulic model was calibrated to high-water marks from the August 1955 historic flood.
Charles River	County boundary	Echo Lake	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.
Cheese Cake Brook	Eddy Street	Watertown Street	Rainfall-runoff routing (SCS 1974)	HEC-2 (USACE 1984)	11/1/1981	AE w/ Floodway	Overbank portions of cross-sections were from topographic maps (Berger 1977). Underwater portions and structures were from field surveys. Roughness factors were from field observations and engineering judgment. Starting water-surface elevations were from the slope-area method.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Cheese Cake Brook	Confluence with Charles River	Eddy Street	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	Flow-change locations were selected based on 50% change in drainage area. Sub-basin delineation used hydro-conditioned lidar topography (FEMA 2011, USGS 2011, USGS 2014b). Cross sections were placed at entrances and exits of structures, at flow-change locations, and at significant changes in stream morphology. Overbank geometries were taken from lidar topography; channel and structure geometries were provided by the City of Newton. Roughness factors were estimated from engineering judgment taking land use into account. Starting water-surface elevations were from normal depth using slope of lower end of reach. Ineffective flow was applied where applicable.
Cheese Cake Brook Tributary A	Hull Street	Beaconwood Road	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.
Cherry Brook	Confluence with Stony Brook 1	Warren Avenue	Unit hydrograph theory	HEC-2 (USACE 1984)	5/1/1978	AE w/ Floodway	Unit hydrograph theory was selected because the basin is ungaged, has natural storage flow regulation, and has high urbanization. Synthetic triangular unit hydrographs were developed using data from Wandle 1977, adjusted for slopes and local inflows, and compared to results of regression equations (Wandle 1977). Cross-section data were from photogrammetric maps (NE Air 1977) or field surveys otherwise. Structures were from field surveys. Roughness factors were informed by field inspection and chosen from Chow 1959. Starting water-surface elevations were from the slope-area method.
Cherry Brook	Warren Avenue	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Cherry Brook Tributary A	Confluence with Cherry Brook	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	4/30/2018	A	See special considerations for Aberjona River Tributary A.
Chester Brook	Confluence with Beaver Brook 1	Hardy Pond	Unit hydrograph theory	HEC-2 (USACE 1984)	4/1/1978	AE w/ Floodway	Unit hydrograph theory was selected because the basin is ungaged, has natural storage flow regulation, and has high urbanization. Synthetic triangular unit hydrographs were developed using data from Wandle 1977, adjusted for slopes and local inflows, and compared to results of regression equations (Wandle 1977). Cross-section data were from the City of Waltham (Waltham 1976) or field surveys otherwise. Structures were from field surveys. Roughness factors were informed by field inspection and chosen from Chow 1959. Starting water-surface elevations were from a rating curve for the lower end of the Lyman Pond spillway.
Chicken Brook	County boundary	Headwaters at unnamed pond above Prentice Street	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/1/2017	AE w/ Floodway	Peak flows were computed from regional regression equations. Roughness factors were estimated using field notes, photographs, and orthoimagery. Overbank portions of cross sections were taken from lidar topography (FEMA 2011). Structures and underwater portions of cross sections were from field surveys. Starting water-surface elevations were from normal depth.
Chicopee Row ponding	Entire shoreline	Entire shoreline	none	none	11/1/2019	A	Analysis of lidar DEM (FEMA 2011, USGS 2011, USGS 2014b), guided by shape of existing waterbody feature (e.g., effective FIRM, National Wetland Inventory, or National Hydrography Dataset), if extant, was used to determine a stillwater elevation corresponding to the expected 1-percent-annual-chance floodplain (323.5 feet NAVD88).
Claypit Brook	Confluence with Merrimack River	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Cochituate Brook	Confluence with Sudbury River	Railroad bridge	Rainfall-runoff routing (SCS 1972a)	HEC-2 (USACE 1984)	11/1/1979	AE w/ Floodway	10-, 2-, 1-, and 0.2-percent-annual-chance rainfall depths were applied to each sub-basin, from which runoff was calculated and discharge routed through reaches and control structures. In certain diversion areas, hand-routing procedures were used. Overbank portions of cross-sections were from photogrammetric maps (Teledyne 1977). Underwater portions and all structures were from field surveys. Roughness factors were estimated based on field inspections and aerial imagery (Teledyne 1977). Starting water-surface elevations were from known water-surface elevations on Sudbury River.
Cold Brook	Confluence with Pantry Brook	Approximately 0.78 mile upstream of confluence with Tributary A to Cold Brook	Regression equations (Jennings et al. 1994)	HEC-2 (USACE 1984)	2/1/1996	AE w/ Floodway	Overbank portions of cross-sections were from photogrammetric maps (Teledyne 1977). Underwater portions and structures were from field surveys. Roughness factors were from field observation and aerial photography (Teledyne 1977).
Cold Brook 1	County boundary	Point of one square mile of drainage area	Regression equations (Zarriello 2017)	HEC-RAS 5.0 (USACE 2016)	6/4/2019	A	See special considerations for Aberjona River Tributary A.

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Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Cold Spring Brook	Confluence with Sudbury River	Approximately 1,500 feet above Main Street	Regression equations	HEC-RAS 4.1	10/1/2012	AE w/ Floodway	Rural regression equations (Wandle 1983) were used to compute discharges for most locations. Locations with more than 10% impervious area used urban regression equations (Sauer et al. 1983) instead. Streamgage statistics, updated through 2010 using log-Pearson type III analysis (IACWD 1982) and either weighted skew coefficients or station skew (if gages were affected by urbanization or regulation), were compared to the statistics for the same gages from the 1983 reports to determine if the regression equations would predict well discharges from additional periods of record. The base-flood-frequency discharges increased 123% from 1983 to 2010, on average, which was applied as an adjustment factor to results from the regression equations. Computed discharges were reduced below flood-storage reservoirs based on average reduction of outflow compared to inflow as determined by flood-routing computations. Flood-routing computations were obtained from the NRCS or are original to this study. A HEC-HMS rainfall-runoff model was used to validate the results of the regression equations. The HEC-HMS model used the NRCS Curve Number method to compute runoff and the NRCS Unit Hydrograph method to transform it. The meteorological input was from a type III storm. Five-minute time-steps were used. The HEC-HMS model was calibrated to precipitation and streamflow data from the 2007 storm event. The regression equation discharges were adjusted at several locations based on comparison to the HEC-HMS model. Cross-sections were from a blend of field survey data and lidar data. Structures were from field surveys or, where available for large structures, construction plans. Roughness factors were from engineering judgment and field observations. Starting water-surface elevations were from normal depth.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Cold Spring Brook	Ashland Reservoir	Front Street	Regression equations (Johnson and Tasker 1974)	HEC-2 (USACE 1984)	11/1/1979	AE w/ Floodway	Regression equations were used to compute 10-, 2-, and 1-percent-annual-chance discharges. The 0.2-percent-annual-chance discharges were obtained graphically from the other discharges. Cross-sections were from photogrammetric maps (Teledyne 1977). Structures were from field surveys. Roughness factors were from field inspection and aerial photographs (Teledyne 1977). Starting water-surface elevations were from backwater computations downstream.
Coldspring Brook pond	Entire shoreline	Entire shoreline	none	none	6/4/2019	A	Analysis of lidar DEM (FEMA 2011, USGS 2011, USGS 2014b), guided by shape of existing waterbody feature (e.g., effective FIRM, National Wetland Inventory, or National Hydrography Dataset), if extant, was used to determine a stillwater elevation corresponding to the expected 1-percent-annual-chance floodplain (218.2 feet NAVD88).
Coles Brook	Confluence with Fort Pond Brook	Approximately 1,800 feet above Sandalwood Road	Discharge-frequency relationships	HEC-2 (USACE 1984)	12/1/1976	AE w/ Floodway	Discharge-frequency relationships and/or discharge-frequency-drainage area relationships were developed using hydrologic methods (SCS 1972a, SCS 1973a, Johnson and Tasker 1974). Discharges were compared with weighted-average discharges computed from log-Pearson type III analyses (WRC 1976) of streamgage records from Nashoba Brook and Heath Hen Meadow Brook, which have similar basin characteristics. Overbank portions of cross-sections were from topographic maps (USGS various). Underwater portions and structures were from field surveys. Roughness factors were based on field inspections and informed by Barnes 1967. Starting water-surface elevations were from known water-surface elevations on Fort Pond Brook.
Collins Brook	Confluence with Sutton Brook	Pringle Street	Regional relationships (USACE 1972)	HEC-2 (USACE 1984)	12/1/1978	AE w/ Floodway	Roughness factors were from field inspection. Starting water-surface elevations were from known water-surface elevations on Sutton Brook.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Conant Brook	Confluence with Nashoba Brook	Approximately 1,550 feet below Nagog Hill Road	Discharge-frequency relationships	HEC-2 (USACE 1984)	12/1/1976	AE w/ Floodway	Discharge-frequency relationships and/or discharge-frequency-drainage area relationships were developed using hydrologic methods (SCS 1972a, SCS 1973a, Johnson and Tasker 1974). Discharges were compared with weighted-average discharges computed from log-Pearson type III analyses (WRC 1976) of streamgage records from Nashoba Brook and Heath Hen Meadow Brook, which have similar basin characteristics. Overbank portions of cross-sections were from topographic maps (USGS various). Underwater portions and structures were from field surveys. Roughness factors were based on field inspections and informed by Barnes 1967. Starting water-surface elevations were from known water-surface elevations on Nashoba Brook.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Concord River	Confluence with Merrimack River	Approximately 600 feet above Lowell Road	Regression equations	HEC-RAS 4.1	10/1/2012	AE w/ Floodway	Rural regression equations (Wandle 1983) were used to compute discharges for most locations. Locations with more than 10% impervious area used urban regression equations (Sauer et al. 1983) instead. Streamgage statistics, updated through 2010 using log-Pearson type III analysis (IACWD 1982) and either weighted skew coefficients or station skew (if gages were affected by urbanization or regulation), were compared to the statistics for the same gages from the 1983 reports to determine if the regression equations would predict well discharges from additional periods of record. The base-flood-frequency discharges increased 123% from 1983 to 2010, on average, which was applied as an adjustment factor to results from the regression equations. Computed discharges were reduced below flood-storage reservoirs based on average reduction of outflow compared to inflow as determined by flood-routing computations. Flood-routing computations were obtained from the NRCS or are original to this study. A HEC-HMS rainfall-runoff model was used to validate the results of the regression equations. The HEC-HMS model used the NRCS Curve Number method to compute runoff and the NRCS Unit Hydrograph method to transform it. The meteorological input was from a type III storm. Five-minute time-steps were used. The HEC-HMS model was calibrated to precipitation and streamflow data from the 2007 storm event. The regression equation discharges were adjusted at several locations based on comparison to the HEC-HMS model. Cross-sections were from a blend of field survey data and lidar data. Structures were from field surveys or, where available for large structures, construction plans. Roughness factors were from engineering judgment and field observations. Starting water-surface elevations were from normal depth.