

STREAM ASSESSMENT COSTS AND RECOMMENDATIONS

AF - STREAM ASSESSMENT SUMMARY

Over the course of three weeks, Weston & Sampson conducted a stream assessment for a select portion of streams in Chelmsford, MA. The goal of the stream assessment was to walk the centerline of the streams and document conditions such as sediment build up, debris in stream, culvert conditions, outfall conditions, bank erosion, overgrowth, retaining wall condition, etc. The data was collected using Trimble GPS units, and each defect in the stream was marked as a separate GPS point with photos attached. At various stream points, an upstream and a downstream photo was taken to provide a future frame of reference. All data was uploaded in GIS to serve as a future resource for the Town in prioritizing needs and conducting stream maintenance.

Streams are an important part of the stormwater system. Sediment build-up, debris, retaining walls in poor condition, and culverts in poor condition can all be problematic and contribute to localized flooding. Using the stream assessment data, the functionality of each stream section was analyzed and ranked based on overall stream condition and consequence of failure.

Within the stream assessment area, the Town previously identified a total of 67 culverts. Some of these culverts were located parallel to one another and were inspected as one culvert. This reduced the number of culverts inspected to 53. During the stream assessments, an additional 12 culverts were discovered increasing the total to 65 culverts inspected.

Streams were inspected on the following dates in 2019: 6/17, 6/18, 6/19, 6/21, 6/24, 6/25, 6/26, 6/27, 6/28, 7/1, 7/3, 7/8, 7/9, and 7/10. The assessment area covered approximately 14.5 miles. This includes part of Deep Brook, Stony Brook, two sections of Black Brook, two sections of Beaver Brook, and two sections of River Meadow Brook. The findings included:

- 65 Total Culverts Assessed
- 12 Unmapped Culverts Identified
- 68 Total Outfalls Assessed
- 9 Unmapped Outfalls Identified
- 7 Mapped Outfalls Could Not Be Located

Deep Brook contains 10 culverts which were assessed, including one unmapped culvert. A total of eight outfalls were assessed and no unmapped culverts were identified. This section of Deep Brook was mostly located in wooded areas which resulted in many fallen trees that need to be removed. There were also several areas with a lot of sediment build up. Approximately 1.9 of the 2.1 miles included within the Deep Brook assessment area were documented, with the remaining 0.2 miles consisting of Swains Pond.

Stony Brook contains 17 culverts which were assessed, including four unmapped culverts. A total of 12 outfalls were assessed and one unmapped outfall was identified. The majority of Stony Brook is located in the backyards of private properties. Some areas of the stream were over 5-feet deep. Approximately 3.0 of 3.9 miles from the Stony Brook assessment area were documented. The rest of the area of interest consisted of wetlands with either no defined stream channel or consisted of areas where the water was too deep to perform an assessment.

Black Brook contains nine culverts which were assessed, including two unmapped culverts. A total of 11 outfalls were assessed and no unmapped outfalls were identified. The majority of Black Brook is in the backyards of private properties or large areas of wetlands. Much of the area of interest is moderately or severely overgrown. A condition assessment was performed on approximately 1.2 of the 1.9 miles of Black Brook that were prioritized for assessment. The rest of the area of interest consists of large wetland areas with no defined stream channel.

Beaver Brook contains 12 culverts which were assessed, including two unmapped culverts. A total of 14 outfalls were assessed including seven unmapped outfalls. Approximately 2.0 of the 2.8 miles of stream

included in the Beaver Brook Assessment area were documented, with the remaining portion including wetlands with no defined stream channel or severely overgrown to the point where they were inaccessible.

River Meadow Brook contains 17 culverts which were assessed, including three unmapped culverts. A total of 23 outfalls were assessed with one unmapped outfall identified. Approximately 2.7 of the 4.6 miles of stream within the River Meadow Brook assessment area were documented. The portion of the brook that was not inspected consisted of a large adjacent wetlands area that was too deep and had too much sediment to access.

Cold Springs Brook contains two culverts which were assessed, and one outfall which was identified. Of the total 0.59 miles of stream prioritized for assessment, 0.47 miles were inspected. The uninspected area could not be accessed due to Route 3. During the investigation, moderate overgrowth was encountered along the length of the brook, as well as many fallen trees ranging from <6" to 12" in diameter. At one point in the stream, a pile of sediment and other debris was observed acting as a dam and causing approximately 3-feet of ponding.

Chelmsford, MA
Stormwater Capital Improvement Plan
Stream Improvements - Cost Assessment for Recommended Improvements

Stream	Cost Assessment				Notes
	Quantity	Unit Cost	Repair Cost	Total Cost	
Deep Brook (Dunstable Rd to Stonehill Rd)					
<i>Sediment Removal (cy)</i>	345	\$125	\$43,125	\$121,875	assume removal of 16" of sediment for 700 feet - 10 feet wide 8 fallen trees <6", 25 trees 6"-12", 16 trees 12"-24" (entire section) 900' moderate overgrowth, 150' severe overgrowth
<i>Debris Removal (trees, leaves, etc) (lf)</i>	2100	\$25	\$52,500		
<i>Cut Back Overgrowth (lf)</i>	1050	\$25	\$26,250		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Deep Brook (Stonehill Rd to Ledge Rd)					
<i>Sediment Removal (cy)</i>	120	\$125	\$15,000	\$57,500	assume removal of 13" of sediment for 300 feet - 10 feet wide 10 fallen trees <6", 15 trees 6"-12", 2 trees 12"-24" 550' moderate overgrowth
<i>Debris Removal (trees, leaves, etc) (lf)</i>	1150	\$25	\$28,750		
<i>Cut Back Overgrowth (lf)</i>	550	\$25	\$13,750		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Deep Brook (Ledge Rd to Dunstable Rd)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0	\$76,250	25 fallen trees <6", 12 trees 6"-12", 3 trees 12"-24", 2 tires (entire section from Ledge Rd to Swains Pond) 800' moderate overgrowth, 250' severe overgrowth
<i>Debris Removal (trees, leaves, etc) (lf)</i>	2000	\$25	\$50,000		
<i>Cut Back Overgrowth (lf)</i>	1050	\$25	\$26,250		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Deep Brook (Dunstable Rd to far side of Dunshire Dr)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0	\$18,150	1 fallen tree <6", 1 tree 12"-24", 1 tree 24"-36" 100' severe overgrowth .333 cy per lf - if rebuilding masonry walls, 50 ft long
<i>Debris Removal (trees, leaves, etc) (lf)</i>	150	\$25	\$3,750		
<i>Cut Back Overgrowth (lf)</i>	100	\$25	\$2,500		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	17	\$700	\$11,900		
Deep Brook (Dunshire Dr to Tyngsborough Rd)					
<i>Sediment Removal (cy)</i>	360	\$125	\$45,000	\$83,750	assume removal of 12" of sediment for 650 feet - 15 feet wide 1 fallen tree <6", 2 trees 6"-12", garbage debris along stream **possibly decrease length 700' moderate overgrowth
<i>Debris Removal (trees, leaves, etc) (lf)</i>	850	\$25	\$21,250		
<i>Cut Back Overgrowth (lf)</i>	700	\$25	\$17,500		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Stony Brook (Westford/Chelmsford Line to School St)					
<i>Sediment Removal (cy)</i>	230	\$125	\$28,750	\$41,250	assume removal of 11" of sediment for 450 feet - 15 feet wide 1 fallen tree <6", 3 trees 6"-12", 1 tree 12"-24"
<i>Debris Removal (trees, leaves, etc) (lf)</i>	500	\$25	\$12,500		
<i>Cut Back Overgrowth (lf)</i>	0	\$25	\$0		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Stony Brook (School St to Springfield Terminal Railroad Tracks)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0	\$45,000	8 fallen trees <6", 10 trees 6"-12", 3 trees 12"-24" (entire section)
<i>Debris Removal (trees, leaves, etc) (lf)</i>	1800	\$25	\$45,000		
<i>Cut Back Overgrowth (lf)</i>	0	\$25	\$0		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Stony Brook (Springfield Terminal Railroad Tracks to Meadowbrook Rd)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0	\$110,000	9 fallen trees <6", 14 trees 6"-12", 8 trees 12"-24" (entire section) 2200' moderate overgrowth
<i>Debris Removal (trees, leaves, etc) (lf)</i>	2200	\$25	\$55,000		
<i>Cut Back Overgrowth (lf)</i>	2200	\$25	\$55,000		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Stony Brook (Meadowbrook Rd to Mallory St)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0	\$92,500	Section from Mallory St to Route 3 not assessed, wetlands, deep water + sediment. Not included in cost 9 fallen trees <6", 6 trees 6"-12", 6 trees 12"-24" 1600' moderate overgrowth
<i>Debris Removal (trees, leaves, etc) (lf)</i>	2100	\$25	\$52,500		
<i>Cut Back Overgrowth (lf)</i>	1600	\$25	\$40,000		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Stony Brook (Wetlands North of Jordan Street to Graniteville Rd)					
<i>Sediment Removal (cy)</i>	28	\$125	\$3,500	\$27,250	Majority of section is wetlands, not assessed and not included in cost assume removal of 9" of sediment for 100 feet - 10 feet wide 6 fallen trees <6", 6 trees 6"-12", 1 tree 12"-24" 450' moderate overgrowth
<i>Debris Removal (trees, leaves, etc) (lf)</i>	500	\$25	\$12,500		
<i>Cut Back Overgrowth (lf)</i>	450	\$25	\$11,250		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Stony Brook (Graniteville Rd to Windsor St)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0	\$37,500	11 fallen trees <6", 12 trees 6"-12", 2 trees 12"-24" 400' moderate overgrowth
<i>Debris Removal (trees, leaves, etc) (lf)</i>	1100	\$25	\$27,500		
<i>Cut Back Overgrowth (lf)</i>	400	\$25	\$10,000		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		

Stream	Cost Assessment				Notes
	Quantity	Unit Cost	Repair Cost	Total Cost	
Stony Brook (Windsor St to Clydesdale Rd)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0		
<i>Debris Removal (trees, leaves, etc) (lf)</i>	1100	\$25	\$27,500	\$27,500	2 fallen trees <6", 6 trees 6"-12", 4 trees 12"-24"
<i>Cut Back Overgrowth (lf)</i>	0	\$25	\$0		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Stony Brook (Clydesdale Rd to Longspur Rd)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0		
<i>Debris Removal (trees, leaves, etc) (lf)</i>	250	\$25	\$6,250	\$18,750	Entire section not assessed due to resident complaint. 2 fallen trees <6" recorded
<i>Cut Back Overgrowth (lf)</i>	500	\$25	\$12,500		500' moderate overgrowth
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Stony Brook (Longspur Rd to Old Westford Road)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0		
<i>Debris Removal (trees, leaves, etc) (lf)</i>	1300	\$25	\$32,500	\$61,250	19 fallen trees <6", 7 trees 6"-12", 4 trees 12"-24"
<i>Cut Back Overgrowth (lf)</i>	1150	\$25	\$28,750		1000' moderate overgrowth, 150' severe overgrowth
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Stony Brook (Old Westford Road to Northeast of Thomas Drive)					
<i>Sediment Removal (cy)</i>	27	\$125	\$3,375		assume removal of 11" of sediment for 100 feet - 8 feet wide
<i>Debris Removal (trees, leaves, etc) (lf)</i>	10	\$25	\$250	\$14,875	Old metal guardrail in stream
<i>Cut Back Overgrowth (lf)</i>	450	\$25	\$11,250		200' moderate overgrowth, 250' severe overgrowth
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Black Brook (North Rd to Wiggan St)					
<i>Sediment Removal (cy)</i>	79	\$125	\$9,875		assume removal of 17" of sediment for 150 feet - 10 feet wide
<i>Debris Removal (trees, leaves, etc) (lf)</i>	250	\$25	\$6,250	\$41,125	4 fallen trees <6", 2 trees 6"-12"
<i>Cut Back Overgrowth (lf)</i>	1000	\$25	\$25,000		500' moderate overgrowth, 500' severe overgrowth
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Black Brook (Wiggan St to East Sheppard Ln)					
<i>Sediment Removal (cy)</i>	27	\$125	\$3,375		sediment depth ranges from 0 to 36 inches in spots.
<i>Debris Removal (trees, leaves, etc) (lf)</i>	900	\$25	\$22,500	\$48,375	13 fallen tree <6"-36" (entire section)
<i>Cut Back Overgrowth (lf)</i>	900	\$25	\$22,500		150' severe overgrowth, 750' moderate overgrowth (entire section)
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Black Brook (East Sheppard Ln to Erlin Rd)					
<i>Sediment Removal (cy)</i>	20	\$125	\$2,500		assume removal of 16" of sediment for 50 feet - 8 feet wide
<i>Debris Removal (trees, leaves, etc) (lf)</i>	10	\$25	\$250	\$2,750	1 fallen tree 6-12"
<i>Cut Back Overgrowth (lf)</i>	0	\$25	\$0		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Black Brook (Erlin Rd to North Rd)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0		
<i>Debris Removal (trees, leaves, etc) (lf)</i>	350	\$25	\$8,750	\$17,500	1 fallen tree <6", 3 trees <6"-12"
<i>Cut Back Overgrowth (lf)</i>	350	\$25	\$8,750		350' moderate overgrowth
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Black Brook (North Rd to Manwell Rd)					
<i>Sediment Removal (cy)</i>	4	\$125	\$500		assume removal of 4" of sediment for 50 feet - 6 feet wide
<i>Debris Removal (trees, leaves, etc) (lf)</i>	400	\$25	\$10,000	\$21,750	3 fallen trees <6", 3 trees 6"-12", metal posts and wooden board in stream
<i>Cut Back Overgrowth (lf)</i>	450	\$25	\$11,250		450' moderate overgrowth
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Black Brook (Manwell Rd to Claude Rd)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0		
<i>Debris Removal (trees, leaves, etc) (lf)</i>	25	\$25	\$625	\$6,875	1 fallen tree <6", some garbage in stream
<i>Cut Back Overgrowth (lf)</i>	250	\$25	\$6,250		100' severe overgrowth, 150' moderate overgrowth
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Black Brook (Claude Rd to Gregory Rd)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0		
<i>Debris Removal (trees, leaves, etc) (lf)</i>	50	\$25	\$1,250	\$6,250	2 fallen trees <6"
<i>Cut Back Overgrowth (lf)</i>	200	\$25	\$5,000		200' moderate overgrowth
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		

Stream	Cost Assessment				Notes
	Quantity	Unit Cost	Repair Cost	Total Cost	
Black Brook (Gregory Rd to Old Middlesex Turnpike)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0		
<i>Debris Removal (trees, leaves, etc) (lf)</i>	250	\$25	\$6,250	\$12,500	3 fall trees <6", 3 trees 12"-24", garbage bag of styrofoam in stream
<i>Cut Back Overgrowth (lf)</i>	250	\$25	\$6,250		100' moderate overgrowth, 150' severe overgrowth
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Black Brook (Old Middlesex Turnpike to Smith St)					
<i>Sediment Removal (cy)</i>	33	\$125	\$4,125		Wetlands between Smith St and end of Balsam Dr not assessed, not included in costs
<i>Debris Removal (trees, leaves, etc) (lf)</i>	350	\$25	\$8,750	\$30,375	assume removal of 7" of sediment for 150 feet - 10 feet wide
<i>Cut Back Overgrowth (lf)</i>	700	\$25	\$17,500		5 fallen trees <6", 2 trees 6"-12", 3 trees 12"-24"
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		450' moderate overgrowth, 250' severe overgrowth
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Beaver Brook (Pinehill Rd to Galloway Rd)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0		
<i>Debris Removal (trees, leaves, etc) (lf)</i>	1000	\$25	\$25,000	\$50,000	7 fallen trees <6", 6 trees 6"-12", 1 tree 12"-24"
<i>Cut Back Overgrowth (lf)</i>	1000	\$25	\$25,000		1000' moderate overgrowth
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Beaver Brook (Galloway Rd to Canter Rd)					
<i>Sediment Removal (cy)</i>	108	\$125	\$13,500		Portion of section is wetlands and was not assessed, not included in costs
<i>Debris Removal (trees, leaves, etc) (lf)</i>	2250	\$25	\$56,250	\$112,250	assume removal of 14" of sediment for 250 feet - 10 feet wide
<i>Cut Back Overgrowth (lf)</i>	1700	\$25	\$42,500		27 fallen trees <6", 22 trees 6"-12", 5 trees 12"-24", 1 tree 24"-36", 2 tires in stream
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		1600' moderate overgrowth, 100' severe overgrowth
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Beaver Brook (Garrison Rd to Hunt Rd)					
<i>Sediment Removal (cy)</i>	54	\$125	\$6,750		Wetlands d/s of Garrison Rd not assessed, not included in costs
<i>Debris Removal (trees, leaves, etc) (lf)</i>	2600	\$25	\$65,000	\$120,500	assume removal of 7" of sediment for 250 feet - 10 feet wide
<i>Cut Back Overgrowth (lf)</i>	1950	\$25	\$48,750		40 fallen trees <6", 11 trees 6"-12", 3 trees 12"-24", 1 tire, other garbage & wooden boards in stream
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		1800' moderate overgrowth, 150' severe overgrowth
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Beaver Brook (Hunt Rd to Walking Trail)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0		
<i>Debris Removal (trees, leaves, etc) (lf)</i>	450	\$25	\$11,250	\$22,500	4 fallen trees <6", 0 trees 6"-12", 1 tree 12"-24"
<i>Cut Back Overgrowth (lf)</i>	450	\$25	\$11,250		450' moderate overgrowth
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Beaver Brook (Walking Trail to Lisa Lane)					
<i>Sediment Removal (cy)</i>	124	\$125	\$15,500		assume removal of 8" of sediment for 500 feet - 10 feet wide
<i>Debris Removal (trees, leaves, etc) (lf)</i>	1600	\$25	\$40,000	\$95,500	23 fallen trees <6", 9 trees 6"-12", 1 tree 12"-24"
<i>Cut Back Overgrowth (lf)</i>	1600	\$25	\$40,000		1550' moderate overgrowth, 50' severe overgrowth
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Beaver Brook (Lisa Ln to Mansfield Dr)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0		
<i>Debris Removal (trees, leaves, etc) (lf)</i>	200	\$25	\$5,000	\$13,750	2 fallen trees <6", 1 tree 6"-12"
<i>Cut Back Overgrowth (lf)</i>	350	\$25	\$8,750		350' moderate overgrowth
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Beaver Brook (Mansfield Dr to High St)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0		Part of section is wetlands, not assessed, not included in costs
<i>Debris Removal (trees, leaves, etc) (lf)</i>	800	\$25	\$20,000	\$51,250	10 fallen trees <6", 11 trees 6"-12", 4 trees 12"-24"
<i>Cut Back Overgrowth (lf)</i>	1250	\$25	\$31,250		650' moderate overgrowth, 600' severe overgrowth
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Beaver Brook (High St to Southeast of Littleton Rd)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0		Majority of section is wetlands, not assessed and not included in cost
<i>Debris Removal (trees, leaves, etc) (lf)</i>	50	\$25	\$1,250	\$3,750	2 fallen trees <6", 1 tree 6"-12"
<i>Cut Back Overgrowth (lf)</i>	100	\$25	\$2,500		100' moderate overgrowth
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
River Meadow Brook (BillERICA Road to Turnpike Road)					
<i>Sediment Removal (cy)</i>	0	\$125	\$0		Part of section is wetlands, not assessed, not included in costs
<i>Debris Removal (trees, leaves, etc) (lf)</i>	300	\$25	\$7,500	\$16,250	wetlands very mucky
<i>Cut Back Overgrowth (lf)</i>	350	\$25	\$8,750		1 fallen tree <6", 1 tree 6"-12", 1 tree 12"-24"
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		350' moderate overgrowth
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		

Stream	Cost Assessment				Notes
	Quantity	Unit Cost	Repair Cost	Total Cost	
River Meadow Brook (Turnpike Road to Warren Avenue)					This section was very deep and lots of sediment build up. Majority not assessed. Wetlands wetlands very mucky
<i>Sediment Removal (cy)</i>	0	\$125	\$0	\$0	
<i>Debris Removal (trees, leaves, etc) (lf)</i>	0	\$25	\$0		
<i>Cut Back Overgrowth (lf)</i>	0	\$25	\$0		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
River Meadow Brook (Warren Avenue to Farley Brook Split)					This section was very deep and lots of sediment build up. Majority not assessed. Wetlands wetlands very mucky
<i>Sediment Removal (cy)</i>	0	\$125	\$0	\$0	
<i>Debris Removal (trees, leaves, etc) (lf)</i>	0	\$25	\$0		
<i>Cut Back Overgrowth (lf)</i>	0	\$25	\$0		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
River Meadow Brook (Boston Road to Farley Brook Split)					6 fallen trees <6", 1 tree 12"-24" 250' moderate overgrowth
<i>Sediment Removal (cy)</i>	0	\$125	\$0	\$11,250	
<i>Debris Removal (trees, leaves, etc) (lf)</i>	200	\$25	\$5,000		
<i>Cut Back Overgrowth (lf)</i>	250	\$25	\$6,250		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
River Meadow Brook (Concord Road to Pecos Circle)					Part of section is wetlands, not assessed, not included in costs assume sediment removal 8" for 75' - 12' wide 33 fallen trees <6", 19 trees 6"-12", 4 trees 12"-24" 850' moderate overgrowth, 250' severe overgrowth
<i>Sediment Removal (cy)</i>	22	\$125	\$2,750	\$90,250	
<i>Debris Removal (trees, leaves, etc) (lf)</i>	2400	\$25	\$60,000		
<i>Cut Back Overgrowth (lf)</i>	1100	\$25	\$27,500		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
River Meadow Brook (Pecos Circle to Old Stage Road)					assume removal of 20" sediment for 25' - 12' wide 16 fallen trees <6", 5 trees 6"-12", 5 trees 12"-24", 1 tree 24"-36"(entire stretch) 350' moderate overgrowth
<i>Sediment Removal (cy)</i>	19	\$125	\$2,375	\$41,125	
<i>Debris Removal (trees, leaves, etc) (lf)</i>	1200	\$25	\$30,000		
<i>Cut Back Overgrowth (lf)</i>	350	\$25	\$8,750		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
River Meadow Brook (Old Stage Road to Sierra Drive)					Part of section is wetlands, not assessed, not included in costs assume removal of 16" sediment for 475' - 12' wide 14 fallen trees <6", 11 trees 6"-12", 4 trees 12"-24", 1 tree 500' moderate overgrowth, 100' severe overgrowth
<i>Sediment Removal (cy)</i>	281	\$125	\$35,125	\$75,125	
<i>Debris Removal (trees, leaves, etc) (lf)</i>	1000	\$25	\$25,000		
<i>Cut Back Overgrowth (lf)</i>	600	\$25	\$15,000		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
River Meadow Brook (Sierra Drive to Bonanza Road)					assume removal of 12" sediment for 175' - 12' wide 4 fallen trees <6", 5 trees 6"-12" (entire section)
<i>Sediment Removal (cy)</i>	78	\$125	\$9,750	\$19,750	
<i>Debris Removal (trees, leaves, etc) (lf)</i>	400	\$25	\$10,000		
<i>Cut Back Overgrowth (lf)</i>	0	\$25	\$0		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
River Meadow Brook (Bonanza Road to Dakota Drive)					assume sediment removal 15" for 25' - 12' wide 8 fallen trees <6", 3 trees 6"-12", 3 trees 12"-24" (entire section)
<i>Sediment Removal (cy)</i>	14	\$125	\$1,750	\$14,250	
<i>Debris Removal (trees, leaves, etc) (lf)</i>	500	\$25	\$12,500		
<i>Cut Back Overgrowth (lf)</i>	0	\$25	\$0		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
River Meadow Brook (Dakota Drive to Eldorado Road)					assume removal of 22" sediment for 550' - 12' wide 14 fallen trees <6", 17 trees 6"-12"(entire section)
<i>Sediment Removal (cy)</i>	448	\$125	\$56,000	\$88,500	
<i>Debris Removal (trees, leaves, etc) (lf)</i>	1300	\$25	\$32,500		
<i>Cut Back Overgrowth (lf)</i>	0	\$25	\$0		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
River Meadow Brook (Eldorado Road to Tuttle Road)					assume removal of 23" sediment for 600' - 12' wide 14 fallen trees <6", 14 trees 6"-12", 1 tree 12"-24", 1 tree (entire section) 1100' moderate overgrowth, 150' severe overgrowth
<i>Sediment Removal (cy)</i>	511	\$125	\$63,875	\$127,625	
<i>Debris Removal (trees, leaves, etc) (lf)</i>	1300	\$25	\$32,500		
<i>Cut Back Overgrowth (lf)</i>	1250	\$25	\$31,250		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
River Meadow Brook (South of Tuttle Road)					Majority of section is wetlands, not assessed and not included in cost 1 fallen tree 6"-12" 50' moderate overgrowth
<i>Sediment Removal (cy)</i>	0	\$125	\$0	\$1,500	
<i>Debris Removal (trees, leaves, etc) (lf)</i>	10	\$25	\$250		
<i>Cut Back Overgrowth (lf)</i>	50	\$25	\$1,250		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		

Stream	Cost Assessment				Notes
	Quantity	Unit Cost	Repair Cost	Total Cost	
River Meadow Brook (West of Sandra Drive)					
<i>Sediment Removal (cy)</i>	66	\$125	\$8,250	\$20,750	assume removal of 17" sediment for 125' - 10' wide 1 fallen tree <6", 1 tree 6"-12" (entire section) moderate overgrowth, entire section
<i>Debris Removal (trees, leaves, etc) (lf)</i>	250	\$25	\$6,250		
<i>Cut Back Overgrowth (lf)</i>	250	\$25	\$6,250		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
River Meadow Brook (Sandra Drive to Donna Road)					
<i>Sediment Removal (cy)</i>	162	\$125	\$20,250	\$26,500	assume removal of 21" sediment for 250' - 10' wide 250' moderate overgrowth
<i>Debris Removal (trees, leaves, etc) (lf)</i>	0	\$25	\$0		
<i>Cut Back Overgrowth (lf)</i>	250	\$25	\$6,250		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
River Meadow Brook (Donna Road to Temi Road)					
<i>Sediment Removal (cy)</i>	130	\$125	\$16,250	\$31,250	assume removal of 14" sediment for 300' - 10' wide 1 fallen tree <6", 1 fallen tree 6"-12", trash can in stream ** may need to decrease 300' severe overgrowth
<i>Debris Removal (trees, leaves, etc) (lf)</i>	300	\$25	\$7,500		
<i>Cut Back Overgrowth (lf)</i>	300	\$25	\$7,500		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
River Meadow Brook (Temi Road to Janet Road)					
<i>Sediment Removal (cy)</i>	181	\$125	\$22,625	\$33,875	assume removal of 18" sediment for 325' - 10' wide 4 fallen trees <6", 3 trees 6"-12", trash can in stream 50' severe overgrowth
<i>Debris Removal (trees, leaves, etc) (lf)</i>	400	\$25	\$10,000		
<i>Cut Back Overgrowth (lf)</i>	50	\$25	\$1,250		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
River Meadow Brook (Farley Brook to South of Mill road)					
<i>Sediment Removal (cy)</i>	310	\$125	\$38,750	\$39,000	Sediment was 16" deep in sections. 5' wide, 3000 feet long. Average sediment depth is assumed 3-9" 1 6-12" fallen Tree River was very deep most of the way, could not walk it.
<i>Debris Removal (trees, leaves, etc) (lf)</i>	10	\$25	\$250		
<i>Cut Back Overgrowth (lf)</i>	0	\$25	\$0		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
River Meadow Brook (Section East of Janet Road)					
<i>Sediment Removal (cy)</i>	104	\$125	\$13,000	\$13,250	assume removal 30" sediment for 75' - 15' wide 1 fallen tree 6"-12". Very steep slope, hard to access
<i>Debris Removal (trees, leaves, etc) (lf)</i>	10	\$25	\$250		
<i>Cut Back Overgrowth (lf)</i>	0	\$25	\$0		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
Cold Springs Brook (Richardson Road East to Route 3)					
<i>Sediment Removal (cy)</i>	30	\$125	\$3,750	\$76,250	Sediment dam, and average of 3 inches for 1000 feet 13 trees 6"-12" and 10 trees <6", 2 tires, 1 bag of trash, and a dam blocking flow. Moderate overgrowth the entire way
<i>Debris Removal (trees, leaves, etc) (lf)</i>	1700	\$25	\$42,500		
<i>Cut Back Overgrowth (lf)</i>	1200	\$25	\$30,000		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		
East Chelmsford Water District					
<i>Sediment Removal (cy)</i>	0	\$125	\$0	\$0	
<i>Debris Removal (trees, leaves, etc) (lf)</i>	0	\$25	\$0		
<i>Cut Back Overgrowth (lf)</i>	0	\$25	\$0		
<i>Repair Retaining Walls (sf)</i>	0	\$30	\$0		
<i>Rebuild Retaining Walls (cy)</i>	0	\$700	\$0		

Deep Brook Total Cost:	\$357,525
Stony Brook Total Cost:	\$475,875
Black Brook Total Cost:	\$187,500
Beaver Brook Total Cost:	\$469,500
River Meadow Brook Total Cost:	\$650,250
Cold Springs Brook Total Cost:	\$76,250

Total Construction/Cleaning Cost:	\$2,216,900
Design/Permitting (Assume 20%)	\$443,380
Construction Oversight (Assume 5%)	\$110,845
Environmental Controls (10%)	\$221,690
Total Project Cost	\$2,992,815
20% Contingency	\$598,563
Total Project Cost (w/ 20% Contingency)	\$3,591,378

Sediment Removal	3,915 cy	\$489,375
Debris Removal	39,925 lf	\$998,125
Cut Back Overgrowth	28,700 lf	\$717,500
Rebuild Retaining Wall	17 cy	\$11,900

Project Type	Projects
Sediment Removal	28
Debris Removal	48
Cut Back Overgrowth	40