

December 20, 2018

Mr. Nickie D. Mills
City of Staunton
Department of Community Development
Engineering Division
P.O. Box 58
Staunton, VA 24402

RE: Gypsy Hill Park Stream Restoration – Conceptual Design Submittal

Mr. Mills:

Timmons Group is pleased to submit the conceptual design package for the Gypsy Hill Park Stream Restoration Project along Peyton Branch. We have included the conceptual layout, cost estimate, drainage area map, typical stream structure photographs and an existing tree inventory, along with a report detailing the anticipated nutrient removal based on Chesapeake Bay TMDL Special Conditions Guidance for urban stream restoration.

Please note that the pollutant load reductions were calculated using only Protocols 1 & 2, as defined on Page 32 of the [Recommendation of the Expert Panel](#) guidance document. The calculations do not account for the potential creation of wetlands (Protocol 3). Protocol 3 requires a wetlands-to-watershed area ratio of one (1) percent to achieve full credit. Based on the conceptual design, the Gypsy Hill project has a wetlands-to-watershed ratio of 0.038 percent. With this percentage, any pollutant and sediment removal calculated using Protocol 3 would be negligible compared to those values calculated using Protocols 1 and 2.

However, the project would be able to receive additional nutrient credits for land use change by converting the existing pervious area into wetlands and also for providing a forested buffer to filter sheet flow draining directly to Peyton Branch. The design would strive to maximize the wetlands areas to take advantage of both nutrient crediting options.

The preliminary pollutant load reduction calculations show a removal rate of 67.38 lbs/yr of phosphorus, based solely on Protocols 1 & 2, with an estimated construction cost of \$1,058,748. This results in a value of \$15,713 per lbs/yr of phosphorus removal, meeting the minimum SLAF grant requirement of \$50,000 per lbs/yr of phosphorus removal. Please note that the cost of any boardwalks, trails or educational signage has not been included in this estimate as these items do not qualify for SLAF grant assistance. Engineering design fees, which do qualify for SLAF grant assistance, have also been excluded from the cost estimate.

The stream restoration conceptual design assumes the implementation of a Priority 2 restoration, creating a new flood bench at a lower elevation than the historic floodplain. However, the proposed streambed will likely be raised above its existing elevation in some areas to assist in balancing earthwork and to provide some cover for existing utility crossings.

This segment of Peyton Branch lies within a FEMA-mapped Zone AE floodplain. A HEC-RAS model will be required for this project to support the issuance of a No-Rise Certificate. The proposed design will offset the increase in streambed elevations by providing bankfull benches along the entire length of the restored channel. Additionally, there are several proposed wetlands and large-scale flood benches in

select areas that will provide attenuation during significant rainfall events and likely reduce the 100-year water surface elevations.

The conceptual layout strives to achieve several project objectives including the reduction of bank erosion, flood attenuation, preservation of historically significant or memorial trees, creation of public educational outreach opportunities, uplift of aquatic habitat and contribution to the park's current aesthetics.

The design would seek to reduce environmental impacts by repurposing natural materials that are currently onsite. The trunks of any trees removed would be utilized to construct log sills or log j-hooks. The root wads would be placed in the oxbow ponds and rearing area to provide cover for aquatic life from predatory birds. The branches of any removed trees would be converted to brush toe to protect the banks of outer meander bends from increased shear stress during high-flow events. Additionally, any gravel, cobble or small boulders onsite will be reclaimed to serve as streambed substrate or construction materials for rock sills, rock j-hooks and cross vanes.

If you have any questions or require additional information, please contact Alex Lucado at 804-200-6482 or via email at Alex.Lucado@timmons.com.

Sincerely,



Alex Lucado, PE, CFM
Stormwater Services Project Engineer
Timmons Group

Attachments:

Attachment 1: Pollutant Load Reduction Summary

Attachment 2: Drainage Area Map

Attachment 3: Conceptual Layout, Typical Structures & Features and Existing Tree Inventory

Attachment 4: Engineer's Opinion of Probable Construction Costs

Attachment 1:
Pollutant Load Reduction Summary

Path: L:\20238847-Master_Contract_Staunton_DPW\38847_002-Gypsy_Hill_Stream\GISField Mapping\38847_002-BANCS Assessment.mxd



Legend

Erosion Rate Potential

- Very Low (0 - 0.02)
- Low (0.02 - 0.07)
- Moderate (0.07 - 0.14)
- High (0.14 - 0.17)
- Extreme (≥ 0.17)
- Not Rated
- Peyton Branch
- Tributary to Peyton Branch



CITY OF STAUNTON GYPSY HILL PARK PEYTON BRANCH STREAM RESTORATION BANCS ASSESSMENT MAP



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0 50 100 200 300 400 500 Feet

Worksheet 3-13. Summary form of annual streambank erosion estimates for various study reaches.

Stream: Peyton Branch					Location: Gypsy Hill Park					
Graph Used:					Total Stream Length (ft): 2484				Date: 11/8/2018	
Observers: ACL, KEA					Valley Type:				Stream Type:	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
	Bank	Start Station (ft)	End Station (ft)	BEHI rating (Worksheet 3-11) (adjective)	NBS rating (Worksheet 3-12) (adjective)	Bank erosion rate (Figure 3-9 or 3-10) (ft/yr)	Length of bank (ft)	Study bank height (ft)	Erosion subtotal $[(4) \times (5) \times (6)]$ (ft ³ /yr)	Erosion Rate (tons/yr/ft) $\{[(7)/27] \times 1.3 / (5)\}$
1.	LB	1000	1200	Low	Very Low	0.01710	200	5.2	17.78	0.00428
2.	LB	1290	1375	Moderate	Low	0.15287	85	3.2	41.58	0.02355
3.	LB	1700	1725	Low	Low	0.03566	25	1.9	1.69	0.00326
4.	LB	1725	1790	Extreme	Moderate	1.07417	65	2.3	157.10	0.11637
5.	LB	1790	1845	Low	Low	0.03566	55	1.6	3.14	0.00275
6.	LB	1845	1890	Extreme	Very High	7.02692	45	2.9	917.01	0.98117
7.	LB	1890	2000	Moderate	Low	0.15287	110	1.7	28.59	0.01251
8.	LB	2000	2020	Moderate	Moderate	0.25348	20	2.1	10.65	0.02563
9.	LB	2020	2055	Moderate	Moderate	0.25348	35	2.3	19.96	0.02746
10.	LB	2055	2130	Moderate	Low	0.15287	75	1.9	21.78	0.01398
10.	LB	2130	2240	Moderate	Very High	0.69693	110	2.9	222.32	0.09731
11.	LB	2240	2345	Low	Low	0.03566	105	1.5	5.62	0.00258
12.	LB	2345	2360	High	Very High	0.87205	15	2.0	26.16	0.08398
13.	LB	2360	2430	Low	Low	0.03566	70	1.4	3.49	0.00240
14.	LB	2430	2495	High	Moderate	0.37957	65	1.8	44.41	0.03290
15.	LB	2495	2575	Low	Low	0.03566	80	1.4	3.99	0.00240
16.	LB	2575	2750	Low	Low	0.03566	175	3.8	23.71	0.00652
17.	LB	2750	2950	Low	Low	0.03566	200	5.7	40.65	0.00979
18.	LB	2950	3125	Low	Moderate	0.07435	175	5.2	67.66	0.01862
19.	LB	3190	3250	High	Moderate	0.37957	60	1.9	43.27	0.03472
20.	LB	3250	3400	Low	Low	0.03566	150	3.0	16.05	0.00515
21.	RB	1000	1150	Moderate	Very Low	0.09219	150	3.3	45.64	0.01465
22.	RB	1150	1200	Moderate	Very Low	0.09219	50	4.3	19.82	0.01909
23.	RB	1290	1375	Low	Low	0.03566	85	3.8	11.37	0.00644
24.	RB	1700	1725	Moderate	Low	0.15287	25	1.5	5.73	0.01104
25.	RB	1725	1780	Low	Low	0.03566	55	1.4	2.75	0.00240
26.	RB	1780	1795	Moderate	High	0.42031	15	2.3	14.50	0.04655
27.	RB	1795	1845	Moderate	Low	0.15287	50	1.5	11.47	0.01104

Worksheet 3-13. Summary form of annual streambank erosion estimates for various study reaches.

Stream: Peyton Branch					Location: Gypsy Hill Park					
Graph Used:				Total Stream Length (ft): 2484				Date: 11/8/2018		
Observers: ACL, KEA				Valley Type:				Stream Type:		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
	Bank	Start Station (ft)	End Station (ft)	BEHI rating (Worksheet 3-11) (adjective)	NBS rating (Worksheet 3-12) (adjective)	Bank erosion rate (Figure 3-9 or 3-10) (ft/yr)	Length of bank (ft)	Study bank height (ft)	Erosion subtotal $[(4) \times (5) \times (6)]$ (ft ³ /yr)	Erosion Rate (tons/yr/ft) $\{[(7)/27] \times 1.3 / (5)\}$
29.	RB	1890	2000	High	Moderate	0.37957	110	1.8	75.16	0.03290
30.	RB	2000	2020	Moderate	Low	0.15287	20	1.6	4.89	0.01178
31.	RB	2020	2130	High	Moderate	0.37957	110	1.5	62.63	0.02741
32.	RB	2130	2240	Moderate	Very High	0.69693	110	2.0	153.32	0.06711
33.	RB	2240	2360	Moderate	Low	0.15287	120	1.6	29.35	0.01178
33.	RB	2360	2490	High	Low	0.25042	130	1.7	55.34	0.02050
34.	RB	2490	2575	Moderate	Moderate	0.25348	85	1.9	40.94	0.02319
34.	RB	2575	2695	Low - Moderate	Moderate	0.16392	120	1.8	35.41	0.01421
34.	RB	2695	2950	Low	Low	0.03566	255	5.0	45.46	0.00858
34.	RB	2950	3125	Moderate	Low	0.15287	175	5.5	147.14	0.04048
34.	RB	3190	3270	Moderate	Low	0.15287	80	2.3	28.13	0.01693
34.	RB	3270	3400	Low	Very High	0.32332	130	4.1	172.33	0.06383
34.	RB	3400	3484	Moderate	Low	0.15287	84	3.3	42.38	0.02429
Sum erosion subtotals in Column (7) for each BEHI/NBS combination								Total Erosion (ft ³ /yr)	2720.35	
Convert erosion in ft ³ /yr to yds ³ /yr {divide Total Erosion (ft ³ /yr) by 27}								Total Erosion (yds ³ /yr)	100.75	
Convert erosion in yds ³ /yr to tons/yr {multiply Total Erosion (yds ³ /yr) by 1.3}								Total Erosion (tons/yr)	130.98	
Calculate erosion per unit length of channel {divide Total Erosion (tons/yr) by total length of stream (ft) surveyed}								Unit Erosion Rate (tons/yr/ft)	0.0527	

Worksheet 3-13. Summary form of annual streambank erosion estimates for various study reaches.

Stream: Tributary to Peyton Branch					Location: Gypsy Hill Park					
Graph Used:		Total Stream Length (ft): 501.83					Date: 11/8/2018			
Observers:		ACL, KEA		Valley Type:		Stream Type:				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
	Bank	Start Station (ft)	End Station (ft)	BEHI rating (Worksheet 3-11) (adjective)	NBS rating (Worksheet 3-12) (adjective)	Bank erosion rate (Figure 3-9 or 3-10) (ft/yr)	Length of bank (ft)	Study bank height (ft)	Erosion subtotal [(4)×(5)×(6)] (ft ³ /yr)	Erosion Rate (tons/yr/ft) {[(7)/27] × 1.3 / (5)}
1.	LB	1000	1075	Moderate	Very High	0.69693	75	3.5	182.94	0.11745
2.	LB	1075	1165	High	Low	0.25042	90	3.8	85.64	0.04582
3.	LB	1165	1262	Low	Low	0.03566	97	0.7	2.42	0.00120
4.	LB	1262	1350	Moderate	Low	0.15287	88	6.5	87.44	0.04784
5.	RB	1000	1075	Low	Very High	0.32332	75	4.3	104.27	0.06694
6.	RB	1075	1240	Low	Low	0.03566	165	0.6	3.53	0.00103
7.	RB	1240	1350	Low - Moderate	Low	0.09426	110	3.3	34.22	0.01498
Sum erosion subtotals in Column (7) for each BEHI/NBS combination								Total Erosion (ft ³ /yr)	500.47	
Convert erosion in ft ³ /yr to yds ³ /yr {divide Total Erosion (ft ³ /yr) by 27}								Total Erosion (yds ³ /yr)	18.54	
Convert erosion in yds ³ /yr to tons/yr {multiply Total Erosion (yds ³ /yr) by 1.3}								Total Erosion (tons/yr)	24.10	
Calculate erosion per unit length of channel {divide Total Erosion (tons/yr) by total length of stream (ft) surveyed}								Unit Erosion Rate (tons/yr/ft)	0.0480	

Gypsy Hill Park Stream Restoration

Calculated Pollutant Load Reductions

1. Credit for Streambank Restoration per Protocol 1

Peyton Branch					
Station Range of Existing Bank			Length of bank (ft)	Erosion Rate (tons/yr/ft)	Sediment Subtotal (ton/yr)
Main Reach LB	1290	1375	85	0.02355	2.00
Main Reach LB	1700	1725	25	0.00326	0.08
Main Reach LB	1725	1790	65	0.11637	7.56
Main Reach LB	1790	1845	55	0.00275	0.15
Main Reach LB	1845	1890	45	0.98117	44.15
Main Reach LB	1890	2000	110	0.01251	1.38
Main Reach LB	2000	2020	20	0.02563	0.51
Main Reach LB	2020	2055	35	0.02746	0.96
Main Reach LB	2055	2130	75	0.01398	1.05
Main Reach LB	2130	2240	110	0.09731	10.70
Main Reach LB	2240	2345	105	0.00258	0.27
Main Reach LB	2345	2360	15	0.08398	1.26
Main Reach LB	2360	2430	70	0.00240	0.17
Main Reach LB	2430	2495	65	0.03290	2.14
Main Reach LB	2495	2575	80	0.00240	0.19
Main Reach LB	2575	2750	175	0.00652	1.14
Main Reach LB	2750	2950	200	0.00979	1.96
Main Reach LB	3225	3250	25	0.03472	0.87
Main Reach LB	3250	3400	150	0.00515	0.77
Main Reach RB	1290	1375	85	0.00644	0.55
Main Reach RB	1700	1725	25	0.01104	0.28
Main Reach RB	1725	1780	55	0.00240	0.13
Main Reach RB	1780	1795	15	0.04655	0.70
Main Reach RB	1795	1845	50	0.01104	0.55
Main Reach RB	1890	2000	110	0.03290	3.62
Main Reach RB	2000	2020	20	0.01178	0.24
Main Reach RB	2020	2130	110	0.02741	3.02
Main Reach RB	2130	2240	110	0.06711	7.38
Main Reach RB	2240	2360	120	0.01178	1.41
Main Reach RB	2360	2490	130	0.02050	2.66
Main Reach RB	2490	2575	85	0.02319	1.97
Main Reach RB	2575	2695	120	0.01421	1.70
Main Reach RB	2575	2950	375	0.00858	3.22
Main Reach RB	3225	3270	45	0.01693	0.76
Main Reach RB	3270	3400	130	0.06383	8.30

Station Range of Existing Bank			Length of bank (ft)	Erosion Rate (tons/yr/ft)	Sediment Subtotal (ton/yr)
Tributary 1 LB	1000	1075	75	0.11745	8.81
Tributary 1 LB	1075	1165	90	0.04582	4.12
Tributary 1 LB	1165	1200	35	0.00120	0.04
Tributary 1 RB	1000	1075	75	0.06694	5.02
Tributary 1 RB	1075	1200	125	0.00103	0.13
Total Sediment Prevented by Proposed Bank Restoration (tons/yr) =					131.94
Average Sediment Delivery Factor (non-Coastal Plain) =					0.181
Calculated Sediment Load Reduction (50% efficiency) (lb/yr) =					23880.35
Calculated Phosphorus Reduction (50% efficiency) (lb/yr) =					69.27
Calculated Nitrogen Reduction (50% efficiency) (lb/yr) =					150.41

Note: Erosion rates determined using field observation and calculated erosion rates.

2. Credit for Streambank Restoration per Protocol 2

Step 1: Determine Total Post-Construction Stream Length with BHR = 1.0

Post-construction stream length (ft) =	2050.00
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Step 2: Determine the Dimensions of the Hyporheic Box

Channel width at median base flow depth (ft) =	6.7
Channel width plus 5 feet on each bank (ft) =	16.7
Hyporheic box depth (ft) =	5
Hyporheic cross-sectional area (ft ²) =	83.5
Hyporheic box volume (ft ³) =	171175

Step 3: Multiply the hyporheic box mass by the unit denitrification rate

Weight of soil within Hyporheic corridor (ton) =	10698.4375
Unit denitrification rate (lbs/ton/day of soil) =	1.06E-04
Calculated Nitrogen Reduction (lb/yr) =	413.92

Gypsy Hill Park Stream Restoration

Calculated Pollutant Load Reductions

3. Adjustments for Unregulated Baseline Loads

Step 1. Calculate the POC Reductions from the Proposed Stream Restoration Project:

Calculated POC Reductions	Gypsy Hill Park
Total Nitrogen (lb/yr)	564.33
Total Phosphorus (lb/yr)	69.27
Total TSS (lb/yr)	23880.35

¹From Protocols 1 & 2

Step 2. Characterize the Acres Draining to the Proposed Stream Restoration Project:

Gypsy Hill Park							
	Urban Impervious Acres	Urban Pervious Acres	Total Urban Acres	Urban Area Ratio	Forested Acres	Forested Area Ratio	Total Drainage Area
Regulated Land	551.41	1,251.23	1,802.64	0.85	230.40		
Unregulated Land	4.71	52.81	57.52	0.03	25.91		
Totals			1,860.16		256.31	0.12	2,116.47

Step 3. Calculate the Total Reductions for Regulated and Unregulated Urban Lands

Calculated POC Reductions	Gypsy Hill Park		
	Reg.	Unreg.	Forest
Total Nitrogen (lb/yr)	480.65	15.34	68.34
Total Phosphorus (lb/yr)	59.00	1.88	8.39
Total TSS (lb/yr)	20339.37	649.00	2891.97

Step 4. Account for the Total Baseline Reductions on Unregulated Land

Baseline Loading Rates		Loading Rate Reduction 1st Permit Cycle ²	Calculated Baseline Reduction	Gypsy Hill Park	
				Un-Regulated Drainage Area	Total Baseline Reduction
TN	Urban Impervious	0.08	1.6	4.71	7.54
	Urban Pervious	0.03	0.6	52.81	31.69
	Total Baseline TN Load				39.22
TP	Urban Impervious	0.01	0.2	4.71	0.94
	Urban Pervious	0.001	0.02	52.81	1.06
	Total Baseline TP Load				2.00
TSS	Urban Impervious	11.71	234.2	4.71	1103.08
	Urban Pervious	0.77	15.4	52.81	813.27
	Total Baseline TSS Load				1916.36

²From Table 3b in the Permit (Potomac River Basin)

Step 5: Total Reductions for Regulated and Unregulated Lands Adjusted for Baseline

Calculated POC Reductions Adjusted for Baseline	Gypsy Hill Park		
	Reg.	Unreg.	Forest
Total Nitrogen (lb/yr)	480.65	0.00	68.34
Total Phosphorus (lb/yr)	59.00	0.00	8.39
Total TSS (lb/yr)	20339.37	0.00	2891.97

Step 6: Calculate Total Reductions from Regulated and Unregulated (Non-Forested) Acres Accounting for Required Baseline Reductions

Total Calculated POC Reductions Adjusted for Baseline	Gypsy Hill Park
Total Nitrogen (lb/yr)	548.99
Total Phosphorus (lb/yr)	67.38
Total TSS (lb/yr)	23231.34

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 12:02	
Stream Bank: Left Bank	Start Station: 1000	End Station: 1200

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	8.5
Weighted Root Density:	10	Bank Angle:	8
Surface Protection:	0	Bank Material Adjustment:	-20
Stratification Adjustment:	0	Total Score:	17
		Rating:	Low

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method II	Near Bank Stress:	Very Low

EROSION RATES					
Length of Bank (ft):	200	Erosion Rate (ft ³ /yr):	17.784	Erosion Rate (ton/yr/ft):	0.004281333333333333

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 12:27	
Stream Bank: Left Bank	Start Station: 1290	End Station: 1375

BEHI SCORES				
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	2.5	
Weighted Root Density:	3	Bank Angle:	4	
Surface Protection:	1	Bank Material Adjustment:	0	
Stratification Adjustment:	0	Total Score:	21	Rating: Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method II	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	85	Erosion Rate (ft ³ /yr):	41.58064	Erosion Rate (ton/yr/ft):	0.0235533037037037

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 12:39	
Stream Bank: Left Bank	Start Station: 1700	End Station: 1725

BEHI SCORES			
Study Bank Height/ Bankfull Height:	9.5	Root Depth/ Study Bank Height:	2
Weighted Root Density:	3	Bank Angle:	3.5
Surface Protection:	1	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	19
		Rating:	Low

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method II	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	25	Erosion Rate (ft ³ /yr):	1.69385	Erosion Rate (ton/yr/ft):	0.003262222962962963

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 12:48	
Stream Bank: Left Bank	Start Station: 1725	End Station: 1790

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	8.5
Weighted Root Density:	10	Bank Angle:	8
Surface Protection:	9.5	Bank Material Adjustment:	0
Stratification Adjustment:	5	Total Score: 51	Rating: Extreme

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Moderate

EROSION RATES					
Length of Bank (ft):	65	Erosion Rate (ft ³ /yr):		Erosion Rate (ton/yr/ft):	

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 13:03	
Stream Bank: Left Bank	Start Station: 1790	End Station: 1845

BEHI SCORES			
Study Bank Height/ Bankfull Height:	8.5	Root Depth/ Study Bank Height:	0
Weighted Root Density:	2	Bank Angle:	6
Surface Protection:	2.5	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	19
		Rating:	Low

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method II	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	55	Erosion Rate (ft ³ /yr):	3.13808	Erosion Rate (ton/yr/ft):	0.00274714074074074

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 13:11	
Stream Bank: Left Bank	Start Station: 1845	End Station: 1890

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	10
Weighted Root Density:	10	Bank Angle:	8
Surface Protection:	9.5	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	48
		Rating:	Extreme

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method III	Near Bank Stress:	Very High

EROSION RATES					
Length of Bank (ft):	45	Erosion Rate (ft ³ /yr):	917.01306	Erosion Rate (ton/yr/ft):	0.981166237037037

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 13:21	
Stream Bank: Left Bank	Start Station: 1890	End Station: 2000

BEHI SCORES			
Study Bank Height/ Bankfull Height:	9	Root Depth/ Study Bank Height:	2
Weighted Root Density:	4.5	Bank Angle:	4
Surface Protection:	1	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	21
		Rating:	Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method II	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	110	Erosion Rate (ft ³ /yr):	28.58669	Erosion Rate (ton/yr/ft):	0.0125126925925926

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 13:27	
Stream Bank: Left Bank	Start Station: 2000	End Station: 2020

BEHI SCORES				
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	2	
Weighted Root Density:	5.5	Bank Angle:	6	
Surface Protection:	1	Bank Material Adjustment:	0	
Stratification Adjustment:	0	Total Score:	25	Rating: Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Moderate

EROSION RATES					
Length of Bank (ft):	20	Erosion Rate (ft ³ /yr):	10.64616	Erosion Rate (ton/yr/ft):	0.025629644444444444

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 13:34	
Stream Bank: Left Bank	Start Station: 2020	End Station: 2055

BEHI SCORES				
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	3.5	
Weighted Root Density:	5.5	Bank Angle:	6	
Surface Protection:	3.5	Bank Material Adjustment:	0	
Stratification Adjustment:	0	Total Score:	29	Rating: Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Moderate

EROSION RATES					
Length of Bank (ft):	35	Erosion Rate (ft ³ /yr):	19.96155	Erosion Rate (ton/yr/ft):	0.027460333333333333

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 13:44	
Stream Bank: Left Bank	Start Station: 2055	End Station: 2130

BEHI SCORES				
Study Bank Height/ Bankfull Height:	9.5	Root Depth/ Study Bank Height:	4	
Weighted Root Density:	7	Bank Angle:	4	
Surface Protection:	2.5	Bank Material Adjustment:	0	
Stratification Adjustment:	0	Total Score:	27	Rating: Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method II	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	75	Erosion Rate (ft ³ /yr):	21.783975	Erosion Rate (ton/yr/ft):	0.0139847740740741

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 13:46	
Stream Bank: Left Bank	Start Station: 2130	End Station: 2240

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	2.5
Weighted Root Density:	8	Bank Angle:	6
Surface Protection:	2.5	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	29
		Rating:	Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Very High

EROSION RATES					
Length of Bank (ft):	110	Erosion Rate (ft ³ /yr):	153.3246	Erosion Rate (ton/yr/ft):	0.0671117777777778

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 15:05	
Stream Bank: Left Bank	Start Station: 2240	End Station: 2345

BEHI SCORES			
Study Bank Height/ Bankfull Height:	8.5	Root Depth/ Study Bank Height:	2
Weighted Root Density:	2.5	Bank Angle:	4
Surface Protection:	1	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	18
		Rating:	Low

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	105	Erosion Rate (ft ³ /yr):	5.61645	Erosion Rate (ton/yr/ft):	0.002575444444444444

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 15:12	
Stream Bank: Left Bank	Start Station: 2345	End Station: 2360

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	4
Weighted Root Density:	7	Bank Angle:	8
Surface Protection:	5	Bank Material Adjustment:	0
Stratification Adjustment:	5	Total Score:	39
		Rating:	High

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Very High

EROSION RATES					
Length of Bank (ft):	15	Erosion Rate (ft ³ /yr):	26.1615	Erosion Rate (ton/yr/ft):	0.0839751851851852

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 15:22	
Stream Bank: Left Bank	Start Station: 2360	End Station: 2430

BEHI SCORES			
Study Bank Height/ Bankfull Height:	8.5	Root Depth/ Study Bank Height:	0
Weighted Root Density:	2	Bank Angle:	3
Surface Protection:	0	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	14
		Rating:	Low

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	70	Erosion Rate (ft ³ /yr):	4.24354	Erosion Rate (ton/yr/ft):	0.00240374814814815

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 15:25	
Stream Bank: Left Bank	Start Station: 2430	End Station: 2495

BEHI SCORES			
Study Bank Height/ Bankfull Height:	9.5	Root Depth/ Study Bank Height:	5
Weighted Root Density:	8.5	Bank Angle:	4
Surface Protection:	2.5	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	30
		Rating:	High

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method V	Near Bank Stress:	Moderate

EROSION RATES					
Length of Bank (ft):	65	Erosion Rate (ft ³ /yr):	44.40969	Erosion Rate (ton/yr/ft):	0.03289606666666667

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 15:34	
Stream Bank: Left Bank	Start Station: 2495	End Station: 2575

BEHI SCORES			
Study Bank Height/ Bankfull Height:	8.5	Root Depth/ Study Bank Height:	0
Weighted Root Density:	1	Bank Angle:	3
Surface Protection:	0.5	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	13
		Rating:	Low

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	80	Erosion Rate (ft ³ /yr):	3.99392	Erosion Rate (ton/yr/ft):	0.00240374814814815

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 15:37	
Stream Bank: Left Bank	Start Station: 2575	End Station: 2750

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	2
Weighted Root Density:	3.5	Bank Angle:	3.5
Surface Protection:	0	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	19
		Rating:	Low

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	175	Erosion Rate (ft ³ /yr):	23.7139	Erosion Rate (ton/yr/ft):	0.00652445925925926

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 15:55	
Stream Bank: Left Bank	Start Station: 2750	End Station: 2950

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	0
Weighted Root Density:	2	Bank Angle:	5.5
Surface Protection:	1	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	19
		Rating:	Low

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	200	Erosion Rate (ft ³ /yr):	40.6524	Erosion Rate (ton/yr/ft):	0.009786688888888889

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 16:01	
Stream Bank: Left Bank	Start Station: 2950	End Station: 3125

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	0
Weighted Root Density:	2	Bank Angle:	6
Surface Protection:	0	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	18
		Rating:	Low

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method II	Near Bank Stress:	Moderate

EROSION RATES					
Length of Bank (ft):	175	Erosion Rate (ft ³ /yr):	67.6585	Erosion Rate (ton/yr/ft):	0.018615037037037

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 16:11	
Stream Bank: Left Bank	Start Station: 3190	End Station: 3250

BEHI SCORES			
Study Bank Height/ Bankfull Height:	8.5	Root Depth/ Study Bank Height:	6
Weighted Root Density:	10	Bank Angle:	6
Surface Protection:	2.5	Bank Material Adjustment:	0
Stratification Adjustment:	5	Total Score:	38
		Rating:	High

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Moderate

EROSION RATES					
Length of Bank (ft):	60	Erosion Rate (ft ³ /yr):	43.27098	Erosion Rate (ton/yr/ft):	0.0347236259259259

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 16:18	
Stream Bank: Left Bank	Start Station: 3250	End Station: 3400

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	2
Weighted Root Density:	2.5	Bank Angle:	3.5
Surface Protection:	0.5	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score: 19	Rating: Low

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	150	Erosion Rate (ft³/yr):	16.05	Erosion Rate (ton/yr/ft):	0.00515088888888889

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 12:12	
Stream Bank: Right Bank	Start Station: 1000	End Station: 1150

BEHI SCORES				
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	2.5	
Weighted Root Density:	4	Bank Angle:	3.5	
Surface Protection:	1	Bank Material Adjustment:	0	
Stratification Adjustment:	0	Total Score:	21	Rating: Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method II	Near Bank Stress:	Very Low

EROSION RATES					
Length of Bank (ft):	150	Erosion Rate (ft ³ /yr):	45.63405	Erosion Rate (ton/yr/ft):	0.01464796666666667

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 12:22	
Stream Bank: Right Bank	Start Station: 1150	End Station: 1200

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	2.5
Weighted Root Density:	3	Bank Angle:	4
Surface Protection:	2.5	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	22
		Rating:	Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method II	Near Bank Stress:	Very Low

EROSION RATES					
Length of Bank (ft):	50	Erosion Rate (ft ³ /yr):	19.82085	Erosion Rate (ton/yr/ft):	0.019086744444444444

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 12:33	
Stream Bank: Right Bank	Start Station: 1290	End Station: 1375

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	2
Weighted Root Density:	1.5	Bank Angle:	5.5
Surface Protection:	0	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score: 19	Rating: Low

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method II	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	85	Erosion Rate (ft³/yr):	11.366625	Erosion Rate (ton/yr/ft):	0.006438611111111111

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 12:44	
Stream Bank: Right Bank	Start Station: 1700	End Station: 1725

BEHI SCORES				
Study Bank Height/ Bankfull Height:	8.5	Root Depth/ Study Bank Height:	3	
Weighted Root Density:	5	Bank Angle:	6	
Surface Protection:	0	Bank Material Adjustment:	0	
Stratification Adjustment:	0	Total Score:	23	Rating: Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method II	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	25	Erosion Rate (ft³/yr):	5.732625	Erosion Rate (ton/yr/ft):	0.0110406111111111

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 12:56	
Stream Bank: Right Bank	Start Station: 1725	End Station: 1780

BEHI SCORES			
Study Bank Height/ Bankfull Height:	8.5	Root Depth/ Study Bank Height:	2
Weighted Root Density:	3.5	Bank Angle:	3.5
Surface Protection:	1	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score: 19	Rating: Low

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	55	Erosion Rate (ft³/yr):	2.74582	Erosion Rate (ton/yr/ft):	0.00240374814814815

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 13:00	
Stream Bank: Right Bank	Start Station: 1780	End Station: 1795

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	2.5
Weighted Root Density:	3.5	Bank Angle:	8
Surface Protection:	2.5	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	27
		Rating:	Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	High

EROSION RATES					
Length of Bank (ft):	15	Erosion Rate (ft ³ /yr):	14.500695	Erosion Rate (ton/yr/ft):	0.0465454407407407

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 13:08	
Stream Bank: Right Bank	Start Station: 1795	End Station: 1845

BEHI SCORES			
Study Bank Height/ Bankfull Height:	8.5	Root Depth/ Study Bank Height:	2.5
Weighted Root Density:	5	Bank Angle:	8
Surface Protection:	1	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	25
		Rating:	Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method II	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	50	Erosion Rate (ft ³ /yr):	11.46525	Erosion Rate (ton/yr/ft):	0.011040611111111111

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 13:25	
Stream Bank: Right Bank	Start Station: 1890	End Station: 2000

BEHI SCORES			
Study Bank Height/ Bankfull Height:	9.5	Root Depth/ Study Bank Height:	7
Weighted Root Density:	10	Bank Angle:	8
Surface Protection:	2.5	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	37
		Rating:	High

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method II	Near Bank Stress:	Moderate

EROSION RATES					
Length of Bank (ft):	110	Erosion Rate (ft ³ /yr):	75.15486	Erosion Rate (ton/yr/ft):	0.03289606666666667

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 13:33	
Stream Bank: Right Bank	Start Station: 2000	End Station: 2020

BEHI SCORES			
Study Bank Height/ Bankfull Height:	8.5	Root Depth/ Study Bank Height:	3.5
Weighted Root Density:	5	Bank Angle:	8
Surface Protection:	1	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	26
		Rating:	Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	20	Erosion Rate (ft ³ /yr):	4.89184	Erosion Rate (ton/yr/ft):	0.0117766518518519

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 13:37	
Stream Bank: Right Bank	Start Station: 2020	End Station: 2130

BEHI SCORES			
Study Bank Height/ Bankfull Height:	8.5	Root Depth/ Study Bank Height:	6
Weighted Root Density:	7.5	Bank Angle:	8
Surface Protection:	3.5	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	34
		Rating:	High

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method V	Near Bank Stress:	Moderate

EROSION RATES					
Length of Bank (ft):	110	Erosion Rate (ft ³ /yr):	62.62905	Erosion Rate (ton/yr/ft):	0.0274133888888889

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 13:46	
Stream Bank: Right Bank	Start Station: 2130	End Station: 2240

BEHI SCORES				
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	2.5	
Weighted Root Density:	8	Bank Angle:	6	
Surface Protection:	2.5	Bank Material Adjustment:	0	
Stratification Adjustment:	0	Total Score:	29	Rating: Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Very High

EROSION RATES					
Length of Bank (ft):	110	Erosion Rate (ft ³ /yr):	153.3246	Erosion Rate (ton/yr/ft):	0.0671117777777778

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 15:09	
Stream Bank: Right Bank	Start Station: 2240	End Station: 2360

BEHI SCORES				
Study Bank Height/ Bankfull Height:	8.5	Root Depth/ Study Bank Height:	3	
Weighted Root Density:	5.5	Bank Angle:	5.5	
Surface Protection:	1	Bank Material Adjustment:	0	
Stratification Adjustment:	0	Total Score:	24	Rating: Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	120	Erosion Rate (ft ³ /yr):	29.35104	Erosion Rate (ton/yr/ft):	0.0117766518518519

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 15:15	
Stream Bank: Right Bank	Start Station: 2360	End Station: 2490

BEHI SCORES			
Study Bank Height/ Bankfull Height:	9	Root Depth/ Study Bank Height:	4
Weighted Root Density:	6.5	Bank Angle:	8
Surface Protection:	4	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	32
		Rating:	High

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	130	Erosion Rate (ft ³ /yr):	55.34282	Erosion Rate (ton/yr/ft):	0.0204973407407407

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 15:30	
Stream Bank: Right Bank	Start Station: 2490	End Station: 2575

BEHI SCORES				
Study Bank Height/ Bankfull Height:	9.5	Root Depth/ Study Bank Height:	2.5	
Weighted Root Density:	3.5	Bank Angle:	5.5	
Surface Protection:	1	Bank Material Adjustment:	0	
Stratification Adjustment:	0	Total Score:	22	Rating: Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method V	Near Bank Stress:	Moderate

EROSION RATES					
Length of Bank (ft):	85	Erosion Rate (ft ³ /yr):	40.93702	Erosion Rate (ton/yr/ft):	0.0231887259259259

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 15:45	
Stream Bank: Right Bank	Start Station: 2575	End Station: 2695

BEHI SCORES			
Study Bank Height/ Bankfull Height:	8.5	Root Depth/ Study Bank Height:	2.5
Weighted Root Density:	5	Bank Angle:	3.5
Surface Protection:	1.5	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	21
		Rating:	Low - Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Moderate

EROSION RATES					
Length of Bank (ft):	120	Erosion Rate (ft ³ /yr):	35.40672	Erosion Rate (ton/yr/ft):	0.0142064

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 15:50	
Stream Bank: Right Bank	Start Station: 2695	End Station: 2950

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	0
Weighted Root Density:	2	Bank Angle:	4.5
Surface Protection:	1	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	18
		Rating:	Low

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	255	Erosion Rate (ft ³ /yr):	45.4665	Erosion Rate (ton/yr/ft):	0.00858481481481481

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 16:05	
Stream Bank: Right Bank	Start Station: 2950	End Station: 3125

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	2
Weighted Root Density:	2	Bank Angle:	3.5
Surface Protection:	2	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	20
		Rating:	Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	175	Erosion Rate (ft ³ /yr):	147.137375	Erosion Rate (ton/yr/ft):	0.0404822407407407

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION			
Project Site: Gypsy Hill Park		Project Location: Staunton, Virginia	
Reach: Main Reach		Date/Time: Nov 6, 2018 16:14	
Stream Bank: Right Bank		Start Station: 3190	End Station: 3270

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	2.5
Weighted Root Density:	5	Bank Angle:	2.5
Surface Protection:	1	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score: 21	Rating: Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	80	Erosion Rate (ft ³ /yr):	28.12808	Erosion Rate (ton/yr/ft):	0.016928937037037

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 16:21	
Stream Bank: Right Bank	Start Station: 3270	End Station: 3400

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	0
Weighted Root Density:	3	Bank Angle:	5.5
Surface Protection:	0.5	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	19
		Rating:	Low

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Very High

EROSION RATES					
Length of Bank (ft):	130	Erosion Rate (ft ³ /yr):	172.32956	Erosion Rate (ton/yr/ft):	0.063825762962963

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION			
Project Site: Gypsy Hill Park		Project Location: Staunton, Virginia	
Reach: Main Reach		Date/Time: Nov 6, 2018 16:25	
Stream Bank: Right Bank		Start Station: 3400	End Station: 3484.17

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	2.5
Weighted Root Density:	2.5	Bank Angle:	3.5
Surface Protection:	2	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	21
		Rating:	Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	84.17000000000001	Erosion Rate (ft ³ /yr):	42.46132407	Erosion Rate (ton/yr/ft):	0.02428934444444444

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Tributary	Date/Time: Nov 6, 2018 16:38	
Stream Bank: Left Bank	Start Station: 1000	End Station: 1075

BEHI SCORES				
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	2	
Weighted Root Density:	3.5	Bank Angle:	2.5	
Surface Protection:	2	Bank Material Adjustment:	0	
Stratification Adjustment:	0	Total Score:	20	Rating: Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Very High

EROSION RATES					
Length of Bank (ft):	75	Erosion Rate (ft ³ /yr):	182.94	Erosion Rate (ton/yr/ft):	0.1174456111111111

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Tributary	Date/Time: Nov 6, 2018 16:43	
Stream Bank: Left Bank	Start Station: 1075	End Station: 1165

BEHI SCORES				
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	3	
Weighted Root Density:	5	Bank Angle:	5	
Surface Protection:	7	Bank Material Adjustment:	0	
Stratification Adjustment:	0	Total Score:	30	Rating: High

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	90	Erosion Rate (ft ³ /yr):	85.64	Erosion Rate (ton/yr/ft):	0.0458175851851852

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Main Reach	Date/Time: Nov 6, 2018 16:51	
Stream Bank: Left Bank	Start Station: 1165	End Station: 1262

BEHI SCORES			
Study Bank Height/ Bankfull Height:	7	Root Depth/ Study Bank Height:	0
Weighted Root Density:	2	Bank Angle:	3.5
Surface Protection:	1	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	14
		Rating:	Low

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	97	Erosion Rate (ft ³ /yr):	2.42	Erosion Rate (ton/yr/ft):	0.00120187407407407

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Tributary	Date/Time: Nov 6, 2018 16:57	
Stream Bank: Left Bank	Start Station: 1262	End Station: 1350

BEHI SCORES				
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	2.5	
Weighted Root Density:	3.5	Bank Angle:	5.5	
Surface Protection:	2	Bank Material Adjustment:	0	
Stratification Adjustment:	0	Total Score:	24	Rating: Moderate

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	88	Erosion Rate (ft³/yr):	87.44	Erosion Rate (ton/yr/ft):	0.0478426481481482

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Tributary	Date/Time: Nov 6, 2018 16:41	
Stream Bank: Right Bank	Start Station: 1000	End Station: 1075

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	0
Weighted Root Density:	1	Bank Angle:	5
Surface Protection:	1	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	17
		Rating:	Low

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Very High

EROSION RATES					
Length of Bank (ft):	75	Erosion Rate (ft ³ /yr):	104.27	Erosion Rate (ton/yr/ft):	0.0669392148148148

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Tributary	Date/Time: Nov 6, 2018 16:46	
Stream Bank: Right Bank	Start Station: 1075	End Station: 1240

BEHI SCORES			
Study Bank Height/ Bankfull Height:	6	Root Depth/ Study Bank Height:	2.5
Weighted Root Density:	2.5	Bank Angle:	1.5
Surface Protection:	1	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	14
		Rating:	Low

NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	165	Erosion Rate (ft ³ /yr):	3.53	Erosion Rate (ton/yr/ft):	0.00103017777777778

SITE PHOTOGRAPHS	
Upstream	Downstream
	

BANCS Summary Report

LOCATION & DESCRIPTION		
Project Site: Gypsy Hill Park	Project Location: Staunton, Virginia	
Reach: Tributary	Date/Time: Nov 6, 2018 16:53	
Stream Bank: Right Bank	Start Station: 1240	End Station: 1350

BEHI SCORES			
Study Bank Height/ Bankfull Height:	10	Root Depth/ Study Bank Height:	2
Weighted Root Density:	3	Bank Angle:	5
Surface Protection:	1	Bank Material Adjustment:	0
Stratification Adjustment:	0	Total Score:	21
		Rating:	Low - Moderate

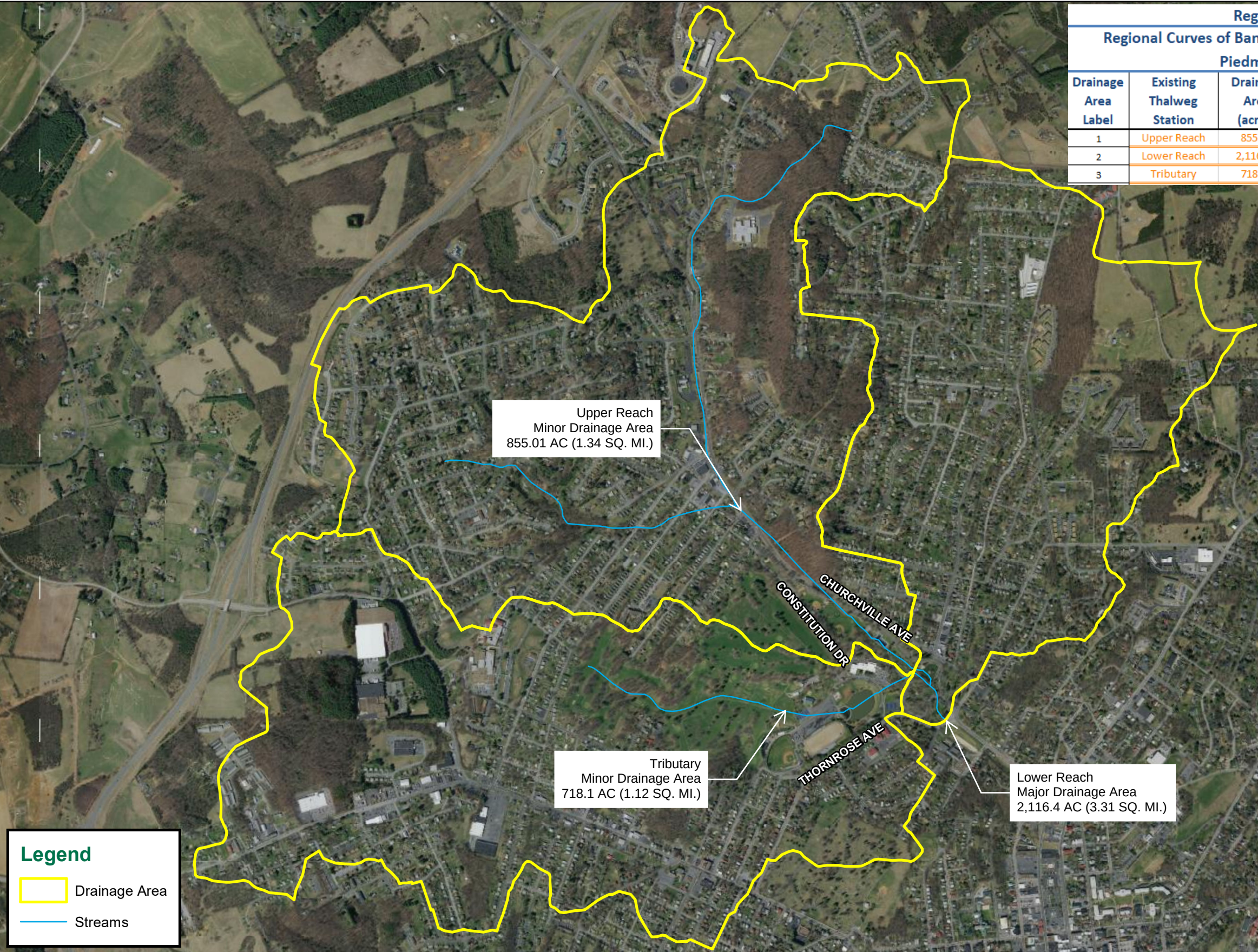
NEAR-BANK STRESS DATA			
Methods for Estimating NBS:	Method I	Near Bank Stress:	Low

EROSION RATES					
Length of Bank (ft):	110	Erosion Rate (ft ³ /yr):	34.22	Erosion Rate (ton/yr/ft):	0.01497686666666667

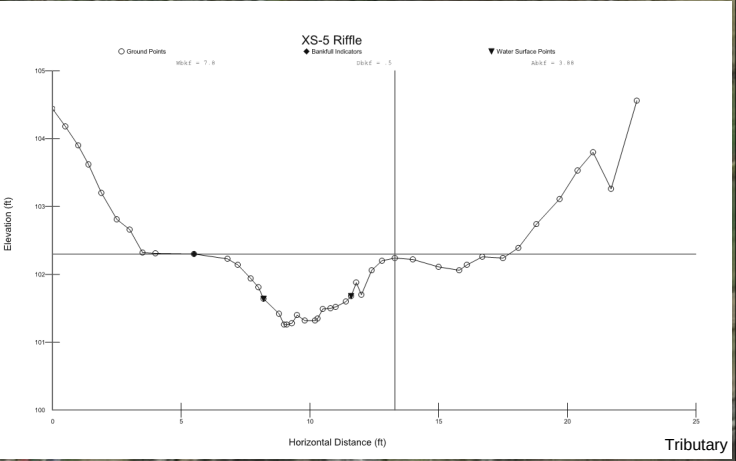
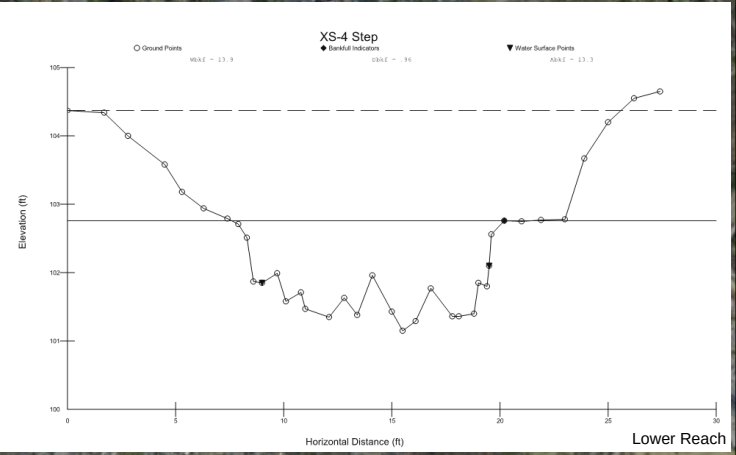
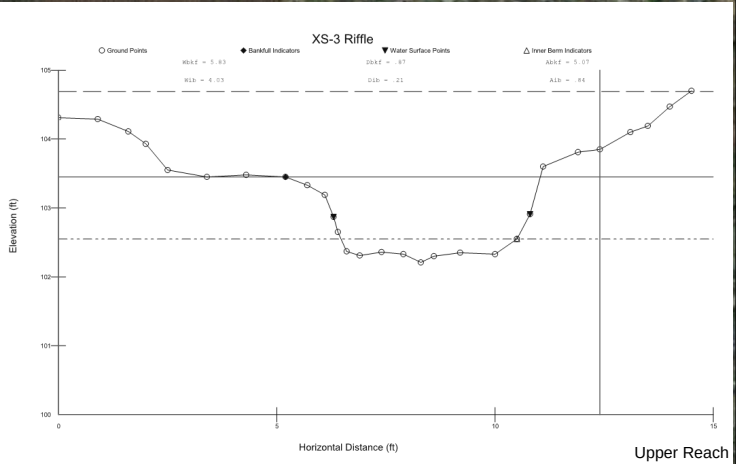
SITE PHOTOGRAPHS	
Upstream	Downstream
	

Attachment 2:
Drainage Area Map

Path: L:\202138847-Master_Contract_Staunton_DPW\38847_002-Gypsy_Hill_Stream\GISField Mapping\38847_002-Hydrology.mxd



Regional Curve Data for Peyton Branch								
Regional Curves of Bankfull Channel Geometry for Non-Urban Streams in the Piedmont Physiographic Province, Virginia ²								
Drainage Area Label	Existing Thalweg Station	Drainage Area (acres)	Drainage Area (sq mi)	Cross-Sectional Area	Bankfull Discharge (cfs)	Bankfull Width	Bankfull Mean Depth	Bankfull Slope (ft/ft)
1	Upper Reach	855.01	1.336	14.66	57.75	14.68	0.994	0.006
2	Lower Reach	2,116.35	3.307	30.22	136.27	21.67	1.392	0.008
3	Tributary	718.08	1.122	12.76	48.95	13.62	0.931	0.006



CITY OF STAUNTON GYPSY HILL PARK
PEYTON BRANCH STREAM RESTORATION
DRAINAGE AREA MAP & EXISTING CROSS
SECTION ANALYSIS



Attachment 3:
Conceptual Layout, Typical Structures & Features
and Existing Tree Inventory

L:\2021\38847\Master_Corridor_Staunton_DPW\38847_002-Gypsy_Hill_Stream\DWG\Sheet\Exh1\38847_002-EX1-MSTR.dwg | Plotted on 12/19/2018 5:20 PM | by Alex Lucado



LEGEND

- PROPOSED STREAM ALIGNMENT
- ROCK SILL
- J-HOOK
- LOG SILL
- GROSS VANE
- CONSTRUCTED WETLANDS AND/OR FLOOD BENCH
- RIPARIAN BUFFER PLANTING
- REARING AREA (FISH HABITAT)
- OXBOW POND
- OXBOW OUTFALL
- OXBOW CONNECTOR CHANNEL
- POTENTIAL BOARDWALK
- POTENTIAL TRAIL
- TREE TO REMAIN
- TREE TO BE RELOCATED
- TREE ID (REFER TO EXHT-3.0 & EXHT-3.1 FOR CORRESPONDING PHOTOGRAPHS)

NOTES

- REFER TO EXHT-2.0 FOR PHOTOGRAPHS OF TYPICAL STREAM STRUCTURES.
- BRUSH TOE AND SOIL LIFTS ARE NOT DEPICTED BUT WILL BE USED TO STABILIZE BANKS IN MULTIPLE AREAS.
- OXBOW PONDS AND REARING AREA WILL UTILIZE ROOT WADS FROM REMOVED TREES TO PROVIDE COVER FOR FISH.
- LOG SILLS WILL BE CONSTRUCTED USING REMOVED TREES.
- BRUSH TOE WILL BE CONSTRUCTED USING CUTTINGS FROM REMOVED TREES.

SCALE 1"=40'

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DATE

12/20/2018

DRAWN BY

A. LUCADO

DESIGNED BY

A. LUCADO

CHECKED BY

M. CLAUD

SCALE

1"=40'

CONCEPTUAL LAYOUT

ENTRANCE CORRIDOR OVERLAY DISTRICT - CITY OF STAUNTON - VIRGINIA

GYPSY HILL PARK STREAM RESTORATION

JOB NO.

38847.002

SHEET NO.

EXHT-1.0

TIMMONS GROUP

GYPSY HILL PARK STREAM RESTORATION

CONCEPTUAL LAYOUT

REVISION DESCRIPTION

DATE

12/20/2018

DRAWN BY

A. LUCADO

DESIGNED BY

A. LUCADO

CHECKED BY

M. CLAUD

SCALE

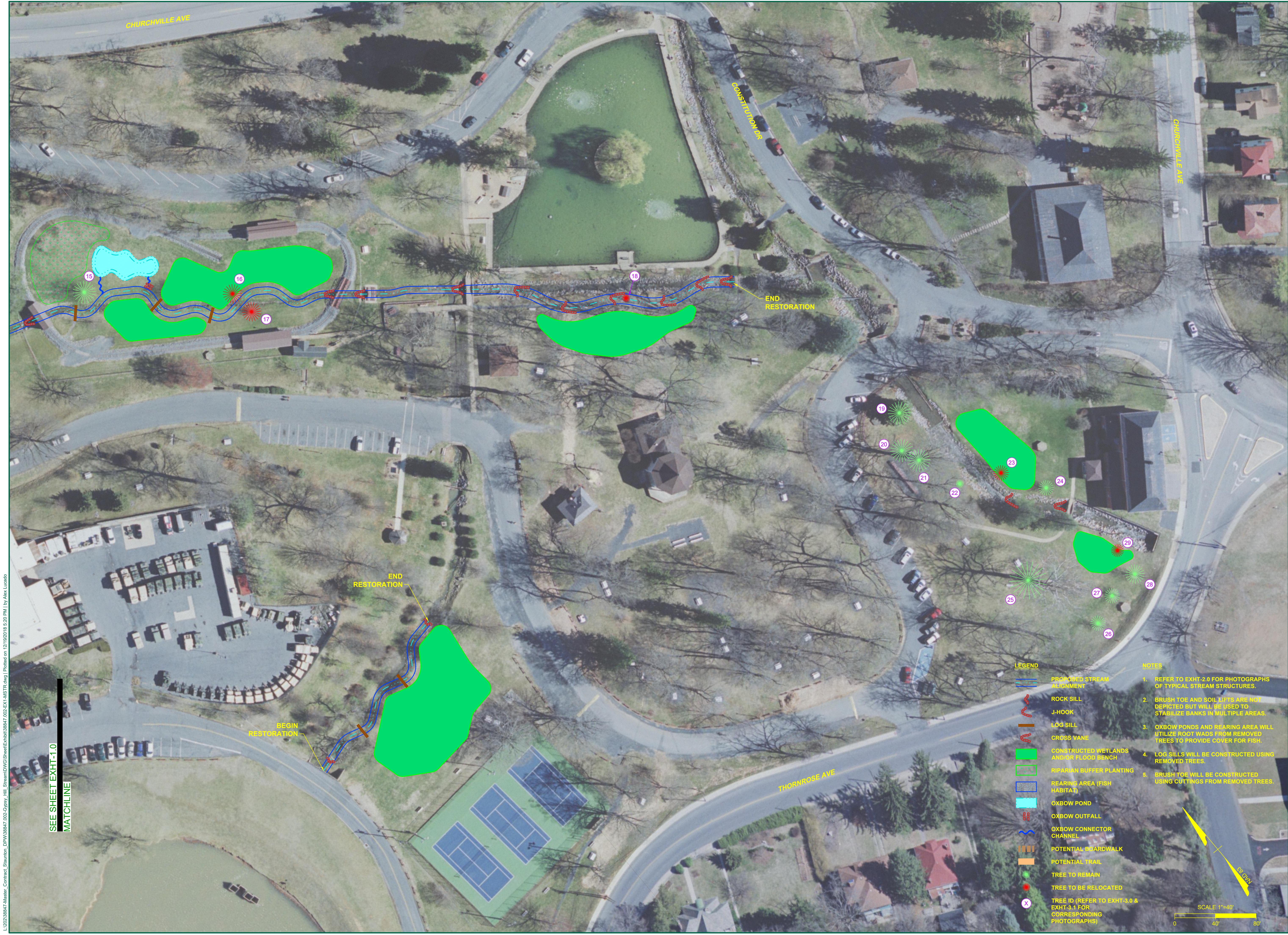
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SEE SHEET EXHT-1.0
MATCHLINE

LEGEND

- PROPOSED STREAM ALIGNMENT
- ROCK SILL
- J-HOOK
- LOG SILL
- CROSS VANE
- CONSTRUCTED WETLANDS AND/OR FLOOD BENCH
- RIPARIAN BUFFER PLANTING
- REARING AREA (FISH HABITAT)
- OXBOW POND
- OXBOW OUTFALL
- OXBOW CONNECTOR CHANNEL
- POTENTIAL BOARDWALK
- POTENTIAL TRAIL
- TREE TO REMAIN
- TREE TO BE RELOCATED
- TREE ID (REFER TO EXHT-3.0 & EXHT-3.1 FOR CORRESPONDING PHOTOGRAPHS)

NOTES

- REFER TO EXHT-2.0 FOR PHOTOGRAPHS OF TYPICAL STREAM STRUCTURES.
- BRUSH TOE AND SOIL LIFTS ARE NOT DEPICTED BUT WILL BE USED TO STABILIZE BANKS IN MULTIPLE AREAS.
- OXBOW PONDS AND REARING AREA WILL UTILIZE ROOT WADS FROM REMOVED TREES TO PROVIDE COVER FOR FISH.
- LOG SILLS WILL BE CONSTRUCTED USING REMOVED TREES.
- BRUSH TOE WILL BE CONSTRUCTED USING CUTTINGS FROM REMOVED TREES.

SCALE 1"=40'

0 40' 80'

TIMMONS GROUP

GYPSY HILL PARK STREAM RESTORATION
ENTRANCE CORRIDOR OVERLAY DISTRICT - CITY OF STAUNTON - VIRGINIA

CONCEPTUAL LAYOUT

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A. LUCADO
CHECKED BY
M. CLAUD
SCALE
1"=40'

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DATE
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A. LUCADO

CHECKED BY
M. CLAUD

SCALE
N.T.S.

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GYPSY HILL PARK STREAM RESTORATION

ENTRANCE CORRIDOR OVERLAY DISTRICT - CITY OF STAUNTON - VIRGINIA

TYPICAL STRUCTURES & FEATURES

JOB NO.
8847.002

SHEET NO.
EXHT-2.0

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1 AMERICAN ELM



2 AMERICAN ELM



3 LINDEN



4 BURR OAK



5 BURR OAK



6 BURR OAK



7 WALNUT



8 CYPRESS



9 SYCAMORE



10 BLACK GUM



11 CYPRESS



12 CYPRESS



13 BLACK GUM



14 SAWTOOTH OAK



15 WILLOW



16 CYPRESS

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DATE	DATE
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	DRAWN BY
	A. LUCADO
	DESIGNED BY
	A. LUCADO
	CHECKED BY
	M. CLAUD
	SCALE
	N.T.S.

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GYPSY HILL PARK STREAM RESTORATION
ENTRANCE CORRIDOR OVERLAY DISTRICT - CITY OF STAUNTON - VIRGINIA
EXISTING TREE INVENTORY

JOB NO.
38847.002
SHEET NO.
EXHT-3.0



17 CYPRESS



21 MAPLE



25 SYCAMORE



29 MAPLE



18 FLOWERING DOGWOOD



22 MAPLE



26 CYPRESS



19 MAGNOLIA



23 BEECH



27 CYPRESS



20 MAPLE



24 BEECH



28 CYPRESS

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GYPSY HILL PARK STREAM RESTORATION
ENTRANCE CORRIDOR OVERLAY DISTRICT - CITY OF STAUNTON - VIRGINIA
EXISTING TREE INVENTORY

JOB NO.
38847.002

SHEET NO.
EXHT-3.1

Attachment 4:
Engineer's Opinion of Probable Construction Costs

Gypsy Hill Park Stream Restoration
Engineer's Opinion of Probable Construction Costs
December 2018

Item Number	Item	Quantity	Unit	Unit Price	Total
1	Mobilization / Demobilization	1	L.S.	\$80,000.00	\$80,000.00
2	Select Tree Removal or Relocation	9	EA.	\$1,500.00	\$13,500.00
3	Erosion and Sediment Control Measures	1	L.S.	\$60,000.00	\$60,000.00
4	Dewatering	1	L.S.	\$35,000.00	\$35,000.00
5	Stream Realignment (Includes channel grading & substrate)	1	L.S.	\$250,000.00	\$250,000.00
6	Stream Structures (Includes rock sills, log sills, j-hooks, cross vanes, soil lifts and brush toe)	1	L.S.	\$200,000.00	\$200,000.00
7	Oxbows (Includes pond, connector channels & outfall)	1	L.S.	\$30,000.00	\$30,000.00
8	Rearing Area	1	L.S.	\$1,500.00	\$1,500.00
9	Riparian Buffer Planting	0.1	AC.	\$7,500.00	\$750.00
10	Constructed Wetlands	0.8	AC.	\$50,000.00	\$39,900.00
11	Seeding, Planting, Livestakes & Matting	1	L.S.	\$120,000.00	\$120,000.00
12	Utility Relocation or Rehabilitation	1	L.S.	\$40,000.00	\$40,000.00
13	Traffic Control / Work Area Protection	1	L.S.	\$15,000.00	\$15,000.00
14	Construction Staking	1	L.S.	\$25,000.00	\$25,000.00
15	As-Built Survey	1	L.S.	\$10,000.00	\$10,000.00
				SUB-TOTAL =	\$920,650.00
				15% CONTINGENCY =	\$138,097.50
				TOTAL =	\$1,058,747.50