

Appendix V – Mitigation Credit Sheets/Stream Assessment Forms

Required Wetland Mitigation Credit Table and Worksheet



TIP: Leave cursor over each factor or option below to pop-up helpful information or definitions.

Required Wetland Mitigation Credit Table

FACTORS	OPTIONS					
Lost Type	Type C 0.2		Type B 2.0		Type A 3.0	
Priority Category	Tertiary 0.5		Secondary 1.5		Primary 2.0	
Existing Condition	Very Impaired 0.1	Impaired 1.0		Partially Impaired 2.0	Fully Functional 2.5	
Duration	0 to 1 Year 0.2	1 to 3 Years 0.5	3 to 5 Years 1.0	5 to 10 Years 1.5	Over 10 Years 2.0	
Dominant Impact	Shade 0.2	Clear 1.0	Drain 2.0	Dredge 2.5	Impound/Flood 2.5	Fill 3.0
Cumulative Impact	< 0.25 Acre 0.1	0.25 - 0.99 Acres 0.2	1.0 - 2.99 Acres 0.5	3.0 - 9.99 Acres 1.0	≥ 10.0 Acres 2.0	

NOTE: The cumulative impact factor for the overall project should be included in the sum of factors for each impacted area on the Required Wetland Mitigation Credit Worksheet

Wet A

Wet B

Wet C

Wet D

Wet E

Required Wetland Mitigation Credit Worksheet

FACTOR	AREA 1	AREA 2	AREA 3	AREA 4	AREA 5	AREA 6
Lost Type	Type A	Type A	Type A	Type A	Type A	
Priority Category	Tertiary	Tertiary	Tertiary	Tertiary	Tertiary	
Existing Condition	Fully Functional	Impaired	Impaired	Impaired	Impaired	
Duration	Over 10 Years	Over 10 Years	Over 10 Years	Over 10 Years	Over 10 Years	
Dominant Impact	Fill	Fill	Fill	Dredge	Fill	
Cumulative Impact	0.25 - 0.99 Acres	0.25 - 0.99 Acres	0.25 - 0.99 Acres	0.25 - 0.99 Acres	0.25 - 0.99 Acres	
Sum of Factors	11.2	9.7	9.7	9.2	9.7	
Impacted Area	0.21	0.17	0.02	0.03	0.18	
R x AA=	2.352	1.649	0.194	0.276	1.746	

Required Wetland Mitigation Credits = $\Sigma (R \times A) =$

6.217

Required Wetland Mitigation Credit Table and Worksheet



TIP: Leave cursor over each factor or option below to pop-up helpful information or definitions.

Required Wetland Mitigation Credit Table						
FACTORS	OPTIONS					
Lost Type	Type C 0.2	Type B 2.0			Type A 3.0	
Priority Category	Tertiary 0.5	Secondary 1.5			Primary 2.0	
Existing Condition	Very Impaired 0.1	Impaired 1.0	Partially Impaired 2.0		Fully Functional 2.5	
Duration	0 to 1 Year 0.2	1 to 3 Years 0.5	3 to 5 Years 1.0	5 to 10 Years 1.5	Over 10 Years 2.0	
Dominant Impact	Shade 0.2	Clear 1.0	Drain 2.0	Dredge 2.5	Impound/Flood 2.5	Fill 3.0
Cumulative Impact	< 0.25 Acre 0.1	0.25 - 0.99 Acres 0.2	1.0 - 2.99 Acres 0.5	3.0 - 9.99 Acres 1.0	≥ 10.0 Acres 2.0	

NOTE: The cumulative impact factor for the overall project should be included in the sum of factors for each impacted area on the Required Wetland Mitigation Credit Worksheet

Wet F

Wet G

Wet H

Wet I

Wet I

Required Wetland Mitigation Credit Worksheet						
FACTOR	AREA 1	AREA 2	AREA 3	AREA 4	AREA 5	AREA 6
Lost Type	Type A	Type A	Type A	Type A	Type A	
Priority Category	Tertiary	Tertiary	Tertiary	Tertiary	Tertiary	
Existing Condition	Fully Functional	Impaired	Fully Functional	Fully Functional	Fully Functional	
Duration	Over 10 Years	Over 10 Years	Over 10 Years	Over 10 Years	Over 10 Years	
Dominant Impact	Fill	Dredge	Dredge	Dredge	Fill	
Cumulative Impact	0.25 - 0.99 Acres	0.25 - 0.99 Acres	0.25 - 0.99 Acres	0.25 - 0.99 Acres	0.25 - 0.99 Acres	
Sum of Factors	11.2	9.2	10.7	10.7	11.2	
Impacted Area	0.01	0.11	0.01	0.06	0.07	
R x AA=	0.112	1.012	0.107	0.642	0.784	

Required Wetland Mitigation Credits = $\Sigma (R \times A) =$

2.657

WETLAND MITIGATION SUMMARY WORKSHEET

Mitigation Summary Worksheet For Permit Application #

SAC 2019-00924

I. Required Mitigation	Credits	Acres
A. Required Mitigation Credits	8.87	0.87
B. Has the permittee protected the remaining on-site aquatic resources? The permittee may be eligible for a 25% reduction in Required Mitigation Credits (A x 0.25)	<input checked="" type="radio"/> NO <input type="radio"/> YES <div style="text-align: center;">0</div>	
C. Total Required Mitigation Credits = A - B	8.87	0.87

II. Third Party Mitigation Credit Summary Enter the amount and type of mitigation credits proposed to be purchased, if applicable.	Credits	Acres
D. Restoration and/or Enhancement		
E. Preservation		
F. Total Third Party Mitigation = D + E		

III. Permittee-Responsible Mitigation Credit Summary Enter the total amount of Permittee-Responsible Mitigation Credits proposed, as calculated from the Proposed Mitigation Credit Worksheet and if applicable.	Credits	Acres
G. Restoration and/or Enhancement	15.54	
H. Preservation		
I. Total Permittee-Responsible Mitigation = G + H	15.54	

IV. Proposed Mitigation Summary	Credits	Acres
J. Total Restoration and/or Enhancement = D + G	15.54	
K. Total Preservation = E + H		
L. Total Proposed Mitigation = F + I	15.54	

V. Local Compensatory Mitigation Goals Proposed Mitigation Credits (PMC) must be Greater than or equal to the Required Mitigation Credits (RMC)	Yes	No
$PMC \geq RMC$ Are the Credits in Row L greater than or equal to Row C?	YES	
$PMC \text{ Restoration and/or Enhancement} \geq \frac{1}{2} RMC$ Are the Credits in Row J greater than or equal to 50% of Row C?	YES	

Determination of Stream Credits

3.0 Table and Worksheet

Working Draft, Subject to Change

Last Revised: October 07, 2010

Adverse Impact Factors Table for Linear Systems										
FACTORS	OPTIONS									
Stream Type ¹	Non-RPW 0.10			1 st and 2 nd Order RPWs 0.8			All Other Streams 0.4			
Priority Category	Tertiary 0.1			Secondary 0.4			Primary 0.6			
Existing Condition	Very Impaired 0.1		Impaired 0.5		Partially Impaired 0.75			Fully Functional 1.5		
Duration	Temporary 0.05			Recurrent 0.1			Permanent 0.3			
Dominant Impact	Shade / Clear 0.05	Utility Crossing 0.15	Culvert 0.3	Armor 0.5	Detention / Weir 0.75	Morpho-Logic 1.5	Impound / Flood 2.0	Pipe 2.2	Fill 2.5	
Cumulative Impact (LF)	< 50' .01		51-300' 0.10		301-500' 0.20		501-1000' 0.40		1001-6000' 1.5	> 6000' 3.0

¹ Stream type does not include man-made linear features. These features will be evaluated on a case-by-case basis.

NWW-1

NWW-1

NWW-1

NWW-2

NWW-2A

NWW-2A

Required Mitigation Credits Worksheet for Linear Systems						
FACTOR	IMPACT 1	IMPACT 2	IMPACT 3	IMPACT 4	IMPACT 5	IMPACT 6
Stream Type	1st & 2nd Order RPW	1st & 2nd Order RPW	1st & 2nd Order RPW	1st & 2nd Order RPW	1st & 2nd Order RPW	1st & 2nd Order RPW
Priority Category	Tertiary	Tertiary	Tertiary	Tertiary	Tertiary	Tertiary
Existing Condition	Impaired	Impaired	Impaired	Impaired	Partially Impaired	Partially Impaired
Duration	Permanent	Permanent	Permanent	Permanent	Permanent	Permanent
Dominant Impact	Fill	Impound/Flood	Armor	Fill	Pipe	Armor
Cumulative Impact	1001-6000'	1001-6000'	1001-6000'	1001-6000'	1001-6000'	1001-6000'
Sum of R Factors	5.7	5.2	3.7	5.7	5.65	3.95
Linear Feet Impact	1217	1020	116	1066	755	20
R x LL =	6936.9	5304	429.2	6076.2	4265.75	79

Total Required Credits = Σ (R x LL) =

23091.05

Determination of Stream Credits

3.0 Table and Worksheet

Working Draft, Subject to Change

Last Revised: October 07, 2010

Adverse Impact Factors Table for Linear Systems										
FACTORS	OPTIONS									
Stream Type ¹	Non-RPW 0.10			1 st and 2 nd Order RPWs 0.8			All Other Streams 0.4			
Priority Category	Tertiary 0.1			Secondary 0.4			Primary 0.6			
Existing Condition	Very Impaired 0.1		Impaired 0.5		Partially Impaired 0.75			Fully Functional 1.5		
Duration	Temporary 0.05			Recurrent 0.1			Permanent 0.3			
Dominant Impact	Shade / Clear 0.05	Utility Crossing 0.15	Culvert 0.3	Armor 0.5	Detention / Weir 0.75	Morpho-Logic 1.5	Impound / Flood 2.0	Pipe 2.2	Fill 2.5	
Cumulative Impact (LF)	< 50' .01		51-300' 0.10		301-500' 0.20		501-1000' 0.40		1001-6000' 1.5	> 6000' 3.0

¹ Stream type does not include man-made linear features. These features will be evaluated on a case-by-case basis.

NWW-3

NWW-4

NWW-4

NWW-4

Required Mitigation Credits Worksheet for Linear Systems						
FACTOR	IMPACT 1	IMPACT 2	IMPACT 3	IMPACT 4	IMPACT 5	IMPACT 6
Stream Type	1st & 2nd Order RPW	1st & 2nd Order RPW	1st & 2nd Order RPW	1st & 2nd Order RPW		
Priority Category	Tertiary	Tertiary	Tertiary	Tertiary		
Existing Condition	Impaired	Impaired	Impaired	Impaired		
Duration	Permanent	Permanent	Permanent	Permanent		
Dominant Impact	Fill	Fill	Impound/Flood	Armor		
Cumulative Impact	1001-6000'	1001-6000'	1001-6000'	1001-6000'		
Sum of R Factors	5.7	5.7	5.2	3.7		
Linear Feet Impact	189	257	283	68		
R x LL =	1077.3	1464.9	1471.6	251.6		

Total Required Credits = Σ (R x LL) =

4265.4

Determination of Stream Credits

Linear Systems

Working Draft, Subject to Change

Last Revised: October 7, 2010

Mitigation Summary Worksheet For Permit Application #

SAC-2019-00924

I. Required Mitigation	Credits	Linear Feet (Impact)
A. Required Mitigation Credits Calculated from Worksheet	27356.4	4,991
B. Reduction Credit: Has the permittee protected the remaining on-site aquatic resources? Are the remaining on-site aquatic resources at least 3x the proposed LF of impacted resources? (If you answer yes to both questions, you may reduce the required credits under Section I (A) by 25%)	<input checked="" type="radio"/> NO <input type="radio"/> YES	Linear Feet (Preservation)
	0	
C. Total Required Mitigation Credits = A - B	27356.4	YES

II. Permittee Responsible Mitigation Credit Summary	Credits	Linear Feet
D. Riparian Buffer Preservation / Enhancement	4292.9	
E. Stream Restoration / Enhancement / Improvement	41389	
F. Total Proposed Bank Mitigation = D + E	45681.9	

III. Third Party Mitigation Credit Summary	Credits	Linear Feet
G. Riparian Buffer Preservation / Enhancement		
H. Stream Restoration / Enhancement / Improvement		
I. Total Proposed Non-Bank Mitigation = G + H		

IV. Proposed Mitigation Summary	Credits	Linear Feet
J. Total Riparian Buffer Mitigation = D + G	4292.9	
K. Total Stream Restoration Mitigation = E + H	41389	
L. Total Proposed Mitigation = F + I	45681.9	

V. Local Compensatory Mitigation Goals	Yes	No
Proposed Mitigation Credits (PMC) must be Greater than or equal to the Required Mitigation Credits (RMC)		
PMC ≥ RMC - or in words - Are the Credits in Row L greater than or equal to Row C?	YES	
PMC Restoration and/or Enhancement ≥ ½ RMC - or in words - Are the Credits in Row J greater than or equal to 50% of Row C?		NO

LOW GRADIENT STREAM ASSESSMENT DATA SHEET				
Stream Name: NWW-1		Basin/Watershed: Catawba (HUC 03050103)		USGS Quad: Rock Hill East, SC
Latitude: 34.9538N		Longitude: -80.9814W		County: York
Date: 9/4/2019		Time: 9am		Investigator: CD
Stream width: 3-4 feet		Stream Depth: 0' (dry channel)		Length of Stream Reach: 2,429 feet
Has it rained within the past 48 hours? No Adjacent land use? (Industrial/residential/railroad/highway/forest)				
Habitat	Condition Category			
Parameter	Fully Functional	Partially Impaired	Impaired	Very Impaired
1.Epifaunal Substrate or Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization.	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat lack of habitat is obvious; substrate unstable or lacking.
SCORE	2.0	1.5	1.0	0.5
2.Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	2.0	1.5	1.0	0.5
3.Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pool present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	2.0	1.5	1.0	0.5
4.Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	2.0	1.5	1.0	0.5
5.Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel or < 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	2.0	1.5	1.0	0.5
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, usually in areas of bridge abutments; evidence of past channelization (greater than past 20 yr.) may be present, but recent channelization not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. In stream habitat greatly altered or removed entirely.
SCORE	2.0	1.5	1.0	0.5
7.Channel Sinuosity	The bends in the stream increase the stream length 3-4x longer than if it was in a straight line (if braided channel, this parameter is difficult to rate).	The bends in the stream increase the stream length is 2-3x longer than if it was in a straight line.	The bends in the stream increase the stream length is 2 to 1x longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	2.0	1.5	1.0	0.5
8.Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over; 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosion scars.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
9.Vegetative Protection	>90% of SB surfaces and adjacent riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes. minimal or no evidence of grazing or mowing; almost all plants allowed to grow naturally	70-90% of the SB surfaces covered by native vegetation but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential more than 1/2 of potential plant stubble height remaining	50-70% of SB covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than 1/2 potential plant stubble height remaining.	<50% of SB surfaces covered by vegetation; disruption of SB vegetation is very high; vegetation has been removed to 5 cm. or less in average stubble height.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
10.Riparian Veg Zone Width	Width of riparian zone >18 meters; human activities (roads, clear-cuts, lawns, crops, parking lots) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone < 6 meters; little or no riparian vegetation due to human activities.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25

Total Score: **10.5 (Impaired)**

NOTES/COMMENTS: Dry channel (intermittent); culverts (2); bank erosion (40-50%); large powerline easement; incised channel in many locations below culvert. Invasive species (*Microstegium vimineum*, *Ligustrum sinense*, *Elaeagnus pungens*, and *Elaeagnus umbellata*) within and adjacent to channel.

LOW GRADIENT STREAM ASSESSMENT DATA SHEET				
Stream Name: NWW-2		Basin/Watershed: Catawba (HUC 03050103)		USGS Quad: Rock Hill East, SC
Latitude: 34.9590N		Longitude: -80.9817W		County: York
Date: 9/4/2019		Time: 9am		Investigator: CD
Stream width: 3-4 feet		Stream Depth: 0' (dry channel)		Length of Stream Reach: 1,066 feet
Has it rained within the past 48 hours? No Adjacent land use? (residential/d/highway/powerline/forest)				
Habitat	Condition Category			
Parameter	Fully Functional	Partially Impaired	Impaired	Very Impaired
1.Epifaunal Substrate or Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization.	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat lack of habitat is obvious; substrate unstable or lacking.
SCORE	2.0	1.5	1.0	0.5
2.Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	2.0	1.5	1.0	0.5
3.Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pool present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	2.0	1.5	1.0	0.5
4.Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	2.0	1.5	1.0	0.5
5.Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel or < 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	2.0	1.5	1.0	0.5
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, usually in areas of bridge abutments; evidence of past channelization (greater than past 20 yr.) may be present, but recent channelization not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. In stream habitat greatly altered or removed entirely.
SCORE	2.0	1.5	1.0	0.5
7.Channel Sinuosity	The bends in the stream increase the stream length 3-4x longer than if it was in a straight line (if braided channel, this parameter is difficult to rate).	The bends in the stream increase the stream length is 2-3x longer than if it was in a straight line.	The bends in the stream increase the stream length is 2 to 1x longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	2.0	1.5	1.0	0.5
8.Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over; 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosion scars.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
9.Vegetative Protection	>90% of SB surfaces and adjacent riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes. minimal or no evidence of grazing or mowing; almost all plants allowed to grow naturally	70-90% of the SB surfaces covered by native vegetation but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential more than 1/2 of potential plant stubble height remaining	50-70% of SB covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than 1/2 potential plant stubble height remaining.	<50% of SB surfaces covered by vegetation; disruption of SB vegetation is very high; vegetation has been removed to 5 cm. or less in average stubble height.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
10.Riparian Veg Zone Width	Width of riparian zone >18 meters; human activities (roads, clear-cuts, lawns, crops, parking lots) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone < 6 meters; little or no riparian vegetation due to human activities.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25

Total Score: **10.5 (Impaired)**

NOTES/COMMENTS: Dry channel (intermittent); culvert; bank erosion (40-50%); powerline easement; incised channel in many locations. Invasive species (*Microstegium vimineum*, *Ligustrum sinense*, *Elaeagnus pungens*, and *Elaeagnus umbellata*) within and adjacent to channel.

LOW GRADIENT STREAM ASSESSMENT DATA SHEET				
Stream Name: NWW-2A		Basin/Watershed: Catawba (HUC 03050103)		USGS Quad: Rock Hill East, SC
Latitude: 34.9541N		Longitude: -80.9769W		County: York
Date: 9/4/2019		Time: 9am		Investigator: CD
Stream width: 5-6 feet		Stream Depth: 0' (dry channel)		Length of Stream Reach: 900 feet
Has it rained within the past 48 hours? No Adjacent land use? (highway/powerline/forest/railroad)				
Habitat	Condition Category			
Parameter	Fully Functional	Partially Impaired	Impaired	Very Impaired
1.Epifaunal Substrate or Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization.	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat lack of habitat is obvious; substrate unstable or lacking.
SCORE	2.0	1.5	1.0	0.5
2.Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	2.0	1.5	1.0	0.5
3.Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pool present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	2.0	1.5	1.0	0.5
4.Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	2.0	1.5	1.0	0.5
5.Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel or < 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	2.0	1.5	1.0	0.5
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, usually in areas of bridge abutments; evidence of past channelization (greater than past 20 yr.) may be present, but recent channelization not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. In stream habitat greatly altered or removed entirely.
SCORE	2.0	1.5	1.0	0.5
7.Channel Sinuosity	The bends in the stream increase the stream length 3-4x longer than if it was in a straight line (if braided channel, this parameter is difficult to rate).	The bends in the stream increase the stream length is 2-3x longer than if it was in a straight line.	The bends in the stream increase the stream length is 2 to 1x longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	2.0	1.5	1.0	0.5
8.Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over; 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosion scars.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
9.Vegetative Protection	>90% of SB surfaces and adjacent riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes. minimal or no evidence of grazing or mowing; almost all plants allowed to grow naturally	70-90% of the SB surfaces covered by native vegetation but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential more than 1/2 of potential plant stubble height remaining	50-70% of SB covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than 1/2 potential plant stubble height remaining.	<50% of SB surfaces covered by vegetation; disruption of SB vegetation is very high; vegetation has been removed to 5 cm. or less in average stubble height.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
10.Riparian Veg Zone Width	Width of riparian zone >18 meters; human activities (roads, clear-cuts, lawns, crops, parking lots) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone < 6 meters; little or no riparian vegetation due to human activities.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25

Total Score: **11.0 (Partially Impaired)**

NOTES/COMMENTS: Partially dry channel (intermittent); culverts (3); bank erosion (40-50%); powerline easement; incised channel in many locations. Invasive species (*Microstegium vimineum*, *Ligustrum sinense*, *Elaeagnus pungens*, and *Elaeagnus umbellata*) within and adjacent to channel. One culvert does not allow aquatic passage on downstream opening. Heavy trash, sediment, and debris from adjacent highway.

LOW GRADIENT STREAM ASSESSMENT DATA SHEET				
Stream Name: NWW-3		Basin/Watershed: Catawba (HUC 03050103)		USGS Quad: Rock Hill East, SC
Latitude: 34.9585N		Longitude: -80.9810W		County: York
Date: 9/4/2019		Time: 9am		Investigator: CD
Stream width: 1-2 feet		Stream Depth: 0' (dry channel)		Length of Stream Reach: 189 feet
Has it rained within the past 48 hours? No		Adjacent land use? (residential/highway/forest/cutover forest)		
Habitat	Condition Category			
Parameter	Fully Functional	Partially Impaired	Impaired	Very Impaired
1.Epifaunal Substrate or Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization.	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat lack of habitat is obvious; substrate unstable or lacking.
SCORE	2.0	1.5	1.0	0.5
2.Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	2.0	1.5	1.0	0.5
3.Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pool present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	2.0	1.5	1.0	0.5
4.Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	2.0	1.5	1.0	0.5
5.Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel or < 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	2.0	1.5	1.0	0.5
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, usually in areas of bridge abutments; evidence of past channelization (greater than past 20 yr.) may be present, but recent channelization not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. In stream habitat greatly altered or removed entirely.
SCORE	2.0	1.5	1.0	0.5
7.Channel Sinuosity	The bends in the stream increase the stream length 3-4x longer than if it was in a straight line (if braided channel, this parameter is difficult to rate).	The bends in the stream increase the stream length is 2-3x longer than if it was in a straight line.	The bends in the stream increase the stream length is 2 to 1x longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	2.0	1.5	1.0	0.5
8.Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over; 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosion scars.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
9.Vegetative Protection	>90% of SB surfaces and adjacent riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes. minimal or no evidence of grazing or mowing; almost all plants allowed to grow naturally	70-90% of the SB surfaces covered by native vegetation but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential more than 1/2 of potential plant stubble height remaining	50-70% of SB covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than 1/2 potential plant stubble height remaining.	<50% of SB surfaces covered by vegetation; disruption of SB vegetation is very high; vegetation has been removed to 5 cm. or less in average stubble height.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
10.Riparian Veg Zone Width	Width of riparian zone>18 meters; human activities (roads, clear-cuts, lawns, crops, parking lots) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone < 6 meters; little or no riparian vegetation due to human activities.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25

Total Score: **8.5 (Impaired)**

NOTES/COMMENTS: Dry channel (intermittent); bank erosion (40-50%); incised channel at lower end. Riparian area has been partially cut at headwater of stream. Stream appears to have been straightened in the past. Invasive species (*Microstegium vimineum*, *Ligustrum sinense*, *Elaeagnus pungens*, and *Elaeagnus umbellata*) within and adjacent to channel.

LOW GRADIENT STREAM ASSESSMENT DATA SHEET				
Stream Name: NWW-4		Basin/Watershed: Catawba (HUC 03050103)		USGS Quad: Rock Hill East, SC
Latitude: 34.9636N		Longitude: -80.9839W		County: York
Date: 9/4/2019		Time: 9am		Investigator: CD
Stream width: 1-2 feet		Stream Depth: 0' (dry channel)		Length of Stream Reach: 679 feet
Has it rained within the past 48 hours? No		Adjacent land use? (residential/highway/powerline/forest)		
Habitat	Condition Category			
Parameter	Fully Functional	Partially Impaired	Impaired	Very Impaired
1.Epifaunal Substrate or Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization.	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat lack of habitat is obvious; substrate unstable or lacking.
SCORE	2.0	1.5	1.0	0.5
2.Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	2.0	1.5	1.0	0.5
3.Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pool present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	2.0	1.5	1.0	0.5
4.Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	2.0	1.5	1.0	0.5
5.Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel or < 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	2.0	1.5	1.0	0.5
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, usually in areas of bridge abutments; evidence of past channelization (greater than past 20 yr.) may be present, but recent channelization not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. In stream habitat greatly altered or removed entirely.
SCORE	2.0	1.5	1.0	0.5
7.Channel Sinuosity	The bends in the stream increase the stream length 3-4x longer than if it was in a straight line (if braided channel, this parameter is difficult to rate).	The bends in the stream increase the stream length is 2-3x longer than if it was in a straight line.	The bends in the stream increase the stream length is 2 to 1x longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	2.0	1.5	1.0	0.5
8.Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over; 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosion scars.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
9.Vegetative Protection	>90% of SB surfaces and adjacent riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes. minimal or no evidence of grazing or mowing; almost all plants allowed to grow naturally	70-90% of the SB surfaces covered by native vegetation but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential more than 1/2 of potential plant stubble height remaining	50-70% of SB covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than 1/2 potential plant stubble height remaining.	<50% of SB surfaces covered by vegetation; disruption of SB vegetation is very high; vegetation has been removed to 5 cm. or less in average stubble height.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
10.Riparian Veg Zone Width	Width of riparian zone >18 meters; human activities (roads, clear-cuts, lawns, crops, parking lots) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone < 6 meters; little or no riparian vegetation due to human activities.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25

Total Score: **10 (Impaired)**

NOTES/COMMENTS: Dry channel (intermittent); culvert at highway, bank erosion (40-50%); incised channel at lower end after former pond bottom. Invasive species (*Microstegium vimineum*, *Ligustrum sinense*, *Elaeagnus pungens*, and *Elaeagnus umbellata*) within and adjacent to channel. Channel ends in former pond bottom and restarts after cut in former dam. Braiding of stream as it nears I-77.



1 NWW-1. Southern portion. Eroding banks typical of areas around slopes.



2 NWW-1. Between culvert and property boundary. Eroding banks typical of areas around slopes. Channel is also incised.



3 NWW-1. Culvert in channel near powerline easement.



4 NWW-1. Upper portions.



Site Photographs
Project Inspector – Stream Assessment
Rock Hill, York County, South Carolina

S&ME Project 4261-19-077

Taken by: CH/CD

Date: May 24 & Sept 4, 2019



5 NWW-2. Western portion near culvert at I-77. Channel is spread out and less defined.



7 NWW-2. Within powerline easement. Channel is lined with Japanese stiltgrass.



6 NWW-2. Central portion. Stream is incised and appears to have been channelized below powerline easement.



8 NWW-2.



Site Photographs
Project Inspector – Stream Assessment
Rock Hill, York County, South Carolina

S&ME Project 4261-19-077

Taken by: CH/CD

Date: May 24 & Sept 4, 2019



9 NWW-2A. Culvert just east I-77. No upstream aquatic passage due to position of culvert above streambed.



10 NWW-2A. Scour, incision, and debris from adjacent interstate.



11 NWW-3. Channel has been straightened.



12 NWW-3. Upper portion. Riparian buffer has been primarily cut. Channel is lined with Japanese stiltgrass.





13 NWW-4. Upper portion. Channel is lined with Japanese stiltgrass.



14 NWW-4. Upper portion. Channel is lined with Japanese stiltgrass.



15 NWW-4: Below former pond bottom. Stream has been channelized in this portion.



16 NWW-4. Culvert in stream at I-77.

