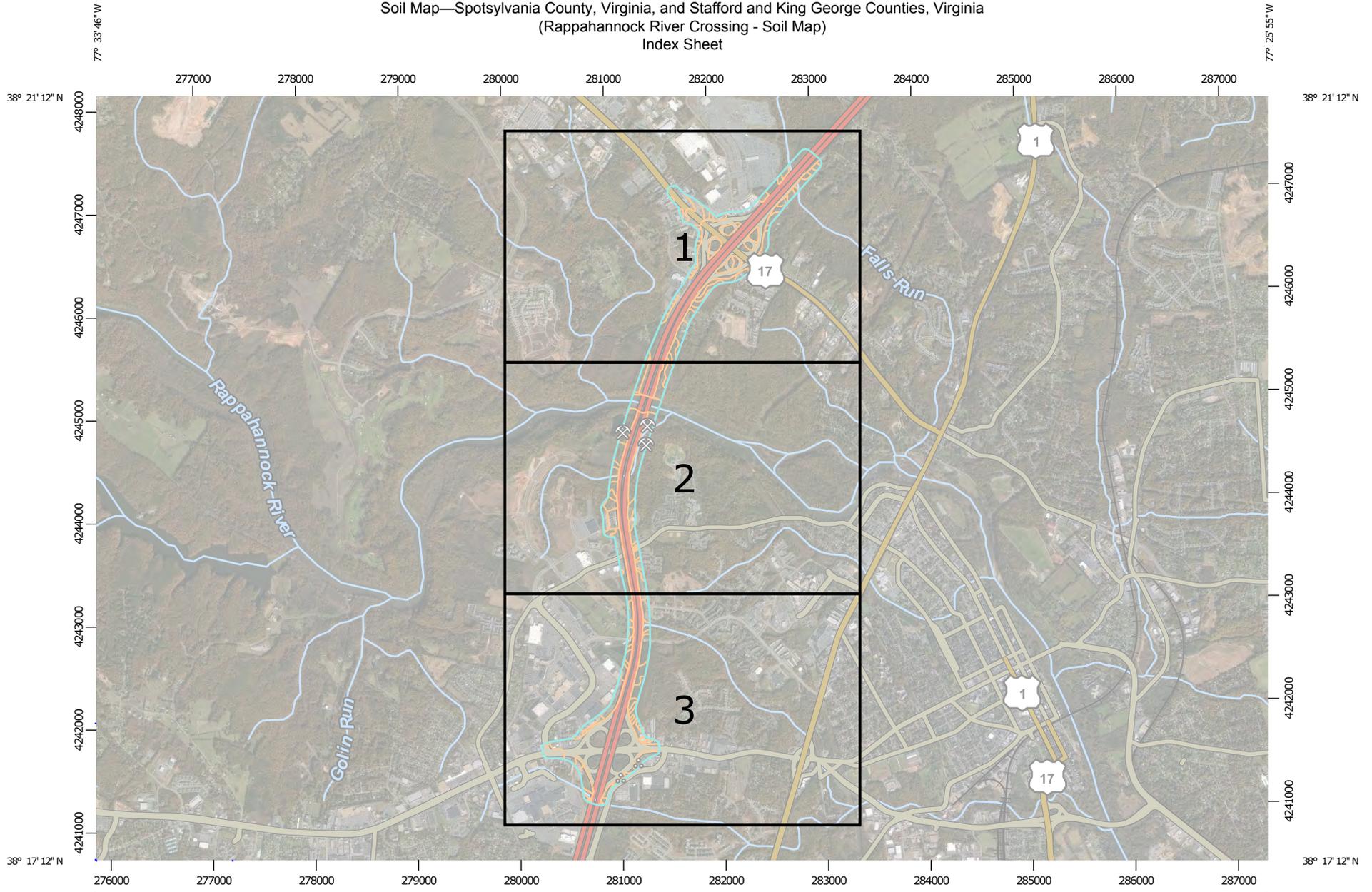


# Appendix A

## Soil Information

Soil Map—Spotsylvania County, Virginia, and Stafford and King George Counties, Virginia  
(Rappahannock River Crossing - Soil Map)  
Index Sheet



Map Scale: 1:52,300 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84



Soil Map—Spotsylvania County, Virginia, and Stafford and King George Counties, Virginia  
 (Rappahannock River Crossing - Soil Map)  
 Map sheet 1 of 3

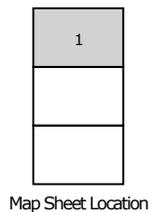


Map Scale: 1:15,800 if printed on A landscape (11" x 8.5") sheet.

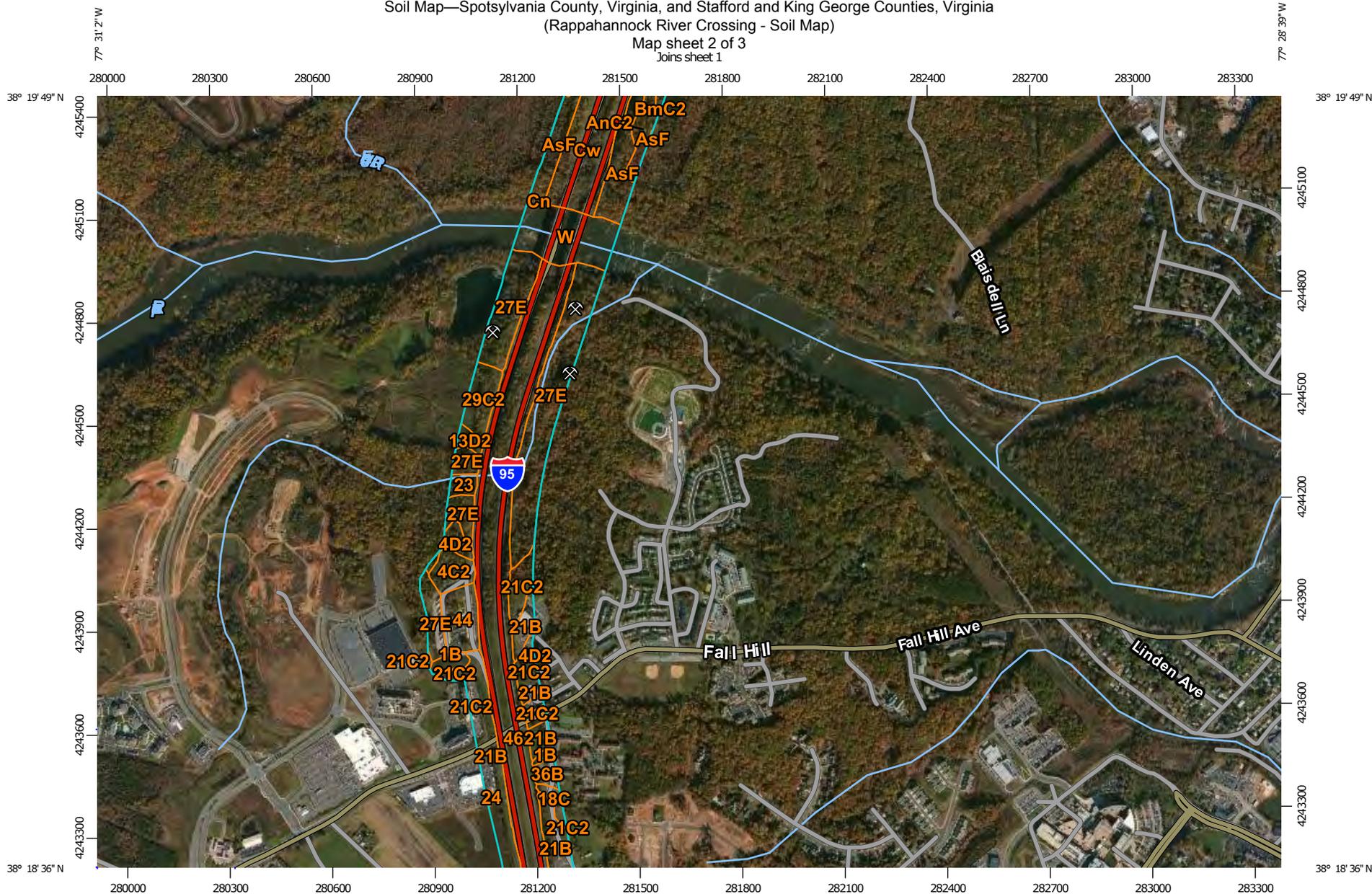
0 200 400 800 1200 Meters

0 500 1000 2000 3000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84



Soil Map—Spotsylvania County, Virginia, and Stafford and King George Counties, Virginia  
 (Rappahannock River Crossing - Soil Map)  
 Map sheet 2 of 3  
 Joins sheet 1

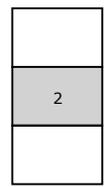


Map Scale: 1:15,800 if printed on A landscape (11" x 8.5") sheet.

0 200 400 800 1200 Meters

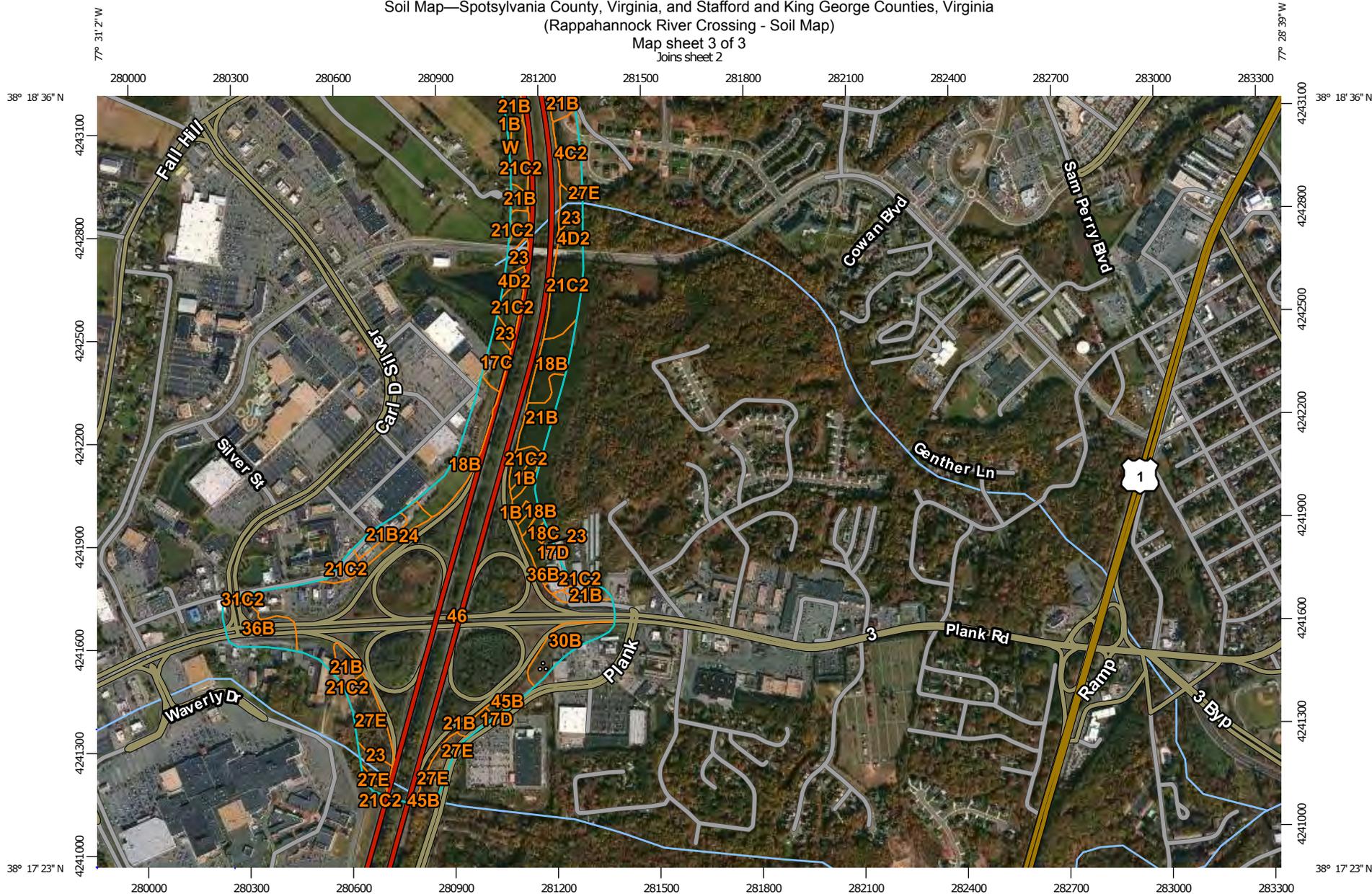
0 500 1000 2000 3000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

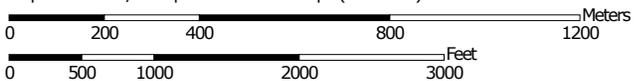


Map Sheet Location

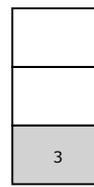
Soil Map—Spotsylvania County, Virginia, and Stafford and King George Counties, Virginia  
 (Rappahannock River Crossing - Soil Map)  
 Map sheet 3 of 3  
 Joins sheet 2



Map Scale: 1:15,800 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84



Map Sheet Location

## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

### Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

### Water Features



Streams and Canals

### Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

### Background



Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Spotsylvania County, Virginia

Survey Area Data: Version 9, Dec 13, 2013

Soil Survey Area: Stafford and King George Counties, Virginia

Survey Area Data: Version 12, Dec 13, 2013

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 14, 2011—Nov 7, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

Spotsylvania County, Virginia (VA177)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1B	Abell sandy loam, 2 to 7 percent slopes	3.6	0.6%
4C2	Appling-Wedowee sandy loams, 7 to 15 percent slopes, eroded	6.7	1.1%
4D2	Appling-Wedowee sandy loams, 15 to 25 percent slopes, eroded	4.2	0.7%
13D2	Cecil-Pacolet complex, 15 to 25 percent slopes, eroded	1.0	0.2%
17C	Dystrochrepts-Udults complex, sloping	2.1	0.4%
17D	Dystrochrepts-Udults complex, moderately steep	0.6	0.1%
18B	Emporia sandy loam, 2 to 7 percent slopes	10.7	1.8%
18C	Emporia sandy loam, 7 to 15 percent slopes	1.3	0.2%
21B	Faceville-Varina complex, 2 to 7 percent slopes	27.8	4.8%
21C2	Faceville-Varina complex, 7 to 15 percent slopes, eroded	22.2	3.8%
23	Fluvaquents-Udifluvents complex	6.0	1.0%
24	Goldsboro sandy loam	2.3	0.4%
27E	Louisburg sandy loam, 25 to 50 percent slopes	37.7	6.5%
29C2	Masada loam, 7 to 15 percent slopes, eroded	3.9	0.7%
30B	Mattaponi sandy loam, 2 to 7 percent slopes	4.5	0.8%
31C2	Mattaponi sandy clay loam, 7 to 15 percent slopes, eroded	0.3	0.0%
36B	Savannah sandy loam, 2 to 7 percent slopes	9.2	1.6%
44	Udorthents, gravelly	4.7	0.8%
45B	Udorthents-Udifluvents complex, gently sloping	1.5	0.3%
46	Urban land-Udults complex, smoothed	165.5	28.4%
W	Water	0.1	0.0%
<b>Subtotals for Soil Survey Area</b>		<b>315.7</b>	<b>54.2%</b>
<b>Totals for Area of Interest</b>		<b>582.9</b>	<b>100.0%</b>

Stafford and King George Counties, Virginia (VA179)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ae	Alluvial land, wet	3.8	0.7%
AnC2	Appling gravelly fine sandy loam, 6 to 10 percent slopes, eroded	3.5	0.6%
AsF	Ashlar fine sandy loam, 25 to 35 percent slopes	9.7	1.7%
AvB	Aura gravelly fine sandy loam, 2 to 6 percent slopes	2.1	0.4%
AvD2	Aura gravelly fine sandy loam, 10 to 18 percent slopes, eroded	4.7	0.8%
AwD	Aura-Galestown-Sassafras complex, 6 to 15 percent slopes	12.4	2.1%
AwE	Aura-Galestown-Sassafras complex, 15 to 30 percent slopes	4.4	0.7%
BaA	Bertie very fine sandy loam, 0 to 3 percent slopes	3.0	0.5%
BmA	Bourne fine sandy loam, 0 to 2 percent slopes	3.5	0.6%
BmB	Bourne fine sandy loam, 2 to 6 percent slopes	30.7	5.3%
BmC2	Bourne fine sandy loam, 6 to 10 percent slopes, eroded	10.2	1.7%
BnB	Bourne fine sandy loam, gravelly subsoil variant, 2 to 6 percent slopes	3.3	0.6%
BnC2	Bourne fine sandy loam, gravelly subsoil variant 6 to 10 percent slopes, eroded	0.4	0.1%
CaB2	Caroline fine sandy loam, 2 to 6 percent slopes, eroded	5.8	1.0%
CaC2	Caroline fine sandy loam, 6 to 10 percent slopes, eroded	1.6	0.3%
CcD3	Caroline clay loam, 10 to 18 percent slopes, severely eroded	0.9	0.2%
Cn	Congaree loam	0.4	0.1%
Cw	Cut and fill land	151.5	26.0%
Iu	Iuka fine sandy loam, local alluvium, 0 to 4 percent slopes	0.7	0.1%
KfB	Kempsville fine sandy loam, gravelly substratum, 2 to 6 percent slopes	0.1	0.0%
SfB	Sassafras fine sandy loam, 2 to 6 percent slopes	1.4	0.2%

<b>Stafford and King George Counties, Virginia (VA179)</b>			
<b>Map Unit Symbol</b>	<b>Map Unit Name</b>	<b>Acres in AOI</b>	<b>Percent of AOI</b>
TeB	Tetotum fine sandy loam, 2 to 6 percent slopes	1.0	0.2%
W	Water	10.4	1.8%
Wh	Wehadkee very fine sandy loam, 0 to 2 percent slopes	2.1	0.4%
<b>Subtotals for Soil Survey Area</b>		<b>267.3</b>	<b>45.8%</b>
<b>Totals for Area of Interest</b>		<b>582.9</b>	<b>100.0%</b>

Appendix B  
Wetland Data Sheets  
and Unified Stream Methodology  
Forms

# Stream Assessment Form (Form 1)

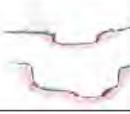
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
5505-06	Rappahannock	Stafford	R2	02080104	05/13/14			1

Name(s) of Evaluator(s)	Stream Name and Information
Justin Bates and Megan Welling	WUS1 (Falls Run)

## 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute to stability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.0</b>
<b>NOTES&gt;&gt;</b>						

## 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category						
	Optimal	Suboptimal	Marginal	Poor			
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory. <b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover. <b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition. <b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.			<b>NOTES&gt;&gt;</b> high suboptimal - buffer disturbed on the south side of the channel, cleared for haul road
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b> <b>1.2</b>	<b>Low</b> <b>1.1</b>	<b>High</b> <b>0.85</b>	<b>Low</b> <b>0.75</b>	<b>High</b> <b>0.6</b>	
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100	
<b>Right Bank</b>	% Riparian Area>	<b>50%</b>	<b>25%</b>	<b>25%</b>			<b>100%</b>
	Score >	<b>1.5</b>	<b>1.2</b>	<b>1.1</b>			
<b>Left Bank</b>	% Riparian Area>	<b>50%</b>	<b>50%</b>				<b>100%</b>
	Score >	<b>1.2</b>	<b>1.1</b>				
							CI= (Sum % RA * Scores*0.01)/2
							Rt Bank CI > <b>1.33</b>
							Lt Bank CI > <b>1.15</b>

## 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	<b>CI</b>
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>1.20</b>

# Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
5505-06		Fredericksburg		02080104	5/13/14			1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>** There is a 3 cell box culvert

	Conditional Category						
	Negligible	Minor	Moderate	Severe	SCORE		
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>	<b>1.50</b>

### REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

<b>THE REACH CONDITION INDEX (RCI) &gt;&gt;</b>	<b>1.18</b>
RCI= (Sum of all CI's)/5	
<b>COMPENSATION REQUIREMENT (CR) &gt;&gt;</b>	<b>0</b>
CR = RCI X LF X IF	

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Ephemeral Stream Assessment Form (Form 1a)

Unified Stream Methodology for use in Virginia

For use in ephemeral streams

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
5505-06	Rappahannock	Stafford	Ephemeral	02080104	05/13/14			1

Name(s) of Evaluator(s)	Stream Name and Information
Justin Bates and Megan Welling	WUS2 (Tributary to Falls Run)

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category								NOTES>>
Optimal	Suboptimal		Marginal		Poor			
<b>Riparian Buffers</b> Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and an <b>non-maintained</b> understory. Wetlands areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with >30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
		High	Low	High	Low	High	Low	
	Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100		
Right Bank	% Riparian Area>	100%					100%	
	Score >	1.5						
Left Bank	% Riparian Area>	100%					100%	
	Score >	1.2						
Rt Bank CI > 1.50      CI Lt Bank CI > 1.20      1.20								

### REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

THE REACH CONDITION INDEX (RCI) >> 0.60

RCI= (Riparian CI)/2

COMPENSATION REQUIREMENT (CR) >> 0

CR = RCI X LF X IF

INSERT PHOTOS:



# Ephemeral Stream Assessment Form (Form 1a)

Unified Stream Methodology for use in Virginia

For use in ephemeral streams

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
5505-06	Rappahannock	Stafford	Ephemeral	02080104	05/13/14			1

<b>Name(s) of Evaluator(s)</b> Justin Bates and Megan Welling	<b>Stream Name and Information</b> WUS3
--	--

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Riparian Buffers	Conditional Category						NOTES>>
	Optimal	Suboptimal		Marginal		Poor	
Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and an <b>non-maintained</b> understory. Wetlands areas.		<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with >30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.
		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>
<b>Condition Scores</b>	<b>1.5</b>	<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>

- Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
- Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
- Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

<b>Right Bank</b>	% Riparian Area>	<b>90%</b>	<b>10%</b>				<b>100%</b>	
	Score >	<b>1.2</b>	<b>1.5</b>					
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>	
	Score >	<b>1.2</b>						

CI= (Sum % RA \* Scores\*0.01)/2

<b>Rt Bank CI &gt;</b>	<b>1.23</b>	<b>CI</b>
<b>Lt Bank CI &gt;</b>	<b>1.20</b>	<b>1.10</b>

## REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

<b>THE REACH CONDITION INDEX (RCI) &gt;&gt;</b>	<b>0.55</b>
---	-------------

RCI= (Riparian CI)/2

<b>COMPENSATION REQUIREMENT (CR) &gt;&gt;</b>	<b>0</b>
---	----------

CR = RCI X LF X IF

INSERT PHOTOS:



# Stream Assessment Form (Form 1)

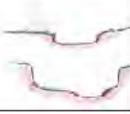
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
5505-06	Rappahannock	Fredericksburg	R2	02080104	05/13/14			1

Name(s) of Evaluator(s)	Stream Name and Information
Justin Bates and Megan Welling	WUS4

## 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category						
	Optimal	Suboptimal	Marginal	Poor	Severe		
<b>Channel Condition</b>	 <p>Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.</p>	 <p>Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.</p>	 <p>Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute to stability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on &gt; 40% of the banks and depositional features which contribute to stability.</p>	 <p>Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on &gt; 40% of the banks and stable sediment deposition is absent.</p>	 <p>Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.</p>	<p><b>3</b></p> <p><b>2.4</b></p> <p><b>2</b></p> <p><b>1.6</b></p> <p><b>1</b></p>	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.5</b>	
<b>NOTES&gt;&gt;</b>							

## 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category						
	Optimal	Suboptimal	Marginal	Poor			
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<p><b>High Suboptimal:</b> Riparian areas with tree stratum (dbh &gt; 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.</p> <p><b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh &gt; 3 inches) present, with &gt; 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).</p>	<p><b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh &gt; 3 inches) present, with &lt;30% tree canopy cover.</p> <p><b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh &gt; 3 inches) present, with &lt;30% tree canopy cover with maintained understory.</p>	<p><b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.</p> <p><b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.</p>	<p><b>NOTES&gt;&gt; Visitor Center parking lot, west buffer</b></p>		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b> <b>1.2</b>	<b>Low</b> <b>1.1</b>	<b>High</b> <b>0.85</b>			<b>Low</b> <b>0.75</b>
<p>1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.</p> <p>2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.</p> <p>3. Enter the % Riparian Area and Score for each riparian category in the blocks below.</p>						<p>Ensure the sums of % Riparian Blocks equal 100</p>	
<b>Right Bank</b>	% Riparian Area>	<b>30%</b>	<b>20%</b>	<b>50%</b>			<b>100%</b>
	Score >	<b>0.85</b>	<b>1.1</b>	<b>1.2</b>			
<b>Left Bank</b>	% Riparian Area>	<b>30%</b>	<b>10%</b>	<b>60%</b>			<b>100%</b>
	Score >	<b>0.85</b>	<b>1.1</b>	<b>1.2</b>			
							CI= (Sum % RA * Scores*0.01)/2
							Rt Bank CI > <b>1.08</b>
							Lt Bank CI > <b>1.09</b>
							<b>CI</b>
							<b>1.20</b>

## 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	<b>CI</b>
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>1.20</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
5505-06		Fredericksburg		02080104	5/13/14			1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The Cls and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.14**

RCI= (Sum of all Cl's)/5

**COMPENSATION REQUIREMENT (CR) >>** **0**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
5505-06	Rappahannock	Fredericksburg	R2	02080104	5/14/14			1

Name(s) of Evaluator(s)	Stream Name and Information
Justin Bates and Megan Welling	WUS5

## 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute to stability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

## 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category						
	Optimal	Suboptimal	Marginal	Poor			
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory. <b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover. <b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition. <b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.			
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b> <b>1.2</b>	<b>Low</b> <b>1.1</b>	<b>High</b> <b>0.85</b>	<b>Low</b> <b>0.75</b>	<b>High</b> <b>0.6</b>	<b>Low</b> <b>0.5</b>
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100	
<b>Right Bank</b>	% Riparian Area>	<b>20%</b>	<b>60%</b>	<b>20%</b>			<b>100%</b>
	Score >	<b>1.5</b>	<b>1.1</b>	<b>0.85</b>			
							CI= (Sum % RA * Scores*0.01)/2
<b>Left Bank</b>	% Riparian Area>	<b>80%</b>	<b>20%</b>				<b>100%</b>
	Score >	<b>1.1</b>	<b>0.85</b>				
							Rt Bank CI > <b>1.13</b>
							Lt Bank CI > <b>1.05</b>
							<b>CI</b>
							<b>1.20</b>

## 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b> <b>0.90</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
5505-06		Fredericksburg		02080104	5/14/14			1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The Cls and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >> 1.20**

RCI= (Sum of all Cl's)/5

**COMPENSATION REQUIREMENT (CR) >> 0**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
5505-06	Rappahannock	Fredericksburg	R4	02080104	5/14/14			1

Name(s) of Evaluator(s) Justin Bates and Megan Welling	Stream Name and Information WUS6 (Tributary to Hazel Run)
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## 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute to stability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.0</b>
<b>NOTES&gt;&gt;</b>						

## 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category								NOTES>>
	Optimal	Suboptimal	Marginal	Poor				
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	
<b>Condition Scores</b>	<b>1.5</b>	<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>	
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100		
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>	
	Score >	<b>1.2</b>						
CI= (Sum % RA * Scores*0.01)/2								
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>	<b>Rt Bank CI &gt; 1.20</b>
	Score >	<b>1.5</b>						<b>Lt Bank CI &gt; 1.50</b>

## 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

Conditional Category					NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
	<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
5505-06		Fredericksburg		02080104	5/14/14			1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>> box culvert**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>
<b>1.50</b>						

### REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >> 1.24**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >> 0**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
5505-06	Rappahannock	Fredericksburg	R2	02080104	5/14/14			1

Name(s) of Evaluator(s)	Stream Name and Information
Justin Bates and Megan Welling	WUS7 (Tributary to Hazel Run)

## 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute to stability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

## 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category						
	Optimal	Suboptimal	Marginal	Poor			
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory. <b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover. <b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition. <b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.			
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b> <b>1.2</b>	<b>Low</b> <b>1.1</b>	<b>High</b> <b>0.85</b>	<b>Low</b> <b>0.75</b>	<b>High</b> <b>0.6</b>	<b>Low</b> <b>0.5</b>
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100	
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>
	Score >	<b>1.2</b>					
CI= (Sum % RA * Scores*0.01)/2							
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>
	Score >	<b>1.2</b>					
<b>Rt Bank CI &gt;</b>						<b>1.20</b>	<b>CI</b>
<b>Lt Bank CI &gt;</b>						<b>1.20</b>	<b>1.20</b>

## 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b> <b>1.20</b>

# Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
5505-06		Fredericksburg		02080104	5/14/14			1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The Cls and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >> 1.26**

RCI= (Sum of all Cl's)/5

**COMPENSATION REQUIREMENT (CR) >> 0**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

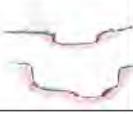
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
5505-06	Rappahannock	Stafford	R2	02080104	5/14/14			1

Name(s) of Evaluator(s)	Stream Name and Information
Justin Bates and Megan Welling	WUS8 (Tributary to Falls Run)

## 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute to stability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.0</b>
<b>NOTES&gt;&gt;</b>						

## 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category						
	Optimal	Suboptimal	Marginal	Poor			
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory. <b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover. <b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition. <b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.			
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b> <b>1.2</b>	<b>Low</b> <b>1.1</b>	<b>High</b> <b>0.85</b>	<b>Low</b> <b>0.75</b>	<b>High</b> <b>0.6</b>	<b>Low</b> <b>0.5</b>
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100	
<b>Right Bank</b>	% Riparian Area>	<b>70%</b>	<b>20%</b>	<b>10%</b>			<b>100%</b>
	Score >	<b>1.2</b>	<b>1.1</b>	<b>0.85</b>			
<b>Left Bank</b>	% Riparian Area>	<b>60%</b>	<b>30%</b>	<b>10%</b>			<b>100%</b>
	Score >	<b>1.2</b>	<b>1.1</b>	<b>0.85</b>			
CI= (Sum % RA * Scores*0.01)/2							
	Rt Bank CI >	<b>1.15</b>				<b>CI</b>	
	Lt Bank CI >	<b>1.14</b>				<b>1.10</b>	

## 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	<b>CI</b>
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>0.90</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
5505-06		Fredericksburg		02080104	5/14/14			1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor	Moderate	Severe	
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

**1.10**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The Cls and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >> 1.02**

RCI= (Sum of all Cl's)/5

**COMPENSATION REQUIREMENT (CR) >> 0**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

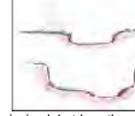
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
5505-06	Rappahannock	Stafford	R2	02080104	5/14/14			1

Name(s) of Evaluator(s)	Stream Name and Information
Justin Bates and Megan Welling	WUS9 (Tributary to Falls Run)

## 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute to stability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.0</b>
<b>NOTES&gt;&gt;</b>						

## 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category						
	Optimal	Suboptimal	Marginal	Poor			
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory. <b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover. <b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition. <b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.			
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b> <b>1.2</b>	<b>Low</b> <b>1.1</b>	<b>High</b> <b>0.85</b>	<b>Low</b> <b>0.75</b>	<b>High</b> <b>0.6</b>	<b>Low</b> <b>0.5</b>
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100	
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>
	Score >	<b>1.1</b>					
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>
	Score >	<b>1.1</b>					
CI= (Sum % RA * Scores*0.01)/2							
	<b>Rt Bank CI &gt;</b>	<b>1.10</b>					<b>CI</b>
	<b>Lt Bank CI &gt;</b>	<b>1.10</b>					<b>0.75</b>

## 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	<b>CI</b>
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>0.90</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
5505-06		Fredericksburg		02080104	5/14/14			1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**0.70**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **0.87**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **0**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

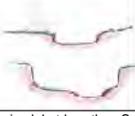
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
5505-06	Rappahannock	Stafford	R2	02080104	5/14/14			1

Name(s) of Evaluator(s)	Stream Name and Information
Justin Bates and Megan Welling	WUS10 (Tributary to Falls Run)

## 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category										
	Optimal	Suboptimal	Marginal	Poor	Severe						
<b>Channel Condition</b>	 <p>Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.</p>	 <p>Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.</p>	 <p>Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute to stability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on &gt; 40% of the banks and depositional features which contribute to stability.</p>	 <p>Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on &gt; 40% of the banks and stable sediment deposition is absent.</p>	 <p>Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.</p>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>Score</b>											
<b>NOTES&gt;&gt;</b>											

## 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category										
	Optimal	Suboptimal	Marginal	Poor							
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.  <b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.  <b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.  <b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>NOTES&gt;&gt;</b>
<b>Condition Scores</b>	1.5	1.2	1.1	0.85	0.75	0.6	0.5				
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.								Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	30%	40%	20%	10%				100%		
	Score >	1.5	1.1	0.85	0.75						
<b>Left Bank</b>	% Riparian Area>	20%	45%	25%	10%				100%		
	Score >	1.5	1.1	0.85	0.75						
										Cl= (Sum % RA * Scores*0.01)/2	
									Rt Bank Cl >	1.14	Cl
									Lt Bank Cl >	1.08	1.20

## 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category									
	Optimal	Suboptimal	Marginal	Poor						
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>1.50</b>	
<b>Score</b>										
<b>NOTES&gt;&gt;</b>										

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
5505-06		Fredericksburg		02080104	5/14/14			1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category			
	Negligible	Minor	Moderate	Severe
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.		
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>

**1.30**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The Cls and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >> 1.28**

RCI= (Sum of all Cl's)/5

**COMPENSATION REQUIREMENT (CR) >> 0**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

**WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont**

Project/Site: Rappahannock City/County: Stafford Sampling Date: May 13, 2014  
 Applicant/Owner: VDOT State: VA Sampling Point: WET1&2 - UTP1  
 Investigator(s): Justin Bates and Megan Welling Section, Township, Range: Fredericksburg  
 Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): convex Slope (%): \_\_\_\_\_  
 Subregion (LRR or MLRA): LRR S (MLRA 147) Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_  
 Soil Map Unit Name: \_\_\_\_\_ NWI Classification: UPL  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

Hydrophytic Vegetation Present?      Yes ____ No <u>X</u> Hydric Soil Present?                      Yes ____ No <u>X</u> Wetland Hydrology Present?            Yes ____ No <u>X</u>	<b>Is the Sampled Area within a Wetland?</b> Yes ____ No <u>X</u>
Remarks: Maintained roadway embankment.	

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b> <u>Primary Indicators (minimum of one is required; check all that apply)</u> ____ Surface Water (A1)                      ____ True Aquatic Plants (B14) ____ High Water Table (A2)                    ____ Hydrogen Sulfide Odor (C1) ____ Saturation (A3)                              ____ Oxidized Rhizospheres on Living Roots (C3) ____ Water Marks (B1)                            ____ Presence of Reduced Iron (C4) ____ Sediment Deposits (B2)                    ____ Recent Iron Reduction in Tilled Soils (C6) ____ Drift Deposits (B3)                          ____ Thin Muck Surface (C7) ____ Algal Mat or Crust (B4)                      ____ Other (Explain in Remarks) ____ Iron Deposits (B5) ____ Inundation Visible on Aerial Imagery (B7) ____ Water-Stained Leaves (B9) ____ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ____ Surface Soil Cracks (B6) ____ Sparsely Vegetated Concave Surface (B8) ____ Drainage Patterns (B10) ____ Moss Trim Lines (B16) ____ Dry-Season Water Table (C2) ____ Crayfish Burrows (C8) ____ Saturation Visible on Aerial Imagery (C9) ____ Stunted or Stressed Plants (D1) ____ Geomorphic Position (D2) ____ Shallow Aquitard (D3) ____ Microtopographic Relief (D4) ____ FAC-Neutral Test (D5)	
<b>Field Observations:</b> Surface Water Present?    Yes ____ No <u>X</u> Depth (inches): _____ Water Table Present?        Yes ____ No <u>X</u> Depth (inches): _____ Saturation Present?         Yes ____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	<b>Wetland Hydrology Present?      Yes ____      No <u>X</u></b>	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

**VEGETATION (Five Strata) – Use scientific names of plants.**

	Absolute Dominant Indicator			
<b>Tree Stratum</b> (Plot size: ) % Cover Species? Status				<b>Dominance Test worksheet:</b>  Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)  Total Number of Dominant Species Across All Strata: <u>3</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50</u> (A/B)
1. <u>Juniperus virginiana</u> (Cedar,eastern red)	<u>2</u>	Y	FACU	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
			<u>2</u> = Total Cover	
<b>Sapling Stratum</b> (Plot size: ) _____				
1. <u>Liquidambar styraciflua</u> (Gum,sweet)	15 Y FAC		_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
			<u>15</u> = Total Cover	
<b>Shrub Stratum</b> (Plot size: ) _____				
1. <u>Festuca arundinacea</u> (Fescue,kentucky)	68 Y FAC		_____	
2. <u>Agropyron repens</u> (Quackgrass)	20 Y FACU		_____	
3. <u>Vitis aestivalis</u> (Grape,summer)	5 FAC		_____	
4. <u>Dichantheium acuminatum</u> (Grass,panic)	4 FAC		_____	
5. <u>Andropogon virginicus</u> (Broom-sedge)	4	_____	FAC	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
			<u>100</u> = Total Cover	
<b>Herb Stratum</b> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
			<u>0</u> = Total Cover	
<b>Woody Vine Stratum</b> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
			<u>0</u> = Total Cover	
<b>Hydrophytic Vegetation Present?</b> Yes <u>    </u> No <u>  X  </u>				

**Prevalence Index worksheet:**  
 Total % Cover of: \_\_\_\_\_ Multiply by: \_\_\_\_\_  
 OBL species 0 x 1 = 0  
 FACW species 0 X 2 = 0  
 FAC species 95 X 3 = 285  
 FACU species 22 X 4 = 88  
 UPL species 0 X 5 = 0  
 Column Totals: 117 (A) 373 (B)  
  
 Prevalence Index = B/A = 3.19

**Hydrophytic Vegetation Indicators:**  
1 - Rapid Test for Hydrophytic Vegetation  
2 - Dominance Test is > 50%  
3 - Prevalence Test is ≤ 3.01  
4 - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)  
 \_\_\_\_\_ Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must

**Definitions of Vegetation Strata:**  
  
**Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).**  
  
**Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.**  
  
**Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.**  
  
**Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately \_\_\_\_\_**

Remarks: (Include photo numbers here or on a separate sheet.)



## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Rappahannock City/County: Stafford Sampling Date: May 13, 2014  
 Applicant/Owner: VDOT State: VA Sampling Point: WET1-WTP1  
 Investigator(s): Justin Bates and Megan Welling Section, Township, Range: Fredericksburg  
 Landform (hillslope, terrace, etc.) Flat Local relief (concave, convex, none): concave Slope (%): \_\_\_\_\_  
 Subregion (LRR or MLRA): LRR S (MLRA 147) Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_  
 Soil Map Unit Name: \_\_\_\_\_ NWI Classification: PFO  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No ____ Hydric Soil Present? Yes <u>X</u> No ____ Wetland Hydrology Present? Yes <u>X</u> No ____	<b>Is the Sampled Area within a Wetland?</b> Yes <u>X</u> No ____
Remarks: Wetland is fed by roadway drainage. Floodplain of WUS 1	

### HYDROLOGY

<b>Wetland Hydrology Indicators:</b> <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1)                      ___ True Aquatic Plants (B14) ___ High Water Table (A2)                    ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3)                              ___ Oxidized Rhizospheres on Living Roots (C3) <u>X</u> Water Marks (B1)                              ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2)                    ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3)                         ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4)                     ___ Other (Explain in Remarks) ___ Iron Deposits (B5)                            ___ ___ Inundation Visible on Aerial Imagery (B7) <u>X</u> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) <u>X</u> Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) <u>X</u> Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) <u>X</u> FAC-Neutral Test (D5)
--	---

<b>Field Observations:</b> Surface Water Present? Yes ___ No <u>X</u> Depth (inches): _____ Water Table Present? Yes ___ No <u>X</u> Depth (inches): _____ Saturation Present? Yes ___ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes <u>X</u> No ____
--	--

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point WET1-WTP1

	Absolute Dominant Indicator		
<b>Tree Stratum (Plot size: ) % Cover Species? Status</b>			
1. <u>Acer rubrum (Maple,red)</u>	20	Y	FAC
2. <u>Liquidambar styraciflua (Gum,sweet)</u>	20	Y	FAC
3. <u>Aristolochia tomentosa (Dutchman's-pine,woolly)</u>	10	Y	FAC
4. <u>Carpinus caroliniana (Hornbeam,american)</u>	10	Y	FAC
5. <u>Fagus grandifolia (Beech)</u>	10	Y	FAC
6. <u>Platanus occidentalis (Sycamore,american)</u>	10	Y	FACW
7. <u>Betula nigra (Birch,river)</u>	5		FACW
	85	= Total Cover	
<b>Sapling Stratum (Plot size: ) _____</b>			
1. _____			
2. _____			
3. _____			
4. _____			
5. _____			
6. _____			
7. _____			
	0	= Total Cover	
<b>Shrub Stratum (Plot size: ) _____</b>			
1. <u>Asimina triloba (Pawpaw,common)</u>	10	Y	FAC
2. <u>Lindera benzoin (Spicebush,northern)</u>	10	Y	FACW
3. _____			
4. _____			
5. _____			
6. _____			
7. _____			
	20	= Total Cover	
<b>Herb Stratum (Plot size: ) _____</b>			
1. <u>Arisaema triphyllum (Jack-in-the-pulpit,swamp)</u>	10	Y	FACW
2. <u>Boehmeria cylindrica (False-nettle,small-spike)</u>	10	Y	FACW
3. <u>Dichanthelium clandestinum (Witchgrass,deer-tongue)</u>	10	Y	FACW
4. <u>Onoclea sensibilis (Fern,sensitive)</u>	10	Y	FACW
5. <u>Parthenocissus quinquefolia (Creeper,virginia)</u>	10	Y	FAC
6. _____			
7. _____			
8. _____			
9. _____			
10. _____			
11. _____			
12. _____			
	50	= Total Cover	
<b>Woody Vine Stratum (Plot size: ) _____</b>			
1. <u>Toxicodendron radicans (Ivy,poison)</u>	15	Y	FAC
2. <u>Lonicera japonica (Honeysuckle,japanese)</u>	10	Y	FAC
3. _____			
4. _____			
5. _____			
	25	= Total Cover	

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 15 (A)

Total Number of Dominant Species Across All Strata: 15 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

---

**Prevalence Index worksheet:**

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	X 2 = _____
FAC species _____	X 3 = _____
FACU species _____	X 4 = _____
UPL species _____	X 5 = _____
Column Totals: _____	(A) _____ (B) _____

Prevalence Index = B/A = \_\_\_\_\_

---

**Hydrophytic Vegetation Indicators:**

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is > 50%

3 - Prevalence Test is ≤ 3.0<sup>1</sup>

4 - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)

       Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

---

**Definitions of Vegetation Strata:**

**Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).**

**Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.**

**Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.**

**Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately \_\_\_\_\_**

---

**Hydrophytic Vegetation Present?**      Yes X      No \_\_\_\_\_

Remarks: (Include photo numbers here or on a separate sheet.)



**WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont**

Project/Site: Rappahannock City/County: Stafford Sampling Date: May 13, 2014  
 Applicant/Owner: VDOT State: VA Sampling Point: WET2-WTP1  
 Investigator(s): Justin Bates and Megan Welling Section, Township, Range: Fredericksburg  
 Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): concave Slope (%): \_\_\_\_\_  
 Subregion (LRR or MLRA): LRR S (MLRA 147) Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_  
 Soil Map Unit Name: \_\_\_\_\_ NWI Classification: PFO  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

Hydrophytic Vegetation Present? Yes <u>X</u> No ____ Hydric Soil Present? Yes <u>X</u> No ____ Wetland Hydrology Present? Yes <u>X</u> No ____	<p align="center"><b>Is the Sampled Area within a Wetland?</b></p> Yes <u>X</u> No ____
Remarks: Wetland is fed by roadway drainage and WUS 2. WUS 2 has been cut off from wetland by a dirt haul road.	

**HYDROLOGY**

<p><b>Wetland Hydrology Indicators:</b>                  Primary Indicators (minimum of one is required; check all that apply)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%; border: none;"><input checked="" type="checkbox"/> Surface Water (A1)</td> <td style="width:50%; border: none;"><input type="checkbox"/> True Aquatic Plants (B14)</td> </tr> <tr> <td style="border: none;"><input checked="" type="checkbox"/> High Water Table (A2)</td> <td style="border: none;"><input type="checkbox"/> Hydrogen Sulfide Odor (C1)</td> </tr> <tr> <td style="border: none;"><input checked="" type="checkbox"/> Saturation (A3)</td> <td style="border: none;"><input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)</td> </tr> <tr> <td style="border: none;"><input checked="" type="checkbox"/> Water Marks (B1)</td> <td style="border: none;"><input checked="" type="checkbox"/> Presence of Reduced Iron (C4)</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Sediment Deposits (B2)</td> <td style="border: none;"><input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Drift Deposits (B3)</td> <td style="border: none;"><input type="checkbox"/> Thin Muck Surface (C7)</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Algal Mat or Crust (B4)</td> <td style="border: none;"><input type="checkbox"/> Other (Explain in Remarks)</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Iron Deposits (B5)</td> <td></td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)</td> <td></td> </tr> <tr> <td style="border: none;"><input checked="" type="checkbox"/> Water-Stained Leaves (B9)</td> <td></td> </tr> <tr> <td style="border: none;"><input checked="" type="checkbox"/> Aquatic Fauna (B13)</td> <td></td> </tr> </table>	<input checked="" type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> True Aquatic Plants (B14)	<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	<input checked="" type="checkbox"/> Water Marks (B1)	<input checked="" type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Iron Deposits (B5)		<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		<input checked="" type="checkbox"/> Water-Stained Leaves (B9)		<input checked="" type="checkbox"/> Aquatic Fauna (B13)		<p>Secondary Indicators (minimum of two required)</p> <table style="width:100%; border: none;"> <tr><td style="border: none;"><input type="checkbox"/> Surface Soil Cracks (B6)</td></tr> <tr><td style="border: none;"><input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8)</td></tr> <tr><td style="border: none;"><input checked="" type="checkbox"/> Drainage Patterns (B10)</td></tr> <tr><td style="border: none;"><input type="checkbox"/> Moss Trim Lines (B16)</td></tr> <tr><td style="border: none;"><input type="checkbox"/> Dry-Season Water Table (C2)</td></tr> <tr><td style="border: none;"><input type="checkbox"/> Crayfish Burrows (C8)</td></tr> <tr><td style="border: none;"><input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)</td></tr> <tr><td style="border: none;"><input type="checkbox"/> Stunted or Stressed Plants (D1)</td></tr> <tr><td style="border: none;"><input checked="" type="checkbox"/> Geomorphic Position (D2)</td></tr> <tr><td style="border: none;"><input type="checkbox"/> Shallow Aquitard (D3)</td></tr> <tr><td style="border: none;"><input type="checkbox"/> Microtopographic Relief (D4)</td></tr> <tr><td style="border: none;"><input checked="" type="checkbox"/> FAC-Neutral Test (D5)</td></tr> </table>	<input type="checkbox"/> Surface Soil Cracks (B6)	<input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input checked="" type="checkbox"/> Drainage Patterns (B10)	<input type="checkbox"/> Moss Trim Lines (B16)	<input type="checkbox"/> Dry-Season Water Table (C2)	<input type="checkbox"/> Crayfish Burrows (C8)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)	<input type="checkbox"/> Stunted or Stressed Plants (D1)	<input checked="" type="checkbox"/> Geomorphic Position (D2)	<input type="checkbox"/> Shallow Aquitard (D3)	<input type="checkbox"/> Microtopographic Relief (D4)	<input checked="" type="checkbox"/> FAC-Neutral Test (D5)
<input checked="" type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> True Aquatic Plants (B14)																																		
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<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Other (Explain in Remarks)																																		
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<input checked="" type="checkbox"/> FAC-Neutral Test (D5)																																			
<p><b>Field Observations:</b></p> Surface Water Present? Yes <u>X</u> No ____ Depth (inches): <u>1</u> Water Table Present? Yes <u>X</u> No ____ Depth (inches): <u>8</u> Saturation Present? Yes <u>X</u> No ____ Depth (inches): <u>8</u> (includes capillary fringe)	<p align="center"><b>Wetland Hydrology Present?</b> Yes <u>X</u> No ____</p>																																		
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:																																			
Remarks:																																			

**VEGETATION (Five Strata) – Use scientific names of plants.**

WET2-  
WTP1  
Sampling Point

Absolute Dominant Indicator				Dominance Test worksheet:	
Tree Stratum (Plot size: ) % Cover Species? Status				Number of Dominant Species That Are OBL, FACW, or FAC: <u>9</u>	(A)
1. <u>Nyssa sylvatica (Gum,black)</u>	<u>5</u>	<u>Y</u>	<u>FAC</u>	Total Number of Dominant Species Across All Strata: <u>9</u>	(B)
2. <u>Platanus occidentalis (Sycamore,american)</u>	<u>5</u>	<u>Y</u>	<u>FACW</u>	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u>	(A/B)
3. <u>Ulmus rubra (Elm,slippery)</u>	<u>5</u>	<u>Y</u>	<u>FAC</u>		
4. <u>Carpinus caroliniana (Hornbeam,american)</u>	<u>2</u>		<u>FAC</u>		
5. <u>Quercus alba (Oak,white)</u>	<u>2</u>		<u>FACU</u>		
6. <u>Salix nigra (Willow,black)</u>	<u>1</u>		<u>OBL</u>		
7. _____					
	<u>20</u>	= Total Cover			
Sapling Stratum (Plot size: ) _____				Prevalence Index worksheet:	
1. _____				Total % Cover of: _____	Multiply by: _____
2. _____				OBL species _____	x 1 = _____
3. _____				FACW species _____	X 2 = _____
4. _____				FAC species _____	X 3 = _____
5. _____				FACU species _____	X 4 = _____
6. _____				UPL species _____	X 5 = _____
7. _____				Column Totals: _____	(A) _____ (B) _____
	<u>0</u>	= Total Cover		Prevalence Index = B/A = _____	
Shrub Stratum (Plot size: ) _____				Hydrophytic Vegetation Indicators:	
1. _____				<b>1 - Rapid Test for Hydrophytic Vegetation</b>	
2. _____				<input checked="" type="checkbox"/> 2 - Dominance Test is > 50%	
3. _____				3 - Prevalence Test is ≤ 3.0 <sup>1</sup>	
4. _____				4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)	
5. _____				_____ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)	
6. _____				<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
7. _____					
	<u>0</u>	= Total Cover		Definitions of Vegetation Strata:	
Herb Stratum (Plot size: ) _____				<b>Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).</b>	
1. <u>Lindera benzoin (Spicebush,northern)</u>	<u>10</u>	<u>Y</u>	<u>FACW</u>	<b>Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.</b>	
2. <u>Asimina triloba (Pawpaw,common)</u>	<u>5</u>	<u>Y</u>	<u>FAC</u>	<b>Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.</b>	
3. <u>Boehmeria cylindrica (False-nettle,small-spike)</u>	<u>5</u>	<u>Y</u>	<u>FACW</u>	<b>Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately _____</b>	
4. <u>Dichanthelium clandestinum (Witchgrass,deer-tongue)</u>	<u>5</u>	<u>Y</u>	<u>FACW</u>		
5. <u>Juncus effusus (Rush,soft)</u>	<u>5</u>	<u>Y</u>	<u>FACW</u>		
6. <u>Fraxinus pennsylvanica (Ash,green)</u>	<u>3</u>		<u>FACW</u>		
7. _____					
8. _____					
9. _____					
10. _____					
11. _____					
12. _____					
	<u>33</u>	= Total Cover		<b>Hydrophytic Vegetation Present? Yes <u>X</u> No _____</b>	
Woody Vine Stratum (Plot size: ) _____					
1. <u>Lonicera japonica (Honeysuckle,japanese)</u>	<u>50</u>	<u>Y</u>	<u>FAC</u>		
2. <u>Smilax rotundifolia (Greenbrier,common)</u>	<u>10</u>		<u>FAC</u>		
3. _____					
4. _____					
5. _____					
	<u>60</u>	= Total Cover			
Remarks: (Include photo numbers here or on a separate sheet.)					

**SOIL**

Sampling Point: WET2-WTP1

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-8	5YR3/1	85	5YR4/4	15	RM	M	Sandy Clay Loam	
8-16	5YR4/1	80	5YR4/4	20	RM	M	Sandy Clay Loam	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.      <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 136, 122)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**

**Indicators for Problematic Hydric Soils<sup>3</sup>:**

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

<sup>3</sup>Indicators of Hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: \_\_\_\_\_  
Depth (inches): \_\_\_\_\_

Hydric Soil Present?      Yes       No \_\_\_\_\_

Remarks:

**WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont**

Project/Site: Rappahannock City/County: Stafford Sampling Date: May 14, 2014  
 Applicant/Owner: VDOT State: VA Sampling Point: WET3-UTP1  
 Investigator(s): Justin Bates and Megan Welling Section, Township, Range: Fredericksburg  
 Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): convex Slope (%): \_\_\_\_\_  
 Subregion (LRR or MLRA): LRR S (MLRA 147) Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_  
 Soil Map Unit Name: \_\_\_\_\_ NWI Classification: UPL  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

Hydrophytic Vegetation Present?      Yes <u>X</u> No ____ Hydric Soil Present?                      Yes ____ No <u>X</u> Wetland Hydrology Present?            Yes ____ No <u>X</u>	<b>Is the Sampled Area within a Wetland?</b> Yes ____ No <u>X</u>
Remarks:	

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b> <u>Primary Indicators (minimum of one is required; check all that apply)</u> ____ Surface Water (A1)                      ____ True Aquatic Plants (B14) ____ High Water Table (A2)                    ____ Hydrogen Sulfide Odor (C1) ____ Saturation (A3)                              ____ Oxidized Rhizospheres on Living Roots (C3) ____ Water Marks (B1)                            ____ Presence of Reduced Iron (C4) ____ Sediment Deposits (B2)                    ____ Recent Iron Reduction in Tilled Soils (C6) ____ Drift Deposits (B3)                            ____ Thin Muck Surface (C7) ____ Algal Mat or Crust (B4)                      ____ Other (Explain in Remarks) ____ Iron Deposits (B5) ____ Inundation Visible on Aerial Imagery (B7) ____ Water-Stained Leaves (B9) ____ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ____ Surface Soil Cracks (B6) ____ Sparsely Vegetated Concave Surface (B8) ____ Drainage Patterns (B10) ____ Moss Trim Lines (B16) ____ Dry-Season Water Table (C2) ____ Crayfish Burrows (C8) ____ Saturation Visible on Aerial Imagery (C9) ____ Stunted or Stressed Plants (D1) ____ Geomorphic Position (D2) ____ Shallow Aquitard (D3) ____ Microtopographic Relief (D4) ____ FAC-Neutral Test (D5)	
<b>Field Observations:</b> Surface Water Present?    Yes ____ No <u>X</u> Depth (inches): _____ Water Table Present?        Yes ____ No <u>X</u> Depth (inches): _____ Saturation Present?         Yes ____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	<b>Wetland Hydrology Present?      Yes ____      No <u>X</u></b>	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

**VEGETATION (Five Strata) – Use scientific names of plants.**

Absolute Dominant Indicator				Dominance Test worksheet:	
Tree Stratum (Plot size: ) _____					
1. <u>Gleditsia triacanthos (Honey-locust)</u>	20	Y	FAC	Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)	
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>5</u> (B)	
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>60</u> (A/B)	
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
	20	= Total Cover			
Sapling Stratum (Plot size: ) _____					
1. _____	_____	_____	_____	Prevalence Index worksheet:	
2. _____	_____	_____	_____	Total % Cover of: _____ Multiply by: _____	
3. _____	_____	_____	_____	OBL species _____ x 1 = _____	
4. _____	_____	_____	_____	FACW species _____ X 2 = _____	
5. _____	_____	_____	_____	FAC species _____ X 3 = _____	
6. _____	_____	_____	_____	FACU species _____ X 4 = _____	
7. _____	_____	_____	_____	UPL species _____ X 5 = _____	
	0	= Total Cover		Column Totals: _____ (A) _____ (B)	
				Prevalence Index = B/A = _____	
Shrub Stratum (Plot size: ) _____					
1. _____	_____	_____	_____	<b>Hydrophytic Vegetation Indicators:</b>	
2. _____	_____	_____	_____	<b>1 - Rapid Test for Hydrophytic Vegetation</b>	
3. _____	_____	_____	_____	<input checked="" type="checkbox"/> 2 - Dominance Test is > 50%	
4. _____	_____	_____	_____	3 - Prevalence Test is ≤ 3.01	
5. _____	_____	_____	_____	4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)	
6. _____	_____	_____	_____	Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)	
7. _____	_____	_____	_____		
	0	= Total Cover		<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
Herb Stratum (Plot size: ) _____					
1. <u>Toxicodendron radicans (Ivy,poison)</u>	60	Y	FAC	<b>Definitions of Vegetation Strata:</b>	
2. <u>Lespedeza angustifolia (Bushclover,narrow-leaf)</u>	20	Y	FACU	<b>Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).</b>	
3. <u>Rosa multiflora (Rose,multiflora)</u>	20	Y	UPL	<b>Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.</b>	
4. _____	_____	_____	_____	<b>Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.</b>	
5. _____	_____	_____	_____	<b>Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately _____</b>	
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
11. _____	_____	_____	_____		
12. _____	_____	_____	_____		
	100	= Total Cover			
Woody Vine Stratum (Plot size: ) _____					
1. <u>Lonicera japonica (Honeysuckle,japanese)</u>	80	Y	FAC	<b>Hydrophytic Vegetation Present?</b> Yes <u>X</u> No _____	
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
	80	= Total Cover			

Remarks: (Include photo numbers here or on a separate sheet.)





**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point WET3-WTP1

	Absolute Dominant Indicator				
<b>Tree Stratum (Plot size: ) % Cover Species? Status</b>					
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
	0 = Total Cover				
<b>Sapling Stratum (Plot size: ) _____</b>					
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
	0 = Total Cover				
<b>Shrub Stratum (Plot size: ) _____</b>					
1. <u>Acer rubrum (Maple,red)</u>	5	Y	FAC		
2. <u>Gleditsia triacanthos (Honey-locust)</u>	5	Y	FAC		
3. <u>Platanus occidentalis (Sycamore,american)</u>	5	Y	FACW		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
	15 = Total Cover				
<b>Herb Stratum (Plot size: ) _____</b>					
1. <u>Toxicodendron radicans (Ivy,poison)</u>	40	Y	FAC		
2. <u>Polygonum pensylvanicum (Smartweed,pennsylvania)</u>	20	Y	FACW		
3. <u>Eleocharis rostellata (Spikerush,beaked)</u>	10		OBL		
4. <u>Juncus effusus (Rush,soft)</u>	10		FACW		
5. <u>Lespedeza stipulacea (Lespedeza,korean)</u>	5		FACU		
6. <u>Rosa multiflora (Rose,multiflora)</u>	6		UPL		
7. <u>Scirpus cyperinus (Wool-grass)</u>	6		OBL		
8. <u>Ludwigia palustris (Seedbox,marsh)</u>	2		OBL		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
11. _____	_____	_____	_____		
12. _____	_____	_____	_____		
	97			= Total Cover	
<b>Woody Vine Stratum (Plot size: ) _____</b>					
1. <u>Lonicera japonica (Honeysuckle,japanese)</u>	80	Y	FAC		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
	80			= Total Cover	

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

---

**Prevalence Index worksheet:**

Total % Cover of:		Multiply by:
OBL species _____	x 1 =	_____
FACW species _____	x 2 =	_____
FAC species _____	x 3 =	_____
FACU species _____	x 4 =	_____
UPL species _____	x 5 =	_____
Column Totals: _____		(A) _____ (B) _____

Prevalence Index = B/A = \_\_\_\_\_

---

**Hydrophytic Vegetation Indicators:**

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is > 50%

3 - Prevalence Test is ≤ 3.0<sup>1</sup>

4 - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

---

**Definitions of Vegetation Strata:**

**Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).**

**Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.**

**Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.**

**Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately \_\_\_\_\_**

---

**Hydrophytic Vegetation Present?** Yes X No \_\_\_\_\_

Remarks: (Include photo numbers here or on a separate sheet.)



## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Rappahannock City/County: Stafford Sampling Date: May 14, 2014  
 Applicant/Owner: VDOT State: VA Sampling Point: WET4-UTP1  
 Investigator(s): Justin Bates and Megan Welling Section, Township, Range: Fredericksburg  
 Landform (hillslope, terrace, etc.) \_\_\_\_\_ Local relief (concave, convex, none): none Slope (%): \_\_\_\_\_  
 Subregion (LRR or MLRA): LRR S (MLRA 147) Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_  
 Soil Map Unit Name: \_\_\_\_\_ NWI Classification: UPL  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <u>X</u> Hydric Soil Present? Yes _____ No <u>X</u> Wetland Hydrology Present? Yes _____ No <u>X</u>	<b>Is the Sampled Area within a Wetland?</b> Yes _____ No <u>X</u>
Remarks:	

### HYDROLOGY

<b>Wetland Hydrology Indicators:</b> <u>Primary Indicators (minimum of one is required; check all that apply)</u> _____ Surface Water (A1)                      _____ True Aquatic Plants (B14) _____ High Water Table (A2)                      _____ Hydrogen Sulfide Odor (C1) _____ Saturation (A3)                                      _____ Oxidized Rhizospheres on Living Roots (C3) _____ Water Marks (B1)                                      _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2)                      _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3)                                      _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4)                                      _____ Other (Explain in Remarks) _____ Iron Deposits (B5) _____ Inundation Visible on Aerial Imagery (B7) _____ Water-Stained Leaves (B9) _____ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> _____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) _____ FAC-Neutral Test (D5)
<b>Field Observations:</b> Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes _____ No <u>X</u>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

**VEGETATION (Five Strata) – Use scientific names of plants.**

	Absolute % Cover	Dominant Species?	Indicator Status	
<b>Tree Stratum</b> (Plot size: _____)				
1.	_____	_____	_____	
2.	_____	_____	_____	
3.	_____	_____	_____	
4.	_____	_____	_____	
5.	_____	_____	_____	
6.	_____	_____	_____	
7.	_____	_____	_____	
	0	= Total Cover		
<b>Sapling Stratum</b> (Plot size: _____)				
1.	_____	_____	_____	
2.	_____	_____	_____	
3.	_____	_____	_____	
4.	_____	_____	_____	
5.	_____	_____	_____	
6.	_____	_____	_____	
7.	_____	_____	_____	
	0	= Total Cover		
<b>Shrub Stratum</b> (Plot size: _____)				
1.	_____	_____	_____	
2.	_____	_____	_____	
3.	_____	_____	_____	
4.	_____	_____	_____	
5.	_____	_____	_____	
6.	_____	_____	_____	
7.	_____	_____	_____	
	0	= Total Cover		
<b>Herb Stratum</b> (Plot size: _____)				
1.	_____	_____	_____	
2.	_____	_____	_____	
3.	_____	_____	_____	
4.	_____	_____	_____	
5.	_____	_____	_____	
6.	_____	_____	_____	
7.	_____	_____	_____	
8.	_____	_____	_____	
9.	_____	_____	_____	
10.	_____	_____	_____	
11.	_____	_____	_____	
12.	_____	_____	_____	
	0	= Total Cover		
<b>Woody Vine Stratum</b> (Plot size: _____)				
1.	_____	_____	_____	
2.	_____	_____	_____	
3.	_____	_____	_____	
4.	_____	_____	_____	
5.	_____	_____	_____	
	0	= Total Cover		

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: NaN (A/B)

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**Prevalence Index worksheet:**

Total % Cover of:		Multiply by:		
OBL species	<u>0</u>	x 1 =	<u>0</u>	
FACW species	<u>0</u>	x 2 =	<u>0</u>	
FAC species	<u>0</u>	x 3 =	<u>0</u>	
FACU species	<u>0</u>	x 4 =	<u>0</u>	
UPL species	<u>0</u>	x 5 =	<u>0</u>	
Column Totals:	<u>0</u>	(A)	<u>0</u>	(B)

Prevalence Index = B/A = NaN

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**Hydrophytic Vegetation Indicators:**

     1 - Rapid Test for Hydrophytic Vegetation

     2 - Dominance Test is > 50%

     3 - Prevalence Test is ≤ 3.0<sup>1</sup>

     4 - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)

     Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

---

**Definitions of Vegetation Strata:**

**Tree** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

**Sapling** – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

**Shrub** – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

**Herb** – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately \_\_\_\_\_

---

**Hydrophytic Vegetation Present?**      Yes           No   X

Remarks: (Include photo numbers here or on a separate sheet.)



## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Rappahannock City/County: Stafford Sampling Date: May 14, 2014  
 Applicant/Owner: VDOT State: VA Sampling Point: WET4-WTP1  
 Investigator(s): Justin Bates and Megan Welling Section, Township, Range: Fredericksburg  
 Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): concave Slope (%): \_\_\_\_\_  
 Subregion (LRR or MLRA): LRR S (MLRA 147) Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_  
 Soil Map Unit Name: \_\_\_\_\_ NWI Classification: PFO  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No ____ Hydric Soil Present? Yes <u>X</u> No ____ Wetland Hydrology Present? Yes <u>X</u> No ____	<b>Is the Sampled Area within a Wetland?</b> Yes <u>X</u> No ____
Remarks:	

### HYDROLOGY

<b>Wetland Hydrology Indicators:</b> <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1)                      ___ True Aquatic Plants (B14) ___ High Water Table (A2)                    ___ Hydrogen Sulfide Odor (C1) <u>X</u> Saturation (A3) <u>X</u> Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) <u>X</u> Presence of Reduced Iron (C4) ___ Sediment Deposits (B2)                   ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3)                         ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4)                     ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <u>X</u> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) <u>X</u> Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) <u>X</u> Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) <u>X</u> FAC-Neutral Test (D5)
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<b>Field Observations:</b> Surface Water Present? Yes ___ No <u>X</u> Depth (inches): _____ Water Table Present? Yes ___ No <u>X</u> Depth (inches): _____ Saturation Present? Yes <u>X</u> No ___ Depth (inches): <u>8</u> (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes <u>X</u> No ____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Five Strata) – Use scientific names of plants.**

		Absolute Dominant Indicator		
<b>Tree Stratum (Plot size: ) % Cover Species? Status</b>				
1.	<i>Acer rubrum</i> (Maple,red)	20	Y	FAC
2.	<i>Liquidambar styraciflua</i> (Gum,sweet)	20	Y	FAC
3.	<i>Platanus occidentalis</i> (Sycamore,american)	10		FACW
4.	<i>Liriodendron tulipifera</i> (Tree,tulip)	5		FAC
5.	<i>Ilex opaca</i> (Holly,american)	1		FAC
6.				
7.				
		56	= Total Cover	
<b>Sapling Stratum (Plot size: ) _____</b>				
1.				
2.				
3.				
4.				
5.				
6.				
7.				
		0	= Total Cover	
<b>Shrub Stratum (Plot size: ) _____</b>				
1.	<i>Lindera benzoin</i> (Spicebush,northern)	50	Y	FACW
2.	<i>Acer rubrum</i> (Maple,red)	10		FAC
3.	<i>Liquidambar styraciflua</i> (Gum,sweet)	10		FAC
4.				
5.				
6.				
7.				
		70	= Total Cover	
<b>Herb Stratum (Plot size: ) _____</b>				
1.	<i>Symplocarpus foetidus</i> (Skunk-cabbage)	20	Y	OBL
2.	<i>Boehmeria cylindrica</i> (False-nettle,small-spike)	10	Y	FACW
3.	<i>Acer rubrum</i> (Maple,red)	3		FAC
4.	<i>Parthenocissus quinquefolia</i> (Creeper,virginia)	3		FAC
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
		36	= Total Cover	
<b>Woody Vine Stratum (Plot size: _____)</b>				
1.				
2.				
3.				
4.				
5.				
		0	= Total Cover	

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

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**Prevalence Index worksheet:**

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	X 2 = _____
FAC species _____	X 3 = _____
FACU species _____	X 4 = _____
UPL species _____	X 5 = _____
Column Totals: _____	(A) _____ (B) _____

Prevalence Index = B/A = \_\_\_\_\_

---

**Hydrophytic Vegetation Indicators:**

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is > 50%

3 - Prevalence Test is ≤ 3.0<sup>1</sup>

4 - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)

\_\_\_\_\_ Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

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**Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately \_\_\_\_\_**

---

**Hydrophytic Vegetation Present?** Yes X No \_\_\_\_\_

Remarks: (Include photo numbers here or on a separate sheet.)



## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Rappahannock City/County: Stafford Sampling Date: May 14, 2014  
 Applicant/Owner: VDOT State: VA Sampling Point: WET5-UTP1  
 Investigator(s): Justin Bates and Megan Welling Section, Township, Range: Fredericksburg  
 Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): convex Slope (%): \_\_\_\_\_  
 Subregion (LRR or MLRA): LRR S (MLRA 147) Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_  
 Soil Map Unit Name: \_\_\_\_\_ NWI Classification: UPL  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No ____ Hydric Soil Present? Yes ____ No <u>X</u> Wetland Hydrology Present? Yes ____ No <u>X</u>	<b>Is the Sampled Area within a Wetland?</b> Yes ____ No <u>X</u>
Remarks: Highway embankment	

### HYDROLOGY

<b>Wetland Hydrology Indicators:</b> <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1)                      ___ True Aquatic Plants (B14) ___ High Water Table (A2)                      ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3)                                      ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1)                                      ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2)                              ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3)                                      ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4)                                      ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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<b>Field Observations:</b> Surface Water Present? Yes ____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes ____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes ____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes ____ No <u>X</u>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Five Strata) – Use scientific names of plants.**

<p><b>Tree Stratum (Plot size: ) % Cover Species? Status</b></p> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:35%;"></td> <td colspan="3" style="text-align: center;">Absolute Dominant Indicator</td> </tr> <tr> <td>1. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>2. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>3. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>4. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>5. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>6. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>7. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td></td> <td colspan="3" style="text-align: center;">0 = Total Cover</td> </tr> </table> <p><b>Sapling Stratum (Plot size: ) _____</b></p> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:35%;"></td> <td colspan="3"></td> </tr> <tr> <td>1. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>2. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>3. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>4. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>5. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>6. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>7. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td></td> <td colspan="3" style="text-align: center;">0 = Total Cover</td> </tr> </table> <p><b>Shrub Stratum (Plot size: ) _____</b></p> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:35%;">1. <u>Juniperus virginiana (Cedar, eastern red)</u></td> <td style="width:10%; text-align: center;">3</td> <td style="width:10%; text-align: center;">Y</td> <td style="width:45%; text-align: center;">FACU</td> </tr> <tr> <td>2. _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3. _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4. _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td>5. _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td>6. _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td>7. _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td colspan="3" style="text-align: center;">3 = Total Cover</td> </tr> </table> <p><b>Herb Stratum (Plot size: ) _____</b></p> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:35%;">1. <u>Festuca arundinacea (Fescue, kentucky)</u></td> <td style="width:10%; text-align: center;">50</td> <td style="width:10%; text-align: center;">Y</td> <td style="width:45%; text-align: center;">FAC</td> </tr> <tr> <td>2. <u>Toxicodendron radicans (Ivy, poison)</u></td> <td style="text-align: center;">20</td> <td style="text-align: center;">Y</td> <td style="text-align: center;">FAC</td> </tr> <tr> <td>3. <u>Lespedeza stipulacea (Lespedeza, korean)</u></td> <td style="text-align: center;">10</td> <td></td> <td style="text-align: center;">FACU</td> </tr> <tr> <td>4. <u>Andropogon virginicus (Broom-sedge)</u></td> <td style="text-align: center;">5</td> <td></td> <td style="text-align: center;">FAC</td> </tr> <tr> <td>5. <u>Parthenocissus quinquefolia (Creeper, virginia)</u></td> <td style="text-align: center;">5</td> <td></td> <td style="text-align: center;">FAC</td> </tr> <tr> <td>6. <u>Liriodendron tulipifera (Tree, tulip)</u></td> <td style="text-align: center;">5</td> <td></td> <td style="text-align: center;">FAC</td> </tr> <tr> <td>7. _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td>8. _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td>9. _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td>10. _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td>11. _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td>12. _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td colspan="3" style="text-align: center;">93 = Total Cover</td> </tr> </table> <p><b>Woody Vine Stratum (Plot size: ) _____</b></p> <table style="width:100%; 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border-collapse: collapse;"> <tr> <td style="width:60%;">Total % Cover of:</td> <td style="width:10%;"></td> <td style="width:30%;">Multiply by:</td> </tr> <tr> <td>OBL species _____</td> <td></td> <td>x 1 = _____</td> </tr> <tr> <td>FACW species _____</td> <td></td> <td>X 2 = _____</td> </tr> <tr> <td>FAC species _____</td> <td></td> <td>X 3 = _____</td> </tr> <tr> <td>FACU species _____</td> <td></td> <td>X 4 = _____</td> </tr> <tr> <td>UPL species _____</td> <td></td> <td>X 5 = _____</td> </tr> <tr> <td>Column Totals: _____</td> <td>(A)</td> <td>_____ (B)</td> </tr> </table> <p style="text-align: center;">Prevalence Index = B/A = _____</p> <p><b>Hydrophytic Vegetation Indicators:</b></p> <p><u>1</u> - Rapid Test for Hydrophytic Vegetation</p> <p><input checked="" type="checkbox"/> 2 - Dominance Test is &gt; 50%</p> <p><u>3</u> - Prevalence Test is ≤ 3.0<sup>1</sup></p> <p><u>4</u> - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)</p> <p><u>    </u> Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)</p> <p><sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.</p> <p><b>Definitions of Vegetation Strata:</b></p> <p><b>Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).</b></p> <p><b>Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.</b></p> <p><b>Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.</b></p> <p><b>Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately _____</b></p> <hr/> <p style="text-align: center;"><b>Hydrophytic Vegetation Present?</b>      Yes <u>X</u>      No _____</p>	Total % Cover of:		Multiply by:	OBL species _____		x 1 = _____	FACW species _____		X 2 = _____	FAC species _____		X 3 = _____	FACU species _____		X 4 = _____	UPL species _____		X 5 = _____	Column Totals: _____	(A)	_____ (B)
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**VEGETATION (Five Strata) – Use scientific names of plants.**

WET5-  
WTP1  
Sampling Point

<p><b>Tree Stratum (Plot size: ) % Cover Species? 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50%</p> <p><u>3</u> - Prevalence Test is ≤ 3.0<sup>1</sup></p> <p><u>4</u> - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)</p> <p><u>    </u> Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)</p> <p><sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.</p> <hr/> <p><b>Definitions of Vegetation Strata:</b></p> <p><b>Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).</b></p> <p><b>Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.</b></p> <p><b>Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.</b></p> <p><b>Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately _____</b></p> <hr/> <p style="text-align: center;"><b>Hydrophytic Vegetation Present?</b>      Yes <u>X</u>      No _____</p>	Total % Cover of:		Multiply by:		OBL species	_____	x 1 =	_____	FACW species	_____	X 2 =	_____	FAC species	_____	X 3 =	_____	FACU species	_____	X 4 =	_____	UPL species	_____	X 5 =	_____	Column Totals:	_____	(A)	_____ (B)
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<p>Remarks: (Include photo numbers here or on a separate sheet.)                  Much of PEM portion has been graded through and grass seed planted.</p>																																																																																																																																																																																																																																																									









**WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont**

Project/Site: Rappahannock City/County: Stafford Sampling Date: May 14, 2014  
 Applicant/Owner: VDOT State: VA Sampling Point: WET6-UTP1  
 Investigator(s): Justin Bates and Megan Welling Section, Township, Range: Fredericksburg  
 Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): convex Slope (%): \_\_\_\_\_  
 Subregion (LRR or MLRA): LRR S (MLRA 147) Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_  
 Soil Map Unit Name: \_\_\_\_\_ NWI Classification: UPL  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

Hydrophytic Vegetation Present? Yes ____ No <u>X</u> Hydric Soil Present? Yes ____ No <u>X</u> Wetland Hydrology Present? Yes ____ No <u>X</u>	<b>Is the Sampled Area within a Wetland?</b> Yes ____ No <u>X</u>
Remarks: Highway embankment, frequently mowed	

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b> <u>Primary Indicators (minimum of one is required; check all that apply)</u> ____ Surface Water (A1)      ____ True Aquatic Plants (B14) ____ High Water Table (A2)      ____ Hydrogen Sulfide Odor (C1) ____ Saturation (A3)      ____ Oxidized Rhizospheres on Living Roots (C3) ____ Water Marks (B1)      ____ Presence of Reduced Iron (C4) ____ Sediment Deposits (B2)      ____ Recent Iron Reduction in Tilled Soils (C6) ____ Drift Deposits (B3)      ____ Thin Muck Surface (C7) ____ Algal Mat or Crust (B4)      ____ Other (Explain in Remarks) ____ Iron Deposits (B5) ____ Inundation Visible on Aerial Imagery (B7) ____ Water-Stained Leaves (B9) ____ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ____ Surface Soil Cracks (B6) ____ Sparsely Vegetated Concave Surface (B8) ____ Drainage Patterns (B10) ____ Moss Trim Lines (B16) ____ Dry-Season Water Table (C2) ____ Crayfish Burrows (C8) ____ Saturation Visible on Aerial Imagery (C9) ____ Stunted or Stressed Plants (D1) ____ Geomorphic Position (D2) ____ Shallow Aquitard (D3) ____ Microtopographic Relief (D4) ____ FAC-Neutral Test (D5)
<b>Field Observations:</b> Surface Water Present? Yes ____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes ____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes ____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes ____ No <u>X</u>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

**VEGETATION (Five Strata) – Use scientific names of plants.**

<p><b>Tree Stratum (Plot size: ) % Cover Species? Status</b></p> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:35%;"></td> <td colspan="3" style="text-align: center;">Absolute Dominant Indicator</td> </tr> <tr> <td>1. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>2. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>3. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>4. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>5. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>6. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>7. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td></td> <td colspan="3" style="text-align: center;">0 = Total Cover</td> </tr> </table> <p><b>Sapling Stratum (Plot size: ) _____</b></p> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:35%;"></td> <td colspan="3"></td> </tr> <tr> <td>1. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>2. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>3. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>4. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>5. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>6. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>7. _____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td></td> <td colspan="3" style="text-align: center;">0 = Total Cover</td> </tr> </table> <p><b>Shrub Stratum (Plot size: ) _____</b></p> <table style="width:100%; 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border-collapse: collapse;"> <tr> <td style="width:40%;">Total % Cover of:</td> <td style="width:10%;"></td> <td style="width:10%;">Multiply by:</td> <td style="width:40%;"></td> </tr> <tr> <td>OBL species</td> <td style="text-align: center;"><u>0</u></td> <td>x 1 =</td> <td style="text-align: center;"><u>0</u></td> </tr> <tr> <td>FACW species</td> <td style="text-align: center;"><u>0</u></td> <td>x 2 =</td> <td style="text-align: center;"><u>0</u></td> </tr> <tr> <td>FAC species</td> <td style="text-align: center;"><u>10</u></td> <td>x 3 =</td> <td style="text-align: center;"><u>30</u></td> </tr> <tr> <td>FACU species</td> <td style="text-align: center;"><u>90</u></td> <td>x 4 =</td> <td style="text-align: center;"><u>360</u></td> </tr> <tr> <td>UPL species</td> <td style="text-align: center;"><u>0</u></td> <td>x 5 =</td> <td style="text-align: center;"><u>0</u></td> </tr> <tr> <td>Column Totals:</td> <td style="text-align: center;"><u>100</u></td> <td>(A)</td> <td style="text-align: center;"><u>390</u> (B)</td> </tr> </table> <p style="text-align: right;">Prevalence Index = B/A = <u>3.9</u></p> <hr/> <p><b>Hydrophytic Vegetation Indicators:</b></p> <p><u>1</u> - Rapid Test for Hydrophytic Vegetation</p> <p><u>2</u> - Dominance Test is &gt; 50%</p> <p><u>3</u> - Prevalence Test is ≤ 3.01</p> <p><u>4</u> - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)</p> <p>Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)</p> <p><sup>1</sup>Indicators of hydric soil and wetland hydrology must</p> <hr/> <p><b>Definitions of Vegetation Strata:</b></p> <p><b>Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).</b></p> <p><b>Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.</b></p> <p><b>Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.</b></p> <p><b>Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately</b></p> <hr/> <p style="text-align: center;"><b>Hydrophytic Vegetation Present?</b></p> <p style="text-align: center;">Yes <u>    </u> No <u>X</u></p>	Total % Cover of:		Multiply by:		OBL species	<u>0</u>	x 1 =	<u>0</u>	FACW species	<u>0</u>	x 2 =	<u>0</u>	FAC species	<u>10</u>	x 3 =	<u>30</u>	FACU species	<u>90</u>	x 4 =	<u>360</u>	UPL species	<u>0</u>	x 5 =	<u>0</u>	Column Totals:	<u>100</u>	(A)	<u>390</u> (B)
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**WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont**

Project/Site: Rappahannock City/County: Stafford Sampling Date: May 14, 2014  
 Applicant/Owner: VDOT State: VA Sampling Point: WET6-WTP1  
 Investigator(s): Justin Bates and Megan Welling Section, Township, Range: Fredericksburg  
 Landform (hillslope, terrace, etc.) \_\_\_\_\_ Local relief (concave, convex, none): concave Slope (%): \_\_\_\_\_  
 Subregion (LRR or MLRA): LRR S (MLRA 147) Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_  
 Soil Map Unit Name: \_\_\_\_\_ NWI Classification: PEM  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

Hydrophytic Vegetation Present? Yes <u>X</u> No ____ Hydric Soil Present? Yes <u>X</u> No ____ Wetland Hydrology Present? Yes <u>X</u> No ____	<b>Is the Sampled Area within a Wetland?</b> Yes <u>X</u> No ____
Remarks: Median of I-95, frequently mowed. Concrete v-ditch runs through portion of wetland.	

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b> Primary Indicators (minimum of one is required; check all that apply) ___ Surface Water (A1)                      ___ True Aquatic Plants (B14) ___ High Water Table (A2)                      ___ Hydrogen Sulfide Odor (C1) <u>X</u> Saturation (A3) <u>X</u> Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) <u>X</u> Presence of Reduced Iron (C4) ___ Sediment Deposits (B2)                                      ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3)                                      ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4)                                      ___ Other (Explain in Remarks) ___ Iron Deposits (B5)                                      ___ ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) <u>X</u> Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) <u>X</u> Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) <u>X</u> FAC-Neutral Test (D5)
<b>Field Observations:</b> Surface Water Present? Yes ___ No <u>X</u> Depth (inches): _____ Water Table Present? Yes ___ No <u>X</u> Depth (inches): _____ Saturation Present? Yes <u>X</u> No ___ Depth (inches): <u>8</u> (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes <u>X</u> No ____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

**VEGETATION (Five Strata) – Use scientific names of plants.**

Sampling Point WET6-WTP1

<p style="text-align: center;">Absolute Dominant Indicator</p> <p>Tree Stratum (Plot size: ) <u>                    </u> % Cover Species? Status</p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p> <p>5. _____</p> <p>6. _____</p> <p>7. _____</p> <p style="text-align: right;">0 = Total Cover</p> <p>Sapling Stratum (Plot size: ) <u>                    </u></p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p> <p>5. _____</p> <p>6. _____</p> <p>7. _____</p> <p style="text-align: right;">0 = Total Cover</p> <p>Shrub Stratum (Plot size: ) <u>                    </u></p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p> <p>5. _____</p> <p>6. _____</p> <p>7. _____</p> <p style="text-align: right;">0 = Total Cover</p> <p>Herb Stratum (Plot size: ) <u>                    </u></p> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:35%;">1. <i>Festuca arundinacea</i> (Fescue,kentucky)</td> <td style="width:10%; text-align: center;">20</td> <td style="width:10%; text-align: center;">Y</td> <td style="width:45%;">FAC</td> </tr> <tr> <td>2. <i>Juncus effusus</i> (Rush,soft)</td> <td style="text-align: center;">15</td> <td style="text-align: center;">Y</td> <td>FACW</td> </tr> <tr> <td>3. <i>Carex intumescens</i> (Sedge,bladder)</td> <td style="text-align: center;">10</td> <td style="text-align: center;">Y</td> <td>FACW</td> </tr> <tr> <td>4. <i>Carex lurida</i> (Sedge,shallow)</td> <td style="text-align: center;">10</td> <td style="text-align: center;">Y</td> <td>OBL</td> </tr> <tr> <td>5. <i>Toxicodendron radicans</i> (Ivy,poison)</td> <td style="text-align: center;">10</td> <td style="text-align: center;">Y</td> <td>FAC</td> </tr> <tr> <td>6. <i>Boehmeria cylindrica</i> (False-nettle,small-spike)</td> <td style="text-align: center;">5</td> <td></td> <td>FACW</td> </tr> <tr> <td>7. <i>Scirpus cyperinus</i> (Wool-grass)</td> <td style="text-align: center;">3</td> <td></td> <td>OBL</td> </tr> <tr> <td>8. _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td>9. _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td>10. _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td>11. _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td>12. _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">73</td> <td></td> <td>= Total Cover</td> </tr> </table> <p>Woody Vine Stratum (Plot size: <u>                    </u>)</p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p> <p>5. _____</p> <p style="text-align: right;">0 = Total Cover</p>	1. <i>Festuca arundinacea</i> (Fescue,kentucky)	20	Y	FAC	2. <i>Juncus effusus</i> (Rush,soft)	15	Y	FACW	3. <i>Carex intumescens</i> (Sedge,bladder)	10	Y	FACW	4. <i>Carex lurida</i> (Sedge,shallow)	10	Y	OBL	5. <i>Toxicodendron radicans</i> (Ivy,poison)	10	Y	FAC	6. <i>Boehmeria cylindrica</i> (False-nettle,small-spike)	5		FACW	7. <i>Scirpus cyperinus</i> (Wool-grass)	3		OBL	8. _____				9. _____				10. _____				11. _____				12. _____					73		= Total Cover	<p><b>Dominance Test worksheet:</b></p> <p>Number of Dominant Species That Are OBL, FACW, or FAC: <u>    5    </u> (A)</p> <p>Total Number of Dominant Species Across All Strata: <u>    5    </u> (B)</p> <p>Percent of Dominant Species That Are OBL, FACW, or FAC: <u>    100    </u> (A/B)</p> <hr/> <p><b>Prevalence Index worksheet:</b></p> <table style="width:100%;"> <tr> <td style="width:60%;">Total % Cover of:</td> <td style="width:40%;">Multiply by:</td> </tr> <tr> <td>OBL species _____</td> <td>x 1 = _____</td> </tr> <tr> <td>FACW species _____</td> <td>X 2 = _____</td> </tr> <tr> <td>FAC species _____</td> <td>X 3 = _____</td> </tr> <tr> <td>FACU species _____</td> <td>X 4 = _____</td> </tr> <tr> <td>UPL species _____</td> <td>X 5 = _____</td> </tr> <tr> <td>Column Totals: _____</td> <td>(A) _____ (B) _____</td> </tr> </table> <p style="text-align: center;">Prevalence Index = B/A = _____</p> <p><b>Hydrophytic Vegetation Indicators:</b></p> <p><u>    1    </u> - Rapid Test for Hydrophytic Vegetation</p> <p><input checked="" type="checkbox"/> <u>    2    </u> - Dominance Test is &gt; 50%</p> <p><u>    3    </u> - Prevalence Test is ≤ 3.0<sup>1</sup></p> <p><u>    4    </u> - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)</p> <p><u>    </u> Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)</p> <p><sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.</p> <p><b>Definitions of Vegetation Strata:</b></p> <p><b>Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).</b></p> <p><b>Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.</b></p> <p><b>Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.</b></p> <p><b>Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately _____</b></p> <hr/> <p style="text-align: center;"><b>Hydrophytic Vegetation Present?</b></p> <p style="text-align: center;">Yes <u>    X    </u> No <u>    </u></p>	Total % Cover of:	Multiply by:	OBL species _____	x 1 = _____	FACW species _____	X 2 = _____	FAC species _____	X 3 = _____	FACU species _____	X 4 = _____	UPL species _____	X 5 = _____	Column Totals: _____	(A) _____ (B) _____
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<p>Remarks: (Include photo numbers here or on a separate sheet.)</p>																																																																			



**WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont**

Project/Site: Rappahannock City/County: Stafford Sampling Date: May 14, 2014  
 Applicant/Owner: VDOT State: VA Sampling Point: WET6-WTP2  
 Investigator(s): Justin Bates and Megan Welling Section, Township, Range: Fredericksburg  
 Landform (hillslope, terrace, etc.) \_\_\_\_\_ Local relief (concave, convex, none): concave Slope (%): \_\_\_\_\_  
 Subregion (LRR or MLRA): LRR S (MLRA 147) Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_  
 Soil Map Unit Name: \_\_\_\_\_ NWI Classification: PSS  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_  
 Are Vegetation \_\_\_\_, Soil \_\_\_\_, or Hydrology \_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

Hydrophytic Vegetation Present? Yes <u>X</u> No ____ Hydric Soil Present? Yes <u>X</u> No ____ Wetland Hydrology Present? Yes <u>X</u> No ____	<p align="center"><b>Is the Sampled Area within a Wetland?</b></p> Yes <u>X</u> No ____
Remarks: Median of I-95	

**HYDROLOGY**

<p><b>Wetland Hydrology Indicators:</b>                  Primary Indicators (minimum of one is required; check all that apply)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%; border: none;"><u>X</u> Surface Water (A1)</td> <td style="width:50%; border: none;">True Aquatic Plants (B14)</td> </tr> <tr> <td style="border: none;"><u>X</u> High Water Table (A2)</td> <td style="border: none;"><u>X</u> Hydrogen Sulfide Odor (C1)</td> </tr> <tr> <td style="border: none;"><u>X</u> Saturation (A3)</td> <td style="border: none;"><u>X</u> Oxidized Rhizospheres on Living Roots (C3)</td> </tr> <tr> <td style="border: none;"><u>X</u> Water Marks (B1)</td> <td style="border: none;"><u>X</u> Presence of Reduced Iron (C4)</td> </tr> <tr> <td style="border: none;"><u>X</u> Sediment Deposits (B2)</td> <td style="border: none;">Recent Iron Reduction in Tilled Soils (C6)</td> </tr> <tr> <td style="border: none;">____ Drift Deposits (B3)</td> <td style="border: none;">Thin Muck Surface (C7)</td> </tr> <tr> <td style="border: none;">____ Algal Mat or Crust (B4)</td> <td style="border: none;">Other (Explain in Remarks)</td> </tr> <tr> <td style="border: none;">____ Iron Deposits (B5)</td> <td></td> </tr> <tr> <td style="border: none;">____ Inundation Visible on Aerial Imagery (B7)</td> <td></td> </tr> <tr> <td style="border: none;"><u>X</u> Water-Stained Leaves (B9)</td> <td></td> </tr> <tr> <td style="border: none;"><u>X</u> Aquatic Fauna (B13)</td> <td></td> </tr> </table>	<u>X</u> Surface Water (A1)	True Aquatic Plants (B14)	<u>X</u> High Water Table (A2)	<u>X</u> Hydrogen Sulfide Odor (C1)	<u>X</u> Saturation (A3)	<u>X</u> Oxidized Rhizospheres on Living Roots (C3)	<u>X</u> Water Marks (B1)	<u>X</u> Presence of Reduced Iron (C4)	<u>X</u> Sediment Deposits (B2)	Recent Iron Reduction in Tilled Soils (C6)	____ Drift Deposits (B3)	Thin Muck Surface (C7)	____ Algal Mat or Crust (B4)	Other (Explain in Remarks)	____ Iron Deposits (B5)		____ Inundation Visible on Aerial Imagery (B7)		<u>X</u> Water-Stained Leaves (B9)		<u>X</u> Aquatic Fauna (B13)		<p>Secondary Indicators (minimum of two required)</p> <table style="width:100%; border: none;"> <tr><td style="border: none;">____ Surface Soil Cracks (B6)</td></tr> <tr><td style="border: none;">____ Sparsely Vegetated Concave Surface (B8)</td></tr> <tr><td style="border: none;"><u>X</u> Drainage Patterns (B10)</td></tr> <tr><td style="border: none;">____ Moss Trim Lines (B16)</td></tr> <tr><td style="border: none;">____ Dry-Season Water Table (C2)</td></tr> <tr><td style="border: none;">____ Crayfish Burrows (C8)</td></tr> <tr><td style="border: none;">____ Saturation Visible on Aerial Imagery (C9)</td></tr> <tr><td style="border: none;">____ Stunted or Stressed Plants (D1)</td></tr> <tr><td style="border: none;"><u>X</u> Geomorphic Position (D2)</td></tr> <tr><td style="border: none;">____ Shallow Aquitard (D3)</td></tr> <tr><td style="border: none;">____ Microtopographic Relief (D4)</td></tr> <tr><td style="border: none;"><u>X</u> FAC-Neutral Test (D5)</td></tr> </table>	____ Surface Soil Cracks (B6)	____ Sparsely Vegetated Concave Surface (B8)	<u>X</u> Drainage Patterns (B10)	____ Moss Trim Lines (B16)	____ Dry-Season Water Table (C2)	____ Crayfish Burrows (C8)	____ Saturation Visible on Aerial Imagery (C9)	____ Stunted or Stressed Plants (D1)	<u>X</u> Geomorphic Position (D2)	____ Shallow Aquitard (D3)	____ Microtopographic Relief (D4)	<u>X</u> FAC-Neutral Test (D5)
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<p><b>Field Observations:</b></p> Surface Water Present? Yes <u>X</u> No ____ Depth (inches): <u>2</u> Water Table Present? Yes <u>X</u> No ____ Depth (inches): <u>3</u> Saturation Present? Yes <u>X</u> No ____ Depth (inches): <u>0</u> (includes capillary fringe)	<p align="center"><b>Wetland Hydrology Present?</b> Yes <u>X</u> No ____</p>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Five Strata) – Use scientific names of plants.**

<p><b>Tree Stratum (Plot size: ) % Cover Species? Status</b></p> <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:35%;"></th> <th colspan="3" style="text-align: center;">Absolute Dominant Indicator</th> </tr> </thead> <tbody> <tr><td>1. _____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>2. _____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>3. _____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>4. _____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>5. _____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>6. _____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>7. _____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td colspan="4" style="text-align: center;">_____ 0 = Total Cover</td></tr> </tbody> </table> <p><b>Sapling Stratum (Plot size: ) _____</b></p> <table style="width:100%; border-collapse: collapse;"> <tbody> <tr><td>1. _____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>2. _____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>3. _____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>4. _____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>5. _____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>6. _____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>7. _____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td colspan="4" style="text-align: center;">_____ 0 = Total Cover</td></tr> </tbody> </table> <p><b>Shrub Stratum (Plot size: ) _____</b></p> <table style="width:100%; 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(7.6 cm) or larger in diameter at breast height (DBH).</b></p> <p><b>Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.</b></p> <p><b>Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.</b></p> <p><b>Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately _____</b></p> <hr/> <p style="text-align: center;"><b>Hydrophytic Vegetation Present?</b>      Yes <u>X</u>      No _____</p>	Total % Cover of:		Multiply by:	OBL species	_____	x 1 = _____	FACW species	_____	X 2 = _____	FAC species	_____	X 3 = _____	FACU species	_____	X 4 = _____	UPL species	_____	X 5 = _____	Column Totals:	_____ (A)	_____ (B)
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# Stream Assessment Form (Form 1)

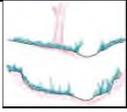
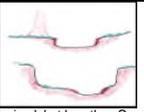
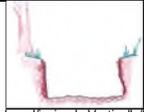
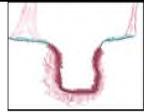
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	1-1	20	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.0</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	<b>NOTES&gt;&gt; Road margin</b>	
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	100%					100%		
	Score >								
<b>Left Bank</b>	% Riparian Area>	100%					100%		
	Score >								
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>0.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>0.50</b>	<b>0.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	<b>NOTES&gt;&gt; Lacking varied substrate, water velocity, woody/leafy debris, shade, riffles.</b>
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	
					<b>0.50</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	1-1	20	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabiions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>Culvert crossings, grading, riprap**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**0.70**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >> 0.74**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >> 15**

CR = RCI X LF X IF

**INSERT PHOTOS:**



965

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

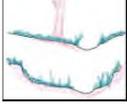
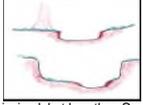
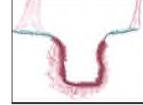
Unified Stream Methodology for use in Virginia

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Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	1-2	125	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>1.6</b>
<b>NOTES&gt;&gt;</b>	<b>Marl/bedrock stream bed, scouring likely from flash flow events</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.50</b>

**NOTES>>** Few to no pool sequences, heavy sediment w/abundant iron-oxidizing bacteria visible (i.e. potentially LWQ).

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	1-2	125	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>Stormwater inputs (concrete flume)**

	Conditional Category						
	Negligible	Minor	Moderate	Severe			
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.		60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>	<b>1.50</b>

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >> 1.02**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >> 128**

CR = RCI X LF X IF

**INSERT PHOTOS:**



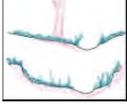
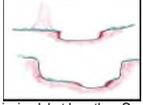
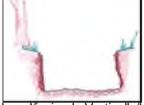
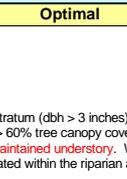
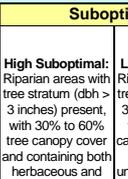
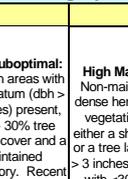
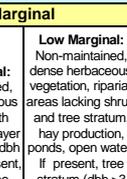
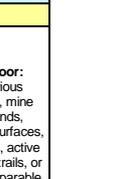
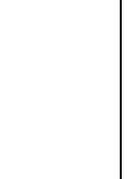
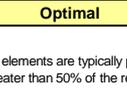
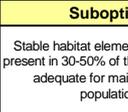
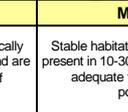
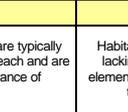
983 / 984 US / DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor	
4673	I-95 Corridor Study	Stafford		02070011	03-2012	1-3	75	1	
Name(s) of Evaluator(s)		Stream Name and Information							
Mark Dennis		Unnamed tributary to Rappahannock River							
<b>1. Channel Condition:</b> Assess the cross-section of the stream and prevailing condition (erosion, aggradation)									
<b>Conditional Category</b>									
<b>Channel Condition</b>	<b>Optimal</b>	<b>Suboptimal</b>	<b>Marginal</b>	<b>Poor</b>	<b>Severe</b>				
									
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.				
<b>Score</b>	3	2.4	2	1.6	1				
<b>NOTES&gt;&gt;</b>									
<b>2. RIPARIAN BUFFERS:</b> Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)									
<b>Conditional Category</b>									
<b>Riparian Buffers</b>	<b>Optimal</b>	<b>Suboptimal</b>		<b>Marginal</b>		<b>Poor</b>		<b>NOTES&gt;&gt;</b>	
									
	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	1.5	High 1.2	Low 1.1	High 0.85	Low 0.75	High 0.6	Low 0.5		
0. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 1. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 2. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	100%					100%		
	Score >	1.5							
<b>Left Bank</b>	% Riparian Area>	100%					100%		
	Score >	1.5							
							Cl= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank Cl &gt;</b>	<b>1.50</b>	<b>Cl</b>
							<b>Lt Bank Cl &gt;</b>	<b>1.50</b>	<b>1.50</b>
<b>3. INSTREAM HABITAT:</b> Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.									
<b>Conditional Category</b>									
<b>Instream Habitat/ Available Cover</b>	<b>Optimal</b>	<b>Suboptimal</b>	<b>Marginal</b>	<b>Poor</b>					
									
	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.					
<b>Score</b>	1.5	1.2	0.9	0.5					
<b>NOTES&gt;&gt; Moderate sedimentation w/abundant iron-oxidizing bacteria visible (i.e. potentially LWQ).</b>									
<b>Cl</b>									
<b>1.20</b>									

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	1-3	75	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.16**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **87**

CR = RCI X LF X IF

**INSERT PHOTOS:**



989 DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

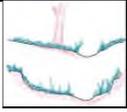
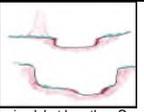
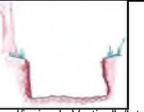
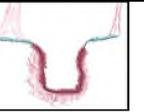
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	1-4	280	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**0. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>1.0</b>
<b>NOTES&gt;&gt;</b>	<b>Stream bed below average rooting depth, majority of banks vertical/undercut</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.50</b>

**NOTES>> Lack of riffle-pool sequencing, variable substrate and water depths.**

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	1-4	280	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor	Moderate	Severe	
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **0.90**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **252**

CR = RCI X LF X IF

**INSERT PHOTOS:**



991 DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

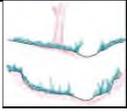
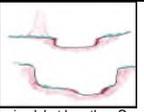
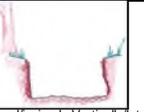
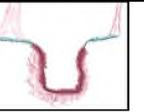
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-1	550	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>1.6</b>
<b>NOTES&gt;&gt;</b>	<b>Stream bed below average rooting depth on RB, majority of banks vertical/undercut</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	<b>70%</b>	<b>30%</b>				<b>100%</b>		
	Score >	<b>1.2</b>	<b>0.5</b>						
<b>Left Bank</b>	% Riparian Area >	<b>70%</b>	<b>30%</b>				<b>100%</b>		
	Score >	<b>1.2</b>	<b>0.5</b>						
							CI = (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>0.99</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>0.99</b>	<b>0.99</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.90</b>

**NOTES>> Lack of riffle-pool sequencing, variable substrate and water depths.**

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-1	550	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor	Moderate	Severe	
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.00

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 550

CR = RCI X LF X IF

**INSERT PHOTOS:**



1010 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

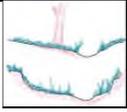
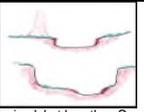
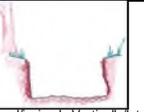
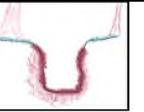
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-2	450	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

## 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.0</b>
<b>NOTES&gt;&gt;</b>	<b>Incised but stabilizing</b>					

## 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
				<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>50%</b>	<b>50%</b>				<b>100%</b>		
	Score >	<b>1.2</b>	<b>0.5</b>						
<b>Left Bank</b>	% Riparian Area>	<b>90%</b>	<b>10%</b>				<b>100%</b>		
	Score >	<b>1.2</b>	<b>0.5</b>						
								CI= (Sum % RA * Scores*0.01)/2	
							<b>Rt Bank CI &gt;</b>	<b>0.85</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.13</b>	<b>0.99</b>

## 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>

**NOTES>> Lack of variable substrate and water depths.**

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-2	450	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor	Moderate	Severe	
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.14**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **513**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1018 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

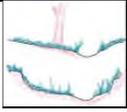
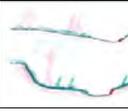
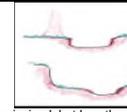
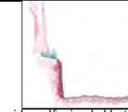
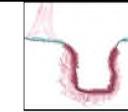
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-3	115	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

## 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	Severe
<b>Channel Condition</b>					
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>
<b>NOTES&gt;&gt;</b>	<b>Low incision</b>				

CI

## 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category						
	Optimal	Suboptimal	Marginal	Poor			
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>

- Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
- Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
- Enter the % Riparian Area and Score for each riparian category in the blocks below.

		Ensure the sums of % Riparian Blocks equal 100					
<b>Right Bank</b>	% Riparian Area>	50%	50%				100%
	Score >	1.2	0.5				
<b>Left Bank</b>	% Riparian Area>	90%	10%				100%
	Score >	1.2	0.5				

CI= (Sum % RA \* Scores^0.01)/2

Rt Bank CI >	0.85	CI
Lt Bank CI >	1.13	0.99

## 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category			
	Optimal	Suboptimal	Marginal	Poor
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>

**NOTES>> High embeddedness (cemented channel bed); lack of variable substrate, woody/leafy debris, and water depths.**

CI

0.50

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-3	115	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>> Cemented channel with no natural meander pattern forming.**

Channel Alteration	Conditional Category						
	Negligible	Minor	Moderate	Severe			
	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.		Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	1.5	1.3	1.1	0.9	0.7	0.5	<b>0.50</b>

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >> 0.88**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >> 101**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1032 DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

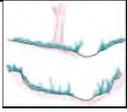
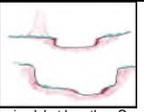
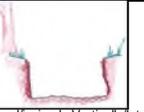
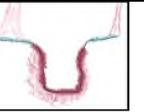
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-4A	120	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.0</b>
<b>NOTES&gt;&gt;</b>	<b>2' headcut at bottom of reach near river's edge</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							
	Optimal	Suboptimal	Marginal	Poor				
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	
				<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>	
	1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100	
<b>Right Bank</b>	% Riparian Area >	<b>90%</b>	<b>10%</b>				<b>100%</b>	
	Score >	<b>1.2</b>	<b>0.6</b>					
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>	<b>CI</b>
	Score >	<b>1.2</b>						<b>1.14</b>
								<b>1.20</b>
								<b>1.17</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	<b>CI</b>
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>0.50</b>

**NOTES>> Lack of consistent riffle-pool sequencing, variable substrate, and water depths.**

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-4A	120	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.03

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 124

CR = RCI X LF X IF

**INSERT PHOTOS:**



1034 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

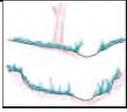
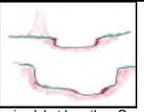
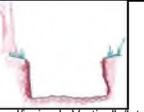
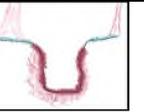
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-4B	245	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>90%</b>	<b>10%</b>				<b>100%</b>		
	Score >	<b>1.2</b>	<b>0.6</b>						
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.2</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.14</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.20</b>	<b>1.17</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>0.50</b>

**NOTES>> Lack of consistent riffle-pool sequencing, variable substrate, and water depths.**

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-4B	245	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor	Moderate	Severe	
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.11

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 272

CR = RCI X LF X IF

**INSERT PHOTOS:**



1037 DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

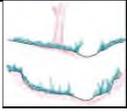
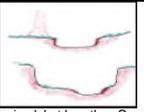
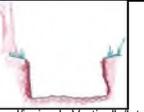
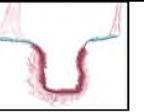
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-5A	100	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	Severe
<b>Channel Condition</b>					
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>
<b>NOTES&gt;&gt;</b>					

CI

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	<b>NOTES&gt;&gt;</b>	
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	50%	50%				100%		
	Score >	1.2	0.6						
<b>Left Bank</b>	% Riparian Area>	100%					100%		
	Score >	1.2							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>0.90</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.20</b>	<b>1.05</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	<b>NOTES&gt;&gt; Lack of consistent riffle-pool sequencing, variable substrate, and water depths.</b>
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	
					<b>CI</b>
					<b>0.50</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-5A	100	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor	Moderate	Severe	
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 0.93

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 93

CR = RCI X LF X IF

**INSERT PHOTOS:**



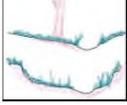
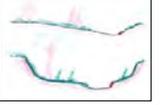
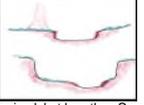
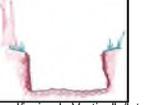
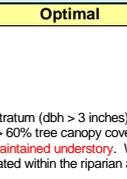
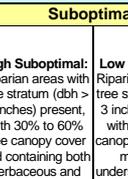
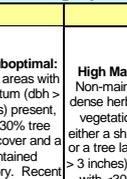
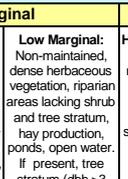
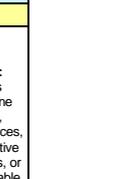
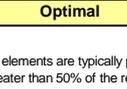
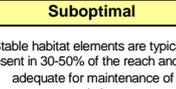
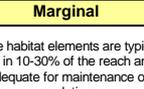
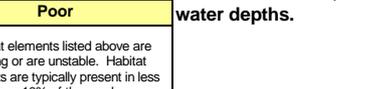
1040 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor	
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-5B	1392	1	
Name(s) of Evaluator(s)		Stream Name and Information							
Mark Dennis		Unnamed tributary to Rappahannock River							
<b>1. Channel Condition:</b> Assess the cross-section of the stream and prevailing condition (erosion, aggradation)									
Conditional Category									
<b>Channel Condition</b>	<b>Optimal</b>	<b>Suboptimal</b>	<b>Marginal</b>	<b>Poor</b>	<b>Severe</b>				
									
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.				
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>				
<b>NOTES&gt;&gt;</b>		<b>Stable roadside drainage</b>							
<b>2. RIPARIAN BUFFERS:</b> Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)									
Conditional Category									
<b>Riparian Buffers</b>	<b>Optimal</b>	<b>Suboptimal</b>		<b>Marginal</b>		<b>Poor</b>		<b>NOTES&gt;&gt;</b>	
									
	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>15%</b>	<b>85%</b>				<b>100%</b>		
	Score >	<b>0.6</b>	<b>0.5</b>						
<b>Left Bank</b>	% Riparian Area>	<b>10%</b>	<b>90%</b>				<b>100%</b>		
	Score >	<b>0.6</b>	<b>1.2</b>						
							Cl= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank Cl &gt;</b>	<b>0.52</b>	<b>Cl</b>
							<b>Lt Bank Cl &gt;</b>	<b>1.14</b>	<b>0.83</b>
<b>3. INSTREAM HABITAT:</b> Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.									
Conditional Category									
<b>Instream Habitat/ Available Cover</b>	<b>Optimal</b>	<b>Suboptimal</b>	<b>Marginal</b>	<b>Poor</b>					
									
	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.					
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>					
							<b>NOTES&gt;&gt; Lack of riffle-pool sequencing, variable substrate, and water depths.</b>	<b>Cl</b>	
								<b>0.50</b>	

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-5B	1392	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

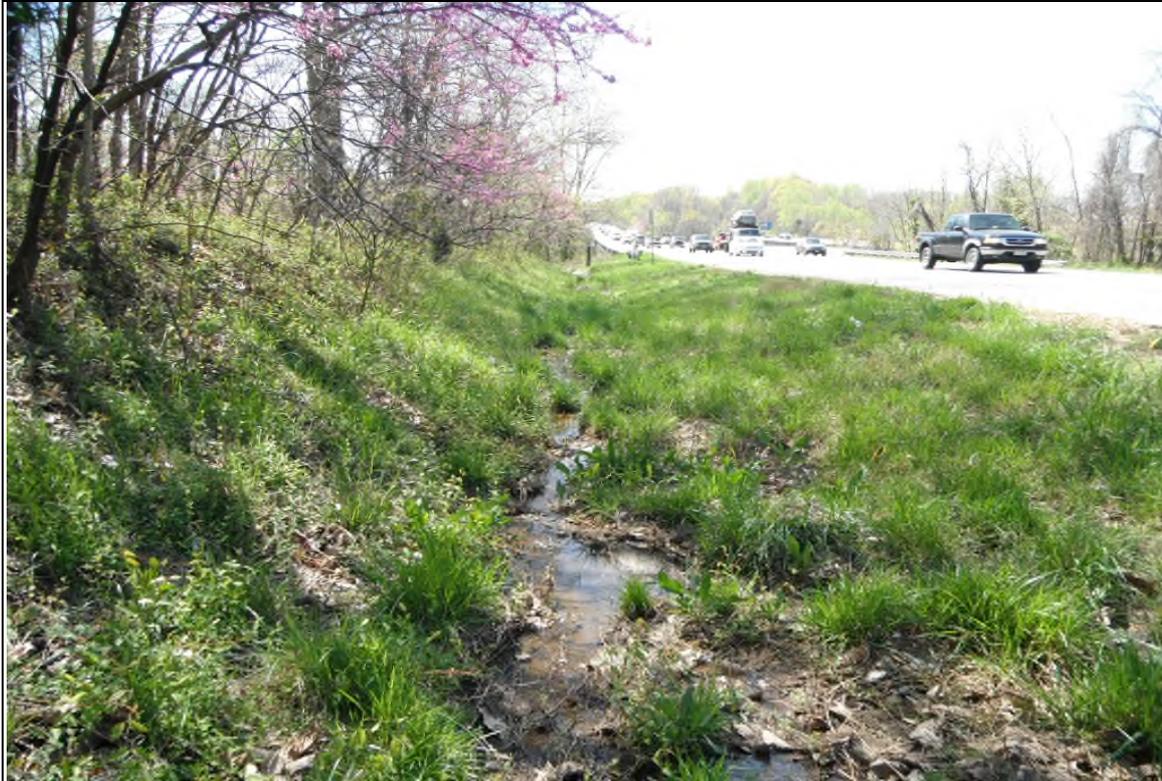
**THE REACH CONDITION INDEX (RCI) >>** **1.05**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **1462**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1043 DS

**DESCRIBE PROPOSED IMPACT:**

# Ephemeral Stream Assessment Form (Form 1a)

Unified Stream Methodology for use in Virginia

For use in ephemeral streams

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-4A	120	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category								NOTES>>
Riparian Buffers	Optimal	Suboptimal		Marginal		Poor		
	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and an non-maintained understory. Wetlands areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with >30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	
<b>Condition Scores</b>	<b>1.5</b>	<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>	
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100		
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>	
	Score >	<b>1.2</b>						
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>				<b>100%</b>		
	Score >	<b>1.5</b>						
							Cl= (Sum % RA * Scores*0.01)/2	
							Rt Bank Cl >	<b>1.20</b>
							Lt Bank Cl >	<b>1.50</b>
							<b>Cl</b>	<b>1.35</b>

## REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

<b>THE REACH CONDITION INDEX (RCI) &gt;&gt;</b>	<b>0.68</b>
RCI= (Riparian Cl)/2	
<b>COMPENSATION REQUIREMENT (CR) &gt;&gt;</b>	<b>82</b>
CR = RCI X LF X IF	

INSERT PHOTOS:



# Stream Assessment Form (Form 1)

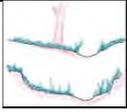
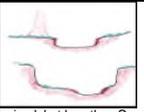
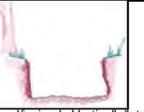
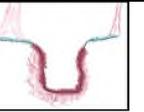
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-7	160	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>1.0</b>
<b>NOTES&gt;&gt;</b>	<b>Vert/lat. unstable, highly incised, substrate embedded in fine sediment; headcuts at top and bottom of reach</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	50%	50%				100%		
	Score >	1.5	0.6						
<b>Left Bank</b>	% Riparian Area >	100%					100%		
	Score >	1.5							
								CI = (Sum % RA * Scores*0.01)/2	
							<b>Rt Bank CI &gt;</b>	<b>1.05</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.28</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.90</b>

**NOTES>> Lack of riffle-pool sequencing, variable substrate, and water depths.**

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-7	160	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **0.94**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **150**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1101 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

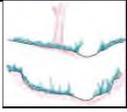
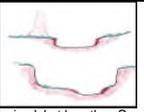
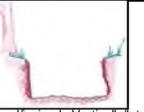
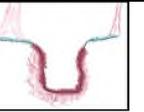
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-8	160	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							
	Optimal	Suboptimal	Marginal	Poor				
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	
				<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>	
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100		
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>	
	Score >	<b>1.5</b>						
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>	<b>CI</b>
	Score >	<b>1.5</b>						<b>1.50</b>
								CI= (Sum % RA * Scores^0.01)/2

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>

**NOTES>>** Moderate riffle-pool sequencing and water depths.

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-8	160	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor		Moderate	Severe
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.44**

RCI= (Sum of all CIs)/5

**COMPENSATION REQUIREMENT (CR) >>** **230**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1094 DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

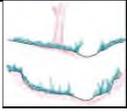
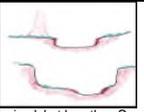
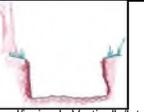
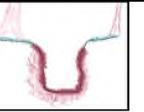
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-9	120	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.0</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.90</b>

**NOTES>> Woody/leafy debris, shade, stable substrate.**

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-9	120	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >> 1.18**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >> 142**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1103 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

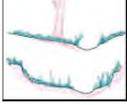
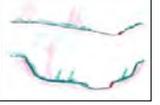
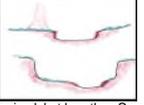
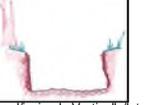
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-10A	120	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>1.6</b>
<b>NOTES&gt;&gt;</b>	<b>Vert. unstable; bedrock prevalent in a majority of stream bed</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.90</b>

**NOTES>>** Moderate riffle-pool sequencing; some woody/leafy debris

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-10A	120	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor	Moderate	Severe	
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.10

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 132

CR = RCI X LF X IF

**INSERT PHOTOS:**



1108 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

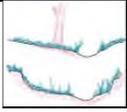
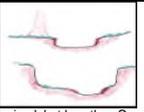
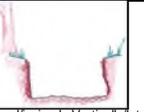
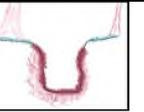
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-10B	585	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

### 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>	<b>Bedrock and large boulders prevalent in a majority of stream bed</b>					

### 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

### 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>

**NOTES>> Varied substrate, water depth, and velocities; woody/leafy debris, stable riffle-pool complexes**

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-10B	585	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.44**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **842**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1115 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

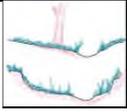
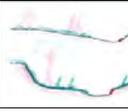
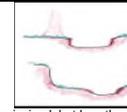
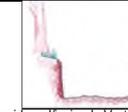
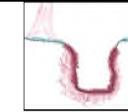
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-11	80	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

## 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	Severe
<b>Channel Condition</b>					
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>
<b>NOTES&gt;&gt;</b>	<b>Bedrock and large boulders prevalent, with significant and varied alluvial deposition; mid-channel bar</b>				

CI

2.4

## 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	100%					100%		
	Score >	1.5							
<b>Left Bank</b>	% Riparian Area >	100%					100%		
	Score >	1.5							
							CI = (Sum % RA * Scores*0.01)/2		
							Rt Bank CI >	1.50	CI
							Lt Bank CI >	1.50	1.50

## 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	

**NOTES>> Varied substrate, water depth, and velocities; woody debris, stable riffle-pool complexes**

CI

1.50

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-11	80	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.38**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **110**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1125/1126 US/DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

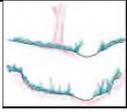
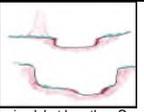
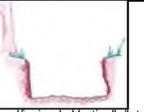
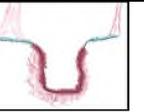
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-12	120	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>	<b>Bedrock and smaller boulders prevalent, with significant and varied alluvial deposition</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	<b>NOTES&gt;&gt; Varied substrate, water depth, and velocities; woody debris, stable riffle-pool complexes</b>
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.50</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-12	120	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.50**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **180**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1124 DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

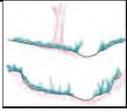
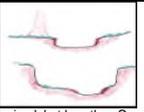
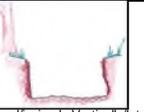
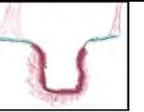
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-13A	100	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>	<b>Bedrock and large boulders prevalent</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI = (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.50</b>

**NOTES>> Varied substrate, water depth, and velocities; stable riffle-pool complexes**

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-13A	100	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor	Moderate	Severe	
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.50

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 150

CR = RCI X LF X IF

**INSERT PHOTOS:**



1120 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

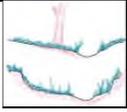
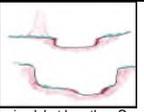
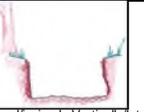
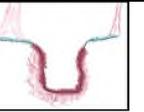
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-13B	125	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>	<b>Bedrock and large boulders prevalent</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							
	Optimal	Suboptimal	Marginal		Poor			
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	<b>NOTES&gt;&gt; Slightly less dense canopy</b>
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>	
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.							Ensure the sums of % Riparian Blocks equal 100	
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>	
	Score >	<b>1.2</b>						
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>	<b>CI</b>
	Score >	<b>1.2</b>						<b>1.20</b>
								$CI = (\text{Sum } \% RA * \text{Scores} * 0.01) / 2$

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	<b>NOTES&gt;&gt; Varied substrate, water depth, and velocities; woody/leafy debris, stable riffle-pool complexes</b>
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.50</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-13A	125	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>> 30" RCP outfall on left bank at top of reach**

	Conditional Category						
	Negligible	Minor	Moderate	Severe			
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.		60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>	<b>1.50</b>

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >> 1.44**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >> 180**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

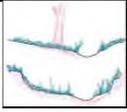
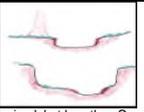
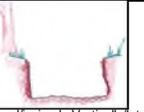
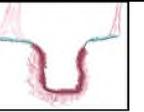
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-14	180	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>	<b>Bedrock and large boulders prevalent</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							
	Optimal	Suboptimal	Marginal		Poor			
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	<b>NOTES&gt;&gt; Slightly less dense canopy</b>
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>	
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100		
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>	
	Score >	<b>1.2</b>						
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>	<b>CI</b>
	Score >	<b>1.2</b>					<b>1.20</b>	<b>1.20</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	<b>NOTES&gt;&gt; Varied substrate, water depth, and velocities; woody/leafy debris, stable riffle-pool complexes</b>
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.50</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-14	180	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.44

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 259

CR = RCI X LF X IF

**INSERT PHOTOS:**



1154 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

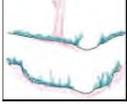
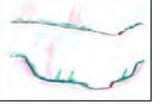
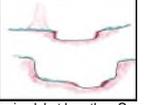
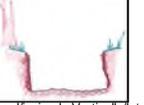
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-15A	200	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	Severe
<b>Channel Condition</b>					
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>
<b>NOTES&gt;&gt;</b>	<b>Boulders prevalent; overwidened but with some floodplain connectivity; some small bar formations</b>				

CI

2.4

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category						
	Optimal	Suboptimal	Marginal		Poor		
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100	
<b>Right Bank</b>	% Riparian Area >	100%					100%
	Score >	1.5					
<b>Left Bank</b>	% Riparian Area >	100%					100%
	Score >	1.5					
							CI = (Sum % RA * Scores*0.01)/2
						<b>Rt Bank CI &gt;</b>	<b>1.50</b>
						<b>Lt Bank CI &gt;</b>	<b>1.50</b>

CI

1.50

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category			
	Optimal	Suboptimal	Marginal	Poor
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>

**NOTES>> Varied substrate, some areas of undercut banks w/root mats; woody/leafy debris**

CI

1.20

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-15A	200	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.32

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 264

CR = RCI X LF X IF

**INSERT PHOTOS:**



1158 DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

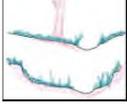
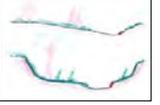
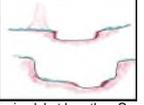
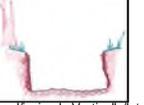
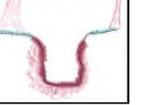
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-15B	110	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>	<b>Overwidened but vegetated banks 80% stable; low gradient; low floodplain connectivity, early bar features beginning to form; bedrock/boulder cascade at top of reach</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							
	Optimal	Suboptimal	Marginal		Poor			
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>	
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100		
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>	
	Score >	<b>1.5</b>						
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>	<b>CI</b>
	Score >	<b>1.5</b>						<b>1.50</b>
								CI= (Sum % RA * Scores*0.01)/2

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.50</b>

**NOTES>>** Varied substrate, some areas of undercut banks w/root mats; woody/leafy debris

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-15B	110	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

Channel Alteration	Conditional Category						
	Negligible	Minor	Moderate	Severe			
	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.		Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	1.5	1.3	1.1	0.9	0.7	0.5	<b>1.50</b>

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

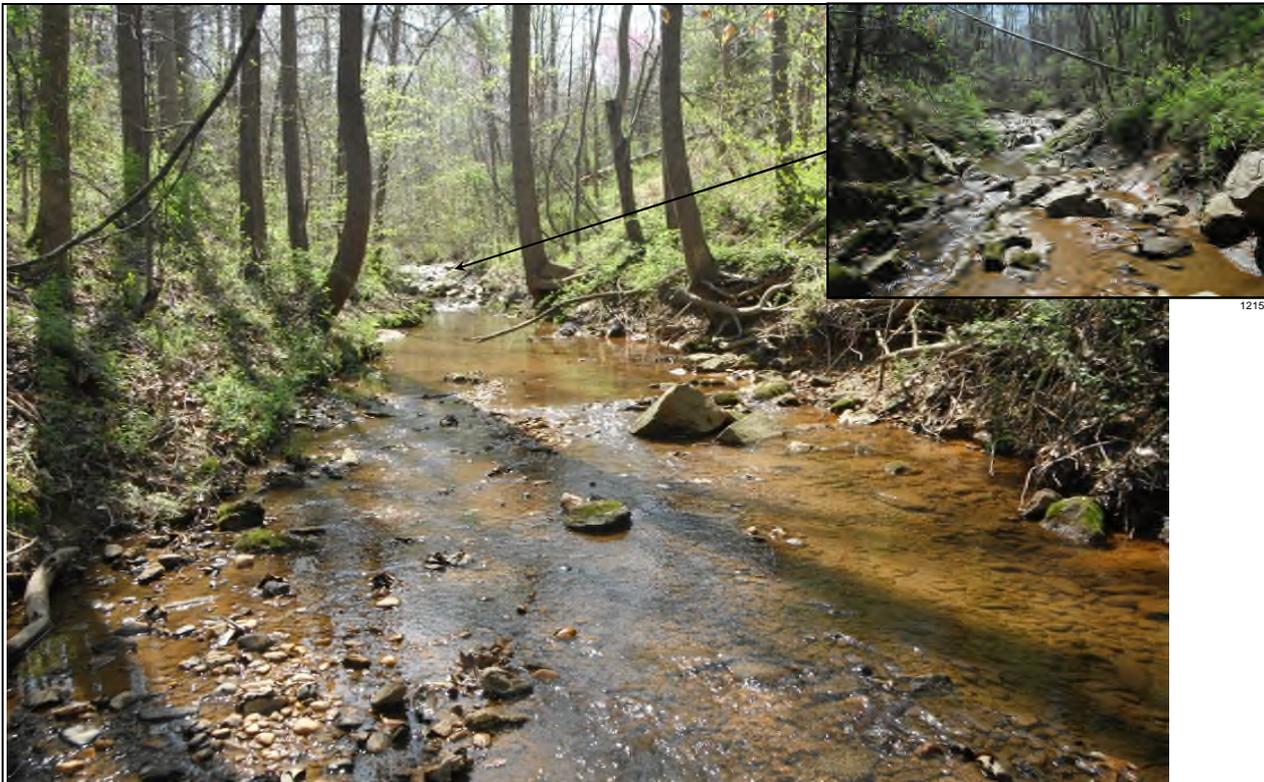
**THE REACH CONDITION INDEX (RCI) >>** **1.38**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **152**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

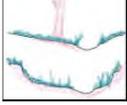
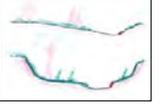
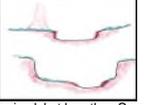
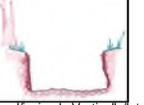
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-15C	140	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	CI
<b>Score</b>	3	2.4	2	1.6	1	2.4
<b>NOTES&gt;&gt;</b>	Bedrock prevalent; vegetated banks 90% stable; limited floodplain connectivity					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	<b>NOTES&gt;&gt;</b> Slightly less dense canopy	
<b>Condition Scores</b>		High 1.2	Low 1.1	High 0.85	Low 0.75	High 0.6	Low 0.5		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	100%					100%		
	Score >	1.2							
<b>Left Bank</b>	% Riparian Area >	100%					100%		
	Score >	1.2							
CI = (Sum % RA * Scores*0.01)/2									
							Rt Bank CI >	1.20	CI
							Lt Bank CI >	1.20	1.20

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	<b>NOTES&gt;&gt;</b> Varied substrate w/moderate sedimentation; shade; woody/leafy debris
<b>Score</b>	1.5	1.2	0.9	0.5	
					CI
					1.20

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-15C	140	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>> 8' box culvert and wing wall at top of reach (LB)**

	Conditional Category						
	Negligible	Minor	Moderate	Severe			
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.		60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>	<b>1.30</b>

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >> 1.22**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >> 171**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1213 (Box culv.)

1211 DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

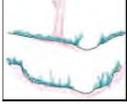
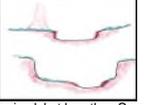
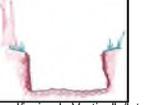
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-16	350	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	Severe
<b>Channel Condition</b>					
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>
<b>NOTES&gt;&gt;</b>	<b>Numerous bedrock step-pool features; ~10-20% erosional areas; banks generally well-vegetated</b>				

CI

2.4

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	<b>NOTES&gt;&gt;</b>	
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	100%					100%		
	Score >	1.5							
<b>Left Bank</b>	% Riparian Area >	100%					100%		
	Score >	1.5							
								CI = (Sum % RA * Scores*0.01)/2	
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category			
	Optimal	Suboptimal	Marginal	Poor
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>

**NOTES>> Varied substrate, some areas of undercut banks w/root mats; woody/leafy debris; small step pools**

CI

1.20

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-16	350	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.32

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 462

CR = RCI X LF X IF

**INSERT PHOTOS:**



1164 US

**DESCRIBE PROPOSED IMPACT:**

# Ephemeral Stream Assessment Form (Form 1a)

Unified Stream Methodology for use in Virginia

For use in ephemeral streams

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-4A	120	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Riparian Buffers	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and an non-maintained understory. Wetlands areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with >30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
<b>Condition Scores</b>	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

- Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
- Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
- Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

<b>Right Bank</b>	% Riparian Area>	10%	90%				100%	
	Score >	0.85	1.5					
<b>Left Bank</b>	% Riparian Area>	10%	90%				100%	
	Score >	0.85	1.5					
								Cl= (Sum % RA * Scores*0.01)/2
								Rt Bank Cl > 1.44
								Lt Bank Cl > 1.44
								<b>Cl</b>

## REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

<b>THE REACH CONDITION INDEX (RCI) &gt;&gt;</b>	<b>0.72</b>
RCI= (Riparian Cl)/2	
<b>COMPENSATION REQUIREMENT (CR) &gt;&gt;</b>	<b>86</b>
CR = RCI X LF X IF	

INSERT PHOTOS:



# Stream Assessment Form (Form 1)

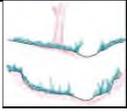
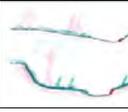
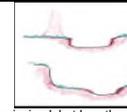
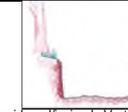
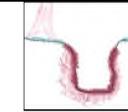
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-17	80	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	Severe
<b>Channel Condition</b>					
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>
<b>NOTES&gt;&gt;</b>	<b>Vert. &amp; lat. unstable; 2' headcut at top of reach at study area limit; streambed within rooting depth</b>				

CI

1.6

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.							Ensure the sums of % Riparian Blocks equal 100		
<b>Right Bank</b>	% Riparian Area>	<b>10%</b>	<b>90%</b>				<b>100%</b>		
	Score >	<b>0.85</b>	<b>1.5</b>						
<b>Left Bank</b>	% Riparian Area>	<b>10%</b>	<b>90%</b>				<b>100%</b>		
	Score >	<b>0.85</b>	<b>1.5</b>						
							CI= (Sum % RA * Scores*0.01)/2		
							Rt Bank CI >	<b>1.44</b>	<b>CI</b>
							Lt Bank CI >	<b>1.44</b>	<b>1.44</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category			
	Optimal	Suboptimal	Marginal	Poor
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>

**NOTES>> Varied substrate, some areas of undercut banks w/root mats; woody/leafy debris; small step pools**

CI

1.20

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-17	80	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >> 1.15**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >> 92**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1174 (Headcut)

1173 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

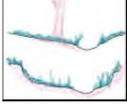
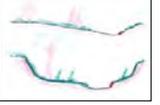
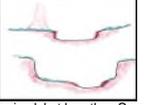
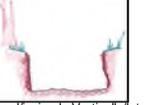
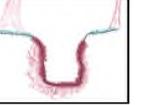
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-18	120	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.0</b>
<b>NOTES&gt;&gt;</b>	<b>Overwidened but generally stabilizing; benches forming from old sloughing</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
				<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.2</b>							
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.2</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.20</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.20</b>	<b>1.20</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>

**NOTES>>** Varied substrate, some areas of undercut banks w/root mats; woody/leafy debris;

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-18	120	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.18

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 142

CR = RCI X LF X IF

**INSERT PHOTOS:**



1181 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

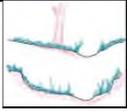
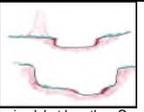
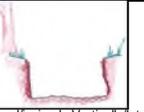
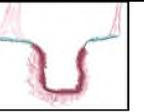
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-19	160	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>	<b>Relatively steep gradient; bedrock and large boulders prevalent; some debris in channel</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>0.90</b>

**NOTES>> Large boulder/bedrock cascade with some step-pools; fine sediment with minimal, embedded gravels**

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-18	160	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.38

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 221

CR = RCI X LF X IF

**INSERT PHOTOS:**



1184 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

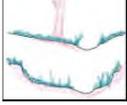
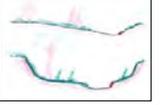
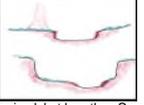
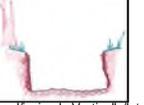
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-20	300	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>	<b>Stable, vegetated banks; benches forming</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.50</b>

**NOTES>>** Varied substrate; woody/leafy debris; stable substrate and features; shade

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-20	300	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.50

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 450

CR = RCI X LF X IF

**INSERT PHOTOS:**



1193 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

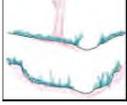
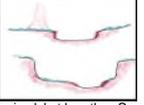
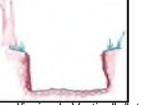
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-21	80	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

### 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	Severe
<b>Channel Condition</b>					
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>
<b>NOTES&gt;&gt;</b>	<b>Bedrock and boulders, mixed cobble-gravel bed; 60% stable, vegetated banks; spot erosion ~40%; benches forming</b>				

CI

### 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category						
	Optimal	Suboptimal	Marginal	Poor			
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

						Ensure the sums of % Riparian Blocks equal 100	
	% Riparian Area>	100%					100%
<b>Right Bank</b>	Score >	1.5					
						CI= (Sum % RA * Scores*0.01)/2	
<b>Left Bank</b>	% Riparian Area>	100%				100%	
	Score >	1.5					
						<b>Rt Bank CI &gt;</b>	<b>1.50</b>
						<b>Lt Bank CI &gt;</b>	<b>1.50</b>

### 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	

**NOTES>> Varied, stable substrate and features; woody/leafy debris; shade**

CI

1.20

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-21	80	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category						
	Negligible	Minor	Moderate	Severe			
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.		60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>	<b>1.50</b>

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

<b>THE REACH CONDITION INDEX (RCI) &gt;&gt;</b>	<b>1.32</b>
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RCI= (Sum of all CI's)/5

<b>COMPENSATION REQUIREMENT (CR) &gt;&gt;</b>	<b>106</b>
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CR = RCI X LF X IF

**INSERT PHOTOS:**



1197 DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

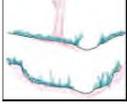
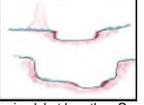
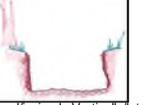
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-22	100	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>	<b>Bedrock and boulders prevalent; moderate gradient; some small bench features forming</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal		Poor				
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>

**NOTES>>** Varied, stable substrate and features; woody/leafy debris; shade

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-22	100	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.44**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **144**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1203 DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

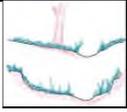
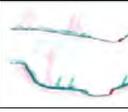
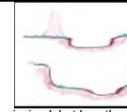
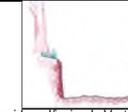
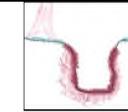
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-23	100	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	Severe
<b>Channel Condition</b>					
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>
<b>NOTES&gt;&gt;</b>	<b>Mixed gravel-cobble-boulder-bedrock substrate; moderate gradient; some small bench features forming</b>				

**CI**  
**2.4**

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category						
	Optimal	Suboptimal	Marginal	Poor			
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100	
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>
	Score >	<b>1.2</b>					
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>
	Score >	<b>1.2</b>					
						CI = (Sum % RA * Scores*0.01)/2	
						<b>Rt Bank CI &gt;</b>	<b>1.20</b>
						<b>Lt Bank CI &gt;</b>	<b>1.20</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category			
	Optimal	Suboptimal	Marginal	Poor
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>

**NOTES>> Varied substrate and water depths; stable features; woody/leafy debris; shade**

**CI**  
**1.20**

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-23	100	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor	Moderate	Severe	
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.26**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **126**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1207 DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

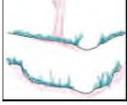
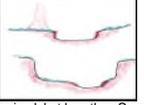
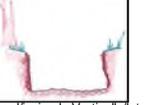
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-24	75	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.2</b>
<b>NOTES&gt;&gt;</b>	<b>Bedrock and boulders prevalent; moderately high gradient; some erosion but banks stabilizing</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							
	Optimal	Suboptimal	Marginal		Poor			
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	<b>NOTES&gt;&gt; Slightly less dense canopy</b>
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>	
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.							Ensure the sums of % Riparian Blocks equal 100	
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>	
	Score >	<b>1.2</b>						
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>	<b>CI</b>
	Score >	<b>1.2</b>					<b>1.20</b>	<b>1.20</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	<b>NOTES&gt;&gt; Widely varied substrate; varied water depths; woody/leafy debris; shade</b>
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	
					<b>1.50</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-24	75	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>> 36" RCP outfall and concrete flume at top of reach**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**0.90**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >> 1.16**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >> 87**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1208 (RCP outfall)

1204 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

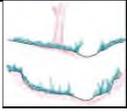
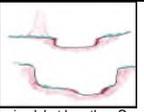
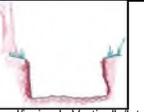
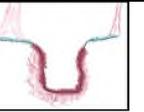
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-25	100	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>	<b>Bedrock/boulder/large cobble prevalent; higher gradient</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal		Poor				
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores*0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.50</b>

**NOTES>> Variable water depths; stable step-pool features; shade**

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-25	100	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.50

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 150

CR = RCI X LF X IF

**INSERT PHOTOS:**



1223 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

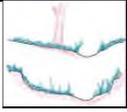
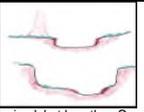
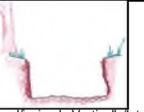
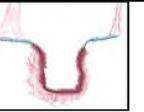
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-26	60	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.0</b>
<b>NOTES&gt;&gt;</b>	<b>Cobble to gravels to fines prevalent</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							
	Optimal	Suboptimal	Marginal		Poor			
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	<b>NOTES&gt;&gt; Slightly less dense canopy</b>
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>	
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.							Ensure the sums of % Riparian Blocks equal 100	
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>	
	Score >	<b>1.2</b>						
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>	<b>CI</b>
	Score >	<b>1.2</b>					<b>1.20</b>	<b>1.20</b>
								$CI = (\text{Sum } \% RA * \text{Scores} * 0.01) / 2$

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	<b>NOTES&gt;&gt; Variable substrate, but lack of varied water velocity/depth</b>
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.90</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-26	60	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.12**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **67**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1231 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

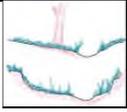
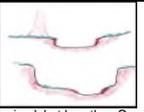
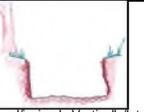
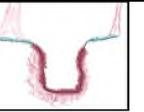
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-27	300	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>	<b>Stabilized banks, but with old root control headcut at top of reach</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal		Poor				
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	<b>NOTES&gt;&gt; Slightly less dense canopy</b>	
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.2</b>							
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.2</b>							
							CI = (Sum % RA * Scores*0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.20</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.20</b>	<b>1.20</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	<b>NOTES&gt;&gt; Low flow; lots of woody/leafy debris, shade, root mats, undercut banks; lack of varied water velocity/depth</b>
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	
					<b>CI</b>
					<b>0.90</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-27	300	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.20

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 360

CR = RCI X LF X IF

**INSERT PHOTOS:**



1237 (Headcut)

1236 DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

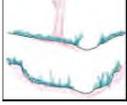
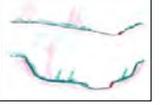
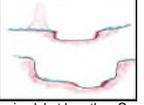
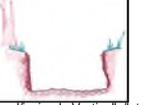
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-28	200	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							
	Optimal	Suboptimal	Marginal	Poor				
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated, non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>	
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100		
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>	
	Score >	<b>1.5</b>						
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>	<b>CI</b>
	Score >	<b>1.5</b>						<b>1.50</b>
								CI= (Sum % RA * Scores^0.01)/2

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>

**NOTES>> Woody/leafy debris, varied water depths and substrate; lack of root mats, undercut banks, shade over channel**

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-28	200	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor	Moderate	Severe	
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.44**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **288**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1239 DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

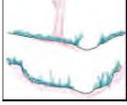
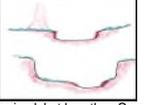
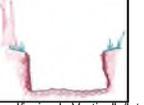
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-29	650	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>	<b>Cobble-gravel bed with occasional massive bedrock/boulders; banks largely stable w significant bar features, some debris</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							
	Optimal	Suboptimal	Marginal		Poor			
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	<b>NOTES&gt;&gt; Slightly less dense canopy</b>
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>	
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100		
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>	
	Score >	<b>1.2</b>						
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>	<b>CI</b>
	Score >	<b>1.2</b>					<b>1.20</b>	<b>1.20</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	<b>NOTES&gt;&gt; Varied substrate and water velocity/depth; shade, stable riffle-pool complexes</b>
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	
					<b>1.50</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	2-29	650	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor	Moderate	Severe	
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.32

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 858

CR = RCI X LF X IF

**INSERT PHOTOS:**



1252 (DS)

1244 DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

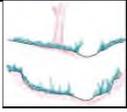
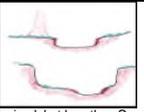
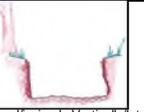
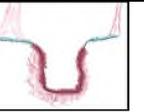
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	3-1	20	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

### 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>	<b>Cobble-gravel bed; banks largely stable; some debris</b>					

### 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.2</b>							
<b>Left Bank</b>	% Riparian Area >	<b>30%</b>	<b>70%</b>				<b>100%</b>		
	Score >	<b>1.1</b>	<b>0.6</b>						
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.20</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>0.75</b>	<b>0.98</b>

### 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>0.90</b>

**NOTES>> Varied substrate and water depths; shade**

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	3-1	20	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>> Culverts at top & bottom, concrete flumes of both banks**

	Conditional Category						
	Negligible	Minor	Moderate	Severe			
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.		60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>	<b>1.10</b>

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

<b>THE REACH CONDITION INDEX (RCI) &gt;&gt;</b>	<b>1.08</b>
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RCI= (Sum of all CIs)/5

<b>COMPENSATION REQUIREMENT (CR) &gt;&gt;</b>	<b>22</b>
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CR = RCI X LF X IF

**INSERT PHOTOS:**



1075 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

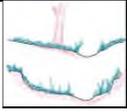
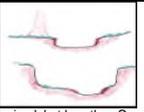
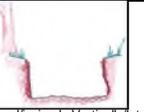
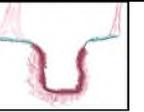
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	3-2	80	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>	<b>Man-made channel</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							
	Optimal	Suboptimal	Marginal	Poor				
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>	
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100		
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>	
	Score >							
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>	
	Score >							
						CI= (Sum % RA * Scores^0.01)/2		
						<b>Rt Bank CI &gt;</b>	<b>1.10</b>	<b>CI</b>
						<b>Lt Bank CI &gt;</b>	<b>1.10</b>	<b>1.10</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.90</b>

**NOTES>> Rip-rap riffle, deep pool with crest of structures limiting migration; shade**

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	3-2	80	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>> Box culverts essentially comprise the entire reach**

	Conditional Category						
	Negligible	Minor	Moderate	Severe			
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.		60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>	<b>0.50</b>

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

<b>THE REACH CONDITION INDEX (RCI) &gt;&gt;</b>	<b>0.98</b>
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RCI= (Sum of all CIs)/5

<b>COMPENSATION REQUIREMENT (CR) &gt;&gt;</b>	<b>78</b>
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CR = RCI X LF X IF

**INSERT PHOTOS:**



1077 DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

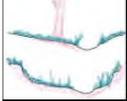
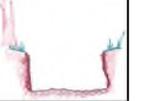
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	3-3	300	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	Severe
<b>Channel Condition</b>					
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.
<b>Score</b>	3	2.4	2	1.6	1
<b>NOTES&gt;&gt;</b>	<b>Man-made rip-rap BMP outfall channel</b>				

CI

2.4

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category						
	Optimal	Suboptimal	Marginal	Poor			
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.
<b>Condition Scores</b>	1.5	High 1.1	Low 1.1	High 0.85	Low 0.75	High 0.6	Low 0.5
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100	
<b>Right Bank</b>	% Riparian Area > Score >	20% 1.2	60% 0.85	20% 0.5			100%
<b>Left Bank</b>	% Riparian Area > Score >	20% 0.85	60% 0.6	20% 0.5			100%
						CI= (Sum % RA * Scores^0.01)/2	
						Rt Bank CI >	0.85
						Lt Bank CI >	0.63

CI

0.74

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category			
	Optimal	Suboptimal	Marginal	Poor
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.
<b>Score</b>	1.5	1.2	0.9	0.5

**NOTES>>** Stable rip-rap creates riffle-like and pool features under sufficient flow/submergent conditions; SAV present; lack of varied substrate, woody/leafy debris, root mats, feature complexes

CI

1.20

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	3-3	300	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES >> 100% rip-rap channel**

Channel Alteration	Conditional Category						
	Negligible	Minor	Moderate	Severe			
	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.		Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	0.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >> 0.97**

RCI= (Sum of all CIs)/5

**COMPENSATION REQUIREMENT (CR) >> 291**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1080 US

1081 (DS)

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

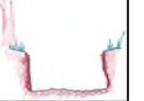
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	3-4	250	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>	<b>Slightly incised; banks 70% stable, 80% vegetated; depositional features</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							
	Optimal	Suboptimal	Marginal	Poor				
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	
				<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>	
	1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100	
<b>Right Bank</b>	% Riparian Area>	<b>50%</b>	<b>50%</b>				<b>100%</b>	
	Score >	<b>1.2</b>	<b>0.6</b>					
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>	
	Score >							
								CI= (Sum % RA * Scores^0.01)/2
								<b>Rt Bank CI &gt;</b>
								<b>0.90</b>
								<b>Lt Bank CI &gt;</b>
								<b>1.20</b>
								<b>1.05</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.90</b>

**NOTES>>** Low velocity, but with varied depths and substrate; shade; stable riffle-pool complexes

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	3-4	250	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>> Culvert & riprap at bottom of reach; easement grading; concrete flume on LB**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**0.70**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >> 1.01**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >> 253**

CR = RCI X LF X IF

**INSERT PHOTOS:**



1082 DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

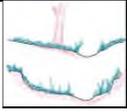
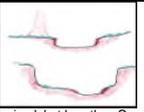
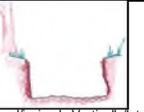
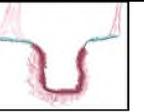
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	4-1	265	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
				<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores*0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	4-1	265	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>> SWM outfall at top of reach**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**0.70**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >> 1.28**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >> 339**

CR = RCI X LF X IF

**INSERT PHOTOS:**

1064 (US)

1063 US

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

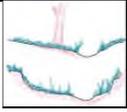
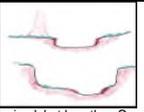
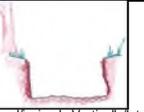
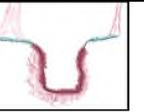
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	4-2	310	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.0</b>
<b>NOTES&gt;&gt;</b>	<b>Moderate gradient; moderately incised</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category									
	Optimal	Suboptimal	Marginal	Poor						
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	<b>NOTES&gt;&gt; OHE esmt on RB</b>		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>			
<p>1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.</p> <p>2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.</p> <p>3. Enter the % Riparian Area and Score for each riparian category in the blocks below.</p>							<p>Ensure the sums of % Riparian Blocks equal 100</p>			
<b>Right Bank</b>	% Riparian Area>	<b>20%</b>	<b>80%</b>				<b>100%</b>	$CI = (\text{Sum } \% RA * \text{Scores} * 0.01) / 2$		
	Score >	<b>1.2</b>	<b>0.6</b>							
OHE esmt										
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>	<b>Rt Bank CI &gt;</b>	<b>0.72</b>	<b>CI</b>
	Score >	<b>1.5</b>						<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.11</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	<b>NOTES&gt;&gt; Low flow, but varied substrate; woody/leafy debris; shade</b>
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	
					<b>0.90</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	4-2	310	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>> Some debris in channel**

Channel Alteration	Conditional Category						
	Negligible	Minor	Moderate	Severe			
	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.		Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
SCORE	1.5	1.3	1.1	0.9	0.7	0.5	1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

<b>THE REACH CONDITION INDEX (RCI) &gt;&gt;</b>	<b>1.10</b>
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RCI= (Sum of all CI's)/5

<b>COMPENSATION REQUIREMENT (CR) &gt;&gt;</b>	<b>341</b>
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CR = RCI X LF X IF

**INSERT PHOTOS:**

1052

DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

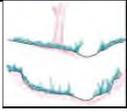
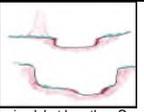
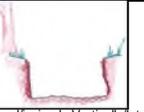
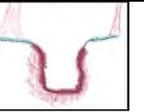
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	4-3	60	1

Name(s) of Evaluator(s)	Stream Name and Information
Mark Dennis	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>	<b>Gravel bars, embedded small rip-rap cobble; woody veg. at water's edge</b>					

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category									
	Optimal	Suboptimal	Marginal	Poor						
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.			
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>			
				<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>			
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100				
<b>Right Bank</b>	% Riparian Area>	<b>60%</b>	<b>60%</b>				<b>120%</b>			
	Score >	<b>1.2</b>	<b>0.6</b>							
Maintained										
<b>Left Bank</b>	% Riparian Area>	<b>80%</b>	<b>20%</b>				<b>100%</b>			
	Score >	<b>1.2</b>	<b>0.6</b>							
								CI= (Sum % RA * Scores^0.01)/2		
								<b>Rt Bank CI &gt;</b>	<b>1.08</b>	<b>CI</b>
								<b>Lt Bank CI &gt;</b>	<b>1.08</b>	<b>1.08</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>

**NOTES>> Varied substrate; woody/leafy debris; shade**

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	03-2012	4-3	60	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>> SWM culv. At top & bottom of reach; rip-rap side channel**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.10**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.28**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **77**

CR = RCI X LF X IF

**INSERT PHOTOS:**

1069 (US)

1071 DS

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Summary Form (Form 2)

## Unified Stream Methodology for use in Virginia

Project #	Applicant	Date
4673	VDOT	03-2012
Evaluators		HUC
M. Dennis		02070011
		Locality
		Stafford

Stream Name	Reach ID	Length of Impact (L <sub>1</sub> ) (feet)	Reach Condition Index (RCI)	Impact Factor (IF)	Compensation Requirement (CR) (L <sub>1</sub> × RCI × IF)
UT to Rappahannock R.	1-1	20	0.74	1.0	15
UT to Rappahannock R.	1-2	125	1.02	1.0	128
UT to Rappahannock R.	1-3	75	1.16	1.0	87
UT to Rappahannock R.	1-4	280	0.90	1.0	252
UT to Rappahannock R.	2-1	550	1.00	1.0	550
UT to Rappahannock R.	2-2	450	1.14	1.0	513
UT to Rappahannock R.	2-3	115	0.88	1.0	101
UT to Rappahannock R.	2-4A	120	1.03	1.0	124
UT to Rappahannock R.	2-4B	245	1.11	1.0	272
UT to Rappahannock R.	2-5A	100	0.93	1.0	93
UT to Rappahannock R.	2-5B	1,392	1.05	1.0	1,462
UT to Rappahannock R.	2-6	215	1.27	1.0	273
UT to Rappahannock R.	2-7	175	0.94	1.0	165
UT to Rappahannock R.	2-8	175	1.44	1.0	252
UT to Rappahannock R.	2-9	135	1.18	1.0	159
UT to Rappahannock R.	2-10A	135	1.10	1.0	149
UT to Rappahannock R.	2-10B	585	1.44	1.0	842
UT to Rappahannock R.	2-11	80	1.38	1.0	110
UT to Rappahannock R.	2-12	120	1.50	1.0	180
UT to Rappahannock R.	2-13A	100	1.50	1.0	150
UT to Rappahannock R.	2-13B	125	1.44	1.0	180
UT to Rappahannock R.	2-14	180	1.44	1.0	259
UT to Rappahannock R.	2-15A	200	1.32	1.0	264
UT to Rappahannock R.	2-15B	110	1.38	1.0	152
UT to Rappahannock R.	2-15C	140	1.22	1.0	171
UT to Rappahannock R.	2-16	350	1.32	1.0	462
UT to Rappahannock R.	2-17	80	1.15	1.0	92
UT to Rappahannock R.	2-18	120	1.18	1.0	142
UT to Rappahannock R.	2-19	160	1.38	1.0	221
UT to Rappahannock R.	2-20	300	1.50	1.0	450
UT to Rappahannock R.	2-21	80	1.32	1.0	106
UT to Rappahannock R.	2-22	100	1.44	1.0	144
UT to Rappahannock R.	2-23	100	1.26	1.0	126
UT to Rappahannock R.	2-24	75	1.16	1.0	87
UT to Rappahannock R.	2-25	100	1.50	1.0	150
UT to Rappahannock R.	2-26	60	1.12	1.0	67
UT to Rappahannock R.	2-27	300	1.20	1.0	360
UT to Rappahannock R.	2-28	200	1.44	1.0	288
UT to Rappahannock R.	2-29	650	1.32	1.0	858
UT to Rappahannock R.	3-1	20	1.08	1.0	22
UT to Rappahannock R.	3-2	80	0.98	1.0	78
UT to Rappahannock R.	3-3	300	0.97	1.0	291
UT to Rappahannock R.	3-4	250	1.01	1.0	253
UT to Rappahannock R.	4-1	265	1.28	1.0	339
UT to Rappahannock R.	4-2	310	1.10	1.0	341
UT to Rappahannock R.	4-3	60	1.28	1.0	77
					0
	<b>Total L<sub>1</sub></b>	<b>9,907</b>		<b>Total CR</b>	<b>11,857</b>

Note: Round all feet & CR's to the nearest whole number.

## Stream Assessment Summary Form (Form 2)

### Unified Stream Methodology for use in Virginia

Project #	Applicant	Date
4673	VDOT	04-2012
Evaluators		HUC
M. Dennis		02070011
		Locality
		Stafford

Stream Name	Reach ID	Length of Impact (L <sub>I</sub> ) (feet)	Reach Condition Index (RCI)	Impact Factor (IF)	Compensation Requirement (CR) (L <sub>I</sub> × RCI × IF)
UT to Rappahannock R.	1-1	200	1.09	1.0	218
UT to Rappahannock R.	1-2	280	0.90	1.0	252
UT to Rappahannock R.	1-3	20	0.74	1.0	15
UT to Rappahannock R.	2-1	1,857	1.03	1.0	1,913
UT to Rappahannock R.	2-2	1,115	1.00	1.0	1,115
UT to Rappahannock R.	2-3	1,420	1.23	1.0	1,747
UT to Rappahannock R.	2-4	430	1.24	1.0	533
UT to Rappahannock R.	2-5	300	1.50	1.0	450
UT to Rappahannock R.	2-6	1,415	1.37	1.0	1,939
UT to Rappahannock R.	2-7	500	1.32	1.0	660
UT to Rappahannock R.	2-8	160	1.31	1.0	210
UT to Rappahannock R.	2-9	650	1.32	1.0	858
UT to Rappahannock R.	2-10	275	1.29	1.0	355
UT to Rappahannock R.	3-1	270	1.05	1.0	284
UT to Rappahannock R.	3-2	380	0.98	1.0	372
UT to Rappahannock R.	4-1	325	1.28	1.0	416
UT to Rappahannock R.	4-2	310	1.10	1.0	341
		<b>Total L<sub>I</sub></b>		<b>Total CR</b>	<b>11,678</b>
		<b>9,907</b>			

Note: Round all feet & CR's to the nearest whole number.



# Stream Assessment Form (Form 1)

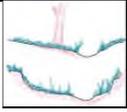
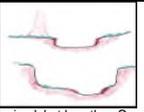
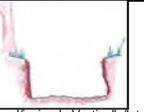
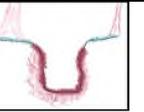
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/24/12	5-2	688	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.0</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
0. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 1. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 2. Enter the % Riparian Area and Score for each riparian category in the blocks below.							Ensure the sums of % Riparian Blocks equal 100		
<b>Right Bank</b>	% Riparian Area>	<b>60%</b>	<b>20%</b>	<b>20%</b>			<b>100%</b>		
	Score >	<b>1.5</b>	<b>0.6</b>	<b>0.5</b>					
<b>Left Bank</b>	% Riparian Area>	<b>60%</b>	<b>40%</b>				<b>100%</b>		
	Score >	<b>1.5</b>	<b>0.6</b>						
							CI= (Sum % RA * Scores*0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.12</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.14</b>	<b>1.13</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.00</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/24/12	5-2		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

1.20

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.07

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 736

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

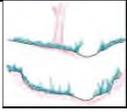
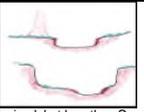
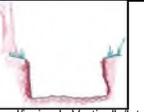
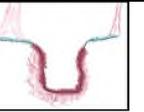
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/24/12	5-3	167	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**0. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>40%</b>	<b>40%</b>	<b>20%</b>			<b>100%</b>		
	Score >	<b>1.5</b>	<b>1.2</b>	<b>0.6</b>					
<b>Left Bank</b>	% Riparian Area>	<b>70%</b>	<b>30%</b>				<b>100%</b>		
	Score >	<b>1.5</b>	<b>0.6</b>						
								CI= (Sum % RA * Scores*0.01)/2	
							<b>Rt Bank CI &gt;</b>	<b>1.20</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.23</b>	<b>1.22</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/24/12	5-3		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor	Moderate	Severe	
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

1.20

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.20

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 200

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

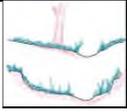
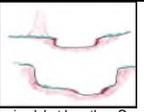
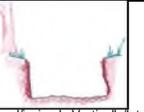
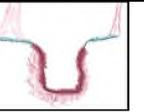
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/24/12	5-4	695	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

### 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>						

### 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category							
	Optimal	Suboptimal	Marginal	Poor				
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>	
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100		
<b>Right Bank</b>	% Riparian Area>	<b>15%</b>	<b>85%</b>				<b>100%</b>	
	Score >	<b>1.5</b>	<b>0.6</b>					
<b>Left Bank</b>	% Riparian Area>	<b>35%</b>	<b>65%</b>				<b>100%</b>	<b>CI</b>
	Score >	<b>1.5</b>	<b>0.6</b>				<b>0.92</b>	<b>0.83</b>
								CI= (Sum % RA * Scores^0.01)/2

### 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/24/12	5-4		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.31**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **910**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Ephemeral Stream Assessment Form (Form 1a)

Unified Stream Methodology for use in Virginia

For use in ephemeral streams

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/24/12	5-5	315	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Riparian Buffers	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and an non-maintained understory. Wetlands areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with >30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
<b>Condition Scores</b>	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.	Ensure the sums of % Riparian Blocks equal 100
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.	
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.	

<b>Right Bank</b>	% Riparian Area>	100%						100%
	Score >	1.5						
<b>Left Bank</b>	% Riparian Area>	80%	10%	10%				100%
	Score >	1.5	0.6	0.5				

CI= (Sum % RA * Scores*0.01)/2	Rt Bank CI >	1.50	CI
	Lt Bank CI >	1.31	1.41

## REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

THE REACH CONDITION INDEX (RCI) >> 0.71

RCI= (Riparian CI)/2

COMPENSATION REQUIREMENT (CR) >> 224

CR = RCI X LF X IF

INSERT PHOTOS:



# Stream Assessment Form (Form 1)

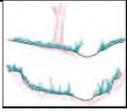
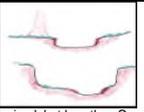
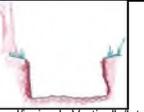
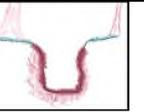
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/24/12	5-6	498	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.2</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area>	<b>95%</b>	<b>5%</b>				<b>100%</b>		
	Score >	<b>1.5</b>	<b>0.6</b>						
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.46</b>	<b>1.48</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>
<b>NOTES&gt;&gt;</b>					

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/24/12	5-6		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.28

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 637

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Ephemeral Stream Assessment Form (Form 1a)

Unified Stream Methodology for use in Virginia

For use in ephemeral streams

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/24/12	5-7	256	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

## 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Riparian Buffers	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and an non-maintained understory. Wetlands areas.	High Suboptimal: Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	Low Suboptimal: Riparian areas with tree stratum (dbh > 3 inches) present, with >30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	High Marginal: Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	Low Marginal: Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	High Poor: Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	Low Poor: Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
Condition Scores	1.5	High 1.2	Low 1.1	High 0.85	Low 0.75	High 0.6	Low 0.5	

- Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
- Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
- Enter the % Riparian Area and Score for each riparian category in the blocks below.

		Ensure the sums of % Riparian Blocks equal 100						
Right Bank	% Riparian Area>	20%	80%					100%
	Score >	1.5	0.85					
Left Bank	% Riparian Area>	100%						100%
	Score >	1.5						
		Cl= (Sum % RA * Scores*0.01)/2 Rt Bank Cl > 0.98 Lt Bank Cl > 1.50						
		CI 1.24						

### REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

THE REACH CONDITION INDEX (RCI) >>	0.62
RCI= (Riparian CI)/2	
COMPENSATION REQUIREMENT (CR) >>	159
CR = RCI X LF X IF	

INSERT PHOTOS:



# Stream Assessment Form (Form 1)

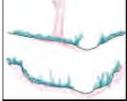
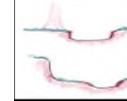
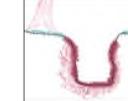
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/24/12	5-8	77	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

## 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

## 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI = (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

## 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/24/12	5-8		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category						
	Negligible	Minor	Moderate	Severe			
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.		60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>	<b>1.30</b>

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

<b>THE REACH CONDITION INDEX (RCI) &gt;&gt;</b>	<b>1.28</b>
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RCI= (Sum of all CI's)/5

<b>COMPENSATION REQUIREMENT (CR) &gt;&gt;</b>	<b>99</b>
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CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

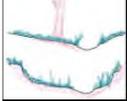
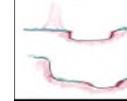
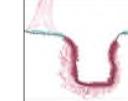
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/24/12	5-9	348	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

### 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

### 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>85%</b>	<b>15%</b>				<b>100%</b>		
	Score >	<b>1.5</b>	<b>0.85</b>						
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >								
							CI= (Sum % RA * Scores*0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.40</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>0.85</b>	<b>1.13</b>

### 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.50</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/24/12	5-9		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.31**

RCI= (Sum of all CIs)/5

**COMPENSATION REQUIREMENT (CR) >>** **456**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

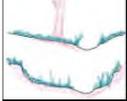
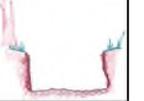
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/24/12	5-10	201	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
0. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 1. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 2. Enter the % Riparian Area and Score for each riparian category in the blocks below.							Ensure the sums of % Riparian Blocks equal 100		
<b>Right Bank</b>	% Riparian Area > Score >	<b>40%</b> <b>1.5</b>	<b>60%</b> <b>0.5</b>				<b>100%</b>		
<b>Left Bank</b>	% Riparian Area > Score >	<b>20%</b> <b>1.5</b>	<b>20%</b> <b>0.6</b>	<b>60%</b> <b>0.5</b>			<b>100%</b>		
							CI = (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>0.90</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>0.72</b>	<b>0.81</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b> <b>1.30</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/24/12	5-10		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category						
	Negligible	Minor	Moderate	Severe			
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.		60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>	<b>1.30</b>

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

<b>THE REACH CONDITION INDEX (RCI) &gt;&gt;</b>	<b>1.16</b>
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RCI= (Sum of all CI's)/5

<b>COMPENSATION REQUIREMENT (CR) &gt;&gt;</b>	<b>233</b>
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CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

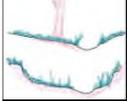
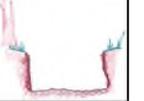
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	6-1	3298	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area>	<b>95%</b>	<b>5%</b>				<b>100%</b>		
	Score >	<b>1.5</b>	<b>0.6</b>						
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.46</b>	<b>1.48</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.50</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	6-1		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.50**

RCI= (Sum of all CIs)/5

**COMPENSATION REQUIREMENT (CR) >>** **4947**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

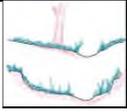
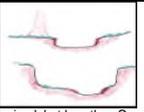
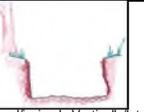
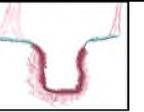
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	6-2		1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>
<b>NOTES&gt;&gt;</b>					

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	6-2		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category			
	Negligible	Minor	Moderate	Severe
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.		
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.44**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **0**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

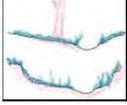
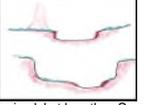
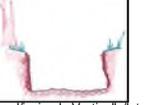
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	6-3	901	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores*0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.90</b>
<b>NOTES&gt;&gt;</b>					

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	6-3		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category			
	Negligible	Minor	Moderate	Severe
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.		
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.38**

RCI= (Sum of all CIs)/5

**COMPENSATION REQUIREMENT (CR) >>** **1243**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

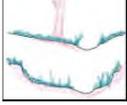
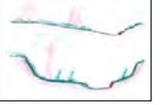
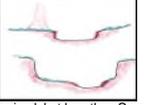
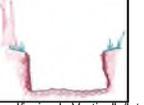
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	6-4	989	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

### 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

### 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores*0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

### 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.40</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	6-4		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category						
	Negligible	Minor	Moderate	Severe			
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.		60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>	<b>1.50</b>

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

<b>THE REACH CONDITION INDEX (RCI) &gt;&gt;</b>	<b>1.36</b>
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RCI= (Sum of all CIs)/5

<b>COMPENSATION REQUIREMENT (CR) &gt;&gt;</b>	<b>1345</b>
---	-------------

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

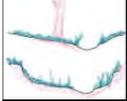
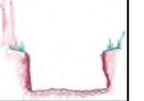
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	6-5	1640	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>95%</b>	<b>5%</b>				<b>100%</b>		
	Score >	<b>1.5</b>	<b>0.6</b>						
<b>Left Bank</b>	% Riparian Area>	<b>95%</b>	<b>5%</b>				<b>100%</b>		
	Score >	<b>1.5</b>	<b>0.6</b>						
								CI= (Sum % RA * Scores^0.01)/2	
							<b>Rt Bank CI &gt;</b>	<b>1.46</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.46</b>	<b>1.46</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.40</b>
<b>NOTES&gt;&gt;</b>					

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	6-5		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.35**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **2214**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

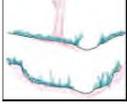
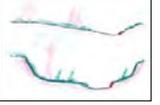
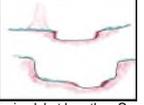
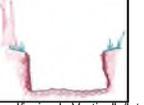
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	6-6	566	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

### 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.6</b>
<b>NOTES&gt;&gt;</b>						

### 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>95%</b>	<b>5%</b>				<b>100%</b>		
	Score >	<b>1.5</b>	<b>0.6</b>						
<b>Left Bank</b>	% Riparian Area>	<b>95%</b>	<b>5%</b>				<b>100%</b>		
	Score >	<b>1.5</b>	<b>0.6</b>						
							CI= (Sum % RA * Scores*0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.46</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.46</b>	<b>1.46</b>

### 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.90</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	6-6		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category			
	Negligible	Minor	Moderate	Severe
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
			60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.29

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 730

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

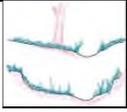
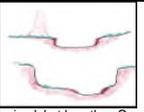
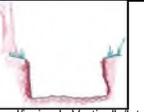
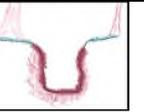
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	6-7	393	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

### 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>						

### 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

### 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.90</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	6-7		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor	Moderate	Severe	
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.38**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **542**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

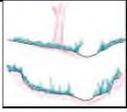
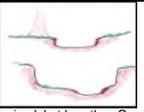
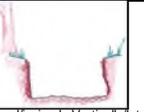
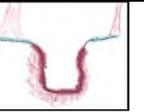
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-1	430	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.90</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-1		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.26**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **542**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

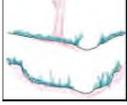
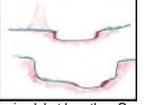
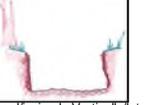
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-2	112	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

### 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

### 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

### 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-2		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category						
	Negligible	Minor	Moderate	Severe			
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.		60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	1.5	1.3	1.1	0.9	0.7	0.5	<b>1.50</b>

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

<b>THE REACH CONDITION INDEX (RCI) &gt;&gt;</b>	<b>1.32</b>
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RCI= (Sum of all CI's)/5

<b>COMPENSATION REQUIREMENT (CR) &gt;&gt;</b>	<b>148</b>
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CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

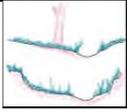
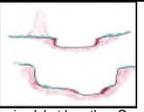
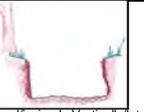
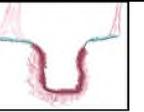
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-3	377	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

### 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.0</b>
<b>NOTES&gt;&gt;</b>						

### 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area>	<b>40%</b>	<b>60%</b>				<b>100%</b>		
	Score >	<b>0.6</b>	<b>0.5</b>						
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>0.54</b>	<b>1.02</b>

### 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.00</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-3		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

<b>THE REACH CONDITION INDEX (RCI) &gt;&gt;</b>	<b>1.10</b>
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RCI= (Sum of all CI's)/5

<b>COMPENSATION REQUIREMENT (CR) &gt;&gt;</b>	<b>415</b>
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CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

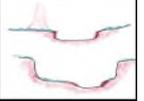
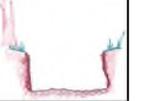
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-4	602	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.0</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
				<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	<b>40%</b>	<b>60%</b>				<b>100%</b>		
	Score >	<b>0.6</b>	<b>0.5</b>						
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI = (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>0.54</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.02</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.00</b>
<b>NOTES&gt;&gt;</b>					

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-4		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.10

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 662

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

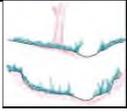
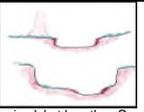
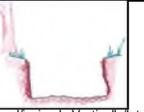
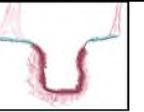
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-5	143	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>80%</b>	<b>20%</b>				<b>100%</b>		
	Score >	<b>1.5</b>	<b>0.5</b>						
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores*0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.30</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.40</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-5		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor	Moderate	Severe	
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.30

RCI= (Sum of all CIs)/5

**COMPENSATION REQUIREMENT (CR) >>** 186

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

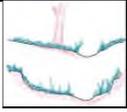
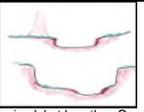
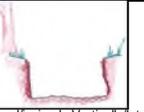
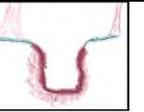
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-6	192	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.90</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-6		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category						
	Negligible	Minor	Moderate		Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>	<b>1.50</b>

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

<b>THE REACH CONDITION INDEX (RCI) &gt;&gt;</b>	<b>1.26</b>
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RCI= (Sum of all CI's)/5

<b>COMPENSATION REQUIREMENT (CR) &gt;&gt;</b>	<b>242</b>
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CR = RCI X LF X IF

**INSERT PHOTOS:**

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

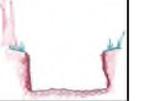
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-7	291	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores*0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-7		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

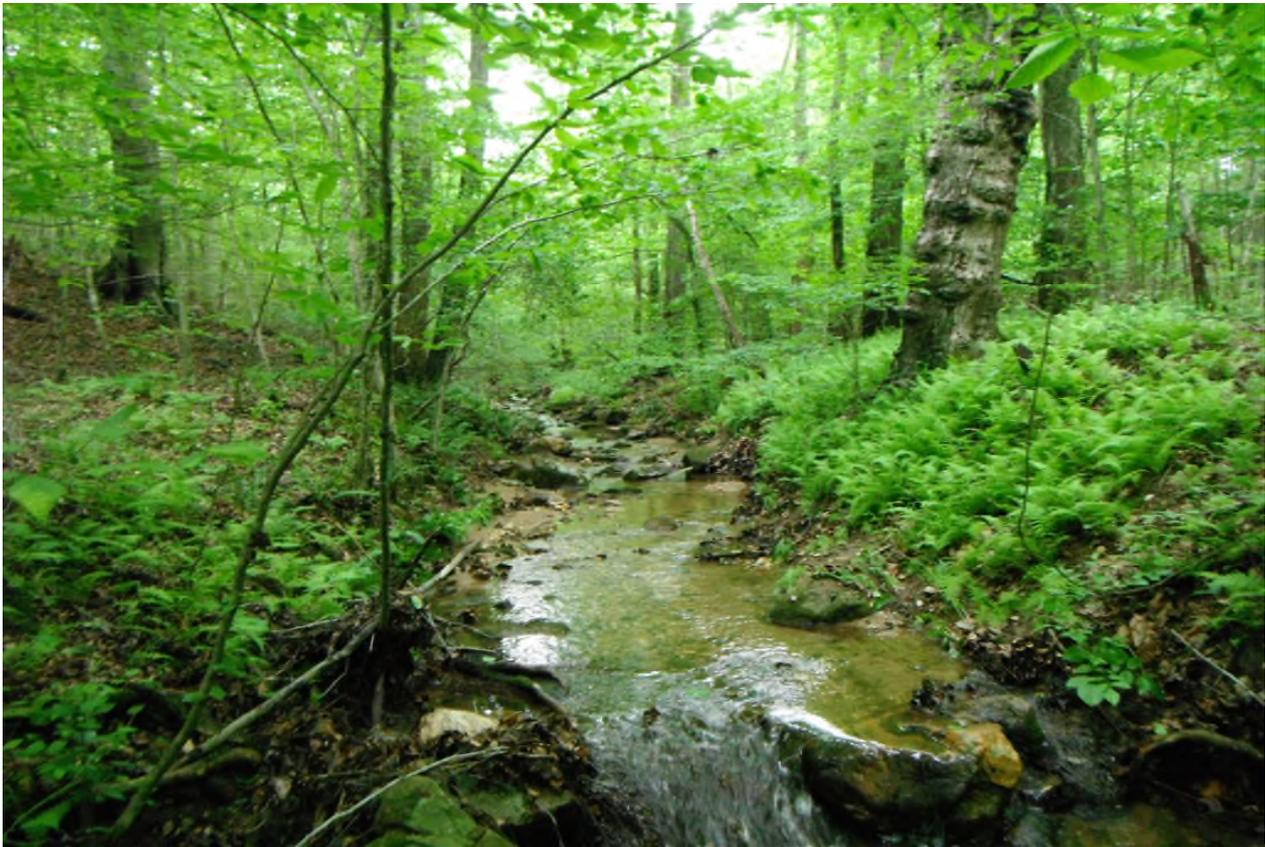
**THE REACH CONDITION INDEX (RCI) >>** **1.44**

RCI= (Sum of all CIs)/5

**COMPENSATION REQUIREMENT (CR) >>** **419**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

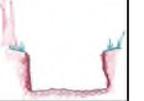
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-8	660	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>3.0</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores*0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.50</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-8		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor		Moderate	Severe
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.50**

RCI= (Sum of all CIs)/5

**COMPENSATION REQUIREMENT (CR) >>** **990**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Ephemeral Stream Assessment Form (Form 1a)

Unified Stream Methodology for use in Virginia

For use in ephemeral streams

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/24/12	7-9	81	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

## 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Riparian Buffers	Conditional Category							NOTES>>
	Optimal	Suboptimal		Marginal		Poor		
	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and an non-maintained understory. Wetlands areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with >30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.	
<b>Condition Scores</b>	1.5	1.2	1.1	0.85	0.75	0.6	0.5	

- Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
- Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
- Enter the % Riparian Area and Score for each riparian category in the blocks below.

		Ensure the sums of % Riparian Blocks equal 100							
Right Bank	% Riparian Area>	100%						100%	
	Score >	1.5							
									CI= (Sum % RA * Scores*0.01)/2
Left Bank	% Riparian Area>	100%						100%	
	Score >	1.5							
									Rt Bank CI > 1.50
									Lt Bank CI > 1.50
									CI
									1.50

### REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

THE REACH CONDITION INDEX (RCI) >>	0.75
RCI= (Riparian CI)/2	
COMPENSATION REQUIREMENT (CR) >>	61
CR = RCI X LF X IF	

INSERT PHOTOS:



# Stream Assessment Form (Form 1)

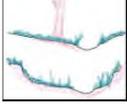
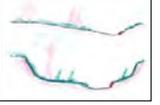
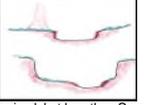
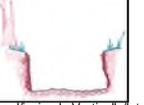
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-10	282	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.90</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-10		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category			
	Negligible	Minor	Moderate	Severe
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.		
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.26**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **355**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

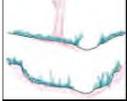
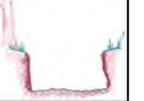
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-11	803	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.90</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-11		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.26**

RCI= (Sum of all CIs)/5

**COMPENSATION REQUIREMENT (CR) >>** **1012**

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

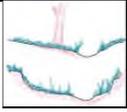
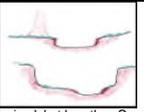
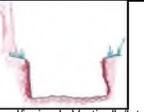
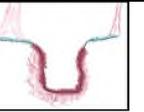
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-11	306	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
<b>Left Bank</b>	% Riparian Area >	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores^0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.50</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.50</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.90</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	7-11		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

1.50

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** 1.26

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** 386

CR = RCI X LF X IF

**INSERT PHOTOS:**



**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

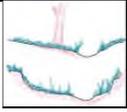
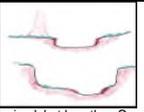
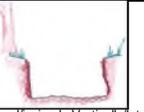
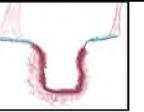
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	8-1A	1095	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

### 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

### 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>90%</b>	<b>10%</b>				<b>100%</b>		
	Score >	<b>1.5</b>	<b>0.6</b>						
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>					<b>100%</b>		
	Score >	<b>1.5</b>							
							CI= (Sum % RA * Scores*0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>1.41</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.46</b>

### 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle poole complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	8-1A	1095	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor	Moderate		Severe
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

<b>THE REACH CONDITION INDEX (RCI) &gt;&gt;</b>	<b>1.31</b>
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RCI= (Sum of all CI's)/5

<b>COMPENSATION REQUIREMENT (CR) &gt;&gt;</b>	<b>1434</b>
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CR = RCI X LF X IF

**INSERT PHOTOS:**

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

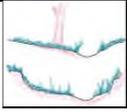
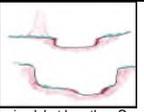
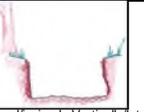
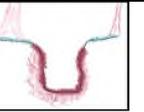
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	8-1B	587	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

### 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

### 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category									
	Optimal	Suboptimal	Marginal	Poor						
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.			
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>			
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>			
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100				
<b>Right Bank</b>	% Riparian Area>	<b>90%</b>	<b>10%</b>					<b>100%</b>		
	Score >	<b>1.5</b>	<b>0.6</b>							
<b>Left Bank</b>	% Riparian Area>	<b>100%</b>						<b>100%</b>		
	Score >	<b>1.5</b>								
								CI= (Sum % RA * Scores*0.01)/2		
								<b>Rt Bank CI &gt;</b>	<b>1.41</b>	<b>CI</b>
								<b>Lt Bank CI &gt;</b>	<b>1.50</b>	<b>1.46</b>

### 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>1.20</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	8-1B	587	1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category				
	Negligible	Minor	Moderate		Severe
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.31**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **769**

CR = RCI X LF X IF

**INSERT PHOTOS:**

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

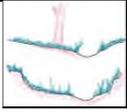
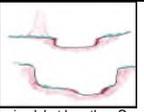
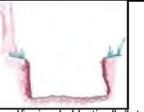
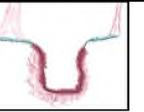
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	8-2	791	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

### 1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

### 2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>		<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>10%</b>	<b>20%</b>	<b>70%</b>			<b>100%</b>		
	Score >	<b>1.5</b>	<b>1.2</b>	<b>0.6</b>					
<b>Left Bank</b>	% Riparian Area>	<b>50%</b>	<b>50%</b>				<b>100%</b>		
	Score >	<b>1.5</b>	<b>0.6</b>						
							CI= (Sum % RA * Scores*0.01)/2		
							<b>Rt Bank CI &gt;</b>	<b>0.81</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.05</b>	<b>0.93</b>

### 3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.90</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	8-2		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category					
	Negligible	Minor	Moderate	Severe		
<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>

**1.50**

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

**THE REACH CONDITION INDEX (RCI) >>** **1.15**

RCI= (Sum of all CI's)/5

**COMPENSATION REQUIREMENT (CR) >>** **910**

CR = RCI X LF X IF

**INSERT PHOTOS:**

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Form (Form 1)

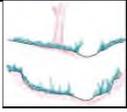
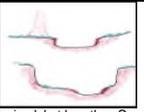
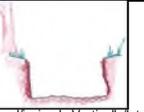
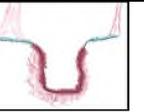
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	8-3	367	1

Name(s) of Evaluator(s)	Stream Name and Information
Chris Plummer	Unnamed tributary to Rappahannock River

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

	Conditional Category					
	Optimal	Suboptimal	Marginal	Poor	Severe	
<b>Channel Condition</b>						
	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars/bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars, and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% of stream is covered by sediment. Sediment may be temporary/transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically/laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary/transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	<b>CI</b>
<b>Score</b>	<b>3</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1</b>	<b>2.4</b>
<b>NOTES&gt;&gt;</b>						

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

	Conditional Category								
	Optimal	Suboptimal	Marginal	Poor					
<b>Riparian Buffers</b>	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and a non-maintained understory. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with > 30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh > 3 inches) present, with <30% tree canopy cover with maintained understory.	<b>High Poor:</b> Lawns, mowed, and maintained areas, nurseries, no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
<b>Condition Scores</b>	<b>1.5</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>		
		<b>1.2</b>	<b>1.1</b>	<b>0.85</b>	<b>0.75</b>	<b>0.6</b>	<b>0.5</b>		
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors. 2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below. 3. Enter the % Riparian Area and Score for each riparian category in the blocks below.						Ensure the sums of % Riparian Blocks equal 100			
<b>Right Bank</b>	% Riparian Area>	<b>50%</b>	<b>50%</b>				<b>100%</b>		
	Score >	<b>1.5</b>	<b>1.2</b>						
<b>Left Bank</b>	% Riparian Area>	<b>60%</b>	<b>40%</b>				<b>100%</b>		
	Score >	<b>1.5</b>	<b>0.6</b>						
								CI= (Sum % RA * Scores^0.01)/2	
							<b>Rt Bank CI &gt;</b>	<b>1.35</b>	<b>CI</b>
							<b>Lt Bank CI &gt;</b>	<b>1.14</b>	<b>1.25</b>

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle pools complexes, stable features.

	Conditional Category				
	Optimal	Suboptimal	Marginal	Poor	
<b>Instream Habitat/ Available Cover</b>	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
<b>Score</b>	<b>1.5</b>	<b>1.2</b>	<b>0.9</b>	<b>0.5</b>	<b>CI</b>
					<b>0.90</b>

## Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Reach	Reach Length	Impact Factor
4673	I-95 Corridor Study	Stafford		02070011	5/23/12	8-3		1

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

**NOTES>>**

	Conditional Category						
	Negligible	Minor	Moderate		Severe		
	<b>Channel Alteration</b>	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.
<b>SCORE</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>	<b>1.50</b>

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

<b>THE REACH CONDITION INDEX (RCI) &gt;&gt;</b>	<b>1.21</b>
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RCI= (Sum of all CI's)/5

<b>COMPENSATION REQUIREMENT (CR) &gt;&gt;</b>	<b>444</b>
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CR = RCI X LF X IF

**INSERT PHOTOS:**

**DESCRIBE PROPOSED IMPACT:**

# Stream Assessment Summary Form (Form 2)

## Unified Stream Methodology for use in Virginia

Project #	Applicant	Date
4673	VDOT	03-2012
Evaluators		HUC
M. Dennis		02070011
		Locality
		Stafford

Stream Name	Reach ID	Length of Impact (L <sub>1</sub> ) (feet)	Reach Condition Index (RCI)	Impact Factor (IF)	Compensation Requirement (CR) (L <sub>1</sub> × RCI × IF)
UT to Rappahannock R.	1-1	20	0.74	1.0	15
UT to Rappahannock R.	1-2	125	1.02	1.0	128
UT to Rappahannock R.	1-3	75	1.16	1.0	87
UT to Rappahannock R.	1-4	280	0.90	1.0	252
UT to Rappahannock R.	2-1	550	1.00	1.0	550
UT to Rappahannock R.	2-2	450	1.14	1.0	513
UT to Rappahannock R.	2-3	115	0.88	1.0	101
UT to Rappahannock R.	2-4A	120	1.03	1.0	124
UT to Rappahannock R.	2-4B	245	1.11	1.0	272
UT to Rappahannock R.	2-5A	100	0.93	1.0	93
UT to Rappahannock R.	2-5B	1,392	1.05	1.0	1,462
UT to Rappahannock R.	2-6	215	1.27	1.0	273
UT to Rappahannock R.	2-7	175	0.94	1.0	165
UT to Rappahannock R.	2-8	175	1.44	1.0	252
UT to Rappahannock R.	2-9	135	1.18	1.0	159
UT to Rappahannock R.	2-10A	135	1.10	1.0	149
UT to Rappahannock R.	2-10B	585	1.44	1.0	842
UT to Rappahannock R.	2-11	80	1.38	1.0	110
UT to Rappahannock R.	2-12	120	1.50	1.0	180
UT to Rappahannock R.	2-13A	100	1.50	1.0	150
UT to Rappahannock R.	2-13B	125	1.44	1.0	180
UT to Rappahannock R.	2-14	180	1.44	1.0	259
UT to Rappahannock R.	2-15A	200	1.32	1.0	264
UT to Rappahannock R.	2-15B	110	1.38	1.0	152
UT to Rappahannock R.	2-15C	140	1.22	1.0	171
UT to Rappahannock R.	2-16	350	1.32	1.0	462
UT to Rappahannock R.	2-17	80	1.15	1.0	92
UT to Rappahannock R.	2-18	120	1.18	1.0	142
UT to Rappahannock R.	2-19	160	1.38	1.0	221
UT to Rappahannock R.	2-20	300	1.50	1.0	450
UT to Rappahannock R.	2-21	80	1.32	1.0	106
UT to Rappahannock R.	2-22	100	1.44	1.0	144
UT to Rappahannock R.	2-23	100	1.26	1.0	126
UT to Rappahannock R.	2-24	75	1.16	1.0	87
UT to Rappahannock R.	2-25	100	1.50	1.0	150
UT to Rappahannock R.	2-26	60	1.12	1.0	67
UT to Rappahannock R.	2-27	300	1.20	1.0	360
UT to Rappahannock R.	2-28	200	1.44	1.0	288
UT to Rappahannock R.	2-29	650	1.32	1.0	858
UT to Rappahannock R.	3-1	20	1.08	1.0	22
UT to Rappahannock R.	3-2	80	0.98	1.0	78
UT to Rappahannock R.	3-3	300	0.97	1.0	291
UT to Rappahannock R.	3-4	250	1.01	1.0	253
UT to Rappahannock R.	4-1	265	1.28	1.0	339
UT to Rappahannock R.	4-2	310	1.10	1.0	341
UT to Rappahannock R.	4-3	60	1.28	1.0	77
					0
	<b>Total L<sub>1</sub></b>	<b>9,907</b>		<b>Total CR</b>	<b>11,857</b>

Note: Round all feet & CR's to the nearest whole number.

## Stream Assessment Summary Form (Form 2)

### Unified Stream Methodology for use in Virginia

Project #	Applicant	Date
4673	VDOT	04-2012
Evaluators		HUC
M. Dennis		02070011
		Locality
		Stafford

Stream Name	Reach ID	Length of Impact (L <sub>I</sub> ) (feet)	Reach Condition Index (RCI)	Impact Factor (IF)	Compensation Requirement (CR) (L <sub>I</sub> × RCI × IF)
UT to Rappahannock R.	1-1	200	1.09	1.0	218
UT to Rappahannock R.	1-2	280	0.90	1.0	252
UT to Rappahannock R.	1-3	20	0.74	1.0	15
UT to Rappahannock R.	2-1	1,857	1.03	1.0	1,913
UT to Rappahannock R.	2-2	1,115	1.00	1.0	1,115
UT to Rappahannock R.	2-3	1,420	1.23	1.0	1,747
UT to Rappahannock R.	2-4	430	1.24	1.0	533
UT to Rappahannock R.	2-5	300	1.50	1.0	450
UT to Rappahannock R.	2-6	1,415	1.37	1.0	1,939
UT to Rappahannock R.	2-7	500	1.32	1.0	660
UT to Rappahannock R.	2-8	160	1.31	1.0	210
UT to Rappahannock R.	2-9	650	1.32	1.0	858
UT to Rappahannock R.	2-10	275	1.29	1.0	355
UT to Rappahannock R.	3-1	270	1.05	1.0	284
UT to Rappahannock R.	3-2	380	0.98	1.0	372
UT to Rappahannock R.	4-1	325	1.28	1.0	416
UT to Rappahannock R.	4-2	310	1.10	1.0	341
		<b>Total L<sub>I</sub></b>		<b>Total CR</b>	<b>11,678</b>
		<b>9,907</b>			

Note: Round all feet & CR's to the nearest whole number.

North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/24/12	Project: 4673	Latitude:
Evaluator: C Plummer	Site: 2-7	Longitude:
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30$	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 15)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuous bed and bank	0	1	2	3
2. Sinuosity	0	4	2	3
3. In-channel structure: riffle-pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	3	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 <sup>a</sup> Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 6)

14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 5.5)

20 <sup>a</sup> Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> Rooted plants in channel	3	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae, periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
29 <sup>b</sup> Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants. Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/24/14	Project: 4673	Latitude:
Evaluator: C Plummer	Site: 2-9A	Longitude:
Total Points: 21.5 <small>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30</small>	County:	Other <small>e.g. Quad Name:</small>

A. Geomorphology (Subtotal = 10)	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	0	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainage way	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 4.5)	Absent	Weak	Moderate	Strong
14. Groundwater flow/discharge	0	1 +	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wreck lines)	0	0.5	1	1.5
19. Hyrcic soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 7)	Absent	Weak	Moderate	Strong
20 <sup>b</sup> . Fibrous roots in channel	0	2	1	0
21 <sup>b</sup> . Rooted plants in channel	0	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1 +	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/24/12	Project: 4673	Latitude:
Evaluator: C. Plummer	Site: 2-9	Longitude:
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30</i> 33	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 19)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	2+	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 6.5)

14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 7.5)

20 <sup>b</sup> . Fibrous roots in channel	0	2	1	0
21 <sup>b</sup> . Rooted plants in channel	0	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: <u>5/24/14</u>	Project: <u>4673</u>	Latitude:
Evaluator: <u>C Plummer</u>	Site: <u>2-8</u>	Longitude:
Total Points: <u>27.5</u> <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30</i>	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = <u>15.5</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	<u>3</u>
2. Sinuosity	0	1	<u>2</u>	3
3. In-channel structure: riffle-pool sequence	0	1	<u>2</u>	3
4. Soil texture or stream substrate sorting	0	<u>1</u>	2	3
5. Active/relic floodplain	0	1	2	<u>3</u>
6. Depositional bars or benches	0	1	<u>2</u>	3
7. Braided channel	<u>0</u>	1	2	3
8. Recent alluvial deposits	0	<u>1</u>	2	3
9 <sup>a</sup> Natural levees	<u>0</u>	1	2	3
10. Headcuts	<u>0</u>	1	2	3
11. Grade controls	<u>0</u>	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	<u>1.5</u>
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = <u>0</u>		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>6</u> )	Absent	Weak	Moderate	Strong
14. Groundwater flow/discharge	0	<u>1</u>	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	<u>2</u>	3
16. Leaf litter	1.5	<u>1</u>	0.5	0
17. Sediment on plants or debris	<u>0</u>	0.5	1	1.5
18. Organic debris lines or piles (Wreck lines)	0	<u>0.5</u>	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = <u>1.5</u>	

C. Biology (Subtotal = <u>6</u> )	Absent	Weak	Moderate	Strong
20 <sup>b</sup> . Fibrous roots in channel	3	<u>2</u>	1	0
21 <sup>b</sup> . Rooted plants in channel	<u>3</u>	2	1	0
22. Crayfish	<u>0</u>	0.5	1	1.5
23. Bivalves	<u>0</u>	1	2	3
24. Fish	<u>0</u>	0.5	1	1.5
25. Amphibians	0	<u>0.5</u>	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	<u>0.5</u>	1	1.5
27. Filamentous algae; periphyton	<u>0</u>	1	2	3
28. Iron oxidizing bacteria/fungus.	<u>0</u>	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/24/12	Project: 4673	Latitude:
Evaluator: C Plummer	Site: 3-1	Longitude:
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30	County: 22	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 12)	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 3)	Absent	Weak	Moderate	Strong
14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	2	3
16. Leaf litter	1.5	0.5	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 7)	Absent	Weak	Moderate	Strong
20 <sup>b</sup> . Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> . Rooted plants in channel	0	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/24/12	Project: 4673	Latitude:
Evaluator: C Plummer	Site: 3-2	Longitude:
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30$	County: 24.5	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 14)	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 7)	Absent	Weak	Moderate	Strong
20 <sup>b</sup> . Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> . Rooted plants in channel	3	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality - Stream Identification Form; Version 3.1

Date: 5/24/12	Project: 4673	Latitude:
Evaluator: C. Phummer	Site: 4-2	Longitude:
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30$	County: 20	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 10.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	- 0	3
2. Sinuosity	0	0.5	2	3
3. In-channel structure: riffle-pool sequence	0	0.5	2	3
4. Soil texture or stream substrate sorting	0	0.5	2	3
5. Active/relic floodplain	0	1	- 2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 4.5)

14. Groundwater flow/discharge	0	0.5	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel - dry or growing season	0	0.5	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0.5	0.5	1	1.5
18. Organic debris lines or piles (Wreck lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 5)

20 <sup>b</sup> . Fibrous roots in channel	3	0.5	1	0
21 <sup>b</sup> . Rooted plants in channel	3	0.5	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae, periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5; SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/24/12	Project: 4673	Latitude:
Evaluator: C. Plummer	Site: 4-1	Longitude:
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30$	38.5	County:
		Other e.g. Quad Name:

A. Geomorphology (Subtotal = 21.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	1	2+	3
4. Soil texture or stream substrate sorting	0	1	2+	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1+	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7.5)

14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wreck lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 9.5)

20 <sup>b</sup> . Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> . Rooted plants in channel	3	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/24/12	Project: 4673	Latitude:
Evaluator: C. Plummer	Site: 5-1	Longitude:
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30$	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 9.5)	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 <sup>b</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 3)	Absent	Weak	Moderate	Strong
14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wreck lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 4.5)	Absent	Weak	Moderate	Strong
20 <sup>b</sup> . Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> . Rooted plants in channel	3	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

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Sketch:

North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/24/12	Project: 4673	Latitude:
Evaluator: C. Plummer	Site: 5-2	Longitude:
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30$	County: 27	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 15)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	0+	2	3
3. In-channel structure: riffle-pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	0+	3
6. Depositional bars or benches	0	0	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7)

14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	0	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 5)

20 <sup>b</sup> . Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> . Rooted plants in channel	3	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/24/12	Project: 4673	Latitude:
Evaluator: C. Plummer	Site: 5-3	Longitude:
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30$ 25	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 13.5)	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	1	2 +	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	2	3
16. Leaf litter	1	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 4)	Absent	Weak	Moderate	Strong
20 <sup>b</sup> . Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> . Rooted plants in channel	3	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae: periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5; SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants. Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/24/12	Project: 4673	Latitude:
Evaluator: CPlummer	Site: 5-4	Longitude:
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30$	29	County:
		Other e.g. Quad Name:

A. Geomorphology (Subtotal = 14.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9.5)

14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel -- dry or growing season	0	1	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 6)

20 <sup>b</sup> . Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> . Rooted plants in channel	3	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5; SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants. Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/24/12	Project: 4673	Latitude:
Evaluator: C Plummer	Site: 5-5	Longitude:
Total Points: 16.75 <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30</i>	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 10.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	-0	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	-2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	0	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 3.5)

14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	2	3
16. Leaflitter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 2.75)

20 <sup>b</sup> . Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> . Rooted plants in channel	3	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macrobenthos (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/24/12	Project: 4673	Latitude:
Evaluator: C. Plummer	Site: 5-6	Longitude:
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30$ 36.5	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 21.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	1	2+	3
4. Soil texture or stream substrate sorting	0	1	2+	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1+	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8)

14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 7)

20 <sup>b</sup> . Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> . Rooted plants in channel	3	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macrobenthos (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1+	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

Odd smell to water, lots of foam and made fingers feel slippery.

North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/24/12	Project: 4673	Latitude:
Evaluator: C. Plummer	Site: 5-7	Longitude:
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30$ 15.25	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 8.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	0	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	0	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	0	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 4)

14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	0	2	3
16. Leaf litter	1.5	0	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 2.75)

20 <sup>b</sup> . Fibrous roots in channel	3	2	0	0
21 <sup>b</sup> . Rooted plants in channel	3	2	0	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5; SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/24/12	Project: 4673	Latitude:
Evaluator: C. Plummer	Site: 5-9	Longitude:
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30$	County: 35	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 20)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2+	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	2
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9)

14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 6)

20 <sup>b</sup> . Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> . Rooted plants in channel	3	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/24/12	Project: 4673	Latitude:
Evaluator: C. Plummer	Site: 5-10	Longitude:
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30$ 23	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 10)	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 <sup>a</sup> Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 6.5)	Absent	Weak	Moderate	Strong
14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	2	3
16. Leaf/litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	1	1	1.5
18. Organic debris lines or piles (Wreck lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 6.5)	Absent	Weak	Moderate	Strong
20 <sup>b</sup> . Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> . Rooted plants in channel	3	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5; SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/23/12	Project: 4673	Latitude:
Evaluator: C. Plummer	Site: 6-1	Longitude:
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30$ 42	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 26)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2+	3
3. In-channel structure: riffle-pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2+	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1+	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8)

14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	0.5	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 8)

20 <sup>b</sup> . Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> . Rooted plants in channel	3	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macrobenthos (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form: Version 3.1

Date: 5/23/12 Project: 4673 Latitude: \_\_\_\_\_  
 Evaluator: C Plummer Site: 6-2A Longitude: \_\_\_\_\_  
 Total Points: \_\_\_\_\_ County: \_\_\_\_\_ Other: \_\_\_\_\_  
*Stream is at least intermittent if ≥ 19 or perennial if > 30* 37 e.g. Quad Name: \_\_\_\_\_

A. Geomorphology (Subtotal = 20)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	<u>0</u>
2. Sinuosity	0	1	<u>0</u>	3
3. In-channel structure: riffle-pool sequence	0	1	<u>2</u>	3
4. Soil texture or stream substrate sorting	0	1	<u>2</u>	3
5. Active/rolic floodplain	0	1	<u>2</u> +	3
6. Depositional bars or benches	0	1	<u>2</u>	3
7. Braided channel	<u>0</u>	1	2	<u>3</u>
8. Recent alluvial deposits	0	1	2	3
9 <sup>a</sup> . Natural levées	<u>0</u>	1	<u>2</u>	3
10. Headcuts	0	<del>1</del>	<u>2</u>	3
11. Grade controls	0	<u>0.5</u> +	1	1.5
12. Natural valley or drainageway	0	0.5	1	<u>1.5</u>
13. Second or greater order channel on <u>existing</u> USGS or NRCS map or other documented evidence.	No = <u>0</u>		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8)

14. Groundwater flow/discharge	0	1	2	<u>3</u>
15. Water in channel and > 48 hrs since rain, <u>or</u> Water in channel – dry or growing season	0	1	<u>2</u>	3
16. Leaf litter	1.5	1	<u>0.5</u>	0
17. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	<u>0.5</u>	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = <u>1.5</u>	

C. Biology (Subtotal = 9)

20 <sup>b</sup> . Fibrous roots in channel	<u>3</u>	2	1	0
21 <sup>b</sup> . Rooted plants in channel	3	<u>2</u>	1	0
22. Crayfish	<u>0</u>	0.5	1	1.5
23. Bivalves	<u>0</u>	1	2	3
24. Fish	<u>0</u>	0.5	1	1.5
25. Amphibians	0	<u>0.5</u>	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	<u>1</u>	1.5
27. Filamentous algae; periphyton	0	<u>0</u>	2	3
28. Iron-oxidizing bacteria/fungus.	<u>0</u>	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = <u>1.5</u> ; SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

2 sp Caddis, Stone, Frogs, Skunk Cabs

North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: <u>5/23/12</u>	Project: <u>4673</u>	Latitude:
Evaluator: <u>L Plummer</u>	Site: <u>6-2B</u>	Longitude:
<b>Total Points:</b> <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30</i> <u>24</u>	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = <u>15.5</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	<u>3</u>
2. Sinuosity	0	1	<u>-2</u>	3
3. In-channel structure: riffle-pool sequence	0	<u>0</u>	2	3
4. Soil texture or stream substrate sorting	0	<u>0</u>	2	3
5. Active/relic floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	<u>0+</u>	2	3
7. Braided channel	<u>0</u>	1	2	3
8. Recent alluvial deposits	0	<u>0+</u>	2	3
9 <sup>a</sup> Natural levees	<u>0</u>	1	2	3
10. Headcuts	0	1	<u>2</u>	3
11. Grade controls	0	0.5	<u>1</u>	1.5
12. Natural valley or drainageway	0	0.5	1	<u>1.5</u>
13. Second or greater order channel on <u>existing</u> USGS or NRCS map or other documented evidence.	No = <u>0</u>		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>3.5</u> )	Absent	Weak	Moderate	Strong
14. Groundwater flow/discharge	0	<u>1</u>	2	3
15. Water in channel and > 48 hrs since rain, <u>or</u> Water in channel -- dry or growing season	0	<u>1</u>	2	3
16. Leaf litter	1.5	1	<u>0.5</u>	0
17. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	<u>0.5</u>	1	1.5
19. Hydric soils (redoximorphic features) present?	No = <u>0</u>		Yes = 1.5	

C. Biology (Subtotal = <u>5</u> )	Absent	Weak	Moderate	Strong
20 <sup>b</sup> . Fibrous roots in channel	3	2	<u>-1</u>	0
21 <sup>b</sup> . Rooted plants in channel	<u>0+</u>	2	1	0
22. Crayfish	<u>0</u>	0.5	1	1.5
23. Bivalves	<u>0</u>	1	2	3
24. Fish	<u>0</u>	0.5	1	1.5
25. Amphibians	0	<u>0.5</u>	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	<u>0.5</u>	1	1.5
27. Filamentous algae; periphyton	<u>0</u>	1	2	3
28. Iron oxidizing bacteria/fungus.	<u>0</u>	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = <u>0</u>			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/23/12	Project: 4673	Latitude:
Evaluator: C Plummer	Site: 6-3	Longitude:
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 14)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	-2	3
2. Sinuosity	0	0.5	2	3
3. In-channel structure: riffle-pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 3.5)

	Absent	Weak	Moderate	Strong
14. Groundwater flow/discharge	0	-1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	1	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 4.5)

	Absent	Weak	Moderate	Strong
20 <sup>b</sup> . Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> . Rooted plants in channel	3	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron-oxidizing bacteria/fungus	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: <del>5/12/12</del> 5/23/12	Project: 4673	Latitude:
Evaluator: C Plummer	Site: 6-4	Longitude:
Total Points: 37 <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30</i>	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 21.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2+	3
3. In-channel structure: riffle-pool sequence	0	1	2+	3
4. Soil texture or stream substrate sorting	0	1	2+	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2+	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9.5)

14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel -- dry or growing season	0	1	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 7)

20 <sup>b</sup> . Fibrous roots in channel	3	0	1	0
21 <sup>b</sup> . Rooted plants in channel	0	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/23/12	Project: 4673	Latitude:
Evaluator: C. Plummer	Site: 6-5	Longitude:
Total Points: 36 <small>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30</small>	County:	Other <small>e.g. Quad Name:</small>

A. Geomorphology (Subtotal = 20.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1+	2	3
7. Braided channel	1	1	2	3
8. Recent alluvial deposits	0	1+	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 6)

14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 7.5)

20 <sup>b</sup> . Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> . Rooted plants in channel	3	2	1	0
22. Crayfish	1	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron-oxidizing bacteria/fungus.	0	0.5	1	1.5
29 <sup>c</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

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Sketch:

North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/27/12	Project: 4677	Latitude:
Evaluator: L. Plummer	Site: 6-6	Longitude:
Total Points: 20.5 <small>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30</small>	County:	Other <small>e.g. Quad Name:</small>

A. Geomorphology (Subtotal = 13)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2+	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	1+	2	3
4. Soil texture or stream substrate sorting	0	0	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1+	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 3.5)

14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1+	2	3
16. Leaf litter	1.5	1+	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 6)

20 <sup>a</sup> . Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> . Rooted plants in channel	0	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron-oxidizing bacteria/fungus	0	0.5	1	1.5
29 <sup>d</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>a</sup> Items 20 and 21 focus on the presence of upland plants. Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: <u>5/23/12</u>	Project: <u>7673</u>	Latitude:
Evaluator: <u>C. P. [unclear]</u>	Site: <u>6-7</u>	Longitude:
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30</i>	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = <u>11.5</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	2	2	3
4. Soil texture or stream substrate sorting	0	2	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>5.5</u> )	Absent	Weak	Moderate	Strong
14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel -- dry or growing season	0	1	2	3
16. Leaf/litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = <u>6</u> )	Absent	Weak	Moderate	Strong
20 <sup>b</sup> . Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> . Rooted plants in channel	3	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macrobenthos (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: <u>5/24/12</u>	Project: <u>4673</u>	Latitude:
Evaluator: <u>C. Pinner</u>	Site: <u>7-1</u>	Longitude:
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = <u>15</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	<u>3</u>
2. Sinuosity	0	<u>0</u>	2	3
3. In-channel structure: riffle-pool sequence	0	<u>0</u>	<u>2</u>	3
4. Soil texture or stream substrate sorting	0	1	<u>2</u>	3
5. Active/relic floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	<u>0</u>	2	3
7. Braided channel	<u>0</u>	1	2	3
8. Recent alluvial deposits	0	<u>0</u>	2	3
9 <sup>a</sup> . Natural levees	<u>0</u>	1	2	3
10. Headcuts	0	<u>0</u>	2	3
11. Grade controls	<u>0</u>	<u>0.5</u>	1	<u>1.5</u>
12. Natural valley or drainageway	0	0.5	1	<u>1.5</u>
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = <u>0</u>		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>6.5</u> )	Absent	Weak	Moderate	Strong
14. Groundwater flow/discharge	0	<u>0</u>	2	3
15. Water in channel and > 48 hrs since rain, <u>or</u> Water in channel – dry or growing season	0	1	<u>0</u>	3
16. Leaf litter	1.5	<u>0</u>	0.5	0
17. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	<u>0.5</u>	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = <u>1.5</u>	

C. Biology (Subtotal = <u>5.5</u> )	Absent	Weak	Moderate	Strong
20 <sup>b</sup> . Fibrous roots in channel	3	<u>0</u>	1	0
21 <sup>b</sup> . Rooted plants in channel	<u>0</u>	2	1	0
22. Crayfish	<u>0</u>	0.5	1	1.5
23. Bivalves	<u>0</u>	1	2	3
24. Fish	<u>0</u>	0.5	1	1.5
25. Amphibians	<u>0</u>	0.5	1	1.5
26. Macrobenthos (note diversity and abundance)	0	<u>0.5</u>	1	1.5
27. Filamentous algae: periphyton	<u>0</u>	1	2	3
28. Iron oxidizing bacteria/fungus.	<u>0</u>	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: <u>5/24/12</u>	Project: <u>4673</u>	Latitude:
Evaluator: <u>C. Plummer</u>	Site: <u>7-2</u>	Longitude:
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30$	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 20.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	<u>3</u>
2. Sinuosity	0	<u>1</u>	2	3
3. In-channel structure: riffle-pool sequence	0	1	<u>2</u>	3
4. Soil texture or stream substrate sorting	0	1	<u>2</u>	3
5. Active/relic floodplain	0	1	<u>2+</u>	3
6. Depositional bars or benches	0	1	<u>2</u>	3
7. Braided channel	<u>0</u>	1	2	3
8. Recent alluvial deposits	0	1	<u>2</u>	3
9 <sup>a</sup> Natural levees	<u>0</u>	1	2	3
10. Headcuts	0	<u>1</u>	2	3
11. Grade controls	0	0.5	<u>1</u>	1.5
12. Natural valley or drainageway	0	0.5	1	<u>1.5</u>
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes <u>3</u>	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7)

14. Groundwater flow/discharge	0	<u>1</u>	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel - dry or growing season	0	1	<u>2</u>	3
16. Leaf litter	1.5	<u>1</u>	0.5	0
17. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
18. Organic debris lines or piles (Wrack lines)	0	<u>0.5</u>	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes <u>1.5</u>	

C. Biology (Subtotal = 8.5)

20 <sup>b</sup> . Fibrous roots in channel	<u>3</u>	2	1	0
21 <sup>b</sup> . Rooted plants in channel	<u>3</u>	2	1	0
22. Crayfish	<u>0</u>	0.5	1	1.5
23. Bivalves	<u>0</u>	1	2	3
24. Fish	0	<u>0.5</u>	1	1.5
25. Amphibians	0	<u>0.5</u>	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	<u>0.5</u>	1	1.5
27. Filamentous algae; periphyton	0	<u>1</u>	2	3
28. Iron-oxidizing bacteria/fungus	<u>1</u>	0.5	1	1.5
29 <sup>c</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/24/12	Project: 4673	Latitude:
Evaluator: C. Plummer	Site: 7-4	Longitude:
Total Points: Stream is at least Intermittent if $\geq 19$ or perennial if $\geq 30$	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 14)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 6.5)

14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel -- dry or growing season	0	1	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 10)

20 <sup>b</sup> . Fibrous roots in channel	0	2	1	0
21 <sup>b</sup> . Rooted plants in channel	0	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron-oxidizing bacteria/fungus.	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

\* Refusal due to bedrock w/in 1-2"

North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: <u>5/14/12</u>	Project: <u>4673</u>	Latitude:
Evaluator: <u>L Plummer</u>	Site: <u>7-5</u>	Longitude:
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30</i>	County:	Other <i>e.g. Quad Name:</i>
<u>23</u>		

A. Geomorphology (Subtotal = <u>10.5</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	<u>3</u>
2. Sinuosity	0	<u>1</u>	2	3
3. In-channel structure: riffle-pool sequence	0	<u>0.5</u>	2	3
4. Soil texture or stream substrate sorting	0	<u>0.5</u>	2	3
5. Active/relic floodplain	0	<u>0.5</u>	2	3
6. Depositional bars or benches	<u>0.5</u>	1	2	3
7. Braided channel	<u>0.5</u>	1	2	3
8. Recent alluvial deposits	<u>0.5</u>	1	2	3
9 <sup>a</sup> Natural levees	<u>0.5</u>	1	2	3
10. Headcuts	0	<u>1</u>	2	3
11. Grade controls	0	0.5	<u>1</u>	1.5
12. Natural valley or drainageway	0	0.5	1	<u>1.5</u>
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = <u>0</u>		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>6</u> )	Absent	Weak	Moderate	Strong
14. Groundwater flow/discharge	0	<u>1</u> +	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	<u>2</u>	3
16. Leaf litter	1.5	1	<u>0.5</u>	0
17. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	<u>0.5</u>	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = <u>1.5</u>	

C. Biology (Subtotal = <u>6.5</u> )	Absent	Weak	Moderate	Strong
20 <sup>b</sup> . Fibrous roots in channel	<u>0.5</u>	2	1	0
21 <sup>b</sup> . Rooted plants in channel	<u>0.5</u>	2	1	0
22. Crayfish	<u>0.5</u>	0.5	1	1.5
23. Bivalves	<u>0.5</u>	1	2	3
24. Fish	<u>0.5</u>	0.5	1	1.5
25. Amphibians	<u>0.5</u>	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	<u>0.5</u>	1	1.5
27. Filamentous algae; periphyton	<u>0.5</u>	1	2	3
28. Iron oxidizing bacteria/fungus.	<u>0.5</u>	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: <u>5/24/12</u>	Project: <u>4673</u>	Latitude:
Evaluator: <u>C Plummer</u>	Site: <u>7-b</u>	Longitude:
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if &gt; 30</i> <u>27.5</u>	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = <u>11.5</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	<u>0</u>	3
2. Sinuosity	0	<u>0</u>	2	3
3. In-channel structure: riffle-pool sequence	0	<u>0</u> +	2	3
4. Soil texture or stream substrate sorting	0	<u>0</u>	2	3
5. Active/relic floodplain	0	1	<u>0</u>	3
6. Depositional bars or benches	0	<u>0</u>	2	3
7. Braided channel	<u>0</u>	1	2	3
8. Recent alluvial deposits	0	<u>0</u>	2	3
9 <sup>a</sup> . Natural levees	<u>0</u>	1	2	3
10. Headcuts	0	<u>1</u>	2	3
11. Grade controls	<u>0</u>	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	<u>1.5</u>
13. Second or greater order channel on <u>existing</u> USGS or NRCS map or other documented evidence.	No <u>0</u>		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>6</u> )	Absent	Weak	Moderate	Strong
14. Groundwater flow/discharge	0	<u>0</u>	2	3
15. Water in channel and > 48 hrs since rain, <u>or</u> Water in channel -- dry or growing season	0	1	<u>0</u>	3
16. Leaf litter	1.5	1	<u>0.5</u>	0
17. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	<u>0.5</u>	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = <u>1.5</u>	

C. Biology (Subtotal = <u>6</u> )	Absent	Weak	Moderate	Strong
20 <sup>b</sup> . Fibrous roots in channel	3	<u>0</u> +	1	0
21 <sup>b</sup> . Rooted plants in channel	<u>0</u>	2	1	0
22. Crayfish	<u>0</u>	0.5	1	1.5
23. Bivalves	<u>0</u>	1	2	3
24. Fish	<u>0</u>	0.5	1	1.5
25. Amphibians	0	<u>0.5</u>	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	<u>0.5</u>	1	1.5
27. Filamentous algae; periphyton	<u>0</u>	1	2	3
28. Iron-oxidizing bacteria/fungus.	<u>0</u>	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5; SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: <u>9/24/12</u>	Project: <u>4673</u>	Latitude:
Evaluator: <u>C. Plummer</u>	Site: <u>7-7</u>	Longitude:
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = <u>22.5</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	<u>3</u>
2. Sinuosity	0	1	<u>2</u>	3
3. In-channel structure: riffle-pool sequence	0	1	<u>2</u>	3
4. Soil texture or stream substrate sorting	0	1	<u>2</u>	3
5. Active/relic floodplain	0	1	2	<u>3</u>
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Braided channel	<u>0</u>	1	2	3
8. Recent alluvial deposits	0	<u>1</u>	2	3
9 <sup>a</sup> . Natural levees	<u>0</u>	1	2	3
10. Headcuts	0	<u>1</u>	2	3
11. Grade controls	0	0.5	<u>1</u>	1.5
12. Natural valley or drainageway	0	0.5	1	<u>1.5</u>
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes <u>3</u>	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>6.5</u> )	Absent	Weak	Moderate	Strong
14. Groundwater flow/discharge	0	<u>1</u>	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	<u>2</u>	3
16. Leaf litter	1.5	<u>1</u>	0.5	0
17. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	<u>0.5</u>	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes <u>1.5</u>	

C. Biology (Subtotal = <u>6.5</u> )	Absent	Weak	Moderate	Strong
20 <sup>b</sup> . Fibrous roots in channel	<u>3</u>	2	1	0
21 <sup>b</sup> . Rooted plants in channel	<u>3</u>	2	1	0
22. Crayfish	<u>0.5</u>	0.5	1	1.5
23. Bivalves	<u>0</u>	1	2	3
24. Fish	<u>0</u>	0.5	1	1.5
25. Amphibians	<u>0</u>	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	<u>0.5</u>	1	1.5
27. Filamentous algae; periphyton	<u>0</u>	1	2	3
28. Iron-oxidizing bacteria/fungus.	<u>0</u>	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBI = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: <u>5/24/12</u>	Project: <u>4673</u>	Latitude:
Evaluator: <u>C Plummer</u>	Site: <u>7-4</u>	Longitude:
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30$	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 6.5)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	<u>0.5</u>	2	3
2. Sinuosity	0	<u>0</u>	2	3
3. In-channel structure: riffle-pool sequence	<u>0</u>	1	2	3
4. Soil texture or stream substrate sorting	<u>0</u>	1	2	3
5. Active/relic floodplain	<u>0</u>	1	2	3
6. Depositional bars or benches	<u>0</u>	1	2	3
7. Braided channel	<u>0</u>	1	2	3
8. Recent alluvial deposits	0	<u>0</u>	2	3
9 <sup>a</sup> Natural levees	<u>0</u>	1	2	3
10. Headcuts	0	1	<u>2</u>	3
11. Grade controls	<u>0</u>	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	<u>1.5</u>
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = <u>0</u>		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 2.5)

14. Groundwater flow/discharge	<u>0</u>	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel -- dry or growing season	0	<u>1</u>	2	3
16. Leaf litter	1.5	1	<u>0.5</u>	0
17. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	<u>0.5</u>	1	1.5
19. Hydric soils (redoximorphic features) present?	No = <u>0</u>		Yes = 1.5	

C. Biology (Subtotal = 4)

20 <sup>b</sup> . Fibrous roots in channel	3	2	<u>1</u>	0
21 <sup>b</sup> . Rooted plants in channel	<u>0</u>	2	1	0
22. Crayfish	<u>0</u>	0.5	1	1.5
23. Bivalves	<u>0</u>	1	2	3
24. Fish	<u>0</u>	0.5	1	1.5
25. Amphibians	<u>0</u>	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	<u>0</u>	0.5	1	1.5
27. Filamentous algae; periphyton	<u>0</u>	1	2	3
28. Iron-oxidizing bacteria/fungus	<u>0</u>	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: <u>5/24/12</u>	Project: <u>4673</u>	Latitude:
Evaluator: <u>C. Plummer</u>	Site: <u>7-10</u>	Longitude:
Total Points: <i>Stream is at least intermittent if <math>\geq 19</math> or perennial if <math>\geq 30</math></i> <u>21.75</u>	County:	Other e.g. Quad Number:

A. Geomorphology (Subtotal = 12)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	<u>2</u>	3
2. Sinuosity	0	<u>0.5</u>	2	3
3. In-channel structure: riffle-pool sequence	0	<u>0</u>	2	3
4. Soil texture or stream substrate sorting	0	<u>0</u>	2	3
5. Active/relic floodplain	0	1	2	<u>3</u>
6. Depositional bars or benches	0	<u>0</u>	2	3
7. Braided channel	<u>0</u>	1	2	3
8. Recent alluvial deposits	0	<u>0</u>	2	3
9 <sup>a</sup> . Natural levees	<u>0</u>	1	2	3
10. Headcuts	0	<u>0</u>	2	3
11. Grade controls	<u>0</u>	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	<u>0</u>	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = <u>0</u>		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7)

14. Groundwater flow/discharge	0	1	<u>2</u>	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	<u>0</u>	3
16. Leaf litter	1.5	1	<u>0.5</u>	0
17. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	<u>0.5</u>	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = <u>1.5</u>	

C. Biology (Subtotal = 2.75)

20 <sup>b</sup> . Fibrous roots in channel	3	2	<u>1</u>	0
21 <sup>b</sup> . Rooted plants in channel	3	2	<u>1</u>	0
22. Crayfish	<u>0</u>	0.5	1	1.5
23. Bivalves	<u>0</u>	1	2	3
24. Fish	<u>0</u>	0.5	1	1.5
25. Amphibians	<u>0</u>	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	<u>0</u>	0.5	1	1.5
27. Filamentous algae; periphyton	<u>0</u>	1	2	3
28. Iron oxidizing bacteria/fungus.	<u>0</u>	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = <u>0.75</u> ; OBL = 1.5; SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: <u>5/24/12</u>	Project: <u>4673</u>	Latitude:
Evaluator: <u>C Plummer</u>	Site: <u>7-11</u>	Longitude:
Total Points: <i>Stream is at least intermittent if <math>\geq 19</math> or perennial if <math>\geq 30</math></i> <u>23.75</u>	County:	Other e.g. Quad Name:

A. Geomorphology (Subtotal = <u>12</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	<u>2</u>	3
2. Sinuosity	0	<u>0</u>	2	3
3. In-channel structure: riffle-pool sequence	0	<u>0</u>	2	3
4. Soil texture or stream substrate sorting	0	<u>0</u>	2	3
5. Active/relic floodplain	<u>0</u>	1	2	<u>3</u>
6. Depositional bars or benches	0	<u>0</u>	2	3
7. Braided channel	<u>0</u>	1	2	3
8. Recent alluvial deposits	0	<u>0</u>	2	3
9 <sup>b</sup> . Natural levees	<u>0</u>	1	2	3
10. Headcuts	0	<u>0</u>	2	3
11. Grade controls	<u>0</u>	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	<u>1</u>	1.5
13. Second or greater order channel on <u>existing</u> USGS or NRCS map or other documented evidence.	No = <u>0</u>		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>8</u> )	Absent	Weak	Moderate	Strong
14. Groundwater flow/discharge	0	1	2	<u>3</u>
15. Water in channel and > 48 hrs since rain, <u>or</u> Water in channel – dry or growing season	0	1	<u>2</u>	3
16. Leaf litter	1.5	1	<u>0.5</u>	0
17. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	<u>0.5</u>	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = <u>1.5</u>	

C. Biology (Subtotal = <u>3.75</u> )	Absent	Weak	Moderate	Strong
20 <sup>b</sup> . Fibrous roots in channel	3	2	<u>1</u>	0
21 <sup>b</sup> . Rooted plants in channel	3	<u>0</u>	1	0
22. Crayfish	<u>0</u>	0.5	1	1.5
23. Bivalves	<u>0</u>	1	2	3
24. Fish	<u>0</u>	0.5	1	1.5
25. Amphibians	<u>0</u>	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	<u>0</u>	0.5	1	1.5
27. Filamentous algae; periphyton	<u>0</u>	1	2	3
28. Iron oxidizing bacteria/fungus.	<u>0</u>	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = <u>0.75</u> ; OBL = 1.5; SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants; Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 5/14/12	Project: 4673	Latitude:
Evaluator: C Plummer	Site: 7-12	Longitude:
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30</i>	County: 21	Other e.g. Quad Name:

A. Geomorphology (Subtotal = 9)	Absent	Weak	Moderate	Strong
1 <sup>a</sup> . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 <sup>a</sup> . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

<sup>a</sup> Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7)	Absent	Weak	Moderate	Strong
14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 6)	Absent	Weak	Moderate	Strong
20 <sup>b</sup> . Fibrous roots in channel	3	2	1	0
21 <sup>b</sup> . Rooted plants in channel	0	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
29 <sup>b</sup> . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; Other = 0			

<sup>b</sup> Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

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# Appendix C

## Water Quality

VDEQ 2012 Impaired Waters (Categories 4 and 5)										
Water Name	Assessment Unit	Segment Description	Designated Use	Cause Group Code	Cause Category	Cause Name	Impairment Source(s)	Cycle First Listed	TMDL Schedule	Distance from the Study Area (closest point to footprint)
Rappahannock River	VAN-E20E_RPP03 A2	Begins at the fall line at Route 1 and continues downstream until the confluence with Ware Creek.	Recreation	E20E-01-BAC	4A	Escherichia coli	<ul style="list-style-type: none"> <li>•Livestock (grazing or feeding operations)</li> <li>•On-site treatment systems (septic systems and similar decentralized systems)</li> <li>•Urban Runoff / storm sewers</li> <li>•wastes from pets</li> <li>•waterfowl</li> <li>•wildlife other than waterfowl</li> </ul>	2002	2010	1.45 miles
			Fish Consumption	E20E-03-PCB	5A	PCB in Fish Tissue	unknown	2004	2016	
Falls Run	VAN-E20R_FAL01 A04	Segment begins at the headwaters of Falls Run and continues downstream until the confluence with the Rappahanno	Aquatic Life	E20R-01-BEN	5A	Benthic-Macroinvertebrate Bioassessments	unknown	2012	2024	Within Study Area

		ck River.								
Claiborne Run	VAN-E20R_CLB01 A00	Segment begins at the Route 1 crossing of Claiborne Run and continues downstream until the confluence with the Rappahannock River.	Fish Consumption	E20E-03-PCB	5A	PCB in Fish Tissue	unknown	2006	2018	1.31 miles
			Recreation	E20R-01-BAC	4A	Escherichia coli	<ul style="list-style-type: none"> <li>•Livestock (grazing or feeding operations)</li> <li>•On-site treatment systems (septic systems and similar decentralized systems)</li> <li>•Urban Runoff / storm sewers</li> <li>•wastes from pets</li> <li>•waterfowl</li> <li>•wildlife other than waterfowl</li> </ul>	2004	2016	
Hazel run	VAN-E20R_HAL01 A00	Segment begins at the Route 95 crossing and continues downstream until the confluence with the Rappahannock River.	Fish Consumption	E20E-03-PCB	5A	PCB in Fish Tissue	unknown	2006	2018	0.72 miles
			Recreation	E20R-02-BAC	4A	Escherichia coli	<ul style="list-style-type: none"> <li>•Livestock (grazing or feeding operations)</li> <li>•On-site treatment systems (septic systems and similar decentralized systems)</li> <li>•Urban Runoff / storm sewers</li> <li>•wastes from</li> </ul>	2004	2016	

							<ul style="list-style-type: none"> <li>•pets</li> <li>•waterfowl</li> <li>•wildlife other than waterfowl</li> </ul>			
			Aquatic Life	E20R-02-BEN	5A	Benthic-Macroinvertebrate Bioassessments	unknown	2012	2024	

# Appendix D

## Threatened and Endangered Species and Habitat Information



MEMORANDUM

**TO:** FILE

**FROM:** Laura Meadows - McCormick Taylor, Inc.

**DATE:** May 27, 2014

**RE:** Comments from NOAA

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Laura Meadows of McCormick Taylor contacted Christine Vaccaro from the National Oceanic and Atmospheric Administration regarding the Rappahannock River Crossing Project. Ms. Vaccaro stated that McCormick Taylor did not receive a scoping letter response from NOAA because they had no comments on the project.



Threats to the significant Aquatic Natural Communities and the surrounding watershed include water quality degradation related to point and non-point pollution, water withdrawal and introduction of non-native species.

Furthermore, the Embrey Hill Conservation Site is located within the project site. Conservation sites are tools for representing key areas of the landscape that warrant further review for possible conservation action because of the natural heritage resources and habitat they support. Conservation sites are polygons built around one or more rare plant, animal, or natural community designed to include the element and, where possible, its associated habitat, and buffer or other adjacent land thought necessary for the element's conservation. Conservation sites are given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain; on a scale of 1-5, 1 being most significant. Embrey Hill Conservation Site has been given a biodiversity significance ranking of B5, which represents a site of general significance. The natural heritage resource of concern at this site is:

Water-willow Rocky Bar and Shore

G4G5/S4/NL/NL

Water-willow Rocky Bar and Shore is found primarily in the Piedmont, Central Appalachians, Cumberland Plateau, Interior Low Plateau, Ozarks, Ouachita Mountains, and adjacent provinces. It ranges from Alabama, Georgia and the Carolinas west to Arkansas and Oklahoma and north to Ohio, New York, and New Jersey, with possible outliers north to southern Quebec. The stands occur on the shoals or bars of rocky streams and riverbeds, where they are subject to frequent high-energy floods. The substrate is a variable mixture of sand, gravel and cobbles, often with deposits of silt and muck. American water-willow (*Justicia americana*) is the dominant, and sometimes only, species in this community, forming lawn-like stands in shallow reaches of rivers (NatureServe, 2010). This community occurs along most of the Piedmont and mountain-region rivers and larger streams in Virginia. Potential threats include pollutants and invasive aquatic plants.

Finally, the Yellow lance (*Elliptio lanceolata*, G2G3/S2S3/SOC/NL) has been historically documented downstream from the project site in the Rappahannock River. The Yellow lance occurs in mid-sized rivers and second and third order streams. To survive, it needs a silt-free, stable streambed and well-oxygenated water that is free of pollutants. This species has been the subject of taxonomic debate in recent years (NatureServe, 2009). Currently in Virginia, the Yellow lance is recognized from populations in the Chowan, James, York, and Rappahannock drainages. Its range also extends into Neuse-Tar river system in North Carolina. In recent years, significant population declines have been noted across its range (NatureServe, 2009). Please note that this species is currently classified as a species of concern by the United States Fish and Wildlife Service (USFWS) however, this designation has no official legal status.

Considered good indicators of the health of aquatic ecosystems, freshwater mussels are dependent on good water quality, good physical habitat conditions, and an environment that will support populations of host fish species (Williams et al., 1993). Because mussels are sedentary organisms, they are sensitive to water quality degradation related to increased sedimentation and pollution. They are also sensitive to habitat destruction through dam construction, channelization, and dredging, and the invasion of exotic mollusk species. The Yellow lance may be particularly sensitive to chemical pollutants and exposure to fine sediments from erosion (NatureServe, 2009).

To minimize adverse impacts to the aquatic ecosystem as a result of the proposed activities, DCR recommends the implementation of and strict adherence to applicable state and local erosion and sediment control/storm water management laws and regulations, establishment/enhancement of riparian buffers with native plant species and maintaining natural stream flow.

Please note this project is within a section of the Rappahannock River, which has been designated as a scenic river in the state of Virginia. Due to this designation, DCR recommends you contact Lynn Crump of the DCR-Division of Planning and Recreation at 804-786-5054 or [Lynn.Crump@dcr.virginia.gov](mailto:Lynn.Crump@dcr.virginia.gov).

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

New and updated information is continually added to Biotics. Please re-submit project information and map for an update on this natural heritage information if the scope of the project changes and/or six months has passed before it is utilized.

All VDOT projects on state-owned lands must comply with the Virginia Erosion & Sediment Control (ESC) Law and Regulations, the Virginia Stormwater Management (SWM) Law and Regulations, the most current version of the DCR approved VDOT Annual ESC and SWM Specifications and Standards, and the project-specific ESC and SWM plans.

[Reference: VESCL §10.1-560, §10.1-564; VESCR §4VAC50-30 et al; VSWML §10.1-603 et al; VSWMR §4VAC-3-20 et al].

The Virginia Department of Game and Inland Fisheries (VDGIF) maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters, that may contain information not documented in this letter. Their database may be accessed from <http://vafwis.org/fwis>, or contact Gladys Cason (804-367-0909 or [Gladys.Cason@dgif.virginia.gov](mailto:Gladys.Cason@dgif.virginia.gov)).

According to the information currently in our files, Rappahannock River, which has been designated by the Virginia Department of Game and Inland Fisheries (VDGIF) as a “Threatened and Endangered Species Water” for the Dwarf wedgemussel is within 2 miles of the project area. Therefore, DCR recommends coordination with the U.S. Fish and Wildlife Service (USFWS) and Virginia's regulatory authority for the management and protection of this species, the VDGIF, to ensure compliance with the Virginia Endangered Species Act (VA ST §§ 29.1-563 – 570).

Thank you for the opportunity to comment on this project.

Cc: Ernie Aschenbach, VDGIF  
Troy Andersen, USFWS  
Lynn Crump, DCR-DPRR

#### Literature Cited

Fleming, G.P., K.D. Patterson, K. Taverna, and P.P. Coulling. 2011. The natural communities of Virginia: classification of ecological community groups. Second approximation. Version 2.4. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA.

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: December 13, 2011).

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Williams, J.D., M.L. Warren, Jr., K.S. Cummings, J.L. Harris, and R.J. Neves. 1993. Conservation status of freshwater mussels of the United States and Canada. Fisheries 18: 69.

## Natural Heritage Resources by County

Your Search Criteria:

Fredericksburg (City)

Taxonomic Group:

Federal Legal Status: LE, LT,

State Legal Status: LE, LT,

Search run: 03-11-2014

Click highlighted scientific names below to go to NatureServe report.

[Search Menu](#)

Your Search did not return any results.

Note: On-line queries provide basic information from DCR's databases at the time of the request. They are NOT to be substituted for a project review or for on-site surveys required for environmental assessments of specific project areas.

Need Additional Information? For more detailed information on locations of Natural Heritage Resources submit an [information request](#).

Want to Contribute? If you have information on locations of natural heritage resources, please fill out and submit a [rare species sighting form](#)

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Return to the [Database Search page](#)

## Natural Heritage Resources by County

Your Search Criteria:

Spotsylvania County(ies)

Taxonomic Group:

Federal Legal Status: LE, LT,

State Legal Status: LE, LT,

Search run: 03-11-2014

Click highlighted scientific names below to go to NatureServe report.

[Search Menu](#)

Scientific Name	Common Name	<a href="#">Global Rank</a>	<a href="#">State Rank</a>	<a href="#">Federal Status</a>	<a href="#">State Status</a>	Last Year Observed
<b>Spotsylvania</b>						
BIVALVIA (MUSSELS)						
<a href="#">Alasmidonta heterodon</a>	Dwarf Wedgemussel	G1G2	S1	LE	LE	2008
<a href="#">Lasmigona subviridis</a>	Green Floater	G3	S2		LT	1927
HETEROPTERA (TRUE BUGS)						
<a href="#">Sigara depressa</a>	Virginia Piedmont Water Boatman	G1G2	S1S2	SOC	LE	1969
VASCULAR PLANTS						
<a href="#">Isotria medeoloides</a>	Small Whorled Pogonia	G2	S2	LT	LE	2006

Note: On-line queries provide basic information from DCR's databases at the time of the request. They are NOT to be substituted for a project review or for on-site surveys required for environmental assessments of specific project areas.

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Return to the [Database Search page](#)

## Natural Heritage Resources by County

### Your Search Criteria:

Stafford County(ies)

Taxonomic Group:

Federal Legal Status: LE, LT,

State Legal Status: LE, LT,

Search run: 03-11-2014

Click highlighted scientific names below to go to NatureServe report.

[Search Menu](#)

Scientific Name	Common Name	<a href="#">Global Rank</a>	<a href="#">State Rank</a>	<a href="#">Federal Status</a>	<a href="#">State Status</a>	Last Year Observed
<b>Stafford</b>						
<b>BIVALVIA (MUSSELS)</b>						
<a href="#">Alasmidonta heterodon</a>	Dwarf Wedgemussel	G1G2	S1	LE	LE	2003
<b>VASCULAR PLANTS</b>						
<a href="#">Aeschynomene virginica</a>	Sensitive Joint-vetch	G2	S2	LT	LT	1997
<a href="#">Harperella vivipara</a>	Harperella	G2	S1	LE	LE	2009
<a href="#">Isotria medeoloides</a>	Small Whorled Pogonia	G2	S2	LT	LE	2011

Note: On-line queries provide basic information from DCR's databases at the time of the request. They are NOT to be substituted for a project review or for on-site surveys required for environmental assessments of specific project areas.

Need Additional Information? For more detailed information on locations of Natural Heritage Resources submit an [information request](#).

Want to Contribute? If you have information on locations of natural heritage resources, please fill out and submit a [rare species sighting form](#)

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March 19, 2014

Shirl A. Dressler  
Project Review  
Department of Game & Inland Fisheries  
4010 West Broad Street  
Richmond, Virginia 23220

Subject: Rappahannock River Crossing  
Spotsylvania County, Stafford County, City of Fredericksburg  
VDOT Project # 0095-111-259, P101; UPC # 101595

Dear Ms. Dressler,

VDOT and FHWA have initiated a study of proposed improvements along I-95 between the Route 3 Interchange and the Route 17 Interchange in Spotsylvania County, Stafford County, and the City of Fredericksburg in Virginia. The purpose of this study is to identify transportation needs within the area, including access to and from the commercial and industrial facilities, and to evaluate the impacts of potential improvements to meet those needs.

The enclosed map shows the area to be evaluated in the study. Elements of the study include the purpose and need for the project, evaluation of proposed improvements, identification of environmental resources, evaluation of environmental impacts, and public involvement. Please note, in-stream work may be required.

Using our subscription to DGIF's Fish and Wildlife Information Service (FWIS), we have performed an Initial Project Assessment for the project area and identified two species listed as "Confirmed" within a 2-mile radius of the project area. These species are the Dwarf Wedgemussel and the Green Floater. We also conducted a search using the Center for Conservation Biology's VaEagles Nest Locator. While the database indicated that several bald eagle (*Haliaeetus leucocephalus*) nests exist within the associated counties; none were located within 660 feet of the project area. A map showing the location of the nests in relation to the project area is included for your reference. We will also be coordinating with the Virginia Department of Conservation and Recreation (DCR), but we would like to request your confirmation of the project report and determination if further coordination with DGIF or US Fish & Wildlife Service is required.

If you have any questions, please feel free to contact me at (804) 762-5800 or at [lpmeadows@mtmail.biz](mailto:lpmeadows@mtmail.biz). We look forward to your response. Thank you!

Sincerely,

A handwritten signature in cursive script that reads "Laura Meadows".

Laura Meadows  
Research Assistant

**Attachments:**

- Project Area Map
- Map of Search Location in VaFWIS Database
- VaFWIS Initial Project Assessment Report (Compiled on 3/11/2014)
- Map showing location of Bald Eagle Nest according to CCB's VaEagles Nest Locator



VaFWIS - Department of Game and Inland Fisheries



38,19,16.3 -77,30,12.3

back 38,21,15.1 -77,27,46.7

Refresh Browser Page

Map Click **Pan** **Zoom** **In** **Out**

Map Scale **In** **Zoom** **Out**

Screen Size **Small** **Size** **Big**

[Help](#)

Search Point

- Change to "clicked" map point
- Fixed at 38,19,16.3 -77,30,12.3

Show Position Rings

- Yes  No

1/2 mile and 1/8 mile at the Search Point

Show Search Area

- Yes  No

2 Search distance miles radius

Search Point is at map center

Base Map [Choices](#)

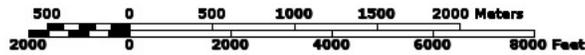
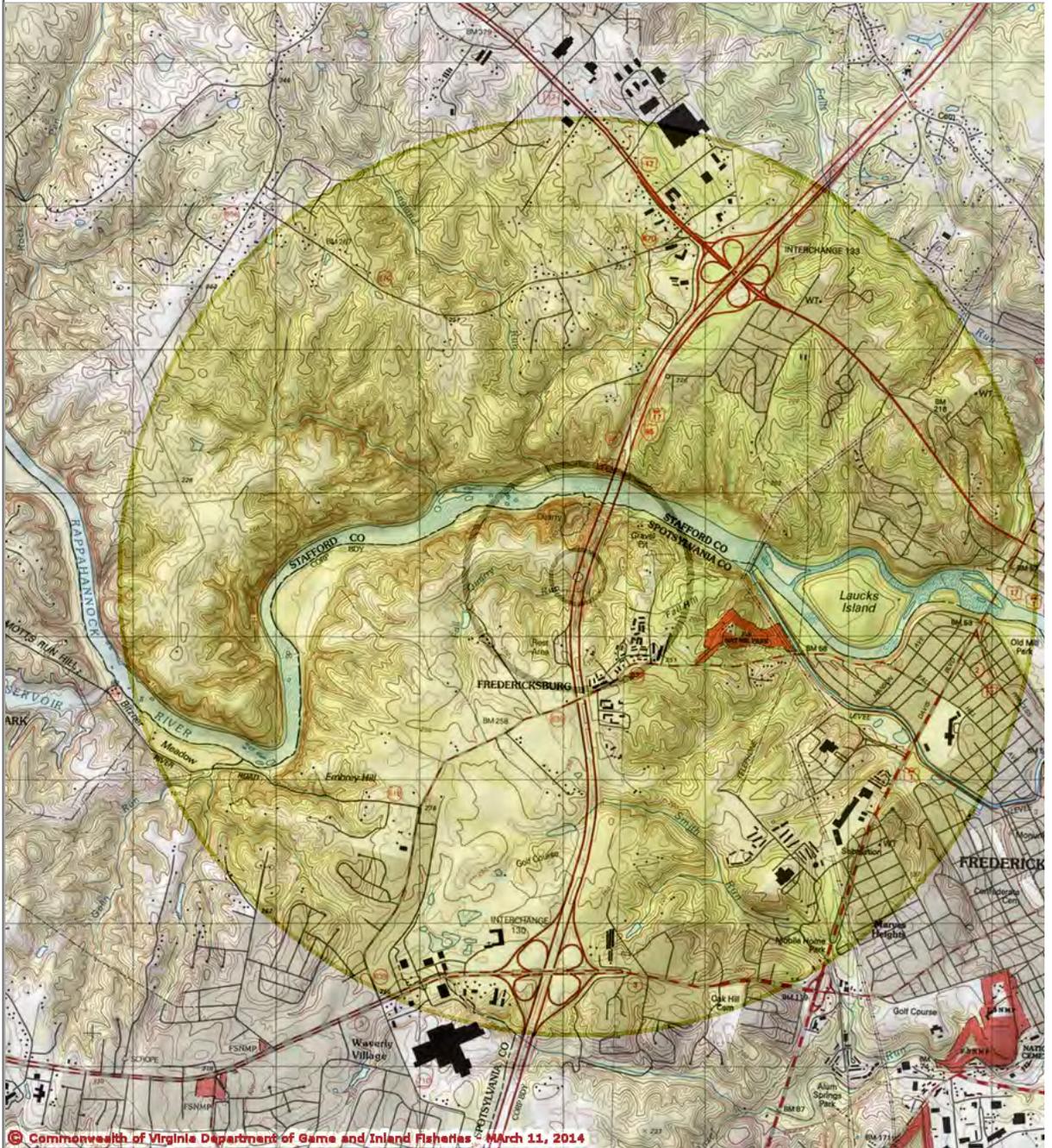
Topography

Map Overlay [Choices](#)

Current List: Position, Search

Map Overlay Legend

- Position Rings**  
1/2 mile and 1/8 mile at the Search Point
- 2 mile radius Search Area**



Point of Search 38,19,16.3 -77,30,12.3

Map Location 38,19,16.3 -77,30,12.3

- Select Coordinate System:
- Degrees, Minutes, Seconds Latitude - Longitude
  - Decimal Degrees Latitude - Longitude
  - Meters UTM NAD83 East North Zone
  - Meters UTM NAD27 East North Zone

Base Map source: Topographic maps from TOPO! copyright 2006 (see [National Geographic Maps](#) for details)

Map projection is UTM Zone 18 NAD 1983 with left 277154 and top 4248420. Pixel size is 8 meters . Coordinates displayed are Degrees, Minutes, Seconds North and West. Map is currently displayed as 1000 columns by 1000 rows for a total of 1000000 pixels. The map display represents 8000 meters east to west by 8000 meters north to south for a total of 64.0 square kilometers. The map display represents 26251 feet east to west by 26251 feet north to south for a total of 24.7 square miles.

Topographic maps and Black and white aerial photography for year 1990+- are from the United States Department of the Interior, United States Geological Survey. Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network.

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<http://www.national.geographic.com/topo>

All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries.

map assembled 2014-03-11 13:44:44 (qa/qc December 5, 2012 8:04 - tn=527863 dist=3218 I )  
\$poi=38.3212027 -77.5034249

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| [DGIF](#) | [Credits](#) | [Disclaimer](#) | Contact [shirldressler@dgif.virginia.gov](mailto:shirldressler@dgif.virginia.gov) | Please view our [privacy policy](#) |  
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## VaFWIS Initial Project Assessment Report Compiled on

[Help](#)

3/11/2014, 1:46:24 PM

Known or likely to occur within a 2 mile radius around point 38,19,16.3 -77,30,12.3  
in 177 Spotsylvania County, 179 Stafford County, 630 Fredericksburg City, VA

[View Map of  
Site Location](#)

476 Known or Likely Species ordered by Status Concern for Conservation  
(displaying first 20) (20 species with Status\* or Tier I\*\* or Tier II\*\* )

<a href="#">BOVA Code</a>	<a href="#">Status*</a>	<a href="#">Tier**</a>	<a href="#">Common Name</a>	<a href="#">Scientific Name</a>	Confirmed	Database(s)
010032	FESE	II	<a href="#">Sturgeon, Atlantic</a>	Acipenser oxyrinchus		BOVA
060003	FESE	II	<a href="#">Wedgemussel, dwarf</a>	Alasmidonta heterodon	<a href="#">Yes</a>	BOVA,TEWaters,Habitat
040129	ST	I	<a href="#">Sandpiper, upland</a>	Bartramia longicauda		BOVA
040293	ST	I	<a href="#">Shrike, loggerhead</a>	Lanius ludovicianus		BOVA
060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	<a href="#">Yes</a>	TEWaters,Habitat
40292	ST		<a href="#">Shrike, migrant loggerhead</a>	Lanius ludovicianus migrans		BOVA
050022	FP		<a href="#">Bat, northern long-eared</a>	Myotis septentrionalis		BOVA
010038	FC	IV	<a href="#">Alewife</a>	Alosa pseudoharengus	<a href="#">Yes</a>	SppObs
010045	FC		<a href="#">Herring, blueback</a>	Alosa aestivalis	<a href="#">Yes</a>	SppObs
100248	FS	I	<a href="#">Fritillary, regal</a>	Speyeria idalia idalia		BOVA
040093	FS	II	<a href="#">Eagle, bald</a>	Haliaeetus leucocephalus	<a href="#">Yes</a>	BOVA,SppObs,BAEANests
030063	CC	III	<a href="#">Turtle, spotted</a>	Clemmys guttata		BOVA
010077		I	<a href="#">Shiner, bridle</a>	Notropis bifrenatus	<a href="#">Yes</a>	BOVA,Habitat,SppObs
040372		I	<a href="#">Crossbill, red</a>	Loxia curvirostra		BOVA

040225		I	<a href="#">Sapsucker, yellow-bellied</a>	Sphyrapicus varius		BOVA
40319		I	<a href="#">Warbler, black-throated green</a>	Dendroica virens		BOVA
040052		II	<a href="#">Duck, American black</a>	Anas rubripes		BOVA
040105		II	<a href="#">Rail, king</a>	Rallus elegans		BOVA,Habitat
40320		II	<a href="#">Warbler, cerulean</a>	Dendroica cerulea		BOVA
040266		II	<a href="#">Wren, winter</a>	Troglodytes troglodytes		BOVA

To view All 476 species [View 476](#)

\* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; CC=Collection Concern

\*\* I=VA Wildlife Action Plan - Tier I - Critical Conservation Need;  
 II=VA Wildlife Action Plan - Tier II - Very High Conservation Need;  
 III=VA Wildlife Action Plan - Tier III - High Conservation Need;  
 IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Bat Colonies or Hibernacula: Not Known

Anadromous Fish Use Streams (2 records)

[View Map of All Anadromous Fish Use Streams](#)

Stream ID	Stream Name	Reach Status	Anadromous Fish Species			View Map
			Different Species	Highest TE*	Highest Tier**	
C69	<a href="#">Rappahannock river 1</a>	Confirmed	6	FC	IV	<a href="#">Yes</a>
C84	<a href="#">Rappahannock river 2</a>	Confirmed	4	FC	IV	<a href="#">Yes</a>

Impediments to Fish Passage (1 records)

[View Map of All Fish Impediments](#)

ID	Name	River	View Map
98	<a href="#">EMBREY DAM</a>	RAPPAHANNOCK RIVER	<a href="#">Yes</a>

Colonial Water Bird Survey

N/A

Threatened and Endangered Waters ( 2 Reaches )

[View Map of All Threatened and Endangered Waters](#)

Stream Name	T&E Waters Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
<a href="#">Rappahannock River (02080104)</a>	FESE	UUUUUJ	FESE	II	<a href="#">Wedgemussel, dwarf</a>	Alasmidonta heterodon	<a href="#">Yes</a>
		060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	
<a href="#">Rappahannock River (02080104)</a>	ST	060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	<a href="#">Yes</a>

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests ( 3 records )

[View Map of All Query Results Bald Eagle Nests](#)

Nest	N Obs	Latest Date	DGIF Nest Status	View Map
<a href="#">ST0003</a>	2	Mar 1 2000	HISTORIC	<a href="#">Yes</a>
<a href="#">ST0101</a>	8	Apr 24 2006	HISTORIC	<a href="#">Yes</a>
<a href="#">ST9401</a>	16	Apr 26 2000	HISTORIC	<a href="#">Yes</a>

Displayed 3 Bald Eagle Nests

Habitat Predicted for Aquatic WAP Tier I & II Species ( 3 Reaches )

[View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species](#)

Stream Name	Tier Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					

Rappahannock River (20801041)	FESE	00000	1111	II	<a href="#">Wedgemussel dwarf</a>	Alasmidonta heterodon	<a href="#">Yes</a>
		060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	
Rappahannock River (20801041)	ST	010077		I	<a href="#">Shiner, bride</a>	Notropis bifrenatus	<a href="#">Yes</a>
		060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	
Rappahannock River (20801041)	ST	060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	<a href="#">Yes</a>

Habitat Predicted for Terrestrial WAP Tier I & II Species

BOVA Code	Status*	Tier**	Common Name	Scientific Name	View Map
040105		II	<a href="#">Rail, king</a>	Rallus elegans	<a href="#">Yes</a>

Public Holdings: ( 1 names )

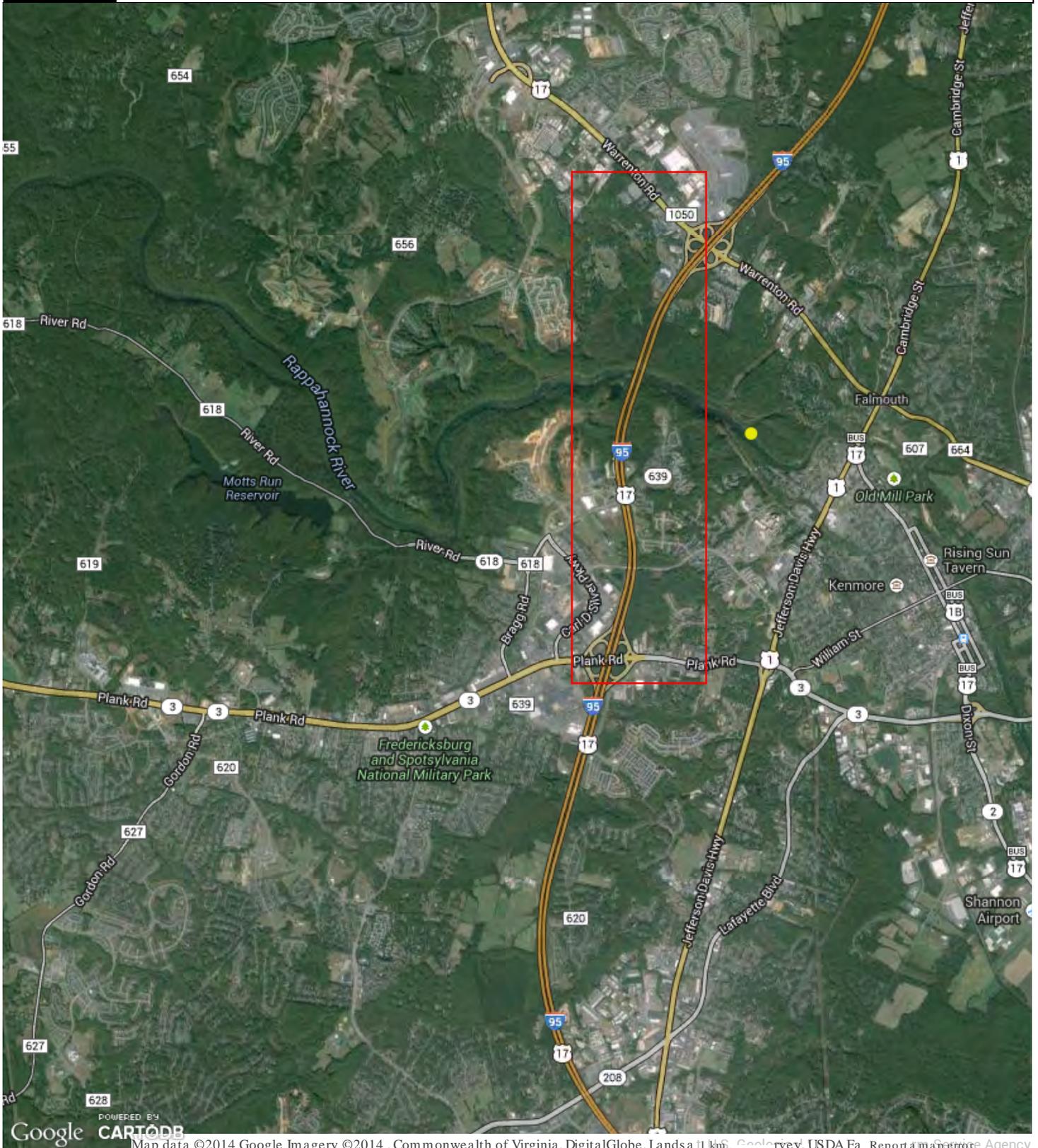
Name	Agency	Level
Fredericksburg & Spotsylvania National Military Park	National Park Service	Federal

Compiled on 3/11/2014, 1:46:24 PM 1527863.0 report=IPA searchType= R dist= 3218 poi= 38,19,16.3 -77,30,12.3

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[back](#) 38,19,20.6 -77,30,57.2

Map Click **Pan**

[Refresh Browser Page](#)

Map Scale **In** **Zoom** **Out**

Screen Size **Small** **Size** **Big**

[Help](#)

38,19,01.0 -77,30,16.8

is the Search Point

Search Point

- Change to "clicked" map point
- Fixed at 38,19,01.0 -77,30,16.8

Show Position Rings

- Yes  No
- 1/2 mile and 1/8 mile at the Search Point

Show Search Area

- Yes  No
- 2 Search distance miles radius

Search Point is at map center

Base Map [Choices](#)

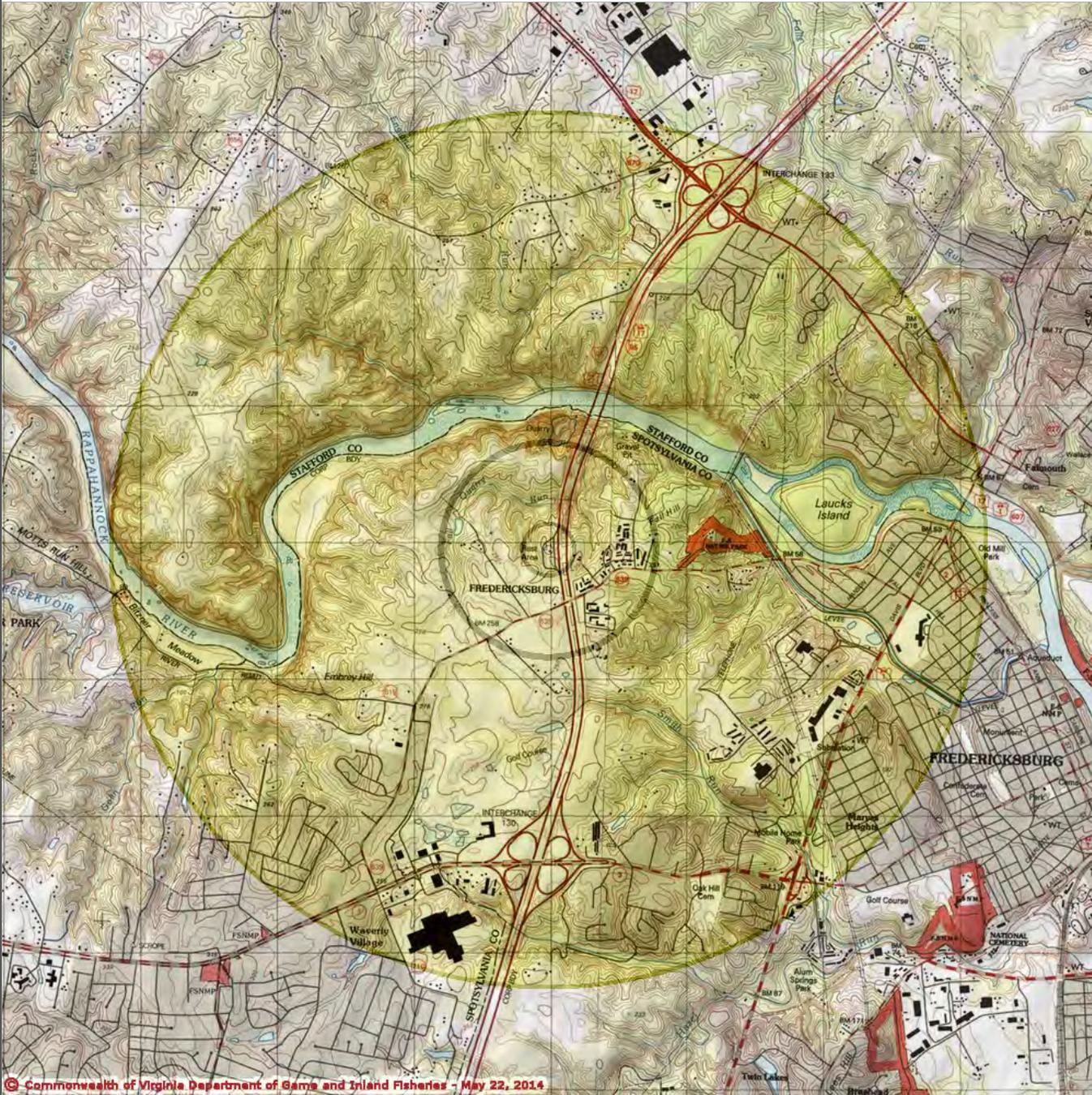
Topography

Map Overlay [Choices](#)

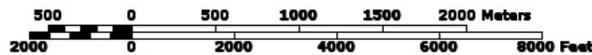
Current List: Position, Search

Map Overlay Legend

- Position Rings 1/2 mile and 1/8 mile at the Search Point
- 2 mile radius Search Area



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Point of Search 38,19,01.0 -77,30,16.8

Map Location 38,19,01.0 -77,30,16.8

- Select Coordinate System:
- Degrees, Minutes, Seconds Latitude - Longitude
  - Decimal Degrees Latitude - Longitude
  - Meters UTM NAD83 East North Zone
  - Meters UTM NAD27 East North Zone

Base Map source: Topographic maps from TOPO! copyright 2006 (see [National Geographic Maps](#) for details)

Map projection is UTM Zone 18 NAD 1983 with left 277032 and top 4247951. Pixel size is 8 meters. Coordinates displayed are Degrees, Minutes, Seconds North and West. Map is currently displayed as 1000 columns by 1000 rows for a total of 1000000 pixels. The map display represents 8000 meters east to west by 8000 meters north to south for a total of 64.0 square kilometers. The map display represents 26251 feet east to west by 26251 feet north to south for a total of 24.7 square miles.

miles.

Topographic maps and Black and white aerial photography for year 1990+ are from the United States Department of the Interior, United States Geological Survey. Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network.

Shaded topographic maps are from TOPO! ©2006 National Geographic  
<http://www.national.geographic.com/topo>

All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries.

map assembled 2014-05-22 15:07:08 (qa/qc December 5, 2012 8:04 - tn=553955

dist=3218.688 1 )

\$poi=37.3388889 -80.3388889

## VaFWIS Initial Project Assessment Report Compiled on

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5/22/2014, 3:16:53 PM

Known or likely to occur within a 2 mile radius around point 38,19,01.0 -77,30,16.8  
in 177 Spotsylvania County, 179 Stafford County, 630 Fredericksburg City, VA

[View Map of  
Site Location](#)

475 Known or Likely Species ordered by Status Concern for Conservation  
(displaying first 21) (21 species with Status\* or Tier I\*\* or Tier II\*\* )

<a href="#">BOVA Code</a>	<a href="#">Status*</a>	<a href="#">Tier**</a>	<a href="#">Common Name</a>	<a href="#">Scientific Name</a>	Confirmed	Database(s)
010032	FESE	II	<a href="#">Sturgeon, Atlantic</a>	Acipenser oxyrinchus		BOVA
060003	FESE	II	<a href="#">Wedgemussel, dwarf</a>	Alasmidonta heterodon	<a href="#">Yes</a>	BOVA,TEWaters,Habitat
040129	ST	I	<a href="#">Sandpiper, upland</a>	Bartramia longicauda		BOVA
040293	ST	I	<a href="#">Shrike, loggerhead</a>	Lanius ludovicianus		BOVA
060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	<a href="#">Yes</a>	TEWaters,Habitat
40292	ST		<a href="#">Shrike, migrant loggerhead</a>	Lanius ludovicianus migrans		BOVA
050022	FP		<a href="#">Bat, northern long-eared</a>	Myotis septentrionalis		BOVA
010038	FC	IV	<a href="#">Alewife</a>	Alosa pseudoharengus	<a href="#">Yes</a>	SppObs
010045	FC		<a href="#">Herring, blueback</a>	Alosa aestivalis	<a href="#">Yes</a>	SppObs
100248	FS	I	<a href="#">Fritillary, regal</a>	Speyeria idalia idalia		BOVA
040093	FS	II	<a href="#">Eagle, bald</a>	Haliaeetus leucocephalus	<a href="#">Yes</a>	BOVA,SppObs,BAEANests
030063	CC	III	<a href="#">Turtle, spotted</a>	Clemmys guttata		BOVA
010077		I	<a href="#">Shiner, bridle</a>	Notropis bifrenatus	<a href="#">Yes</a>	BOVA,Habitat,SppObs
040372		I	<a href="#">Crossbill, red</a>	Loxia curvirostra		BOVA

040225		I	<a href="#">Sapsucker, yellow-bellied</a>	Sphyrapicus varius		BOVA
40319		I	<a href="#">Warbler, black-throated green</a>	Dendroica virens		BOVA
040052		II	<a href="#">Duck, American black</a>	Anas rubripes		BOVA
040036		II	<a href="#">Night-heron, yellow-crowned</a>	Nyctanassa violacea violacea		BOVA
040105		II	<a href="#">Rail, king</a>	Rallus elegans		BOVA
40320		II	<a href="#">Warbler, cerulean</a>	Dendroica cerulea		BOVA
040266		II	<a href="#">Wren, winter</a>	Troglodytes troglodytes		BOVA

To view All 475 species [View 475](#)

\* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; CC=Collection Concern

\*\* I=VA Wildlife Action Plan - Tier I - Critical Conservation Need;  
 II=VA Wildlife Action Plan - Tier II - Very High Conservation Need;  
 III=VA Wildlife Action Plan - Tier III - High Conservation Need;  
 IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Bat Colonies or Hibernacula: Not Known

Anadromous Fish Use Streams (2 records)

[View Map of All Anadromous Fish Use Streams](#)

Stream ID	Stream Name	Reach Status	Anadromous Fish Species			View Map
			Different Species	Highest TE*	Highest Tier**	
C69	<a href="#">Rappahannock river 1</a>	Confirmed	6	FC	IV	<a href="#">Yes</a>
C84	<a href="#">Rappahannock river 2</a>	Confirmed	4	FC	IV	<a href="#">Yes</a>

Impediments to Fish Passage (1 records)

[View Map of All Fish Impediments](#)

ID	Name	River	View Map
98	<a href="#">EMBREY DAM</a>	RAPPAHANNOCK RIVER	<a href="#">Yes</a>

Colonial Water Bird Survey

N/A

Threatened and Endangered Waters ( 2 Reaches )

[View Map of All Threatened and Endangered Waters](#)

Stream Name	T&E Waters Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
<a href="#">Rappahannock River (02080104)</a>	FESE	000005	FESE	II	<a href="#">Wedgemussel dwarf</a>	Alasmidonta heterodon	<a href="#">Yes</a>
		060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	
<a href="#">Rappahannock River (02080104)</a>	ST	060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	<a href="#">Yes</a>

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests ( 3 records )

[View Map of All Query Results Bald Eagle Nests](#)

Nest	N Obs	Latest Date	DGIF Nest Status	View Map
<a href="#">ST0003</a>	2	Mar 1 2000	HISTORIC	<a href="#">Yes</a>
<a href="#">ST0101</a>	8	Apr 24 2006	HISTORIC	<a href="#">Yes</a>
<a href="#">ST9401</a>	16	Apr 26 2000	HISTORIC	<a href="#">Yes</a>

Displayed 3 Bald Eagle Nests

Habitat Predicted for Aquatic WAP Tier I & II Species ( 4 Reaches )

[View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species](#)

Tier Species		View

Stream Name	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					Map
		BOVA Code	Status	Tier	Common Name	Scientific Name	
IVINE RUN (20801041)	FESE	000003	FESE	II	<a href="#">Wedgemussel dwarf</a>	Alasmidonta heterodon	<a href="#">Yes</a>
Rappahannock River (20801041)	FESE	060003	FESE	II	<a href="#">Wedgemussel dwarf</a>	Alasmidonta heterodon	<a href="#">Yes</a>
		060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	
Rappahannock River (20801041)	ST	010077		I	<a href="#">Shiner, bridle</a>	Notropis bifrenatus	<a href="#">Yes</a>
		060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	
Rappahannock River (20801041)	ST	060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	<a href="#">Yes</a>

Habitat Predicted for Terrestrial WAP Tier I & II Species

N/A

Public Holdings: ( 1 names )

Name	Agency	Level
Fredericksburg & Spotsylvania National Military Park	National Park Service	Federal

Compiled on 5/22/2014, 3:16:54 PM I553955.0 report=IPA searchType= R dist= 3218.688 poi= 38,19,01.0 -77,30,16.8  
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 SppObs=0.524971; TEWaters=0.062185; TierReaches=0.071494; TierTerrestrial=0.088932; Total=1.525439; Trout=0.03641



38,20,26.0 -77,29,29.8 is the Search Point  
Submit Cancel

back



Map Scale In Zoom Out

Screen Size Small Size Big

Help

38,20,13.5 -77,27,28.4

Search Point  
 Change to "clicked" map point  
 Fixed at 38,20,26.0 -77,29,29.8

Show Position Rings  
 Yes  No  
1/2 mile and 1/8 mile at the Search Point

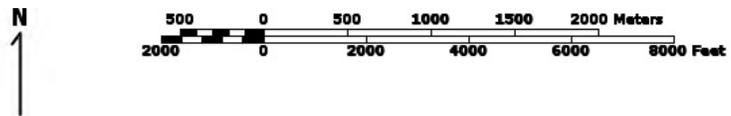
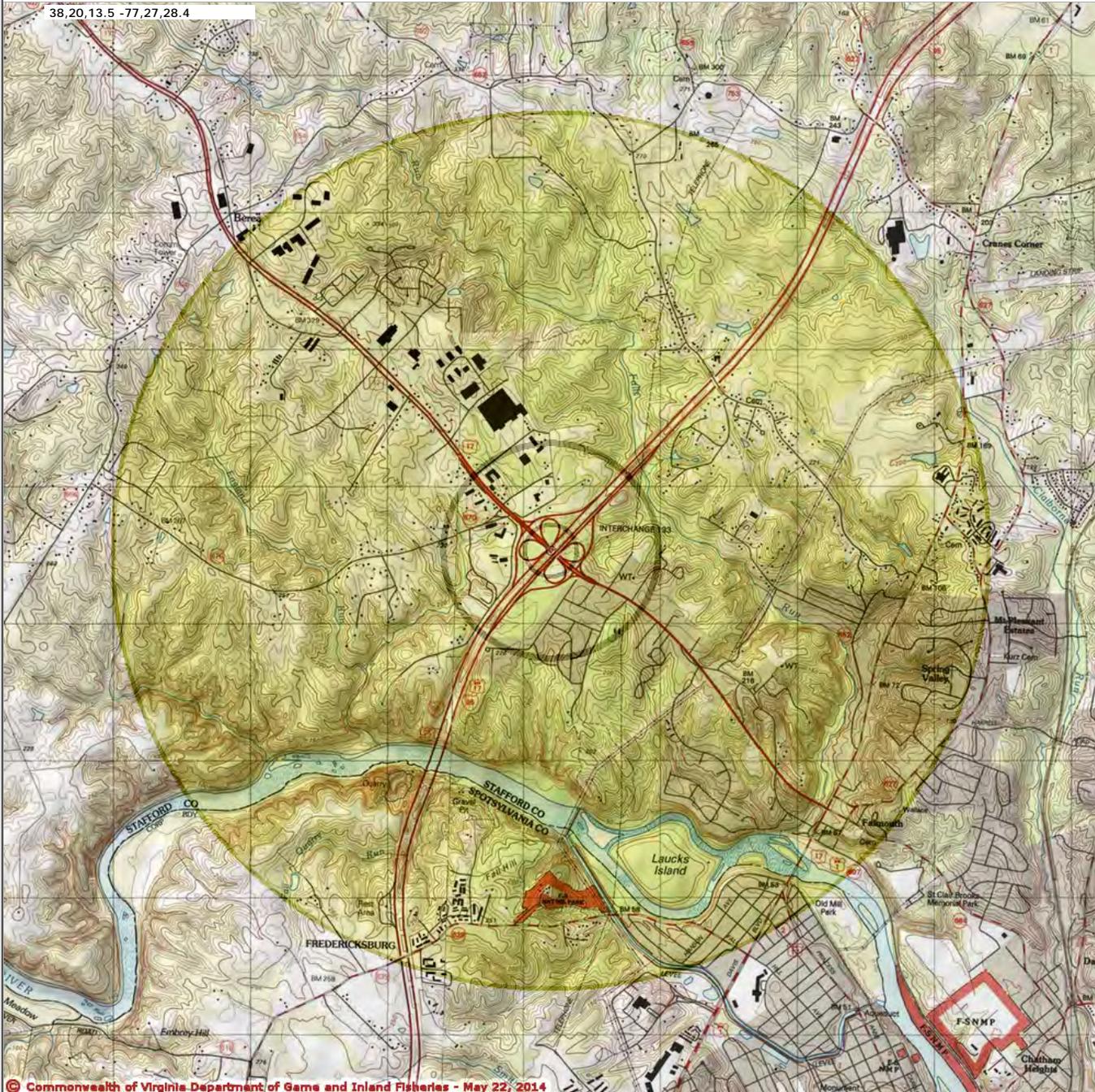
Show Search Area  
 Yes  No  
2 Search distance miles radius

Search Point is at map center

Base Map Choices  
Topography

Map Overlay Choices  
Current List: Position, Search

Map Overlay Legend  
 Position Rings 1/2 mile and 1/8 mile at the Search Point  
 2 mile radius Search Area



Point of Search 38,20,26.0 -77,29,29.8  
Map Location 38,20,26.0 -77,29,29.8

Select Coordinate System:  Degrees, Minutes, Seconds Latitude - Longitude  
 Decimal Degrees Latitude - Longitude  
 Meters UTM NAD83 East North Zone  
 Meters UTM NAD27 East North Zone

Base Map source: Topographic maps from TOPO! copyright 2006 (see [National Geographic Maps](#) for details)

Map projection is UTM Zone 18 NAD 1983 with left 278244 and top 4250542. Pixel size is 8 meters  
. Coordinates displayed are Degrees, Minutes, Seconds North and West. Map is currently displayed as 1000 columns by 1000 rows for a total of 1000000 pixels. The map display represents 8000 meters east to west by 8000 meters north to south for a total of 64.0 square kilometers. The map display represents 26251 feet east to west by 26251 feet north to south for a total of 24.7 square

miles.

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Shaded topographic maps are from TOPO! ©2006 National Geographic  
<http://www.national.geographic.com/topo>

All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries.

map assembled 2014-05-22 15:18:02 (qa/qc December 5, 2012 8:04 - tn=553969

dist=3218.688 I )

\$poi=38.3169444 -77.5046667

## VaFWIS Initial Project Assessment Report Compiled on

[Help](#)

5/22/2014, 3:24:12 PM

Known or likely to occur within a 2 mile radius around point 38,20,26.0 -77,29,29.8  
in 179 Stafford County, 630 Fredericksburg City, VA

[View Map of  
Site Location](#)

456 Known or Likely Species ordered by Status Concern for Conservation  
(displaying first 21) (21 species with Status\* or Tier I\*\* or Tier II\*\* )

<a href="#">BOVA Code</a>	<a href="#">Status*</a>	<a href="#">Tier**</a>	<a href="#">Common Name</a>	<a href="#">Scientific Name</a>	Confirmed	Database(s)
010032	FESE	II	<a href="#">Sturgeon, Atlantic</a>	Acipenser oxyrinchus		BOVA
060003	FESE	II	<a href="#">Wedgemussel, dwarf</a>	Alasmidonta heterodon	<a href="#">Yes</a>	BOVA,TEWaters,Habitat
040129	ST	I	<a href="#">Sandpiper, upland</a>	Bartramia longicauda		BOVA
40293	ST	I	<a href="#">Shrike, loggerhead</a>	Lanius ludovicianus		BOVA
060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	<a href="#">Yes</a>	TEWaters,Habitat
040292	ST		<a href="#">Shrike, migrant loggerhead</a>	Lanius ludovicianus migrans		BOVA
050022	FP		<a href="#">Bat, northern long-eared</a>	Myotis septentrionalis		BOVA
010038	FC	IV	<a href="#">Alewife</a>	Alosa pseudoharengus	<a href="#">Yes</a>	SppObs
010045	FC		<a href="#">Herring, blueback</a>	Alosa aestivalis	<a href="#">Yes</a>	SppObs
100248	FS	I	<a href="#">Fritillary, regal</a>	Speyeria idalia idalia		BOVA
040093	FS	II	<a href="#">Eagle, bald</a>	Haliaeetus leucocephalus	<a href="#">Yes</a>	BOVA,SppObs,BAEANests
030063	CC	III	<a href="#">Turtle, spotted</a>	Clemmys guttata		BOVA
010077		I	<a href="#">Shiner, bridle</a>	Notropis bifrenatus	<a href="#">Yes</a>	BOVA,Habitat,SppObs
040372		I	<a href="#">Crossbill, red</a>	Loxia curvirostra		BOVA

040225		I	<a href="#">Sapsucker, yellow-bellied</a>	Sphyrapicus varius		BOVA
40319		I	<a href="#">Warbler, black-throated green</a>	Dendroica virens		BOVA
040052		II	<a href="#">Duck, American black</a>	Anas rubripes		BOVA
040036		II	<a href="#">Night-heron, yellow-crowned</a>	Nyctanassa violacea violacea		BOVA
040105		II	<a href="#">Rail, king</a>	Rallus elegans		BOVA
40320		II	<a href="#">Warbler, cerulean</a>	Dendroica cerulea		BOVA
040266		II	<a href="#">Wren, winter</a>	Troglodytes troglodytes		BOVA

To view All 456 species [View 456](#)

\* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; CC=Collection Concern

\*\* I=VA Wildlife Action Plan - Tier I - Critical Conservation Need;  
 II=VA Wildlife Action Plan - Tier II - Very High Conservation Need;  
 III=VA Wildlife Action Plan - Tier III - High Conservation Need;  
 IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Bat Colonies or Hibernacula: Not Known

Anadromous Fish Use Streams (2 records)

[View Map of All Anadromous Fish Use Streams](#)

Stream ID	Stream Name	Reach Status	Anadromous Fish Species			View Map
			Different Species	Highest TE*	Highest Tier**	
C69	<a href="#">Rappahannock river 1</a>	Confirmed	6	FC	IV	<a href="#">Yes</a>
C84	<a href="#">Rappahannock river 2</a>	Confirmed	4	FC	IV	<a href="#">Yes</a>

Impediments to Fish Passage (1 records)

[View Map of All Fish Impediments](#)

ID	Name	River	View Map
98	<a href="#">EMBREY DAM</a>	RAPPAHANNOCK RIVER	<a href="#">Yes</a>

Colonial Water Bird Survey

N/A

Threatened and Endangered Waters ( 2 Reaches )

[View Map of All Threatened and Endangered Waters](#)

Stream Name	T&E Waters Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
<a href="#">Rappahannock River (02080104)</a>	FESE	000005	FESE	II	<a href="#">Wedgemussel dwarf</a>	Alasmidonta heterodon	<a href="#">Yes</a>
		060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	
<a href="#">Rappahannock River (02080104)</a>	ST	060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	<a href="#">Yes</a>

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests ( 3 records )

[View Map of All Query Results Bald Eagle Nests](#)

Nest	N Obs	Latest Date	DGIF Nest Status	View Map
<a href="#">ST0003</a>	2	Mar 1 2000	HISTORIC	<a href="#">Yes</a>
<a href="#">ST0101</a>	8	Apr 24 2006	HISTORIC	<a href="#">Yes</a>
<a href="#">ST9401</a>	16	Apr 26 2000	HISTORIC	<a href="#">Yes</a>

Displayed 3 Bald Eagle Nests

Habitat Predicted for Aquatic WAP Tier I & II Species ( 3 Reaches )

[View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species](#)

Tier Species		View

Stream Name	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					Map
Rappahannock River (20801041)	FESE	000003	FESE	II	<a href="#">Wedgemussel dwarf</a>	Alasmidonta heterodon	<a href="#">Yes</a>
		060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	
Rappahannock River (20801041)	ST	010077		I	<a href="#">Shiner, bridle</a>	Notropis bifrenatus	<a href="#">Yes</a>
		060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	
Rappahannock River (20801041)	ST	060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	<a href="#">Yes</a>

Habitat Predicted for Terrestrial WAP Tier I & II Species

N/A

Public Holdings: ( 1 names )

Name	Agency	Level
Fredericksburg & Spotsylvania National Military Park	National Park Service	Federal

Compiled on 5/22/2014, 3:24:12 PM I553969.0 report=IPA searchType= R dist= 3218.688 poi= 38,20,26.0 -77,29,29.8  
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38,17,46.4 -77,30,17.9 is the Search Point

[back](#)

Map Click **Pan** **Zoom** **In** **Out**

Map Scale **In** **Zoom** **Out**

Screen Size **Small** **Size** **Big**

[Help](#)

Search Point  
 Change to "clicked" map point  
 Fixed at 38,17,46.4 -77,30,17.9

Show Position Rings  
 Yes  No  
1/2 mile and 1/8 mile at the Search Point

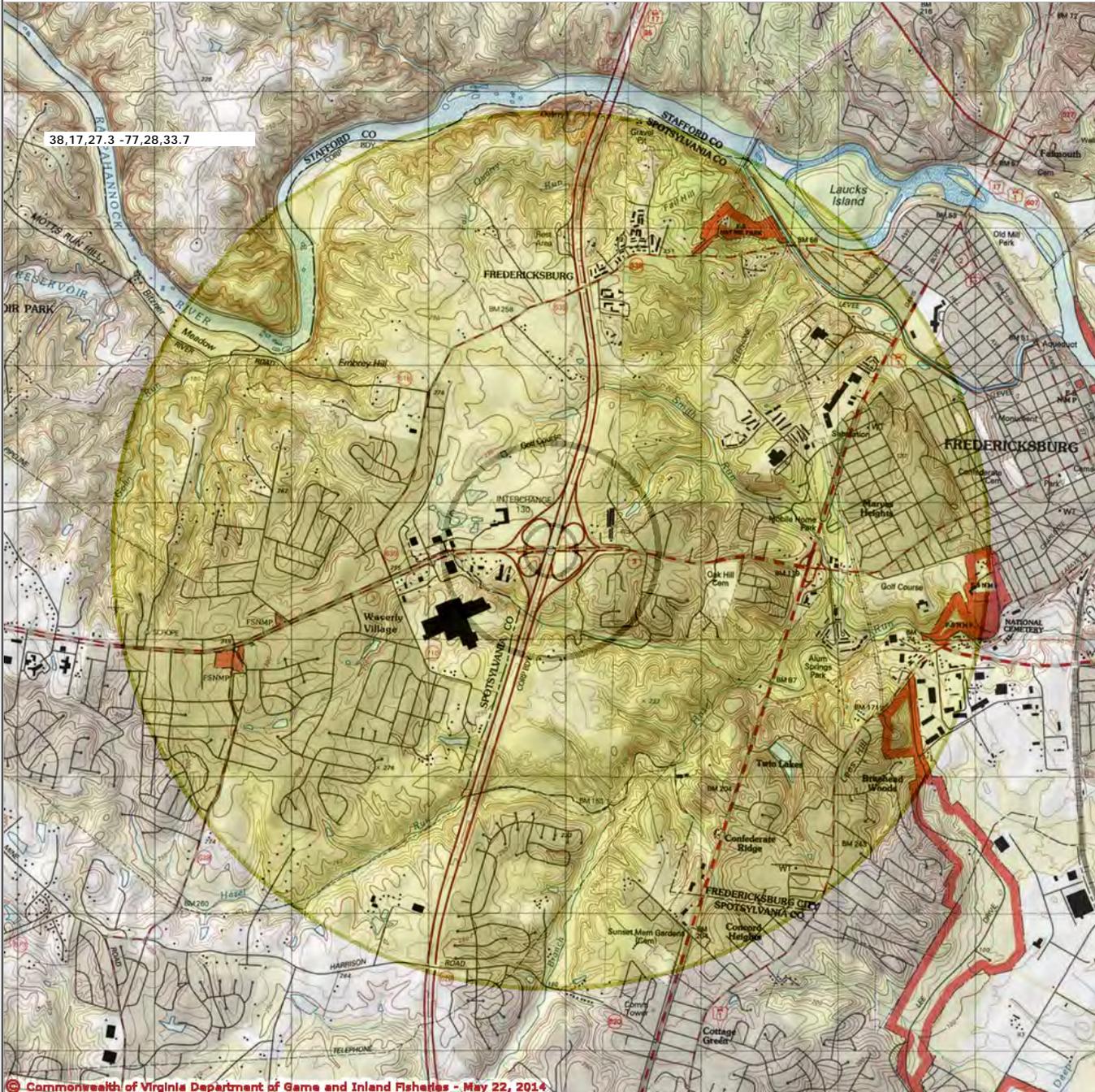
Show Search Area  
 Yes  No  
2 Search distance miles radius

Search Point is at map center

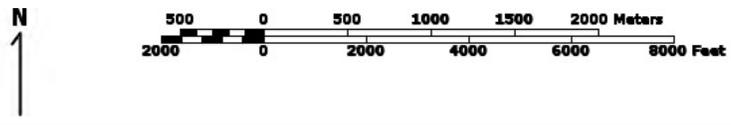
Base Map [Choices](#)  
Topography

Map Overlay [Choices](#)  
Current List: Position, Search

Map Overlay Legend  
 **Position Rings 1/2 mile and 1/8 mile at the Search Point**  
 **2 mile radius Search Area**



© Commonwealth of Virginia Department of Game and Inland Fisheries - May 22, 2014



Point of Search 38,17,46.4 -77,30,17.9  
Map Location 38,17,46.4 -77,30,17.9

Select Coordinate System:  Degrees, Minutes, Seconds Latitude - Longitude  
 Decimal Degrees Latitude - Longitude  
 Meters UTM NAD83 East North Zone  
 Meters UTM NAD27 East North Zone

Base Map source: Topographic maps from TOPO! copyright 2006 (see [National Geographic Maps](#) for details)

Map projection is UTM Zone 18 NAD 1983 with left 276943 and top 4245652. Pixel size is 8 meters. Coordinates displayed are Degrees, Minutes, Seconds North and West. Map is currently displayed as 1000 columns by 1000 rows for a total of 1000000 pixels. The map display represents 8000 meters east to west by 8000 meters north to south for a total of 64.0 square kilometers. The map display represents 26251 feet east to west by 26251 feet north to south for a total of 24.7 square

miles.

Topographic maps and Black and white aerial photography for year 1990+ are from the United States Department of the Interior, United States Geological Survey. Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network.

Shaded topographic maps are from TOPO! ©2006 National Geographic  
<http://www.national.geographic.com/topo>

All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries.

map assembled 2014-05-22 15:25:09 (qa/qc December 5, 2012 8:04 - tn=553975  
dist=3218.688 I )

\$poi=38.3405556 -77.4916111

## VaFWIS Initial Project Assessment Report Compiled on

[Help](#)

5/22/2014, 3:28:43 PM

Known or likely to occur within a 2 mile radius around point 38,17,46.4 -77,30,17.9  
in 177 Spotsylvania County, 179 Stafford County, 630 Fredericksburg City, VA

[View Map of  
Site Location](#)

472 Known or Likely Species ordered by Status Concern for Conservation  
(displaying first 21) (21 species with Status\* or Tier I\*\* or Tier II\*\* )

<a href="#">BOVA Code</a>	<a href="#">Status*</a>	<a href="#">Tier**</a>	<a href="#">Common Name</a>	<a href="#">Scientific Name</a>	Confirmed	Database(s)
010032	FESE	II	<a href="#">Sturgeon, Atlantic</a>	Acipenser oxyrinchus		BOVA
060003	FESE	II	<a href="#">Wedgemussel, dwarf</a>	Alasmidonta heterodon	<a href="#">Yes</a>	BOVA, TEWaters, Habitat
040129	ST	I	<a href="#">Sandpiper, upland</a>	Bartramia longicauda		BOVA
040293	ST	I	<a href="#">Shrike, loggerhead</a>	Lanius ludovicianus		BOVA
060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	<a href="#">Yes</a>	TEWaters, Habitat
040292	ST		<a href="#">Shrike, migrant loggerhead</a>	Lanius ludovicianus migrans		BOVA
050022	FP		<a href="#">Bat, northern long-eared</a>	Myotis septentrionalis		BOVA
010038	FC	IV	<a href="#">Alewife</a>	Alosa pseudoharengus	<a href="#">Yes</a>	SppObs
010045	FC		<a href="#">Herring, blueback</a>	Alosa aestivalis	<a href="#">Yes</a>	SppObs
100248	FS	I	<a href="#">Fritillary, regal</a>	Speyeria idalia idalia		BOVA
040093	FS	II	<a href="#">Eagle, bald</a>	Haliaeetus leucocephalus		BOVA
030063	CC	III	<a href="#">Turtle, spotted</a>	Clemmys guttata		BOVA
010077		I	<a href="#">Shiner, bridle</a>	Notropis bifrenatus		BOVA
040372		I	<a href="#">Crossbill, red</a>	Loxia curvirostra		BOVA
040225		I	<a href="#">Sapsucker, yellow-bellied</a>	Sphyrapicus varius		BOVA
			<a href="#">Warbler, black-</a>			

40319		I	<a href="#">throated green</a>	Dendroica virens		BOVA
040052		II	<a href="#">Duck, American black</a>	Anas rubripes		BOVA
040036		II	<a href="#">Night-heron, yellow-crowned</a>	Nyctanassa violacea violacea		BOVA
040105		II	<a href="#">Rail, king</a>	Rallus elegans		BOVA
40320		II	<a href="#">Warbler, cerulean</a>	Dendroica cerulea		BOVA
040266		II	<a href="#">Wren, winter</a>	Troglodytes troglodytes		BOVA

To view All 472 species [View 472](#)

\* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; CC=Collection Concern

\*\* I=VA Wildlife Action Plan - Tier I - Critical Conservation Need;  
 II=VA Wildlife Action Plan - Tier II - Very High Conservation Need;  
 III=VA Wildlife Action Plan - Tier III - High Conservation Need;  
 IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Bat Colonies or Hibernacula: Not Known

Anadromous Fish Use Streams (3 records)

[View Map of All](#)

[Anadromous Fish Use Streams](#)

Stream ID	Stream Name	Reach Status	Anadromous Fish Species			View Map
			Different Species	Highest TE*	Highest Tier**	
C30	<a href="#">Hazel Run</a>	Confirmed	2	FC	IV	<a href="#">Yes</a>
C69	<a href="#">Rappahannock river 1</a>	Confirmed	6	FC	IV	<a href="#">Yes</a>
C84	<a href="#">Rappahannock river 2</a>	Confirmed	4	FC	IV	<a href="#">Yes</a>

Impediments to Fish Passage (2 records)

[View Map of All](#)

[Fish Impediments](#)

ID	Name	River	View Map
120	<a href="#">raised culvert</a>	LONG BRANCH	<a href="#">Yes</a>
121	<a href="#">raised culvert</a>	HAZEL RUN	<a href="#">Yes</a>

Colonial Water Bird Survey

N/A

Threatened and Endangered Waters ( 2 Reaches )

[View Map of All Threatened and Endangered Waters](#)

Stream Name	T&E Waters Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
<a href="#">Rappahannock River (02080104)</a>	FESE	000003	FESE	II	<a href="#">Wedgemussel, dwarf</a>	Alasmidonta heterodon	<a href="#">Yes</a>
		060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	
<a href="#">Rappahannock River (02080104)</a>	ST	060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	<a href="#">Yes</a>

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests

N/A

Habitat Predicted for Aquatic WAP Tier I & II Species ( 2 Reaches )

[View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species](#)

Stream Name	Tier Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
Rappahannock River (20801041)	FESE	000003	FESE	II	<a href="#">Wedgemussel, dwarf</a>	Alasmidonta heterodon	<a href="#">Yes</a>
		060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	

Rappahannock River (20801041)	ST	060081	ST	II	<a href="#">Floater. green</a>	Lasmigona subviridis	<a href="#">Yes</a>
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### Habitat Predicted for Terrestrial WAP Tier I & II Species

N/A

Public Holdings: ( 1 names )

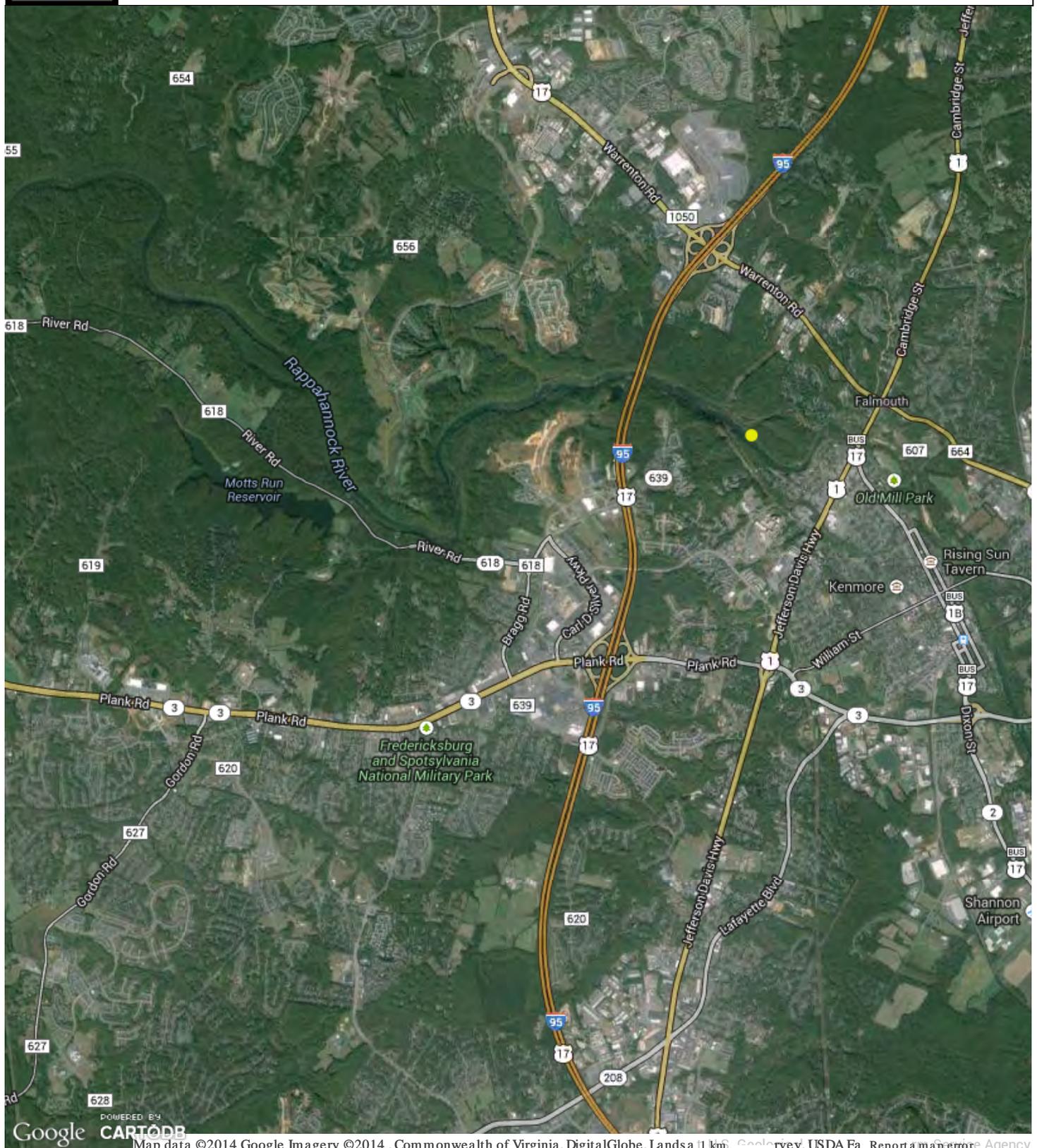
Name	Agency	Level
Fredericksburg & Spotsylvania National Military Park	National Park Service	Federal

Compiled on 5/22/2014, 3:28:43 PM I553975.0 report=IPA searchType= R dist= 3218.688 poi= 38,17,46.4 -77,30,17.9

PixelSize=64; Anadromous=0.03208; BECAR=0.024775; Bats=0.025055; Buffer=0.162538; County=0.051488; Impediments=0.027202; Init=0.202802; PublicLands=0.05393; SppObs=0.427713; TEWaters=0.046089; TierReaches=0.055836; TierTerrestrial=0.074093; Total=1.384292; Trout=0.041951



CCB encourages the use of CCB data sets in wildlife conservation and management applications. This data is protected by intellectual property laws. All users are reminded to view the data use agreement on [cbbirds.org](http://cbbirds.org) to ensure compliance with our data use policies. Metadata can be found on the data portal on [cbbirds.org](http://cbbirds.org). Direct questions to [info@cbbirds.org](mailto:info@cbbirds.org) or 757-221-1645.



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# United States Department of the Interior



FISH AND WILDLIFE SERVICE  
Ecological Services  
6669 Short Lane  
Gloucester, Virginia 23061

Date:

## Online Project Review Certification Letter

Project Name:

Dear Applicant:

Thank you for using the U.S. Fish and Wildlife Service (Service) Virginia Field Office online project review process. By printing this letter in conjunction with your project review package, you are certifying that you have completed the online project review process for the referenced project in accordance with all instructions provided, using the best available information to reach your conclusions. This letter, and the enclosed project review package, completes the review of your project in accordance with the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA), and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c, 54 Stat. 250), as amended (Eagle Act). This letter also provides information for your project review under the National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, 83 Stat. 852), as amended. A copy of this letter and the project review package must be submitted to this office for this certification to be valid. This letter and the project review package will be maintained in our records.

The species conclusions table in the enclosed project review package summarizes your ESA and Eagle Act conclusions. These conclusions resulted in “no effect” and/or “not likely to adversely affect” determinations for listed species and critical habitat and/or “no Eagle Act permit required” determinations for eagles regarding potential effects of your proposed project. We certify that the use of the online project review process in strict accordance with the instructions provided as documented in the enclosed project review package results in reaching the appropriate determinations. Therefore, we concur with the “no effect” and “not likely to adversely affect” determinations for listed species and critical habitat and “no Eagle Act permit required” determinations for eagles. Additional coordination with this office is not needed.

Candidate species are not legally protected pursuant to the ESA. However, the Service encourages consideration of these species by avoiding adverse impacts to them. Please contact this office for additional coordination if your project action area contains candidate species.

Should project plans change or if additional information on the distribution of listed species, critical habitat, or bald eagles becomes available, this determination may be reconsidered. This certification letter is valid for one year.

Applicant

Page 2

Information about the online project review process including instructions and use, species information, and other information regarding project reviews within Virginia is available at our website [http://www.fws.gov/northeast/virginiafield/endspecies/project\\_reviews.html](http://www.fws.gov/northeast/virginiafield/endspecies/project_reviews.html). If you have any questions, please contact Kimberly Smith of this office at (804) 693-6694, extension 124.

Sincerely,

/s/ Cynthia A. Schulz

Cindy Schulz  
Supervisor  
Virginia Field Office

Enclosures - project review package

# **RAPPAHANNOCK RIVER CROSSING PROJECT**

**CITY OF FREDERICKSBURG, SPOTSYLVANIA COUNTY, AND  
STAFFORD COUNTY, VIRGINIA**

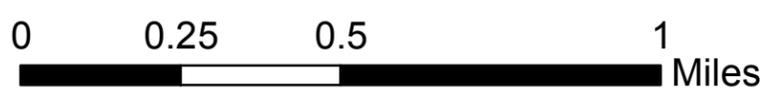
## **PROJECT AREA MAP**



Rappahannock River Crossing  
Study Area

### Rappahannock River Crossing

VDOT Project 0095-111-259, P101  
UPC 101595



# **RAPPAHANNOCK RIVER CROSSING PROJECT**

**CITY OF FREDERICKSBURG, SPOTSYLVANIA COUNTY, AND  
STAFFORD COUNTY, VIRGINIA**

**IPaC OFFICIAL SPECIES LIST**

**MARCH 11, 2014**



## United States Department of the Interior



FISH AND WILDLIFE SERVICE  
Virginia Ecological Services Field Office  
6669 SHORT LANE  
GLOUCESTER, VA 23061  
PHONE: (804)693-6694 FAX: (804)693-9032  
URL: [www.fws.gov/northeast/virginiafield/](http://www.fws.gov/northeast/virginiafield/)

Consultation Tracking Number: 05E2VA00-2014-SLI-1331

March 11, 2014

Project Name: Rappahannock River Crossing

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project.

### To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having

similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan ([http://www.fws.gov/windenergy/eagle\\_guidance.html](http://www.fws.gov/windenergy/eagle_guidance.html)). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment



United States Department of Interior  
Fish and Wildlife Service

Project name: Rappahannock River Crossing

## Official Species List

### Provided by:

Virginia Ecological Services Field Office  
6669 SHORT LANE  
GLOUCESTER, VA 23061  
(804) 693-6694  
<http://www.fws.gov/northeast/virginiafield/>

**Consultation Tracking Number:** 05E2VA00-2014-SLI-1331

**Project Type:** Transportation

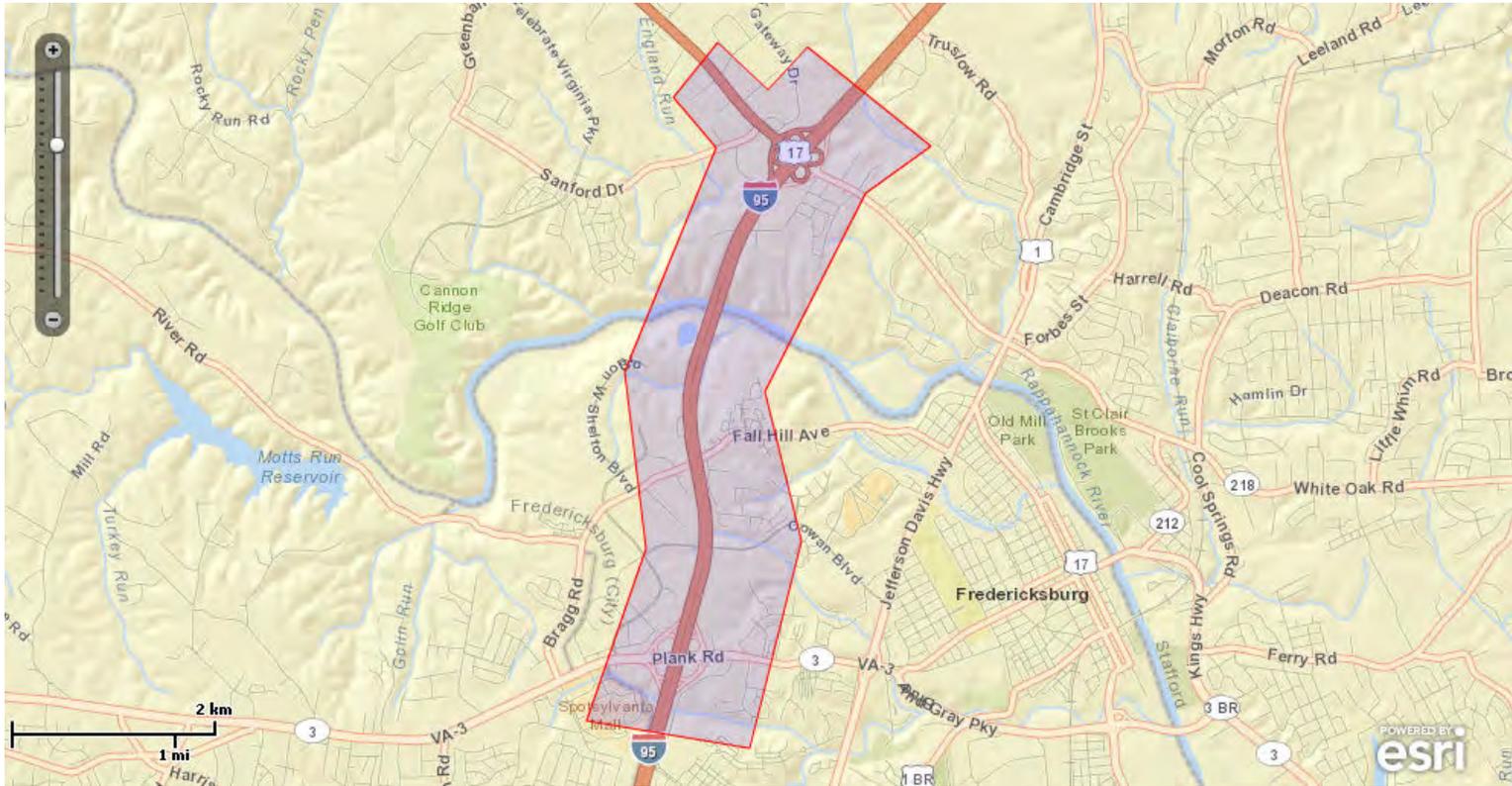
**Project Description:** This project includes the widening of I-95 between Route 17 and Route 3, in addition to interchange improvements at both intersections.



United States Department of Interior  
Fish and Wildlife Service

Project name: Rappahannock River Crossing

**Project Location Map:**



**Project Coordinates:** MULTIPOLYGON (((-77.476794 38.3413695, -77.4841754 38.3371888, -77.4955051 38.3196826, -77.4913852 38.3064829, -77.4972217 38.2881676, -77.5155894 38.2905861, -77.5089032 38.3058094, -77.5113065 38.3214335, -77.5009982 38.3412281, -77.5058047 38.3456778, -77.5008266 38.3505244, -77.4951617 38.3463375, -77.4906985 38.3501138, -77.476794 38.3413695)))

**Project Counties:** Fredericksburg, VA | Spotsylvania, VA | Stafford, VA



United States Department of Interior  
Fish and Wildlife Service

Project name: Rappahannock River Crossing

## Endangered Species Act Species List

There are a total of 3 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed on the **Has Critical Habitat** lines may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Dwarf wedgemussel (*Alasmidonta heterodon*)

Population: Entire

Listing Status: Endangered

harperella (*Ptilimnium nodosum*)

Listing Status: Endangered

Small Whorled pogonia (*Isotria medeoloides*)

Listing Status: Threatened



United States Department of Interior  
Fish and Wildlife Service

Project name: Rappahannock River Crossing

## **Critical habitats that lie within your project area**

There are no critical habitats within your project area.

# **RAPPAHANNOCK RIVER CROSSING PROJECT**

**CITY OF FREDERICKSBURG, SPOTSYLVANIA COUNTY, AND  
STAFFORD COUNTY, VIRGINIA**

## **SPECIES CONCLUSION TABLE**

**MARCH 11, 2014**

## Species Conclusions Table

Project Name: Rappahannock River Crossing

Date: March 11, 2014

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
Dwarf Wedgemussel ( <i>Alasmidonta heterdon</i> )	No critical habitat present	No effect	Dwarf Wedgemussel typically is found in sand, firm muddy sand, and gravel bottoms in rivers of varying sizes with slow to moderate current. They are buried in the substrate in shallow riffle and shoal areas. They need silt-free, stable stream bed and well-oxygen water, which is free of pollutants to survive. Individuals found tend to be closer to shore and under the overhanging riparian canopy. They were found in a variety of substrates (VDGIF). WEG completed a dwarf wedgemussel survey for various projects located within the study corridor. The dwarf wedgemussel survey conducted within a portion of the study corridor found no habitat to occur within the study area.
Harperella ( <i>Ptilimnium nodosum</i> )	No critical habitat present	No effect	Harperella is a perennial herb that grows to a height of 6-36 inches. They typically occur on rocky or gravel shoals and sandbars and along the margins of clear, swift-flowing stream sections (USFWS). The leaves are reduced to hollow, quill-like structures. The small, white flowers occur in heads or umbels, reminiscent of a small Queen Anne's lace flower head. Seeds are elliptical and laterally compressed. In pond habitats, flowering begins in May, while riverine populations flower much later, beginning in late June or July and continuing until frost. The NatureServe Explorer database specified that the location of Harperella within Stafford County is near the Potomac River.

<p>Small Whorled Pogonia (<i>Isotria medeoloides</i>)</p>	<p>No critical habitat present</p>	<p>No effect</p>	<p>Small whorled pogonia typically occurs on mesic sites in mixed-deciduous or mixed-deciduous coniferous forests that are generally in second- or third-growth successional stages (USFWS 1992). Most occupied sites have been cutover in the past and allowed to regenerate for at least several decades. Occupied sites typically have sparse to moderate ground cover, a relatively open understory, and proximity to long persisting canopy breaks associated with logging roads, streams, and large tree falls. In Virginia, the ages of older canopy trees have been estimated to be 45 to 80 years old. Virginia sites typically contain dry-mesic to wet-mesic soils that are low-nutrient, acidic loams. Small whorled pogonia generally occurs on gentle to moderate slopes with eastern or northern exposures, although the plant has been documented on all slope aspects. Decaying woody debris is also present at most occupied sites and, like many orchids, mycorrhizal associations likely play a prominent role in nutrient uptake (USFWS 1992). WEG completed a small whorled pogonia habitat survey for various projects located within the study corridor. Potential habitat areas were confirmed as identified on the Natural Resource Inventory Map, but no plants were found during the previously conducted detailed searches. Additional habitat surveys and detailed surveys in suitable habitat areas may be required for these species.</p>
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**RAPPAHANNOCK RIVER CROSSING PROJECT**

**CITY OF FREDERICKSBURG, SPOTSYLVANIA COUNTY, AND  
STAFFORD COUNTY, VIRGINIA**

**ENVIRONMENTAL COORDINATION LETTER**

**SENT TO:**

**VIRGINIA DEPARTMENT OF GAME AND INLAND  
FISHERIES**



March 12, 2014

Shirl A. Dressler  
Project Review  
Department of Game & Inland Fisheries  
4010 West Broad Street  
Richmond, Virginia 23220

Subject: Rappahannock River Crossing  
Spotsylvania County, Stafford County, City of Fredericksburg  
VDOT Project # 0095-111-259, P101; UPC # 101595

Dear Ms. Dressler,

VDOT and FHWA have initiated a study of proposed improvements along I-95 between the Route 3 Interchange and the Route 17 Interchange in Spotsylvania County, Stafford County, and the City of Fredericksburg in Virginia. The purpose of this study is to identify transportation needs within the area, including access to and from the commercial and industrial facilities, and to evaluate the impacts of potential improvements to meet those needs.

The enclosed map shows the area to be evaluated in the study. Elements of the study include the purpose and need for the project, evaluation of proposed improvements, identification of environmental resources, evaluation of environmental impacts, and public involvement. Please note, in-stream work may be required.

Using our subscription to DGIF's Fish and Wildlife Information Service (FWIS), we have performed an Initial Project Assessment for the project area and identified two species listed as "Confirmed" within a 2-mile radius of the project area. These species are the Dwarf Wedgemussel and the Green Floater. We also conducted a search using the Center for Conservation Biology's VaEagles Nest Locator. While the database indicated that several bald eagle (*Haliaeetus leucocephalus*) nests exist within the associated counties; none were located within 660 feet of the project area. A map showing the location of the nests in relation to the project area is included for your reference. We will also be coordinating with the Virginia Department of Conservation and Recreation (DCR), but we would like to request your confirmation of the project report and determination if further coordination with DGIF or US Fish & Wildlife Service is required.

If you have any questions, please feel free to contact me at (804) 762-5800 or at [lpmeadows@mtmail.biz](mailto:lpmeadows@mtmail.biz). We look forward to your response. Thank you!

Sincerely,

A handwritten signature in cursive script that reads "Laura Meadows".

Laura Meadows  
Research Assistant

**Attachments:**

- Project Area Map
- Map of Search Location in VaFWIS Database
- VaFWIS Initial Project Assessment Report (Compiled on 3/11/2014)
- Map showing location of Bald Eagle Nest according to CCB's VaEagles Nest Locator



Rappahannock River Crossing  
Study Area

**Rappahannock River Crossing**  
VDOT Project 0095-111-259, P101  
UPC 101595



VaFWIS - Department of Game and Inland Fisheries



38,19,16.3 -77,30,12.3

back 38,21,15.1 -77,27,46.7

Refresh Browser Page

Map Click **Pan** **Zoom** **In** **Out**

Map Scale **In** **Zoom** **Out**

Screen Size **Small** **Size** **Big**

[Help](#)

Search Point

- Change to "clicked" map point
- Fixed at 38,19,16.3 -77,30,12.3

Show Position Rings

- Yes  No

1/2 mile and 1/8 mile at the Search Point

Show Search Area

- Yes  No

2 Search distance miles radius

Search Point is at map center

Base Map [Choices](#)

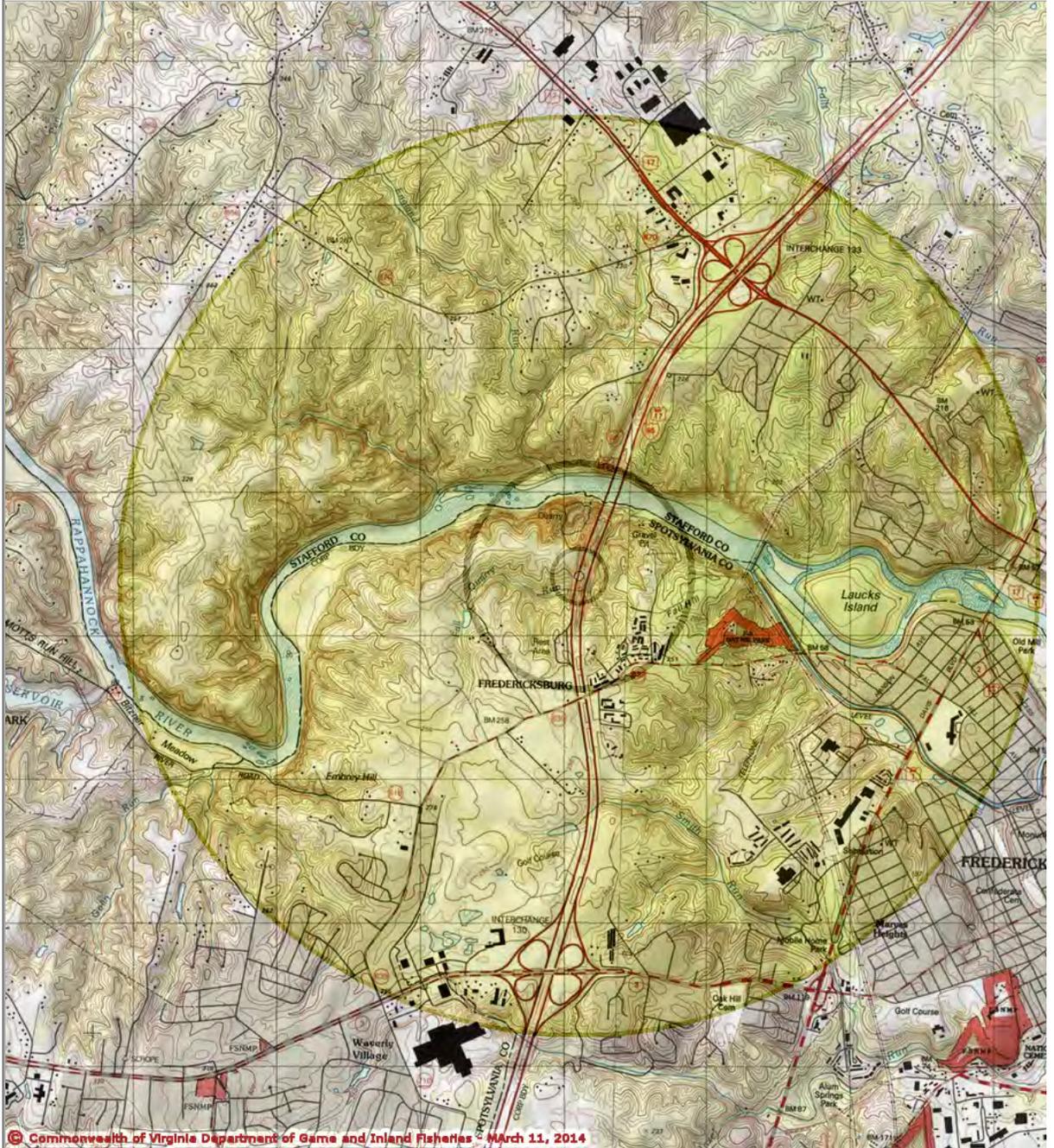
Topography

Map Overlay [Choices](#)

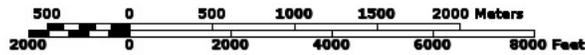
Current List: Position, Search

Map Overlay Legend

- Position Rings  
1/2 mile and 1/8 mile at the Search Point
- 2 mile radius Search Area



© Commonwealth of Virginia Department of Game and Inland Fisheries March 11, 2014



Point of Search 38,19,16.3 -77,30,12.3

Map Location 38,19,16.3 -77,30,12.3

- Select Coordinate System:
- Degrees,Minutes,Seconds Latitude - Longitude
  - Decimal Degrees Latitude - Longitude
  - Meters UTM NAD83 East North Zone
  - Meters UTM NAD27 East North Zone

Base Map source: Topographic maps from TOPO! copyright 2006 (see [National Geographic Maps](#) for details)

Map projection is UTM Zone 18 NAD 1983 with left 277154 and top 4248420. Pixel size is 8 meters . Coordinates displayed are Degrees, Minutes, Seconds North and West. Map is currently displayed as 1000 columns by 1000 rows for a total of 1000000 pixels. The map display represents 8000 meters east to west by 8000 meters north to south for a total of 64.0 square kilometers. The map display represents 26251 feet east to west by 26251 feet north to south for a total of 24.7 square miles.

Topographic maps and Black and white aerial photography for year 1990+ are from the United States Department of the Interior, United States Geological Survey. Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network.

Shaded topographic maps are from TOPO! ©2006 National Geographic  
<http://www.national.geographic.com/topo>

All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries.

map assembled 2014-03-11 13:44:44 (qa/qc December 5, 2012 8:04 - tn=527863 dist=3218 I )  
\$poi=38.3212027 -77.5034249

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| [DGIF](#) | [Credits](#) | [Disclaimer](#) | Contact [shirldressler@dgif.virginia.gov](mailto:shirldressler@dgif.virginia.gov) | Please view our [privacy policy](#) |  
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## VaFWIS Initial Project Assessment Report Compiled on

[Help](#)

3/11/2014, 1:46:24 PM

Known or likely to occur within a 2 mile radius around point 38,19,16.3 -77,30,12.3  
in 177 Spotsylvania County, 179 Stafford County, 630 Fredericksburg City, VA

[View Map of  
Site Location](#)

476 Known or Likely Species ordered by Status Concern for Conservation  
(displaying first 20) (20 species with Status\* or Tier I\*\* or Tier II\*\* )

<a href="#">BOVA Code</a>	<a href="#">Status*</a>	<a href="#">Tier**</a>	<a href="#">Common Name</a>	<a href="#">Scientific Name</a>	Confirmed	Database(s)
010032	FESE	II	<a href="#">Sturgeon, Atlantic</a>	Acipenser oxyrinchus		BOVA
060003	FESE	II	<a href="#">Wedgemussel, dwarf</a>	Alasmidonta heterodon	<a href="#">Yes</a>	BOVA,TEWaters,Habitat
040129	ST	I	<a href="#">Sandpiper, upland</a>	Bartramia longicauda		BOVA
40293	ST	I	<a href="#">Shrike, loggerhead</a>	Lanius ludovicianus		BOVA
060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	<a href="#">Yes</a>	TEWaters,Habitat
040292	ST		<a href="#">Shrike, migrant loggerhead</a>	Lanius ludovicianus migrans		BOVA
050022	FP		<a href="#">Bat, northern long-eared</a>	Myotis septentrionalis		BOVA
010038	FC	IV	<a href="#">Alewife</a>	Alosa pseudoharengus	<a href="#">Yes</a>	SppObs
010045	FC		<a href="#">Herring, blueback</a>	Alosa aestivalis	<a href="#">Yes</a>	SppObs
100248	FS	I	<a href="#">Fritillary, regal</a>	Speyeria idalia idalia		BOVA
040093	FS	II	<a href="#">Eagle, bald</a>	Haliaeetus leucocephalus	<a href="#">Yes</a>	BOVA,SppObs,BAEANests
030063	CC	III	<a href="#">Turtle, spotted</a>	Clemmys guttata		BOVA
010077		I	<a href="#">Shiner, bridle</a>	Notropis bifrenatus	<a href="#">Yes</a>	BOVA,Habitat,SppObs
040372		I	<a href="#">Crossbill, red</a>	Loxia curvirostra		BOVA

040225		I	<a href="#">Sapsucker, yellow-bellied</a>	Sphyrapicus varius		BOVA
40319		I	<a href="#">Warbler, black-throated green</a>	Dendroica virens		BOVA
040052		II	<a href="#">Duck, American black</a>	Anas rubripes		BOVA
040105		II	<a href="#">Rail, king</a>	Rallus elegans		BOVA,Habitat
40320		II	<a href="#">Warbler, cerulean</a>	Dendroica cerulea		BOVA
040266		II	<a href="#">Wren, winter</a>	Troglodytes troglodytes		BOVA

To view All 476 species [View 476](#)

\* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; CC=Collection Concern

\*\* I=VA Wildlife Action Plan - Tier I - Critical Conservation Need;  
 II=VA Wildlife Action Plan - Tier II - Very High Conservation Need;  
 III=VA Wildlife Action Plan - Tier III - High Conservation Need;  
 IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Bat Colonies or Hibernacula: Not Known

Anadromous Fish Use Streams (2 records)

[View Map of All Anadromous Fish Use Streams](#)

Stream ID	Stream Name	Reach Status	Anadromous Fish Species			View Map
			Different Species	Highest TE*	Highest Tier**	
C69	<a href="#">Rappahannock river 1</a>	Confirmed	6	FC	IV	<a href="#">Yes</a>
C84	<a href="#">Rappahannock river 2</a>	Confirmed	4	FC	IV	<a href="#">Yes</a>

Impediments to Fish Passage (1 records)

[View Map of All Fish Impediments](#)

ID	Name	River	View Map
98	<a href="#">EMBREY DAM</a>	RAPPAHANNOCK RIVER	<a href="#">Yes</a>

Colonial Water Bird Survey

N/A

Threatened and Endangered Waters ( 2 Reaches )

[View Map of All Threatened and Endangered Waters](#)

Stream Name	T&E Waters Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
<a href="#">Rappahannock River (02080104)</a>	FESE	U00003	FESE	II	<a href="#">Wedgemussel, dwarf</a>	Alasmidonta heterodon	<a href="#">Yes</a>
		060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	
<a href="#">Rappahannock River (02080104)</a>	ST	060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	<a href="#">Yes</a>

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests ( 3 records )

[View Map of All Query Results Bald Eagle Nests](#)

Nest	N Obs	Latest Date	DGIF Nest Status	View Map
<a href="#">ST0003</a>	2	Mar 1 2000	HISTORIC	<a href="#">Yes</a>
<a href="#">ST0101</a>	8	Apr 24 2006	HISTORIC	<a href="#">Yes</a>
<a href="#">ST9401</a>	16	Apr 26 2000	HISTORIC	<a href="#">Yes</a>

Displayed 3 Bald Eagle Nests

Habitat Predicted for Aquatic WAP Tier I & II Species ( 3 Reaches )

[View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species](#)

Stream Name	Tier Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					

Rappahannock River (20801041)	FESE	00000	11111	II	<a href="#">Wedgemussel dwarf</a>	Alasmidonta heterodon	<a href="#">Yes</a>
		060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	
Rappahannock River (20801041)	ST	010077		I	<a href="#">Shiner, bridge</a>	Notropis bifrenatus	<a href="#">Yes</a>
		060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	
Rappahannock River (20801041)	ST	060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	<a href="#">Yes</a>

Habitat Predicted for Terrestrial WAP Tier I & II Species

BOVA Code	Status*	Tier**	Common Name	Scientific Name	View Map
040105		II	<a href="#">Rail, king</a>	Rallus elegans	<a href="#">Yes</a>

Public Holdings: ( 1 names )

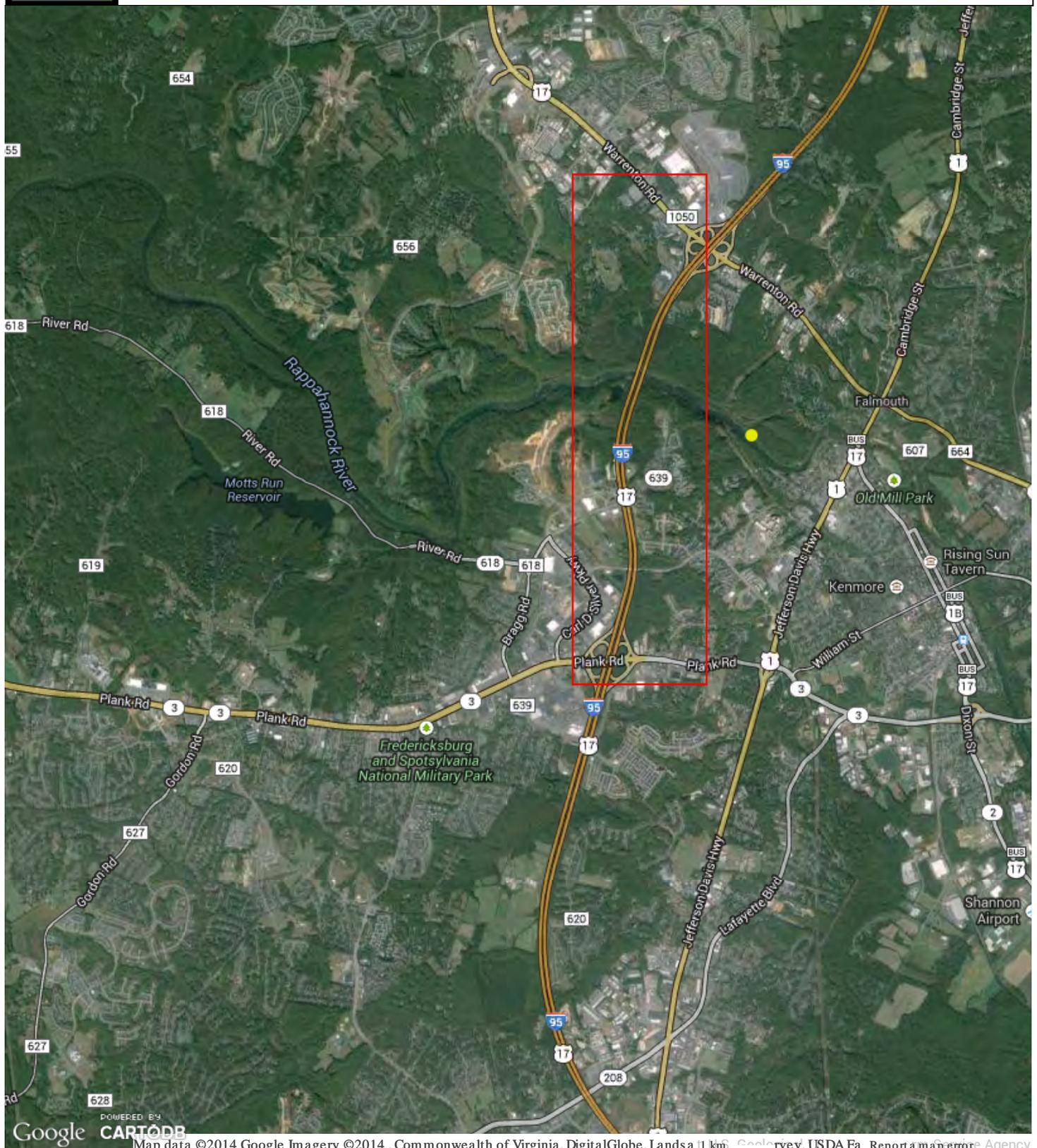
Name	Agency	Level
Fredericksburg & Spotsylvania National Military Park	National Park Service	Federal

Compiled on 3/11/2014, 1:46:24 PM 1527863.0 report=IPA searchType= R dist= 3218 poi= 38,19,16.3 -77,30,12.3

PixelSize=64; Anadromous=0.032682; BECAR=0.025319; Bats=0.017028; Buffer=0.154855; County=0.069406; Impediments=0.031516; Init=0.197957; PublicLands=0.039897; SppObs=0.521195; TEWaters=0.047164; TierReaches=0.067311; TierTerrestrial=0.07951; Total=1.389812; Trout=0.033748



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Map data ©2014 Google Imagery ©2014 , Commonwealth of Virginia, DigitalGlobe, Landsat 11 km, Google, USDA Forest Service, Report a map error Agency

**RAPPAHANNOCK RIVER CROSSING PROJECT**

**CITY OF FREDERICKSBURG, SPOTSYLVANIA COUNTY, AND  
STAFFORD COUNTY, VIRGINIA**

**ENVIRONMENTAL COORDINATION LETTER**

**SENT TO:**

**VIRGINIA DEPARTMENT OF CONSERVATION AND  
RECREATION**



## COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION

1401 EAST BROAD STREET  
RICHMOND, VIRGINIA 23219-2000

**Charles Kilpatrick, P.E.**  
Commissioner

February 27, 2014

Mr. David Johnson  
Director  
Virginia Department of Conservation and Recreation  
203 Governor Street, Suite 302  
Richmond, VA 23219-2094

Project: Rappahannock River Crossing  
Spotsylvania County, Stafford County, City of Fredericksburg  
VDOT Project Number: 0095-111-259, P101; UPC No. 101595

Dear Mr. Johnson,

The Virginia Department of Transportation (VDOT), along with the Federal Highway Administration (FHWA), is studying proposed improvements along an approximate 3-mile section of the I-95 corridor, from the Route 3 Interchange (Exit 130) to the Route 17 Interchange (Exit 133). In accordance with the requirements of the National Environmental Policy Act (NEPA) and other federal and state laws and regulations, VDOT is assessing potential impacts to be documented in an Environmental Assessment (EA) for this project.

The enclosed map shows the area to be evaluated in the study. This study and resultant proposed improvements would involve construction of collector/distributor lanes in each direction, two new bridges crossing the Rappahannock River and interchange modifications at the Route 3 (Exit 130) and Route 17 (Exit 133) Interchanges.

At this early stage of the study, our efforts are focused on environmental resources and other relevant factors to be included in the environmental document. To that end, please review the enclosed map and provide comments on any issues or concerns regarding human and natural resources under your jurisdiction or interest within the project area indicated.

This project is subject to Section 106 of the National Historic Preservation Act (16 U.S.C. 470f; 36 CFR 800.2(c)(3)). Under Section 106, local governments with jurisdiction over areas in which effects to historic properties (typically historic buildings and districts; archaeological sites; battlefields) may occur are entitled to participate in consultation regarding the project's potential effects on historic properties. Information about Section 106 and the role of consulting parties can be found at <http://www.achp.gov/usersguide.html>. If you are a representative of local government, please let the

VirginiaDOT.org  
WE KEEP VIRGINIA MOVING

Department know if you have any information or concerns about historic properties potentially affected by this project, and if your locality wishes to participate further in consultation to identify historic properties; assess project effects; and avoid, minimize, or mitigate any adverse effects. Please designate a Section 106 point of contact for your local government.

We would greatly appreciate your response by March 31, 2014. Please submit comments and/or information to our consultant at the following address:

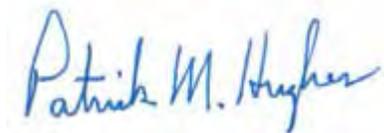
Brennan Collier  
McCormick Taylor, Inc.  
North Shore Commons A  
4951 Lake Brook Drive, Suite 275  
Glen Allen, Virginia 23060

If you prefer, you can e-mail information to [bscollier@mccormicktaylor.com](mailto:bscollier@mccormicktaylor.com). Please reference "Rappahannock River Crossing Scoping Response" in the subject heading of your correspondence.

In addition, throughout the study process, we may contact you and your organization for specific data needs and information. We would greatly appreciate your cooperation and participation in providing this information.

If you have questions or need additional information, please contact me by phone at (804) 371-6839 or email at [patrick.hughes@VDOT.virginia.gov](mailto:patrick.hughes@VDOT.virginia.gov).

Sincerely,



Patrick Hughes  
Project Manager

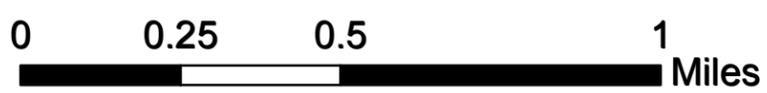
Enclosure  
Project Area Map



Rappahannock River Crossing  
Study Area

### Rappahannock River Crossing

VDOT Project 0095-111-259, P101  
UPC 101595



**RAPPAHANNOCK RIVER CROSSING PROJECT**

**CITY OF FREDERICKSBURG, SPOTSYLVANIA COUNTY, AND  
STAFFORD COUNTY, VIRGINIA**

**ENVIRONMENTAL COORDINATION LETTER**

**RECEIVED FROM:**

**VIRGINIA DEPARTMENT OF CONSERVATION AND  
RECREATION**



streams in the region. These stream reaches also hold a “Healthy” stream designation per the INSTAR Virtual Stream Assessment (VSS) score.

Threats to the significant Aquatic Natural Communities and the surrounding watershed include water quality degradation related to point and non-point pollution, water withdrawal and introduction of non-native species.

Furthermore, the Embrey Hill Conservation Site is located within the project site. Conservation sites are tools for representing key areas of the landscape that warrant further review for possible conservation action because of the natural heritage resources and habitat they support. Conservation sites are polygons built around one or more rare plant, animal, or natural community designed to include the element and, where possible, its associated habitat, and buffer or other adjacent land thought necessary for the element’s conservation. Conservation sites are given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain; on a scale of 1-5, 1 being most significant. Embrey Hill Conservation Site has been given a biodiversity significance ranking of B5, which represents a site of general significance. The natural heritage resource of concern at this site is:

Water-willow Rocky Bar and Shore

G4G5/S4/NL/NL

Water-willow Rocky Bar and Shore is found primarily in the Piedmont, Central Appalachians, Cumberland Plateau, Interior Low Plateau, Ozarks, Ouachita Mountains, and adjacent provinces. It ranges from Alabama, Georgia and the Carolinas west to Arkansas and Oklahoma and north to Ohio, New York, and New Jersey, with possible outliers north to southern Quebec. The stands occur on the shoals or bars of rocky streams and riverbeds, where they are subject to frequent high-energy floods. The substrate is a variable mixture of sand, gravel and cobbles, often with deposits of silt and muck. American water-willow (*Justicia americana*) is the dominant, and sometimes only, species in this community, forming lawn-like stands in shallow reaches of rivers (NatureServe, 2010). This community occurs along most of the Piedmont and mountain-region rivers and larger streams in Virginia. Potential threats include pollutants and invasive aquatic plants.

Finally, the Yellow lance (*Elliptio lanceolata*, G2G3/S2S3/SOC/NL) has been historically documented downstream from the project site in the Rappahannock River. The Yellow lance occurs in mid-sized rivers and second and third order streams. To survive, it needs a silt-free, stable streambed and well-oxygenated water that is free of pollutants. This species has been the subject of taxonomic debate in recent years (NatureServe, 2009). Currently in Virginia, the Yellow lance is recognized from populations in the Chowan, James, York, and Rappahannock drainages. Its range also extends into Neuse-Tar river system in North Carolina. In recent years, significant population declines have been noted across its range (NatureServe, 2009). Please note that this species is currently classified as a species of concern by the United States Fish and Wildlife Service (USFWS) however, this designation has no official legal status.

Considered good indicators of the health of aquatic ecosystems, freshwater mussels are dependent on good water quality, good physical habitat conditions, and an environment that will support populations of host fish species (Williams et al., 1993). Because mussels are sedentary organisms, they are sensitive to water quality degradation related to increased sedimentation and pollution. They are also sensitive to habitat destruction through dam construction, channelization, and dredging, and the invasion of exotic mollusk species. The Yellow lance may be particularly sensitive to chemical pollutants and exposure to fine sediments from erosion (NatureServe, 2009).

To minimize adverse impacts to the aquatic ecosystem as a result of the proposed activities, DCR recommends the implementation of and strict adherence to applicable state and local erosion and

sediment control/storm water management laws and regulations, establishment/enhancement of riparian buffers with native plant species and maintaining natural stream flow.

Please note this project is within a section of the Rappahannock River, which has been designated as a scenic river in the state of Virginia. Due to this designation, DCR recommends you contact Lynn Crump of the DCR-Division of Planning and Recreation at 804-786-5054 or [Lynn.Crump@dcr.virginia.gov](mailto:Lynn.Crump@dcr.virginia.gov).

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

New and updated information is continually added to Biotics. Please re-submit project information and map for an update on this natural heritage information if the scope of the project changes and/or six months has passed before it is utilized.

All VDOT projects on state-owned lands must comply with the Virginia Erosion & Sediment Control (ESC) Law and Regulations, the Virginia Stormwater Management (SWM) Law and Regulations, the most current version of the DCR approved VDOT Annual ESC and SWM Specifications and Standards, and the project-specific ESC and SWM plans. [Reference: VESCL §10.1-560, §10.1-564; VESCR §4VAC50-30 et al; VSWML §10.1-603 et al; VSWMR §4VAC-3-20 et al].

The Virginia Department of Game and Inland Fisheries (VDGIF) maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters, that may contain information not documented in this letter. Their database may be accessed from <http://vafwis.org/fwis>, or contact Gladys Cason (804-367-0909 or [Gladys.Cason@dgif.virginia.gov](mailto:Gladys.Cason@dgif.virginia.gov)). According to the information currently in our files, Rappahannock River, which has been designated by the Virginia Department of Game and Inland Fisheries (VDGIF) as a "Threatened and Endangered Species Water" for the Dwarf wedgemussel is within 2 miles of the project area. Therefore, DCR recommends coordination with the U.S. Fish and Wildlife Service (USFWS) and Virginia's regulatory authority for the management and protection of this species, the VDGIF, to ensure compliance with the Virginia Endangered Species Act (VA ST §§ 29.1-563 – 570).

Thank you for the opportunity to comment on this project.

Cc: Ernie Aschenbach, VDGIF  
Troy Andersen, USFWS  
Lynn Crump, DCR-DPRR

#### Literature Cited

Fleming, G.P., K.D. Patterson, K. Taverna, and P.P. Coulling. 2011. The natural communities of Virginia: classification of ecological community groups. Second approximation. Version 2.4. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA.

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed:December 13, 2011).

NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 5, 2010 ).

Williams, J.D., M.L. Warren, Jr., K.S. Cummings, J.L. Harris, and R.J. Neves. 1993. Conservation status of freshwater mussels of the United States and Canada. Fisheries 18: 69.

# **RAPPAHANNOCK RIVER CROSSING PROJECT**

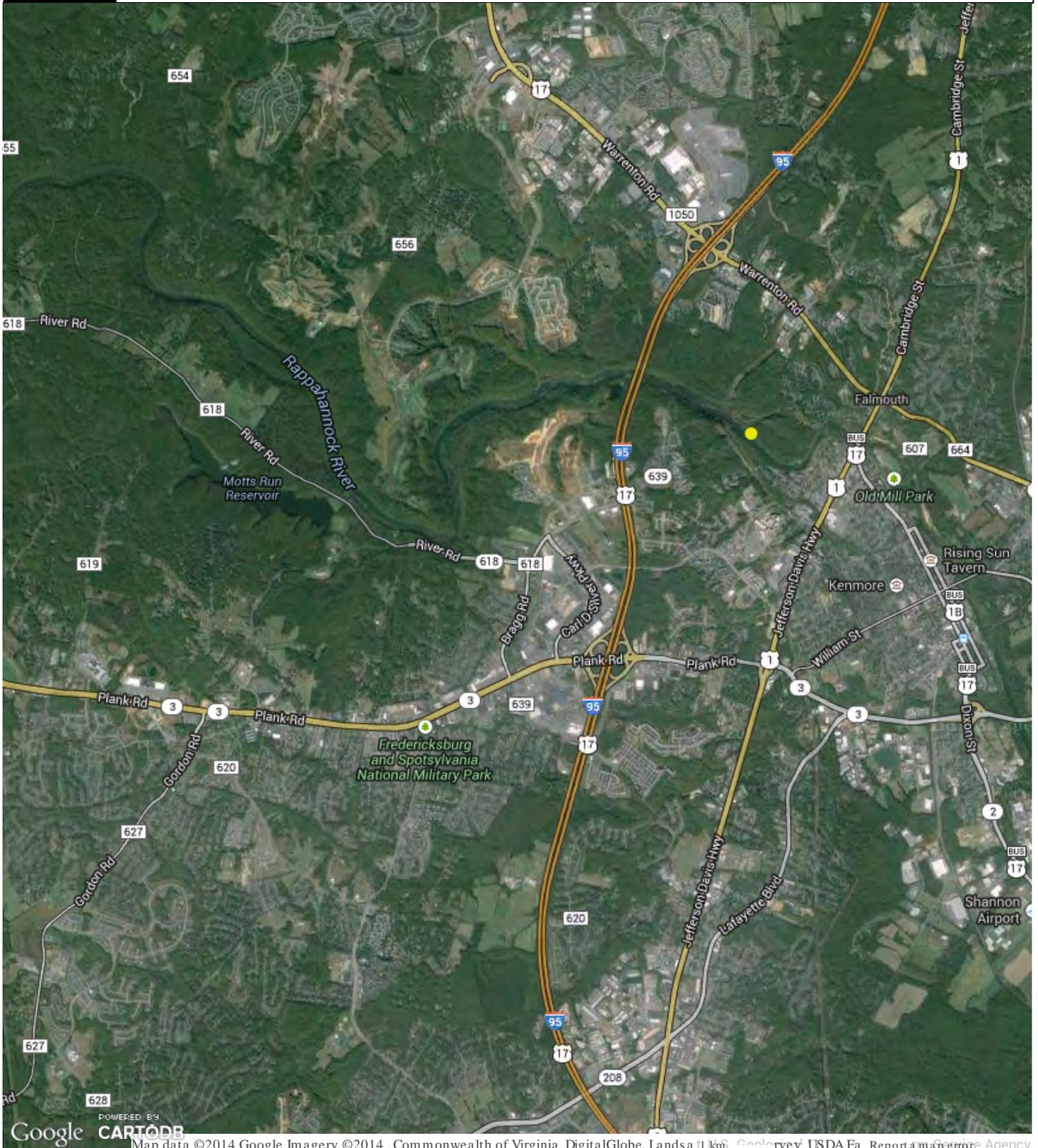
**CITY OF FREDERICKSBURG, SPOTSYLVANIA COUNTY, AND  
STAFFORD COUNTY, VIRGINIA**

**CENTER FOR CONSERVATION BIOLOGY**

**VAEAGLES NEST LOCATOR MAP**



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**RAPPAHANNOCK RIVER CROSSING PROJECT**

**CITY OF FREDERICKSBURG, SPOTSYLVANIA COUNTY, AND  
STAFFORD COUNTY, VIRGINIA**

**UPDATED VDGIF AND FWIS IPaC DATABASE SEARCHES**

**NORTHERN LONG-EARED BAT**

**MAY 2015**



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Options

Species Information

[By Name](#)

[By Land Management](#)

[References](#)

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**VaFWIS Initial Project Assessment Report** Compiled on 5/15/2015, 10:23:56 AM

Known or likely to occur within a **2 mile radius around point 38,18,12.3 -77,30,13.2** [View Map of Site Location](#)  
 in **177 Spotsylvania County, 179 Stafford County, 630 Fredericksburg City, VA**

532 Known or Likely Species ordered by Status Concern for Conservation  
 (displaying first 25) (25 species with Status\* or Tier I\*\* or Tier II\*\*)

BOVA Code	Status*	Tier**	Common Name	Scientific Name	Confirmed	Database(s)
010032	FESE	II	<a href="#">Sturgeon, Atlantic</a>	Acipenser oxyrinchus		BOVA
060003	FESE	II	<a href="#">Wedgemussel, dwarf</a>	Alasmidonta heterodon	Yes	BOVA, TEWaters, Habitat
040129	ST	I	<a href="#">Sandpiper, upland</a>	Bartramia longicauda		BOVA
040293	ST	I	<a href="#">Shrike, loggerhead</a>	Lanius ludovicianus		BOVA
060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	Yes	BOVA, TEWaters, Habitat
040292	ST		<a href="#">Shrike, migrant loggerhead</a>	Lanius ludovicianus migrans		BOVA
050022	FP		<a href="#">Bat, northern long-eared</a>	Myotis septentrionalis		BOVA
010038	FC	IV	<a href="#">Alewife</a>	Alosa pseudoharengus	Yes	BOVA, SppObs
010045	FC		<a href="#">Herring, blueback</a>	Alosa aestivalis	Yes	BOVA, SppObs
100248	FS	I	<a href="#">Fritillary, regal</a>	Speyeria idalia idalia		BOVA
040093	FS	II	<a href="#">Eagle, bald</a>	Haliaeetus leucocephalus	Yes	BOVA, SppObs, BAEANests
060175	FS	II	<a href="#">Slabshell, Roanoke</a>	Elliptio roanokensis		BOVA
060029	FS	III	<a href="#">Lance, yellow</a>	Elliptio lanceolata		BOVA
030063	CC	III	<a href="#">Turtle, spotted</a>	Clemmys guttata		BOVA
010077		I	<a href="#">Shiner, bridle</a>	Notropis bifrenatus		BOVA
040372		I	<a href="#">Crossbill, red</a>	Loxia curvirostra		BOVA
040225		I	<a href="#">Sapsucker, yellow-bellied</a>	Sphyrapicus varius		BOVA
040319		I	<a href="#">Warbler, black-throated green</a>	Dendroica virens		BOVA
010432		II	<a href="#">Madtom, spotted-margin</a>	Noturus insignis ssp 1		BOVA
040052		II	<a href="#">Duck, American black</a>	Anas rubripes		BOVA
040036		II	<a href="#">Night-heron, yellow-crowned</a>	Nyctanassa violacea violacea		BOVA
040213		II	<a href="#">Owl, northern saw-whet</a>	Aegolius acadicus		BOVA
040105		II	<a href="#">Rail, king</a>	Rallius elegans		BOVA
040320		II	<a href="#">Warbler, cerulean</a>	Dendroica cerulea		BOVA
040266		II	<a href="#">Wren, winter</a>	Troglodytes troglodytes		BOVA

To view **All 532 species** [View 532](#)

\* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; CC=Collection Concern

\*\* I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier

Bat Colonies or Hibernacula: **Not Known**

Stream Name	T&E Waters Species						View Map
	Highest TE *	BOVA Code, Status *, Tier **, Common & Scientific Name					
<a href="#">Rappahannock River (02080104)</a>	FESE	060003	FESE	II	<a href="#">Wedgemussel, dwarf</a>	Alasmidonta heterodon	<a href="#">Yes</a>
		060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	
<a href="#">Rappahannock River (02080104)</a>	ST	060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	<a href="#">Yes</a>

**Managed Trout Streams**

N/A

**Bald Eagle Concentration Areas and Roosts**

N/A

**Bald Eagle Nests** ( 3 records )

[View Map of All Query Results](#)  
[Bald Eagle Nests](#)

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**Site Location**

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38,18,12.3 -77,30,13.2  
is the Search Point

---

**Show Position Rings**  
 Yes  No  
 1 mile and 1/4 mile at the Search Point

**Show Search Area**  
 Yes  No  
 2 Search distance miles radius

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Search Point is at map center

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**Base Map [Choices](#)**  
 Topography ▼

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**Map Overlay [Choices](#)**  
 Current List: Position, Search, BECAR, BAEANests, TEWaters, TierII, Habitat, Trout, Anadromous



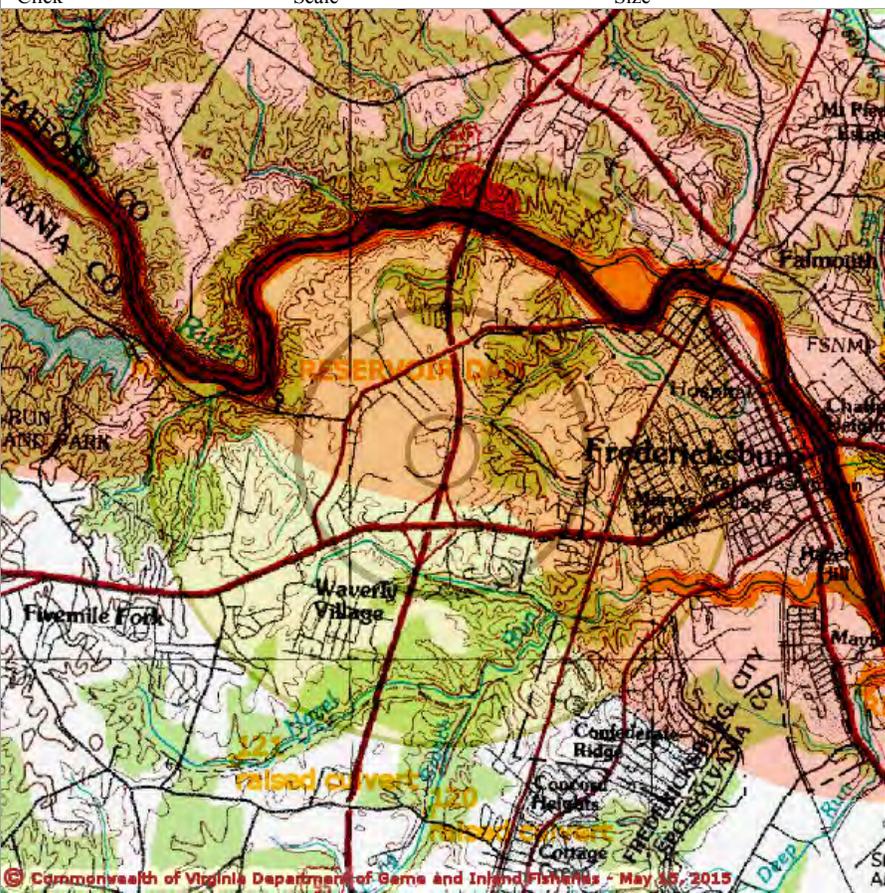

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Map Scale In Zoom Out

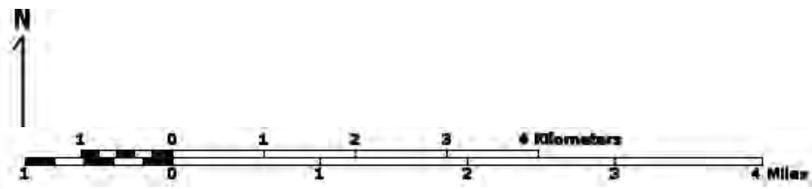
Screen Size Small Size Big

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Point of Search 38,18,12.3 -77,30,13.2  
 Map Location 38,18,12.3 -77,30,13.2

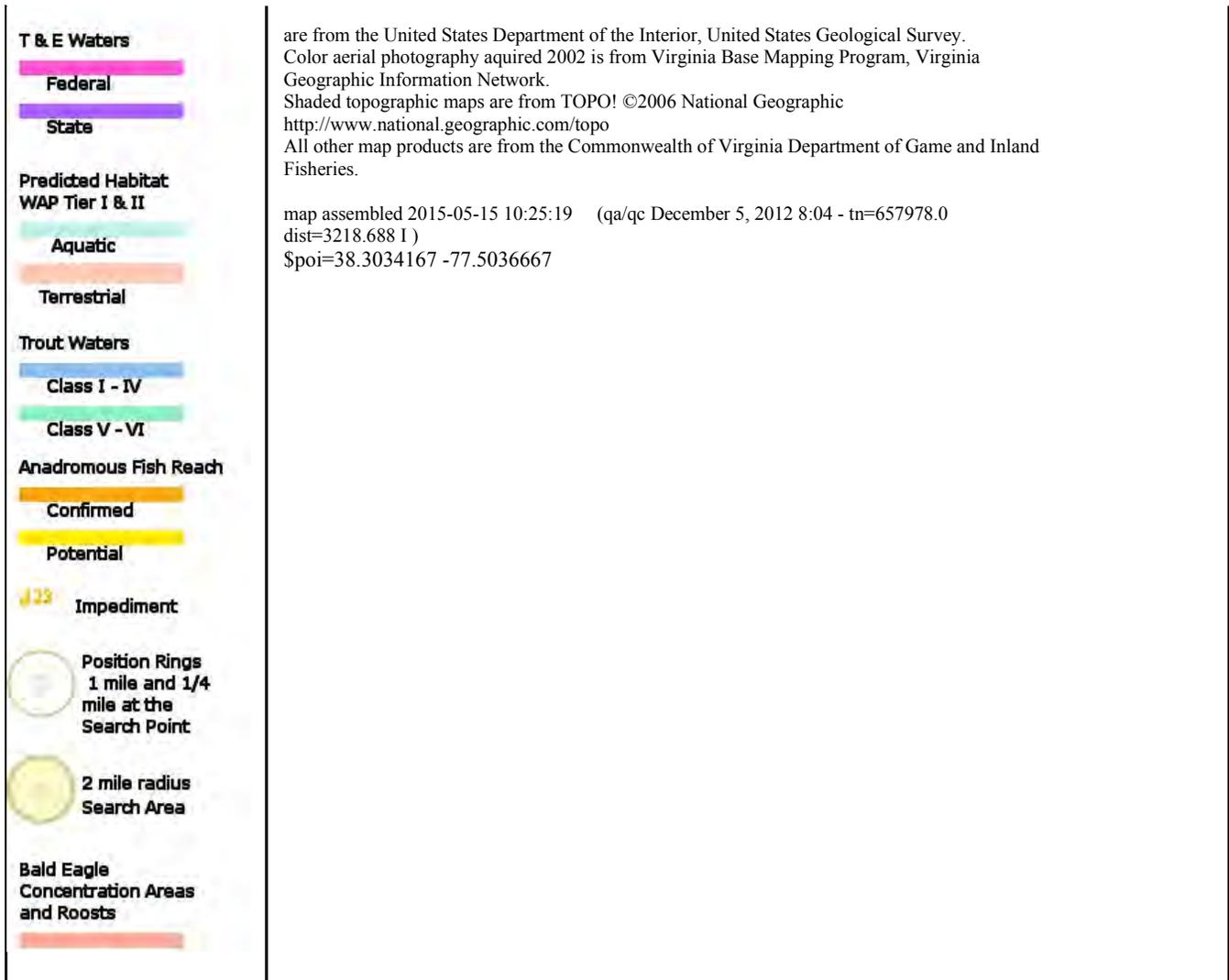
Select **Coordinate System:**  Degrees,Minutes,Seconds Latitude - Longitude  
 Decimal Degrees Latitude - Longitude  
 Meters UTM NAD83 East North Zone  
 Meters UTM NAD27 East North Zone

Base Map source: USGS 1:100,000 topographic maps (see [Microsoft terraserver-usa.com](http://Microsoft.terraserver-usa.com) for details)

Map projection is UTM Zone 18 NAD 1983 with left 276279 and top 4247246. Pixel size is 16 meters . Coordinates displayed are Degrees, Minutes, Seconds North and West.Map is currently displayed as 600 columns by 600 rows for a total of 360000 pixels. The map display represents 9600 meters east to west by 9600 meters north to south for a total of 92.1 square kilometers. The map display represents 31501 feet east to west by 31501 feet north to south for a total of 35.5 square miles.

Topographic maps and Black and white aerial photography for year 1990+-

**Map Overlay Legend**



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Fish and Wildlife Information Service

Home » [By Map](#) » VaFWIS GeographicSelect Options

Options

Species Information

By Name

By Land Management

References

Geographic Search

By Map

By Coordinates

By Place Name

Database Search

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VaFWIS Initial Project Assessment Report Compiled on 5/15/2015, 10:30:32 AM

Known or likely to occur within a 2 mile radius around point 38,20,01.0 -77,29,54.3 in 179 Stafford County, 630 Fredericksburg City, VA [View Map of Site Location](#)

500 Known or Likely Species ordered by Status Concern for Conservation (displaying first 22) (22 species with Status\* or Tier \*\* or Tier II\*\*)

BOVA Code	Status*	Tier**	Common Name	Scientific Name	Confirmed	Database(s)
010032	FESE	II	<a href="#">Sturgeon, Atlantic</a>	Acipenser oxyrinchus		BOVA
060003	FESE	II	<a href="#">Wedgemussel, dwarf</a>	Alasmidonta heterodon	Yes	BOVA, TEWaters, Habitat
040129	ST	I	<a href="#">Sandpiper, upland</a>	Bartramia longicauda		BOVA
040293	ST	I	<a href="#">Shrike, loggerhead</a>	Lanius ludovicianus		BOVA
060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	Yes	BOVA, TEWaters, Habitat
040292	ST		<a href="#">Shrike, migrant loggerhead</a>	Lanius ludovicianus migrans		BOVA
050022	FP		<a href="#">Bat, northern long-eared</a>	Myotis septentrionalis		BOVA
010038	FC	IV	<a href="#">Alewife</a>	Alosa pseudoharengus	Yes	BOVA, SppObs
010045	FC		<a href="#">Herring, blueback</a>	Alosa aestivalis	Yes	BOVA, SppObs
100248	FS	I	<a href="#">Fritillary, regal</a>	Speyeria idalia idalia		BOVA
040093	FS	II	<a href="#">Eagle, bald</a>	Haliaeetus leucocephalus	Yes	BOVA, SppObs, BAEANests
030063	CC	III	<a href="#">Turtle, spotted</a>	Clemmys guttata		BOVA
010077		I	<a href="#">Shiner, bridge</a>	Notropis bifrenatus	Yes	BOVA, Habitat, SppObs
040372		I	<a href="#">Crossbill, red</a>	Loxia curvirostra		BOVA
040225		I	<a href="#">Sapsucker, yellow-bellied</a>	Sphyrapicus varius		BOVA
040319		I	<a href="#">Warbler, black-throated green</a>	Dendroica virens		BOVA
040052		II	<a href="#">Duck, American black</a>	Anas rubripes		BOVA
040036		II	<a href="#">Night-heron, yellow-crowned</a>	Nyctanassa violacea violacea		BOVA
040213		II	<a href="#">Owl, northern saw-whet</a>	Aegolius acadicus		BOVA
040105		II	<a href="#">Rail, king</a>	Rallus elegans		BOVA, Habitat
040320		II	<a href="#">Warbler, cerulean</a>	Dendroica cerulea		BOVA
040266		II	<a href="#">Wren, winter</a>	Troglodytes troglodytes		BOVA

To view All 500 species [View 500](#)

\* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; CC=Collection Concern

\*\* I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier

Bat Colonies or Hibernacula: **Not Known**

Anadromous Fish Use Streams ( 2 records )

[View Map of All Anadromous Fish Use Streams](#)

Anadromous Fish Species

		060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	
<a href="#">Rappahannock River (02080104)</a>	ST	060081	ST	II	<a href="#">Floater, green</a>	Lasmigona subviridis	<a href="#">Yes</a>

**Managed Trout Streams**

N/A

**Bald Eagle Concentration Areas and Roosts**

N/A

**Bald Eagle Nests** (3 records)

[View Map of All Query Results](#)  
[Bald Eagle Nests](#)

Nest	N Obs	Latest Date	DGIF Nest Status	View Map
<a href="#">ST0003</a>	2	Mar 1 2000	HISTORIC	<a href="#">Yes</a>
<a href="#">ST0101</a>	8	Apr 24 2006	HISTORIC	<a href="#">Yes</a>
<a href="#">ST0401</a>	16	Apr 26 2000	HISTORIC	<a href="#">Yes</a>

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**Site Location**

38,20,01.0 -77,29,54.3  
is the Search Point

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**Show Position Rings**

Yes  No  
1 mile and 1/4 mile at the Search Point

**Show Search Area**

Yes  No  
2 Search distance miles radius

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Search Point is at map center

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**Base Map [Choices](#)**

Topography ▼

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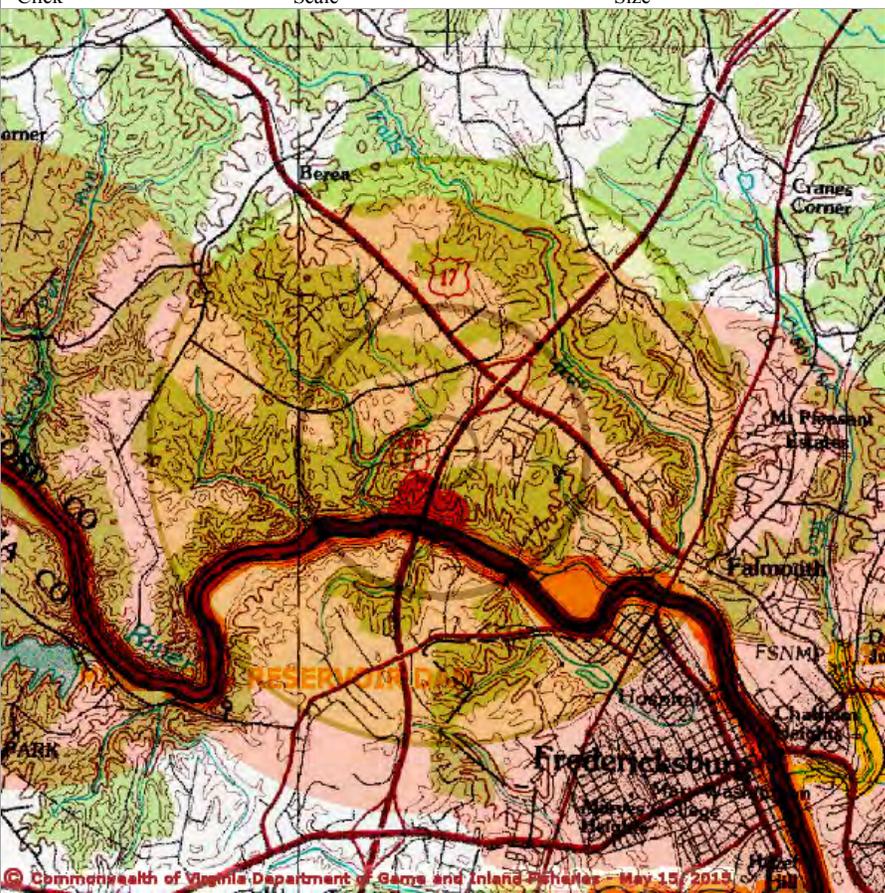
**Map Overlay [Choices](#)**

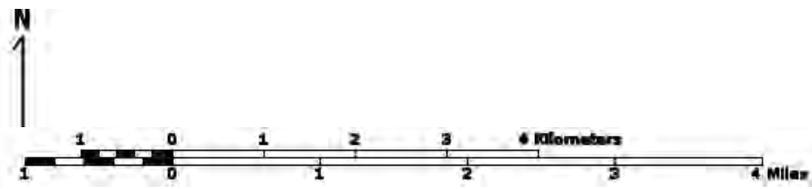
Current List: Position, Search, BECAR, BAEANests, TEWaters, TierII, Habitat, Trout, Anadromous




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Point of Search 38,20,01.0 -77,29,54.3

Map Location 38,20,01.0 -77,29,54.3

Select **Coordinate System**:  Degrees,Minutes,Seconds Latitude - Longitude  
 Decimal Degrees Latitude - Longitude  
 Meters UTM NAD83 East North Zone  
 Meters UTM NAD27 East North Zone

Base Map source: USGS 1:100,000 topographic maps (see [Microsoft terraServer-usa.com](http://Microsoft.terraServer-usa.com) for details)

Map projection is UTM Zone 18 NAD 1983 with left 276829 and top 4250585. Pixel size is 16 meters . Coordinates displayed are Degrees, Minutes, Seconds North and West.Map is currently displayed as 600 columns by 600 rows for a total of 360000 pixels. The map display represents 9600 meters east to west by 9600 meters north to south for a total of 92.1 square kilometers. The map display represents 31501 feet east to west by 31501 feet north to south for a total of 35.5 square miles.

Topographic maps and Black and white aerial photography for year 1990+-

**Map Overlay Legend**

<p><b>T &amp; E Waters</b></p> <p> <b>Federal</b></p> <p> <b>State</b></p>	<p>are from the United States Department of the Interior, United States Geological Survey. Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network. Shaded topographic maps are from TOPO! ©2006 National Geographic <a href="http://www.national.geographic.com/topo">http://www.national.geographic.com/topo</a> All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries.</p>
<p><b>Predicted Habitat WAP Tier I &amp; II</b></p> <p> <b>Aquatic</b></p> <p> <b>Terrestrial</b></p>	<p>map assembled 2015-05-15 10:30:48 (qa/qc December 5, 2012 8:04 - tn=657981.0 dist=3218.688 I) \$poi=38.3336111 -77.4984167</p>
<p><b>Trout Waters</b></p> <p> <b>Class I - IV</b></p> <p> <b>Class V - VI</b></p>	
<p><b>Anadromous Fish Reach</b></p> <p> <b>Confirmed</b></p> <p> <b>Potential</b></p>	
<p> <b>Impediment</b></p>	
<p> <b>Position Rings</b> 1 mile and 1/4 mile at the Search Point</p>	
<p> <b>2 mile radius Search Area</b></p>	
<p><b>Bald Eagle Concentration Areas and Roosts</b></p> <p></p>	

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## United States Department of the Interior



FISH AND WILDLIFE SERVICE  
Virginia Ecological Services Field Office  
6669 SHORT LANE  
GLOUCESTER, VA 23061  
PHONE: (804)693-6694 FAX: (804)693-9032  
URL: [www.fws.gov/northeast/virginiafield/](http://www.fws.gov/northeast/virginiafield/)

Consultation Code: 05E2VA00-2015-SLI-1986

May 15, 2015

Event Code: 05E2VA00-2015-E-01996

Project Name: Rappahannock River Crossing

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

### To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan ([http://www.fws.gov/windenergy/eagle\\_guidance.html](http://www.fws.gov/windenergy/eagle_guidance.html)). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment



United States Department of Interior  
Fish and Wildlife Service

Project name: Rappahannock River Crossing

## Official Species List

### Provided by:

Virginia Ecological Services Field Office

6669 SHORT LANE

GLOUCESTER, VA 23061

(804) 693-6694

<http://www.fws.gov/northeast/virginiafield/>

**Consultation Code:** 05E2VA00-2015-SLI-1986

**Event Code:** 05E2VA00-2015-E-01996

**Project Type:** TRANSPORTATION

**Project Name:** Rappahannock River Crossing

**Project Description:** Proposed improvements along an approximate 3-mile section of the I-95 corridor, from the Route 3 Interchange (Exit 130) to the Route 17 Interchange (Exit 133).

Improvements would involve construction of collector/distributor lanes in each direction, two new bridges crossing the Rappahannock River and interchange modifications at the Route 3 (Exit 130) and Route 17 (Exit 133) Interchanges.

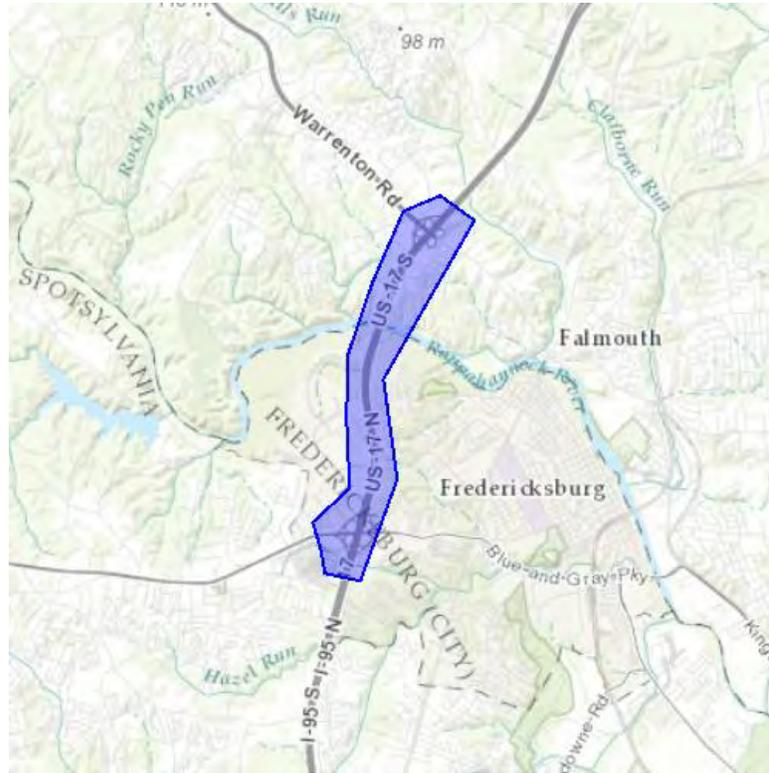
**Please Note:** The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.



United States Department of Interior  
Fish and Wildlife Service

Project name: Rappahannock River Crossing

**Project Location Map:**



**Project Coordinates:** MULTIPOLYGON (((-77.49000549316406 38.34582986313079, -77.4836540222168 38.342194744416744, -77.50064849853516 38.31876404810185, -77.49807357788086 38.30394763084892, -77.50494003295898 38.28912818664797, -77.51163482666016 38.290206066465636, -77.51266479492188 38.29411324660763, -77.51386642456055 38.297616056850146, -77.50717163085936 38.30260053372373, -77.50751495361327 38.313107227858886, -77.50734329223633 38.32240034234858, -77.5027084350586 38.33317347664987, -77.49687194824219 38.34340647092449, -77.49000549316406 38.34582986313079)))

**Project Counties:** Fredericksburg, VA | Spotsylvania, VA | Stafford, VA



United States Department of Interior  
Fish and Wildlife Service

Project name: Rappahannock River Crossing

## Endangered Species Act Species List

There are a total of 4 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Clams	Status	Has Critical Habitat	Condition(s)
Dwarf wedgemussel ( <i>Alasmidonta heterodon</i> ) Population: Entire	Endangered		
<b>Flowering Plants</b>			
harperella ( <i>Ptilimnium nodosum</i> )	Endangered		
Small Whorled pogonia ( <i>Isotria medeoloides</i> )	Threatened		
<b>Mammals</b>			
Northern long-eared Bat ( <i>Myotis septentrionalis</i> )	Threatened		



United States Department of Interior  
Fish and Wildlife Service

Project name: Rappahannock River Crossing

## **Critical habitats that lie within your project area**

There are no critical habitats within your project area.

## Natural Heritage Resources

### Your Criteria

Taxonomic Group: Select All

Federal Legal Status: LE - Listed endangered,LT - Listed threatened,PE - Proposed endangered,PT - Proposed threatened

State Legal Status: LE - Listed endangered,LT - Listed threatened,PE - Proposed endangered,PT - Proposed threatened

County: Spotsylvania

Search Run: 5/15/2015 10:15:07 AM

Click scientific names below to go to NatureServe report.

Click column headings for an explanation of species and community ranks.

Common Name/Natural Community	Scientific Name	<a href="#">Global Conservation Status Rank</a>	<a href="#">State Conservation Status Rank</a>	<a href="#">Federal Legal Status</a>	<a href="#">State Legal Status</a>	Statewide Occurrences
<b>Spotsylvania</b>						
BIVALVIA (MUSSELS)						
Dwarf	<a href="#">Alasmidonta</a>	G1G2	S1	LE	LE	15
Wedgemussel	<a href="#">heterodon</a>					
Green Floater	<a href="#">Lasmigona subviridis</a>	G3	S2	None	LT	64
HETEROPTERA (TRUE BUGS)						
Virginia Piedmont Water	<a href="#">Sigara depressa</a>	G1G2	S1S2	SOC	LE	5

Common Name/Natural Community Boatman	Scientific Name	<a href="#">Global Conservation Status Rank</a>	<a href="#">State Conservation Status Rank</a>	<a href="#">Federal Legal Status</a>	<a href="#">State Legal Status</a>	Statewide Occurrences
VASCULAR PLANTS						
Small Whorled Pogonia	<a href="#">Isotria medeoloides</a>	G2	S2	LT	LE	48

**Note: On-line queries provide basic information from DCR's databases at the time of the request. They are NOT to be substituted for a project review or for on-site surveys required for environmental assessments of specific project areas.**

**For Additional Information** on locations of Natural Heritage Resources please submit an [information request](#).

**To Contribute information** on locations of natural heritage resources, please fill out and submit a [rare species sighting form](#).

## Natural Heritage Resources

### Your Criteria

Taxonomic Group: Select All

Federal Legal Status: LE - Listed endangered,LT - Listed threatened,PE - Proposed endangered,PT - Proposed threatened

State Legal Status: LE - Listed endangered,LT - Listed threatened,PE - Proposed endangered,PT - Proposed threatened

County: Stafford

Search Run: 5/15/2015 10:13:55 AM

Click scientific names below to go to NatureServe report.

Click column headings for an explanation of species and community ranks.

Common Name/Natural Community	Scientific Name	<a href="#">Global Conservation Status Rank</a>	<a href="#">State Conservation Status Rank</a>	<a href="#">Federal Legal Status</a>	<a href="#">State Legal Status</a>	Statewide Occurrences
<b>Stafford</b>						
BIVALVIA (MUSSELS)						
Dwarf	<a href="#">Alasmidonta</a>	G1G2	S1	LE	LE	15
Wedgemussel	<a href="#">heterodon</a>					
VASCULAR PLANTS						
Sensitive Joint-vetch	<a href="#">Aeschynomene virginica</a>	G2	S2	LT	LT	22
Harperella	<a href="#">Harperella nodosa</a>	G2	S1	LE	LE	1

Common Name/Natural Community	Scientific Name	<a href="#">Global Conservation Status Rank</a>	<a href="#">State Conservation Status Rank</a>	<a href="#">Federal Legal Status</a>	<a href="#">State Legal Status</a>	Statewide Occurrences
Small Whorled Pogonia	<a href="#">Isotria medeoloides</a>	G2	S2	LT	LE	48

**Note: On-line queries provide basic information from DCR's databases at the time of the request. They are NOT to be substituted for a project review or for on-site surveys required for environmental assessments of specific project areas.**

**For Additional Information** on locations of Natural Heritage Resources please submit an [information request](#).

**To Contribute information** on locations of natural heritage resources, please fill out and submit a [rare species sighting form](#).

# Appendix E

## Dwarf Wedgemussel and Small Whorled Pogonia Habitat Assessment



Stantec Consulting Services Inc.  
1011 Boulder Springs Drive, Suite 225, Richmond VA 23225-4951

January 16, 2015  
File: 203400417

**Attention: Mr. Stuart Tyler**  
Parsons Transportation Group Inc.  
100 M Street SE  
Suite 1200  
Washington, D.C. 20003-3520

Dear Mr. Tyler,

**Reference: Rappahannock River Crossing, City of Fredericksburg, Stafford and Spotsylvania Counties, Virginia**

This correspondence summarizes the results of habitat surveys for the federally and state endangered dwarf wedgemussel (*Alismidonta heterodon*) and the federally threatened and state endangered small whorled pogonia (SWP) (*Isotria medeoloides*) for the Rappahannock River Crossing project. The project area is located within the City of Fredericksburg, Stafford and Spotsylvania Counties adjacent to Interstate 95 and crosses the Rappahannock River. These surveys were conducted by qualified Stantec staff on December 23, 2014. The following summarizes the life history, survey methods and results for each species.

#### Dwarf Wedgemussel

The dwarf wedgemussel is a small freshwater mussel distinguished by consistently having two lateral teeth on the right valve, but only one on the left (VDGIF VaFWIS 2015). The mussel lives on muddy sand, sand, and gravel bottoms in creeks and rivers of various size, in areas of slow to moderate current with little sediment deposits (USFWS 1993). Dwarf wedgemussels are long term brooders, with fertilization occurring in mid-summer and fall, with glochidia release in the following spring and summer. Fish host species in the south have been confirmed to include the tessellated darter (*Etheostoma olmstedii*), Johnny darter (*E. nigrinum*) and mottled sculpin (*Cottus bairdi*) (USFWS 2007). The dwarf wedgemussel is known to occur within the Rappahannock River and tributary streams within its watershed.

On March 7, 2008 the Virginia Department of Game and Inland Fisheries and the U.S. Fish and Wildlife Service issued a draft freshwater mussel guideline for the Commonwealth of Virginia listing four general assessment/survey types: land-based review, site assessment, abbreviated survey, and full survey. For purposes of identifying potential habitat onsite a land-based review is typically used to verify if additional water-based surveys will be required. During the site visit conducted on December 23, 2014, a land-based review was performed on the three onsite perennial waterbodies to group them based upon the presence or absence of favorable conditions for the dwarf wedgemussel. These categories represent the relative degree to which areas express favorable site attributes for the target species. Appropriate habitat is present in areas that retain



January 16, 2015  
Mr. Stuart Tyler  
Page 2 of 4

**Reference: Rappahannock River Crossing, City of Fredericksburg, Stafford and Spotsylvania Counties, Virginia**

most of the habitat factors described above, or based on professional judgment may still support the target species in areas of degraded habitat. Poor habitat is not sufficient to support freshwater mussel populations.

One perennial waterbody was identified during the land-based review to have potential habitat sufficient to support freshwater mussel populations: the Rappahannock River. The Rappahannock River has known occurrences of the species and characteristics were suitable within the vicinity of the project area. The perennial extent of Fall Quarry Run within the project area was found to be unsuitable in part due to a series of headcuts and grade controls that would preclude the migration of host fish upstream. An unnamed perennial tributary of Hazel Run at the southern portion of the project was also found to be unsuitable. Culverts present an obstacle to host fish migration, the stream is generally embedded and pools are full of silt. No live individual freshwater mussels were identified during this land-based review.

#### Small Whorled Pogonia

SWP is a self-pollinating perennial orchid (Family: Orchidaceae) with a characteristic whorl of five to seven leaves at the summit of a singular, hollow, pale green stem, with small greenish to yellow flowers (Gleason and Cronquist 1991). SWP occupies a very specific habitat type within its range. In particular, the species seems to require the following conditions: mature, mixed hardwood, upland forests; generally open understory conditions with minimal aggressive ground level species; generally level to moderately sloping land within shallow upland draws often, but not always, of northerly or easterly exposure; scattered ground-level sunlight; and, acidic, sandy loam soils (Ware 1991, Gleason and Cronquist 1991, Weakley 2010). In addition, many professionals have noted a prevalence of decaying logs and a well-developed detritus layer on the forest floor. These attributes tend to be present with the species when found, although the exact mechanisms associated with each affinity are not understood (Ware 1991). Certain indicator species may also be helpful in identifying small whorled pogonia habitat, are considered associates, and occur frequently near documented SWP colonies. Colonies of small whorled pogonia are known to occur within Stafford and Spotsylvania Counties.

This SWP habitat survey was conducted using general ground reconnaissance of the property boundary and all interior upland slopes. Notes were taken regarding cover types, community assemblages, slope aspect and grade, associate species, substrate, and other relevant information concerning habitat quality. Such reconnaissance and data collection allows for grouping of various regions into general habitat types: suitable, marginal, or poor, based on the presence of favorable habitat conditions for the target species. These categories represent the relative degree to which areas express favorable site attributes for the target species. Suitable habitat is present in areas that retain most of the habitat factors described above. Marginal habitat occurs in somewhat degraded areas, but based on professional judgment may still support the target species. Poor habitat is not sufficient for SWP colonization.

Design with community in mind



January 16, 2015  
Mr. Stuart Tyler  
Page 3 of 4

**Reference: Rappahannock River Crossing, City of Fredericksburg, Stafford and Spotsylvania Counties, Virginia**

As a result of the habitat survey conducted by Stantec, two areas of marginal small whorled pogonia habitat were identified within the project area. The boundaries of the habitat areas were located using a sub-decimeter accurate Trimble ProXH Global Positioning System (GPS) unit and are depicted on the attached Threatened and Endangered Species Habitat Map.

SWP habitat was categorized as marginal with positive characteristics including open understory, moderate presence of detritus on the forest floor, slope aspect and presence of associates, with possibility of other dormant species being present. Characteristics indicative of lower quality habitat that are present include, but are not limited to: reduced or absent decomposing woody debris, increased light penetration from the surrounding open areas and signs of historic disturbance. Forested communities within the marginal habitat areas identified are generally composed of semi-mature to mature hardwood tree species in the canopy, including white oak (*Quercus alba*), tulip poplar (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*) and hickory species (*Carya* spp.). Associate species scattered in the herbaceous strata include strawberry bush (*Evonymus americana*) and striped wintergreen (*Chimaphila maculata*).

The remainder of the survey area is considered poor, or inappropriate SWP habitat, due to one or more limiting factors. Limiting factors include the absence of forested communities, maintained lawn and right-of-way, high density pine-dominated forests, immature forest communities, dense understory coverage, significant historical land disturbance and wetland habitats.

Please let me know if you have any questions regarding the results of the habitat survey for dwarf wedgemussel and the small whorled pogonia for the Rappahannock River Crossing project.

Regards,

**STANTEC CONSULTING SERVICES INC.**

Sean Wender, PWD  
Senior Ecologist  
Phone: (804) 267-3474  
Fax: (804) 267-3470  
sean.wender@stantec.com

Attachment: Threatened and Endangered Species Habitat Map

c. Brian Hawley, Stantec



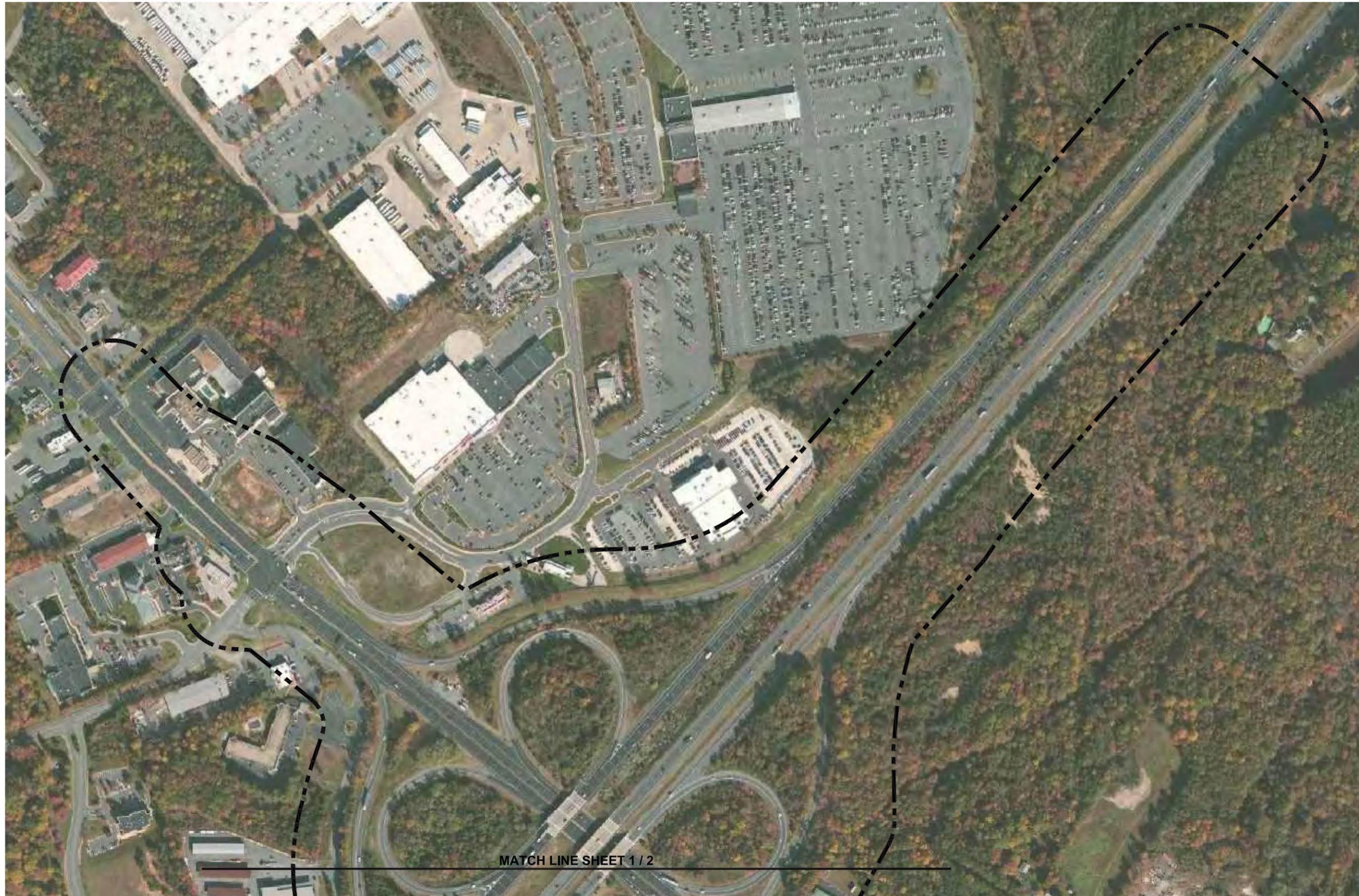
January 16, 2015  
Mr. Stuart Tyler  
Page 4 of 4

**Reference: Rappahannock River Crossing, City of Fredericksburg, Stafford and Spotsylvania Counties, Virginia**

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**LEGEND:**

-  EXISTING TOPOGRAPHY
-  PROJECT LIMITS
-  MARGINAL SMALL WHORLED POGONIA HABITAT

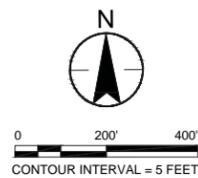
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	JOB NUMBER: 203400417	DRAWN BY: MAC	CHECKED BY: SMW	APPROVED BY: BH	DATE: 20150116



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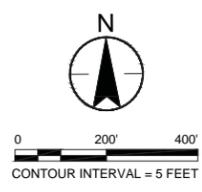
-  EXISTING TOPOGRAPHY
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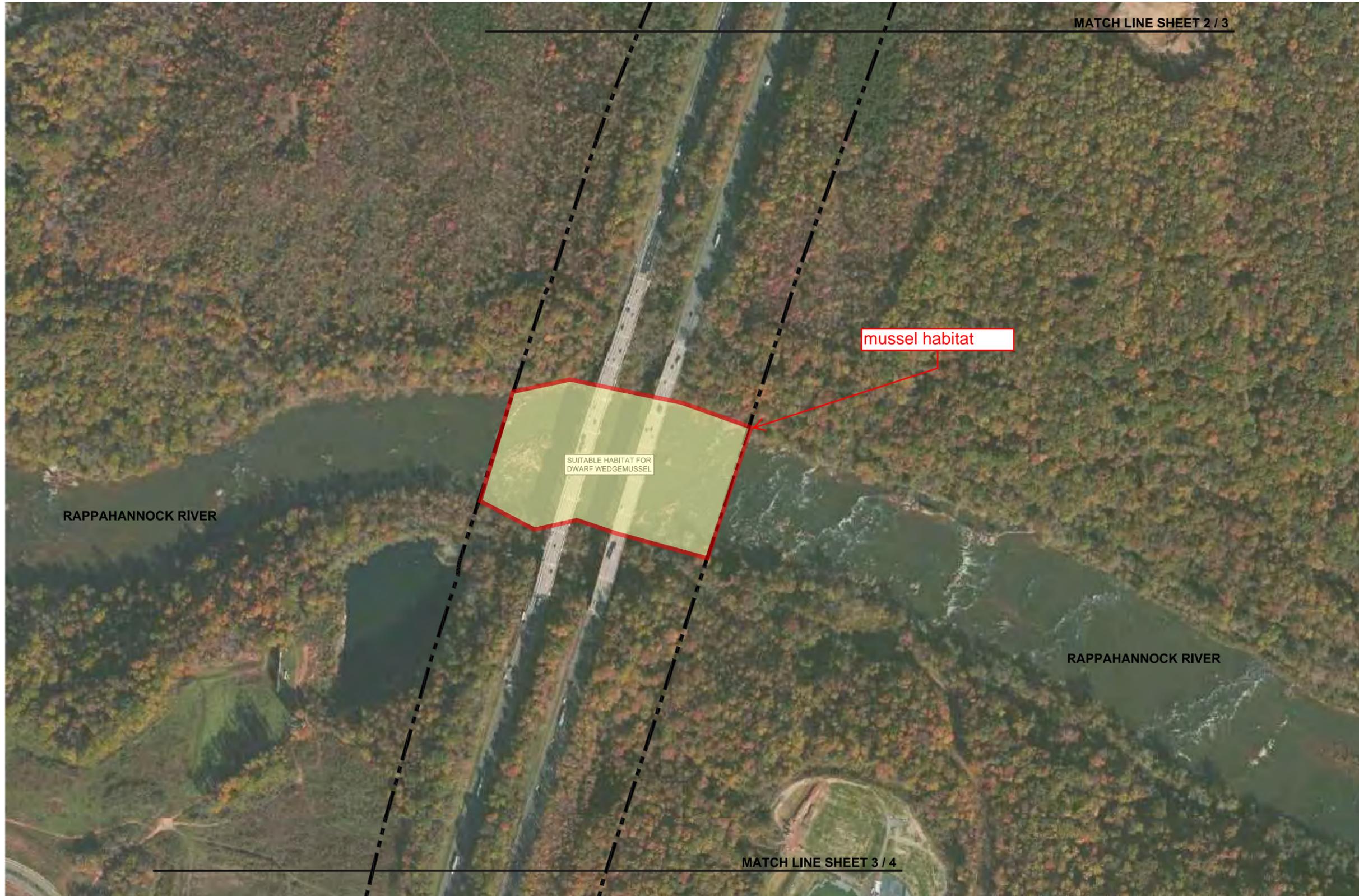
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**LEGEND:**

-  EXISTING TOPOGRAPHY
-  PROJECT LIMITS
-  MARGINAL SMALL WHORLED POGONIA HABITAT

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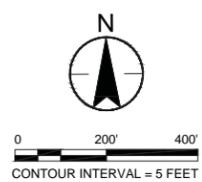
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RAPPAHANNOCK RIVER

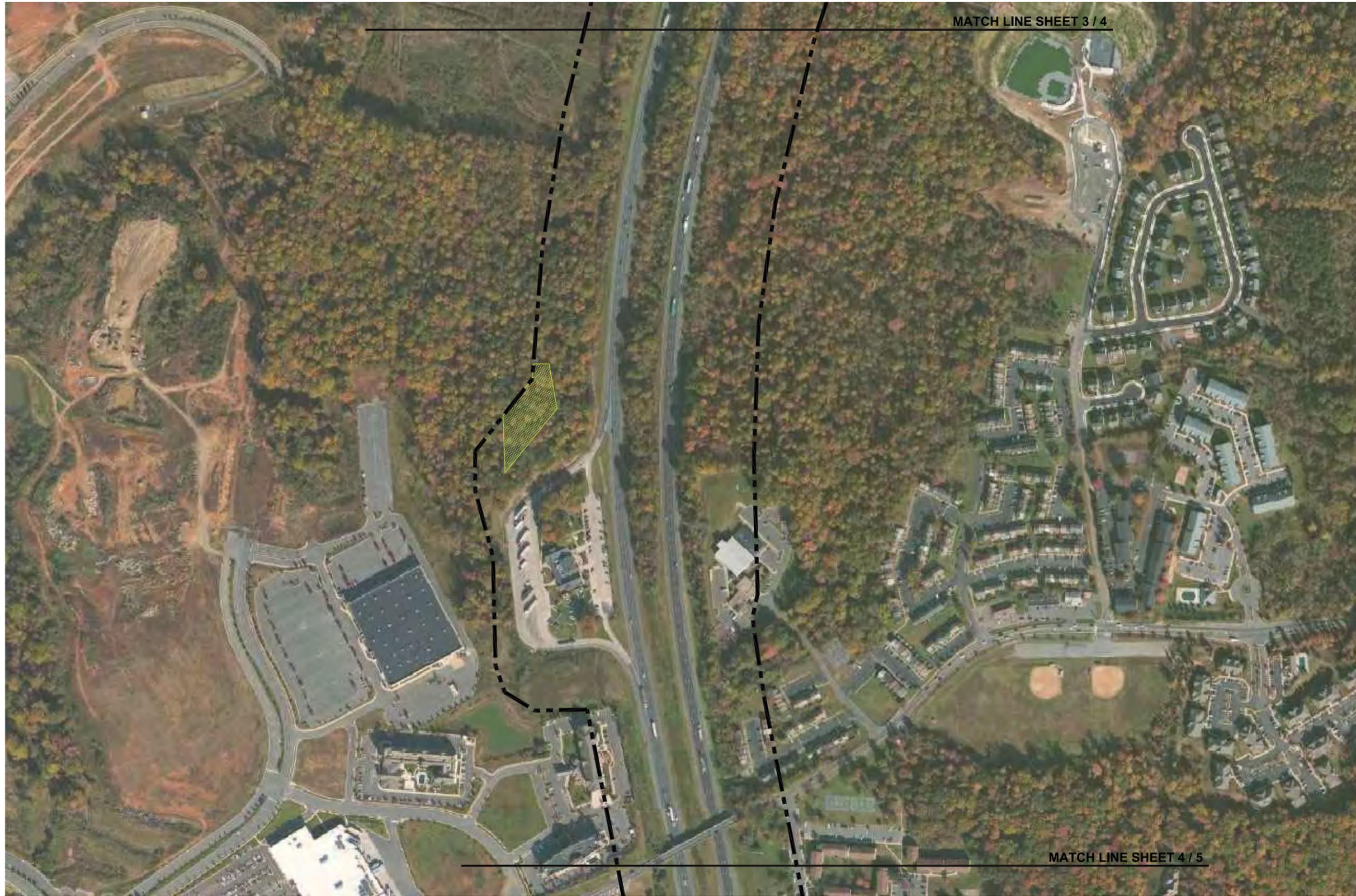
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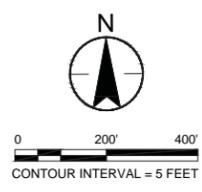
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	RAPPAHANNOCK RIVER CROSSING STAFFORD AND SPOTSYLVANIA COUNTIES, AND CITY OF FREDERICKSBURG, VIRGINIA		CHECKED BY: SMW APPROVED BY: BH DATE: 20150116	
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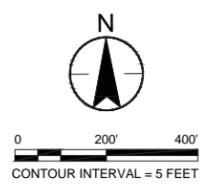
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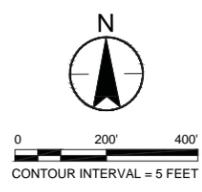
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	JOB NUMBER: 203400417	DRAWN BY: MAC	CHECKED BY: SMW	APPROVED BY: BH	DATE: 20150116



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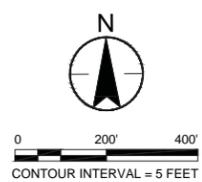
- EXISTING TOPOGRAPHY
- PROJECT LIMITS
- MARGINAL SMALL WHORLED POGONIA HABITAT

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