CITY OF BIRMINGHAM
DEPARTMENT OF PLANNING, ENGINEERING & PERMITS

MEMORANDUM

DATE: October 21, 2015

TO: Brian Ruggs

FROM: Direcus Cooper

THRU: Thomas Miller

RE: Village Creek Stream Assessment Report

City of Birmingham Stormwater Management initiated a 14 mile creek assessment as part of the Village Creek Watershed Management Plan (VCWMP) in March of 2015. This project physically assesses the conditions of the creek and immediate overbank area and looking for areas with high potential for bank scour, in stream erosion, and sediment deposition to help identify potential locations of stream bank restoration and/or conservation for overall VCWMP. With the following objectives:

- Provide ARCADIS with a better understanding of sedimentation and sources of sedimentation for modeling purposes.
- Provide information on the general health of the streams and indicated stream diversity.

This section of the report will give step by step visual through the process of the project:

Step 1: Modification of the Stream Assessment Field Data Form (Draft 2014-10-31) to Village Creek Assessment Form (2014-12-23).

- New form focused primarily on Channel Stability, Channel Scouring/Sedimentation Deposition, and Riparian Habitat Conditions.
- Emphasized information needed in the Hydrologic and Hydrology (H and H) model.
- See exhibit A and B for details.

Step 2: Stormwater management staff completed in the field training by Arcadis, U.S., Inc. Stream Assessment Specialist.

Step 3: Conducted in office investigation of Village Creek

- Stormwater Staff used map books, G.I.S., and Google Earth and Maps to locate all bridge crossings within the 14 miles creek reach.

Step 4: Conducted bridge to bridge drive by investigation of Village Creek

- Determined about 7 of the 14 miles of Village Creek needed in depth field assessment.
- See exhibit C for details.

Step 5: Conducted in field stream assessment of 10 areas within the 7 miles that needed in depth evaluation

- See exhibit D for details.

Step 6: Developed Summary table and map to illustrate conclusion

- See exhibit E for details.

This section of the report will give detail analysis of Channel Stability, Channel Scouring/Sediment Deposition, Riparian Habitat Condition, and Water Appearance as it affects Village Creek:

Chart A

Village Creek Stream "Actual" Assessment Summary of Results

Actual Individual														
	VCSA1	*VCSA2*	*VCSA3*	*VCSA4*	*VCSA5*	*VCSA6*	*VCSA7*	*VCSA8*	*VCSA9*	*VCSA10*	*S. D.*	*Min.*	*Max.*	*Avg.*
Channel Stability	5	7.6	8.8	8.8	10	8.8	9.4	8.2	2.8	2.6	*2.73*	2.6	10.0	7.2
Channel Scouring/ Sediment Deposition	6.7	3.4	5.4	6.2	5.4	5.9	7.1	4.6	3.4	1.5	*1.74*	1.5	7.1	5.0
Riparian Habitat	2.5	1.75	2.75	5.5	1.75	3.5	5.5	5.5	1	1	*1.84*	1.0	5.5	3.1
Water Appearance	7	10	10	10	10	10	10	10	10	10	*0.95*	7.0	10.0	9.7

Note: Boxes highlighted in YELLOW are represented as within one standard deviation unit of range (i.e. ≤70% of all measured data).

Channel Stability

The Bank Stability metric evaluates whether the stream banks are eroded, or have the potential for erosion. Steep banks are more likely to collapse and suffer from erosion than are gently sloping banks, and are therefore considered to be unstable. Signs of erosion include crumbling unvegetated banks, exposed tree roots, and exposed soil. The Bank Stability parameter evaluation can indicate many things about a stream, including whether there is a large supply of sediment available to the stream, if the stream is subject to high, flashy storm flows, and whether there is sufficient vegetation along the stream's banks to keep it stable.

Analyzing the results in the chart above, it was determined that Village Creek data points ranged from excellent to poor with majority of the points being listed as good. RSAT Evaluation method of evaluation determined that Village Creek Channel Stability was overall good. Good is described as:

- 71-80% of bank network stable, infrequent signs of bank sloping, slumping, or failure;
- Stream bend areas stable, outer bank height 2-3 ft. above stream bank for large mainstream areas) overhang 2-2.5 ft.
- Exposed tree roots predominantly old and large, smaller young roots scarce. 2-3 recent tree falls/stream mile;
- bottom 1/3 of bank is generally resistant plant/soil matrix or material
- channel x-sect is generally V or U shaped

As depicted in the Chart A above the only location that stood out of the 70 percentile was Data point 10 (VCSA10). This location had a lot of sedimentation and erosion issues. Please see exhibit D for more details.

Channel Scouring/Sediment Deposition

The erosion transport of material through the landscape is rarely continuous. Instead, particles may undergo repeated cycles of entrainment, transport, and deposition. Transport depends on an appropriate balance of forces within the transporting medium. A reduction in the velocity of the medium, or an increase in the resistance of the particles may upset this balance and cause deposition. Reductions in competence can occur in a variety of ways. Velocity can be reduced locally by the sheltering effect of large rocks, hills, stands of vegetation or other obstructions. Normally, competence changes occur because of large-scale reductions in the velocity of flowing medium. Deposition can also be caused by particle precipitation and flocculation. These processes are active only in water. Precipitation is a process where dissolved ions become solid because of changes in the temperature or chemistry of the water. Flocculation is a chemical process where salt causes the aggregation of minute clay particles into larger masses that are too heavy to remain suspended.

Analyzing the results in the chart above, it was determined that Village Creek data points ranged from excellent to poor with majority of the points being listed as fair. RSAT Evaluation method of evaluation determined that Village Creek Channel Scourning/Sedimentation Deposition was overall fair. Fair is described as:

- 50-75% embedded (60-85% embedded for large mainstream areas);
- Low moderate number of deep pools. Pools substrate 60-80% sand/silt
- Streak marks and/or "banana" deposits common;
- Fresh large sand deposits in channel common. Small localized areas of fresh sand deposits along top of low banks
- Point bars moderate-large and unstable with high amounts of fresh sand common

As depicted in the Chart A above the only location that stood out of the 70 percentile was Data point 10 (VCSA10). This location had a lot of sedimentation and erosion issues. Please see exhibit D for more details.

Riparian Habitat Condition

The Riparian Vegetative Zone metric evaluates the width of natural vegetation from the edge of the stream bank out through the riparian zone. This vegetative zone serves as a buffer to pollutants entering a stream from runoff, controls erosion, and provides habitat and nutrient input into the stream. A relatively undisturbed riparian zone supports a robust stream system; narrow riparian zones occur when roads, parking lots, fields, lawns, bare soil, rocks, or buildings are near the stream bank. The riparian zone is a very important component of stream health. A well-forested riparian zone may provide food for biota through allochthonous inputs, filter nutrients and pollutants from runoff, provide bank stabilization, and provide shade that prevents elevated water temperatures.

Analyzing the results in the chart above, it was determined that Village Creek data points ranged from good to poor with majority of the points being listed as poor. RSAT Evaluation method of evaluation determined that Village Creek Riparian habitat was overall poor. Poor is described as:

- Riparian area mostly non-woody vegetation, narrow width riparian area Canopy coverage <50% shading (<30% for large mainstream areas)

As depicted in the Chart A above the only location that stood out of the 70 percentile was Data point(s) 2, 5, 9, and 10. Please see exhibit D for more details.

Water Appearance

The water appearance was pretty good. No physical indicators such as odor, color, turbidity was detected during investigation. We did notice some floatables is certain areas.

Analyzing the results in the chart above, it was determined that Village Creek data points ranged from good to excellent with majority of the points being listed as excellent. RSAT Evaluation method of evaluation determined that Village Creek Riparian habitat was overall excellent. Excellent is described as:

- Overall very clear or clear but tea-colored: objects were visible at depths 3 to 6 ft. (less if slightly colored)
- The water appearance was overall very clear or clear but tea-colored: objects were visible at depths 3 to 6 ft. (less if slightly colored)
- No oil sheen on surface
- No noticeable film on submerged objects or rocks

As depicted in the Chart A above no data points stood out of the 70 percentile.

3/11/2015 14:58

EXHIBIT A

Table 1: General Information			
Location	Latitude (Northing):	Date:	
	Longitude (Easting):	Time:	
Names of Field Personnel			
Current Weather		72-hour Rainfall	
GPS File Name:		Photo numbers (range):	
Data Point Type (check all that apply)	☐ Stream Assessment Point ☐ Debris, Trash, or Obstructions ☐ Channel Modification	☐ Stream Crossings or Structures ☐ Utility Crossing ☐ Generic Point	
COMMENTS			

Table 2: Stream Assessment Measurements		
	LEFT BANK (facing downstream)	RIGHT BANK (facing downstream)
Top of Bank height (ft):		
Bankfull height (ft):		
Root Depth (ft):		
Root Density (%):		
Bank Slope (m:1)		
Surface Protection (%):		
Bank Material Description:		
Channel Bottom width (ft) (toe of bank to toe of bank)		
Channel wetted width (ft)		
Channel width at top of bank (ft)		
Channel width at bankfull height (ft)		

Table 3: Debris, Trash, or Obstructions		
TYPE	VALUE (circle one) (0=less impact, 3=more impact)	COMMENTS
Vegetation, yard clippings, trees, leaves	0 1 2 3	
Construction debris	0 1 2 3	
Commercial waste (restaurant, shopping carts)	0 1 2 3	
Industrial (hazardous waste drums, chemicals)	0 1 2 3	
Other	0 1 2 3	

Table 4: Channel Modification		
TYPE	VALUE (circle one) (0=less impact, 3=more impact)	COMMENTS
Bank Armoring	0 1 2 3	
Channelization	0 1 2 3	
Concrete Channel	0 1 2 3	
Floodplain Encroachment	0 1 2 3	
Floodplain Encroachment (measurement)	Height:	Width:
Other	0 1 2 3	

Table 5: Stream Crossings or Structures		
TYPE	VALUE (circle one) (0=less impact, 3=more impact)	COMMENTS
Bridge	0 1 2 3	
Culvert (CMP)	0 1 2 3	
Culvert (bottomless)	0 1 2 3	
Dam	0 1 2 3	
Other	0 1 2 3	

Table 6: Utility Crossing		
TYPE	VALUE (circle one) (0=less impact, 3=more impact)	COMMENTS
Gas (natural gas pipeline)	0 1 2 3	
Sanitary Sewer	0 1 2 3	
Power (transmission lines)	0 1 2 3	
Other	0 1 2 3	

Depositional Pattern: See attached "Figure 107 Depositional patterns used for stability assessment interpretations" (Rosgen 1996). Circle the pattern or patterns that best represent the bar patterns (depositional patterns) observed. Be sure to include photos and note them in Table 1.

Figure 107: Depositional patterns used for stability assessment interpretations (Rosgen, 1996)

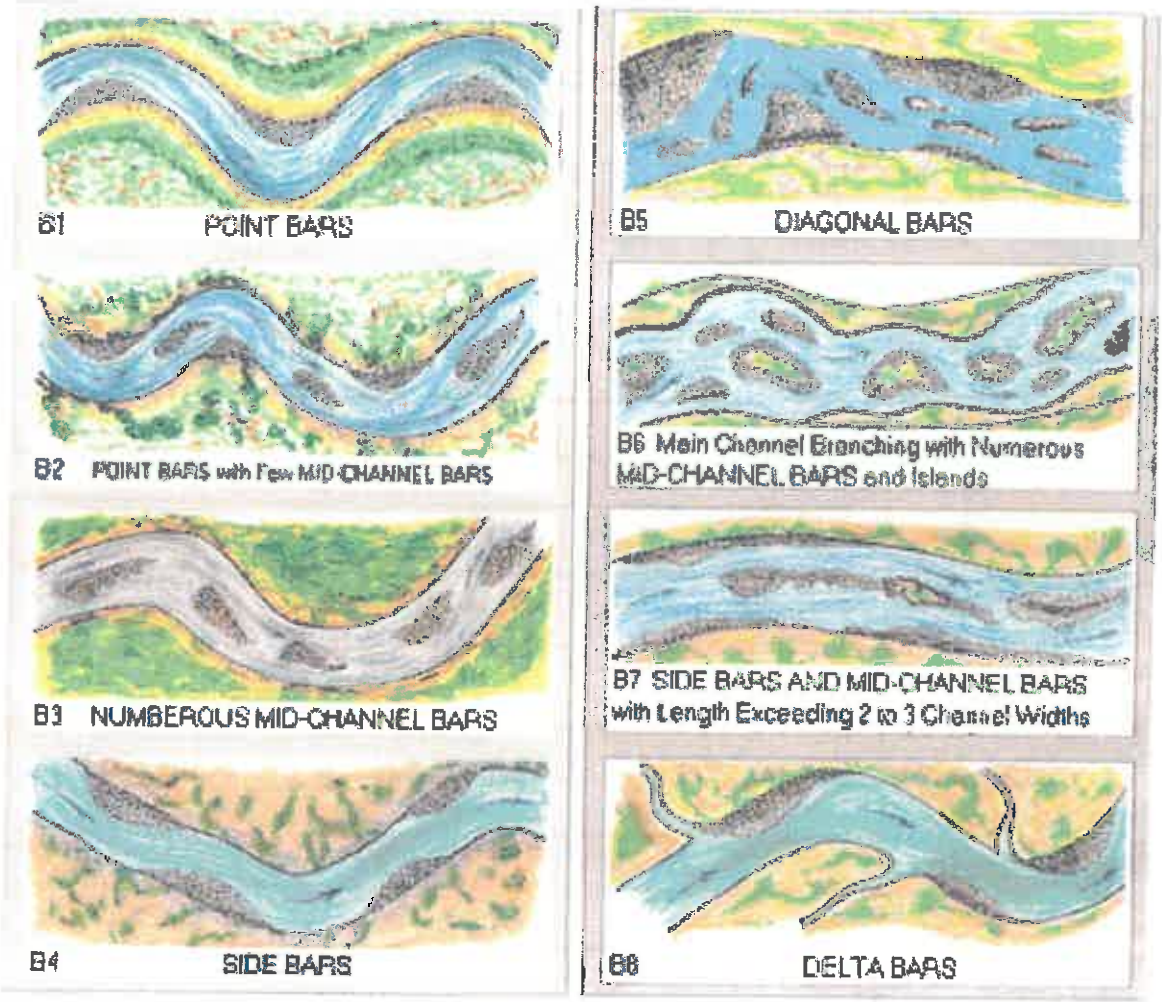


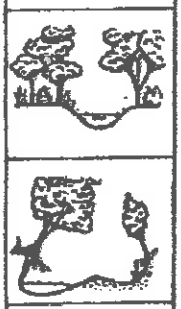
EXHIBIT B

Table 1: General Information			
Project Name:		Date:	
Stream Name:		Time:	
Location:		Current Weather:	
Names of Field Personnel		Rain Event within past 7-days? (circle one)	Yes or No
GPS File Name:			
Data Point Type(Check one)	Stream Assessment Point	Generic Point	
Photo numbers (range):			
COMMENTS			

I. RSAT METRICS

1. CHANNEL STABILITY (RSAT METRIC #1)

Table 2. RSAT Evaluation Method - Representative Stream Characteristics[1]

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability 	• Indicative of hydrologic/ flow regime alteration and general condition of physical aquatic habitat.	• > 80% of bank network stable. no evidence of bank sloughing, slumping or failure;	• 71-80% of bank network stable. infrequent signs of bank sloughing, slumping or failure;	• 50-70% of bank network stable. recent signs of bank sloughing, slumping or failure fairly common;	• <50% of bank network stable. recent bank sloughing, slumping or failure frequently observed ;
	• Provides insight into past, present and possible future changes in channel morphometry.	• stream bend areas are very stable. outerbank height <2 ft. above stream (<4 ft. above stream for large mainstem areas). bank overhang < 2 ft.;	• stream bend areas stable. outer bank height 2-3 ft. above stream bank (4-5 ft. above stream bank for large mainstem areas). overhang 2-2.5 ft.;	• stream bend areas unstable. outer bank height 3-4 ft. above stream (5-7 ft. above stream for large mainstem areas). bank overhang 2.5-3 ft.;	• stream bend areas highly unstable. outer bank height >4 ft. above stream. (>7 ft. above stream for large mainstem areas). overhang >3 ft.;
		• exposed tree roots old, large, and woody. generally 0-1 recent (large) tree falls/stream mile;	• exposed tree roots predominantly old and large, smaller young roots scarce. 2-3 recent (large) tree falls/ stream mile;	• young exposed tree roots common. 4-5 recent (large) tree falls/stream mile;	• young exposed tree roots abundant. ≥6 recent large tree falls/stream mile.;
		• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material;	• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material,	• bottom 1/3 of bank is generally highly erodible material; plant/soil matrix compromised;	• bottom 1/3 of bank is highly erodible material; plant/soil matrix severely compromised;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability (cont'd.)		*channel x-sect. is generally V or U-shaped.	*channel x-sect is generally V or U-shaped.	*channel x-sect is generally trapezoidally-shaped.	*channel x-sect is generally trapezoidally-shaped.
Point Range		9-11	6-8	3-5	0-2

2. CHANNEL SCOURING/SEDIMENT DEPOSITION (RSAT METRIC #2)

Note embeddedness refers to degree to which channel substrate, e.g. gravel or cobble, are buried due to sediment deposition.

2. Channel Scouring/ Sediment Deposition	• Relates to level of uncontrolled stormwater runoff, sediment load and transport and degradation of instream habitat.	• riffle embeddedness <25% sand/silt (<35% for large urban/suburban areas);	• 25-49% embedded (35-59% embedded for large urban/suburban areas);	• 50-75% embedded (60-85% embedded for large urban/suburban areas);	• > 75% embedded (>85% embedded for large urban/suburban areas);
		• high number of deep pools ≥24" (≥48" for large urban/suburban areas). pool substrate <30% composed of sand/silt;	• moderate number of deep pools. pool substrate 30-59% sand/ silt;	• low-moderate number of deep pools. pool substrate 60-80% sand/silt;	• few, if any, deep pools. pool substrate >81% sand/silt;
		• streamlined streak marks and/or banana-shaped sediment deposits absent;	• streak marks and/or "banana" deposits uncommon;	• streak marks and/or "banana" deposits common;	• streak marks and/or "banana" deposits common;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
2. Channel Scouring/ Sediment Deposition (cont'd.)		• fresh, large sand deposits in channel throughout. no evidence of fresh sediment deposition on overbank;	• fresh, large sand deposits in channel uncommon. small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits in channel common. small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits v. common in channel, moderate-heavy sand deposition along major portion of over-bank area v. common;
		• point bars few, small and stable, well vegetated and/ or armored with little or no fresh sand.	• point bars small and stable, well vegetated and/or armored with little or no fresh sand	• point bars moderate-large and unstable with high amount of fresh sand common.	• point bars moderate-large and unstable with high amount of fresh sand present at most stream bends.
Point Range		7-8	5-6	3-4	0-2

5. RIPARIAN HABITAT CONDITION (RSAT METRIC #5)

5. Riparian Habitat Conditions	• Provides insight into change(s) in stream energetics, temperature regime, and both aquatic and terrestrial habitat conditions.	• wide (>200') mature forested buffer along both banks;	• forested buffer generally more than 100 ft. wide along major portion of both banks;	• riparian area predominately wooded but with major localized gaps;	• riparian area mostly non-woody vegetation, narrow-width riparian area;
		• canopy coverage; ≥80% shading (≥60% for large urban/suburban areas).	• canopy coverage; 60-79% shading (45-59% for large urban/suburban areas).	• canopy coverage; 50-69% shading (30-44% for large urban/suburban areas).	• canopy coverage; <50% shading (<30% for large urban/suburban areas).
Point Range		6-7	4-5	2-3	0-1

II. SVAP METRICS

1. CHANNEL CONDITION (SVAP)

Channel condition

Natural channel no structures, dikes. No evidence of down cutting or excessive lateral cutting.	Evidence of past channel alteration, but with significant recovery of channel and banks. Any dikes or levees are set back to provide access to an adequate flood plain	Altered channel; <50% of the reach with riprap and/or channelization. Excess aggradation, braided channel. Dikes or levees restrict flood plain width	Channel is actively downcutting or widening >50% of the reach with riprap or channelization. Dikes or levees prevent access to the flood plain.
10	7	3	1

2. WATER APPEARANCE (SVAP)

Water appearance

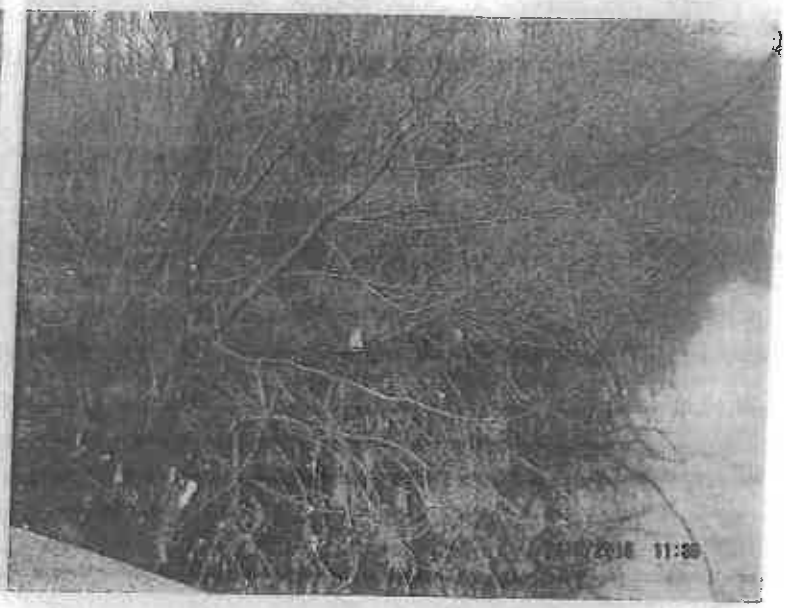
Very clear, or clear but tea-colored, objects visible at depth 3 to 6 ft (less if slightly colored); no oil sheen on surface; no noticeable film on submerged objects or rocks	Occasionally cloudy, especially after storm event, but clears rapidly; objects visible at depth 1.5 to 3 ft; may have slightly green color; no oil sheen on water surface	Considerable cloudiness most of the time; objects visible to depth 0.5 to 1.5 ft; slow areas may appear pea-green; bottom rocks or submerged objects covered with heavy green or olive-green film. or Moderate odor of manure or rotten eggs.	Very turbid or muddy appearance most of the time; objects visible to depth < 0.5 ft; slow moving water may be bright green; other obvious water pollutants; floating algal mats; surface scum; sheen or heavy coat of foam on surface or Strong odor of chemicals, oil, sewage, other pollutants
10	7	5	1

III. CHANNEL CROSS-SECTION MEASURESMENTS

MEASUREMENT	VALUE (FEET)
Top of Bank height	
Channel width at top of bank	
Channel width at toe of bank	

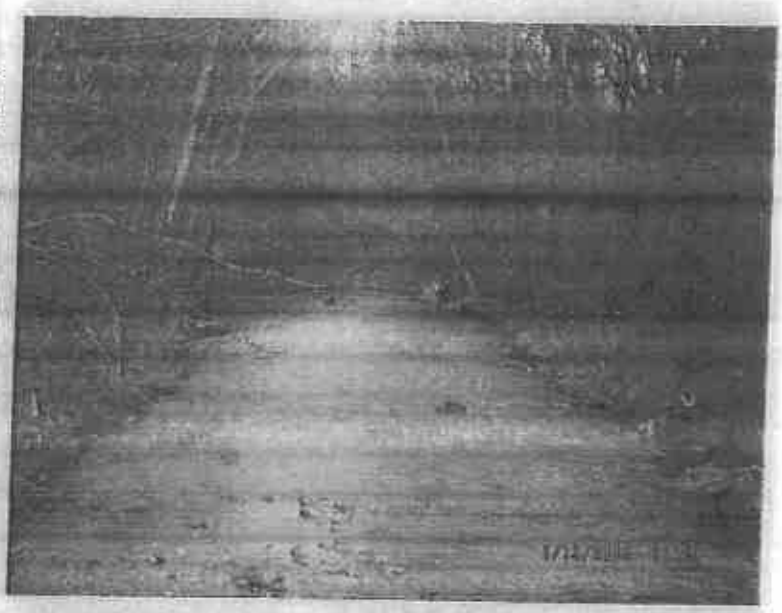
EXHIBIT C

Station 9.4 + 18TH St N

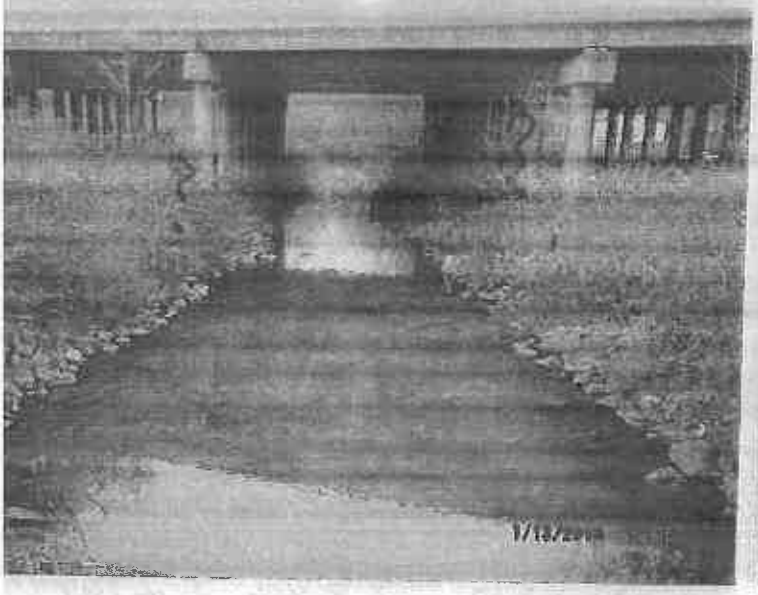


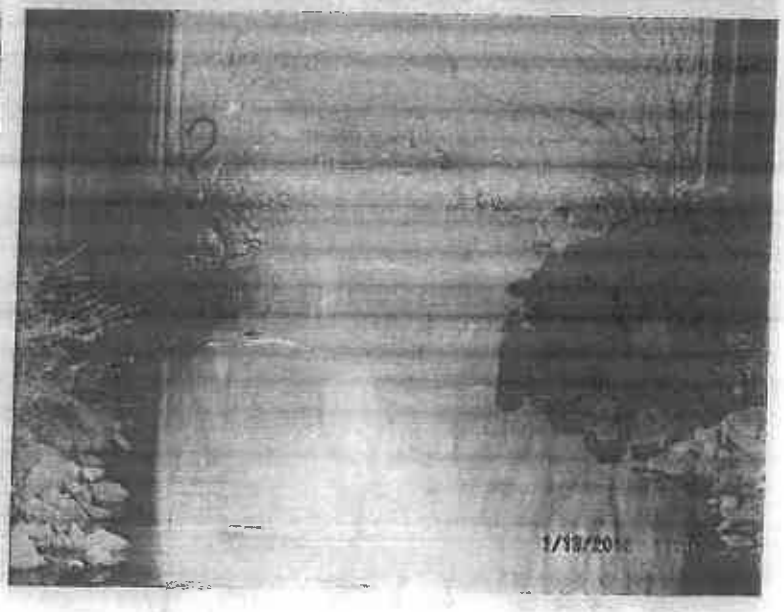
Station 9.4 - 18th St N

18th St N -



18th St N





24th St N

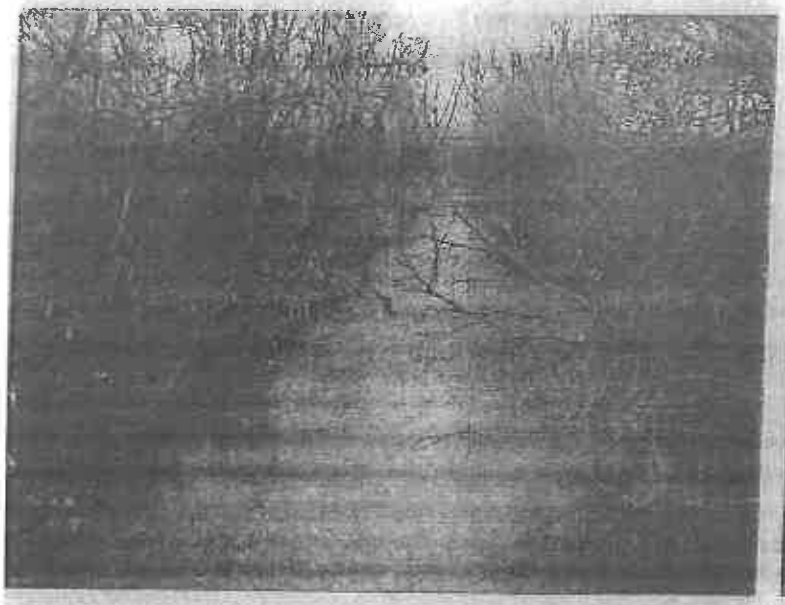
24th St N

24th St N - 25th St N

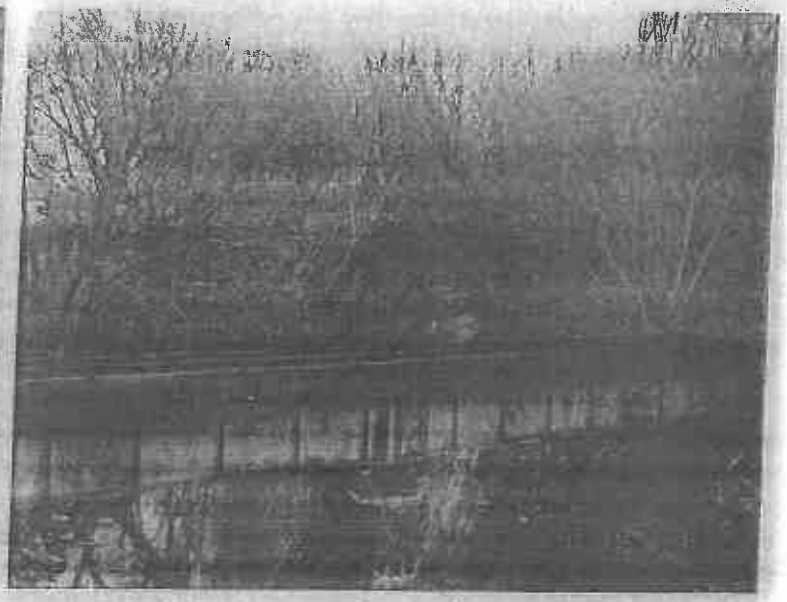
24th St N - 25th St N

2333 25th St N

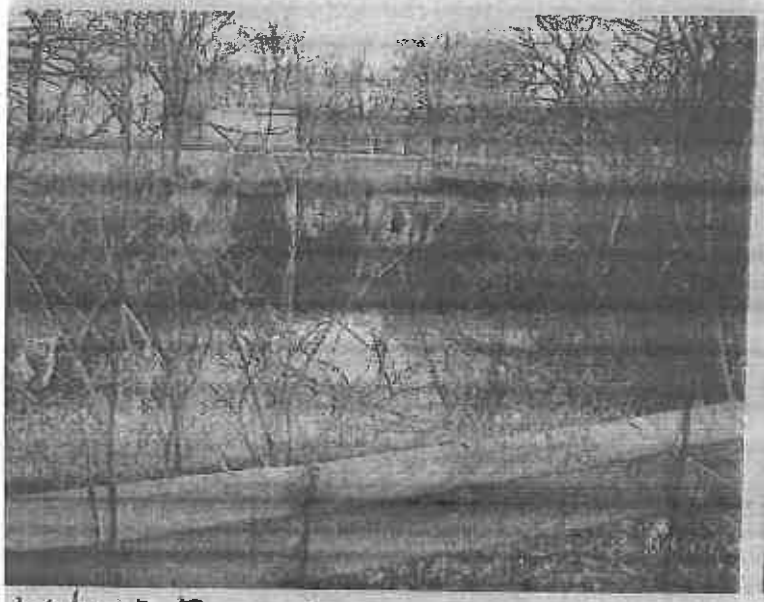
2333 25th St N



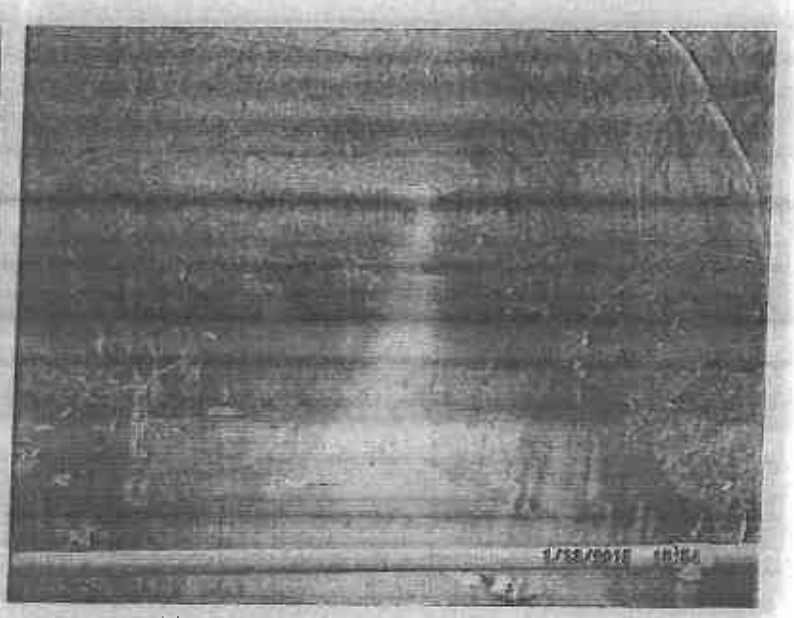
27th St N



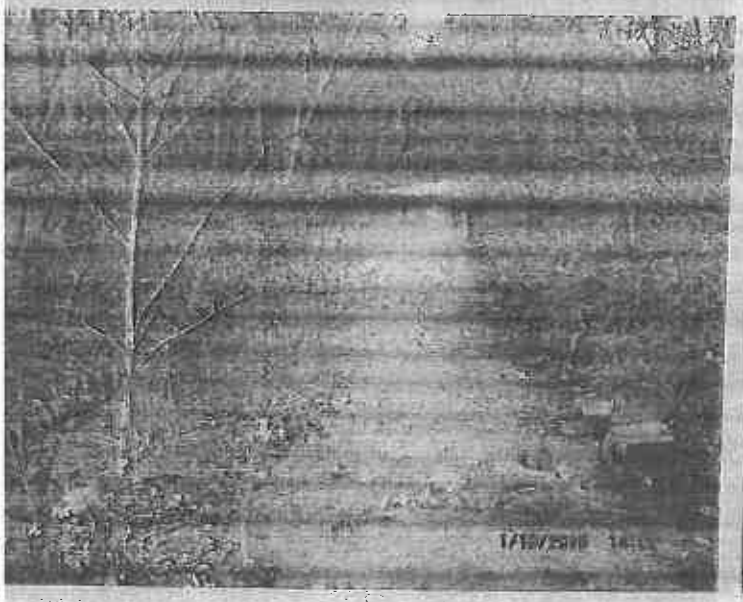
27th St N



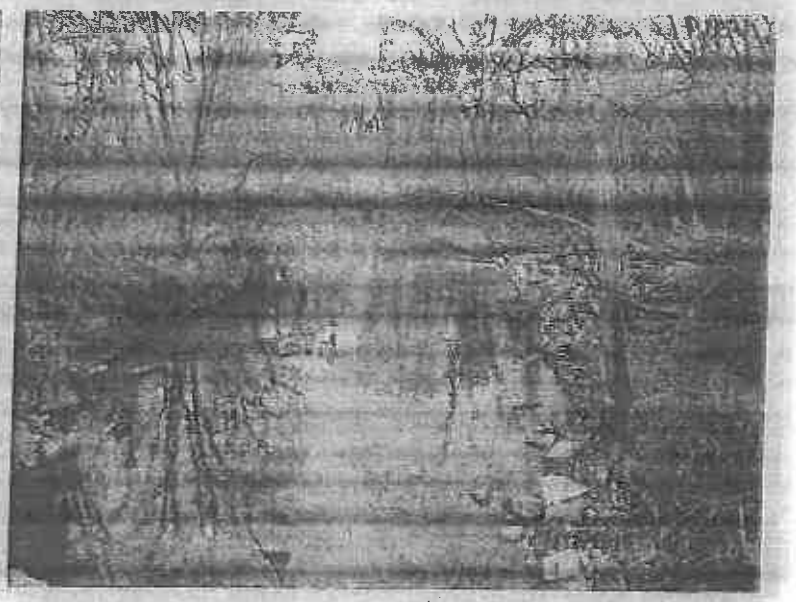
station #8.1



station #7.1

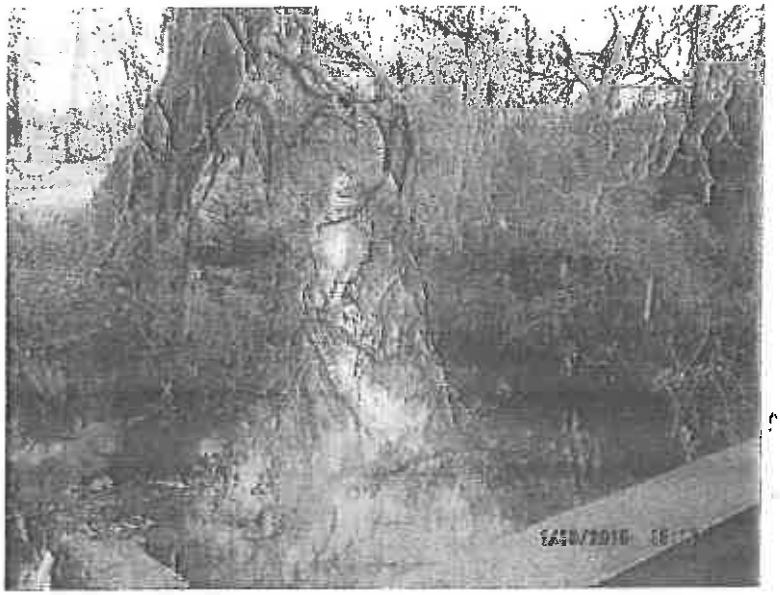


station #8.1

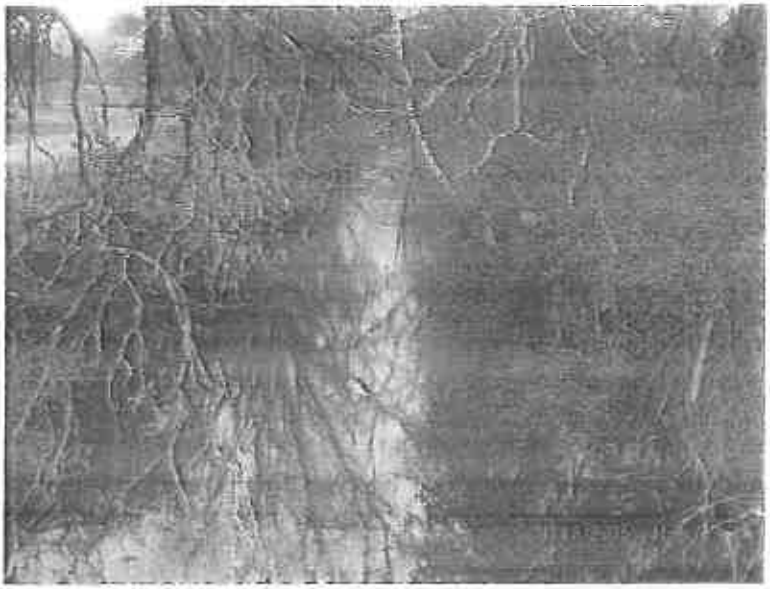


station #7.0

75th St/5th Ave



80th St N/1st Ct N



80th St N/1st Ct N

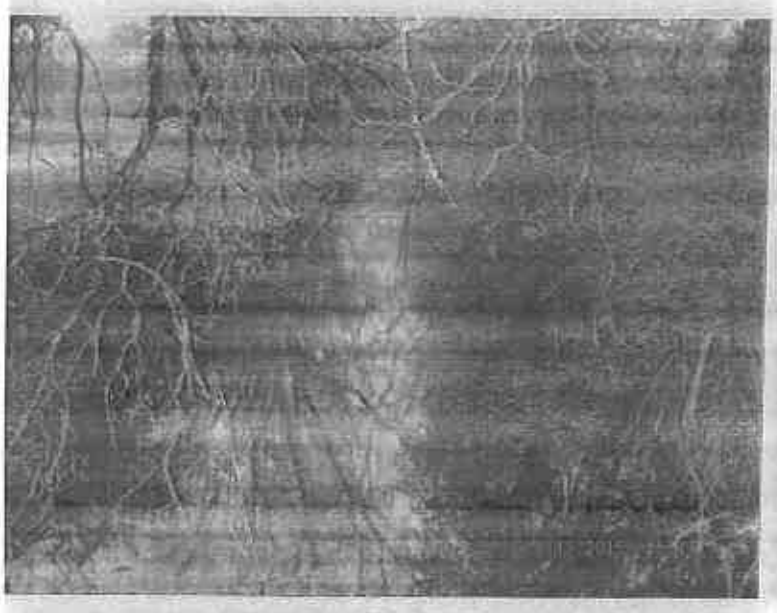
196 84th St N

196 84th St N

85th St & 2nd Ave

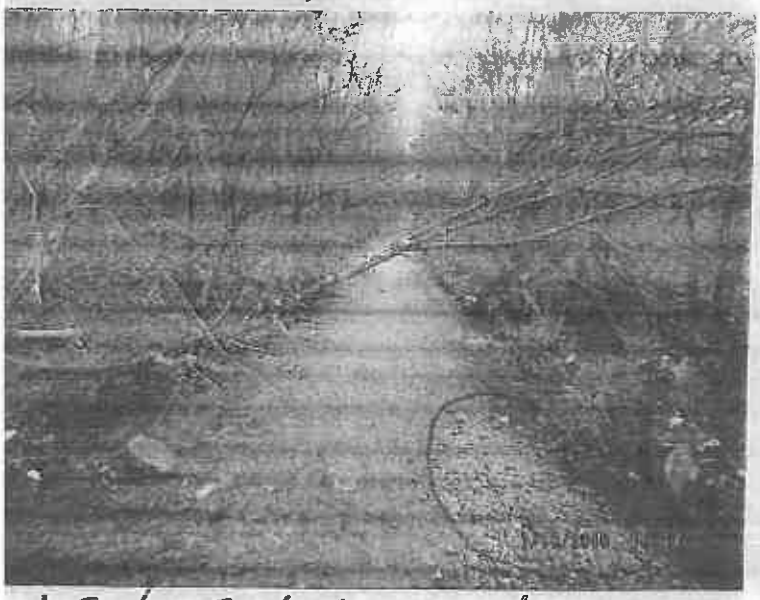
75th St/5th Ave

80th St N/1st Ct N

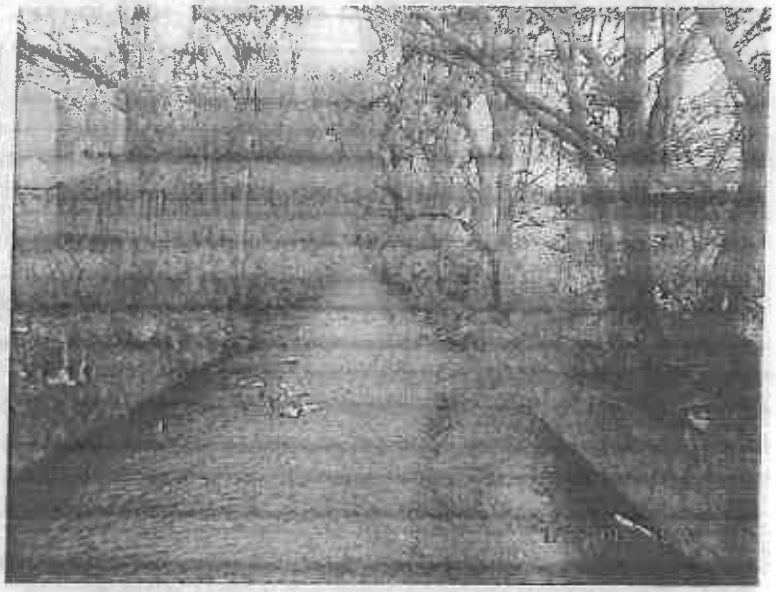


80th St N/1st Ct N

196 84th St N



196 84th St N



85th St & 2nd Ave

85th St / 2nd Ave

Station #7, 8

Station # 1,8

EXHIBIT D

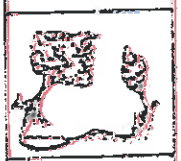
VCSA1

Table 1: General Information			
Project Name:	Village Creek Stream Assessment	Date:	3-11-15
Stream Name:	Village VIC14-VIC13	Time:	14:00
Location:	33°31'27.3613 N 86°53'26.7247 W 33.52427 86.89076	Current Weather:	Overcast 61°F
Names of Field Personnel	D. Cooper A. Sledge A. Moss A. Moore T. Miller	Rain Event within past 7-days? (circle one)	Yes or No
GPS File Name:			
Data Point Type(Check one)	Stream Assessment Point ✓	Generic Point	
Photo numbers (range):	0704, 0711, 0712, 0713 0704 - 0730 12		
COMMENTS			

I. RSAT METRICS

1. CHANNEL STABILITY (RSAT METRIC #1)

Table 1. RSAT Evaluation Method - Representative Stream Characteristics[1]

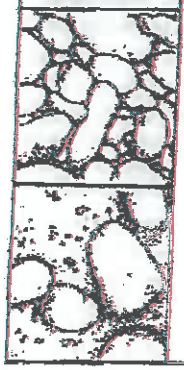
Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability 	• Indicative of hydrologic/ flow regime alteration and general condition of physical aquatic habitat. • Provides insight into past, present and possible future changes in channel morphometry.	• > 80% of bank network stable, no evidence of bank sloughing, slumping or failure;	• 71-80% of bank network stable, infrequent signs of bank sloughing, slumping or failure;	• 50-70% of bank network stable, recent signs of bank sloughing, slumping or failure fairly common;	• <50% of bank network stable recent bank sloughing, slumping or failure frequently observed ;
		• stream bend areas are very stable, outer bank height <2 ft. above stream (<4 ft. above stream for large mainstem areas), bank overhang < 1 ft.,	• stream bend areas stable, outer bank height 2-3 ft. above stream bank (4-5 ft. above stream bank for large mainstem areas), overhang 1-2.5 ft.;	• stream bend areas unstable, outer bank height 3-4 ft. above stream (5-7 ft. above stream for large mainstem areas), bank overhang 2.5-3 ft.;	• stream bend areas highly unstable, outer bank height >4 ft. above stream (>7 ft. above stream for large mainstem areas), overhang >3 ft.,
		• exposed tree roots old, large, and mostly generally 0-1 recent (large) tree falls/stream mile;	• exposed tree roots predominantly old and large, smaller young roots scarce, 2-3 recent (large) tree falls/ stream mile;	• young exposed tree roots common, 4-5 recent (large) tree falls/stream mile;	• young exposed tree roots abundant, ≥6 recent large tree falls/stream mile.;
	outer bank →	• bottom 1/3 of bank is generally highly resistant plant/root matrix or material;	• bottom 1/3 of bank is generally highly resistant plant/root matrix or material,	• bottom 1/3 of bank is generally highly erodible material; plant/root matrix compromised,	• bottom 1/3 of bank is highly erodible material; plant/root matrix severely compromised;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability (cont'd.)		• channel x-sect is generally V or U-shaped	• channel x-sect is generally V or U-shaped	• channel x-sect is generally trapezoidally-shaped	• channel x-sect is generally trapezoidally-shaped
Point Range		9-11	6-8	3-5	0-2

3/11/15

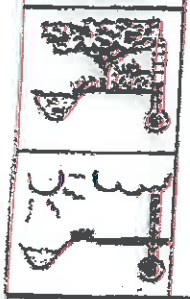
2. CHANNEL SCOURING/SEDIMENT DEPOSITION (RSAT METRIC #2)

Note embeddedness refers to degree to which channel substrate, e.g. gravel or cobble, are buried due to sediment deposition.

2. Channel Scouring/ Sediment Deposition 	• Relates to level of uncontrolled stormwater runoff, sediment load and transport and degradation of instream habitat.	• riffle embeddedness <25% sand/silt (<35% for large mainstem areas);	• 25-49% embedded (35-59% embedded for large mainstem areas);	• 50-74% embedded (60-84% embedded for large mainstem areas);	• > 75% embedded (>85% embedded for large mainstem areas);
		• high number of deep pools ≥24" (≥48" for large mainstem areas), pool substrate <30% composed of sand/silt;	• moderate number of deep pools, pool substrate 30-55% sand/silt;	• low-moderate number of deep pools, pool substrate 50-80% sand/silt;	• few, if any, deep pools, pool substrate >81% sand/silt; sand/rock
		• streambed streak marks and/or banana-shaped sediment deposits absent;	• streak marks and/or "banana" deposits uncommon;	• streak marks and/or "banana" deposits common;	• streak marks and/or "banana" deposits common;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
2. Channel Scouring/ Sediment Deposition (cont'd.)		• fresh, large sand deposits in channel; rare-absent, no evidence of fresh sediment deposition on overbank;	• fresh, large sand deposits in channel uncommon, small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits in channel common, small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits v. common in channel, moderate-heavy sand deposition along major portion of over-bank area v. common;
		• point bars few, small and stable, well vegetated and/or armored with little or no fresh sand.	• point bars small and stable, well vegetated and/or armored with little or no fresh sand.	• point bars moderate-large and unstable with high amount of fresh sand common.	• point bars moderate-large and unstable with high amount of fresh sand present at most stream bends.
Point Range		7-8	5-6	3-4	0-2

3. RIPARIAN HABITAT CONDITION (RSAT METRIC #3)

3. Riparian Habitat Conditions 	• Provides insight into changes in stream energetics, temperature regime, and both aquatic and terrestrial habitat conditions.	• wide (>100) mature forested buffer along both banks;	• forested buffer generally more than 100 ft. wide along major portion of both banks;	• riparian area predominantly wooded but with major localized gaps;	• riparian area mostly non-woody vegetation, narrow-width riparian area;
		• canopy coverage; ≥80% shading (≥60% for large mainstem areas).	• canopy coverage; 60-79% shading (45-59% for large mainstem areas).	• canopy coverage; 30-60% shading (20-44% for large mainstem areas).	• canopy coverage; <30% shading (<20% for large mainstem areas).
Point Range		6-7	4-5	2-3	0-1

3/11/15

II. SVAP METRICS

1. CHANNEL CONDITION (SVAP)

Channel condition

[illegible]	[illegible]	[illegible]	[illegible]
10	7	[illegible]	1

2. WATER APPEARANCE (SVAP)

Water appearance

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

III. CHANNEL CROSS-SECTION MEASURESMENTS

MEASUREMENT	VALUE (FEET)
Top of Bank height left bank	10.5 m (34.45 ft)
Channel width at top of bank	30 m (98.43 ft)
Channel width at toe of bank	12.82 m (42.01 ft)

right bank 9.6 m (31.50 ft)

VCSC1

VCSA2

Table 1: General Information			
Project Name:	Village Creek Watershed Assessment	Date:	3/19/15
Stream Name:	VIC	Time:	12:09
Location: 33. 517095 86. 878588	VIC 13.0 to nearest train bridge upstream 33°31'03.7033, 86°52'42.9187	Current Weather:	Overcast
Names of Field Personnel	Sledge Cooper Moss Moore	Rain Event within past 7 days? (circle one)	(Yes) or No
GPS File Name:			
Data Point Type(Check one)	(Stream Assessment Point)	Generic Point	
Photo numbers (range):	0747-0750		
COMMENTS			

3/19/15

I. RSAT METRICS

1. CHANNEL STABILITY (RSAT METRIC #1)

Table 2. RSAT Evaluation Method - Representative Stream Characteristics[1]

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability	• Indicative of hydrologic/ flow regime alteration and general condition of physical aquatic habitat.	• > 80% of bank network stable. no evidence of bank sloughing, slumping or failure;	• 71-80% of bank network stable. infrequent signs of bank sloughing, slumping or failure;	• 50-70% of bank network stable. recent signs of bank sloughing, slumping or failure fairly common;	• <50% of bank network stable. recent bank sloughing, slumping or failure frequently observed ;
	• Provides insight into past, present and possible future changes in channel morphometry.	• stream bend areas are very stable. outerbank height <2 ft. above stream (<4 ft. above stream for large mainstem areas). bank overhang < 2 ft.; bank height	• stream bend areas stable. outer bank height 2-3 ft. above stream bank (4-5 ft. above stream bank for large mainstem areas). overhang 2-2.5 ft.; higher	• stream bend areas unstable. outer bank height 3-4 ft. above stream (5-7 ft. above stream for large mainstem areas). bank overhang 2.5-3 ft.;	• stream bend areas highly unstable. outer bank height >4 ft. above stream (>7 ft. above stream for large mainstem areas). overhang >3 ft.;
		• exposed tree roots old, large, and woody. generally 0-1 recent (large) tree falls/stream mile;	• exposed tree roots predominantly old and large, smaller young roots scarce. 2-3 recent (large) tree falls/ stream mile;	• young exposed tree roots common. 4-5 recent (large) tree falls/stream mile;	• young exposed tree roots abundant. ≥6 recent large tree falls/stream mile.;
		• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material;	• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material;	• bottom 1/3 of bank is generally highly erodible material; plant/soil matrix compromised;	• bottom 1/3 of bank is highly erodible material; plant/soil matrix severely compromised;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability (cont'd.)		*channel x-sect. is generally V or U-shaped.	*channel x-sect is generally V or U-shaped.	*channel x-sect is generally trapezoidally-shaped.	*channel x-sect. is generally trapezoidally-shaped.
Point Range		9-11	6-8	3-5	0-2

3/19/15

2. CHANNEL SCOURING/SEDIMENT DEPOSITION (RSAT METRIC #4)

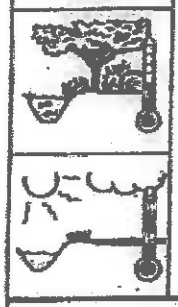
Note embeddedness refers to degree to which channel substrate, e.g. gravel or cobble, are buried due to sediment deposition.

2. Channel Scouring/ Sediment Deposition	• Relates to level of uncontrolled stormwater runoff, sediment load and transport and degradation of instream habitat.	• riffle embeddedness <25% sand/silt (<35% for large mainstem areas);	• 25-49% embedded (35-59% embedded for large mainstem areas);	• 50-75% embedded (60-85% embedded for large mainstem areas);	• > 75% embedded (>85% embedded for large mainstem areas);
		• high number of deep pools ≥24" (≥48" for large mainstem areas), pool substrate <30% composed of sand/silt;	• moderate number of deep pools, pool substrate 30-59% sand/silt;	• low-moderate number of deep pools, pool substrate 60-80% sand/silt;	• few, if any, deep pools, pool substrate >81% sand/silt;
		• streambed streak marks and/or banana-shaped sediment deposits absent;	• streak marks and/or "banana" deposits uncommon;	• streak marks and/or "banana" deposits common;	• streak marks and/or "banana" deposits common;

Why is this ~~bad~~ poor? ?

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
2. Channel Scouring/ Sediment Deposition (cont'd.)		• fresh, large sand deposits in channel are absent; no evidence of fresh sediment deposition on overbank;	• fresh, large sand deposits in channel uncommon; small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits in channel common, small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits v. common in channel, moderate-heavy sand deposition along major portion of over-bank area v. common;
		• point bars few, small and stable, well vegetated and/ or armored with little or no fresh sand.	• point bars small and stable, well vegetated and/or armored with little or no fresh sand.	• point bars moderate-large and unstable with high amount of fresh sand common.	• point bars moderate-large and unstable with high amount of fresh sand present at most stream banks.
Point Range		7-8	5-6	3-4	0-2

3. RIPARIAN HABITAT CONDITION (RSAT METRIC #5)

5. Riparian Habitat Conditions 	• Provides insight into change(s) in stream energetics, temperature regime, and both aquatic and terrestrial habitat conditions.	• wide (>200') mature forested buffer along both banks;	• forested buffer generally more than 100 ft. wide along major portion of both banks;	• riparian area predominantly wooded but with major localized gaps;	• riparian area mostly non-woody vegetation, narrow-width riparian area;
		• canopy coverage; ≥80% shading (≥60% for large mainstem areas).	• canopy coverage; 60-79% shading (45-59% for large mainstem areas).	• canopy coverage; 50-60% shading (30-44% for large mainstem areas).	• canopy coverage; <50% shading (<30% for large mainstem areas).
Point Range		6-7	4-5	2-3	0-1

3/19/15

II. SVAP METRICS

1. CHANNEL CONDITION (SVAP)

Channel condition

Natural channel; no structures, dikes. No evidence of down cutting or excessive lateral cutting.	Evidence of past channel alteration, but with significant recovery of channel and banks. Any dikes or levees are set back to provide access to an adequate flood plain.	Altered channel; <50% of the reach with riprap and/or channelization. Excess aggradation beaded channel. Dikes or levees restrict flood plain width.	Channel is actively downcutting or widening. >50% of the reach with riprap or channelization. Dikes or levees prevent access to the flood plain.
10	7	3	1

2. WATER APPEARANCE (SVAP)

Water appearance

Very clear, or clear but tea-colored; objects visible at depth 3 to 6 ft (less if slightly colored); no oil sheen on surface; no noticeable film on submerged objects or rocks	Occasionally cloudy, especially after storm event, but clears rapidly; objects visible at depth 1.5 to 3 ft; may have slightly green color; no oil sheen on water surface.	Considerable cloudiness most of the time; objects visible to depth 0.5 to 1.5 ft; slow sections may appear pea-green; bottom rocks or submerged objects covered with heavy green or olive-green film or Moderate odor of ammonia or rotten eggs.	Very turbid or muddy appearance most of the time; object is visible to depth < 0.5 ft; slow moving water may be bright green; other obvious water pollutants; floating algal mats; surface scum; sheen or heavy coat of foam on surface or Strong odor of chemicals, oil, sewage, other pollutants.
10	7	3	1

III. CHANNEL CROSS-SECTION MEASURESMENTS

MEASUREMENT	VALUE (FEET)
Top of Bank height	10.1 ft right upstream 10.3 ft left upstream
Channel width at top of bank	45.44 m (149.1 ft)
Channel width at toe of bank	22.66 m (74.34 ft)

VCSA2

JCSA3

Table 1: General Information			
Project Name:	Creek Assessment	**Date:**	6/9/15
Stream Name:	Village Creek	**Time:**	11:30
Location: 33.5252461 86.855081	33°31'30.94 86°51'18.29 Wade Sand & Gravel	**Current Weather:**	
Names of Field Personnel	Cooper Sledge Miller	**Rain Event within past 7-days? (circle one)**	Yes or No
GPS File Name:			
Data Point Type(Check one)	Stream Assessment Point	Generic Point	
Photo numbers (range):			
COMMENTS	Retreival pump present		

6/9/15

I. RSAT METRICS

1. CHANNEL STABILITY (RSAT METRIC #1)

Table 2. RSAT Evaluation Method - Representative Stream Characteristics[1]

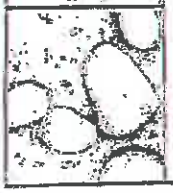
Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability	• Indicative of hydrologic/ flow regime alteration and general condition of physical aquatic habitat.	• > 80% of bank network stable, no evidence of bank sloughing, slumping or failure;	• 71-80% of bank network stable, infrequent signs of bank sloughing, slumping or failure;	• 50-70% of bank network stable, recent signs of bank sloughing, slumping or failure fairly common;	• <50% of bank network stable, recent bank sloughing, slumping or failure frequently observed ;
	• Provides insight into past, present and possible future changes in channel morphometry.	• stream bend areas are very stable, outerbank height <2 ft. above stream (<4 ft. above stream for large mainstem areas), bank overhang < 2 ft.;	• stream bend areas stable, outer bank height 2-3 ft. above stream bank (4-5 ft. above stream bank for large mainstem areas), overhang 2-2.5 ft.;	• stream bend areas unstable, outer bank height 3-4 ft. above stream (5-7 ft. above stream for large mainstem areas), bank overhang 2.5-3 ft.;	• stream bend areas highly unstable, outer bank height >4 ft. above stream. (>7 ft. above stream for large mainstem areas), overhang >3 ft.;
		• exposed tree roots old, large, and woody, generally 0-1 recent (large) tree falls/stream mile;	• exposed tree roots predominantly old and large, smaller young roots scarce, 2-3 recent (large) tree falls/ stream mile;	• young exposed tree roots common, 4-5 recent (large) tree falls/stream mile;	• young exposed tree roots abundant, ≥6 recent large tree falls/stream mile.;
		• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material;	• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material,	• bottom 1/3 of bank is generally highly erodible material; plant/soil matrix compromised,	• bottom 1/3 of bank is highly erodible material; plant/soil matrix severely compromised;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability (cont'd.)		*channel x-sect is generally V or U-shaped.	*channel x-sect is generally V or U-shaped.	*channel x-sect is generally trapezoidally-shaped.	*channel x-sect is generally trapezoidally-shaped.
Point Range		9-11	6-8	3-5	0-2

6/9/15

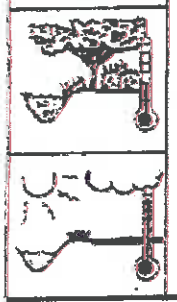
2. CHANNEL SCOURING/SEDIMENT DEPOSITION (RSAT METRIC #2)

Note embeddedness refers to degree to which channel substrate, e.g. gravel or cobble, are buried due to sediment deposition.

2. Channel Scouring/ Sediment Deposition	• Relates to level of uncontrolled stormwater runoff, sediment load and transport and degradation of instream habitat.	• riffle embeddedness <25% sand/silt (<35% for large mainstem areas);	• 25-49% embedded (35-59% embedded for large mainstem areas);	• 50-75% embedded (60-85% embedded for large mainstem areas);	• > 75% embedded (>85% embedded for large mainstem areas);
		• high number of deep pools ≥24" (≥48" for large mainstem areas), pool substrate <20% composed of sand/silt;	• moderate number of deep pools, pool substrate 30-59% sand/ silt;	• low-moderate number of deep pools, pool substrate 60-80% sand/silt;	• few, if any, deep pools, pool substrate >81% sand/silt;
		• streambed streak marks and/or banana-shaped sediment-deposits absent;	• streak marks and/or "banana" deposits uncommon;	• streak marks and/or "banana" deposits common;	• streak marks and/or "banana" deposits common;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
2. Channel Scouring/ Sediment Deposition (cont'd.)		• fresh, large sand deposits in channel rare-absent; no evidence of fresh sediment deposition on overbank;	• fresh, large sand deposits in channel uncommon, small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits in channel common, small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits v common in channel, moderate-heavy sand deposition along major portion of over-bank area v common;
		• point bars few, small and stable, well vegetated and/ or armored with little or no fresh sand.	• point bars small and stable, well vegetated and/or armored with little or no fresh sand.	• point bars moderate-large and unstable with high amount of fresh sand common.	• point bars moderate-large and unstable with high amount of fresh sand present at most stream bends.
Point Range		7-8	5-6	3-4	0-2

3. RIPARIAN HABITAT CONDITION (RSAT METRIC #5)

5. Riparian Habitat Conditions	• Provides insight into change(s) in stream energetics, temperature regime, and both aquatic and terrestrial habitat conditions.	• wide (>200') mature forested buffer along both banks;	• forested buffer generally more than 100 ft. wide along major portion of both banks;	• riparian area predominantly wooded but with major localized gaps;	• riparian area mostly non-woody vegetation, narrow-width riparian area;
		• canopy coverage; ≥80% shading (≥60% for large mainstem areas).	• canopy coverage; 60-79% shading (45-59% for large mainstem areas).	• canopy coverage; 30-40% shading (30-44% for large mainstem areas).	• canopy coverage; <30% shading (<30% for large mainstem areas).
Point Range		6-7	4-5	2-3	0-1

6/9/15

II. SVAP METRICS

1. CHANNEL CONDITION (SVAP)

Channel condition

Natural channel; no structures, dikes. No evidence of down cutting or excessive lateral cutting.	Evidence of past channel alteration, but with significant recovery of channel and banks. Any dikes or levees are set back to provide access to an adequate flood plain	Altered channel; < 50% of the reach with riprap and/or channelization. Excess aggradation leaded channel. Dikes or levees restrict flood plain width	Channel is actively downcutting or widening; > 50% of the reach with riprap or channelization. Dikes or levees prevent access to the flood plain.
10	7	3	1

2. WATER APPEARANCE (SVAP)

Water appearance

Very clear or clear but tea-colored; objects visible at depth 3 to 6 ft; clear (if slightly colored) no oil sheen on surface; no noticeable film on submerged objects or rocks	Occasionally cloudy, especially after storm event, but clears rapidly; objects visible at depth 1.5 to 3 ft; may have slightly green color; no oil sheen on water surface	Considerable cloudiness most of the time; objects visible to depth 0.5 to 1.5 ft; slow sections may appear pea green; bottom rocks or submerged objects covered with heavy green or olive-green film or Moderate odor of ammonia or rotten eggs	Very turbid or muddy appearance most of the time; objects visible to depth < 0.5 ft; slow moving water may be bright green; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface or Strong odor of chemicals, oil, sewage, other pollutants
10	7	3	1

III. CHANNEL CROSS-SECTION MEASURESMENTS

MEASUREMENT	VALUE (FEET)
Top of Bank height	R, Down stream 3.9ft , ← Down 10.26ft
Channel width at top of bank	24 m (78.74ft)
Channel width at toe of bank	12.69 m (41.63ft)

VCSA3

Field Forms 2014-12-23

5/13/15

VCSAA

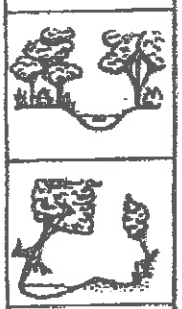
Table 1: General Information			
Project Name:	Village Creek Watershed Assessment Project	Date:	5/13/15
Stream Name:	Village Creek	Time:	8:59AM
Location: 33.525556 86.845833	33° 31' 32" N 86° 50' 45" W 16th St to Center St	Current Weather:	Sunny, clear
Names of Field Personnel	Tom Miller Andrew Doelman	Rain Event within past 7 days? (circle one)	Yes or No
GPS File Name:			
Data Point Type(Check one)	Stream Assessment Point	Generic Point	
Photo numbers (range):			
COMMENTS			

5/13/15
8:59

I. RSAT METRICS

1. CHANNEL STABILITY (RSAT METRIC #1)

Table 2. RSAT Evaluation Method - Representative Stream Characteristics[1]

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability 	• Indicative of hydrologic/ flow regime alteration and general condition of physical aquatic habitat.	• > 80% of bank network stable. no evidence of bank sloughing, slumping or failure;	• 71-80% of bank network stable. infrequent signs of bank sloughing, slumping or failure;	• 50-70% of bank network stable. recent signs of bank sloughing, slumping or failure fairly common;	• <50% of bank network stable. recent bank sloughing, slumping or failure frequently observed ;
	• Provides insight into past, present and possible future changes in channel morphometry.	• stream bend areas are very stable. outerbank height <2 ft. above stream (<4 ft. above stream for large mainstem areas). bank overhang < 2 ft.;	• stream bend areas stable. outer bank height 2-3 ft. above stream bank (4-5 ft. above stream bank for large mainstem areas). overhang 2-2.5 ft.;	• stream bend areas unstable. outer bank height 3-4 ft. above stream (5-7 ft. above stream for large mainstem areas). bank overhang 2.5-3 ft.;	• stream bend areas highly unstable. outer bank height >4 ft. above stream. (>7 ft. above stream for large mainstem areas). overhang >3 ft.;
		• exposed tree roots old, large, and woody. generally 0-1 recent (large) tree falls/stream mile;	• exposed tree roots predominantly old and large, smaller young roots scarce. 2-3 recent (large) tree falls/ stream mile;	• young exposed tree roots common. 4-5 recent (large) tree falls/stream mile;	• young exposed tree roots abundant. ≥6 recent large tree falls/stream mile.;
		• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material;	• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material;	• bottom 1/3 of bank is generally highly erodible material; plant/soil matrix compromised;	• bottom 1/3 of bank is highly erodible material; plant/soil matrix severely compromised;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability (cont'd.)		*channel x-sect. is generally V or U-shaped.	*channel x-sect. is generally V or U-shaped.	*channel x-sect. is generally trapezoidally-shaped.	*channel x-sect. is generally trapezoidally-shaped
Point Range		9-11	6-8	3-5	0-2

5/13/15
8:55

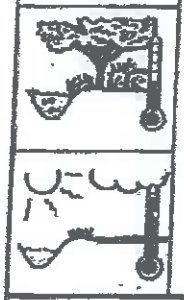
2. CHANNEL SCOURING/SEDIMENT DEPOSITION (RSAT METRIC #2)

Note embeddedness refers to degree to which channel substrate, e.g. gravel or cobble, are buried due to sediment deposition.

2. Channel Scouring/ Sediment Deposition	• Relates to level of uncontrolled stormwater runoff, sediment load and transport and degradation of instream habitat.	• riffle embeddedness <25% sand/silt (<35% for large mainstem areas);	• 25-49% embedded (35-59% embedded for large mainstem areas);	• 50-75% embedded (60-85% embedded for large mainstem areas);	• > 75% embedded (>85% embedded for large mainstem areas);
		• high number of deep pools ≥24" (≥48" for large mainstem areas). pool substrate <30% composed of sand/silt;	• moderate number of deep pools. pool substrate 30-59% sand/ silt;	• low-moderate number of deep pools. pool substrate 60-80% sand/silt;	• few, if any, deep pools. pool substrate >81% sand/silt;
		• streambed streak marks and/or banana-shaped sediment deposits absent;	• streak marks and/or "banana" deposits uncommon;	• streak marks and/or "banana" deposits common;	• streak marks and/or "banana" deposits common;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
2. Channel Scouring/ Sediment Deposition (cont'd.)		• fresh, large sand deposits in channel are absent. no evidence of fresh sediment deposition on overbank;	• fresh, large sand deposits in channel uncommon small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits in channel common. small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits v. common in channel. moderate-heavy sand deposition along major portion of over-bank area v. common;
		• point bars few, small and stable, well vegetated and/ or armored with little or no fresh sand.	• point bars small and stable, well vegetated and/or armored with little or no fresh sand	• point bars moderate-large and unstable with high amount of fresh sand common.	• point bars moderate-large and unstable with high amount of fresh sand present at most stream bends.
Point Range		7-8	5-6	3-4	0-2

3. RIPARIAN HABITAT CONDITION (RSAT METRIC #5)

5. Riparian Habitat Conditions 	• Provides insight into change(s) in stream energetics, temperature regime, and both aquatic and terrestrial habitat conditions.	• wide (>200') mature forested buffer along both banks;	• forested buffer generally more than 100 ft. wide along major portion of both banks;	• riparian area predominantly wooded but with major localized gaps;	• riparian area mostly non-woody vegetation, narrow-width riparian area;
		• canopy coverage; ≥80% shading (≥60% for large mainstem areas).	• canopy coverage; 60-79% shading (45-59% for large mainstem areas).	• canopy coverage; 50-60% shading (30-44% for large mainstem areas).	• canopy coverage; <50% shading (<30% for large mainstem areas).
Point Range		6-7	4-5	2-3	0-1

5/13/15
8:59

II. SVAP METRICS

1. CHANNEL CONDITION (SVAP)

Channel condition

Natural channel, no structures, dikes. No evidence of down cutting or excessive lateral cutting.	Evidence of past channel alteration, but with significant recovery of channel and banks. Any dikes or levies are set back to provide access to an adequate flood plain.	Altered channel; <50% of the reach with riprap and/or channelization. Excess aggradation, braided channel. Dikes or levees restrict flood plain width.	Channel is actively downcutting or widening; >50% of the reach with riprap or channelization. Dikes or levees prevent access to the flood plain.
10	7	3	1

2. WATER APPEARANCE (SVAP)

Water appearance

Very clear or clear but tea colored, objects visible at depth 3 to 6 ft; slow if slightly colored; no oil sheen on surface; no noticeable film on submerged objects or rocks	Occasionally cloudy, especially after storm event, but clears rapidly, objects visible at depth 1.5 to 3 ft; may have slightly green color; no oil sheen on water surface	Considerable cloudiness most of the time; objects visible to depth 0.5 to 1.5 ft; slow sections may appear pea-green; bottom rocks or submerged objects covered with heavy green or olive green film. or Moderate odor of ammonia or rotten eggs.	Very turbid or muddy appearance most of the time; objects visible to depth < 0.5 ft; slow moving water may be bright green; other obvious water pollutants; floating algal mats; surface scum sheen or heavy coat of foam on surface or Strong odor of chemicals, oil, sewage, other pollutants
10	7	3	1

III. CHANNEL CROSS-SECTION MEASURESMENTS

MEASUREMENT	VALUE (FEET)
Top of Bank height	L- 10,8' R- 15'
Channel width at top of bank	25,0M (82.02 ft)
Channel width at toe of bank	11,9M (39.04 ft)

VCSA4

VCGA-5

Table 1: General Information			
Project Name:	Village Creek Stream Assessment	Date:	5/13/15
Stream Name:	Village Creek	Time:	10:38AM
Location: 33.528611 86.838611	33° 31' 43" N 86° 50' 19" W Vanderbilt to Studdles	Current Weather:	
Names of Field Personnel	Miller, Andrew, Moss	Rain Event within past 7 days? (circle one)	Yes or No
GPS File Name:			
Data Point Type(Check one)	Stream Assessment Point	Generic Point	
Photo numbers (range):			
COMMENTS			

5/13/15
10:38

I. RSAT METRICS

1. CHANNEL STABILITY (RSAT METRIC #1)

Table 2. RSAT Evaluation Method - Representative Stream Characteristics[1]

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability	• Indicative of hydrologic/ flow regime alteration and general condition of physical aquatic habitat.	• > 80% of bank network stable. no evidence of bank sloughing, slumping or failure;	• 71-80% of bank network stable. infrequent signs of bank sloughing, slumping or failure;	• 50-70% of bank network stable. recent signs of bank sloughing, slumping or failure fairly common;	• <50% of bank network stable. recent bank sloughing, slumping or failure frequently observed ;
	• Provides insight into past, present and possible future changes in channel morphometry.	• stream bend areas are very stable. outerbank height <2 ft. above stream (<4 ft. above stream for large mainstem areas). bank overhang < 2 ft.;	• stream bend areas stable. outer bank height 2-3 ft. above stream bank (4-5 ft. above stream bank for large mainstem areas). overhang 2-2.5 ft.;	• stream bend areas unstable. outer bank height 3-4 ft. above stream (5-7 ft. above stream for large mainstem areas). bank overhang 2.5-3 ft.;	• stream bend areas highly unstable. outer bank height >4 ft. above stream. (>7 ft. above stream for large mainstem areas). overhang >3 ft.;
		• exposed tree roots old, large, and woody. generally 0-1 recent (large) tree falls/stream mile;	• exposed tree roots predominantly old and large, smaller young roots scarce. 2-3 recent (large) tree falls/ stream mile;	• young exposed tree roots common. 4-5 recent (large) tree falls/stream mile;	• young exposed tree roots abundant. ≥6 recent large tree falls/stream mile.;
		• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material;	• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material;	• bottom 1/3 of bank is generally highly erodible material; plant/soil matrix compromised;	• bottom 1/3 of bank is highly erodible material; plant/soil matrix severely compromised;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability (cont'd.)		*channel x-sect. is generally V or U-shaped.	*channel x-sect is generally V or U-shaped.	*channel x-sect is generally trapezoidally-shaped.	*channel x-sect is generally trapezoidally-shaped.
Point Range		9-11	6-8	3-5	0-2

5/13/15
10:38

2. CHANNEL SCOURING/SEDIMENT DEPOSITION (RSAT METRIC #2)

Note embeddedness refers to degree to which channel substrate, e.g. gravel or cobble, are buried due to sediment deposition.

2. Channel Scouring/ Sediment Deposition	• Relates to level of uncontrolled stormwater runoff, sediment load and transport and degradation of instream habitat.	• riffle embeddedness <25% sand/silt (<35% for large mainstem areas);	• 25-49% embedded (35-59% embedded for large mainstem areas);	• 50-75% embedded (60-85% embedded for large mainstem areas);	• > 75% embedded (>85% embedded for large mainstem areas);
		• high number of deep pools ≥24" (≥48" for large mainstem areas), pool substrate <30% composed of sand/silt;	• moderate number of deep pools, pool substrate 30-59% sand/silt;	• low-moderate number of deep pools, pool substrate 60-80% sand/silt;	• few, if any, deep pools, pool substrate >81% sand/silt; Rock/stone
		• extended streak marks and/or banana-shaped sediment deposits absent;	• streak marks and/or "banana" deposits uncommon;	• streak marks and/or "banana" deposits common;	• streak marks and/or "banana" deposits common;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
2. Channel Scouring/ Sediment Deposition (cont'd.)		• fresh, large sand deposits in channel rare/absent, no evidence of fresh sediment deposition on overbank;	• fresh, large sand deposits in channel uncommon, small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits in channel common, small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits v. common in channel, moderate-heavy sand deposition along major portion of over-bank area v. common;
		• point bars few, small and stable, well vegetated and/or armored with little or no fresh sand.	• point bars small and stable, well vegetated and/or armored with little or no fresh sand	• point bars moderate-large and unstable with high amount of fresh sand common.	• point bars moderate-large and unstable with high amount of fresh sand present at most stream banks.
Point Range		7-8	5-6	3-4	0-2

3. RIPARIAN HABITAT CONDITION (RSAT METRIC #5)

5. Riparian Habitat Conditions	• Provides insight into change(s) in stream energetics, temperature regime, and both aquatic and terrestrial habitat conditions.	• wide (>200') mature forested buffer along both banks;	• forested buffer generally more than 100 ft. wide along major portion of both banks;	• riparian area predominantly wooded but with major localized gaps;	• riparian area mostly non-woody vegetation, narrow-width riparian area;
		• canopy coverage; ≥80% shading (≥60% for large mainstem areas).	• canopy coverage; 60-79% shading (45-59% for large mainstem areas).	• canopy coverage; 30-60% shading (30-44% for large mainstem areas).	• canopy coverage; <30% shading (<20% for large mainstem areas).
Point Range		6-7	4-5	2-3	0-1

5/15/15
10:38

II. SVAP METRICS

1. CHANNEL CONDITION (SVAP)

Channel condition

Natural channel, no structures, dikes. No evidence of down cutting or excessive lateral cutting.	Evidence of past channel alteration, but with significant recovery of channel and banks. Any dikes or levees are set back to provide access to an adequate flood plain.	Altered channel; <50% of the reach with riprap and/or channelization. Excess aggradation, braided channel. Dikes or levees restrict flood plain width.	Channel is actively downcutting or widening. >50% of the reach with riprap or channelization. Dikes or levees prevent access to the flood plain.
10	7	3	1

2. WATER APPEARANCE (SVAP)

Water appearance

Very clear, or clear but tea colored, objects visible at depth 3 to 6 ft; less if slightly colored; no oil sheen on surface; no noticeable film on submerged objects or rocks.	Occasionally cloudy, especially after storm event, but clears rapidly, objects visible at depth 1.5 to 3 ft; may have slightly green color; no oil sheen on water surface.	Considerable cloudiness most of the time; objects visible to depth 0.5 to 1.5 ft; slow sections may appear pea-green; bottom rocks or submerged objects covered with heavy green or olive-green film. or Moderate odor of ammonia or rotten eggs.	Very turbid or muddy appearance most of the time; objects visible to depth [illegible] ft; slow moving water may be bright green; other obvious water pollutants; floating algal mats, surface [illegible] sheen [illegible] coat of foam [illegible] surface. or Strong odor of chemicals, oil, sewage, other pollutants.
10	7	3	1

III. CHANNEL CROSS-SECTION MEASURESMENTS

MEASUREMENT	VALUE (FEET)
Top of Bank height	L = 13.8' R = 12.4'
Channel width at top of bank	25.5M (83.66ft)
Channel width at toe of bank	11.2M (36.75ft)

VCSA5

VCGA6

?①

Table 1: General Information			
Project Name:	Village Creek Stream Assessment	**Date:**	5/21/15
Stream Name:	Village Creek	**Time:**	12:47
Location:	~~33°.33.01 N.~~ | 33.550 N ~~86°.48.21 W~~ | -86.80 W See Comments	**Current Weather:**	Cloudy
Names of Field Personnel	Andrew, Tom	**Rain Event within past 7-days? (circle one)**	Yes or No
GPS File Name:			
Data Point Type(Check one)	Stream Assessment Point	Generic Point	
Photo numbers (range):			
COMMENTS	Lat / Long Revision 33° 31' 55.90" N, -86° 49' 59.43" W 33.53219, -86.82841		

5/21/15
12:47

I. RSAT METRICS

1. CHANNEL STABILITY (RSAT METRIC #1)

Table 2. RSAT Evaluation Method - Representative Stream Characteristics[1]

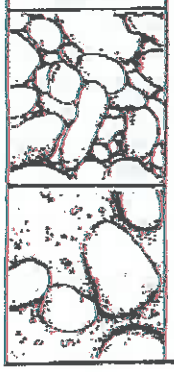
Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability	• Indicative of hydrologic/ flow regime alteration and general condition of physical aquatic habitat. • Provides insight into past, present and possible future changes in channel morphometry.	• > 80% of bank network stable, no evidence of bank sloughing, slumping or failure;	• 71-80% of bank network stable, infrequent signs of bank sloughing, slumping or failure;	• 50-70% of bank network stable, recent signs of bank sloughing, slumping or failure fairly common;	• <50% of bank network stable, recent bank sloughing, slumping or failure frequently observed ;
		• stream bend areas are very stable, outerbank height <2 ft. above stream (<4 ft. above stream for large mainstem areas), bank overhang < 2 ft.;	• stream bend areas stable, outer bank height 2-3 ft. above stream bank (4-5 ft. above stream bank for large mainstem areas), overhang 2-2.5 ft.;	• stream bend areas unstable, outer bank height 3-4 ft. above stream (5-7 ft. above stream for large mainstem areas), bank overhang 2.5-3 ft.;	• stream bend areas highly unstable, outer bank height >4 ft. above stream. (>7 ft. above stream for large mainstem areas), overhang >3 ft.;
		• exposed tree roots old, large, and woody, generally 0-1 recent (large) tree falls/stream mile;	• exposed tree roots predominantly old and large, smaller young roots scarce, 2-3 recent (large) tree falls/ stream mile;	• young exposed tree roots common, 4-5 recent (large) tree falls/stream mile;	• young exposed tree roots abundant, ≥6 recent large tree falls/stream mile.;
		• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material;	• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material;	• bottom 1/3 of bank is generally highly erodible material; plant/soil matrix compromised;	• bottom 1/3 of bank is highly erodible material; plant/soil matrix severely compromised;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability (cont'd.)	mostly rock bed	*channel x-sect. is generally V or U-shaped.	*channel x-sect. is generally V or U-shaped.	*channel x-sect. is generally trapezoidally-shaped.	*channel x-sect. is generally trapezoidally-shaped.
Point Range		9-11	6-8	3-5	0-2

5/21/15
12:47

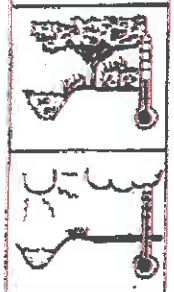
2. CHANNEL SCOURING/SEDIMENT DEPOSITION (RSAT METRIC #2)

Note embeddedness refers to degree to which channel substrate, e.g. gravel or cobble, are buried due to sediment deposition.

2. Channel Scouring/ Sediment Deposition 	• Relates to level of uncontrolled stormwater runoff, sediment load and transport and degradation of instream habitat.	• riffle embeddedness <25% sand/silt (<35% for large mainstem areas);	• 25-49% embedded (35-59% embedded for large mainstem areas);	• 50-75% embedded (60-85% embedded for large mainstem areas);	• > 75% embedded (>85% embedded for large mainstem areas);
		• high number of deep pools ≥24" (≥48" for large mainstem areas), pool substrate <30% composed of sand/silt;	• moderate number of deep pools, pool substrate 30-59% sand/ silt;	• low-moderate number of deep pools, pool substrate 60-80% sand/silt;	• few, if any, deep pools, pool substrate >81% sand/silt;
		• streambed streak marks and/or banana-shaped sediment deposits absent;	• streak marks and/or "banana" deposits uncommon;	• streak marks and/or "banana" deposits common;	• streak marks and/or "banana" deposits common;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
2. Channel Scouring/ Sediment Deposition (cont'd.)	Rock, Brick, stone, River Bed	• fresh, large sand deposits in channel rare-absent, no evidence of fresh sediment deposition on overbank;	• fresh, large sand deposits in channel uncommon, small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits in channel common, small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits v. common in channel, moderate-heavy sand deposition along major portion of over-bank area v. common;
		• point bars few, small and stable, well vegetated and/ or armored with little or no fresh sand.	• point bars small and stable, well vegetated and/or armored with little or no fresh sand	• point bars moderate-large and unstable with high amount of fresh sand common.	• point bars moderate-large and unstable with high amount of fresh sand present at most stream bends.
Point Range		7-8	5-6	3-4	0-2

3. RIPARIAN HABITAT CONDITION (RSAT METRIC #5)

5. Riparian Habitat Conditions 	• Provides insight into change(s) in stream energetics, temperature regime, and both aquatic and terrestrial habitat conditions.	• wide (>200') mature forested buffer along both banks;	• forested buffer generally more than 100 ft. wide along major portion of both banks;	• riparian area predominantly wooded but with major localized gaps;	• riparian area mostly non-woody vegetation, narrow-width riparian area;
		• canopy coverage; ≥80% shading (≥60% for large mainstem areas).	• canopy coverage; 60-79% shading (45-59% for large mainstem areas).	• canopy coverage, 30-60% shading (30-44% for large mainstem areas).	• canopy coverage; <30% shading (<30% for large mainstem areas).
Point Range		6-7	4-5	2-3	0-1

5/12/15
12:47

II. SVAP METRICS

1. CHANNEL CONDITION (SVAP)

Channel condition

Natural channel; no structures, dikes. No evidence of down cutting or excessive lateral cutting.	Evidence of past channel alteration, but with significant recovery of channel and banks. Any dikes or levees are set back to provide access to an adequate flood plain	Altered channel; < 50% of the reach with riprap and or channelization. Excess aggradation inhibited channel. Dikes or levees restrict flood plain width	Channel is actively downcutting or widening >50% of the reach with riprap or channelization. Dikes or levees prevent access to the flood plain.
10	7	3	1

2. WATER APPEARANCE (SVAP)

Water appearance

Very clear or clear but tea-colored; objects visible at depth 3 to 6 ft; less if slightly colored; no oil sheen on surface; no noticeable film on submerged objects or rocks	Occasionally cloudy, especially after storm event, but clears rapidly; objects visible at depth 1.5 to 3 ft; may have slightly green color; no oil sheen on water surface	Considerable cloudiness most of the time; objects visible to depth 0.5 to 1.5 ft; slow sections may appear pea-green; bottom rocks or submerged objects covered with heavy green or olive-green film or Moderate odor of ammonia or rotten eggs.	Very turbid or muddy appearance most of the time; objects visible to depth < 0.5 ft; slow moving waters may be bright green; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface or Strong odor of chemicals, oil, sewage, other pollutants
10	7	3	1

III. CHANNEL CROSS-SECTION MEASURESMENTS

MEASUREMENT	VALUE (FEET)
Top of Bank height	L= 12.7 ft R= 7.6 ft
Channel width at top of bank	21.6M (70.87 ft)
Channel width at toe of bank	12.5M (41.01 ft)

VSCA6

VCYAP

Table 1: General Information			
Project Name:	Village Creek Stream Assessment	Date:	5/21/15
Stream Name:	Village Creek	Time:	8:28A
Location:	33°32'-06" N (33.535) 86°-49'-38" W (86.8272)	Current Weather:	Cloudy
Names of Field Personnel	Tom, Andrew	Rain Event within past 7-days? (circle one)	Yes or (No)
GPS File Name:			
Data Point Type(Check one)	(Stream Assessment Point)	Generic Point	
Photo numbers (range):			
COMMENTS			

5/21/15

I. RSAT METRICS

1. CHANNEL STABILITY (RSAT METRIC #1)

Table 2. RSAT Evaluation Method - Representative Stream Characteristics[1]

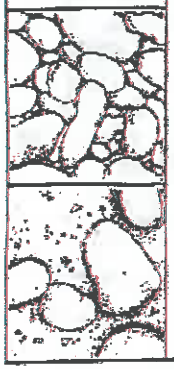
Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability	• Indicative of hydrologic/ flow regime alteration and general condition of physical aquatic habitat.	• > 80% of bank network stable. no evidence of bank sloughing, slumping or failure;	• 71-80% of bank network stable. infrequent signs of bank sloughing, slumping or failure;	• 50-70% of bank network stable. recent signs of bank sloughing, slumping or failure fairly common;	• <50% of bank network stable. recent bank sloughing, slumping or failure frequently observed ;
	• Provides insight into past, present and possible future changes in channel morphometry.	• stream bend areas are very stable. outerbank height <2 ft. above stream (<4 ft. above stream for large mainstem areas). bank overhang < 2 ft.;	• stream bend areas stable. outer bank height 2-3 ft. above stream bank (4-5 ft. above stream bank for large mainstem areas). overhang 2-2.5 ft.;	• stream bend areas unstable. outer bank height 3-4 ft. above stream (5-7 ft. above stream for large mainstem areas). bank overhang 2.5-3 ft.;	• stream bend areas highly unstable. outer bank height >4 ft. above stream. (>7 ft. above stream for large mainstem areas). overhang >3 ft.;
		• exposed tree roots old, large, and woody. generally 0-1 recent (large) tree falls/stream mile;	• exposed tree roots predominantly old and large. smaller young roots scarce. 2-3 recent (large) tree falls/ stream mile;	• young exposed tree roots common. 4-5 recent (large) tree falls/stream mile;	• young exposed tree roots abundant. ≥6 recent large tree falls/stream mile.;
		• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material;	• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material.	• bottom 1/3 of bank is generally highly erodible material; plant/soil matrix compromised;	• bottom 1/3 of bank is highly erodible material; plant/soil matrix severely compromised.

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability (cont'd.)		*channel x-sect is generally V or U-shaped.	*channel x-sect is generally V or U-shaped.	*channel x-sect is generally trapezoidally-shaped.	*channel x-sect is generally trapezoidally-shaped
Point Range		9-11	6-8	3-5	0-2

5/21/15

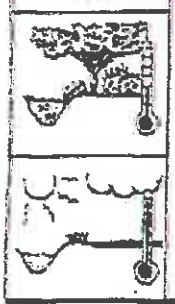
2. CHANNEL SCOURING/SEDIMENT DEPOSITION (RSAT METRIC #2)

Note embeddedness refers to degree to which channel substrate, e.g. gravel or cobble, are buried due to sediment deposition.

2. Channel Scouring/ Sediment Deposition 	• Relates to level of uncontrolled stormwater runoff, sediment load and transport and degradation of instream habitat.	• riffle embeddedness <25% sand/silt (<35% for large mainstem areas);	• 25-49% embedded (35-59% embedded for large mainstem areas);	• 50-75% embedded (60-85% embedded for large mainstem areas);	• > 75% embedded (>85% embedded for large mainstem areas);
		• high number of deep pools ≥24" (≥48" for large mainstem areas) pool substrate <30% composed of sand/silt;	• moderate number of deep pools. pool substrate 30-59% sand/ silt;	• low-moderate number of deep pools. pool substrate 60-80% sand/silt;	• few, if any, deep pools. pool substrate >81% sand/silt;
		• streambed streak marks and/or banana-shaped sediment deposits absent;	• streak marks and/or "banana" deposits uncommon;	• streak marks and/or "banana" deposits common;	• streak marks and/or "banana" deposits common;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
2. Channel Scouring/ Sediment Deposition (cont'd.)	Moderate to Large mid Channel bar evident	• fresh, large sand deposits in channel rare-absent. no evidence of fresh sediment deposition on overbank;	• fresh, large sand deposits in channel uncommon small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits in channel common. small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits v. common in channel. moderate-heavy sand deposition along major portion of over-bank area v. common;
		• point bars few, small and stable, well vegetated and/ or armored with little or no fresh sand.	• point bars small and stable, well vegetated and/or armored with little or no fresh sand.	• point bars moderate-large and unstable with high amount of fresh sand common.	• point bars moderate-large and unstable with high amount of fresh sand present at most stream bends.
Point Range		7-8	5-6	3-4	0-2

3. RIPARIAN HABITAT CONDITION (RSAT METRIC #5)

5. Riparian Habitat Conditions 	• Provides insight into change(s) in stream energetics, temperature regime, and both aquatic and terrestrial habitat conditions.	• wide (>200') mature forested buffer along both banks;	• forested buffer generally more than 100 ft. wide along major portion of both banks;	• riparian area predominantly wooded but with major localized gaps;	• riparian area mostly non-woody vegetation, narrow-width riparian area;
		• canopy coverage; ≥80% shading (≥60% for large mainstem areas).	• canopy coverage; 60-79% shading (45-59% for large mainstem areas).	• canopy coverage, 50-60% shading (30-44% for large mainstem areas).	• canopy coverage, <50% shading (<30% for large mainstem areas).
Point Range		6-7	4-5	2-3	0-1

5/21/15

II. SVAP METRICS

1. CHANNEL CONDITION (SVAP)

Channel condition

Natural channel; no structures, dikes. No evidence of down cutting or excessive lateral cutting	Evidence of past channel alteration, but with significant recovery of channel and banks. Any dikes or levees are set back to provide access to an adequate flood plain	Altered channel; < 50% of the reach with riprap and or channelization. Excess aggradation in braided channel. Dikes or levees restrict flood plain width	Channel is actively downcutting or widening; > 50% of the reach with riprap or channelization. Dikes or levees prevent access to the flood plain
10	7	3	1

16th st N Bridge

2. WATER APPEARANCE (SVAP)

Water appearance

Very clear or clear but tea-colored; objects visible at depth 3 to 6 ft (less if slightly colored); no oil sheen on surface; no noticeable film on submerged objects or rocks	Occasionally cloudy, especially after storm event, but clears rapidly; objects visible at depth 1.5 to 3 ft; may have slightly green color; no oil sheen on water surface	Considerable cloudiness most of the time; objects visible to depth 0.5 to 1.5 ft; slow sections may appear pea green; bottom rocks or submerged objects covered with heavy green or olive-green film or Moderate odor of ammonia or rotten eggs.	Very turbid or muddy appearance most of the time; objects visible to depth < 0.5 ft; slow moving water may be bright green; other obvious water pollutants; floating algal mats; surface scum slicks or heavy crust of foam on surface or Strong odor of chemicals, oil, sewage, other pollutants
10	7	3	1

III. CHANNEL CROSS-SECTION MEASURESMENTS

MEASUREMENT	VALUE (FEET)
Top of Bank height	L = 13.7 Ft R = 12.4 Ft
Channel width at top of bank	29.5 M (96.78 ft)
Channel width at toe of bank	17.7 M (58.07 ft)

VCSA7

VCG-8

9

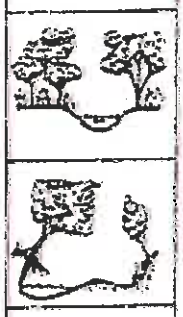
Table 1: General Information			
Project Name:	Creek Assessment	Date:	6/5/15
Stream Name:	Village Creek	Time:	12:10
Location:	Greenwood Park 33°32'53.29, -86°46'54.16 (33.5481, -86.7817	Current Weather:	Sunny
Names of Field Personnel	Directors Alisha Andrew	Rain Event within past 7-days? (circle one)	Yes or No
GPS File Name:			
Data Point Type(Check one)	Stream Assessment Point	Generic Point	
Photo numbers (range):	[illegible] 101-1162		
COMMENTS			

6/5/12
12:10

I. RSAT METRICS

1. CHANNEL STABILITY (RSAT METRIC #1)

Table 2. RSAT Evaluation Method - Representative Stream Characteristics[1]

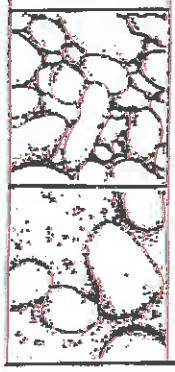
Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
I. Channel Stability 	• Indicative of hydrologic/ flow regime alteration and general condition of physical aquatic habitat. • Provides insight into past, present and possible future changes in channel morphometry.	• > 80% of bank network stable, no evidence of bank sloughing, slumping or failure;	• 71-80% of bank network stable, infrequent signs of bank sloughing, slumping or failure;	• 50-70% of bank network stable, recent signs of bank sloughing, slumping or failure fairly common;	• <50% of bank network stable, recent bank sloughing, slumping or failure frequently observed ;
		• stream bend areas are very stable, outerbank height <2 ft. above stream (<4 ft. above stream for large mainstem areas), bank overhang < 2 ft.;	• stream bend areas stable, outer bank height 2-3 ft. above stream bank (4-5 ft. above stream bank for large mainstem areas), overhang 2-2.5 ft.;	• stream bend areas unstable, outer bank height 3-4 ft. above stream (5-7 ft. above stream for large mainstem areas), bank overhang 2.5-3 ft.;	• stream bend areas highly unstable, outer bank height >4 ft. above stream. (>7 ft. above stream for large mainstem areas), overhang >3 ft.;
		• exposed tree roots old, large, and woody, generally 0-1 recent (large) tree falls/stream mile;	• exposed tree roots predominantly old and large, smaller young roots scarce, 3-5 recent (large) tree falls/ stream mile;	• young exposed tree roots common, 4-5 recent (large) tree falls/stream mile;	• young exposed tree roots abundant, ≥6 recent large tree falls/stream mile.;
		• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material;	• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material;	• bottom 1/3 of bank is generally highly erodible material; plant/soil matrix compromised;	• bottom 1/3 of bank is highly erodible material; plant/soil matrix severely compromised;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
I. Channel Stability (cont'd.)		*channel x-sect. is generally V or U-shaped.	*channel x-sect. is generally V or U-shaped.	*channel x-sect. is generally trapezoidally-shaped.	*channel x-sect. is generally trapezoidally-shaped
Point Range		9-11	6-8	3-5	0-2

6/5/15
12:10

2. CHANNEL SCOURING/SEDIMENT DEPOSITION (RSAT METRIC #2)

Note embeddedness refers to degree to which channel substrate, e.g. gravel or cobble, are buried due to sediment deposition.

2. Channel Scouring/ Sediment Deposition 	• Relates to level of uncontrolled stormwater runoff, sediment load and transport and degradation of instream habitat.	• riffle embeddedness <25% sand/silt (<35% for large mainstem areas);	• 25-49% embedded (35-59% embedded for large mainstem areas);	• 50-75% embedded (60-85% embedded for large mainstem areas);	• > 75% embedded (>85% embedded for large mainstem areas);
		• high number of deep pools ≥24" (≥48" for large mainstem areas), pool substrate <30% composed of sand/silt;	• moderate number of deep pools, pool substrate 30-59% sand/ silt;	• low-moderate number of deep pools, pool substrate 60-80% sand/silt;	• few, if any, deep pools, pool substrate >81% sand/silt;
		• streambed streak marks and/or banana-shaped sediment deposits absent;	• streak marks and/or "banana" deposits uncommon;	• streak marks and/or "banana" deposits common;	• streak marks and/or "banana" deposits common;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
2. Channel Scouring/ Sediment Deposition (cont'd.)		• fresh, large sand deposits in channel rare-absent; no evidence of fresh sediment deposition on overbank;	• fresh, large sand deposits in channel uncommon, small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits in channel common, small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits v. common in channel, moderate-heavy sand deposition along major portion of over-bank area v. common;
		• point bars few, small and stable, well vegetated and/ or armored with little or no fresh sand.	• point bars small and stable, well vegetated and/or armored with little to no fresh sand	• point bars moderate-large and unstable with high amount of fresh sand common.	• point bars moderate-large and unstable with high amount of fresh sand present at most stream bends.
Point Range		7-8	5-6	3-4	0-2

8. RIPARIAN HABITAT CONDITION (RSAT METRIC #5)

5. Riparian Habitat Conditions	• Provides insight into change(s) in stream energetics, temperature regime, and both aquatic and terrestrial habitat conditions.	• wide (>200') mature forested buffer along both banks;	• forested buffer generally more than 100 ft. wide along major portion of both banks;	• riparian area predominantly wooded but with major localized gaps;	• riparian area mostly non-woody vegetation, narrow-width riparian area;
		• canopy coverage; ≥80% shading (≥60% for large mainstem areas).	• canopy coverage; 60-79% shading (45-59% for large mainstem areas).	• canopy coverage; 50-60% shading (30-44% for large mainstem areas).	• canopy coverage; <50% shading (<30% for large mainstem areas).
Point Range		6-7	4-5	2-3	0-1

6/5/15
12:10

II. SVAP METRICS

1. CHANNEL CONDITION (SVAP)

Channel condition

Natural channel, no structures, dikes. No evidence of down cutting or excessive lateral cutting.	Evidence of past channel alteration, but with significant recovery of channel and banks. Any dikes or levies are set back to provide access to an adequate flood plain.	Altered channel; > 50% of the reach with riprap and/or channelization. Excess aggradation, braided channel. Dikes or levees restrict flood plain width.	Channel is actively downcutting or widening. >50% of the reach with riprap or channelization. Dikes or levees prevent access to the flood plain.
10	7	3	1

2. WATER APPEARANCE (SVAP)

Water appearance

Very clear, or clear but tea-colored; objects visible at depth 3 to 6 ft; (less if slightly colored); no oil sheen on surface; no noticeable film on submerged objects or rocks.	Occasionally cloudy, especially after storm event, but clears rapidly; objects visible at depth 1.5 to 3 ft; may have slightly green color; no oil sheen on water surface.	Considerable cloudiness most of the time; objects visible to depth 0.5 to 1.5 ft; slow sections may appear pea green; bottom rocks or submerged objects covered with heavy green or olive green film. or Moderate odor of ammonia or rotten eggs.	Very turbid or muddy appearance most of the time; objects visible to depth < 0.5 ft; slow moving water may be bright green; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface. or Strong odor of chemicals, oil, sewage, other pollutants.
10	7	3	1

III. CHANNEL CROSS-SECTION MEASURESMENTS

MEASUREMENT	VALUE ~~(FEET)~~ m
Top of Bank height	Left/Down 9.9 ft, Right/Down 7.6 ft, ~~Left~~ ~~Right~~ ~~24.~~ ~~feet~~
Channel width at top of bank	17.5 (57.41 ft)
Channel width at toe of bank	8.79 (28.83 ft)

VCSA8

VCSA9

8

Table 1: General Information			
Project Name:	Village Creek Creek Assessment	Date:	6/5/15
Stream Name:	Village Creek	Time:	11:15 AM
Location: 33.559294 86.751589	Airport Pump Station 33°33'33.46 86°45'05.72	Current Weather:	Sunny
Names of Field Personnel	Direcus Andrew Alisha	Rain Event within past 7-days? (circle one)	Yes or No
GPS File Name:			
Data Point Type(Check one)	Stream Assessment Point	Generic Point	
Photo numbers (range):	101-1160 — 101-1162		
COMMENTS	Airport		

6/5/15
11:15

I. RSAT METRICS

1. CHANNEL STABILITY (RSAT METRIC #1)

Table 2. RSAT Evaluation Method - Representative Stream Characteristics[1]

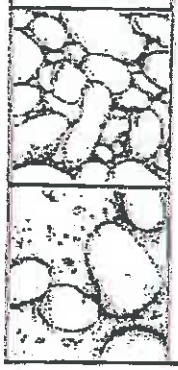
Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability	• Indicative of hydrologic/ flow regime alteration and general condition of physical aquatic habitat.	• > 80% of bank network stable, no evidence of bank sloughing, slumping or failure;	• 71-80% of bank network stable, infrequent signs of bank sloughing, slumping or failure;	• 50-70% of bank network stable, recent signs of bank sloughing, slumping or failure fairly common;	• <50% of bank network stable, recent bank sloughing, slumping or failure frequently observed;
	• Provides insight into past, present and possible future changes in channel morphometry.	• stream bend areas are very stable, outerbank height <2 ft. above stream (<4 ft. above stream for large mainstem areas), bank overhang < 2 ft.;	• stream bend areas stable, outer bank height 2-3 ft. above stream bank (4-5 ft. above stream bank for large mainstem areas), overhang 2-2.5 ft.;	• stream bend areas unstable, outer bank height 3-4 ft. above stream (5-7 ft. above stream for large mainstem areas), bank overhang 2.5-3 ft.;	• stream bend areas highly unstable, outer bank height >4 ft. above stream (>7 ft. above stream for large mainstem areas), overhang >3 ft.;
		• exposed tree roots old, large, and woody, generally 0-1 recent (large) tree falls/stream mile;	• exposed tree roots predominantly old and large, smaller young roots scarce, 2-3 recent (large) tree falls/ stream mile;	• young exposed tree roots common, 4-5 recent (large) tree falls/stream mile;	• young exposed tree roots abundant, ≥6 recent large tree falls/stream mile;
		• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material;	• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material,	• bottom 1/3 of bank is generally highly erodible material; plant/soil matrix compromised,	• bottom 1/3 of bank is highly erodible material; plant/soil matrix severely compromised;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability (cont'd.)		*channel x-sect. is generally V or U-shaped.	*channel x-sect. is generally V or U-shaped.	*channel x-sect. is generally trapezoidally-shaped.	*channel x-sect. is generally trapezoidally-shaped.
Point Range		9-11	6-8	3-5	0-2

6/5/15
11:15

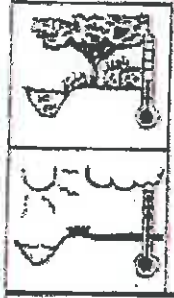
2. CHANNEL SCOURING/SEDIMENT DEPOSITION (RSAT METRIC #2)

Note embeddedness refers to degree to which channel substrate, e.g. gravel or cobble, are buried due to sediment deposition.

2. Channel Scouring/ Sediment Deposition 	• Relates to level of uncontrolled stormwater runoff, sediment load and transport and degradation of instream habitat.	• riffle embeddedness <25% sand/silt (<35% for large mainstem areas);	• 25-49% embedded (35-59% embedded for large mainstem areas);	• 50-75% embedded (60-85% embedded for large mainstem areas);	• > 75% embedded (>85% embedded for large mainstem areas);
		• high number of deep pools ≥24" (≥48" for large mainstem areas), pool substrate <30% composed of sand/silt;	• moderate number of deep pools, pool substrate 30-59% sand/ silt;	• low-moderate number of deep pools, pool substrate 60-80% sand/silt;	• few, if any, deep pools, pool substrate >81% sand/silt;
		• streambed streak marks and/or banana-shaped sediment deposits absent;	• streak marks and/or "banana" deposits uncommon;	• streak marks and/or "banana" deposits common;	• streak marks and/or "banana" deposits common;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
2. Channel Scouring/ Sediment Deposition (cont'd.)		• fresh, large sand deposits in channel rare-absent, no evidence of fresh sediment deposition on overbank;	• fresh, large sand deposits in channel uncommon, small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits in channel common, small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits v. common in channel, moderate-heavy sand deposition along major portion of over-bank area v. common;
		• point bars few, small and stable, well vegetated and/ or armored with little or no fresh sand.	• point bars small and stable, well vegetated and/or armored with little or no fresh sand	• point bars moderate-large and unstable with high amount of fresh sand common.	• point bars moderate-large and unstable with high amount of fresh sand present at most stream bends.
Point Range		7-8	3-6	3-4	0-2

5. RIPARIAN HABITAT CONDITION (RSAT METRIC #5)

5. Riparian Habitat Conditions 	• Provides insight into change(s) in stream energetics, temperature regime, and both aquatic and terrestrial habitat conditions.	• wide (>200') mature forested buffer along both banks;	• forested buffer generally more than 100 ft. wide along major portion of both banks;	• riparian area predominantly wooded but with major localized gaps;	• riparian area mostly non-woody vegetation, narrow-width riparian area;
		• canopy coverage; ≥80% shading (≥60% for large mainstem areas).	• canopy coverage; 60-79% shading (45-59% for large mainstem areas).	• canopy coverage; 30-60% shading (30-44% for large mainstem areas).	• canopy coverage; <50% shading (<30% for large mainstem areas).
Point Range		6-7	4-5	2-3	0-1

6/5/15
11:15

II. SVAP METRICS

1. CHANNEL CONDITION (SVAP)

Channel condition

Natural channel; no structures, dikes. No evidence of down cutting or excessive lateral cutting.	Evidence of past channel alteration, but with significant recovery of channel and banks. Any dikes or levies are set back to provide access to an adequate flood plain	Altered channel; <50% of the reach with riprap and/or channelization. Excess aggradation, braided channel. Dikes or levees restrict flood plain width	Channel is actively downcutting or widening; >50% of the reach with riprap or channelization. Dikes or levees prevent access to the flood plain.
10	7	3	0

2. WATER APPEARANCE (SVAP)

Water appearance

Very clear, or clear but tea-colored; objects visible at depth 3 to 6 ft; dress if slightly colored; no oil sheen on surface; no noticeable film on submerged objects or rocks.	Occasionally cloudy, especially after storm event, but clears rapidly; objects visible at depth 1.5 to 3 ft; may have slightly green color; no oil sheen on water surface.	Considerable cloudiness most of the time; objects visible to depth 0.5 to 1.5 ft; slow sections may appear pea-green; bottom rocks or submerged objects covered with heavy green or olive-green film or Moderate odor of ammonia or rotten eggs.	Very turbid or muddy appearance most of the time; objects visible to depth < 0.5 ft; slow moving water may be bright green; other obvious water pollutants; floating algal mats, surface scum sheen or heavy coat of foam on surface or Strong odor of chemicals, oil, sewage, other pollutants.
10	7	3	1

III. CHANNEL CROSS-SECTION MEASURESMENTS

MEASUREMENT	VALUE ~~(FEET)~~
Top of Bank height	L Down Stream 11.4 (37.4016) ft, R Down stream 10.2 (33.4646) ft
Channel width at top of bank	18.54 (60.8268 ft)
Channel width at toe of bank	7.16 (23.4908) ft

VCSA9

VCSA10

1

Table 1: General Information			
Project Name:	Village Creek Stream Assessment	Date:	11/5/14
Stream Name:	Village	Time:	10:44
Location: 33.578184 86.716686	33.34 41.4613 86 43 00.0669	Current Weather:	Over cast
Names of Field Personnel	A. Moore, A. Moss, A. Sledge, T. Miller, D. Cooper	Rain Event within past 7-days? (circle one)	Yes or (No)
GPS File Name:			
Data Point Type(Check one)	✓ Stream Assessment Point	Generic Point	
Photo numbers (range): 4			
COMMENTS	Golf course first 100 residential beyond Broken weir down stream side (pic)		

11/5/14

I. RSAT METRICS

1. CHANNEL STABILITY (RSAT METRIC #1)

Table 2. RSAT Evaluation Method - Representative Stream Characteristics[1]

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability	• Indicative of hydrologic/ flow regime alteration and general condition of physical aquatic habitat. • Provides insight into past, present and possible future changes in channel morphometry.	• > 89% of bank network stable, no evidence of bank sloughing, slumping or failure;	• 71-89% of bank network stable, infrequent signs of bank sloughing, slumping or failure;	• 50-70% of bank network stable, recent signs of bank sloughing, slumping or failure fairly common;	• <50% of bank network stable, recent bank sloughing, slumping or failure frequently observed;
		• stream bend areas are very stable, outerbank height <2 ft. above stream (<4 ft. above stream for large mainstem areas), bank overhang < 2 ft.;	• stream bend areas stable, outer bank height 2-3 ft. above stream bank (4-5 ft. above stream bank for large mainstem areas), overhang 2-2.5 ft.;	• stream bend areas unstable, outer bank height 3-4 ft. above stream (5-7 ft. above stream for large mainstem areas), bank overhang 2.5-3 ft.;	• stream bend areas highly unstable, outer bank height >4 ft. above stream. (>7 ft. above stream for large mainstem areas), overhang >3 ft.;
		• exposed tree roots old, large, and woody, generally 0-1 recent (large) tree falls/stream mile;	• exposed tree roots predominantly old and large, smaller young roots scarce, 2-3 recent (large) tree falls/ stream mile;	• young exposed tree roots common, 4-5 recent (large) tree falls/stream mile;	• young exposed tree roots abundant, ≥6 recent large tree falls/stream mile.;
		• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material;	• bottom 1/3 of bank is generally highly resistant plant/soil matrix or material;	• bottom 1/3 of bank is generally highly erodible material; plant/soil matrix compromised;	• bottom 1/3 of bank is highly erodible material; plant/soil matrix severely compromised;

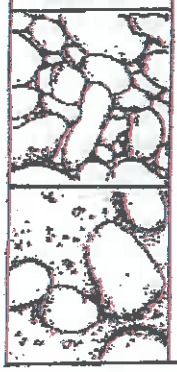
N/A Golf Course

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
1. Channel Stability (cont'd.)		*channel x-sect is generally V or U-shaped	*channel x-sect is generally V or U-shaped	*channel x-sect is generally trapezoidally-shaped	*channel x-sect is generally trapezoidally-shaped
Point Range		9-11	6-8	3-5	0-2

~~11/5~~ 11/5/14

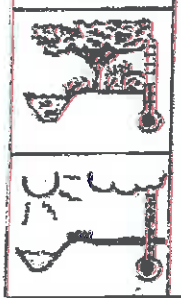
2. CHANNEL SCOURING/SEDIMENT DEPOSITION (RSAT METRIC #2)

Note embeddedness refers to degree to which channel substrate, e.g. gravel or cobble, are buried due to sediment deposition.

2. Channel Scouring/ Sediment Deposition 	• Relates to level of uncontrolled stormwater runoff, sediment load and transport and degradation of instream habitat.	• riffle embeddedness <25% sand/silt (<35% for large mainstem areas);	• 25-49% embedded (35-59% embedded for large mainstem areas);	• 50-75% embedded (60-85% embedded for large mainstem areas);	• > 75% embedded (>85% embedded for large mainstem areas);
		• high number of deep pools ≥24" (≥48" for large mainstem areas), pool substrate <30% composed of sand/silt;	• moderate number of deep pools, pool substrate 30-55% sand/silt;	• low-moderate number of deep pools, pool substrate 60-80% sand/silt;	• few, if any, deep pools, pool substrate >81% sand/silt;
		• streambed streak marks and/or banana-shaped sediment deposits absent;	• streak marks and/or "banana" deposits uncommon;	• streak marks and/or "banana" deposits common;	• streak marks and/or "banana" deposits common;

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
2. Channel Scouring/ Sediment Deposition (cont'd.)		• fresh, large sand deposits in channel rare-absent, no evidence of fresh sediment deposition on overbank;	• fresh, large sand deposits in channel uncommon, small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits in channel common, small localized areas of fresh sand deposits along top of low banks;	• fresh, large sand deposits v. common in channel, moderate-heavy sand deposition along major portion of over-bank area v. common;
		• point bars few, small and stable, well vegetated and/ or armored with little or no fresh sand.	• point bars small and stable, well vegetated and/or armored with little or no fresh sand.	• point bars moderate-large and unstable with high amount of fresh sand common.	• point bars moderate-large and unstable with high amount of fresh sand present at most stream bends.
Point Range		7-8	5-6	3-4	0-2

3. RIPARIAN HABITAT CONDITION (RSAT METRIC #5)

5. Riparian Habitat Conditions 	• Provides height into change(s) in stream energetics, temperature regime, and both aquatic and terrestrial habitat conditions.	• wide (>200') mature forested buffer along both banks;	• forested buffer generally more than 100 ft. wide along major portion of both banks;	• riparian area predominantly wooded but with major localized gaps;	• riparian area mostly non-woody vegetation, narrow-width riparian area;
		• canopy coverage; ≥80% shading (≥60% for large mainstem areas).	• canopy coverage; 60-79% shading (45-59% for large mainstem areas).	• canopy coverage, 30-49% shading (30-44% for large mainstem areas).	• canopy coverage, <30% shading (<30% for large mainstem areas).
Point Range		6-7	4-5	2-3	0-1

11/5/14

II. SVAP METRICS

1. CHANNEL CONDITION (SVAP)

Channel condition

Natural channel, no structures, dikes. No evidence of down cutting or excessive lateral cutting	Evidence of past channel alteration, but with significant recovery of channel and banks. Any dikes or levees are set back to provide access to an adequate flood plain	Altered channel ~50% of the reach with riprap and/or channelization. Excess aggradation, braided channel. Dikes or levees restrict flood plain width.	Channel is actively downcutting or widening ~50% of the reach with riprap or channelization. Dikes or levees prevent access to the flood plain
10	7	3	1

2. WATER APPEARANCE (SVAP)

Water appearance

Very clear, or clear but tea colored, objects visible at depth 3 to 6 ft. (less if slightly colored) no oil sheen on surface, no noticeable film on submerged objects or rocks	Occasionally cloudy, especially after storm event, but clears rapidly, objects visible at depth 1 to 3 ft. may have slightly green color, no oil sheen on water surface	Considerable cloudiness most of the time, objects visible to depth 0.5 to 1.5 ft. slow section may appear pea green; bottom rocks or submerged objects covered with heavy green or olive green film or Moderate odor of ammonia or rotten eggs	Very turbid or muddy appearance most of the time, objects visible to depth ~0.5 ft. slow moving water may be bright green, other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface or Strong odor of chemicals, oil, sewage, other pollutants
10	7	3	1

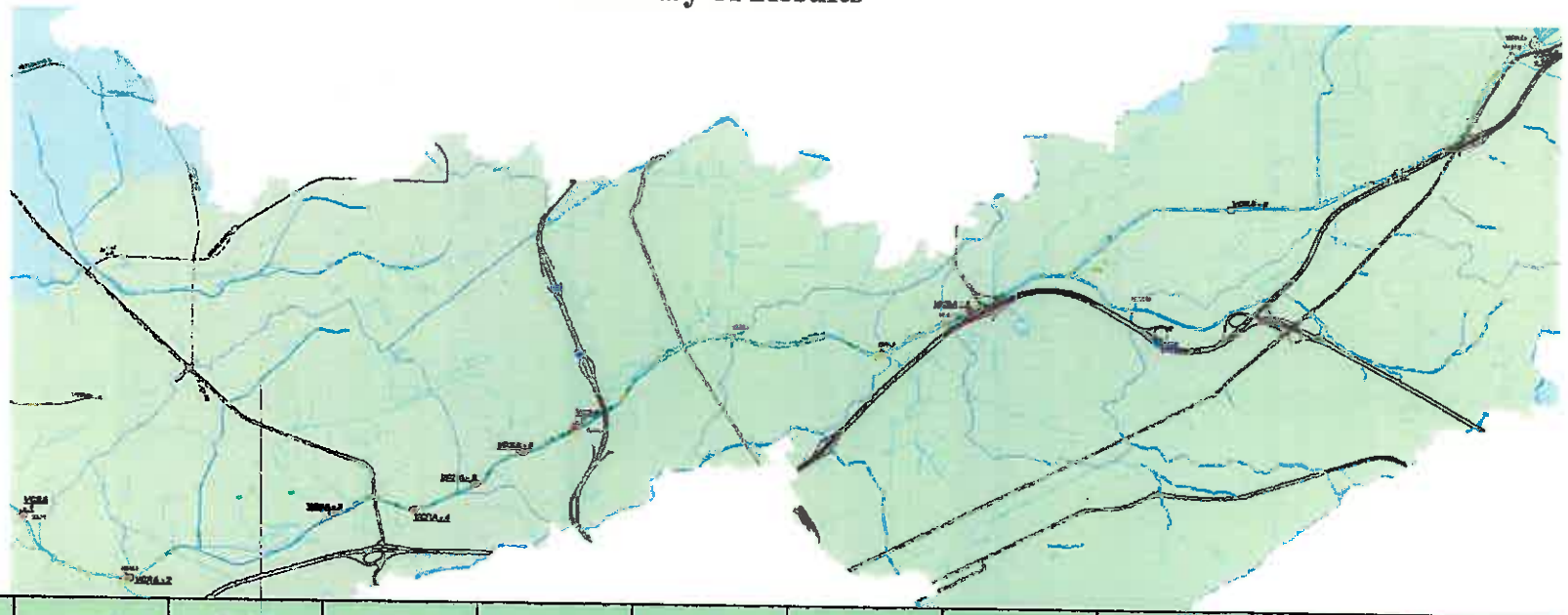
III. CHANNEL CROSS-SECTION MEASURESMENTS

MEASUREMENT	VALUE (FEET)
Top of Bank height	L 5.5ft R 3.8Ft
Channel width at top of bank	71.4ft
Channel width at toe of bank	31ft

VCSA10

EXHIBIT E

Upper Village Creek Stream Assessment
Summary of Results



Channel Actual Condition	VCSA1	VCSA2	VCSA3	VCSA4	VCSA5	VCSA6	VCSA7	VCSA8	VCSA9	VCSA10
Stability	5	7.6	8.8	8.8	10.0	8.8	9.4	8.2	2.8	2.6
Scour/Deposition	6.7	3.4	5.4	6.2	5.4	5.9	7.1	4.6	3.4	1.5
Riparian Habitat	2.5	1.8	2.8	5.5	1.8	3.5	5.5	5.5	1.0	1.0
Condition	1	7	7.0	10.0	10.0	7.0	10.0	3.0	1.0	1.0
Water Appearance	7	10	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Cross-Section	2.13	10.95	8.50	4.69	4.60	5.93	5.5	4.93	1.19	11.01

Relative Metric Score (0-5 Scale)	VCSA1	VCSA2	VCSA3	VCSA4	VCSA5	VCSA6	VCSA7	VCSA8	VCSA9	VCSA10
Stability	1.62	3.38	4.19	4.19	5.00	4.19	4.59	3.78	0.14	0.00
Scour/Deposition	4.64	1.70	3.48	4.20	3.48	3.93	5.00	2.77	1.70	0.00
Riparian Habitat	1.67	0.83	1.94	5.00	0.83	2.78	5.00	5.00	0.00	0.00
Condition	0.00	3.33	3.33	5.00	5.00	3.33	5.00	1.11	0.00	0.00
Water Appearance	0.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Cross-Section	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	7.93	14.24	17.95	23.39	19.32	19.23	24.59	17.66	6.83	5.00