

City of Chattanooga

Water Quality Program



Standard Operating Procedure

for

**STREAM CORRIDOR EVALUATION
(SCORE)**

April 2011

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TITLE & APPROVAL PAGE

Document Title Standard Operating Procedure for Stream Corridor Evaluation

Organization Title City of Chattanooga
Department of Public Works
Water Quality Program

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Purpose The purpose of this document is to provide standard operating procedures for conducting stream assessments for the City of Chattanooga. These procedures shall be followed by Water Quality employees during implementation of the SCORE program. This SOP will be reviewed annually and updated as needed.

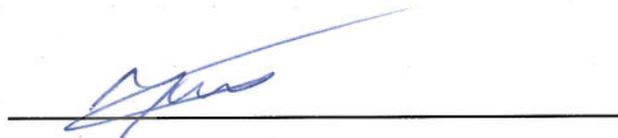
Approvals This is to certify that we have reviewed this document and approve its contents.



Rebecca E. Robinson, CPESC, CPSWQ
Water Quality Supervisor

4-6-11

Date



Mounir Y. Minkara, Ph.D., P.E.
Water Quality Manager

4-6-11

Date

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NOTICE OF REVISIONS RECORD

Date	Specific Section or Page	Revision Type	Revision Description
02/28/11	i	minor	Changed title & title page format
02/28/11	ii	minor	Added table of contents
02/28/11	iii	major	Added title & approval page with signature lines
02/28/11	iv	minor	Added list of figures
02/28/11	v	major	Added notice of revisions record table
02/28/11	1	major	Added definitions section
02/28/11	4	major	Modified introduction section and included language from NPDES Permit TNS068063 (expiration date: 11-30-15)
02/28/11	4	minor	Changed miles of impaired streams from 85 to 95
02/28/11	5	minor	Added disposable gloves, waders, & temperature appropriate clothing to safety equipment list
02/28/11	6	minor	Updated equipment list & added the statement "Necessary equipment will vary per site"
02/28/11	6 & 17	major	Created a "wadeable" & "non-wadeable" field survey section
02/28/11	6-17	major	Rewrote field survey section to provide descriptive directions on filling out each section of the new datasheet
02/28/11	17	major	Added a data entry section
02/28/11	18	minor	Updated the references section
02/28/11	19	major	Added Appendix A for datasheets

DEFINITIONS

agricultural landuse- natural resources related activities: farming, logging, etc.

algae- a plant or plantlike organism that typically grows on slow moving or standing water that is exposed to high levels of sunlight and has a rich source of bacteria

AsFound- geodatabase of all catchbasins, streams, and stormwater conveyances within the City limits

bankfull- the level at which water just begins to overflow the banks on an unincised stream channel; the bankfull stage has an average recurrence interval of approximately 1.5 years (Leopold et al, 1964)

bare ground- surface of earth that is lacking any form of vegetation or man-made structure (concrete, building, etc.)

buffer- area adjacent to and parallel to the stream starting at the top of the stream bank

channelization- to straighten, deepen, or widen a channel

commercial landuse- shopping, retail (all commercial enterprises), goods (clothing, antiques, art, grocery, etc.), service (banks, shoe shine, copying, service station, dry cleaner, etc.), restaurant related, shopping center, shopping mall, stadiums, entertainment (night clubs, theaters), office (except Doctor's office), office park, office center, hotels, motels, day care, pre-school

culvert- a transverse drain used to carry water under a road or railway; if the combined width of all pipes/boxes is greater than 20 ft, then the culvert is considered a bridge (23 CFR 650 subpart C)

dominant buffer- buffer type with the highest percentage of the overall buffer.

illicit discharge- is defined at [40 CFR §122.26\(b\)\(2\)](#) and refers to any discharge to a municipal separate storm sewer that is not entirely composed of stormwater, except discharges authorized under an NPDES permit (other than the NPDES permit for discharges from the MS4) and discharges resulting from fire fighting activities.

impervious buffer- buffer which is covered by a surface that does not allow infiltration of water into the ground, but instead creates runoff or pooling on the surface.

in-channel pond- a pond that is intersected by a stream or creek causing the stream or creek to flow into and exit out of the pond.

industrial landuse- manufacturing (including quarrying, mining, and drilling), warehouse, wholesale distributor, storage facilities, self service warehouse, mini warehouse

institutional landuse- government, schools and colleges, religious facilities, cultural institutions (aquarium, IMAX, museums, clubs (VFW, Masonic, etc.)), health care related (hospitals, clinics, doctor's offices, assisted living facilities), cemeteries, emergency response and public safety (fire, police, EMS)

lawn/turf buffer- buffer which is covered by short grassy vegetation (≤ 12 in) that has been manicured or groomed

primary landuse- landuse type with the highest percentage of the overall landuse.

recreational landuse- public passive parks, public active parks (ballfields, playgrounds), participant restricted recreation (yacht clubs, YMCA, private golf courses, private recreation facilities), preservation, open space, and sanctuaries

residential landuse- single family, duplex, multi-family (3 or more units, condos, apartments), group home, dormitory, retirement home etc., mobile home, attached townhomes (1 unit per parcel)

riffles- a short, relatively shallow and coarse-bedded length of stream over which the stream flows at higher velocity and turbulence than it normally does. As a result of the higher velocity and turbulence, small ripples are frequently found. Riffles are usually caused by an increase in a stream bed's slope or an obstruction in the water.

rip-rap- rock or other material used to armor shorelines, streambeds, bridge abutments, pilings and other streambank structures against scour, water or ice erosion

rock and mortar- structures that are made from rock and concrete type materials used in building walls or protecting stream banks.

rock gabion- a woven galvanized wire basket sometimes lined with geotextiles and filled with rock, stacked or placed to form an erosion resistant structure

sheen- a glossy shine found on the surface of water that can indicate pollution

shrub buffer- buffer which is covered by shorter woody vegetation

tall grass buffer- buffer which is covered by tall (> 12 inches) thick grassy vegetation that has not been manicured or groomed

transportation landuse- general transportation (trucking, railroad yards, river ports, garages, delivery companies, airport), surface parking lots, private surface parking lots, parking garages

tree buffer- buffer which is covered by mature trees

uniform flow- when a stream segment loses habitat diversity due to flow and is limited to a single habitat type (i.e. riffle, run, or pool)

utility landuse- substations, utility companies, water towers, cell towers, sewer related

vacant landuse- vacant lot, vacant building, residential non-structure lot, boarded-up building

WPA ditch- Works Progress Administration project where stream conveyances were channelized and hardened in order to quickly carry water away from a site. WPA ditches typically have concrete bottoms with rock and mortar side walls. Headwalls will sometimes say WPA and have the year the channel was built.

INTRODUCTION

As part of on-going efforts to meet legislative criteria specified under the City of Chattanooga's (City) National Pollutant Discharge Elimination System (NPDES) Permit No. TNS068063, the City's Stream Corridor Evaluation (SCORE) program is utilized. Section 4.2 of the permit states that,

Visual Stream Surveys and Impairment Inventories must be performed on streams impaired for siltation, habitat alteration, and pathogens in order to identify and prioritize MS4 stream impairment sources. It is strongly recommended that visual stream surveys be performed throughout the entire HUC-12 sub watershed of a stream segment identified as being impaired. At a minimum, a visual stream survey must be performed immediately upstream and downstream of each MS4 outfall that discharges into an impaired stream segment.

Within the City, there are approximately 95 linear miles of stream listed by the Tennessee Department of Environment and Conservation (TDEC) as impaired due to the presence of one or any combination of the following: siltation, habitat alteration, and pathogens. The SCORE program provides a comprehensive and consistent approach to identify and evaluate stream channel stability, sediment loading, and in-stream habitat. It provides needed data to help both improve stream parameters and protect public and private infrastructure through improved management and maintenance/restoration decisions.

Stream corridor assessment programs are quantitative tools designed to provide a rapid assessment of the general physical condition of a stream system and to identify the location of a variety of common environmental problems within a stream's corridor (Yetman, 2001). The SCORE program records visually identifiable stream features through selection criteria choices that limit observer variability. Recordable information includes an overall score which measures stream degradation for each stream segment assessed. The overall score is a sum total from the following severity indices: in/near stream construction, channel alteration, barriers/blockages, outfalls, current erosion, canopy, and buffer.

This Standard Operating Procedure (SOP) is specific to the City's Water Quality Program (WQP) and is intended to assist the City in maintaining their compliance under the given NPDES permit. It provides specific operational direction for conducted all phases of the SCORE program.

EMPLOYEE TRAINING, HEALTH, AND SAFETY

The employee shall become familiarized with the protocols outlined in this SOP. The field team shall be comprised of at least two trained individuals. It is the responsibility of the field teams to ensure that all datasheets are completed properly and safety protocol has been followed.

On a yearly basis the Water Quality Manager, or representative, shall review this document to ensure continuing applicability and shall train employees with regards to proper protocol.

Stream assessments present a variety of potentially hazardous situations. As a result of the innate hazard potentials, special attention should be paid with regards to employee safety. General safety equipment and protocol shall include:

- ◆ Fully equipped first aid kit
- ◆ Disposable gloves
- ◆ List of emergency contact names and numbers
- ◆ Radio/Cell phone
- ◆ Soap/Disinfectant
- ◆ Bug spray
- ◆ Safety vest
- ◆ Boots/Waders
- ◆ Temperature appropriate clothing

PROCEDURES

Equipment

Prior to initiating a SCORE assessment, the field team shall compile all necessary gear. Necessary equipment will vary per site, but the following is a standardized list.

- ◆ Map of all stream segments to be assessed showing all of the following:
 - Location markers
 - Labeled SCORE segments with identifiable start & end points
 - AsFound (stream & stormwater conveyance)
 - Labeled outfalls
 - Sanitary sewer locations
 - Labeled parcels
- ◆ Clipboard
- ◆ Datasheets (Appendix A)
 - SCORE form
 - IDIR form
- ◆ Writing utensil
- ◆ Camera
- ◆ Extra batteries
- ◆ Dry erase board and dry erase marker
 - Mandatory for all outfall pictures
- ◆ Tape measure
- ◆ Watch
- ◆ Flow dye
- ◆ Densimeter
- ◆ SCORE SOP
- ◆ Backpack
- ◆ Machete
- ◆ Canoe or boat (for non-wadeable streams)
 - Paddles & Personal Floatation Devices
 - Tennessee Wildlife Resource Agency (TWRA) boat registration

Field Survey

Wadeable Streams

Stream assessments are performed from upstream to downstream. Datasheets (see Appendix A) should be filled out completely and legibly by the field crew conducting the stream evaluation. Upon the field crew reaching the start of the segment to be assessed, general site information should be recorded. This includes the date and time of the

assessment, field crew names/initials, weather conditions of the past 48 hours, and the segment location, length, and number. In addition, the segment should be noted as being wadable or non-wadable. Standard wadable stream segments are divided into 500 foot lengths, but can vary. Segment length and number can be determined with the SCORE geodatabase through the use of the City's Geographic Information System (GIS). Location datum can be the nearest parcel information or any visually identified markers seen while in the field.

Once general segment information is recorded, the field crew can proceed to fill out the datasheet in any order with the exception of the severity indices (In/Near Stream Construction, Channel alteration, Barriers/Blockages, Outfalls, Current Erosion, Canopy, and Buffer). These shall be left for the final scoring at the end of the segment.

The following metrics are measured during the stream assessment. Data collected on these metrics is referenced when the segment is scored for the severity indices.

1) Barriers/ Blockages

If a barrier or blockage is observed, then the location, type, and severity of the blockage are to be documented. It shall also be noted if the barrier/blockage is permanent. Presence of channel diversion, flow impediment, and impediment of fish movement are to be noted. If maintenance should be done on the channel to remove the blockage, then it shall be indicated it on the datasheet. Blockage types include trash, woody debris, beaver dams, man-made dams, pipes, and other hydrologic barriers. In some occasions a pipe or culvert may not cause the impediment of flow, but still impede fish movement. Figure one displays examples of each of the barrier/blockage types listed on the datasheet.

2) In/Near Stream Construction

Development or construction of land within 200 feet of the stream is to be documented. Location along the linear stream segment, as well as the horizontal distance from the stream, is to be estimated in feet. Presence and condition of the sites Best Management Practices (BMPs) are to be documented. Additional comments can be noted as necessary. Any illicit discharge concerns resulting from inadequate BMP's should be documented and reported to the Illicit Discharge Program and Land Development Office (LDO).

3) Landuse

There are nine Land Use categories to choose from: Vacant, Residential, Industrial, Commercial, Transportation, Utility, Institutional, Recreation, and Agricultural. The primary landuse for each bank is to be documented on the datasheet. Primary landuse is determined by the landuse type with the highest observed frequency throughout the length of the segment. Landuse choice should take into account a broader watershed perspective than buffer; it includes the entire drainage area of the contributing flow rather than the area immediately on the right or left bank. GIS maps may be helpful in determining landuse.



Figure 1 Examples of Barriers and Blockages. **A** – Beaver Dam, **B** – Man-made Dam, **C** – Culvert causing fish barrier, **D** – Woody Debris, **E** – Box Culvert causing fish barrier, **F** – Pipe

4) Buffer

Buffer width is estimated in feet and should include dominant buffer type on both sides of the channel. There are six buffer types: impervious, bare ground, lawn/turf, tall grass, shrubs, and trees. The dominant buffer type (or buffer type with greatest land area along the segment) for each corresponding bank is to be documented. The estimated average width of the dominant buffer type is to be documented for each bank, as well. For example, if shrubs are the dominant buffer type, then the estimated average buffer width for shrub buffer would be documented for its corresponding bank. Figure two displays images of each of the buffer types.

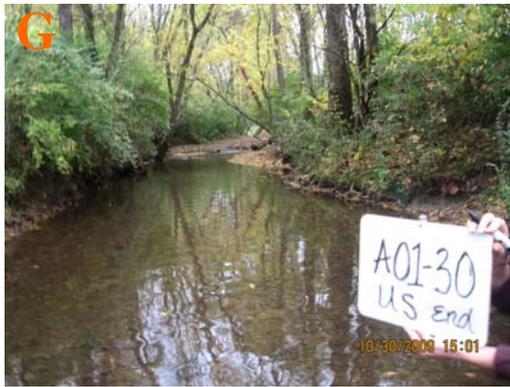


Figure 2 Examples of Buffer types. A – Impervious, B – Bare ground, C – Turf, D – Lawn, E – Tall grass, F – Shrubs, G – Trees, H – Trees

5) Canopy

Percent Canopy can be measured with a densiometer or can be visually estimated. Canopy measurements are taken at two locations along the segment that are considered to be representative samples. When using the densiometer the canopy score can range between zero and 96. The average of the two densiometer readings is multiplied by 1.04 to determine total percentage. For the visual estimation method, estimate the canopy cover at two representative locations along the segment, envisioning full leaf-out. Aerial photography may be used in addition. If there is a significant change in canopy between the start and end of segment, then changes are to be noted in the comments section and can be taken into account during the final canopy estimation.

6) Flow Conditions

Flow conditions include: level of flow, transparency of water, and the presence of algae, odors, sheens, trash, riffles, and abnormal color. Figure three shows examples of some of these conditions. Presence/absence of these conditions is to be documented on the datasheet. If an abnormal color is visible, then note the color in the comments section. Level of flow is to be recorded as either dry, trickle, moderate, or substantial. These measurements are site specific, since flow is considered substantial when the water is at/over the channel's bankfull elevation. Flow condition information is oftentimes beneficial to locating illicit discharges. Additional comments can be noted as necessary.



Figure 3 Examples of Flow Conditions. A – Algae, B – Sheen, C – Trash, D – Riffles

7) Channel Alterations

Possible channel alterations include: channelization (i.e. deepening, straightening, and/or widening), rip-rap/rock gabion, concrete/rock and mortar, culvert/pipe structure, uniform flow, in-channel pond, and impoundment. An “other” column is available for unique alterations. Comments can be noted as necessary. When the presence of any of the above alterations is observed, the observer is to estimate the percentage of the overall segment that the specific alteration is affecting. For example, if 100’ of a 500’ segment has been piped, then the observer would record 20% beside culvert/pipe. Document if the channel is suspected of being a Works Progress Administration (WPA) ditch. Figure four displays the three types of channelization and figure five shows the additional alteration options.



Figure 4 Examples of Channelization. A – Deepened, B – Straightened, C – Widened

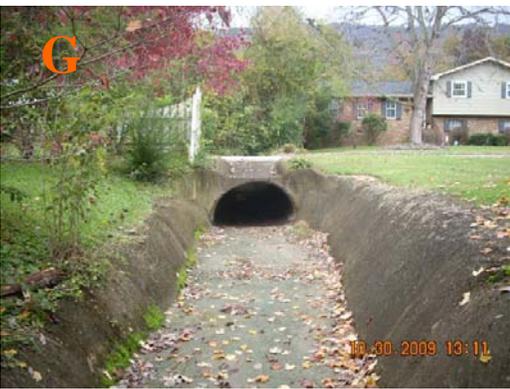
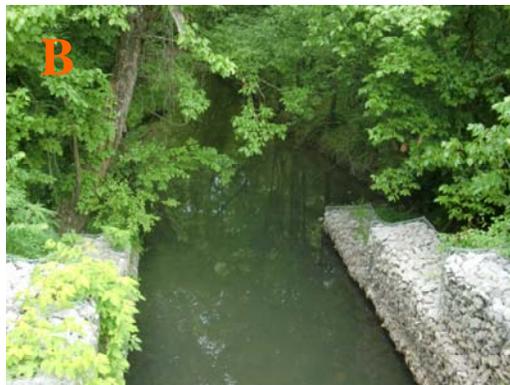


Figure 5 Examples of Channel Alterations. A – Rip-Rap, B – Rock Gabions, C – Culvert/Pipe, D – Uniform Flow, E – In-Channel Pond, F – Impoundment, G – Concrete, H – Rock and Mortar

8) Channel Dimensions and Substrate

Cross sectional measurements of the channel should be taken at the start and middle off the segment. Measurements are recorded in inches and include top width, bottom width, and depth of channel. There are five substrate types: concrete/rock and mortar, bedrock, cobble, gravel, and fine sediments. Figure six displays examples of these substrate choices. Observers are to estimate and document the dominate substrate.



Figure 6 Examples of Substrate. A – Concrete, B – Rock and Mortar, C – Bedrock, D – Cobble, E – Gravel, F – Fine Sediments

9) Erosion

Dominant erosion processes shall be documented during the first 3rd, second 3rd, and last 3rd (or start, middle, end respectively) of the segment. The location of the process along the segment is to be noted as well as if it is on the left bank, right bank, or both. Each erosion process recorded will have a severity rating of minor, moderate, or severe. Additional comments may be noted for each instance of recorded erosion. The pool of erosion process to be drawn from includes the following: bed scour, bank scour, under-cutting, head-cutting, slumping, and other. Figure seven shows examples of each of these choices.



Figure 7 Examples of Erosion. A – Bed Scour, B – Bank Scour, C – Under-cutting, D – Head-cutting, E – Slumping

10) Outfalls

All outfalls observed during assessments are to be documented on the datasheet. At a minimum, observers are to complete the following fields for each outfall: Outfall ID, Type, and Condition. Outfall ID is obtained through GIS. Types of outfalls include Reinforced Concrete Pipe (RCP), Corrugated Metal Pipe (CMP), Poly Vinyl Chloride (PVC), Earthen Channel (E), and Concrete Channel (C). If the outfall type can not be determined, then “unknown (U)” shall be recorded. An outfall’s condition may be recorded as good, fair, poor, severe, or unknown. Figure eight shows examples of the types of outfalls that may be recorded. If the condition is fair, poor, or severe, then documenting the structural problem is required. Structural problems include channel erosion, broken/cracked/corroded pipe, and presence of flow line, excessive vegetation, and sediment deposition. An “other” option is included for atypical problems. Outfalls that are found in the field, but are not on the map are to be recorded as “unmapped.” Unmapped outfalls are turned over to the City GIS staff for updating the AsFound geodatabase. If an outfall is on the map, but the observers are unable to locate it in the field, then it shall be recorded as “undefined.” Undefined outfalls may be unrecognizable sheet flow or may have been incorrectly recorded by AsFound field crews. Undefined outfalls are turned over to the City GIS staff for updating the AsFound geodatabase. The presence of flow is to be documented, as well. A 50 ft upstream and downstream visual inspection of the receiving channel is to be performed at each outfall. If a downstream change is present due to the outfall, then this should be described in the outfall’s comment section.

11) Severity Indices

Severity Indices include the following: In/Near Stream Construction, Channel Alteration, Barriers/Blockages, Outfalls, Current Erosion, Canopy, and Buffer. The severity indices section of the SCORE datasheet is used in generating a score for each of the above categories, as well as an overall total score that is given to the specific stream segment that is being assessed. The observer is to use the measurements taken throughout the stream assessment to score each category. Categories are given a score ranging from one to five with one being the best and five being the worst. The “Buffer” score is obtained by scoring each bank individually and then taking the average, rounding to the nearest integer. The total score of a specific stream segment is the sum of the seven categories from above. Total scores range from seven to 35. Scores ranging from 7-13 are considered minor, 14-24 moderate, and 25-35 severe.

12) Illicit Discharge

If no illicit discharge is detected, then the observer should indicate that an Illicit Discharge Inspection Report, or IDIR (see Appendix A), was not filled out. If an illicit discharge or possible illicit discharge is observed during a stream assessment, then the observer is to document the findings on the datasheet, as well on an IDIR. The observer should indicate the location of the discharge and try to visually identify the substance, odor, color, and possible source along with any other helpful information in the comments section of the SCORE datasheet. Pictures of the illicit discharge should be taken.



Figure 8 Examples of Outfall Types. A – PVC pipe, B – Concrete Channel, C – Earthen Channel, D – CMP, E – RCP

Non-Wadeable Streams

For non-wadeable streams, observers are to use the same datasheet that is used for wadeable channels. Standard non-wadeable stream segments are broken into 2,000 ft segments. Datasheets should be filled out completely with exception of channel dimensions and dominant substrate. In larger non-wadeable channels, retrieving accurate data for channel dimensions and substrate is difficult. Therefore, data on these measurements will not be mandatory. Estimates of channel dimensions and substrate are acceptable, but “estimation” should be circled in the comments section. Channel bottom and top widths can be estimated via GIS prior to field surveying with verification on site. As visual stream surveys are indeed a snapshot of stream corridor condition, a one-time aerial photo with high resolution ($\leq 5\text{m}$) will serve the purpose of channel dimensions when estimating with GIS.

It may be difficult to estimate canopy cover on wide streams by looking up through the canopy. Thus, an attempt should be made to estimate the portion of the shaded water surface area for the whole reach. Time of year, time of day, and weather can affect your observation of shading. Therefore, the relative amount of shade is estimated by assuming that the sun is directly overhead and the vegetation is in full leaf-out. Alternatively, use aerial photographs taken during full leaf-out. The following rough guidelines for percent shade may be used when determining stream surface exposure to the sun:

90 – 100%	stream surface not exposed
70 – 90%	surface slightly exposed or exposed only in patches
40 – 70%	surface exposed, but banks not exposed
20 - 40%	surface exposed and banks exposed at times
0 – 20%	surface and banks exposed

Data Entry

Upon returning to the office, the field crew shall download the pictures and place them in the appropriate folder labeled with the segment number. Pictures should be labeled with the segment number and date at a minimum. The GIS geodatabase should be updated with the date of the assessment and the scores from the severity indices. Before further data entry takes place, the datasheet is to be reviewed by the water quality supervisor or authorized representative for quality control purposes. After the datasheet is signed and dated by the reviewer the SCORE database can be updated, the datasheet can be scanned and the electronic copy placed with the pictures, and the hard copy datasheet can be filed. Each of these activities will be dated on the datasheet.

REFERENCES

“EPA Administered Permit Programs: The National Pollutant Discharge Elimination System,” Title 40 Code of Federal Regulations, Pt 122.

Leopold, L. B., M. Gordon Wolman, and John P. Miller. (1964). Fluvial Processes in Geomorphology. New York: Dover Publications, Inc.

“National Bridge Inspection Standards,” Title 23 Code of Federal Regulations, Pt 650.

Yetman, K.T. (2001). Stream Corridor Assessment Survey SCA Survey Protocols. Watershed Restoration Division Chesapeake and Coastal Watershed Services, Maryland Department of Natural Resources, Annapolis, MD.

APPENDIX A

Stream Corridor Evaluation Data Sheet

Reviewer:			Date:		
Date Entered	GIS:	Database:	Scanned:	Filed:	

Date:	Segment Number:
Time:	Segment Length:
Team:	Wadeable: Yes / No
Weather Past 48 hrs Dry L. Rain H. Rain Snow	Location:

Barriers/Blockages

Type: Trash (T), Woody Debris (WD), Beaver Dam (BD), Man-Made Dam (MD), Pipe (P), Other (O) / **Severity:** Minor (Mn), Moderate (Md), Severe (S)

Blockage	Location	Type	Severity	Permanent	Channel Diversion	Impedes Flow	Impedes Fish	Maintenance Needed
1								
2								
3								

Comments:

In/Near Stream Construction

Site	Location	BMP Present	Failing	< 100'	100'-200'
1					
2					

Comments:

Landuse

Type: Vacant, Residential, Industrial, Commercial, Transportation, Utility, Institutional, Recreation, Agricultural

Primary Land Use	LB:	RB:
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Buffer

Buffer Types: Impervious (I), Bare Ground (BG), Lawn/Turf (L), Tall Grass (TG), Shrub (S), Trees (T)

Dominant Buffer Type	LB:	RB:
Dominant Buffer Width	LB: <15' 15-50' >50'	RB: <15' 15-50' >50'

Canopy

Percent Canopy (with Densimeter or visual estimation measuring/envisioning full leaf out – aerial photography may be used in addition)

First Measurement	US:	DS:	RB:	LB:	Total:	Average	x 1.04 =
Second Measurement	US:	DS:	RB:	LB:	Total:		

Comments: **Estimated** Yes / No

Flow Conditions

Flow: Dry Trickle Moderate Substantial	Transparency: Clear Slightly Cloudy Cloudy Opaque				
Algae: Yes / No	Odor: Yes / No	Sheen: Yes / No	Trash: Yes / No	Riffles: Yes / No	Abnormal Color Yes / No
Comments:					

Channel Alterations

Deepened ≈ _____ %	Rip-Rap/Rock Gabion ≈ _____ %	Uniform Flow ≈ _____ %	Possible WPA Yes / No
Straightened ≈ _____ %	Concrete/Rock & Mortar ≈ _____ %	In-Channel Pond ≈ _____ %	
Widened ≈ _____ %	Culvert/Pipe ≈ _____ %	Impoundment ≈ _____ %	
Other ≈ _____ % (Describe: _____) Comments:			

Channel Dimensions & Substrate

Channel Measurement at Start (in)	Top Width:	Bottom Width:	Depth:	Estimated Yes / No		
Channel Measurement at Middle (in)	Top Width:	Bottom Width:	Depth:	Estimated Yes / No		
Dominate Substrate	Concrete	Bedrock	Cobble	Gravel	Fine Sediments	Unknown
Comments:						

Stream Corridor Evaluation Data Sheet

Erosion

Process: Bed Scour (BDS), Bank Scour (BKS), Under-Cutting (UC), Head-Cutting (HC), Slumping (S), Other (O)

Location	Dominant Process	LB	RB	Minor	Moderate	Severe	Comments
Start							
Middle							
End							

Outfalls

Type: RCP, CMP, PVC, Earthen (E), Concrete (C), Unknown (U) / **Condition:** Good (G), Fair (F), Poor (P), Severe (S), Unknown (U)

Problem: Erosion (E), Broken (B), Cracked (C), Corrosion (CRS), Flow Line (FL), Excessive Vegetation (EV), Sediment Deposition (SD), Other (O)

Outfall ID	Type	Condition	Problem	Unmapped	Undefined	Discharge	DS Change	Comments

Comments:

Severity Indices (1 Minor to 5 Severe)

In/Near Stream Construction	1	2	3	4	5
1 No construction activities within 200 ft of channel					
3 Activities 100 – 200 ft from bank, but with adequate sediment BMP's					
5 Activities < 100 ft from bank with no sediment BMP's					
Channel Alteration	1	2	3	4	5
1 Natural earthen channel with sediment bottom; no structures present					
3 Current or past alteration on ≥ 25% and < 50% of the segment					
5 Current or past alteration on ≥ 75% of the segment					
Barriers/Blockages	1	2	3	4	5
1 No diversions or structures limiting stream flow or fish movement					
3 Small or temporary structures impeding flow; noticeable channel diversion					
5 Permanent structures prevent flow and/or fish movement; channel diverted					
Outfalls	1	2	3	4	5
1 No outfall present or an outfall in good condition; discharge with no odor or discoloration					
3 Outfall in poor condition; moderately damaged, could collapse/crack, or has deposit stains					
5 Outfall in severe condition; severely damaged or shows signs of illicit discharge					
Current Erosion	1	2	3	4	5
1 Banks are stable and protected by vegetation and/or roots; natural erosion patterns present					
3 Moderate erosion is characteristic of the segment					
5 Severe erosion is characteristic of the segment; long reaches of active erosion and/or mass wasting on any portion of the segment					
Canopy	1	2	3	4	5
1 Canopy is > 80%					
3 Canopy is between 40% - 60%					
5 Canopy is < 20%					

Buffer (score LB & RB separately and record the average – round up to nearest integer)

Buffer Width	Impervious/Bare	Turf/Lawn	Tall Grass	Shrub	Trees	Average Score _____
< 15'	5	5	4	3	2	
15-50'	5	4	3	2	1	
> 50'	5	3	2	1	1	

Total Score: _____ **Minor = 7-13** **Moderate = 14-24** **Severe = 25-35**

Illicit Discharge

IDI Report Yes / No	Comments:
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Date entered: GIS _____ CSR _____ Scanned _____ Spreadsheet _____
 QA/QC Reviewer: _____ Date Reviewed: _____ Filed _____

Illicit Discharge Inspection Report



City of Chattanooga
 Water Quality Program
 1250 Market Street, Suite 2100
 Chattanooga, Tennessee 37402
 (423) 643-5877 Fax (423) 643-5862
SWM@mail.chattanooga.gov

Location of Discharge:

Address _____ SR# _____
 Date _____ Watershed _____

Source of Illicit Discharge:

<u>Sanitary Wastewater:</u>	<u>Automotive Fluids / Fuel / Washing:</u>
<input type="checkbox"/> Broken Service Line	<input type="checkbox"/> Oil
<input type="checkbox"/> Sewer Cleanout	<input type="checkbox"/> Antifreeze
<input type="checkbox"/> Septic Tank	<input type="checkbox"/> Transmission
<input type="checkbox"/> Laundry Wastewater	<input type="checkbox"/> Gasoline
<input type="checkbox"/> Sewer Overflow	<input type="checkbox"/> Diesel
	<input type="checkbox"/> Wash Water (Detergent / Construction)
<u>Household:</u>	
<input type="checkbox"/> Paints / Rinse Water	<u>Other:</u>
<input type="checkbox"/> Cleaner	<input type="checkbox"/> Pesticides/Herbicides
<input type="checkbox"/> Swimming Pool Water	<input type="checkbox"/> Fertilizer
	<input type="checkbox"/> Illicit Connection to Storm Drain
<u>Food Service:</u>	<input type="checkbox"/> Illegal Dumping to Storm Drain
<input type="checkbox"/> Cooking Oil	<input type="checkbox"/> Water Leak
<input type="checkbox"/> Grease	<input type="checkbox"/>

Inspection Type: Initial / Follow-up / Final
Letter Type: Notification / WW / NOV / NOV + Civil Penalty / None
Land Use: Commercial / Residential / Other: _____
Found By: FS / SCORE / Smoke Test / 311 / City Emp: WQ or Other / Other: _____

Comments: _____

Inspector(s): _____ Photos? Yes No