Task 1. (b and c) NPS Proj. # 07-04e

Morgan Brook Watershed Based Plan

Barkhamsted, New Hartford and Winchester, CT August, 2012



Prepared by the Northwest Conservation District <u>www.conservect.org/northwest</u>



Funded in part by the Connecticut Department of Energy & Environmental Protection through a United States Environmental Protection Agency Clean Water Act Section 319 Nonpoint Source Grant .



ACKNOWLEDGEMENTS

The Northwest Conservation District gratefully acknowledges the contributions of the following individuals and groups to the development of this watershed based plan:

Eileen Fielding and Alisa Phillips-Griggs, Farmington River Watershed Association

Alison Murdock, committee member and Liz Lacy, Director of Farmington River Coordinating Committee

Nelson Skip Slye, West Hill Pond Homeowners Association, West Hill Pond Watershed Association

Don Stein, First Selectman, Town of Barkhamsted

Jamie Hall, Chair, Inland Wetlands Agency, Town of New Hartford

Madeline McClave, President, New Hartford Land Trust

Candy Perez, Mayor, Town of Winchester

Scott Eisenlohr, Planning Department, Town of Winchester

Dick Labich, President, Highland Lake Watershed Association

Shelley Harms and Jen Perga, Winchester Land Trust

Patricia Gigliotti, Sanitarian and other support staff from Farmington Valley Health Department

Susan Peterson, Mary Ann Nusom Haverstock, and Stan Zaremba (retired) Connecticut Department of Energy and Environmental Protection

Gracious Streamside Landowners of New Hartford, Barkhamsted and Winchester

TABLE	of CONTENTS	5	
	Executive Su	mmary	1
	Watershed D	Description	1-3
EPA Ni	ne Elements o	of the Morgan Brook Watershed Based Plan	3
	Element One	e: Impairment	3-9
	Element Two	p: Load Reduction	9-11
	Element Thr	ee: Management Measures	12-16
	Element Fou	r: Technical and Financial Assistance	16-17
	Five: Public	Information and Education	17
	Element Six a	and Seven: Implementation Schedule and Cost	17-18
	Element Eigh	nt and Nine: Milestones and Monitoring	18
	Conclusion		19
	TABLES		
	Table 1 Back	ground Data for the Morgan Brook Watershed	2
	Table 2 Curre	ent Land Use / Cover Classifications	2
	Table 3 Bact	eria Sampling Location Identification Table	4
	Table 4 Field	Survey Data Sheets Collected	7
	Table 5 Pollu	itant Loads by each Land Use / Land Cover Type	10
	Table 6 Pollu	Itant Loading to Morgan Brook Watershed in pounds	10-11
	Table 7 Pollu	Itant Loading to Morgan Brook Watershed by %	11
	Table 8 Struc	ctures Pollutant Removal Efficiency Rate by %	13
	FIGURES		
	Figure 1	Typical Steam Flow of Morgan Brook	1
	Figure 2	W. West Hill Road Structured Stream Crossing	7
	Figure 3	Greenridge Condominiums and Former KFC	13
	Figure 4	Ledge Brook Plaza	14
	Figure 5	Mallory Brook Plaza and Car Dealership	15
	References		20-21
	APPENDICES		
	Appendix A -	 Morgan Brook Bacteria Sampling Locations and Results 	
	Appendix B -	 Track Down Survey Field Data Sheets with Photos (referen 	iced on interactive map)
	Appendix C -	 West Hill Pond Water Runoff Survey 	
	Appendix D -	 - 305(b) Assessment Results for Morgan Brook and Mallory Connecticut Integrated Water Quality Report 	Brook from 2010
	Appendix F -	- 303(d) Impaired Water Listings for Morgan and Mallory Br	ook from 2010
		Connecticut Integrated Water Quality Report	
	Appendix F -	- Water Quality Criteria for Bacterial Indicators of Sanitary (Quality – From 2011
		Connecticut Water Quality Standards	
	Attachment	– Interactive Watershed Map – Morgan Brook Impaired Wa	atershed Study Area Map

Morgan Brook Watershed Based Plan

Executive Summary

Morgan Brook is listed as a Category 5 impaired waterbody on Connecticut's List of Impaired Waters according to the reporting requirements for Section 303(d) of the Federal Clean Water Act. In the case of Morgan Brook, high concentrations of Escherichia coli (E. coli) bacteria have impaired most of the stream for recreational use. While regular water quality sampling has revealed this issue, the source(s) of this impairment has not been identified. Therefore, a team of environmental scientists from the Northwest Conservation District (NCD) walked all the streams and tributaries of the watershed performing visual inspections of stream corridor health. Failing septic systems can cause high bacteria counts, but none were identified. Large areas of impervious surface (over 30 acres) in the upper watershed were surveyed and no stormwater quality or quantity treatment measures were identified. NCD has identified uncontrolled stormwater runoff from these large areas of impervious surface associated primarily with commercial development - as the most likely source of E. coli bacteria as well as other water quality degrading nonpoint source pollutants impacting Morgan Brook. A series of Low Impact Development (LID) style retrofits are recommended to minimize the negative impacts of impervious surfaces. In addition, an agricultural operation close to a major tributary was noted which may also be contributing bacteria. NCD will encourage the farm manager to seek assistance from the USDA Natural Resource Conservation Service to address potential issues.

Watershed Description

Morgan Brook flows north from West Hill Pond in New Hartford, then East along State Route 44 through Barkhamsted before emptying into the West Branch of the Farmington River near Century Wood Working on Route 181, just south of the village of Pleasant Valley in Barkhamsted. The headwaters of Morgan Brook are West Hill Pond in New Hartford, and Mallory Brook which drains a section of Winchester along its southeastern border with Barkhamsted. The headwaters of the Morgan Brook Watershed begin at an elevation of 950 feet above mean sea level and empty to the Farmington River, approximately 450 feet above mean sea level. An elevation change of 500 feet occurs over 3 miles meaning Morgan Brook has a moderately steep stream gradient of 3%.

The flow energy created by the moderate stream gradient allows Morgan Brook to be very efficient at carrying sediments down its steam corridor and into the Farmington River. This was confirmed by the lack of sediment deposition noted throughout the watershed.



Figure 1. Typical Streamflow of Morgan Brook

The Morgan Brook Watershed, identified by the Connecticut Department of Energy & Environmental Protection (CT DEEP) as Subregional Basin #4305, is approximately 3 miles long and 4 miles wide at its greatest point. Morgan Brook watershed is nested within the Farmington Regional Basin (#43) which lies within the Connecticut River Major Basin (#4). The watershed is comprised of approximately 5,800 acres which is drained by approximately 9 miles of perennial streams, including the tributaries and the main stem of Morgan Brook. Greater than 80% of the watershed lies within the town of Barkhamsted. See Table 1 for additional data for Morgan Brook watershed.

Table 1					
Background Data for Morgan Brook Watershed					
Morgan Brook Subregional Basin #	4305				
Farmington Regional Basin #	43				
Connecticut River Major Basin #	4				
Local Basin Size	5,800 acres / 9 square miles				
Main Stem Stream Length	3.1 miles				
Perennial Stream Density	1.1 miles of stream per square mile				
State Highway Length (44, 318 and 181)	3 miles				
Local Road Length	25 miles				
Road Density	3 miles of road per square mile				
Road Stream Crossings	32				

Land use/land cover within the Morgan Brook watershed is mostly forested with a large area of commercial development within the Winchester headwater region. The remaining non commercial areas are characterized by forest or low density residential cover types with a few small agricultural operations. Watershed percentage of land use/land cover types are summarized in Table 2.

Table 2						
Current Land Use / Cover Classifications in the Morgan Brook Watershed						
(depicted as a percent of the	watershed / app	roximate acres)				
Low Density Residential	7.1% / 412 ac	Pasture	3.0% / 17 ac			
Medium Density Residential	1.9% / 110 ac	Bare Ground	0.6% / 35 ac			
High Density Residential	0.6% / 35 ac	Open Water	5.0% / 290 ac			
Commercial Development	1.2 % / 70 ac	Wetland	2.6% / 151 ac			
Industrial	0.1% / 6.0 ac	Forested	73.2% / 4245 ac			
Institutional	0.1% / 6.0	Transportation	0.6 % / 35 ac			
Turf & Grass	4.6% / 266 ac					

For many years the Farmington River Watershed Association (FRWA) has been performing regular bacteria sampling in Morgan Brook. This regular sampling has revealed steady increases in bacteria concentrations, placing three out of four segments of this watercourse on the List of Waterbodies Not

Meeting Water Quality Standards which has been developed by CT DEEP as required by Section 303(d) of the Federal Clean Water Act (CT DEEP, 2010) (See Appendix E). This list is also known as Connecticut's Impaired Waters List. For details on Morgan Brook see the Assessment Results and Impaired Waters List in the 2010 State of CT Integrated Water Quality Report (CT DEEP, 2010). (See Appendices D and E) Connecticut's Impaired Waters List states the source of the impairments as "unknown".

One way to address water quality problems is to assess the entire watershed and create a United States Environmental Protection Agency (EPA)-approved watershed based plan. This document can then be used to help guide the towns and other stakeholders through a series of priorities that should be addressed in order to remove this stream from Connecticut's Impaired Waters List. These priorities could include increased sampling to narrow down locations of water quality degrading pollutants, retrofitting existing outdated stormwater infrastructure, and rigorous review of development or redevelopment projects that are proposed in the watershed. The overarching goal is to identify and carry out any and all opportunities to reverse the steady increase of water quality degrading pollutants being added to surface water.

Funded in part by the Connecticut Department of Energy & Environmental Protection through a United States Environmental Protection Agency Clean Water Act§319 Nonpoint Source Grant, Northwest Conservation District (NCD) conducted a visual track down survey of the entire Morgan Brook watershed to identify conditions responsible for high bacteria concentrations causing the impairment. The goal of the track down survey was to collect information on all the potential sources of impairment, and design a watershed based plan to layout recommendations to eliminate the sources of bacteria. The next step would be to implement proposed solutions in an effort to have the stream removed from Connecticut's Impaired Waters List. Table 1 and 2 summarize watershed statistics and defining characteristics needed to complete an abbreviated nine-element EPA watershed based plan for Morgan Brook.

US EPA Nine Elements of the Morgan Brook Watershed-Based Plan.

This plan is organized according to the methodology of an abbreviated nine-element EPA watershed based plan for Morgan Brook. The purpose of the plan is to identify the source(s) of the impairment using a qualitative assessment of information gathered by a track down survey. The information gathered during the visual assessment can then be translated into action items that will be used to focus efforts directly on addressing problem area(s).

In addition, a simple pollutant loading model has been employed as a screening tool to identify areas with the largest pollutant loads relative to the size of the land use/land cover types. This can be used to set up a framework that interested parties can use to select the best approaches for addressing potential sources of water quality impairments.

EPA Element One: Impairment

Water Quality Status

The Farmington River Watershed Association (FRWA) has been performing bacteria sampling (including *E. coli*) throughout the Morgan Brook Watershed since 2004. The most recent bacteria sampling took place in July of 2011. The Farmington Valley Health District (FVHD) has also been performing regular *E. coli* sampling at West Hill Pond at two bathing beaches. There are a total of twelve bacteria sampling locations on Morgan Brook (MB), Mallory Brook (ML) and one of its tributaries (Mltrib), and West Hill Pond (WHP). (See Table 3) A map of the Morgan Brook watershed with bacteria sampling locations is included with this Watershed Based Plan. (See Attachment – Interactive Watershed Map) Appendix A contains the results of bacteria sampling in the Morgan Brook Watershed.

Table 3					
Bacteria Sampling Locations					
(sampling resul	ts are included in Appendix A)	1			
Location ID	Location Description	Sampling Organization			
MB-1	B. Sullak Road Stream Crossing, 500 Feet East of W. West Hill Road, Barkhamsted	FRWA			
MB-1.1	B. Sullak Road Tributary to Morgan Brook, Barkhamsted	FRWA			
MB-2	East West Hill Rd Bridge at Rte 44, Barkhamsted	FRWA			
MB-3	Rt 181 Stream Crossing, 400 feet from confluence with Farmington River, Barkhamsted	FRWA			
ML-1	Forest behind Ledgebrook Plaza, Barkhamsted	FRWA			
ML-1.9	100 Feet upstream of ML-2; above beaver dam, Barkhamsted	FRWA			
ML-2	Southwest corner of Mallory Brook Plaza, Barkhamsted	FRWA			
ML-3	Southeast corner of Mallory Brook Plaza, Barkhamsted	FRWA			
Mltrib-4	East side of Mallory Brook Plaza, Barkhamsted	FRWA			
ML-5	Rte 44 Stream Crossing in local basin # 4305-02-2-R1	FRWA			
WHP-1	Brodie Park Beach at West Hill Pond, New Hartford	FVHD			
WHP-2	Dillon Beach at West Hill Pond, New Hartford	FVHD			

Morgan Brook is listed as a Category 5 impaired waterway on Connecticut's List of Impaired Waters according to the reporting requirements for Section 303(d) of the Federal Clean Water Act. Category 5 waters have at least one designated use that cannot be supported and the creation of a Total Maximum Daily Load (TMDL) is needed. In the case of Morgan Brook, the high concentrations of *E. coli* bacteria have impaired three out of four segments of the stream for recreational use.

E. coli concentrations in Morgan Brook regularly exceed the safe threshold for human contact. However, these exceedances are borderline. According to CT DEEP Water Quality Standards, *E. coli* recreational criteria is the geometric mean of samples taken over a 30-day period which needs to be less than 126

Colony Forming Units (CFU) /100 ml, with no sample testing higher than 576 CFU/100 ml for recreational uses other than swimming (CT DEEP, 2011). For designated and non-designated swimming areas, the single sample maximums are 235 CFU /100 ml and 410 CFU /100 ml, respectively. (See Appendix F for Water Quality Criteria for Bacterial Indicators of Sanitary Quality) *E. coli* concentrations in the Morgan Brook watershed have regularly exceeded the geometric mean standard. However, the 576 CFU/100 ml maximum was never exceeded (see Appendix A for sampled bacteria concentrations). Currently, the source of this impairment has not been definitely determined. However, non-point source pollution in uncontrolled stormwater runoff from large impervious surfaces associated primarily with commercial developments high in the watershed is a likely contributing factor.

These large areas of impervious surface are located along a commercially developed stretch of Route 44 in Winchester and Barkhamsted which drain to Mallory Brook, a major tributary of Morgan Brook. Although Mallory Brook has been assessed, it is not listed as impaired. (See Appendix D and Attached – Interactive Watershed Map) This information is a little deceiving, however, because Mallory Brook has not been assessed specifically for recreational use and *E. coli*. Therefore, it is possible that Mallory Brook is actually impaired but sufficient data has not been collected to substantiate this theory. Because FRWA has collected samples showing high bacteria concentrations adjacent to these commercially developed areas, NCD strongly suspects that they are a significant source contributing to the downstream impairment in Morgan Brook. As a result, most of this Watershed Based Plan focuses on this section of the watershed.

Another anomaly is the impairment of the segment of Morgan Brook which is located between the West Hill Pond dam outlet and its confluence with Mallory Brook. (See Appendix E and Attached - Interactive Watershed Map) Morgan Brook originates from West Hill Pond, and regular water quality sampling by FVHD at bathing beaches at either end of this pond have not revealed any water quality problems. In addition, a recent stormwater runoff survey conducted on behalf of West Hill Pond Association by Lenard Engineering, Inc., observes that existing water quality in the pond is excellent and the goal is to maintain or improve these conditions (LEI, 2011). CT DEEP assessment of West Hill Pond shows it to be fully supporting for all uses, including recreational use. (See Appendix D) For these reasons, it appears unlikely that West Hill Pond is contributing to the impairment of the segment of Morgan Brook that flows out of it. Although there is a small cluster of residential and commercial development at the head of Morgan Brook near the lake, NCD did not observe any activities or issues that would necessarily lead to downstream impairment. The rest of this segment of Morgan Brook is mostly forested and undeveloped. (See Figure 1) As NCD's field investigations did not reveal any obvious sources impacting water quality in this stream segment, further investigation of this area is recommended.

Finally, the segment of Morgan Brook that stretches between its confluence with Mallory Brook, downstream to where East West Hill Road crosses it, is also not listed as impaired. (See Appendix E and Attached - Interactive Watershed Map) However, as with Mallory Brook, this segment of Morgan Brook has not been assessed for recreational use and *E. coli*. (See Appendix D) This section is downstream of an impaired segment of Morgan Brook, downstream of Mallory Brook which NCD suspects as being impaired, and just upstream of two contiguous and impaired segments of Morgan Brook. Therefore, it is highly possible that this "unimpaired" segment is also impaired but there currently is not enough data to support this hypothesis.

Identification of Impairment Sources Using Track Down Survey Method

After reviewing existing water quality information, NCD undertook a Track Down Survey to identify potential sources of bacterial impairment as well as other situations that might be impacting water quality. This visual survey of Morgan Brook and its tributaries was conducted in September of 2010 following the methods described in an US EPA approved Track Down Survey Methodology. A more detailed description of the Track Down Survey which utilized the Center for Watershed Protection's Unified Stream Assessment Method Manual #10 is described below. Site impacts were assessed for all potential nonpoint pollution sources observed during the field survey. No water chemistry testing was performed as part of the Track Down Survey. However, the location of bacteria samplings and concentration results collected and analyzed by the Farmington River Watershed Association and the Farmington Valley Health District (Appendix A) have been incorporated into the watershed assessment.

The Track Down Survey was conducted throughout the Morgan Brook Watershed according to a modified version of the Unified Stream Assessment (USA) method developed for small urban watersheds by the Center for Watershed Protection (CWP, 2005). The USA is a protocol for a stream walk assessment that systematically evaluates conditions of stream channels to identify improvement opportunities, including storm water retrofits, stream restoration, riparian management and discharge prevention. The USA method consists of four steps:

- 1) Pre-field Preparation;
- 2) Stream Corridor Assessment;
- 3) Quality Control; and
- 4) Data Evaluation/Interpretation.

NCD conducted the Track Down Survey of Morgan Brook according to these steps, as follows:

1. Pre-field Preparation:

Prior to conducting the surveys, the field team was established and trained, supplies gathered and organized, survey reaches defined, field maps generated, assessment routes and schedules planned, and the public/streamside landowners notified about the surveys. Aerial photos from 2004, topographic maps, and existing data about known problem areas were reviewed to assist in defining survey reaches of uniform character and to familiarize field staff with the area to be surveyed. The watershed contains 11 local basins or sub-watershed areas (identified on accompanying map). The field survey data sheets are identified and organized according to the local basin identification number (e.g., 4305-00-3-R2). District staff also worked with municipal officials in planning and conducting the surveys. Their local knowledge and experience were beneficial in the identification of stream impairments and their sources.

2. Stream Corridor Assessment:

A team of two staff conducted the field surveys. The surveys were conducted in September of 2010 when water flows were slower and water levels lower, making it safe to walk in the stream channel. Surveys were also conducted during dry weather to eliminate the possibility that a rain event might: wash away algae, obscure the presence of aquatic vegetation or otherwise make it difficult to determine normal conditions pertaining to water level, color, odor and turbidity.

Field assessment forms were used to document conditions, problems, and possible restoration/improvement actions. Eight "Impact Assessment Forms" were used to record specific

information about the condition and restorability of individual problem sites identified along the stream corridor. These include: Storm Water Outfalls, Severe Erosion, Impacted Buffers, Utility Impacts, Trash and Debris, Stream Crossings, Channel Modification, and Miscellaneous Impacts. These forms contain questions that collect field data that is important to evaluating pollution source problems, which could include bacteria. Photographs were archived with each survey form to document the condition of the stream at the assessed location. A map of the survey locations with their associated survey data sheets and photos are included in the watershed map on the CD attached to this report. (See Attachment – Interactive Watershed Map)

3. Quality Control:

Field team responsibilities were divided with one member focused on the impact assessment field survey data sheet and the other taking photos and recording GPS locations. The field team walked in an up-stream direction but turned and faced downstream when determining right/left bank issues. Individual impact sites were mapped and photographed as they were encountered, and impact assessment forms completed and ID numbers assigned. Survey data locations and characteristics were compiled in Appendix B. Data was entered immediately after fieldwork was completed, and spot checked by the QA manager. Field team members reviewed draft stream corridor maps with site impact assessment locations to identify inaccuracies in data entry and fill any gaps in stream corridor coverage.

4. Data Evaluation/Interpretation:

<u>Stream Crossings/Stormwater Outfalls</u> - Most of the survey sheets describe the many road crossings in the watershed (Figure 2). Stream crossing survey sheets were completed for thirty-two locations throughout the Morgan Brook watershed (Table 4). All of the stream crossings were stable. However, most had stormwater runoff directly entering the stream from stormwater outfall pipes or by sheet flow. While no one stream crossing stood out as a problem source, collectively, untreated runoff from these locations is likely altering the water quality in Morgan Brook. After reviewing all the



Figure 2 West Hill Road Structured Stream Crossing

potential sources of bacteria and water quality degrading pollutants, stream crossing were assigned a low priority as compared to the problem areas identified by both through visual inspections and the pollutant loading analysis describe below.

Table 4 Field Survey Data Sheets Collected					
ID	Impact Sheet	Sheet Description	No. Completed		
SC	Stream Crossing	Culvert, Bridge or Dam	32		
OT	Stormwater Outfalls	Outfall into	8		
		watercourse			

<u>Agricultural Activities</u> - During the field investigation of the watershed, a small agricultural/livestock operation was noted on Route 44 in the middle of local basin # 4304-02-2-R1. The property was posted so the field team did not walk it. Agricultural operations have the potential to contribute high levels of bacteria to surface water through stormwater runoff.

<u>Impervious Surfaces</u> - Impairment of water quality in a watershed is often caused by uncontrolled stormwater runoff from impervious surfaces. The upper reaches of the Morgan Brook watershed has many acres of impervious surfaces abutting the stream. Most of these expanses of impervious surfaces are associated with commercial and/or transportation-related development. Through land use/land cover analysis as well as field review, NCD identified five key locations where large areas of contiguous impervious surface have no stormwater quality or quantity management measures. In other words, there are no structures that renovate stormwater runoff or even detain and meter it slowly into the surrounding wetlands. Trackdown Field Survey Data Sheets were not created for these large areas of contiguous impervious surfaces because of the lack of a stormwater management system that could be evaluated. The five areas identified and the approximate impervious cover associated with each are as follows:

Green Ridge Condominiums and Former KFC Restaurant,	Winchester	~2 acres
Ledge Brook Plaza, Winchester		~11.4 acres
State Commuter Parking Lot, Barkhamsted		~1 acre
Mallory Brook Plaza, Barkhamsted		~11.6 acres
Car Dealership, Barkhamsted		~4 acres
	Total	~30 acres

The close proximity of these developed areas to Morgan and Mallory Brooks allows stormwater runoff to enter the watercourse directly without any renovation. (See Attachment – Interactive Watershed Map and identified Areas of Concern; Also, see Figures 3, 4 and 5).

The Center for Watershed Protection (CWP) published a research monograph that comprehensively reviews the available scientific data on the impacts of urbanization and impervious surfaces on small streams (Thomas Schueler and Heather K. Holland, 2002). The negative impacts that impervious surfaces can have on waterbodies are generally classified according to four broad categories which look at changes associated with hydrologic, physical, water quality and/or biological indicators. More than 225 research studies were assessed to document the adverse impact of urbanization and impervious surfaces on one or more of these key indicators. In general, most research was focused on smaller watersheds, with drainage areas ranging from a few hundred acres up to ten square miles (Morgan Brook Watershed is 9 sq/mi). One conclusion extracted from the research review is that surface water quality starts to significantly degrade as impervious surface coverage increases in a watershed. Significant impacts occur when impervious cover reaches 10% and above. Currently, impervious surface cover within the entire Morgan Brook Watershed is well below 10%. However, a majority of the large expanses of impervious surfaces with no stormwater controls are within a few feet of the stream, and are concentrated in a headwater region. Therefore, based on the visual inspection of the entire watershed, non-point source pollution from these impervious surfaces is most likely a significant source of the bacteria that is impairing Morgan Brook.

West Hill Pond Storm Water Runoff Survey

The track down survey for the Morgan Brook watershed did not include an assessment of West Hill Pond and its associated watershed. A detailed study was conducted by Lenard Engineering, Inc. for the West Hill Pond Association entitled <u>West Hill Pond Storm Water Runoff Survey</u> (LEI, 2011). This document also contains recommendations for stormwater management (See Appendix C). As discussed previously, NCD does not suspect West Hill Pond of contributing to downstream impairment. (Note – The <u>West Hill</u> <u>Pond Storm Water Survey</u> was funded in part by the CT DEEP through a U.S. EPA CWA Sec. 319 Nonpoint Source Grant to the Connecticut Federation of Lakes under a small grants program for Connecticut lake associations.)

EPA Element Two: Load Reduction

As described previously, the area most likely contributing the largest bacteria loads, relative to the size of the land use category, are the expanses of impervious surfaces associated primarily with commercial and transportation-related development in the upper watershed of the Morgan Brook. These same impervious areas are probably also contributing nonpoint source pollutants such as nutrients and metals that may be degrading the water quality of Morgan Brook, as well.

<u>Bacteria</u> - Unfortunately, at the present time, there is no consistent data documenting the concentrations of *E. coli* generated by different land use/land cover types in the research literature. Therefore, it was not possible to include this information in the pollutant loading calculations described below. However, *E. coli* research, to date, indicates that uncontrolled stormwater runoff from commercial development sites and local/state roadways is often a large source of bacteria contamination in open water systems (Tufford D. and Marshall W., December 2002). The average concentration of *Fecal coliform* bacteria in urban runoff situations is 1,500 col/ml. Although you can not directly extrapolate *E. coli* concentrations from *Fecal coliform* concentrations, it is safe to assume that *E. coli* concentrations would also increase as impervious surfaces areas increase. Since the upper portion of the Morgan Brook watershed has approximately 30 acres of contiguous impervious surfaces that feed directly into Mallory Brook (a major tributary of Morgan Brook), and there are <u>no</u> stormwater quality controls managing runoff from these locations, these areas are likely a significant source of bacteria. Because there is currently no stormwater renovation occurring, any improvements in stormwater management will reduce bacteria loading to the Morgan Brook Watershed.

<u>Other Nonpoint Source Pollutants</u> – NCD also conducted a pollutant loading analysis to better understand other sources of nonpoint pollution in the watershed. The following protocol was used to calculate pollutant loads entering Morgan Brook. Using the calculated areas in Table 1, it is possible to determine the pollutant contribution of each land use/land cover category by using The Simple Method developed by Tom Schueler, 1987, as follows:

The Simple Method: L=0.226(P)(Pj)(Rv)(C)(A) where:

L = Pollutant loads to adjacent water resources in pounds

- P = Annual rainfall depth (inches)
- Pj = Factor to correct for rain events with no runoff

Rv =Runoff coefficient to correct for fraction of rainfall that turns to runoff

I = Impervious coverage where present (acres)

C = Concentration of pollutant (mg/l)

A = Acres of the watershed in specific land use land cover category

0.229= Conversion Factor

The following pollutants were chosen for modeling because of their known adverse impacts to water quality:

- 1) Total Suspended Solids (TSS)
- 2) Total Phosphorus
- 3) Total Nitrogen
- 4) Zinc
- 5) Total Petroleum Hydrocarbons TPH
- 6) Dissolved Nitrogen

Each land use/land cover category contributes different pollutant concentrations (C) to stormwater runoff. Data was gleaned from the resources listed below and included in Table 5.

Table 5							
Pollutant Load Contribution "C" for each Land Use / Land Cover Type							
(pollutant concentration cont	ained in ru	noff mg/	′I)				
	TSS TP TN Zn TPH DIN						
Low Density Residential	60	0.38	2.1	0.16	0.5	0.51	
Medium Density Residential	60	0.3	2.1	0.18	1.25	0.344	
High Density Residential	60	.3	2.1	0.22	1.5	0.344	
Commercial Development	58	0.25	2.6	0.15	3.0	0.324	
Industrial Development	50	0.23	2.1	0.17	3.0	0.324	
Institutional Development	58	0.27	2.1	0.67	3.0	0.521	
Transportation	99	0.25	2.3	0.15	3.0	0.375	
Turf and Grass	357	1.0	2.92	0	0	.215	
Pasture	145	0.38	2.2	0	0	0.65	
Forest	90	0.10	1.5	0	0	0.215	
Wetlands	0	0.38	15	0	0	0	
Bare Ground	1000	0.38	1.5	0	0	0	

1) National Stormwater Quality Database (NSQD), version 1.1-9/4/05 by Maestre &Pitt

- 2) National Urban Runoff Program (NURP), 1983
- 3) University of New Hampshire Stormwater Center

Using the information in Table 5, pollutant load analyses were calculated. The results of these calculations are captured in the Table 6 and Table 7.

Table 6							
Pollutant Loading to Morgan	Brook Wate	ershed b	y Land Us	e / Lan	d Cover Typ	e	
(annual contribution in pound	ds)						
	TSS	ТР	TN	Zn	ТРН	DIN	
Low Density Residential	59,466	376	2,081	160	496	505	
Medium Density Residential	26,168	131	916	77	545	150	
High Density Residential	10,496	52	367	38	262	60	
Commercial Development	36,864	159	1,652	99	1,908	206	
Industrial Development	3,318	9	87	28	124	24	
Institutional Development	2,246	10	77	7	116	20	
Transportation	18,133	46	421	29	549	69	
Turf and Grass	49,068	137	401	0	0	30	
Pasture	13,161	34	200	0	0	59	
Forest	197,924	219	3,298	0	0	473	
Wetlands	0	29	116	0	0	59	
Bare Ground	5705	2	8	0	0	0	
Total	422,549	1,204	9,624	438	4,000	1,655	

Table 7

Pollutant Loading to Morgan Brook Watershed by Land Use / Land Cover Type (percent contribution)

(percent contribution)	(percent contribution)						
	TSS	ТР	TN	Zn	TPH	DIN	
Low Density Residential	14.1%	31.2%	21.6%	36.5%	12.4%	30.5%	
Medium Density Residential	6.2%	10.9%	9.5%	17.6%	13.6%	9.1%	
High Density Residential	2.5%	4.3%	3.8%	8.7%	6.6%	3.6%	
Commercial Development	8.7%	<mark>13.2%</mark>	<mark>17.2%</mark>	22.6%	47.7%	12.4%	
Industrial Development	0.8%	0.7%	0.9%	6.4%	3.1%	1.5%	
Institutional Development	0.5%	0.8%	0.8%	1.6%	2.9%	1.2%	
Transportation	4.3%	3.8%	4.4%	6.6%	13.7%	4.2%	
Turf and Grass	11.6%	11.4%	4.2%	0.0%	0.0%	1.8%	
Pasture	3.1%	2.8%	2.1%	0.0%	0.0%	3.6%	
Forest	46.8%	18.2%	34.3%	0.0%	0.0%	28.6%	
Wetlands	0.0%	2.4%	1.2%	0.0%	0.0%	3.6%	
Bare Ground	1.4%	0.2%	0.1%	0.0%	0.0%	0.0%	
Total	100%	100%	100%	100%	100%	100%	

Commercial development only makes up 1.2% of the total watershed yet, proportionately it contributes a significant amount - 13.2% and 17.2% - of the total phosphorus and nitrogen load to the watershed. (See highlighted text in Table 7) As described previously, it is reasonable to predict that the commercially developed areas are also generating high concentrations of bacteria (Tufford D. and Marshall W., December 2002). This loading analysis of land use/land cover types directed our approach to focus on stormwater management of the large expanses of impervious surface associated primarily with commercial development. Because there is currently no stormwater renovation occurring, any improvements in stormwater management will reduce nutrient and metal loadings, and most likely bacteria loading as well, to the Morgan Brook Watershed.

West Hill Pond Storm Water Runoff Survey

The West Hill Pond Storm Water Survey (LEI, 2011) documents and ranks locations around West Hill Pond that contribute to pollutant loads. This document ranks stormwater infrastructure retrofits that would work best to reduce pollutant loads to the pond. (See Appendix C).

EPA Element Three: Management Measures

This section primarily focuses on impervious surfaces since these are suspected of being the primary sources of bacteria and other nonpoint source pollutants. Most of the large scale commercial development as well as transportation infrastructure - and associated expanses of impervious surface - within the Morgan Brook watershed were built before the concepts and strategies of Low Impact Development (LID) were common practice. Since the commercial and other developed areas are tightly grouped in one section of the watershed, it would be most efficient to start water quality management efforts in these locations.

Bacteria removal efficiencies of LID structures as well as traditional stormwater management structures are variable and tough to predict. However, one particular journal article advises that the best management practices for reducing bacteria concentrations in runoff are bio-retention structures and stormwater retention ponds (Stormwater, May 2008). The key to effective bacteria reduction in stormwater is to pass it through structures that retain water which allows for one or more of the following processes to occur:

- o Photo-degradation by sunlight
- o Microbial predation
- o Filtration through soils or sediments that contain a high organic component
- o Sedimentation
- o Creation of an anaerobic environment

Gravel Wetlands do not fall into the category of bio-retention structures or stormwater management ponds but also provide the above mentioned elements that have been proven to increase *E. coli* die off rates. The processes listed above are also very efficient at removing most other pollutants generated by impervious surfaces.

Although bacteria removal efficiencies are difficult to predict, load reduction efficiencies for other types of nonpoint source pollutants, using different types of LID stormwater management structures have been well documented. (See Table 8) These stormwater water management structures should also reduce bacteria concentrations because they incorporate one or more of the processes described previously.

Table 8 Stormwater Quality and Quantity Management Structures Pollutant Removal Efficiency Rate (% removal)

Pollutant Remo	Pollutant Removal Efficiency Rate (<i>% removal</i>)								
	Total	Total	Total			Total	Total		
	Suspended	Phosphorus	Nitrogen	Zinc	Copper	Petroleum	Dissolved	Source	
	Solids					Hydro-	Nitrogen		
						carbons			
Bioretention /	99	5	29	99	97	58	29	UNHS	
Rain Garden								C07	
Vegetated								UNHS	
Swale	60	0	0	88	0	67	0	C07	
Tree Box Filter	96	0	37	96	0	88	37	UNHS	
Thee box much	50	0	57	50	Ũ			C07	
Pond /									
Wetland	71	56	19	56	59	0	40	NPRD	
System								07	
Extended								NPRD	
Detention	69	39	56	0	0	4	35	07	
Wetland				-	-				
Surface Sand								NPRD	
Filter	87	59	32	80	49	98	0	07	
Grass Filter					-			NPRD	
Strip	68	29	0	45	42	0	0	07	
Infiltration				_				NPRD	
Trench	0	90	42	0	0	0	82	07	
Gravel				-	-			UNHS	
Wetland	99	55	99	99	99	99	99	C07	
Porous								UNHS	
Asphalt	99	38	0	96	0	99	0	C07	
Sources: Univer	sity of New H	amnshire Stor	rmwater Ce	nter — 1	<u>1 ~</u> 2007 Δηρι	ial Report (III		1	
Sources. Oniversity of New Hampshile Stormwater Center – 2007 Annual Nepolt (UNHSCO7)									

National Pollutant Removal Database, Version 3, 2007 (NPRD07)

As described previously, five areas in the upper watershed most likely contribute significant bacteria and other nonpoint source pollutant loads to Morgan Brook. Management measures recommended for each of these five areas are as follows:

<u>Green Ridge Condominiums and the former</u> <u>KFC Restaurant</u> (Winchester) - In this location, approximately 2 acres of impervious surface drains directly to Mallory Brook via a rip-rap channel with no visible control technology at the outlet (Figure 3).



Fig- 3 Green Ridge Condominium and Former KFC Restaurant

Given the space constraints, there are a limited choice of stormwater management retrofits that would be effective in this developed area. Stormwater management strategies could be dispersed throughout the development to cumulatively renovate stormwater so that end of pipe discharges would have reduced pollutant loads.

Stormwater management practices appropriate for use throughout the condominium development and KFC include underground sand filters, infiltration trenches and bioretention areas. These measures are commonly used when space is limited.

<u>Ledgebrook Plaza</u> (Winchester) - Ledgebrook Plaza contains approximately 11.4 acres of contiguous impervious surfaces that drain directly to Mallory Brook (Figure 4). Currently there is no stormwater quality or quantity management of runoff from this area. The health of Mallory Brook – and subsequently Morgan Brook - would benefit greatly if runoff from this commercial development were routed through a properly sized gravel wetland or extended detention wetland.



Figure 4 – Ledge Brook Plaza and State Commuter Parking Lot

<u>State Commuter Parking Lot</u> (Barkhamsted) - The State Commuter Parking Lot adjacent to Ledgebrook Plaza is almost 1 acre of pavement with no stormwater management measures (Figure 4). A simple bioretention measure or infiltration trench structure would help protect the water quality in Mallory Brook. <u>Mallory Brook Plaza</u> (Barkhamsted) - Mallory Brook Plaza on Route 44 contains approximately 11.6 acres of contiguous impervious surfaces that drain directly to Mallory Brook (Figure 5). Currently there is no stormwater quality or quantity management in this area. It is recommended that runoff from this commercial development be routed through a properly sized gravel wetland or extended detention wetland. However, it may be necessary to use the combination of a smaller sized gravel wetland and extended detention wetland in a treatment train, given the extremely flat nature of the site.

In addition, the stream has been ditched between the Mallory Brook Plaza parking area and Route 44. Water quality would be improved if this portion of Mallory Brook could be returned to a more naturalized channel with meanders, pools and riffles. The ability for a stream to buffer against pollutant loading is greatly reduced when a stream is not allowed a more natural morphology. In other words, streams with a series of natural meanders pools and riffles, creating a diverse habitat for plants and animals, is better equipped to handle and renovate pollutant loads. Restoring stream morphology is an important retrofit consideration for this area.



Figure 5 Commercial Development and Car Dealership

<u>Car Dealership</u> (Barkhamsted) - A car dealership on the south side of Route 44 roughly opposite the Mallory Brook Plaza has 4 acres of contiguous impervious surfaces that drain directly to Mallory Brook (Figure 5). Stormwater quality management structure(s) are needed to treat stormwater runoff from the parking area and roof. Treatment systems could include a bio retention area, sand filter and perimeter bioswale. To minimize pollutants loads from generalized sheetflow, a filter strip should be combined with reestablishment of a riparian buffer.

<u>Agriculture</u> - To make sure the previously described agricultural operation is not or will not become a significant source of bacteria, NCD will approach the farm manager with assistance through a Conservation Technical Assistance Grant that is administered through the United States Department of Agriculture – Natural Resource Conservation Service USDA-NRCS.

West Hill Pond Storm Water Runoff Survey

As described previously, the West Hill Pond Storm Water Survey (LEI, 2011) contains recommendations for stormwater infrastructure retrofits that would work best to reduce pollutant loads to the pond. (See Appendix C).

<u>Future Development</u> - NCD also will continue to review development and re-development projects in the watershed to ensure the latest water quality management techniques are being employed. This will protect and improve the water quality in the Morgan Brook Watershed.

EPA Element Four: Technical and Financial Assistance

The approximate costs associated with design, permitting and construction of the stormwater structures discussed in the preceding section are as follows:

Greenridge Condominiums and Former KFC

See discussion under EPA Element Three – Management Measures. A more detailed assessment of stormwater management opportunities is needed to identify the most effective measures that would work on these challenging properties.

Ledge Brook Plaza

The University of New Hampshire just completed construction of a 1 acre Gravel Wetland that services 11 acres of impervious surfaces at a shopping plaza. The cost of constructing this 1 acre Gravel Wetland was over \$200,000. Given that Ledge Brook Plaza also encompasses approximately 11 acres of impervious surface, NCD assumes that a gravel wetland retrofit for this area would also need to be at least one acre in size, and the cost would be approximately the same.

State Commuter Parking Lot

Installation cost of a bioretention structure would be approximately \$20,000, and an infiltration trench would cost \$30,000. A feasibility study would be needed to determine what the site conditions are, and which of these structures would be the most effective at treating stormwater at this site.

Mallory Brook Plaza

Similar to Ledge Brook Plaza, Mallory Brook Plaza would need a 1 acre Gravel Wetland installed for a cost of approximately \$200,000. An alternative that may be cheaper to install would be an Extended Detention Wetland. The cost of a one acre Extended Detention Wetland would be approximately \$150,000. It is difficult to estimate the cost of recreating a natural stream channel. However, this practice could be expensive, but efficiencies could be incorporated while implementing the recommended structures above.

Car Dealership

Stormwater quality management structure(s) to treat stormwater runoff from the parking area and roof could include any combination from the list below:

- 1) a bioretention area (\$35,000)
- 2) a sand filter (\$50,000)
- 3) a perimeter bioswale (\$15,000)

Meanwhile, regrading and creating a vegetated filter strip in combination with a riparian buffer along Mallory Brook could be installed at a cost of approximately \$30,000. This is assuming a 30 foot wide filter strip running for 150 feet along the stream bank.

Overall, the installation of the proper stormwater treatment infrastructure and reestablishment of a more natural stream channel in the upper Morgan Brook watershed could exceed \$1,000,000. Funding and in kind services to design, permit and construct stormwater treatment structures in the upper Morgan Brook Watershed will need to originate from a number of private and public sources. These could include:

- 1) Commercial Property Owners
- 2) Towns of Winchester and Barkhamsted
- 3) Farmington River Coordinating Committee
- 4) Farmington River Watershed Association
- 5) Northwest Conservation District
- 6) Small Town Economic Assistance Program (STEAP) Grant
- 7) EPA Section §319 of the Clean Water Act Grant

Many of the entities listed above will need to be stakeholders along with NCD in implementing this Watershed Based Plan.

West Hill Pond Storm Water Runoff Survey

The West Hill Pond Survey (LEI, 2011) describes the cost associated with each stormwater retrofit recommendation. All the recommendations made in the survey would reduce pollutant loads to the pond, and protect and improve downstream water quality in Morgan Brook. (See Appendix C).

EPA Element Five: Public Information and Education

NCD has presented the results of the Watershed Based Plan to both the Town of Winchester Inland Wetland Commission and the Planning and Zoning Commission. NCD has also met with the First Selectman and Land use Administrator from the Towns of New Hartford and Barkhamsted to discuss the results of the Morgan Brook Watershed Based Plan (WBP). NCD will also provide each town with a hard copy and digital copy of the final Watershed Based Plan and map. NCD plans to continue working with the towns and other watershed stakeholders to facilitate small group brainstorming sessions to coordinate implementation of the Watershed Based Plan. Participation from Federal, State, municipal, non-profit and private sector entities will all be needed to achieve water quality improvement goals.

EPA Element Six and Seven: Implementation Schedule and Cost

In the grid below, projects have been ranked from highest to lowest priority, according to the greatest potential to reduce pollutant loading. The ranking was accomplished by looking at the amount of impervious surface that lacked water quality treatment and the ease of installing stormwater retrofits.

Project Priority Rank	Retrofit Installation and Estimated Cost	Proposed Time Frame: BMP research, project design, permitting and implementation
1. Ledge Brook Plaza	Gravel Wetland or Extended Detention Wetland (\$200,000 to \$250,000)	2 years
2. Mallory Brook Plaza	Gravel Wetland and/or Extended Detention Wetland (\$200,000 and/or \$150,000) Stream Morphology Repair (Cost unknown)	2 years
3. Car Dealership	 Bioretention Area (\$35,000) Sand Filter (\$50,000) Perimeter Bioswale (\$15,000) Riparian Buffer & Filter Strip (\$30,000) 	1.5 years
4. State Commuter Parking Lot	Bioretention (\$20,000 or Infiltration Trench, \$30,000)	0.5 years
5. Green Ridge Condominiums / KFC Restaurant	Bioretention (\$20,000 each) Infiltration Trenches (\$30,000 each) Sand Filter (\$50,00)	To Be Determined

Time estimates regarding the above proposed projects take into account the need for: more detailed site investigation, refinement of structure selection, property owner permission, engineered design, permitting and construction. Actual start date of implementation on any of these proposed measures will depend on developing cooperative relationships with property owners and other stakeholders, and raising adequate funds.

EPA Elements Eight and Nine: Milestones and Monitoring

Performance of stormwater management structures to treat runoff from all the impervious surfaces in the upper water will be measured by stream water quality monitoring. The Farmington River Watershed Association plans to continue sampling for bacteria from April through November at their established

sampling locations. In addition, Farmington Valley Health District will continue to sample West Hill Pond public swimming areas. Continued sampling for bacteria throughout the watershed will indicate if retrofit installations are effective. As discussed previously, the bacteria concentrations that trigger the impairment are borderline exceedances. Therefore, if any one of the problem areas is addressed, there is the potential that bacteria levels will drop to levels that would allow Morgan Brook and Mallory Brook to be removed from the Impaired Waters List.

Conclusion

After walking the entire watershed and performing visual inspections of all the stream channels and riparian corridors, NCD concluded that large areas of impervious surface associated primarily with dense commercial development in the upper watershed is the dominant factor contributing to the bacteria impairment of Morgan Brook. The fact that these large commercial developments are in the headwaters of the watershed makes management of stormwater a high priority. Degrading water quality and altering runoff volumes in the upper watershed can amplify problems throughout a watershed. Given the complete lack of stormwater management in this developed area, any stormwater improvements will bring measurable reductions in bacteria, nutrients and other nonpoint source pollutant loads. Managing stormwater will also reduce erosion throughout the watershed which will also improve water quality. NCD looks forward to working with the property owners, Towns of Barkhamsted and Winchester, and other stakeholder to address these important water quality management issues in the Morgan Brook watershed.

APPENDICES

Appendix A – Morgan Brook Bacteria Sampling Locations and Results

- Appendix B Track Down Survey Field Data Sheets with Photos (referenced on interactive map)
- Appendix C West Hill Pond Water Runoff Survey
- Appendix D 305(b) Assessment Results for Morgan Brook and Mallory Brook from 2010 Connecticut Integrated Water Quality Report
- Appendix E 303(d) Impaired Water Listings for Morgan and Mallory Brook from 2010 Connecticut Integrated Water Quality Report
- Appendix F Water Quality Criteria for Bacterial Indicators of Sanitary Quality From 2011 Connecticut Water Quality Standards
- Attachment Interactive Watershed Map Morgan Brook Impaired Watershed Study Area Map

Any comments or questions regarding this plan should be directed to the Northwest Conservation District Sean Hayden, Executive Director seanhayden@conservect.org 1185 New Litchfield Street Torrington CT 06790 Phone: (860)-626-7222

References

Bioretention Manual - Department of Environmental Resources, Prince Georges County Maryland, 2002

Clary, J, Jones, J, Urbonas, B, Quigley, M, Strecker, E, Wagner, T. 2008. Can Stormwater Management Measures Remove Bacteria? Stormwater The Journal For Surface Water Quality Professionals, Vol 9, No. 3.

CT DEP: <u>2004 Stormwater Quality Manual</u>. Available from: <u>http://www.dep.state.ct.us/wtr/stormwater/strmwtrman.htm</u>

CT DEEP. 2011. Water Quality Standards. Hartford (CT): Bureau of Water Protection and Land Reuse Planning and Standards Division. Available from: http://www.ct.gov/dep/lib/dep/water/water_quality_standards/wqs_final_adopted_2_25_11.pdf

CT DEEP. 2010. State of Connecticut Integrated Water Quality Report, finalized May 2011.

CT LID Inventory by NEMO. Available from: clear.uconn.edu/tools/lid/lid search.asp

CWP, 2005. Center for Watershed Protection Unified Stream Assessment: A Users Manual, Version 2.0

Lake George Waterkeeper – Do-It-Yourself Water Quality , A Landowner's

<u>Guide To Property Management That Protects Lake George.</u> Available from: <u>www.fundforlakegeorge.org</u>

Lenard Engineering, Inc. 2011. <u>West Hill Pond Stormwater Runoff Survey</u>, prepared for West Hill Pond Association by Lenard Engineering Inc.

<u>Low Impact Development – A Design Manual for Urban Areas</u>, published by the Arkansas University Press, 2010.

The Low Impact Development Center, Inc. Sustainable Design and Water Quality Research. Available from: <u>http://www.lowimpactdevelopment.org</u>

Metropolitan Area Planning Council, Smart Growth and Regional Collaboration. Available from: <u>http://www.mapc.org/resources/low-impact-dev-toolkit</u>

New Hampshire Stormwater Manual. Available from: http://des.nh.gov/organization/divisions/water/stormwater/manual.htm

The New York State Stormwater Management Design Manual. Available from: <u>http://www.dec.ny.gov/chemical/29072.html</u>

North Carolina State University, College of Agriculture and Life Sciences College of Engineering, Stormwater Engineering Group. Available from: <u>http://www.bae.ncsu.edu/stormwater/pubs.htm</u>

Overland Park Kansas Stormwater Resources Center. Available from: http://www.opkansas.org/Doing-Business/Stormwater-Resources

<u>Rain Gardens, A How To Manual for Homeowners</u>, Wisconsin Department of Natural Resources. Available from: <u>http://learningstore.uwex.edu/assets/pdfs/GWQ037.pdf</u>

Schueler, Thomas R., Holland, Heather K. The Practice of Watershed Protection. Ellicot City (MD): Center for Watershed Protection; 2010.

(Stormwater, May 2008) *Stormwater* - *The Journal for Surface Water Quality Professionals* – <u>Can</u> <u>Stormwater Management Measures Remove Bacteria</u>? Stormwater, May 2008)

Tufford DL, Marshall WD. 2002. Fecal Coliform Source Assessment in a Small, Mixed Land use Watershed. Journal of the American Water Resources Association (JAWRA) Vol. 38 (6).

UCONN Cooperative Extension Rain Garden Manual. Available from: <u>www.sustainability.uconn.edu/landscape/05-rain_gardens.html</u>

UCONN Cooperative Extension Jordan Cove Project. Available from: www.cag.uconn.edu/nrme/jordancove/

UNH Stormwater Center. Available from: <u>www.unh.edu/erg/cstev</u>







Northwest Conservation District 1185 New Litchfield Street Torrington, CT 06790 www.conservect.org/northwest

Map produced August 1, 2011 revisions/updates: May 25, 2012, August 14, 2012 by NCD GIS Center Project #07-04e, Task 1.A.(3)

Sources: -Connecticut Department of Environmental Protection, Environmental Geographic Information Center (EGIC) -Connecticut Department of Transportation -TeleAtlas -Bacteria Sampling Locations provided by the Farmington River Watershed Association (FRWA) & Farmington Valley Heath District (FVHD) -GPS data collection by Northwest Conservation District

file:MorganBrkImpairedWshdStudyV3.pdf

Morgan Brook Impaired Watershed Study Area Section 319 Nonpoint Source Mgmt Program** Map Key

C Morgan Brook Subregional Watershed (4305) C Waterbody

- *Local Basins w/ ID (e.g.,4305-00-2-R1)*
- Municipal Boundary
- CT Impaired Waters 303(d) 2010 (subset CT 305(b) Assessed Waters 2010) Morgan Brook
- *~~~ Other Water Course*
- *~~~~* Intermittent Water Course
- ─ Primary Route
- \sim Secondary Route
- Local Road/Throroughfare
- 4WD Road / Trail

- Marsh/Swamp
- Track Down Feature
 - Storm Water Outfall
 - Structured Steam Crossing
- FVHD-Bacteria Sampling Location
- FRWA-Bacteria Sampling Location
- Areas of Concern







**Funded in part by CT DEEP through a US EPA Clean Water Act §319 Non Point Source Grant http://www.epa.gov/owow_keep/NPS/cwact.html

APPENDIX - A Morgan Brook Watershed Management Plan Bacteria Sampling Results - Morgan Brook Watershed

Sample Location	Sample Date	Analyte	Concentration cfu/100 mL
MB-1	4/15/09	Fecal Coliform via membrane filtration	7
MB-1	4/15/09	E. coli via MI agar	11
MB-1	5/13/09	Fecal Coliform via membrane filtration	28
MB-1	5/13/09	E. coli via MI agar	48
MB-1	6/10/09	MF_FC	80
MB-1	6/10/09	MF_MI	72
MB-1	7/8/09	Fecal Coliform via membrane filtration	48
MB-1	7/8/09	E. coli via MI agar	34
MB-1	9/14/09	Total coliform	697
MB-1	9/14/09	E.coli	31
MB-1	9/21/09	Total coliform	1,046
MB-1	9/21/09	E.coli	12
MB-1	9/28/09	Total coliform	3,968
MB-1	9/28/09	E.coli	231
MB-1	10/5/09	Total coliform	1,483
MB-1	10/5/09	E.coli	10
MB-1	10/7/09	Fecal Coliform via membrane filtration	110
MB-1	10/7/09	E. coli via MI agar	190
MB-1	4/28/10	Fecal Coliform via membrane filtration	48
MB-1	4/28/10	E. coli via MI agar	58
MB-1	7/7/10	Fecal Coliform via membrane filtration	40
MB-1	7/7/10	E. coli via MI agar	100
MB-1	11/3/10	Fecal Coliform via membrane filtration	60
MB-1	11/3/10	E. coli via MI agar	80
MB-1.1	9/21/09	Total coliform	727
MB-1.1	9/21/09	E.coli	33
MB-1.1	9/28/09	Total coliform	5,172
MB-1.1	9/28/09	E.coli	199
MB-1.1	10/5/09	Total coliform	1,483
MB-1.1	10/5/09	E.coli	52
MB-1.1	10/5/09	Total coliform	9,804
MB-1.1	10/5/09	E.coli	41
MB-2	4/15/09	Fecal Coliform via membrane filtration	4
MB-2	4/15/09	E. coli via MI agar	4
MB-2	5/13/09	Fecal Coliform via membrane filtration	80
MB-2	5/13/09	E. coli via MI agar	74
MB-2	6/10/09	MF_FC	265
MB-2	6/10/09	MF_MI	400
MB-2	7/8/09	Fecal Coliform via membrane filtration	27
MB-2	7/8/09	E. coli via MI agar	21
MB-2	9/14/09	Total coliform	1,918
MB-2	9/14/09	E.COII	110
MB-2	9/21/09	I otal collform	2,420
MB-2	9/21/09	E.COII	28
MB-Z	9/28/09		11,199
MB-Z	9/28/09	E.COII	091
MB-Z	10/5/09	l otal collform	2,105
MD 2	10/5/09	E.COll	41 200
MD 2	10/7/09		200
MB-2	10/7/09	E. coli via Mi agar	200
MB-2	4/28/10	recai Colliorm via membrane filtration	/b 100
MD 2	4/20/10	E. COII VIA MI agar	100
MD 2	7/7/10		50 1E0
MD 2	////10	E. COII VIA MI agar Focal Coliform via mombrano filtration	150
MR_2	11/3/10	F coli via M ager	28
1410-7	11/3/10	E. COII VIA MI AGAI	20

Morgan Brook Watershed Management Plan Bacteria Sampling Results - Morgan Brook Watershed

Sample Location	Sample Date	Analyte	Concentration cfu/100 mL
MB-3	4/15/09	Fecal Coliform via membrane filtration	8
MB-3	4/15/09	E. coll via MI agar	6
MD 2	5/13/09	Fecal Colliorm via memorane intration	90
MB-3	5/15/09 6/10/09	E. COII VIA MI AGAI ME EC	00 38
MB-3	6/10/09	MIT_IC ME MI	34
MB-3	7/8/09	Fecal Coliform via membrane filtration	21
MB-3	7/8/09	F coli via MI agar	15
MB-3	9/14/09	Total coliform	1 354
MB-3	9/14/09	E.coli	30
MB-3	9/21/09	Total coliform	866
MB-3	9/21/09	E.coli	7
MB-3	9/28/09	Total coliform	12,997
MB-3	9/28/09	E.coli	448
MB-3	10/5/09	Total coliform	1,374
MB-3	10/5/09	E.coli	31
MB-3	10/7/09	Fecal Coliform via membrane filtration	225
MB-3	10/7/09	E. coli via MI agar	110
MB-3	4/28/10	Fecal Coliform via membrane filtration	36
MB-3	4/28/10	E. coli via MI agar	40
MB-3	7/7/10	Fecal Coliform via membrane filtration	30
MB-3	7/7/10	E. coli via MI agar	20
MB-3	11/3/10	Fecal Coliform via membrane filtration	12
MB-3	11/3/10	E. coli via MI agar	8
ML-1	9/14/09	Total coliform	6.488
ML-1	9/14/09	E.coli	41
ML-1	9/21/09	Total coliform	1,300
ML-1	9/21/09	E.coli	17
ML-1	9/28/09	Total coliform	2,909
ML-1	9/28/09	E.coli	86
ML-1	10/5/09	Total coliform	958
ML-1	10/5/09	E.coli	20
ML-1.9	9/21/09	Total coliform	2,420
ML-1.9	9/21/09	E.coli	162
ML-1.9	9/28/09	Total coliform	19,863
ML-1.9	9/28/09	E.coli	305
ML-1.9	10/5/09	Total coliform	2,755
ML-1.9	10/5/09	E.coli	98
ML-2	9/14/09	Total coliform	4,106
ML-2	9/14/09	E.coli	52
ML-2	9/21/09	Total coliform	2,420
ML-2	9/21/09	E.coli	104
ML-2	9/28/09	Total coliform	11,199
ML-Z	9/28/09	E.COII	432
ML-Z	10/5/09	Total collorm	3,054
IVI L-Z	10/2/09	E.coli	00
ML-3	9/14/09	Total coliform	10,462
ML-3	9/14/09	E.coli	86
ML-3	9/21/09	Total coliform	2,420
ML-3	9/21/09	E.coli	81
ML-3	9/28/09	Total coliform	4,907
ML-3	9/28/09	E.COli	262
ML-3	10/5/09	I otal collform	1,989 21
IVIL-3	10/5/09	E.COII	21

Morgan Brook Watershed Management Plan Bacteria Sampling Results - Morgan Brook Watershed

Sample Location	Sample Date	Analyte	Concentration cfu/100 mL
Mltrib-4 Mltrib-4 Mltrib-4 Mltrib-4 Mltrib-4 Mltrib-4 Mltrib-4	9/14/09 9/14/09 9/21/09 9/21/09 9/28/09 9/28/09 10/5/09 10/5/09	Total coliform E.coli Total coliform E.coli Total coliform E.coli Total coliform E.coli	4,884 31 2,420 73 5,172 85 15,531 51
ML-5 ML-5	10/5/09 10/5/09	Total coliform E.coli	4,106 241
WHP-1 WHP-1	6/10/2008 6/26/2008 7/15/2008 8/14/2008 8/14/2009 6/18/2009 6/29/2009 7/14/2009 8/4/2009 8/11/2009 8/18/2009 9/1/2009 6/8/2010 6/24/2010 7/27/2010 8/17/2010 8/31/2010 6/20/2011 7/7/2011	E.coli E.coli	<10 10 <10 10 10 <10 10 <10 10 <10 <10 <
WHP-2 WHP-2	6/10/2008 6/26/2008 7/17/2008 7/29/2008 8/14/2008 8/26/2009 6/29/2009 6/29/2009 6/29/2009 6/29/2009 6/3/2010 6/24/2010 7/8/2010 7/8/2010 8/17/2010 8/17/2010 6/7/2011 7/7/2011	E.coli E.coli	42 <10 <10 10 10 <10 <10 <10 31 20 10 <10 10 <10 10 <10 10 <10 10

Appendix - B Morgan Brook Watershed Section 319 Nonpoint Source Management Progam Track Down Survey Summary Table

Map ID	Site ID ⁽¹⁾ Survey Form #	Site ID Local Basin #	Latidude	Longitude
1	4305-00-1_SCa	4305-00-1	41º53'29.2"N	73º2'9.89''W
2	4305-00-1_SCb	4305-00-1	41º53'30.35"N	73º2'5.22''W
3	4305-00-1_SCc	4305-00-1	41º53'43.97"N	73º1'51.99''W
4	4305-00-1_SCd	4305-00-1	41º54'9.06"N	73º2'3.14"W
5	4305-00-1-L1_OTa	4305-00-1-L1	41º52'22.34"N	73º2'38.38''W
6	4305-00-1-L1_SCa	4305-00-1-L1	41º53'26.45"N	73º2'12.01''W
7	4305-00-1-L1_SCb	4305-00-1-L1	41º53'2.18"N	73º2'42.91"W
8	4305-00-1-L1_SCc	4305-00-1-L1	41º52'21.1"N	73º2'20.05''W
9	4305-00-1-L1_SCd	4305-00-1-L1	41º52'21.93"N	73º2'37.23''W
10	4305-00-3-R1_OTa	4305-00-3-R1	41º54'23.72''N	72º59'54.52''W
11	4305-00-3-R1_SCa	4305-00-3-R1	41º54'30.51"N	73º0'2.04''W
12	4305-00-3-R1_SCb	4305-00-3-R1	41º54'41.39"N	73º0'29.62''W
13	4305-00-3-R1_SCc	4305-00-3-R1	41º54'44.51"N	73º1'3.97''W
14	4305-00-3-R1_SCd	4305-00-3-R1	41º54'31.63"N	72º59'56.64''W
15	4305-00-3-R2_OTa	4305-00-3-R2	41º54'16.69"N	72⁰59'46.77''W
16	4305-00-3-R2_SCa	4305-00-3-R2	41º54'6.01''N	72⁰59'21.87''W
17	4305-00-3-R2_SCb	4305-00-3-R2	41º54'8.25"N	72º59'33.16''W
18	4305-01-1_OTa	4305-01-1	41º53'17.72''N	73º1'13.9"W
19	4305-01-1_SCa	4305-01-1	41º53'53.03"N	73º1'30.56"W
20	4305-02-1_OTa	4305-02-1	41º54'42.9"N	73º3'6.93''W
21	4305-02-1_OTb	4305-02-1	41º54'38.1"N	73º3'2.05''W
22	4305-02-1_OTc	4305-02-1	41º54'34.57''N	73º2'36.06''W
23	4305-02-1_OTd	4305-02-1	41º54'33.08"N	73º2'54.6''W
24	4305-02-1_SCa	4305-02-1	41º54'38.79"N	73º2'28.73''W
25	4305-02-1_SCb	4305-02-1	41º54'35.54"N	73º2'57.35''W
26	4305-02-1_SCc	4305-02-1	41º54'41.87''N	73º3'3.54''W
27	4305-02-1_SCd	4305-02-1	41º54'41.99"N	73º3'4.33''W
28	4305-02-1_SCe	4305-02-1	41º54'35.16"N	73º2'36.28''W
29	4305-02-1_SCf	4305-02-1	41º54'32.98"N	73º2'53.5"W
30	4305-02-1_SCg	4305-02-1	41º54'48.78"N	73º3'5.93''W
31	4305-02-1_SCh	4305-02-1	41º54'48.07''N	73º3'6.23"W
32	4305-02-2-R1_SCa	4305-02-2-R1	41º54'43.35"N	73º1'37''W
33	4305-02-2-R1_SCb	4305-02-2-R1	41º54'42.22"N	73º2'19.02''W
34	4305-03-1_SCa	4305-03-1	41º54'46.75"N	73º2'27.17''W
35	4305-04-1_SCa	4305-04-1	41º54'18.77"N	72⁰59'52.66''W
36	4305-04-1_SCb	4305-04-1	41º53'53.24"N	73º1'22.22''W
37	4305-04-1_SCc	4305-04-1	41º54'0.93"N	73º1'1.03''W
38	4305-04-1_SCd	4305-04-1	41º54'4.37''N	73º0'24.11''W
39	4305-04-1_SCe	4305-04-1	41º53'49.49"N	73º1'7.41"W
40	4305-04-1_SCf	4305-04-1	41º53'21.63"N	73º0'53''W

(1): SC = Structured Stream Crossing, OT = Storm Water Outfall

Map #1



						1			1		
WATERSH	ED/SUBSHE	D: 4305-00-1				DA	TE: <u>11</u>	/ 19 / 2010	ASSESSI	ED BY: SH, MN	1
SURVEY R	EACH ID:		TIME	<u>9</u> :10	<u>AMYPM</u>	Рн	ΟΤΟ ΙΙ): (Camera-Pic #	^t)	/#00-1-SC-a,	jpg
SITE ID: (C	Condition-#)	SC- <u>A</u>	LAT <u>41</u>	o 53	<u>' 29.20</u> '' LONG	73 o	02	09.89 '' LM	K	GPS (Unit II	D) ^{R1}
TYPE: 🕅 F	Road Crossin	g 🗌 Railroad	Crossing	🔄 Dam	Footbridge	Geol	ogical F	ormation (+/- 2ft c	hange)	Other:	
	CROSSING	G SHAPE:	# BA	RRELS:	MATERIAL:			NMENT:	DIMENSI	ONS: (if varies s	ketch)
	Arch	Circular	Sin Sin	ngle	Metal (smooth)			ow-aligned	Barrel diar	meter: <u>3</u>	(ft)
	Box D Bottom	flared ends		ouble	Metal (corrugated)			Not flow-aligned		Height: <u>3</u>	(ft)
ROAD OR	Elliptic	al		ipie ther:	Other:	cu)		toward RT bank	Culvert ler	ngth: <u>45</u>	(ft)
K AILKOAD CROSSING		w1		liter.			Do	not know	,	Width: 4	(ft)
ONLY	CONDITIO	DN: (Evidence of)			CULV	ERT SLOPE:	Roadway e	elevation: <u>6</u>	(ft)	
	Crackir	ng/chipping/cor	rosion	Downstre	am scour hole		🗌 Fla	at			
	Sedime	nt deposition		Failing en	nbankment		🔽 Sli	ght $(2^{\circ} - 5^{\circ})$	UNDERSI	ZED?	
	Collect	ed organic debr	is 🗌	Other:			Ob	ovious (>5°)	No 🗌	Yes 🗌 Unsure	
				M	ATERIAL:		_	_		** * 4 .	
		Manmade			Concrete (poured	or <u>bl</u>	<u>lock</u>) [Dry stone		Height:	(ft)
DAMS	TYPE:	Mortared stone MATERIAL:					bion _] Other:			
		Active Bea	aver		ATERIAL:	,	Small u	woody debris		Height:	(ft)
			Ioneu Beav		Large woody debits	, П	Sinan v				
POTENTIA	L RESTORA	TION CANDID		l Fish bar	rier removal 🗌 Fisl	n pass	sage [Upstream storag	e retrofit	Stream repai	ir
⊠ no				Culvert i	repair/replacement	⊐ Be	eaver de	ceiver/removal	l Other		
		DE CONTROL	 גי	l No		know	m		0.000		
If yes	Total	\square PHYSICAL .	BLOCKA (tial	JE:			DLUCI		• (<i>circie π</i>)	A tomporary barri	orsuch
for fish	Tempor	rary 🗍 Un	known		A structure such as a c	road A total fish blockage on a tributary that would isolate a			as a beaver dam or a		
barrier	CAUSE				culvert on a 3rd order	or grea ostream	atter significant reach of stream, or partial blockage that may interfere with the migration of			blockage at the very head of a stream with very little viable fish habitat above it;	
(>0 in drop or		raised, above s	tream	(in)	movement of anadrom	ious fis					
$flow < \frac{1}{2}$	Drop to	o high, water d	rop:	_(in)	lish passage device pr	esent.		anadromous fish.	waterfalls.		uch as
inch)	Shallov	v flow, water de	pth:	_(in)	5	4	3	2	1		
Nome	Other:				5		4	5	Z	1	
NOTES/SK	ETCH:										
				家的豐							
		THE IS	AND THE REAL				1-				
		A AND AND	The second	and the second			a starter				
		6/	A Stra	· STA	C		a stable				
		172	the states	in the same	A Parent A		-				
		M	VII-IC.					4			
				Contraction of the second	AL ST LD		A.				
		XXXX					AT.				
		BEST /	See Se			12	Sight 1				
		- KL	Class and	TA T							
	2		Tal		A ANA A CONT		120	3			
			A DA		A State	6 ×	TEO				
OTHER SUR	VEY FORMS	COMPLETED FC	R SAME A	REA:		100	100	REPORTED T	O AUTHORI	TIES: 🗌 YES 🗌	NO

Map #2



WATERSH	ED/SUBSHE	D: 4305-00-1	- .		DA	TE: <u>11</u>	/ 19 / 2010	ASSESS	ED BY: SH, MN	1
SURVEY R	EACH ID:		TIME: 9	20 AM/PM	Рн	ото ID): (Camera-Pic #	[#])	/# 00-1-SC-b	.jpg
SITE ID: (0	Condition-#)	SC- <u>B</u> I	LAT <u>41 • 53</u>	<u>' 30.35</u> " LONG	-73 o	02 •	05.22 '' LM	К	GPS (Unit II	D) R1
								1	0.1	
I YPE: 📉 F	Coad Crossin		rossing Da		Geolo		ormation (+/- 2ft c	hange)	Other:	1 , 1)
		G SHAPE:	# DARRELS	\mathbf{X} Concrete			NMENI:	DIMENSI	IONS: (if varies s	ketch)
		Other:	Double	Metal (smooth	Metal (smooth)		Not flow-aligned		meter: <u> </u>	(ft)
ROADOR	Bottom	less flared ends	Triple Metal (corrug		ated)	t	oward LT bank	<u> </u>	1 50	<u>(</u> (II)
R AILROAD Elliptical			Other:	Other:	Other:		toward RT bank	Culvert le	width: 4	(ft)
CROSSING ONLY	G							Roadway	elevation: 6	(ft)
011LI		ON: (Evidence of)) sion 🗖 Downs	tream scour hole		CULV	ERT SLOPE:	Roudway	elevation	(11)
		nt deposition	\Box Downs \Box Failing	embankment		🔀 Sli	ght $(2^{\circ} - 5^{\circ})$	UNDERS	IZED?	
	Collect	ed organic debris	Other:	Other:			vious (>5°)	💢 No 🗌	Yes 🗌 Unsure	;
				MATERIAL:						
		☐ Manmade		Concrete (poured	or <u>bl</u>	\underline{ock})	Dry stone		Height:	(ft)
DAMS	TYPE:			Mortared stone	_ Gab	10n	Other:			
		Active Beav	er ned Besver	MATERIAL:	is 🗖	Small w	voody debris		Height:	(ft)
			lieu Deavei			Sinuir w				
POTENTIA	L RESTORA	TION CANDIDA	TE 🗌 Fish t	arrier removal 🔲 Fi	sh pass	age] Upstream storag	e retrofit	Stream repai	r
💢 no			Culve	ert repair/replacement	Be	aver dec	ceiver/removal	Other:		
IS SC ACTI	NG AS GRA	DE CONTROL	🔀 No	Yes U	nknow	'n				
	EXTENT (OF PHYSICAL BI	LOCKAGE:			BLOCH	KAGE SEVERITY	: (circle #)		
If yes for fish	Total	Partia	al	A structure such as a dam or road culvert on a 3rd order or greater			A total fish blockage	on a	A temporary barri	er such
barrier			lowii				tributary that would	isolate a blockage at the very hea		ery head
(> 6 in	CAUSE:		()	stream blocking the movement of anadro	stream blocking the upstream p movement of anadromous fish; no fish passage device present.			may	of a stream with v viable fish habitat	ery little above it:
drop or flow $< \frac{1}{2}$	\Box Drop to	o high water drop	n (in)	fish passage device				gration of	natural barriers such as	
<i>inch</i>)	Shallov	v flow, water dept	h:(in)						waterfalls.	
	Other:			5		4	3	2	1	
NOTES/SK	ETCH:	NU AN				A Barris				
		Alex Mar	See all			11/	4			
	(in)	A			-	-				
	1	1 and the		Constant of	-3 - ;					
		L'alees	and the second	the second	1	and and				
		· Park								
							10 A			
			2010	-		-2-				
			XE-			1				
	89	10/06	J.		Par an					
			1 2	San In San	State State					
			1							
OTHER SUR	VEY FORMS	COMPLETED FOR	SAME AREA:		and the	STR A	REPORTED T	O AUTHORI	TIES: YES	NO

Man #3



$map \pi 3$											
WATERSH	ED/SUBSHE	D: 4305-00-1				DA	TE: 11	<u>/ 19 / 2010</u>	ASSESS	SED BY: SH, MI	M
SURVEY R	EACH ID:		TIME	<u>10</u> : 05	AM/PM	Рн	ото IE	D: (Camera-Pic #	<i>t</i>)	/#00-1-SC-c	2.jpg
SITE ID: (C	Condition-#)	SCC	LAT 41	• 53	<u>43.97</u> " LONG	73 o	01 •	51.99 '' LM	K	GPS (Unit I	D) R1
TYPE: 🔀 H	Road Crossir	ng 🗌 Railroad (Crossing	🗌 Dam	Footbridge	Geolo	ogical F	ormation (+/- 2ft c	hange) 🗌	Other:	
CROSSING SHAPE: Arch Box Other: Bottomless Flared ends CROSSING ONLY			# BAI □ Sin ☑ Do □ Tr □ Ot	# BARRELS: MATERIAL: □ Single ☑ Concrete ☑ Double □ Metal (smooth) □ Triple □ Metal (corrugat □ Other: □ Other:		ed)	ALIGINIENT. Flow-aligned Not flow-aligned toward LT bank toward RT bank Do not know		DIMENSIONS: (if varies sketch) Barrel diameter: 3 Height: 3 Culvert length: 36 Width: 6		sketch) (ft) (ft) (ft) (ft) (ft) (ft)
UNLY	ONLY CONDITION: (Evidence of Cracking/chipping/correct Sediment deposition Collected organic debris) sion Downstream scour hole Failing embankment Other:			TERT SLOPE: at ght $(2^{\circ} - 5^{\circ})$ avious $(>5^{\circ})$	Roadway elevation: (ft) UNDERSIZED? ☑ No □ Yes □ Unsure		
DAMS	Туре:	Manmade			ATERIAL: Concrete (<u>poured</u> Mortared stone	or <u>bl</u>] Gab	ock)] Dry stone] Other:		Height:	(ft)
			oned Beav	ver	Large woody debris		Small w	voody debris		Height:	(ft)
Is SC ACTI	ING AS GRA	ADE CONTROL		Culvert r	repair/replacement [Be know	aver dec n BLOCI	ceiver/removal	Other:		
If yes for fish barrier (> 6 in drop or flow < ¹ / ₂	CAUSE:	Traised, above stropo high, water dra	ream	/n A structure such as a dat culvert on a 3rd order or stream blocking the upst movement of anadromou fish passage device pres			A total fish blockage on a tributary that would isolate a significant reach of stream, or partial blockage that may interfere with the migration of anadromous fish.			A temporary barrier such as a beaver dam or a blockage at the very head of a stream with very little viable fish habitat above it; natural barriers such as waterfalls.	
inch)	Other:	w flow, water dep	otn:	_(1n)	5		4	3	2	1	
NOTES/SK	ETCH:										
OTHER SUR	VEY FORMS	COMPLETED FOR	R SAME A	REA:				R EPORTED T	O AUTHOR	ITIES: 🗌 YES 🛛	NO

Man #4

Structured Stream Crossing

1											
WATERSH	ED/SUBSHE	D: 4305-00-1				DA	TE: 11	<u>/19 / 201</u> 0	ASSESS	ED BY: SH, MN	
SURVEY R	EACH ID:		TIM	ME: <u>10</u> : <u>15</u>	AM/PM	Рн	ото ID	D: (Camera-Pic #	<i>‡</i>)	/# ^{00-1-SC-d}	2.jpg
SITE ID: (C	Condition-#)	SCD	LAT 4	1 o 54	<u>' 09.06</u> " LONG	73 o	02 .	^{03.14} " LM	K	GPS (Unit I	D) ^{R1}
TYPE: 🔀 H	Road Crossin	ig 🗌 Railroad	Crossing	g 🗌 Dam	Footbridge	Geol	ogical F	ormation (+/- 2ft c	hange) 🗌	Other:	
Road or Railroad Crossing	CROSSING SHAPE: # H Arch Circular Box Other: Box Other: Bottomless D CROSSING Elliptical ONLY Condition: Condition: Elliptical Sediment deposition Sediment deposition			# BARRELS: MATERIAL: Single Concrete Double Metal (smooth) Triple Metal (corrugate Other: mortared stone		ALIGNMENT: S Flow-aligned Not flow-aligned ed) toward LT bank toward RT bank Do not know		DIMENSIONS: (if varies sketch Barrel diameter: 3 Height: 3 Culvert length: 40 Width: 3		sketch) (ft) (ft) (ft) (ft) (ft)	
ONLY				Downstre Failing en	am scour hole nbankment		CULV	TERT SLOPE: at ght $(2^{\circ} - 5^{\circ})$ pvious (>5°)	Roadway	elevation: 10 IZED?	(ft)
DAMS	Түре:				ATERIAL: Concrete (<u>poured</u> of Mortared stone	or <u>bl</u>] Gab	lock)] Dry stone] Other:		Height:	(ft)
Image: State of the sector Image: State of the sector <td>Height:</td> <td>(ft)</td>							Height:	(ft)			
POTENTIAL RESTORATION CANDIDATE Fish barrier removal Fish passage Upstream storage retrofit Stream repair Image: Signal control in the storage control											
	EXTENT (OF PHYSICAL	BLOCK	AGE:			BLOCI	KAGE SEVERITY	: (circle #)		
If yes for fish barrier (> 6 in drop or flow < ¹ / ₂	Total Tempor CAUSE: Culvert Drop to	Parary Un	rtial known tream rop:	(in)	A structure such as a c culvert on a 3rd order or stream blocking the up movement of anadrom fish passage device pr	dam or or grea stream ous fis esent.	A total fish blockage on a tributary that would isolate a significant reach of stream, or partial blockage that may interfere with the migration of anadromous fish.			A temporary barrier such as a beaver dam or a blockage at the very head of a stream with very little viable fish habitat above it; natural barriers such as waterfalls.	
inch)	Other:	v flow, water de	epth:	(in)	5		4	3	2	1	
NOTES/SK	ETCH:							Duponyya			7.00

Storm	Water	Outfalls
		0.0.0.00

ΟΤ

М	an	#5
111	an	$t \rightarrow $

WATERSHED	SUBSHED	: 4305-0	0-1-L1			DATE: <u>4 / 19 / 11</u> ASSESSED BY: SH,MM						
SURVEY REA	CH ID:		TI	ME: 10.00 (AM)PM		Рното ID:	(Camera-Pic	#)	/# 00-	1-L1-OT-a.jpg		
SITE ID (Cond	lition-#): O	T- A	LA	T ⁴¹ • 52 • 22.34	" Lor	NG ⁻⁷³ ° 02	' 38.38 ''	LMK		GPS: (Unit ID)R1		
	,				_							
Image: Approximation Image: Approximation Image: Approximation Image: Approximation		Off	MATERIAL: Concrete M PVC/Plastic Br Corrugated Ot Vitrified Tile	letal rick -	SHAPE: NUMBER: Diameter: 10 (in) SUBMER Image: Circular Single FLARED END? No Elliptical Double Yes No Partial Other: Triple HEADWALL? Fully Yes No							
Substantial	bstantial her: X Channel		nel	Concrete Rin Vegetated Ear Other:	prap rth	Trapezoid Parabolic Cother:	$\frac{\text{Channel slope:}}{5} (\text{degrees})$					
PIPE CONDIT	PIPE CONDITION: ODOR: Good No Chip/Cracked Gas			DEPOSITS/STAINS: None Oily	:	VEGGIE DE BELOW OU	ENSITY JTFALL:	BENTHIC Sewage	GROWTH e Fungus Green	IN PIPE: 😡 None] Brown 🔲 Grey] Other:		
Peeling Paint Sewage Corrosion Rancid/So Squashed Sulfide Other: Other:		ge d/Sour le :	 Flow Line Paint Other: 		 □ Normal □ Inhibited □ Excessive □ Other: 	e	JALITY: No pool Clear Poor (see below) Colors Oils Suds Floatables Settled Solids Inadeq. Outlet Protection full of sediment					
FOR COLOR: Clear Brown Grey Yellow Green Orange Red Other: FLOWING ONLY TURBIDITY: None Slight Cloudiness Cloudy Opaque FLOATING: None Sewage Solids Toilet Paper Trash Petroleum (oil sheen) Other: SUSPENDED: None Sewage Solids Toilet Paper Trash Other:						her: Dther:						
CONCERNS:	☐ Needs	s Regular N	Iaintena	nce Bank Erosio	on [Steep Bank	Other:		louuout			
POTENTIAL I	RESTORA	FION CAN	DIDATE	 Discharge invest Storm water retro 	tigation ofit	n 🗌 Stream d	aylighting [l stabilization	Outfall st	abilization			
If yes for day. Length of vege	<i>lighting:</i> etative cove	er from out	fall:	ft Type of	f existin	ng vegetation:	:		Slope:	%		
If yes for stor Yes Land Retrofit Area a	<i>mwater:</i> I Use descr wailable:	s stormwat iption:	er currei	ntly controlled (quality	and/or	quantity)?] No 🗌 No 3MP descriptio	t investigate	ed			
OUTFALL SEVERITY: (circle #)	Hea stro com stre sign	ivy discharge ng smell. The apared to the a am; discharge ificant impact	with a dist amount o amount of e appears downstrea	inct color and/or a f discharge is significant normal flow in receiving to be having a am.	Small dis discharge discharge flow and	scharge; flow mo je has a color and je is very small co any impact appe	ostly clear and odd d/or odor, the amo ompared to the str ears to be minor /	orless. If the ount of ream's base localized.	Outfall does discharge; si of causing a	not have dry weather aining; or appearance ny erosion problems.		
			5	4			3	(2)	1		
SKETCH/NOTES: OTHER SURVEY FOR OTHER SURVEY FOR												

Structured Stream Crossing



/# 00-1-L1-SC-a2.jpg $GPS \; (\textit{Unit ID}) \; \stackrel{\texttt{R1}}{\xrightarrow{}} \;$

(ft)

_(ft)

(ft)

_(ft)

(ft)

(ft)

(ft)

of a stream with very little viable fish habitat above it;

WATERSHI	ED/SUBSHEI	4305-00-	1-L1			DA	TE: 11	1 <u>/ 19 /2010</u>	ASSESS	ED BY: SH, MM		
SURVEY R	EACH ID:		TIME: 8	<u>.</u> 57	AMPM	Рното ID: (<i>Camera-Pic</i> #)				/# 00-1-L1-SC-a2.jp		
SITE ID: (C	Condition-#)	SC- <u>A</u>	LAT <u>41</u> °	53	<u>'26.45</u> " LONG	-73 o	02	12.01 '' LM	K	GPS (Unit ID) R1		
. [
Түре: 🕅 Р	Road Crossin	g 🗌 Railroad	Crossing 🔀	Dam	Footbridge	Geol	ogical F	ormation (+/- 2ft c	hange) 🗌	Other:		
ROAD OR RAILROAD CROSSING ONLY	CROSSING Arch Box Bottom Elliptica	G SHAPE: Circular Other: less al	# BARR	ELS: e le e	MATERIAL: Concrete Metal (smooth Metal (corruga Cother: mortar & stone	ALIGNMENT: X Flow-aligned Not flow-aligned ted) toward LT bank toward RT bank Do not know			DIMENSI Barrel dia Culvert le	in the second secon		
ONLY	CONDITIO	DN: (<i>Evidence of</i> ng/chipping/cor nt deposition ed organic debr	wnstre ling en ner:	$\begin{array}{c} \text{CUL} \\ \square \\ \text{mbankment} \\ \hline \\ \hline \\ \hline \\ \\ \\ \hline \\ \\ \hline \\ \\ \hline \\ \\ \hline \\ \\ \\ \hline \\ \\ \\ \hline \\ \hline \\ \\ \\ \hline \\ \\ \\ \hline \\ \\ \hline \\ \\ \hline \\ \\ \hline \hline \\ \hline \\ \hline \\ \hline \\ \hline \\$			TERT SLOPE: at ght $(2^{\circ} - 5^{\circ})$ ovious $(>5^{\circ})$	Unders	Plevation: (1) PlzeD? (1) Yes (1)			
				M	ATERIAL:							
DAMS	Түре:	Manmade	:		Concrete (<u>poured</u> Mortared stone	or <u>bi</u>] Gat	lock)] Dry stone] Other:		Height: 10 (f		
		Active Be	aver doned Beaver		ATERIAL: Large woody debris 🔲 Small woody debris					Height: (f		
POTENTIA	RESTORA	TION CANDII		sh har	rier removal 🗌 Fis	h nasa	age [Unstream storag	e retrofit	Stream renair		
N no				ilvert i	repair/replacement	Π pus.	eaver de	ceiver/removal	Other			
ISSC ACTI	NG AS GRA	DE CONTROI		<u></u>	Ves DU	know	m					
lobe heri	EVENE			0		IKIIOW		KAGE SEVERITY	• (circle #)			
If yes for fish barrier (> 6 in drop or flow < ¹ / ₂	EXTENT OF PHYSICAL BLOCKAGE: ves \Box Total \Box Partial ·fish \Box Temporary \Box Unknown rrier G in CAUSE: op or \Box Culvert raised, above stream (in) $w < \frac{1}{2}$ \Box Drop too high, water drop:			(in) (in)	A structure such as a culvert on a 3rd order stream blocking the u movement of anadron fish passage device p	dam or road or greater pstream nous fish; no resent. A total fish blockage on a tributary that would isola significant reach of strea partial blockage that may interfere with the migratio anadromous fish.		on a solate a stream, or may gration of	A temporary barrier such as a beaver dam or a blockage at the very hea of a stream with very littl viable fish habitat above natural barriers such as waterfalls.			
inch)	Other	v flow, water de	epth:(in)	5		4 3 2			1		
OTHER STORE								Deposition				
VI HER OUR	VET FURME	COMI LETER I	IN COLUMN TRACK	1.	- Carlos			REPORTED T	U AUTHURI	TIES; TES INO		

Map #6



Map #7											
WATERSHED/SUBSHED: 4305-00-1-L1				DATE: <u>11</u> / <u>19</u> / <u>201</u> 0 ASS					ASSESSED BY: SH, MM		
SURVEY REACH ID:			<u>34</u> AM/PM	РМ РНОТО ID: (<i>Camera-Pic</i> #)			<i>/#</i> ^{00-1-L1-SC-b2.jpg}				
SITE ID: (Condition-#) SC			<u>' 2.18</u> " LONG	-73 •	02	42.91 '' LM	К	GPS (Unit I	D) R1		
Type: X Road Crossing Railroad Crossing Dam Footbridge Geological Formation (+/- 2ft change) Other:											
OAD OR Arch Circular Sin OAD OR Bottomless Tr AllROAD Elliptical Other			S: MATERIAL: Concrete Metal (smoot Metal (corrug Other:	MATERIAL: Concrete Metal (smooth) Metal (corrugated) Other:		ALIGNMENT: ☐ Flow-aligned ☑ Not flow-aligned ☐ toward LT bank ☑ toward RT bank ☐ Do not know		DIMENSIONS: (if varies sketch)Barrel diameter: 1.5 (ft)Height:(ft)Culvert length: 25 (ft)Width: 5 (ft)			
CONDITION: (Evidence of)						CULVERT SLOPE:		Roadway elevation: 2 (ft)			
Cracking/chipping/corros			sion Downstream scour hole Failing embankment Other:		$\square Flat$ $Slight (2^{\circ} - 5^{\circ})$ $\square Obvious (>5^{\circ})$		UNDERSIZED?				
Туре:	🗌 Manmade		MATERIAL: Concrete (poured Mortared stone	ATERIAL:] Concrete (<u>poured</u> or <u>b</u>]] Mortared stone		lock) Dry stone Dion Other:		Height:	(ft)		
	Active Beav	ver oned Beaver	MATERIAL:	ATERIAL: Large woody debris Small woody deb				Height:	(ft)		
I RESTORA			arrier removal	sh nasa		Unstream storag	e retrofit	Stream rena	ir		
no											
	DE CONTROL			Inknow	m] Other:				
CAUSE:	A structure such as culvert on a 3rd ord stream blocking the movement of anadr fish passage device	a dam or er or grea upstrean omous fis present.	road ter h; no A total fish blockage on tributary that would isol significant reach of stre partial blockage that ma interfere with the migral anadromous fish.		e on a isolate a stream, or t may gration of	n a plate a eam, or nay ation of A temporary barrier such as a beaver dam or a blockage at the very head of a stream with very little viable fish habitat above it; natural barriers such as waterfalls.					
Other:					4	3	2	1			
ETCH:											
	ED/SUBSHE EACH ID: Condition-#) Road Crossin Arch Box Bottom Elliptic CONDITIO Sedime CONDICIO Sedime CONDICIO Sedime CONDICIO Shallov CONDICI Shallov CONDICIO COND	ED/SUBSHED: 4305-00-1-11 EACH ID: Condition-#) SCB Caad CrossingRailroad C CROSSING SHAPE: Arch Circular Box Other: Bottomless Elliptical CONDITION: (Evidence of Cracking/chipping/corroc Sediment deposition Collected organic debriss Manmade TYPE: Manmade TYPE: Manmade ING AS GRADE CONTROL EXTENT OF PHYSICAL B Old/Abando I RESTORATION CANDIDA CAUSE: Unk CAUSE: Unk CAUSE: Unk CAUSE: Unk CAUSE: Unk CAUSE: Culvert raised, above str Drop too high, water drop Shallow flow, water dep Other: ETCH:	ED/SUBSHED: 4305-00-1-L1 EACH ID: TIME: 11 Condition-#) SC_B LAT 41 • 53 CROSSING SHAPE: #BARRELS Arch Circular Single Box Other: Double Bottomless Double Elliptical Triple CONDITION: (Evidence of) Cracking/chipping/corrosion Downs Sediment deposition Failing Collected organic debris Other: Active Beaver Old/Abandoned Beaver L RESTORATION CANDIDATE Sinch Culvet NG AS GRADE CONTROL No EXTENT OF PHYSICAL BLOCKAGE: Total Partial Temporary Unknown CAUSE: Culvert raised, above stream (in) Drop too high, water drop: (in) Shallow flow, water depth: (in) Other: ETCH:	ED/SUBSHED: 4305-00-1-L1 EACH ID: TIME: 11 : 34 MPM Condition-#) SC B LAT 41 • 53 ' 2.18 " LONG Cad Crossing Railroad Crossing Dam Footbridge CROSSING SHAFE: # BARRELS: MATERIAL: Arch Circular Double Double Metal (smoot Bottomless Diriple Other: CONDITION: (Evidence of) Cracking/chipping/corrosion Downstream scour hole Sediment deposition Failing embankment Collected organic debris Other: MATERIAL: Concrete (poured Matterial: Concrete (poured Active Beaver Active Beaver Concrete (poured Active Beaver Active Be	ED/SUBSHED: 4305-00-1-L1 DA EACH ID: TIME: 11:34 MpM PH Candition:#) SC-B LAT 41 • 53 • 2.18 • "LONG -73 • Prostridge Geodel Candition:#) SC-B LAT 41 • 53 • 2.18 • "LONG -73 • Ph Cand Crossing Railroad Crossing Dam Footbridge Geodel Crossing Shape: #BARELS: Matrenal: Concrete Metal (smooth) Box Other: Double Metal (corrugated) Other: Other: Other: CONDITION: (Evidence of) Concrete Other: Other: Other: Concrete Mattenal: Other: Other: Other: Other: Collected organic debris Other: Mattenal: Other: Other: Active Beaver Mattenal: Large woody debris Date It Active Beaver Mattenal: Large woody debris Date It Active Beaver Culvert repair/replacement Be It Active Beaver No Yes Unknow Calses: Culvert raised, above stream (in)	ED/SUBSHED: 4305-00-1-L1 EACH ID: TIME: 11 : 34 M/PM PHOTO II EACH ID: TIME: 11 : 34 M/PM PHOTO II Candition-4/) SC_B LAT 41 • 53 : 2.18 " LONG 73 • 02 ' Condectorssing Railroad Crossing Dam Footbridge Geological F CROSSING SHAPE: Arch Circular Single Double Double Box Othe: Double Triple Box Othe: Concrete Contert deposition Conter: Five Matternate Collected organic debris Othe: Collected organic debris Collected organic Collected organic Collected organic Collected	ED/SUBSIED: 4305-00-1-11 EACH ID: TIME: 11: 24 MpM PHOTO ID: (Camera-Pic 4 Candition: 4) SC_B LAT 41 0.53 1.218 "LONG 73 0.2 1.4291 "LM tead Crossing Bailroad Crossing Dam Footbridge Geotogical Formation (+/- 24 of Crossing Carler Bailroad Crossing Dam Hotel (smooth) Construction: 4 Marker LS: All GNMENT: Box Other: Figure Hotel (corregate) Box Other: How aligned Bottomless Dother: How aligned Construction: (Evidence of) Cracking/chipping/corrosion Downstream scour hole Sediment deposition Failing embankment Collected organic debris Other: Correcte Bailty Correcte Co	EXCHENCE: 405-00-1-41 DATE: 11 19 / 2010 ASSESS EACH ID: Thre: 11 24 PHOTO ID: (Camera-Fic.#) Condition:#) SC_B LAT 41 0.53 + 2.48 * LONG: 23 0.2 + 42.91 * LMK Condition:#) SC_B LAT 41 0.53 + 2.48 * LONG: 23 0.2 + 42.91 * LMK Condition:#) SC_B LAT 41 0.53 + 2.48 * LONG: 23 0.2 + 42.91 * LMK Conserve BARELS: Barrel dia Concrete Diver. Diver. Diver. Diver. Diver. Diver. Diver. Culvert 16 Culvert 17 Culvert 16 Concrete Culvert 16 Culver	EDSUBSHED: 4305-00-14.1 DATE: 1.1./.19./.2010 ASSESSED BY: 9H. EACH ID: TIME: 1123 Open PHOTO ID: Concerte-Pic #) ##0014.143 Scandition-#) SC. B. LAT 49.53 2.13 "LONG 73 © 02 r42.91 "LMK GPS (bain Construct Single Barnel diameter: 15 Barnel diameter: 15 Construct Single MATERIAL: ALIGNMENT: DMENSIONS: (fvaries Box Other: Double Metal (corrugato) Doward RT bank Doward RT bank Culvert length: 25 Constructions (Foldence of) Dowart construction Painter Bight: Culvert length: 26 Contexting (chapsito) Double Other: Do not know Roadway elevation: 2 Collected organic debris Other: Contexte (paured or black) Dry stone Height: TYPE: Mannade Concrete (paured or black) Dry stone Height: Old/Abandoned Beaver Cative Beaver Cative Beaver Cative Beaver Dottor: Standard Cor		


Map #8											
WATERSH	ED/SUBSHED: 430	5-00-1-L1			DA	TE: <u>4</u>	/ 19 / 2011	ASSESS	ED BY: SH, MM		
SURVEY R	EACH ID:		TIME: 9 : 55	<u></u> /PM	Рн	ото ID	: (Camera-Pic #	ť)	/# ^{00-1-L1-SC}	-c.jpg	
SITE ID: (C	Condition-#) SC- <u>C</u>	L	AT 41 • 52	<u>' 21.1</u> " LONG	73 o	02 •	20.05 '' LM	К <u></u>	GPS (Unit ID) R1	
TYPE: 🔼 H	Road Crossing 🗌 Ra	ailroad Cr	ossing Dam	Footbridge	Geol	ogical Fo	ormation (+/- 2ft c	hange) 🗌	Other:		
ROAD OR	CROSSING SHAPE	E: cular der: red ends	# BARRELS:	MATERIAL: Concrete Metal (smooth)	RIAL: acrete cal (smooth) cal (corrugated)		ALIGNMENT: Flow-aligned Not flow-aligned toward LT bank		CONS: (if varies shared in the set of the	ketch) (ft) (ft) (ft) (ft)	
RAILROAD CROSSING ONLY			U Other:				not know	Roadway	Width: 3.0 elevation: 3.5	(ft)	
	CONDITION: (Evia Cracking/chippi Sediment depose Collected organi	<i>lence of</i>) ng/corrosi ition ic debris) osion Downstream scour hole Failing embankment s Other:			CULV Fla Slig Ob	ERT SLOPE: t ght $(2^{\circ} - 5^{\circ})$ vious $(>5^{\circ})$		IZED?	(II)	
DAMS	П Ма Туре:		ATERIAL: Concrete (<u>poured</u> Mortared stone	or <u>bl</u>] Gab	lock)] Dry stone] Other:		Height:	(ft)		
		Abandon	ed Beaver	Large woody debris	Small woody debris			Height:	(ft)		
POTENTIAL RESTORATION CANDIDATE Fish barrier removal Fich passage Unstream storage retrofit Stream repair											
I 0 12. (11.1.				repair/replacement	T Puse	eaver dec	ceiver/removal	Other:			
IS SC ACTI	ING AS GRADE CON	TROL	No	\Box Yes \Box Un	 know	m		·			
1000011011	EVTENT OF DIVE	TCAL BL	OCKACE:			BLOCE	KAGE SEVERITY	: (circle #)			
If yes for fish barrier (> 6 in drop or flow < ¹ /2	CAUSE:	Partial Unkno	am (in)	A structure such as a d culvert on a 3rd order stream blocking the up movement of anadrom fish passage device pr		road iter n h; no	A total fish blockage tributary that would i significant reach of s partial blockage that interfere with the mig anadromous fish.	on a solate a stream, or may gration of	A temporary barrie as a beaver dam o blockage at the ve of a stream with ve viable fish habitat natural barriers su waterfalls.	er such or a ry head ery little above it; ch as	
inch)	Other:	ater depth	::(in)	5		4	3	2	1		
NOTES/SK	ETCH:										
										0	

Man 40



Map #9								_		
WATERSH	ED/SUBSHE	4305-00-1-L1	-		DAT	ГЕ: <u>4</u>	/ 19 / 2011	ASSESS	ED BY: SH, M	Μ
SURVEY R	EACH ID:		TIME: 9 : 57	AM/PM	Рно	ото ID	: (Camera-Pic #	<i>(</i>)	/# 00-1-L1	-SC-d.jpg
SITE ID: (Condition-#)	SCD_I	LAT <u>41 ° 52</u>	' 21.93 " LONG	-73 o	02 '	37.23 '' LM	K	GPS (Unit	<i>ID</i>) R1
~										
TYPE: 🔼 I	Road Crossin	ng 🗌 Railroad Ci	rossing Dam	Footbridge	Geolo	gical Fo	ormation (+/- 2ft c	hange) 🗌	Other:	
Road or Railroad Crossing	CROSSIN	G SHAPE: Circular Other: hless flared ends cal	Single Concrete Double Metal (smooth) Triple Metal (corrugate) Other: Other:		ted)	ALIGNMENT: Flow-aligned Not flow-aligned toward LT bank toward RT bank Do not know		DIMENSI Barrel dia Culvert le	IONS: (if varies meter: <u>1</u> Height: <u>1</u> ength: <u>3</u> Width: <u>2</u>	s sketch) (ft)
ONLY CONDITION: (Evidence of) sion Downstream scour hole Failing embankment			CULVERT SLOPE: \Box Flat Slight (2° – 5°) Obvious ($>$ 5°)		Roadway	elevation: <u> </u>	. <u>5 (</u> ft)
	Collect	ted organic debris	Other:				vious (~5)	ДИС		
DAMS	Туре:	🗌 Manmade		ATERIAL: Concrete (<u>poured</u> Mortared stone	or <u>blo</u>] Gabi	ock)	Dry stone Other:		Height:	(ft)
		Active Beave	er M ned Beaver	ATERIAL: Large woody debris	5 🗌 5	Small w	oody debris		Height:	(ft)
POTENTIA no IS SC ACT	L RESTORA	ATION CANDIDA ADE CONTROL	TE Fish bar	rier removal Fish repair/replacement Yes Un	h passa]] Bea lknowr	age [aver dec n] Upstream storag	e retrofit Other:	Stream rep	pair
	EXTENT	OF PHYSICAL BI	LOCKAGE:			BLOCH	KAGE SEVERITY	: (circle #)		
If yes for fish barrier (> 6 in drop or flow < ¹ / ₂	Total Tempo CAUSE: Culver Drop ta	A structure such as a culvert on a 3rd order stream blocking the up movement of anadrom fish passage device pr	A total fish blockage on a tributary that would isolate a significant reach of stream, or partial blockage that may interfere with the migration of anadromous fish. A total fish blockage on a tributary that would isolate a significant reach of stream, or partial blockage that may interfere with the migration of anadromous fish.			A temporary ba as a beaver dar blockage at the of a stream with viable fish habit natural barriers waterfalls.	rrier such m or a very head n very little at above it; such as			
inch)	Other:	w flow, water dept	h:(in)	5		4	3	2	1	
NOTES/SK outlet into	ETCH: West Hill Pond	d								
OTHER SUR	VEY FORMS	COMPLETED FOR	SAME AREA:				Reported T	O AUTHORI	TIES: YES	

M //10							Stor	m Water	Outfalls	ΟΤ
Map #10	/cudcu	ED• 4305	-00-3-R1			DATE: 11 /	18 / 2010		SED DV.	SH. MM
SURVEY REA	CH ID.	ED. 4303	T	ME•9 · 45 AN/PN	Л	Рното ID•	(Camera-Pic		/# 00-3	3-R1-OT-a.jpg
SITE ID (Con	dition_#)	ОТ- А	LA	T ⁴¹ • 54 • 23.72	2 "Lo	NG ⁻⁷³ ◦ 59	154.52 II	LMK	7/1	GPS: (Unit ID) ^{R1}
SITE ID (Cond	<i>uuon-#</i>).	<u> </u>	. LA		L(<u> </u>			
BANK: LT RT [FLOW: None Trickle	Head	TYPE:	e k Off	MATERIAL: Concrete 1 PVC/Plastic 1 Corrugated 0 Vitrified Tile	Metal Brick Other	SHAPE: Circular Elliptical	NUMBER:	DIMENS Diameter: FLARED Yes HEADWA	IONS: 25 (in) END? No ALL? NO	SUBMERGED: No Partially Fully
Substantial	Substantial Other: Channel		nnel	Concrete R Vegetated E Other:	Riprap Earth	 Trapezoid Parabolic Other: 	De Wi	epth: idth (Top): (Bottom):	(in) (in) (in)	Channel slope: (degrees)
PIPE CONDIT	PIPE CONDITION: ODOR: \[\beta] Good \[\beta] No \[\beta] Chip/Cracked \[\beta] Gas \[\beta] Peeling Paint \[\beta] Sewage		:	DEPOSITS/STAIN None Oily	s:	VEGGIE DE BELOW OU	NSITY FFALL:	BENTHIC Sewage	GROWTH e Fungus [e] Green	I IN PIPE: Mone Brown Grey Other:
Peeling Pai	int		vage	Flow Line		☐ Normal		POOL QU		No pool
Corrosion		Ran	cid/Sour	Paint				Odors Cloors Oils Suds		
			ide	Other:		C Other		🗌 Algae [Floatabl	es 🗌 Settled Solids
Other: Other:		er:					Scour Other:	Inadeq	. Outlet Protection	
For	COLOR	k:	💢 Clea	r 🗌 Brown 🗌 G	Grey	Yellow	Green	Orange 🗌	Red 🗌 O	ther:
FLOWING	TURBI	DITY:	Non	e 🗌 Slight Cloudin	less	Cloudy] Opaque			0.1
ONLY	FLOAT SUSPEN	ING: NDED:	Non	e Sewage Solids	i 🗌 To i 🗌 To	ilet Paper 1	rash Per rash Ot	troleum (011 her:	sheen)	Other:
OTHER CONCERNS:		cess Trash (eds Regular	paper/plas Maintena	stic bags) Dumpince Bank Eros	ng (bulk sion [A) Excessi A) Steep Bank 	ve Sedimenta	ation 🗌 H	Ieadcut	
POTENTIAL I	RESTOR	ATION CA	NDIDATI	E Discharge inve	estigatio rofit	n 🗌 Stream da	ylighting [stabilization	Outfall st	abilization	
If yes for day Length of vege	<i>lighting</i> etative co	: over from ou	ıtfall:	ft Type	of existi	ing vegetation:			Slope:	<u>%</u>
If yes for stor Yes Land Retrofit Area a	<i>mwater</i> l Use des wailable	: Is stormw scription:	ater curre	ntly controlled (qualit	ty and/o	or quantity)?] No 🗌 No MP descripti	ot investigate	ed	
OUTFALL SEVERITY: Heavy discharge with a distinct color and/or a strong smell. The amount of discharge is significant compared to the amount of normal flow in receiving stream; discharge appears to be having a significant impact downstream.				Small d dischar dischar flow an	lischarge; flow mo: ge has a color and, ge is very small co d any impact appea	stly clear and od /or odor, the am mpared to the st ars to be minor /	lorless. If the ount of tream's base localized.	Outfall doe: discharge; of causing a	s not have dry weather staining; or appearance any erosion problems.	
			5		4	3			2	X
SKETCH/NO	TES:						D	EDODTED TO		
OTHER SURVE		1712					K	EFUKTED T(JAUIHUKI	пез. <u>—</u> тез <u>—</u> NO



WATERSH	ED/SUBSHE	D: 4305-00-3-R1				DAT	ГЕ: <u>11</u>	/ 18 / 2010	ASSESSI	ED BY: SH, MN	1
SURVEY R	EACH ID:		TIME	<u>9</u> :55	AMYPM	Рно	ото ID	: (Camera-Pic #	<i>t</i>)	/# 00-3-R1-S	C-a.jpg
SITE ID: (Condition-#)	SC]	LAT 41	o 54	<u>'^{30.51} " Long</u>	73 <u>o</u> (0.0 •(^{02.04} '' LM	К	GPS (Unit I	D) ^{R1}
Түре: 🔀	Road Crossin	ng 🔲 Railroad C	Crossing	🗌 Dam	🗌 Footbridge 🗌	Geolo	gical Fo	ormation (+/- 2ft c	hange)	Other:	
ROAD OR RAILROAD CROSSING	CROSSING Arch Box Bottom Elliptic	G SHAPE: Circular Other: less al	# BARRELS:MATH \square Single \square Co \square Double \square Me \square Triple \square Me \square Other: \square Oth		MATERIAL: Concrete Metal (smooth) Metal (corrugation) Other:	ed)	ALIGNMENT: Flow-aligned Not flow-aligned toward LT bank boward RT bank Do not know CULVERT SLOPE: Flat Slight (2° – 5°) Obvious (>5°)		DIMENSIONS: (if varies sketch) Barrel diameter: (ft) Height: (ft) Culvert length: 30 (ft) Width: 20 (ft) Roadway elevation: 10 (ft) UNDERSIZED? No Yes Unsure		(ft) (ft) (ft) (ft) (ft) (ft)
ONLY	CONDITION Crackin	DN: (<i>Evidence of</i> ng/chipping/corro ent deposition ed organic debris) sion [] I [] H [] (sion Downstream scour ho Failing embankment Other:							(ft)
DAMS	Түре:	Manmade Active Beav	rer		ATERIAL: Concrete (<u>poured</u> Mortared stone [ATERIAL:	or <u>blc</u>] Gabi	ock)] Dry stone] Other:		Height: Height:	(ft) (ft)
POTENTIAL RESTORATION CANDIDATE Fish barrier removal Fish passage Upstream storage retrofit Stream repair Mo Culvert repair/replacement Beaver deceiver/removal Other:											
IS SU ACTING AS GRADE CONTROL IN NO I Yes Unknown											
If yes for fish barrier (> 6 in drop or flow < ¹ / ₂ inch)	\overline{F} EXTENT OF PHYSICAL BLOCKAGE: ves Total Partial fish Temporary Unknown rrier $\overline{6}$ in CAUSE: op or Culvert raised, above stream(in) $w < \frac{1}{2}$ Drop too high, water drop: (in)			(in) (in) (in)	(in) (in) (in) (in) (A structure such as a dam or culvert on a 3rd order or grea stream blocking the upstream movement of anadromous fis fish passage device present.			A total fish blockage tributary that would significant reach of s partial blockage that interfere with the mi- anadromous fish.	on a solate a stream, or may gration of	A temporary barr as a beaver dam blockage at the v of a stream with v viable fish habitat natural barriers s waterfalls.	er such or a ery head rery little above it; uch as
incn)	Other:	v now, water dep		_(III)	5		4	3	2	1	
NOTES/SKETCH:											



··r						1			-1			
WATERSHI	ED/SUBSHE	D: 4305-00-3-R1				DA	TE: 11	/ 18 / 2010	ASSESS	ED BY: SH, MM		
SURVEY R	EACH ID:		TIM	E: 10 : 15	AM/M	Рн	ото ID	: (Camera-Pic #	ť)	/# 00-3-R1-S	C-b.jpg	
SITE ID: (C	Condition-#)	SCB	LAT 41	o 54	<u>' 41.39</u> " LONG	73 o	0.0 •	^{29.62} " LM	K	GPS (Unit IL	o) R1	
TYPE: X	Road Crossin	ng 🗌 Railroad	Crossing	🗌 Dam	Footbridge	Geol	ogical Fo	ormation (+/- 2ft c	hange)	Other:		
	CROSSING	G SHAPE:	# B A	ARRELS:	MATERIAL:		ALIG	NMENT:	DIMENSI	ONS: (if varies s	ketch)	
	📉 Arch	Circular	XS	Single Cor				ow-aligned	Barrel dia	meter:	(ft)	
	Box	Other:	Double Metal		Metal (smooth)	th)		Not flow-aligned		Height:		
ROAD OR	Bottom	lless		riple	Metal (corrugat	ed)	t 🔼 t	oward LT bank	Culvert le	noth [.] 40	(佾)	
R AILROAD		al		Other:	U Otner:					Width: 15	(ft)	
ONLY	CONDITIO								Roadway	elevation: 15	(ft)	
		ON: (Evidence of	Downstre	am scour hole		Fla	t					
		ent deposition	Failing er	nbankment		Sli	ght $(2^{\circ} - 5^{\circ})$	UNDERSI	ZED?			
		ed organic debr	is 🗆	Other:	nounkinent		Ob	vious (>5°)	📈 No 🗌	Yes 🗌 Unsure		
				M	ATERIAL:				-			
		🗌 Manmade			Concrete (poured	or <u>bl</u>	lock)	Dry stone		Height:	(ft)	
DAMS	TYPE:				Mortared stone] Gab	oion 🗌] Other:				
2011010		Active Bea	aver	М	ATERIAL:					Unight:	(ft)	
		Old/Aband	loned Bea	aver 🗌	Large woody debris	5	Small w	voody debris		neight.	(11)	
POTENTIAL RESTORATION CANDIDATE 🔄 Fish barrier removal 🗋 Fish passage 📄 Upstream storage retrofit 📄 Stream repair												
Culvert repair/replacement Beaver deceiver/removal Other:												
IS SC ACTING AS GRADE CONTROL 🔏 No 🗌 Yes 🗌 Unknown												
	EXTENT (OF PHYSICAL	BLOCKA	GE:			BLOCH	KAGE SEVERITY	: (circle #)			
<i>If yes</i>	Total	🗌 Pai	tial					A total fish blockage	on a	A temporary barrie	er such	
for fish barrier		rary 🗋 Un	known		A structure such as a culvert on a 3rd order	dam or or grea	road ter	tributary that would isolate a		as a beaver dam of blockage at the ve	or a rv head	
(> 6 in	CAUSE:				stream blocking the up	stream	significant reach of s partial blockage that interfere with the mi		of stream, or that may migration of		ery little	
drop or	Culvert	t raised, above s	tream	(in)	fish passage device p	ious fis resent					above it; ch as	
$flow < \frac{1}{2}$	Drop to	oo high, water d	rop:	(in)	non paccago actico pi	000111		anadromous fish.		waterfalls.	on do	
inch)		v flow, water de	pth:	(in)	5		4	3	2	1		
NOTES/SKI	ETCH.					AL OF	1	24.2				
TOLES			1h		TAN T		X	19				
	Y		11XFR		4		The					
	V.	Den 1	4/	a new com				Car				
		TA Y	700	and the second	State Land	AN AN						
				and the second		The second		12				
		15.100	No.			- Alle	X	(a)				
			1 AVE	Li -		小	No.					
		1	the set					No. Mar				
	1			- Aler	-	3. 14						
						Ko						
	-				and the second second		AS A					
					-							
		and the second	-	port the	And A star	and the second		and the second se				
		The second second	1 - 1 - 1	-		and the second s						
OTHER SUR	VEY FOR		X-	-	a land	-	100	Reported t	O AUTHORI	TIES: 🗌 YES 🗌	NO	



Mars #12

Viap #13												
WATERSH	ED/SUBSHE	D: 4305-00-3-R	1			DA	TE: <u>11</u>	<u>/ 18 / 201</u> 0	ASSESS	ED BY: SH, MM		
SURVEY R	EACH ID:		TIME	<u>10</u> 30	<u> </u>	Рн	ото ID	: (Camera-Pic #	[#])	/# ^{00-3-R1-SC}	-c2.jpg	
SITE ID: (C	Condition-#)	SCC	LAT ⁴¹	• 54	^{44.51} " LONG	-73 o	1.0 '	03.97 '' LM	K	GPS (Unit ID) R1	
	,											
Түре: 🗹 н	Road Crossin	ng 🗌 Railroad	Crossing	🗌 Dam	🗌 Footbridge 🗌	Geol	ogical Fo	ormation (+/- 2ft c	hange) 🗌	Other:		
	CROSSIN	G SHAPE:	# BAH	RRELS:	MATERIAL:		ALIG	NMENT:	DIMENSI	ONS: (if varies sl	ketch)	
	Arch	Circular	☐ Single			Flow-aligned				(ft)		
	Box	Other:	Double Detail (smooth			□ Not flow-aligned		x2	Height [.]	(II) (ff)		
ROADOR	Bottom	less	📈 Tri	iple	Metal (corrugat	ed)	🗌 t	oward LT bank		11cigiit	(11)	
RAILROAD	Elliptic	al	🗌 Ot	her:	Other:		🗌 t	oward RT bank	Culvert le	ngth: 20	(ft)	
CROSSING							Do not know		XI	Width: 10	(ft)	
ONLY	CONDITIO	ON: (Evidence of.)				CULV	ERT SLOPE:	Roadway	elevation: 10	<u>(ft)</u>	
	🔀 Crackir	ng/chipping/corr	Downstre	am scour hole		🔀 Fla	t					
	Sedime	ent deposition		Failing en	nbankment		Slig	ght $(2^{\circ} - 5^{\circ})$	UNDERSI	IZED?		
	Collect	ed organic debri	G Other:			\Box Obvious (>5°)			🛛 No 🗌 Yes 🗌 Unsure			
				M	ATERIAL:							
		🗌 Manmade			Concrete (poured	or <u>bl</u>	lock)	Dry stone		Height:	(ft)	
DAMS	TYPE:				Mortared stone] Gab	oion 🗌] Other:				
		Active Bea	iver	M	ATERIAL:	_				Height:	(ft)	
		Old/Aband	loned Beav	'er	Large woody debris	s 🗋	Small w	voody debris		- <u>8</u>	(9	
POTENTIAL RESTORATION CANDIDATE 🔄 Fish barrier removal 🗌 Fish passage 🗌 Upstream storage retrofit 🗌 Stream repair												
💢 no				Culvert r	repair/replacement [Be	eaver dec	ceiver/removal	Other:			
IS SC ACTING AS GRADE CONTROL V No Ves Unknown												
	EXTENT	OF PHYSICAL I	BLOCKAG	E:			BLOCH	KAGE SEVERITY	: (circle #)			
If yes	Total		tial	al						A temporary barrie	er such	
for fish	Tempo	rary 🗌 Un	known		A structure such as a c	dam or	road	tributary that would isolate a		as a beaver dam o	or a	
barrier	CAUSE			am (in) culvert on a 3rd order of stream blocking the up movement of anadrom			iter	significant reach of	stream, or	of a stream with ve	ry head erv little	
(>0 ln	CAUSE.	t raised, above st	ream				h; no	partial blockage that interfere with the mi	at may igration of		above it;	
$flow < \frac{1}{2}$	Drop to	oo high, water di	op:	(in)	fish passage device pr	resent.		anadromous fish.	gradion of	natural barriers su waterfalls	ch as	
inch)	Shallov	v flow, water de	pth:	_(in)						waterialis.		
	Other:				5		4	3	2	1		
NOTES/SK	ЕТСН:	131		CALL -	A DEMO	R and	Mar Mar					
		All the second		VER	The states	han	1	at su				
	No. of the second se			the		de-						
	3											
		- Internet		Contra de		Tal	T					
		and the second	e seil			R.D	and the					
						- Bay						
	1 al	Les The	Con an in	1 Th								
	4/10	No. 1	1 1	A-LA	and the second		C to one					
			Sec.									
					MALL OF							
				and the	National L			17.				
						-						
	541-r	and the second		1				1				
			1 an.	1			1	1				
OTHER SUR	VEY FO			The s	A TANK		Fall	REPORTED T	O AUTHORI	TIES: 🗌 YES 🗌] NO	



Mars #14

vlap #14										
WATERSH	ED/SUBSHE	D: 4305-00-3-R	1			DA	TE: 04	/ 19 / 2011	ASSESSI	ED BY: SH, MM
SURVEY R	EACH ID:		TIME: 8	<u>.</u> 55	5 <u>M</u> /PM	Рн	ото ID): (Camera-Pic #	#)	/# 00-3-R1-SC-d2.jpg
SITE ID: (0	Condition-#)	SC-D	LAT <u>41</u> °	54	<u>' 31.63</u> " LONG	73 o	59	56.64 '' LM	K	GPS (Unit ID) R1
Түре: 🕅 н	Road Crossin	g 🗌 Railroad	Crossing	Dam	☐ Footbridge ☐	Geol	ogical F	ormation (+/- 2ft c	change)	Other:
ROAD OR	CROSSING Arch Box Bottom	G SHAPE:	#BARRELS: M. Single Double Triple Double		MATERIAL: Concrete Metal (smooth) Metal (corrugate	MATERIAL: Concrete Metal (smooth) Metal (corrugated)		NMENT: ow-aligned t flow-aligned toward LT bank	DIMENSI Barrel dian	ONS: (if varies sketch) meter: 3 (ft) Height: 3 (ft)
RAILROAD CROSSING ONLY	Condition	al DN: (Evidence of.	.)		ie	toward RT bank Do not know CULVERT SLOPE:		Culvert length: 40 Width: 10 Roadway elevation: 7		
	Sedime	ng/chipping/corr nt deposition ed organic debri	sion Dow Faili S Othe	Downstream scour noie Failing embankment Other:				the second seco	Undersi	ZED? Yes 🗌 Unsure
	/			Μ	ATERIAL:		1			
DAMS	Туре:	Manmade		Concrete (<u>poured</u> of Mortared stone	or <u>bl</u>] Gab	lock)] Dry stone] Other:		Height: (ft)	
			ATERIAL: Large woody debris		Small w	voody debris		Height: (ft)		
POTENTIAL RESTORATION CANDIDATE Fish barrier removal Fish passage Upstream storage retrofit Stream repair Mo Culvert repair/replacement Beaver deceiver/removal Other: Is SC ACTING AS GRADE CONTROL Mo Yes Unknown										
	EVTENT	DE DIEVELCAT					BLOCK	AGE SEVERITY	• (circle #)	
If yes for fish barrier (> 6 in drop or flow < ¹ / ₂ inch)	EXTENT OF PHYSICAL BLOCKAGE:If yes \Box Total \Box Partialfor fish \Box Temporary \Box Unknownbarrier(> 6 inCAUSE:drop or \Box Culvert raised, above stream (in)flow < $\frac{1}{2}$ \Box Drop too high, water drop: (in)inch) \Box Shallow flow, water denth:			A structure such as a da culvert on a 3rd order or stream blocking the upst movement of anadromou fish passage device pres		lam or or grea stream ous fis esent.	A total fish blockag tributary that would significant reach o partial blockage th interfere with the n anadromous fish.		e on a isolate a stream, or t may gration of	A temporary barrier such as a beaver dam or a blockage at the very head of a stream with very little viable fish habitat above it; natural barriers such as waterfalls.
Nome	Other:				5		т	5	2	1
	YET I OKWER									

Map #15			Storm Water Outfalls							
WATERSHED/SUBS	4305-00-3-H	R2	DATE: <u>11</u> / <u>18</u> / <u>2010</u> ASSESSED BY: ^{SH,} MM							
SURVEY REACH ID):	TIME: ⁹ : 00 AM/PM	A PHOTO ID: (Camera-Pic #) /# ^{00-3-R2-OT-a2.jpg}							
SITE ID (Condition-#)	: OT-	LAT <u>41 • 54 • 16.69</u>	⁹ "LONG <u>-72 • 59 ' 46.77</u> " LMK GPS: (Unit ID) ^{R1}							
BANK: LT XRT Heat FLOW: None Trickle	d TYPE:	MATERIAL: Concrete M PVC/Plastic H Corrugated C Vitrified Tile	Metal SHAPE: NUMBER: DIMENSIONS: Brick △ Circular △ Single Diameter: 6 (in) SUBMERGED: Other □ Elliptical □ Double □ Yes △ No □ Partially Other: □ Triple HEADWALL? □ Fully							
Substantial	Substantial Other:		Riprap Trapezoid Depth:(in) (in) Earth Parabolic Width (Top):(in) Channel slope:(degrees) Other: " (Bottom):(in) (degrees)							
PIPE CONDITION: ODOR: ☑ Good □ No □ Chip/Cracked ☑ Gas		DEPOSITS/STAINS	S: VEGGIE DENSITY BELOW OUTFALL: BENTHIC GROWTH IN PIPE: None X None Sewage Fungus Brown Grey X Orange Green Other:							
Peeling Paint Sewage Corrosion Rancid/S Squashed Sulfide Other: Other:		□ Flow Line our □ Paint ☑ Other: iron rust colored sta	Image: Normal Normal Image:							
For Cold FLOWING ONLY ONLY SUSP OTHER E	DR: Image: Constraint of the second	Clear Brown G None Slight Clouding None Sewage Solids None Sewage Solids Plastic bags) Dumpin	Grey Yellow Green Orange Red Other: ess Cloudy Opaque Toilet Paper Trash Petroleum (oil sheen) Other: Toilet Paper Trash Other: ng (bulk) Excessive Sedimentation Headcut							
POTENTIAL RESTO	RATION CANDID	ATE X Discharge inve	rofit Channel stabilization Channel Stream Channel Stream Channel Stream Channel Stream Channel Stabilization							
If yes for daylightin Length of vegetative If yes for stormwate	g: cover from outfall: er: Is stormwater co escription:	20 ft Type of the type of type of the type of the type of the type of the type of type of the type of type	of existing vegetation: tree/shrub Slope: 10 % ty and/or quantity)? X No Not investigated Stormwater BMP description:							
OUTFALL SEVERITY: (circle #)	Heavy discharge with strong smell. The amou compared to the amou stream; discharge app significant impact dow	a distinct color and/or a unt of discharge is significant int of normal flow in receiving ears to be having a nstream.	Small discharge; flow mostly clear and discharge has a color and/or odor, the a discharge is very small compared to the flow and any impact appears to be minor 4 3							
SKETCH/NOTES: Other Survey For	SKETCH/NOTES: Grease budding at pipe, Pipe discharge is within designated TROUT MGMNT AREA OTHER SURVEY FORMS COMPLETED FOR SAME AREA: Image: Complete and Co									



Mar #16

Map #16											
WATERSH	ED/SUBSHE	D: 4305-00-3-R2	2		DA	TE: <u>11</u>	<u>/ 18 / 201</u> 0	ASSESS	SED BY: SH, MM		
SURVEY R	EACH ID :		TIME: <u>8</u> :	20 AM/PM	Рн	ото ID	: (Camera-Pic #	¢)	/# ^{00-3-R2-Sc}	-a.jpg	
SITE ID: (C	Condition-#)	SC	LAT <u>41</u> • 54	<u>' 06.01</u> '' LONG	72 o	59 .	21.87 " LM	К	GPS (Unit ID) ^{R1}	
	Road Crossin	ng 🗌 Railroad (Crossing Dam	n 🗌 Footbridge 🗌	Geolo	ogical Fo	ormation $(+/-2ft)$	hange) 🗌	Other:		
ROAD OR RAILROAD CROSSING	CROSSING Arch Box Bottom Elliptic	G SHAPE: Circular Other: iless al	# BARRELS:	MATERIAL: Concrete Metal (smooth) Metal (corrugat Other:	ed)	ALIGI Flo No t Do	NMENT: ow-aligned t flow-aligned toward LT bank toward RT bank	DIMENSI Barrel dia Culvert le	IONS: (<i>if varies sh</i> ameter: Height: 9 ength: 30 Width: 30	ketch) (ft) (ft) (ft)	
ONLY	CONDITIO	ON: (<i>Evidence of.</i> . ng/chipping/corro ent deposition ed organic debris) osion Downstream scour hole Failing embankment S Other:			CULVERT SLOPE: \Box Flat \bigstar Slight ($2^{\circ} - 5^{\circ}$) \Box Obvious (>5°)		Roadway elevation: 12 (ft UNDERSIZED? ☑ No □ Yes □ Unsure		(ft)	
DAMS	Type: Manmade Material: Manmade Concrete (poured or block) Dry stone Mortared stone Gabion Other: Material: Material: Material:									(ft)	
		Old/Aband	oned Beaver	Large woody debris	5	Small w	voody debris		Height:	(π)	
POTENTIAL RESTORATION CANDIDATE Fish barrier removal Fish passage Upstream storage retrofit Stream repair Image: No Culvert repair/replacement Beaver deceiver/removal Other: Is SC ACTING AS GRADE CONTROL Image: No Yes Unknown											
If yes for fish barrier (> 6 in drop or flow < ¹ /2	EXTENT (Total Tempo CAUSE: Culvert Drop to	DF PHYSICAL E Part rary Unk t raised, above st po high, water dr	BLOCKAGE: ial snown ream (in) op: (in) cluster (in)	A structure such as a d. culvert on a 3rd order o stream blocking the ups movement of anadromo fish passage device pression am (in)			A total fish blockage tributary that would i significant reach of s partial blockage that interfere with the min anadromous fish.	con a solate a stream, or may gration of	A temporary barrie as a beaver dam o blockage at the ve of a stream with ve viable fish habitat a natural barriers su waterfalls.	er such or a ry head ery little above it; ch as	
incn)	Other:	v flow, water dep	otn:(in)	5		4	3	2	1		
NOTES/SKETCH:											



WATERSH	ED/SUBSHE	D: 4305-00-3-F	R2			DA	TE: 11	/ 18 / 2010	ASSESS	ED BY: ^{SH, MM}		
SURVEY R	EACH ID:		TIME: 8	<u>30</u>	N/PM	Рн	OTO ID	: (Camera-Pic #	<i>t</i>)	/# ^{00-3-R2-SC}	-b.jpg	
SITE ID: (C	Condition-#)	SCB	LAT <u>41</u> °	54	<u>' 08.25</u> '' LONG	•72 o	59 י	33.16 '' LM	K	GPS (Unit ID) ^{R1}	
TYPE: 🗌 H	Road Crossin	ig 🗌 Railroad	Crossing	Dam	Footbridge	Geolo	ogical Fo	ormation (+/- 2ft c	hange) 🗌	Other:		
	CROSSIN	G SHAPE:	# BARRE	LS:	MATERIAL:		ALIG	NMENT:	DIMENSI	ONS: (if varies sk	etch)	
	Arch	Circular	Single		Concrete	Flow-		w-aligned	Barrel dia	meter:	(骨)	
	👿 Box	Other:	Double Deta		Metal (smooth)	oth) 🔀 Not f		t flow-aligned	Burler diu	Height 10	(ft)	
ROAD OR	Bottom	less	Triple Metal (corru			ed)	🔀 t	oward LT bank		30	(10)	
RAILROAD	🗌 Elliptic	al	Other:		Other:		_ 🗆 t	oward RT bank	Culvert le	ngth: 30	(ft)	
CROSSING					I-Dearn		Do Do	not know	D 1	12 width:	(II)	
ONLY	CONDITIO	ON: (Evidence of)				CULV	ERT SLOPE:	Roadway	elevation:	(ft)	
	Crackir	ng/chipping/corr	rosion 🗌 Dov	vnstrea	am scour hole		Fla	t	UNDEDG	(7 55)		
	Sedime	ent deposition	🗌 Faili	ing en	embankment 🛛			ght $(2^{\circ} - 5^{\circ})$				
		ed organic debr	is 🗌 Oth	Other:				vious (>5°)				
				M	ATERIAL:			1 _		TT.:	(0)	
		∐ Manmade			Concrete (poured)	or <u>bl</u>		Dry stone		Height:	(11)	
DAMS	TYPE:				Mortared stone	Gab	non L] Other:				
		Active Bea	aver		ATERIAL:		G 11	1 11 .		Height:	(ft)	
Old/Abandoned Beaver Large woody debris Small woody debris												
POTENTIAL RESTORATION CANDIDATE Fish barrier removal Fish passage Upstream storage retrofit Stream repair												
🗙 no			L Cu	lvert r	epair/replacement	Be	eaver dec	ceiver/removal	Other:			
IS SC ACTING AS GRADE CONTROL No Yes Unknown												
	EXTENT (OF PHYSICAL	BLOCKAGE:				BLOCH	KAGE SEVERITY	: (circle #)			
If yes	🗌 Total	🗌 Pai	rtial			A total fish blockage on a				A temporary barrie	r such	
Jor Jish barrier		rary 🗋 Un	known		A structure such as a c	dam or or grea	m or road greater		as a beaver dam or blockage at the very		r a rv head	
(> 6 in	CAUSE:				stream blocking the upstream			significant reach of s	stream, or	of a stream with ve	ery little	
drop or	Culvert	raised, above s	tream (i	n)	movement of anadrom	ous fis esent	h; no	interfere with the mig	gration of	viable fish habitat a	above it; ch as	
$flow < \frac{1}{2}$	Drop to	oo high, water di	rop:(i	n)	iisii passage device pi	coon.		anadromous fish.		waterfalls.	.11 0.5	
inch)	Shallov	v flow, water de	epth:(i	n)	5		4	2	2	1		
N	Other:				5		4	5	2	1		
NOTES/SK	ETCH:		12-		ATA	1						
	A	ALA		×./			7					
	1		1 Labor	a get		H		A LA				
			VERE			L	1	4				
			1.	-22			2					
	6	影響。有意		Z				X				
				- La - La								
							A REAL					
		a martin		and a				C				
			1155 - Car	and the			11					
			-				1 1	-				
				Sier				2				
		Tere and		all in a		-	C.	-				
OTHER SUR	VEY FORMS	COMPLETED FO	OR SAME AREA	1000		and the	and the	REPORTED T	O AUTHORI	TIES: YES	NO	

Storm	Water	Outfalls

OT	

Map #18	/lap #18											
WATERSHED)/SUBSHEI	4305-01-	1		DATE: <u>04</u> / <u>19</u> / <u>201</u>	ASSESSI	ED BY: SH, MM					
SURVEY REA	CH ID:		TIN	ME: 09 : 40 AM/PM	PHOTO ID: (Camera-Pi	c#)	/# 01-1-OT-a.jpg					
SITE ID (Cond	lition-#): O	T- <u>A</u>	LA	T <u>41 • 53 ' 17.72</u> '' I	ONG -73 • 01 • 13.90 •	' LMK	GPS: (Unit ID) ^{R1}					
BANK:	🗙 Head	TYPE:		MATERIAL:	SHAPE: NUMBER:	DIMENSIONS: SHAPE: NUMBER: Diameter: <u>18 (in)</u> SUE Circular K Single ELANDO END?						
None Trickle Moderate	None 🗌 Leak O Trickle Moderate			Corrugated Other	Elliptical Double	Yes HEADWAI YES	No Partially L ! Fully No					
U Substantial	l	Chanr	nel	Concrete Riprap	☐ Trapezoid D ☐ Parabolic W ☐ Other:	epth: /idth (Top): ' (Bottom):	(in)Channel slope:(in)(degrees)					
PIPE CONDIT	PIPE CONDITION: ODOR: \[\beed{squares} Good \[\beed{squares} No \[Chip/Cracked \[Gas			DEPOSITS/STAINS: None Oily 	VEGGIE DENSITY BELOW OUTFALL:	BENTHIC G	GROWTH IN PIPE: None Fungus Brown Grey Green Other:					
Peeling Pai Corrosion	int	□ Sewag	ge 1/Sour	☐ Flow Line	Normal	POOL QUA	LITY: No pool ear Poor (see below)					
	□ Squashed □ Sulfide		le	Other:		Odors	Colors Oils Suds					
Other:	☐ Other: ☐ Other:				Other:	Scour Other:	Inadeq. Outlet Protection					
For	COLOR:	ר		Brown Grey	Yellow Green	Orange 🗌 R	ed 🗌 Other:					
FLOWING	TURBIDIT	FY:	None	Slight Cloudiness	\Box Cloudy \Box Opaque	etroleum (ail st	peen) 🗌 Other:					
ONLY	SUSPEND	ED:	None	e Sewage Solids 7	Toilet Paper Trash O	ther:						
OTHER CONCERNS:	Exces	s Trash (pa s Regular M	per/plas Iaintena	tic bags) 🗌 Dumping (bunce 🗌 Bank Erosion	Ilk) Excessive Sedimen Steep Bank Other:	tation 🗌 Hea	adcut					
POTENTIAL I	Restora	FION CAN	DIDATE	 Discharge investigat Storm water retrofit 	ion Stream daylighting Channel stabilization	□ Outfall stab	bilization					
If yes for day Length of vege	<i>lighting:</i> etative cove	er from outf	all:	ft Type of exi	sting vegetation:		_Slope:%					
If yes for stor	<i>mwater:</i> I I Use descr wailable:	s stormwate	er currei	ntly controlled (quality and	/or quantity)? No No No No Stormwater BMP descript	ot investigated						
OUTFALL Heavy discharge with a strong smell. The amou compared to the amour stream; discharge appe significant impact down			with a dist amount of appears downstrea	inct color and/or a f discharge is significant normal flow in receiving to be having a am.	I discharge; flow mostly clear and c arge has a color and/or odor, the ar arge is very small compared to the and any impact appears to be minor	dorless. If the nount of stream's base / localized.	Outfall does not have dry weather discharge; staining; or appearance of causing any erosion problems.					
			5	4	3	2	1					
SKETCH/NO	SKETCH/NOTES:											
			ALL YE	The second se								

Structured Stream Crossing

ED/SUBSHED: 4305-01-1			DATE: <u>04</u>	<u>/ 19 / 201</u> 1	ASSESSE	DBY: SH, MM				
EACH ID:	TIME: 09 : 20	MPM	PHOTO II	D: (<i>Camera-Pic</i> #	<i>f</i>)	/# 01-1-SC-a3.	jpg			
Condition-#) SCA	LAT <u>41</u> • 53	<u>53.03</u> " LONG -7	3 • 01	<u>30.56</u> " LM	K	GPS (Unit ID)) R1			
Road Crossing 🗌 Railroad	Crossing Dam	Footbridge	Geological F	Formation (+/- 2ft c	hange) 🗌 🤇	Other:				
CROSSING SHAPE: Arch Circular Box Other: Bottomless Elliptical	# BARRELS: Single Double Triple Other:	MATERIAL: Concrete Metal (smooth) Metal (corrugate Other: stone	ALIG	ENMENT: ow-aligned ot flow-aligned toward LT bank toward RT bank o not know	DIMENSIONS: (if varies sketch) Barrel diameter: 2 Height: 4 Culvert length: 60 Width: 10					
CONDITION: (Evidence of: Cracking/chipping/corr Sediment deposition Collected organic debri) osion Downstrea X Failing em s Dother:	am scour hole abankment	CULV □ F1 ☑ S1 □ OI	EXAMPLE : at ight $(2^{\circ} - 5^{\circ})$ povious $(>5^{\circ})$	Undersiz	dway elevation:(ft) DERSIZED? No Yes Unsure				
TYPE:		Height: Height:	(ft) (ft)							
			_							
POTENTIAL RESTORATION CANDIDATE Fish barrier removal Fish passage Upstream storage retrofit Stream repair Image: Marrier removal Culvert repair/replacement Beaver deceiver/removal Other:										
NG AS GRADE CONTROL	X No	Yes Unk	nown							
EXTENT OF PHYSICAL	BLOCKAGE:		BLOC	KAGE SEVERITY:	: (circle #)					
CAUSE: Culvert raised, above st Drop too high, water dh	tial known tream(in) rop:(in)	A structure such as a da culvert on a 3rd order o stream blocking the ups movement of anadromo fish passage device pre	am or road ⁻ greater tream us fish; no sent.	A total fish blockage tributary that would is significant reach of s partial blockage that interfere with the mig anadromous fish.	on a solate a tream, or may gration of	A temporary barrier such as a beaver dam or a blockage at the very head of a stream with very little viable fish habitat above it; natural barriers such as waterfalls.				
Other	ptn:(in)	5	4	3	2	1				
ETCH:										
	ED/SUBSHED: 4305-01-1 EACH ID: condition-#) SCA Coad Crossing Railroad CROSSING SHAPE: Arch & Circular Box Other: Bottomless Elliptical CONDITION: (Evidence of Cracking/chipping/corr Sediment deposition Collected organic debri Active Bea Old/Aband COMDITION: CANDID NG AS GRADE CONTROL EXTENT OF PHYSICAL I Total Par Temporary Un CAUSE: Culvert raised, above st Drop too high, water dr Shallow flow, water dr Shallow flow, water dr Shallow flow, water dr Cother: ETCH:	ED/SUBSHED: 4305-01-1 EACH ID: TIME: 09 ; 21 condition-#) SC- A LAT 41 • 53 coad Crossing Railroad Crossing Dam CROSSING SHAPE: #BARRELS: Arch Circular Double Box Other: Double Elliptical Other: Downstreat CONDITION: (Evidence of) Cracking/chipping/corrosion Downstreat Sediment deposition Failing ent Collected organic debris Other: Active Beaver M4 Old/Abandoned Beaver M4 Culvert r NG AS GRADE CONTROL No EXTENT OF PHYSICAL BLOCKAGE: Total Partial Temporary Unknown CAUSE: Culvert raised, above stream (in) Drop too high, water drop: (in) Shallow flow, water depth: (in) Other: ETCH:	ED/SUBSHED: 4305-01-1 EACH ID: TIME: 09 : 20 PM andition-#) SC-A LAT 41 • 53 + 53.03 " LONG -7 toad Crossing Railroad Crossing Dam Footbridge C CROSSING SHAPE: #BARRELS: MATERIAL: Arch Circular Double Double Other: Concrete Other: Box Other: Double Other: Stone CONDITION: (Evidence of) Cracking/chipping/corrosion Downstream scour hole Sediment deposition Failing embankment Collected organic debris Other: MATERIAL: Concrete (poured on Mortared stone Du/ Matterial: Concrete (poured on Mortared stone Du/ Matterial: Concrete (poured on Mortared stone Du/ Active Beaver Du/Abandoned Beaver Du/ Restor Attion CANDIDATE Fish barrier removal Fish Culvert repair/replacement Du/ Matterial Partial Temporary Unknown CAUSE: Culvert raised, above stream (in) Shallow flow, water depth: (in) Shallow flow, water depth: (in) Cother: Stone Store Stor	ENSUBSHED: 4305-01-1 DATE: 94 PHOTO II EACH ID: TIME: 09 : 20 M)PM PHOTO II condition-d) SC-A LAT 41 • 53 • 53.03 * LONG -73 • 01 condition-d) SC-A LAT 41 • 53 • 53.03 * LONG -73 • 01 condition-d) SC-A LAT 41 • 53 • 53.03 * LONG -73 • 01 condition-d) SC-A LAT 41 • 53 • 53.03 * LONG -73 • 01 condition-d) SC-A LAT 41 • 53 • 53.03 * LONG -73 • 01 condition-d) SC-A LAT 41 • 53 • 53.03 * LONG -73 • 01 condition-d) SC-A LAT 41 • 53 • 53.03 * LONG -73 • 01 condition-d) SC-A LAT 41 • 53 • 53.03 * LONG -73 • 01 condition-d) SC-A LAT 41 • 53 • 53.03 * LONG -73 • 01 condition-d) SC-A LAT 41 • 53 • 53.03 * LONG -73 • 01 condition-d) Scienee Matterial: Alter condition-d) Other: Scienee Difficience Difficience CONDITION: (Evidence of) Concrete (poured or block) Difficience Difficience Difficience Collected organic debris Other: Concrete (poured or block) Difficience Difficience	ED/SUBSIDED: 4305-01-1 DATE: 04 / 19 / 2011 EACH ID: TIME: 09 : 20 @PM PHOTO ID: (Camera-Pic A andition::#) SC. A LAT 41 • 52 • 53.03 *' LONG -73 • 01 • 30.56 *' LAM andition::#) SC. A LAT 41 • 52 • 53.03 *' LONG -73 • 01 • 30.56 *' LAM cond Crossing Railroad Crossing Dam Footbridge Geological Formation (+/-2ft c Construct Shape: # BARRELS: MATERIAL: ALIGNMENT: How-aligned Box Other: Single Metal (smooth) How-aligned Botomles Triple Other: Ioward RT bank Botionles Topic CULVERT SLOPE: Flat Scaiment deposition Failing embankment Other: Ioward RT bank Collected organic debris Other: Concrete (pourced or block) in Dry stone Hoti Restruct: Collected organic debris Other: Concrete (pourced or block) in Dry stone MATERIAL: Coll/Abandoned Beaver Large woody debris Small woody debris Ball woody debris R Stallow flow, water dop: (in) No Yes Unknown EXTENT OF PHYSICAL BLOCKAGE: BlocKAGE Seve	ED/SUBSHED: 405-01-1 DATE: 04 / 19 / 201 ASSESSE EACH ID: TIME: 09 / 20 ASSESSE CACH ID: TIME: 09 / 20 ASSESSE Carbon ID: (Camera-Pric #) IAK ASSESSE Ord Crossing Charpe: # BARRELS: MATERIAL: ALIGNMENT: Box Other: Double Material: Indonational # Barrel dam Box Other: Double Metal (corrougle) Itoward UT bank Culvert len Bottomless Other: Double: Other: Double: Volter: Collected organic debris Other: Other: Obvious (>5°) Wondrated stone Gabion Other: Collected organic debris Other: Concrete (pound or hlock) Dry stone UNDRRS/D Collected organic debris Other: MATERIAL: Obvious (>5°) No O Collected organic debris Other: MATERIAL	DATE: 4405-01-1 DATE: 04/19/2011 ASSESSED RY: 51, MM EACL ID: TME: 09/2010 20 (0) PM PHOTO ID: (Camera-Pic #) #01-15C-83. Imatiana-00 SC-A LAT 41 • 53 • 53:03 * LONG 73 • 0.1 • 30:56 * LMK GPS (Junt ID Construction of the second se			

Map #20			Storm Water Outfalls						
WATERSHED/SUBSH	ED: 4305-02-1		DATE: <u>11 / 19 / 2010</u> ASSESSED BY: SH, MM						
SURVEY REACH ID		TIME: 12 : 30 AM	PHOTO ID: (Camera-Pic #) /# 02-1-OT-a.jpg						
SITE ID (Condition-#):	OT- ^A	LAT ⁴¹ • ⁵¹ • ^{42.9}	⁹⁰ "LONG ⁻⁷³ • ⁰³ , ^{06.93} " LMK GPS: (Unit ID) R1						
BANK:	TYPE:	MATERIAL:	Metal SHAPE: NUMBER: Diameter: 24 (in) SUBMERGED: Brick Circular Single FLAREDEND? No						
 None Trickle Moderate 	Leak Off	Corrugated	Other \Box Elliptical \Box Double \Box Yes No \Box Partially Other: \Box Triple HEADWALL? \Box Fully \Box YES No						
Substantial Other:	Channel	Concrete X F	RiprapTrapezoidDepth: $\stackrel{6}{}$ (in)Channel slope:EarthParabolicWidth (Top): 72 (in)Channel slope: \bigcirc Other:" (Bottom):(in) 45 (degrees)						
PIPE CONDITION:	ODOR: No Gas	DEPOSITS/STAIN None Oily	VEGGIE DENSITY BENTHIC GROWTH IN PIPE: X None BELOW OUTFALL: Sewage Fungus None Orange Orange Green Other:						
 Peeling Paint Corrosion Squashed 	Peeling Paint Sewage Corrosion Rancid/So Squashed Sulfide		Image: Normal Normal Image: Image: Normal POOL QUALITY: No pool Image: Image: Image: Normal Settled Solids						
Other:	Other:		Other: Inductors Secure Solids invasive vegetation Other: Other:						
FOR	R: 🔀	Clear Brown C	Grey Yellow Green Orange Red Other:						
FLOWING TURB ONLY FLOAT	DITY:	None Slight Cloudin	ness Cloudy Opaque s Toilet Paper Trash Petroleum (oil sheen) Other:						
OTHER Ex CONCERNS: Ne	NDED: Image: Comparison of the second seco	None 🔛 Sewage Solids /plastic bags) 📄 Dumpi itenance 🗌 Bank Eros	s Toilet Paper Trash Other: ing (bulk) Excessive Sedimentation Headcut sion Steep Bank Other:						
POTENTIAL RESTOR	RATION CANDIE	DATE Discharge inve Storm water ret	estigation Stream daylighting Outfall stabilization trofit Channel stabilization Other:						
<i>If yes for daylighting</i> Length of vegetative c	g: over from outfall:	ft Type	of existing vegetation:Slope:%						
If yes for stormwate	r: Is stormwater c scription:	urrently controlled (quality	ity and/or quantity)? No Not investigated Stormwater BMP description:						
OUTFALL SEVERITY: (circle #)	Heavy discharge with strong smell. The amo compared to the amo stream; discharge app significant impact dow	a distinct color and/or a punt of discharge is significant unt of normal flow in receiving pears to be having a unstream.	Small discharge; flow mostly clear and odorless. If the discharge has a color and/or odor, the amount of discharge is very small compared to the stream's base flow and any impact appears to be minor / localized.						
		5	4 3 2 1						
SKETCH/NOTES: Green Ridge Condo com No stormwater renovati	SKETCH/NOTES: Green Ridge Condo complex No stormwater renovation								
Other Survey Form	IS COMPLETED FO	DR SAME AREA:	Reported to authorities: Yes NO						

Storm Water Outfalls	OT
----------------------	----

Map #21	Map #21										
WATERSHED/SUBSE	ED: 4305-02-1		D ATE: <u>11</u>	DATE: <u>11 / 19 / 2010</u> ASSESSED BY: ^{SH, MM}							
SURVEY REACH ID:	:	TIME: 1 : 00 AM/PI	М Рното ID	: (Camera-Pic #)	/# ⁰	2-1-OT-b.jpg					
SITE ID (Condition-#):	OT	LAT <u>41 • 54 • 38.1</u>	0 • 03	02.05	LMK	GPS: (Unit ID)R1					
BANK: LT RT Head FLOW: None Trickle	TYPE:	MATERIAL:	Metal SHAPE: Brick Circular Other Delliptical	SHAPE: NUMBER: DIMENSIONS: SUBM Image: Single Diameter: 18 (in) SUBM Image: Single FLARED END? Image: No Image: No Image: No Image: Single Image: Single Yes No Image: No Image: Single Image: Other: Image: Triple Image: Single Image							
Substantial	Channel	Concrete I Vegetated F Other:	Riprap 🗌 Trapezoi Earth 🗌 Parabolio 🗌 Other:	d Depth C Width " (F	n: <u>(in)</u> n (Top): <u>(in)</u> Bottom): <u>(in)</u>	Channel slope: (degrees)					
PIPE CONDITION: ODOR: Ø Good No Chip/Cracked Gas Peeling Paint Sewage Corrosion Rancid/S Squashed Sulfide Other: Other:		DEPOSITS/STAIN	IS: VEGGIE DI BELOW OU □ None ☑ Normal □ Inhibited □ Excessiv □ Other:	ENSITY B JTFALL: P e e	BENTHIC GROWTH IN PIPE: None Sewage Fungus Brown Orange Green Other: POOL QUALITY: No pool Good/Clear Poor (see below) Odors Colors Oils Algae Floatables Settled Solids Scour Inadeq. Outlet Protection Other: Other:						
FOR FLOWING ONLY COLO TURBI FLOAT SUSPE OTHER	FOR COLOR: Clear Brown Grey Yellow Green Orange Red Other: TURBIDITY: None Slight Cloudiness Cloudy Opaque FLOATING: None Sewage Solids Toilet Paper Trash Petroleum (oil sheen) Other: SUSPENDED: None Sewage Solids Toilet Paper Trash Other: THER Excess Trash (paper/plastic bags) Dumping (bulk) Excessive Sedimentation Headcut										
POTENTIAL RESTOR	RATION CANDID	ATE Discharge invo	estigation Stream c trofit Channe	laylighting (Outfall stabilizatio	n					
<i>If yes for daylighting</i> Length of vegetative c	g: over from outfall:	ft Type	of existing vegetation	:	Slope:	%					
If yes for stormwater Yes Land Use de Retrofit Area available	r: Is stormwater cu scription: 2:	urrently controlled (quali	ity and/or quantity)? [Stormwater I	□ No □ Not in 3MP description:	nvestigated						
OUTFALL Heavy discharge with a distinct color and/or a strong smell. The amount of discharge is significant compared to the amount of normal flow in receiving stream; discharge appears to be having a significant impact downstream.			Small discharge; flow m discharge has a color an discharge is very small c flow and any impact app	ostly clear and odorle d/or odor, the amoun ompared to the strea ears to be minor / loc.	ess. If the t of Outfall dc discharge of causing	es not have dry weather s; staining; or appearance g any erosion problems.					
SKETCH/NOTES: KFC site Other Survey Form	5 4 3 2 1 SKETCH/NOTES: KFC site Image: Complex of the second se										

Storm Water Outfalls

OT

WATERSHED	VATERSHED/SUBSHED: 4305-02-1						DATE: <u>11</u> <u>/ 19</u> <u>/ 2010</u> ASSESSED BY: ^{SH,} MM						
SURVEY REA	CH ID	:		Т	IME: ²	: 30 AMP	D	PHOTO ID: (Camera-Pic #) /# ^{02-1-OT-c.jpg}					
SITE ID (Cond	lition-#)	: OT-	С	L	AT 41	o 54 , 34.5	⁵⁷ " Lo	$-73 \circ 02$, 36.06	LMK_		GPS: (Unit ID) R1	
BANK:		Г	Гуре:							DIMENSI	IONS:		
LT KRT [Hea	d b	Pine			Concrete	Metal	SHAPE:	NUMBER:	Diameter:	24 (in) SUBMERGED:	
FLOW:		4				PVC/Plastic	Brick	Circular Elliptical	Single		END?	□ NO	
None Trialala			Leak	Off		Corrugated	Other	Other:	Triple	HEADWA	\mathbf{X}_{1} \mathbf{N}_{0}	Fully	
Moderate						viuilleu The				YES Y	No		
Substantial		[Concrete	Riprap	Trapezoid	De	pth:	<u>(in)</u>		
Other:			Char	nnel		Vegetated	Earth		Wi	dth (Top):	(in)	(degrees)	
					Other:			U Other:	"	(Bottom):	(in)	(augrees)	
PIPE CONDIT	TION:		ODOR:		DE	POSITS/STAIN	NS:	VEGGIE DE	NSITY	BENTHIC	GROWTH	H IN PIPE: None	
Chip/Crook	ad							BELOW OU	IFALL:	☐ Sewage	Fungus [Brown Grey	
	nt			are		Elow Line		 □ Normal		POOL OU	ALITY:		
	111			ige id/Sour		Paint		🔀 Inhibited		Good/C	Clear	Poor (see below)	
				de		Other:		Excessive	;	Odors	Colors	Oils Suds	
Other:			_ Othe	r.		ouldi.		Other:	Algae Floatables Settled Solids				
										Other:		1. Outlet I Totection	
FOR	Colo	DR:		Cle	ear 🗌	Brown	Grey	Yellow	Green	Orange 🗌	Red 🗌 C	Other:	
FLOWING	TURB	IDITY:	:	No	ne 🗌	Slight Cloudi	ness	Cloudy] Opaque		-1	Other	
ONLY	FLOA SUSPI	TING: ENDED:	:	No No	one	Sewage Solid	ls 🗌 Toi	ilet Paper 1	Trash Det	roleum (011 her:	sheen)	Other:	
OTHER CONCERNS:	E>	ccess T eeds Re	Frash (p .egular 1	aper/pl Mainter	astic ba	ags) 🗌 Dump	oing (bulk sion [k) Excessi Steep Bank 	ve Sedimenta	tion 🗌 H	eadcut		
POTENTIAL I	RESTO	RATIC	ON CAN	NDIDA'	ТЕ 🗌	Discharge inv	vestigation	n 🗌 Stream da	vlighting	Outfall sta	abilization	1	
🗌 no					\mathbf{X}	Storm water re	etrofit	Channel	stabilization	Other:			
<i>If yes for day</i> Length of vege	<i>lightin</i> tative c	<i>g:</i> cover fi	from out	tfall:		ft Type	e of existi	ing vegetation:			Slope:	%	
If yes for stor	mwate	er: Is st	tormwa	ter curi	rently c	controlled (qual	ity and/o	r quantity)?]No 🗌 No	t investigate	ed		
Yes Land	Use de	escripti	ion:					Stormwater B	MP description	on:			
Retrofit Area a	vailabl	e:									[
OUTFALL Severity:		Heavy of strong	discharge smell. The	e with a d e amoun	listinct co t of disch	olor and/or a arge is significant	Small d	lischarge; flow mo:	stly clear and od	orless. If the	Outfall doe	es not have dry weather	
(circle #)		compar	red to the	amount	of norma	al flow in receiving	dischar	ge has a color and ge is very small co	mpared to the sti	ream's base	discharge;	staining; or appearance	
		significa	ant impac	t downst	tream.	laving a	flow and	d any impact appea	ars to be minor /	localized.	or causing	any erosion problems.	
5 4						4	3	}	2	2	1		
SKETCH/NOT Lombard Ford,	TES:					AN		No. R.					
no stormwater t	reatme	nt befor	re enteri	ing broo	ok		A MAR	(a la					
						61		an es					
						AND AND A	1. Service						
OTHER SURVE	y Form	MS CON	MPLETE	DFOR	SAME A	AREA:			R	EPORTED TO) AUTHORI	TTIES: YES NO	

Storm Water Outfalls	OT	
----------------------	----	--

WATERSHED/SUBSHE	D: 4305-02-1		DATE: 04 / 19 / 2011 ASSESSED BY: SH, MM							
SURVEY REACH ID:	Tr	ME: 8 : 48 (AM/PM	Рното ID: (Camera-Pid	c#) /# 02-1-OT-d.jpg						
SITE ID (Condition-#): (DT-D LA	T <u>41 • 54 · 33.08</u> '' L	ONG ⁻⁷³ • 02 • 54.60 •	LMK GPS: (Unit ID) R1						
	1									
BANK: LT RT Head FLOW: None Trickle Moderate	TYPE:	MATERIAL: Concrete Metal PVC/Plastic Brick Corrugated Other Vitrified Tile	SHAPE:NUMBER:CircularSingleEllipticalDoubleOther:TripleflaredSingle	DIMENSIONS: SUBMERGED: Diameter: (in) FLARED END? No Yes No HEADWALL? Fully Yes No						
Substantial	∫Æ Channel	Concrete Riprap Vegetated Earth Other:	☐ Trapezoid De ☐ Parabolic W ☐ Other: "	epth:(in)idth (Top):(in)(Bottom):(in)						
PIPE CONDITION: ODOR: \[Colored] \[Sourcestage] \[Chip/Cracked] \[Gas] \[Peeling Paint] \[Sewage] \[Corrosion] \[Rancid/Sourcestage] \[Squashed] \[Sulfide] \[Other:] \[Other:]		DEPOSITS/STAINS: Oily Flow Line Paint Other:	VEGGIE DENSITY BELOW OUTFALL: None Normal Inhibited Excessive Other:	BENTHIC GROWTH IN PIPE: None Sewage Fungus Brown Grey Orange Green Other: POOL QUALITY: No pool Good/Clear Poor (see below) Odors Colors Oils Algae Floatables Settled Solids Scour Inadeq. Outlet Protection						
FOR COLOR: FLOWING TURBID ONLY FLOATIE SUSPENI OTHER CONCERNS: Need	FOR COLOR: Clear Brown Grey Yellow Green Orange Red Other: TURBIDITY: None Slight Cloudiness Cloudy Opaque FLOATING: None Sewage Solids Toilet Paper Trash Petroleum (oil sheen) Other: SUSPENDED: None Sewage Solids Toilet Paper Trash Other: OTHER Excess Trash (paper/plastic bags) Dumping (bulk) Excessive Sedimentation Headcut									
POTENTIAL RESTORA	TION CANDIDAT	E Discharge investigati	on Stream daylighting Channel stabilization	Outfall stabilization						
<i>If yes for daylighting:</i> Length of vegetative cov	er from outfall:	ft Type of exis	ting vegetation:	Slope:%						
If yes for stormwater: Yes Land Use desc Retrofit Area available:	Is stormwater curre	ntly controlled (quality and/	or quantity)? No No No No Stormwater BMP description	ot investigated						
OUTFALL He SEVERITY: (co (circle #) str sig	avy discharge with a dis ong smell. The amount of mpared to the amount of eam; discharge appears nificant impact downstre	tinct color and/or a of discharge is significant f normal flow in receiving to be having a eam.	discharge; flow mostly clear and or arge has a color and/or odor, the am arge is very small compared to the s nd any impact appears to be minor	dorless. If the jount of tream's base / localized. Outfall does not have dry weather discharge; staining: or appearance of causing any erosion problems.						
SKETCH/NOTES: Other Survey Forms	S Completed for S	AME AREA:								





NATESTEDISCISSION: 6.005-02 DATE: 11 151 210.7 ASSESSED BY; 54, MM SURVEY REACUID: THR: 2.2 2.4 AM(n) PROTO ID: (Camera-Pice): JR 20.15C-biss STR ID: (Camelation:) SC. LAT 2.54 MA(n) PROTO ID: (Camera-Pice): JR 20.15C-biss TYPE: Read Crossing Raitoad Crossing: Dam Footbrdge Geospical Formation (-/- 2ft change) Other: Dimessions: (guardes accelu) Bottomless Dipuble Geospical Formation (-/- 2ft change) Other: Dimessions: (guardes accelu) Construction Bottomless Dipuble Geospical Formation (-/- 2ft change) Dimessions: (guardes accelu) Bottomless Dipuble Generate Curverts Distomless (ft change) Construction Construction Outer: Other: (ft change) (ft change) Construction Construction Downstream sourt hole Sight (2 - 5') (No low-sligned) (ft change) Construction Collected organic debris Other: Curverts Notes (ft change) (ft change) (ft change)	1 11 ap 1123											
SURVEY REACUID: THE: 2 2 Add(b) PHOTO ID: (Connerce-Fie ::) # 00.150.big STE ID: (Connerce-Fie ::) SC _ Lar 4 _ 0.54 _ 155.4 m Long 72 _ 0.2 _ 122.3 m LMK GR (fuil ID) R3 GR (fuil ID) R3 TYPE: Road Crossing Railboad Crossing Dam Fourbridge Geological Formation (-f- 20 change) Unber PMAGel Other RAISOND (the RAISOND (the pMAGel Other RAISOND (the RAISON	WATERSH	ED/SUBSHE	D: 4305-02-1				DA	TE: 11	/ 18 / 2010	ASSESS	ED BY: SH, MI	N
SITE ID: (Condution=") SC. ^B LAT 41 9.54 1 DAG 9.73 0 LML GPS (that ID) PL TYPE: Read Orossing Ratified Crossing Dam Potbridge Geological Formation (r/- 2ft change) Other: Parking lot entra Box Other: Box Other: Box Other: Single Box Other: Double Double MattRial Double Double Covard 1T bank Coossing Botomises Tiple Double Other: Double Double Graduage evolution: 2 ft Coossing Other: Double Other: Double Double Double Double Graduage evolution: 2 ft Coossing Controls: Exclament deposition Failing embankment Other: Double Double Graduage evolution: 2 ft Datas TYPE Calleaded argains Bouter failing embankment Other: Graduage evolution: 2 ft Datas TYPE No Downstream scour hole Graduage evolution: 2 ft<	SURVEY R	EACH ID:		TIME:	2 24	AM/PM	Рн	ото ID	: (Camera-Pic #	<i>#</i>)	/# ^{02-1-SC-}	b.jpg
TYPE: Read Crossing Railroad Crossing Dam Foodbridge Geological Formation (+/- 2ft change) Other: Publics Matching Read on a Read Crossing Date # BARRELS: MatFRIAL: ALKSMENT: DMENNONS: (() weich a stach) Box Other: Diable Diable Diable Bard diameter: 3: (ft Giance of Construct) Single () Construction Diable Diable Construction Single () Construction Diable Construction Construct	SITE ID: (0	Condition-#)	SCB	LAT <u>41</u>	54	^{35.54} " LONG	73 <u>o</u>	02 ,	^{57.35} '' LM	K	GPS (Unit)	ID) ^{R1}
CROSSING SPAPE: #BARKELS: MATERIAL: CLOCMUT: DMENSIONS: (f/varies starts) Back Other Image: Construction of the starts of the s	Түре: 🗹 н	Road Crossir	ng 🗌 Railroad	Crossing	Dam	🗌 Footbridge 🗌	Geolo	ogical Fo	ormation (+/- 2ft o	change) 🔀	Other: parking	lot entrand
□ Charling entityping corosinin □ Ordersteam scour note □ Stight (2 ^o - 5 ^o) UNDERSIZED? □ Collected organic debris □ Other □ Obvious (>5 ^o) ☑ No □ Yes □ Unsure □ Ams TYPE: □ Mannade □ Correte (gound or block) □ Dry stone Height: (ft) □ Ams TYPE: □ Active Beaver □ Large woody debris Small woody debris Height: (ft) □ Otd/Abandoned Beaver □ Large woody debris Small woody debris Height: (ft) □ Starting of properside □ Culvert repair/replacement □ Beaver deceiver/removal □ Other: Is Starting of the properside of t	Road or Railroad Crossing Only	CROSSING Arch Box Bottom Elliptic	G SHAPE: Circular Other: dess cal ON: (Evidence of.	# BARF	# BARRELS: MATERIAL: Single Concrete Double Metal (smooth) Triple Metal (corrugation) Other: Other:			ALIGN	NMENT: w-aligned t flow-aligned oward LT bank oward RT bank not know ERT SLOPE:	DIMENSI Barrel dia Culvert le Roadway	IONS: (if varies ameter: 3 Height: 3 ength:	sketch) 3 (ft) (ft) (ft) 2 (ft)
DAMS TYPE: Manmade Concrete (<u>poured</u> or <u>block</u>) Dry stone Other: Active Beaver Otd/Abandoned Beaver Height: (ft) POTENTIAL RESTORATION CANDIDATE Fish barrier removal Fish passage Upstream storage retrofit Stream repair Mori and Storage Culvert repair/replacement Beaver deceiver/removal Other: Image: Concrete (<u>poured</u> or <u>block</u>) Stream repair Mori and Storage Culvert repair/replacement Beaver deceiver/removal Other: Stream repair Mori and Storage Fish barrier removal No Yes Unknown Stream repair Storage Temporary Dutknown A structure such as a dam or ord A touchare such as a damor ord A touchare such as a damore suchas adamore such as a damore			ent deposition ed organic debri	is Official	ownstre ailing en ther:	am scour noie nbankment			ght $(2^{\circ} - 5^{\circ})$ vious (>5°)	Unders	IZED? Yes 🗌 Unsur	re
Active Beaver MatterNAL: Height: (ft) Old/Abandoned Beaver Large woody debris Small woody debris Height: (ft) POTENTIAL RESTORATION CANDIDATE Fish barrier removal Fish passage Upstream storage retrofit Stream repair Image: Stream repair Culvert repair/replacement Beaver deceiver/removal Other: Image: Stream repair Fish passage Upstream storage retrofit Stream repair Image: Stream repair Culvert repair/replacement Beaver deceiver/removal Other: Image: Stream repair Total Partial No Yes Unknown Image: Catose: Total Partial A structure such as a dam or road culver in a 3rd order or greater stream or a 3rd order or greater stream or a 3rd order or greater stream on a 3rd order or greater stream on a stream thore with the migration of anadomous fish: no fish passage device present. A structure such as a dam or road culver in a 3rd order or greater stream streage or stream with well with the migration of anadomous fish: no fish passage device present. A structure such as a dam or road culver in a 3rd order or greater stream streage or stream. Notal fish habital above it nations with repair in the stream or streage or stream streage or str	DAMS	Туре:	Manmade			ATERIAL: Concrete (<u>poured</u> Mortared stone	or <u>bl</u>] Gab	ock)] Dry stone] Other:		Height:	(ft)
POTENTIAL RESTORATION CANDIDATE Fish barrier removal Fish passage Upstream storage retrofit Stream repair 			Active Beaver MATERIAL: Old/Abandoned Beaver Large woody debris						voody debris		Height:	(ft)
If yes Total Partial for fish Temporary Unknown barrier A stal fish blockage on a drod red or greater stam A total fish blockage on a thousy that would isolate a splittaneach of stream, or partial blockage that may interfer with the migration of anadromous fish, no fish passage device present. A total fish blockage that may interfer with the migration of anadromous fish, no fish passage device present. A total fish blockage that may interfer with the migration of anadromous fish, no fish passage device present. A total fish blockage that may interfer with the migration of anadromous fish, no fish passage device present. A total fish blockage that may interfer with the migration of anadromous fish, no fish passage device present. A total fish blockage that may interfer with the migration of anadromous fish. NOTES/SKETCH: Conter 5 4 3 2 1 NOTES/SKETCH: Stop & Shop Plaza Basin-in-Stream hybrid If the up that would isolate a split interfer with the migration of anadromous fish. A total fish blockage that may interfer with the migration of anadromous fish. Basin-in-Stream hybrid Stop & Shop Plaza Stop & Shop Plaza A total fish blockage that may interfer with the migration of anadromous fish.	Is SC ACT	ING AS GRA	ADE CONTROL		Culvert 1 No	repair/replacement	Be	aver dec n BLOCK	ceiver/removal] Other:		
inch) Shallow flow, water depth: interpreted in the state of the st	If yes for fish barrier (> 6 in drop or flow < ¹ /2	Traised, above stoo high, water dr	tial known tream	al A struct culvert of stream movemon p: (in)		structure such as a dam or roa ilvert on a 3rd order or greater ream blocking the upstream ovement of anadromous fish; i h passage device present.		road ter h; no h;		on a solate a tream, or may iration of A temporary barrier suc as a beaver dam or a blockage at the very he of a stream with very liti viable fish habitat above natural barriers such as waterfalls.		
NOTES/SKETCH: Stop & Shop Plaza Basin-in-Stream hybrid	inch)	☐ Shallov ☐ Other:	v flow, water de	pth:	(1n)	5		4	3	2	1	
	NOTES/SK Stop & Shop Basin-in-Stre	ETCH: Plaza am hybrid										



									-		
WATERSHI	ED/SUBSHE	D: 4305-02-1				DA	TE: 11	/ 19 / 2010	ASSESS	ED BY: ^{SH, MN}	
SURVEY R	EACH ID:		TIME:	2 <u>.</u> 08	AM(/PM	Рн	ото ІІ	D: (Camera-Pic #	[#])	/# ^{02-1-SC-}	c.jpg
SITE ID: (C	ondition-#)	SC	LAT 41	o 54	<u>' 41.87</u> " LONG	73 o	03	^{03.54} " LM	K	GPS (Unit II	D) R1
Type: 💢 R	oad Crossin	ng 🗌 Railroad	Crossing [Dam	Footbridge	Geol	ogical F	ormation (+/- 2ft c	hange)	Other:	
	CROSSING	G SHAPE:	#BAR	RELS:	MATERIAL:		ALIG	NMENT:	DIMENSI	ONS: (if varies s	ketch)
	Arch	🗹 Circular	🔀 Sing	gle	Concrete		Flc	ow-aligned	Barrel dia	meter: 5	(ft)
	Box	Other:	🗌 Doi	ıble	Metal (smooth)			t flow-aligned		Height: 5	(ft)
ROAD OR	Bottom	lless		ole	Metal (corrugate	ed)		toward LT bank	Culvert le	ngth ^{. 50}	(ft)
R AILROAD		al	U Oth	er:				not know	- Current ne	Width:	(ft)
ONLY	CONDITI		· 、						Roadway	elevation: 10	(ft)
		JN: (Evidence of) rosion □ □	ownstre	am scour hole		Fla	t			()
		ent deposition		ailing en	ann seour noic abankment		🗌 Sli	ght $(2^{\circ} - 5^{\circ})$	UNDERSI	ZED?	
		ed organic debr	is $\Box C$	ther:	iounininent		Ob	ovious (>5°)	🕅 No 🗌 Yes 🗌 Unsure		
				M	ATERIAL:						
		🗌 Manmade			Concrete (poured of	or <u>bl</u>	lock)	Dry stone		Height:	(ft)
DAMS	TYPE:				Mortared stone] Gab	oion 🗌	Other:			
		Active Bea	ver MATERIAL:							Height	(ft)
		Old/Aband	loned Beave	r 🗆	Large woody debris		Small w	voody debris		mengint.	(11)
		•									
POTENTIAI	RESTORA	TION CANDID	ATE	Fish barı	rier removal 🗌 Fish	n pass	sage [Upstream storag	e retrofit	Stream repa	ir
no				Culvert 1	repair/replacement	Be	eaver de	ceiver/removal	Other:		
IS SC ACTI	NG AS GRA	DE CONTROL		No	Yes Uni	know	'n				
	EXTENT (OF PHYSICAL	BLOCKAGI	E:			BLOCI	KAGE SEVERITY	: (circle #)		
If yes	🗌 Total	🗌 Pai	tial	al A structure such as a culvert on a 3rd order				A total fish blockage	on a	A temporary barri	er such
jor jish harrier		rary 🗋 Un	known				road ter	tributary that would i	solate a	as a beaver dam blockage at the v	or a erv head
(> 6 in	CAUSE:				stream blocking the up	1	significant reach of s	t may of a stream with very litt		ery little	
drop or	Culvert	raised, above s	tream	(in)	fish passage device pro	iromous fish; no interfere with the migration				If natural barriers such as	
$flow < \frac{1}{2}$	Drop to	o high, water d	rop:	(in)	- p			anadromous fish.	waterfalls.		
inch)	☐ Shallov	v flow, water de	pth:	(1n)	5		4	3	2	1	
NOTES/SKI				S. 18				2			
110120/012				4	利用のない。目的	A.		R.M.			
				2811			a de la composition de la comp				
					Sugar Angel						
								THE R			
				化学生							
				and -	Meanin X.						
				1 - I	A A A						
				C.L.		10	17-5				
					Valia	-19					
					12 Contraction	-	5-06	No. of Concerns			
				1	A CONTRACTOR			2-1			
							and the				
						ALC: N					
	_	~	~ .			To T	See and	1.0			-
OTHER SUR	VEY FORMS	COMPLETED FO	OR SAME AR	EA		Xel	Real E	REPORTED T	O AUTHORI	TIES: 🗌 YES 🗌	NO



WATERSH	ED/SUBSHE	D: 4305-02-1				DA	TE: 11	/ 19 / 2010	ASSESSI	ED BY: ^{SH, MN}	1
SURVEY R	EACH ID:		TIM	E: 2 : 1	² AM/PM	Рн	ото ID	: (Camera-Pic #	<i>‡</i>)	/# ^{02-1-SC-c}	l.jpg
SITE ID: (C	Condition-#)	SC	LAT 41	• 54	<u>41.99</u> LONG	73 o	03 •	04.33 " LM	K	GPS (Unit II	D) R1
TYPE: Road Crossing Railroad Crossing Dam Footbridge Geological Formation (+/- 2ft change) Other: Parking entrance											
	CROSSIN	G SHAPE:	# BA	RRELS:	MATERIAL:			NMENT:	DIMENSI	ONS: (if varies s	sketch)
	Arch	Circular		ingle	Concrete Metal (smooth)		Flo	t flow aligned	Barrel dian	meter: 2	(ft)
	\square Bottom	less		rinle	Metal (corrugat	ed)		oward LT bank]	Height: 2	(ft)
ROAD OR RAILROAD	Elliptic	al		ther:	Other:)	□ t	oward RT bank	Culvert lei	ngth: <u>40</u>	(ft)
CROSSING					plastic corrugated pi	ре	🗌 Do	not know		Width:	(ft)
ONLY	CONDITI	ON: (Evidence of)				CULV	ERT SLOPE:	Roadway	elevation:	(ft)
	Crackii	ng/chipping/cor	rosion 🔲	Downstre	am scour hole		Fla	t	UNDEDG	app.9	
		ent deposition	. 🛛	Failing er	nbankment			ght $(2^{\circ} - 5^{\circ})$		ZED: Ves 🗌 Unsure	2
		ed organic debr	15	Other: co	rrugated pipe is broker	1		vious (~5)			-
		□ Manmade			ATERIAL:	or bl	lock)	Dry stone		Height:	(ft)
DAMS	Type.				Mortared stone] Gab	bion] Other:		U	
DAMS	IITE.	☐ Active Be	aver	M	ATERIAL:					TT. 1.1.4.	(0)
		Old/Aban	doned Bea	oned Beaver Large woody debris			Small w	voody debris		Height:	(π)
POTENTIA	L RESTORA	ATION CANDIE	DATE	Fish bar	rier removal 🗌 Fish	1 pass	sage 🗌] Upstream storag	e retrofit	Stream repa	ir
🗌 no			×	Culvert	repair/replacement [Be	eaver dec	ceiver/removal	Other:		
IS SC ACTI	ING AS GRA	ADE CONTROL	, 🔽	🕻 No	Yes Un	know	'n				
TC	EXTENT	OF PHYSICAL	BLOCKA	GE:	r		BLOCH	KAGE SEVERITY	: (circle #)		
If yes for fish	☐ Total	rary 🗌 Un	rtial known		A structure such as a dam or read			A total fish blockage	on a	A temporary barri	er such
barrier			KIIO WII	A structure such as a d culvert on a 3rd order o			iter	tributary that would	isolate a	olate a blockage at the very head	
(> 6 in	CAUSE:			()	stream blocking the up	stream	ו h: no	partial blockage that	of a stream with very litt viable fish habitat above natural barriers such as unterfere with the migration of anadromous fish.		ery little
drop or	\Box Culver	t raised, above s	tream	(in)	fish passage device pr	esent.	,	interfere with the mi anadromous fish.			uch as
$flow < \frac{1}{2}$ inch	\square Shallow	v flow. water de	pth:	(in)					waterfalls.		
	Other:	,	I · · · <u> </u>		5	5 4		3	2	1	
NOTES/SK	етсн:			ASK			は空火	No.			
		A CARA			MANY JES	1	83 I	A			
	1			1432		科					
			La XII		PXON COMPANY		15/	4			
			7N	ZXX			A	4			
			EET	\land			1 ma				
			- K			S					
					PR. W		and the second				
	- Ta		A A	ha	in and fit the	代か	RV-				
	J.	LAND.	XX	en	VOL SE	And A					
			24/2/	1				A A			
		Stand and	K			Ser.					
			1100	N/Ka		and a state	E				
		1 AN		71/1	PARASE U	1					_
OTHER SUR	VEY FOI	AB STA			DESTRUCTION A	A.C.	and the second	REPORTED 1	O AUTHORI	fies: 🗌 yes 🗌	NO



					-					
WATERSH	ED/SUBSHE	D: 4305-02-1	-		DATE	E: <u>11 / 19</u>	/ 2010	ASSESS	ED BY: SH, MN	Л
SURVEY R	EACH ID:		TIME: <u>02</u> : 20	AMPM	Рнот	r o ID: (Car	nera-Pic #	<i>(</i>)	/# ^{02-1-SC-e}	e.jpg
SITE ID: (0	Condition-#)	SCE1	LAT <u>41 ° 54</u>	<u>' 35.16</u> " LONG -	73 <mark>°</mark> 02	2 36.28	'' LM	K	GPS (Unit I	D) R1
TYPE: 🔼 I	Road Crossir	ng 🗌 Railroad C	rossing Dam	Footbridge	Geologi	ical Formatio	on (+/- 2ft c	hange) 🗌	Other:	
Road or Railroad Crossing	CROSSING Arch Box Bottom Elliptic	G SHAPE: Circular Other: cal	# BARRELS: Single Double Triple Other:	MATERIAL: Concrete Metal (smooth) Metal (corrugate Other:	ed)	LIGNMEN' Flow-alig Not flow- toward toward Do not kn	r: ned aligned LT bank RT bank ow	DIMENSI Barrel dia Culvert le	IONS: (if varies meter: Height: ength: 40 Width: 8	sketch) (ft) (ft) (ft) (ft) (ft) (ft)
ONLY	CONDITIO	ON: (Evidence of ng/chipping/corror ent deposition red organic debris) sion Downstrea Failing en Other:	am scour hole nbankment		C ULVERT S Flat Slight (2° Obvious (LOPE: - 5 ⁰) >5 [°])	UNDERS	IZED?	(ft)
DAMS	Туре:	☐ Manmade		ATERIAL: Concrete (<u>poured</u> Mortared stone	or <u>bloc</u>] Gabior	<u>k</u>) □ Dry s n □ Other	tone		Height:	(ft)
		Active Beav Old/Abando	er MA ned Beaver	ATERIAL: Large woody debris	□ Sn	nall woody o	lebris		Height:	(ft)
POTENTIA no IS SC ACT	L RESTORA	ATION CANDIDA	TE Fish barr Culvert r	ier removal Fish repair/replacement [Yes Un	n passag Beav known	e 🗌 Upsti er deceiver/r	ream storag removal	e retrofit Other:	Stream repa	nir
	EXTENT (OF PHYSICAL B	LOCKAGE:		B	LOCKAGE	SEVERITY	(circle #)		
If yes for fish barrier (> 6 in drop or flow < ¹ / ₂	Total Tempo CAUSE: Culvert Drop to	Parti rary Dunki t raised, above stro po high, water dro	al nown eam (in) p: (in)	A structure such as a c culvert on a 3rd order c stream blocking the up movement of anadrom fish passage device pr	lam or roa or greater stream ous fish; n esent.	nd A tota tributa signific partial interfe anadre	I fish blockage ry that would i cant reach of s blockage that re with the miq pmous fish.	on a solate a tream, or may gration of	A temporary barn as a beaver dam blockage at the v of a stream with viable fish habita natural barriers s waterfalls.	rier such or a very head very little t above it; such as
inch)	Other:	w flow, water dept	h:(in)	5		4	3	2	1	
Notes/SK Near Lombar	ETCH: d Ford									

Structured Stream Crossing

$\pi 2$								1		
WATERSH	ED/SUBSHED	4305-02-1		_	DA	TE: 04	/ 19 / 2011	ASSESS	ED BY: SH, MN	1
SURVEY R	EACH ID:	,	TIME: 08 : 5	0 AM/PM	Рн	ото ID	: (Camera-Pic #)	/# ^{02-1-SC-f.}	jpg
SITE ID: (C	Condition-#)	SCF L	AT <u>41 ° 54</u>	<u>' 32.98</u> " LONG	73 o	02 '	53.50 " LM	K	GPS (Unit II	D) R1
TYPE: 🔀 H	Road Crossing	g 🗌 Railroad Ci	cossing Dam	Footbridge	Geolo	ogical Fo	ormation (+/- 2ft c	hange) 📉	Other: parking e	xit area
Road or Railroad Crossing Only	CROSSING Arch Box Bottomle CROSSING	SHAPE: Circular Other: ess grated drop 1 structure	# BARRELS:	MATERIAL: Concrete Metal (smooth) Metal (corrugat Other: metal grate	ed)	ALIGI	NMENT: ow-aligned t flow-aligned oward LT bank oward RT bank not know	DIMENSI Barrel dia Culvert le	IONS: (if varies : meter: Height: ingth: 120 Width: 10	(ft) (ft) (ft) (ft) (ft)
UNLY	CONDITIO	N: (Evidence of) g/chipping/corros at deposition d organic debris	ion Downstre	eam scour hole nbankment		CULV Fla Slig Ob	ERT SLOPE: t ght $(2^{\circ} - 5^{\circ})$ vious $(>5^{\circ})$	UNDERSI	IZED?	(11)
DAMS	Туре:	Manmade		ATERIAL: Concrete (poured Mortared stone	or <u>bl</u>] Gab	l <u>ock</u>) [pion [] Dry stone] Other:		Height:	(ft)
		Old/Abandor	er IVI ned Beaver	Large woody debris	5 🗌	Small w	oody debris		Height:	(ft)
POTENTIA no IS SC ACTI	L RESTORAT	FION CANDIDAT	TE Fish bar	rier removal Fisl repair/replacement [Yes Un	1 pass Be know	sage eaver dec	Upstream storage	e retrofit Other:	Stream repa	ir
	EXTENT O	F PHYSICAL BI	OCKAGE:			BLOCH	KAGE SEVERITY:	(circle #)		
If yes for fish barrier (> 6 in drop or flow < ¹ / ₂	Total Tempora CAUSE: Culvert n Drop too	Partia ary Dunkn raised, above stre	am (in)	A structure such as a c culvert on a 3rd order or stream blocking the up movement of anadrom fish passage device pr	dam or or grea ostream ous fis esent.	road ter า h; no	A total fish blockage tributary that would i significant reach of s partial blockage that interfere with the mic anadromous fish.	on a solate a tream, or may gration of	A temporary barri as a beaver dam blockage at the v of a stream with v viable fish habitat natural barriers so waterfalls.	er such or a ery head very little above it; uch as
inch)	Other:	flow, water dept	n:(in)	5		4	3	2	1	
NOTES/SK	ETCH:									٦



interp in the o											
WATERSH	ED/SUBSHE	D: 4305-02-1				DA	TE: <u>04</u>	/ 19 / 2011	ASSESSI	ED BY: ^{SH, MM}	
SURVEY R	EACH ID:		TIM	E: <u>08</u> :40	AM/PM	Рн	ото ID): (Camera-Pic #	<i>f</i>)	/# ^{02-1-SC-g}	2.jpg
SITE ID: (C	Condition-#)	SCG	LAT 41	• 54	<u>48.78</u> " LONG	73 o	03 '	05.93 '' LM	K	GPS (Unit II	D) R1
										•	
TYPE: 🔀 F	Road Crossin	g 🗌 Railroad	Crossing	🗌 Dam	🗌 Footbridge 🗌	Geolo	ogical Fo	ormation (+/- 2ft c	hange) 💢	Other: driveway	private
	CROSSING	G SHAPE:	# BA	RRELS:	MATERIAL:		ALIG	NMENT:	DIMENSI	ONS: (if varies s	ketch)
	Arch	🔀 Circular	🔀 Si	ingle	Concrete		Flc 📈	ow-aligned	Barrel dia	meter: 2	(骨)
	🗌 Box	Other:	D	ouble	Metal (smooth)		🗌 No	t flow-aligned	Darrer dia	Height [.] 2	(ft)
ROAD OR	Bottom	less	T	riple	Metal (corrugate	ed)	🗌 t	toward LT bank			(11)
RAILROAD	Elliptic	al		ther:	Other:		t	toward RT bank	Culvert lei	ngth: 30	(ft)
CROSSING							L Do	not know	D 1		(II)
ONLY	CONDITIO	DN: (Evidence of)				CULV	TERT SLOPE:	Roadway	elevation: 3.5	<u>(ft)</u>
	Crackir	ig/chipping/cori	osion	Downstre	am scour hole			$t = 1 + (2^{9} - 5^{9})$	UNDEDG	7509	
		nt deposition		Failing en	nbankment			ght $(2^{\circ} - 5^{\circ})$		ZED: Vec 🗌 Uncura	
		ed organic debr	is 🗌	Other:			AOP	vious (>5)			5
				M	ATERIAL:					Unight:	(#)
		Manmade			Concrete (poured of	or <u>bi</u> 1 Coh	<u>оск</u>) [_ ion [Dry stone		meight.	(11)
DAMS	TYPE:										
		Active Bea	iver		AIERIAL. Large woody debris		Small u	yoody debris		Height:	(ft)
			ioneu bea		Large woody debits		Sinan w				
POTENTIA	DESTORA	TION CANDID] Fich bar	rier removal 🗌 Fish	nace	aga [Linstream storag	e retrofit	Stream renai	r
	LINESTOKA	TION CANDID			ren removarrist	T pass	age L		Othory		11
	~	~					avei ueu		Other.		
IS SC ACTI	NG AS GRA	DE CONTROL	×	No	Yes Un	know	n				
IC	EXTENT (OF PHYSICAL	BLOCKA	GE:			BLOCH	KAGE SEVERITY	: (circle #)		
1j yes for fish	Tempo	rary 🗌 Pai	tial known		A structuro such as a d	lam or	road	A total fish blockage	on a	A temporary barri	er such
barrier			KIIO WII		culvert on a 3rd order of	or grea	ter	tributary that would i	solate a	blockage at the ve	ery head
(> 6 in	CAUSE:				stream blocking the up	stream	h: no	partial blockage that	may	of a stream with v	ery little
drop or		raised, above s	tream	(in)	fish passage device pro	esent.	I, IIU	interfere with the mig	gration of	natural barriers su	uch as
$flow < \frac{1}{2}$	\Box Drop to	o high, water di	:op:	(in)				anauromous listi.		waterfalls.	
inch)	☐ Shallov	v flow, water de	pth:	(1n)	5		4	3	2	1	
NOTES/SKI											



Map $#31$											
WATERSH	ED/SUBSHE	D: 4305-02-1			DAT	ге: <mark>04</mark>	/ 19 / 2011	ASSESS	ED BY: SH, MM		
SURVEY R	EACH ID:		TIME::	AM/PM	Рно	ото ID): (Camera-Pic #	f)	/# ^{02-1-SC-h.}	jpg	
SITE ID: (C	Condition-#)	SC- <u>H</u> I	AT <u>41</u> • 54	<u>' 48.07</u> '' LONG	-73 °	03 '	06.23 " LM	K	GPS (Unit IL)) R1	
TYPE: 🗌 F	Road Crossir	ng 🗌 Railroad Ci	rossing Dam	Footbridge	Geolo	gical Fo	ormation (+/- 2ft c	hange) 🗌	Other:		
	CROSSIN	G SHAPE:	#BARRELS:	MATERIAL:		ALIG	NMENT:	DIMENSI	IONS: (if varies s	ketch)	
	Arch	🔀 Circular	Single	Concrete		Flo	ow-aligned	Barrel dia	ameter: <u>4</u>	_(ft)	
	Box	Other:		Metal (smooth)	ad)		t flow-aligned		Height: 5	(ft)	
ROAD OR	\Box Elliptic	flared end	C Other:	Other:	cu)		toward RT bank	Culvert le	ength: 35	_(ft)	
CROSSING						Do	not know		Width: 15	(ft)	
ONLY	CONDITI	ON: (Evidence of)				CULV	ERT SLOPE:	Roadway	elevation: 7	(ft)	
	Crackii	ng/chipping/corros	sion 🗌 Downstre	am scour hole		🗌 Fla	it .				
	Sedime	ent deposition	Failing er	nbankment		Slig	ght $(2^{\circ} - 5^{\circ})$		IZED?		
	Collect	ed organic debris	Other:				vious (>5°)		Yes Unsure		
				ATERIAL:	or ble	aale)	Drystona		Height [.]	(ff)	
Direct	Trees			Mortared stone	01 <u>010</u>] Gabi	$\frac{O(K)}{O(K)}$	Other:		fieight.	(11)	
DAMS	TYPE:		-r M	ATERIAL:							
		Old/Abandor	ned Beaver	Large woody debris	s 🗆 S	Small w	voody debris		Height:	(ft)	
		1	I								
POTENTIA	L RESTORA	ATION CANDIDA?	FE Fish bar	rier removal 🗌 Fisl	1 passa	age 🗌] Upstream storag	e retrofit	Stream repai	r	
🕅 no			Culvert	repair/replacement [Bea	aver dec	ceiver/removal	Other:			
IS SC ACTI	ING AS GRA	ADE CONTROL	No	Yes Un	knowr	1					
	EXTENT (OF PHYSICAL BI	LOCKAGE:		-	BLOCH	KAGE SEVERITY	: (circle #)	I		
If yes	Total	Partia	al				A total fish blockage	on a	A temporary barrie	er such	
barrier			lowii	A structure such as a c culvert on a 3rd order	am or r or great	road er	tributary that would i	solate a	as a beaver dam of blockage at the ve	or a ery head	
(> 6 in	CAUSE:			stream blocking the up	stream	v: no	partial blockage that	may	of a stream with v	ery little	
drop or		t raised, above stre	am (in)	fish passage device pr	esent.	1, 110	interfere with the mig	gration of	natural barriers su	ch as	
$flow < \frac{1}{2}$ inch)	\Box Drop u	o nign, water drop v flow water dent	$\frac{1}{2} \frac{1}{2} \frac{1}$				unduromous nam.		waterfalls.		
inchj	Other:	with the second	n(m)	5		4	3	2	1		
NOTES/SK	ЕТСН:										
				9		T AL					
		· WERTHAN	0-0-						N X X		
		and the second s		A CONTRACTOR OF		X	and the second s		and the second	100	
1/2 mars					The second	1.24			AL VALLE		
	Actual Description Conter: Description Conter: Description W CONDITION: (Evidence of) CILVERT SLOPE: Readway elevation: T(f) Readway elevation: CILVERT SLOPE: Description Description Description Stight (2' - 5') UNDERSIZED? UNDERSIZED? UNDERSIZED? Collected organic debris Other: Stight (2' - 5') No Y SC Unsure S TYPE: Active Beaver Concrete (poursed or block) Dry stone Height: (f) CACTING AS GRADE CONTROL Collvert repair/replacement Bissage (2) Upstream storage retrofit Stream repair o Collvert repair/replacement Beaver deceiver/removal Other: Atomore start and a dore of pair. stream for a stream f(in) Extent or PHYSICAL BLOCKAGE: BLOCKAGE SEVERITY: (circle t) A topal dore or pair. ream blocking be upstream for addition of additions of shr on bight water drop: (in) Start and addition or pair. A ball shr blocking on a ball would isole a start and where gifteen read of stream, or pair. A ball shr blocking on a ball would isole a stream dore or start and addition or pair. ir Carting as farma dore or start and addition or gifteen										
	Cracking/chipping corrosion Downstream scour hole Flat Slight (2° - 5°) UNDERSIZED? Collected organic debris Other: MATTERIAL: Slight (2° - 5°) No Yes Unsure s Type:										
and the second second			A STATISTICS		and a		R. Alax	p p			
			20	en Chan ha			110-	a state	And And		
	State.	5 7 B- 4	and the second						Part Part		
	NY 13	ma a			A.C.	2 Y			De lie	and a	
	EX BIL		1 x a a	and the second				72.5		Sept N	
1 Sans	Mar Bar	1900 - 17	and the				and the second	- AND	1 4 6		
	STAR &				a a f			- Here		THE.	
0	-X107	A BE ALL STREET	C P S S S S S S S		and the second	Contraction of the	and The	State Barr	Concession of the	-	



intap no2									-		
WATERSH	ED/SUBSHE	D: 4305-02-2-R1				DA	TE: 11	/ 18 / 2010	ASSESSI	E D BY: ^{SH,} MM	
SURVEY R	EACH ID:	<u>_</u>	TIME: 1	.2 : 00	AM/PM	Рн	ΙΟΤΟ ID	: (Camera-Pic #	^t)	/# ^{02-2-R1-Second}	c-a.jpg
SITE ID: (C	Condition-#)	SC- <u>A</u>	LAT <u>41</u> °	54	<u>43.35</u> " LONG	73 o	01 .	37.00 " LM	K	GPS (Unit II	D) R1
				_							
TYPE:	Road Crossir	ng 🗌 Railroad	Crossing	Dam	Footbridge	Geol	ogical Fo	ormation (+/- 2ft c	hange) 🗌 (Other:	
	CROSSIN	G SHAPE:	# BARR	ELS:	MATERIAL:			NMENT:	DIMENSI	ONS: (if varies s	ketch)
	Arch	Circular	Singl	e	Metal (smooth)			t flow-aligned	Barrel diar	meter:	(ft)
-	D Bottom	less		e	Metal (corrugat	ted)		oward LT bank]	Height:	(ft)
ROAD OR Railroad	Elliptic	al		r:	Other:		t t	oward RT bank	Culvert ler	ngth: <u>100</u>	(ft)
CROSSING							🗌 Do	not know		Width: <u>8</u>	(ft)
ONLY	CONDITI	ON: (Evidence of.)				CULV	ERT SLOPE:	Roadway e	elevation: 12	(ft)
	Crackii	ng/chipping/corr	osion 🗌 Do	wnstre	am scour hole		Fla	$t = 1 \pm (2^{\circ} + 5^{\circ})$	UNDEDSI	7509	
		ent deposition		iling en	nbankment			gnt $(2^{\circ} - 5^{\circ})$		ZED: Yes 🗌 Unsure	
		ed organic debri	s 🗋 Ot	ner:				vious (> 5)			,
		☐ Manmade			Concrete (poured	or b	lock)	Dry stone		Height:	(ft)
DAMS	Турб				Mortared stone] Gat	bion] Other:		c	
Dimit	1112.	Active Bea	iver	M	ATERIAL:					Height:	(ff)
		Old/Aband	loned Beaver		Large woody debris	s 🗌	Small w	oody debris		Height.	(11)
		•							·		
POTENTIA	L RESTORA	ATION CANDID	ATE \Box F	ish barı	rier removal 🗌 Fis	h pass	sage 🗌] Upstream storag	e retrofit [Stream repai	ir
🔀 no				ulvert r	repair/replacement	Be	eaver dec	ceiver/removal	Other:		
IS SC ACTI	ING AS GRA	DE CONTROL	X N	0	Yes Un	know	/n				
IC	EXTENT	OF PHYSICAL I	BLOCKAGE	:			BLOCH	KAGE SEVERITY	: (circle #)		
for fish	Total	rarv 🗌 Uni	tial known		A structure such as a	dam or	road	A total fish blockage	on a	A temporary barri	er such or a
barrier	1	, <u> </u>			culvert on a 3rd order	or grea	ater	tributary that would i significant reach of s	solate a stream, or	blockage at the ve	ery head
(> 6 in	CAUSE: \Box Culver	traised above st	ream	(in)	movement of anadrom	nous fis	n sh; no	partial blockage that	may gration of	viable fish habitat	above it;
flow $< \frac{1}{2}$	Drop to	oo high, water di	rop:	(in)	fish passage device p	resent.		anadromous fish.	gration or	natural barriers su waterfalls	ich as
inch)	Shallov	v flow, water de	pth:	(in)						waterralis.	
	Other:				5		4	3	2	1	
NOTES/SK	ETCH:	XBT	No.	and i	And Contraction						
			1 mills	1 B-A	and the second			A.			
			11/2	Alar	- SCHEN	No.	and the				
		Lint.					THE GAR				
		10 E	1 10/2	A.			S. 8 .	1 AL			
	1 200	and the second		200		1		and the			
	1ET		ATT		M SA	1					
	1/		MA				1				
	15	14103			- 40	and l	- 1				
	1 Ale	MARX.		-	all !!	1		1			
		AL-IL DO		-		Y	Sec.	and the second s			
	12	to the				and a	X	A A A A A A A A A A A A A A A A A A A			
	11/m	C. S. C.	San Ale	-		100	-	- Contraction of the second se			
OTHER SUP	VEY FO	1955	- P-J-					REPORTED T	о антнори	TIES: VES	
UTHER DUR	THE FUL		The state	1922 -	and the second second	- March		TELOVIED I	- AUTIONI		1 110



WATERSHED	SUBSHEI ACH ID: udition-#) ad Crossing CROSSING Arch Sox Box Bottoml Elliptica	SC-BL SC-BL g Railroad Cr SHAPE: Circular Other: ess d	TIME: 12 AT 41 • 54 ossing Dar #BARRELS: Single Double Triple	av /PM <u>42.22</u> " LONG n ☐ Footbridge ☐ MATERIAL: Concrete ☐ Metal (smooth	DATE: 1: PHOTO I .73 0.2 Geological ALLIG	1 <u>/ 18 / 2010</u> D: (<i>Camera-Pic</i> # <u>' 19.02</u> '' LM Formation (+/- 2ft c GNMENT:	ASSESSE (*) K change) [] (ED BY: SH, MM /# 02-2-R1-Si GPS (Unit II Other:	C-b.jpg))R1
SURVEY REA SITE ID: (Con TYPE: K Roa Road or Railroad Crossing Only	ACH ID: ndition-#) S ad Crossing CROSSING Arch Solution Box Box CROSSING Arch Solution CROSSING	SCBL gRailroad Cr SHAPE: Circular Other: ess l	TIME: 12	AM/PM '42.22 '' LONG n Footbridge MATERIAL: Concrete Metal (smooth	Geological	D: (Camera-Pic # '19.02 '' LM Formation (+/- 2ft c GNMENT:	<pre> K change) □ (DIMENSI </pre>	/# 02-2-R1-Si GPS (Unit II Other:	C-b.jpg)) ^{R1}
SITE ID: (Con TYPE: K Roa Road or Railroad Crossing Only	ad Crossing CROSSING Arch Box Box Bottoml Elliptica CONDITIO	SC-BL	AT 41 • 54 ossing Dan #BARRELS: Single Double Triple	n Footbridge MATERIAL:	Geological	<u>' 19.02</u> '' LM Formation (+/- 2ft c GNMENT:	K	GPS (Unit IL	9) ^{R1}
TYPE: X ROAD ROAD OR RAILROAD CROSSING ONLY	ad Crossiną CROSSING Arch Box Bottoml Elliptica CONDITIO	g 🗌 Railroad Cr SHAPE: Circular Other: ess	ossing Dan # BARRELS: Single Double Triple	n Footbridge MATERIAL:	Geological	Formation (+/- 2ft c	change)	Other:	
ROAD OR RAILROAD CROSSING ONLY	CROSSING Arch Box Bottoml Elliptica	SHAPE: Circular Other: ess	# BARRELS: Single Double Triple	MATERIAL:		GNMENT:		Other.	
ROAD OR RAILROAD CROSSING ONLY	Arch Arch Box Bottoml Elliptica	Circular Other: ess	Single Double Triple	Concrete		JININILINI .		ONS. (if varias s	kotch)
ONLY C			Other:	Metal (corruga)	low-aligned lot flow-aligned l toward LT bank l toward RT bank Po not know	Barrel diar F Culvert ler	neter: Height: ngth: Width:	(ft) (ft) (ft) (ft)
	Sedimer	N: (Evidence of) g/chipping/corros nt deposition ed organic debris	ion Downst	ream scour hole embankment		WERT SLOPE: lat light $(2^{\circ} - 5^{\circ})$ obvious (>5°)	Roadway e	elevation: 10 ZED? Yes 🗌 Unsure	(ft)
			Ν	ATERIAL:					
DAMS]	Гуре:	Manmade		Concrete (<u>poured</u> Mortared stone	or <u>block</u>)] Gabion	Dry stone Other:		Height:	(ft)
		Active Beave	er N ned Beaver [ATERIAL:	s 🗌 Small	woody debris		Height:	(ft)
POTENTIAL F	Restora' g as Grai	TION CANDIDAT	TE Fish ba	arrier removal repair/replacement Yes U	h passage Beaver d hknown	Upstream storag	e retrofit [] Other:	Stream repai	r
If yes [for fish [barrier (> 6 in C drop or [flow < ¹ / ₂	EXTENT O Total Tempor CAUSE: Culvert Drop too	F PHYSICAL BL Partia ary Unkn raised, above stre o high, water drop	OCKAGE: l own am (in) p: (in)	A structure such as a culvert on a 3rd order stream blocking the u movement of anadroi fish passage device p	BLO dam or road or greater pstream nous fish; no resent.	A total fish blockage tributary that would significant reach of s partial blockage tha interfere with the mi anadromous fish.	con a isolate a stream, or t may gration of	A temporary barri as a beaver dam of blockage at the ve of a stream with v viable fish habitat natural barriers su waterfalls.	er such or a ry head ery little above it; och as
inch)	☐ Shallow ☐ Other:	flow, water deptl	n:(in)	5	4	3	2	1	
NOTES/SKET	гсн:								



WATERSH	ED/SUBSHE	D: 4305-03-1			DA	TE: <u>11</u>	/ 19 / 2010	ASSESS	ED BY: SH, M	Μ
SURVEY R	EACH ID:		TIME: <u>12</u> :	45 AM(PM)	Рн	ото ID	: (Camera-Pic #	f)	/# 03-1-SC-	a.jpg
SITE ID: (0	Condition-#)	SC- <u>A</u>	LAT <u>41 ° 54</u>	<u>' 46.75</u> " LONG	-73 <u>o</u>	02 '	27.17 " LM	K	GPS (Unit I	D) R1
Type: 🔀 I	Road Crossin	ng 🗌 Railroad C	Crossing 🗌 Dan	n 🗌 Footbridge 🗌	Geolo	ogical Fo	ormation (+/- 2ft c	hange) 🗌	Other:	
Road or Railroad Crossing	CROSSING Arch Box Bottom Elliptic	G SHAPE: Circular Other: cless cal	# BARRELS:	MATERIAL: Concrete Metal (smooth) Metal (corrugation) Other:) , ted)	ALIGI	NMENT: ow-aligned t flow-aligned oward LT bank oward RT bank not know	DIMENSI Barrel dia Culvert le	IONS: (if varies meter: Height: ngth: Width:	sketch)(ft)(ft)(ft)(ft)(ft)
ONLY	CONDITIO	ON: (<i>Evidence of</i> ng/chipping/corro ent deposition ed organic debris) sion Downstr Failing o Other:	ream scour hole embankment		CULV Fla	ERT SLOPE: t ght $(2^{\circ} - 5^{\circ})$ vious $(>5^{\circ})$	Roadway	elevation: IZED? Yes [] Unsur	(ft)
DAMS	Түре:	Active Beau	N L Ver N	Image: Arrow of the second state Concrete (poured Mortared stone Image: Arrow of the second state Image: Arrow of the second state	or <u>bl</u>] Gab	ock)] Dry stone] Other:		Height:	(ft)
			oned Beaver	Large woody debri	s 🗌	Small w	oody debris		Height:	(ft)
If yes for fish barrier (> 6 in drop or flow < ¹ / ₂	ING AS GRA EXTENT (Total Tempo CAUSE: Culvert Drop to	ADE CONTROL DF PHYSICAL B Part rary Unk t raised, above str po high, water dro	No LOCKAGE: ial nown eam (in) pp: (in)	Yes Ur A structure such as a culvert on a 3rd order stream blocking the up movement of anadron fish passage device p	dam or or grea pstream nous fish resent.	n BLOCH road ter h; no	A total fish blockage tributary that would i significant reach of s partial blockage that interfere with the mig anadromous fish.	: (circle #) on a solate a tream, or may gration of	A temporary barri as a beaver dam blockage at the v of a stream with viable fish habita natural barriers s waterfalls.	ier such or a very head very little t above it; such as
inch)	☐ Shallov	v flow, water dep	th:(1n)	5		4	3	2	1	
Notes/Sk	ETCH:						Bracesse			



intup #20										
WATERSH	ED/SUBSHE	D: 4305-04-1			DA	TE: <u>11</u>	/ <u>19 / 201</u> 0	ASSESSE	ED BY: SH,	MM
SURVEY R	EACH ID:		TIME: 9 : 30	AM/PM	Рн	ото ID:	(Camera-Pic #	t)	/# ^{04-1-SO}	C-a.jpg
SITE ID: (0	Condition-#)	SC- <u>A</u> L	AT <u>41 ° 54</u>	<u>'18.77</u> " LONG -	72 °	59 '	52.66 '' LM	К	GPS (Unit	<i>ID</i>) R1
	Road Crossir	ng 🗌 Railroad Cr	ossing Dam	Footbridge	Geolc	ogical Fo	rmation (+/- 2ft c	hange) 🗌 🤇	Other:	
Road or Railroad Crossing	CROSSING Arch Box Bottom Elliptic	G SHAPE: Circular Other: less ral	# BARRELS: Single Double Triple Other:	MATERIAL: Concrete Metal (smooth) Metal (corrugate Other:	ed)	ALIGN	MENT: w-aligned flow-aligned ward LT bank ward RT bank not know	DIMENSIO Barrel diar I Culvert ler	ONS: (if varie meter: Height: ngth: Width:	(ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft)
ONLY		ON: (Evidence of)					ERT SLOPE:	Roadway e	elevation:	<u> (ft)</u>
	Crackii	ng/chipping/corros ent deposition ed organic debris	Ion Downstrea	am scour hole ibankment		Slig	ht $(2^{\circ} - 5^{\circ})$ ious (>5°)	Undersi No	ZED? Yes 🗌 Unst	ıre
DAMS	Туре:	🗌 Manmade		ATERIAL: Concrete (<u>poured</u> of Mortared stone	or <u>bl</u>] Gab	ock)	Dry stone Other:		Height:	(ft)
		Active Beave	er MA ned Beaver	ATERIAL: Large woody debris		Small wo	oody debris		Height:	(ft)
POTENTIA no IS SC ACT	L RESTORA	ATION CANDIDAT	TE Fish barr Culvert r No	ier removal 🔲 Fish epair/replacement [🗌 Yes 📃 Uni	n passa Bea known	age 🗌 aver dece n	Upstream storag	e retrofit [Other:	Stream rej	pair
If yes for fish barrier (> 6 in drop or flow < ¹ / ₂	EXTENT Total Tempo CAUSE: Culvert Drop to	DF PHYSICAL BL Partia rary Unkn t raised, above stre	OCKAGE: 1 own am(in) b:(in)	A structure such as a d culvert on a 3rd order o stream blocking the up movement of anadrom fish passage device pro	lam or i or great stream ous fish esent.	road ter h; no	A total fish blockage tributary that would i significant reach of s partial blockage that interfere with the mig anadromous fish.	on a solate a stream, or may gration of	A temporary ba as a beaver da blockage at the of a stream wit viable fish hab natural barriers waterfalls.	arrier such m or a e very head h very little itat above it; s such as
inch)	☐ Shallov ☐ Other:	v flow, water deptl	1:(1N)	5		4	3	2	1	
NOTES/SK	ETCH:						REPORTED T			

Mon #26



Map #50											
WATERSH	ED/SUBSHE	D: ⁴³⁰⁵⁻⁰⁴⁻¹			DA	TE: 04	/ 19 / 2011	ASSESS	ED BY: SH, M	Μ	
SURVEY R	EACH ID:		TIME: 9 : 25	AMPM	Рн	ото ID	: (Camera-Pic #	^f)	/# 04-1-SC-b	.jpg	
SITE ID: (C	ap 7.50										
TYPE: K	Road Crossin	ig 🗌 Railroad C	Crossing Dam	Footbridge	Geol	ogical Fo	ormation (+/- 2ft c	hange) 🗌	Other:		
Map 7:50											
	Arch	Circular	Single	Concrete			w-aligned	Barrel dia	meter: 1	(ft)	
	Box Bottom	less		Metal (corrugat	ed)		oward LT bank		Height: <u>1</u>	(ft)	
ROAD OR RAILROAD	Elliptic	al	Other:	Other:		□ t	oward RT bank	Culvert le	ength: <u>60</u>)(ft)	
CROSSING	_ `					🗌 Do	not know		Width: 1	(ft)	
ONLY	CONDITIO	ON: (Evidence of)			CULV	ERT SLOPE:	Roadway	elevation: 3	(ft)	
	Crackir	ng/chipping/corro	sion Downstream	am scour hole		K Fla	t	INDEDS	17509		
	Sedime	ent deposition	☐ Failing en	ıbankment			ght $(2^\circ - 5^\circ)$		Ves 🗌 Unsur	_	
							vious (> 5)				
		□ Manmade		Concrete (poured	or bl	ock)	Drv stone		Height:	(ft)	
DAMS	TYPE:			Mortared stone] Gab	oion [] Other:				
	11120	Active Beav	rer M	ATERIAL:					Height.	(ff)	
		Old/Abando	oned Beaver	Large woody debris	5	Small w	voody debris		Height.	(11)	
		~					7			-	
POTENTIA	L RESTORA	TION CANDIDA	TE 🗌 Fish barr	ier removal [] Fis	h pass	age _	Upstream storag	e retrofit	Stream repa	ir	
X no				epair/replacement	Be	aver dec	ceiver/removal	Other:			
IS SC ACTI	NG AS GRA	DE CONTROL	🔀 No	Yes Un	know	'n					
Ifves	EXTENT (OF PHYSICAL B	LOCKAGE:			BLOCH	KAGE SEVERITY	: (circle #)			
for fish		rary Unk	nown	A structure such as a	dam or	road	A total fish blockage	on a	A temporary barr as a beaver dam	ier such or a	
barrier	G			culvert on a 3rd order	or grea	ter	significant reach of s	solate a stream, or	blockage at the v	ery head	
(> 6 in	CAUSE:	raised above str	eam (in)	movement of anadrom	ous fis	h; no	partial blockage that	may gration of	viable fish habitat	t above it;	
$flow < \frac{1}{2}$	Drop to	oo high, water dro	p: (in)	fish passage device pr	resent.		anadromous fish.	gration of	natural barriers s waterfalls	uch as	
inch)	Shallov	v flow, water dep	th:(in)			4	2	2	1		
N. 10	Other:			5		4	3	2	I		
NOTES/SK		TV9									
	1		The state			A CAR			N MIL and		
	- We We	内局部			Nº T				Real B		
					and the second						
Self-											
		1 als			6	-					
OTHER SUR	VEY FORMS	COMPLETED FOR	SAME AREA:				R EPORTED T	O AUTHORI	TIES: 🗌 YES 🗌] NO	

Report sewage spill, significant pollution, or hazardous materials to CT DEP 860-424-3824 and local health department.



ED/SUBSHE	D: ⁴³⁰⁵⁻⁰⁴⁻¹	-		DA	TE: 11	/ 18 / 2010	ASSESS	ED BY: SH, N	ИМ
EACH ID:		TIME: ²	: <u>20</u> AM(PM)	Рн	ото ID): (Camera-Pic #	<i>≠</i>)	/# 04-1-SC	-c.jpg
ondition-#)	SC- <u></u> CI	AT <u>41 • 54</u>	<u>' 0.93</u> '' LON	G <u>-73</u> °	01 '	01.03 '' LM	К	GPS (Unit	ID) R1
oad Crossin	g 🗌 Railroad Ci	rossing D	am 🗌 Footbridge	Geol	ogical Fo	ormation (+/- 2ft c	hange) 🗌	Other:	
CROSSING	G SHAPE:	# BARREL	S: MATERIAL:		ALIG	NMENT:	DIMENSI	IONS: (if varies	sketch)
Arch	Circular	Single	Concrete		Flc	ow-aligned	Barrel dia	imeter: 3	<u>(ft)</u>
Box	U Other:		Metal (smo	oth)		t flow-aligned		Height: <u>3</u>	(ft)
Bollom Elliptic	al	C Other:	Other	igateu)		toward RT bank	Culvert le	ength: 55	(ft)
					Do	not know		Width:	(ft)
CONDITIO	DN: (Evidence of))			CULV	ERT SLOPE:	Roadway	elevation: 5	_(ft)
🔀 Crackir	g/chipping/corros	sion 🗌 Down	stream scour hole		🗌 Fla	ıt			
Sedime	nt deposition	🗌 Failing	g embankment		🔼 Sli	ght $(2^{\circ} - 5^{\circ})$	UNDERS	IZED?	
Collect	ed organic debris	Other:	:		L Ob	vious (>5°)	No 🗌	Yes 🛄 Unsu	re
	_		MATERIAL:		–	7 -		TT : 14	(0)
	Manmade		Concrete (poure	$\frac{d}{\Box}$ or $\frac{b}{\Box}$	lock)	Dry stone		Height:	(ff)
TYPE:						J Other:			
	☐ Active Beave	er ned Besver	Large woody de	hris 🗖	Small w	voody debris		Height:	(ft)
		leu Deavei			Sinun w				
RESTORA	TION CANDIDA	FE Fish	barrier removal	Fish pass	sage	Upstream storag	e retrofit	Stream rep	air
		X Culv	ert repair/replacement	nt 🗌 Be	eaver dec	ceiver/removal	Other: hea	alth & safety issu	ies
NG AS GRA	DE CONTROL			Unknow	m		-		
EVERNE				CIRIO	BLOCK	KAGE SEVERITV	• (circle #)		
	Partia	al			DLUCI		• (encie n)	A temporary bar	rior such
Tempor	rary 🗌 Unkn	lown	A structure such a	s a dam or	road	A total fish blockage tributary that would	eon a isolate a	as a beaver dan	n or a
CAUSE			culvert on a 3rd or stream blocking th	der or grea e upstrean	iter 1	significant reach of	stream, or	of a stream with	very head verv little
Culvert	raised, above stre	am (in)	movement of anac	Iromous fis	h; no	interfere with the mi	gration of	viable fish habita	at above it;
Drop to	o high, water drop	p:(in)	iisii passage devid	e present.		anadromous fish.	- -	waterfalls.	SUCH as
Shallov	v flow, water dept	h:(in)	5		4	3	2	1	
Other:					-		2	1	
	ED/SUBSHE CACH ID: ondition-#) Oad Crossin CROSSING Arch Box Bottom Elliptic CONDITIC	ED/SUBSHED: 4305-04-1 CACH ID: I oad Crossing Railroad C CROSSING SHAPE: Arch Arch Circular Box Other: Botomless Elliptical CONDITION: (Evidence of) Cracking/chipping/corros Sediment deposition Collected organic debris TYPE: Active Beave Old/Abandor Active Beave Old/Abandor Restoration Candidation CAUSE: Culvert raised, above stree Drop too high, water drop Shallow flow, water dept Other: TCH:	ED/SUBSHED: 4305-04-1 CACH ID: TIME: 2 ondition-#) SC- C LAT 41 • 54 oad Crossing Railroad Crossing Data Data Arch Circular Box Other: Double Triple Box Other: Box Other: Double Triple Box Other: CONDITION: (Evidence of) Cracking/chipping/corrosion Down Sediment deposition Failing Collected organic debris Other Manmade Partial TYPE: Active Beaver Old/Abandoned Beaver RESTORATION CANDIDATE Fish Culvert raised, above stream Total Partial Temporary Unknown CAUSE: Culvert raised, above stream Drop too high, water drop: Chier:	D/SUBSHED: 4305-04-1 CACH ID: TIME: 2 : 20 AMEN andition=#) SC-C LAT 41 • 54 • 0.93 " LON oad Crossing Railroad Crossing Dam Footbridge CROSSING SHAPE: # BARRELS: MATERIAL: Arch Circular Single Metal (smoother) Box Other: Other: Other: Other: Bottomless Double Metal (smoother) Metal (smoother) Condition= Other: Other: Other: Condition= Other: Other: Other: Collected organic debris Other: Other: Other: Collected organic debris Other: Mortared stone Mortared stone Manmade Concrete (poure Mortared stone Mortared stone Material Manmade Concrete (poure Mortared stone Material Partial No Yes Partial Trype: Old/Abandoned Beaver HATERIAL: Astructure such a culvert na 3rd or stream blocking the passage devide	D/SUBSHED: 4305-04-1 DA CACH ID: TIME: 2 20 AMCM PH madition:-#) SC-C LAT 41 • 54 • 0.93 "I LONG -73 • oad Crossing Railroad Crossing Dam Footbridge Geol CROSSING SHAPE: # BARRELS: MATERIAL: • Concrete • Metal (smooth) • Arch © Other: Double Triple © Other: • Other: • Other: • Other: • Other: • • Matterial (smooth) • Matterial (smooth) • Other: • Other:	D/SUBSHED: 4305-04-1 DATE: 11 CACH ID: TIME: 2 : 20 _ AM(FM) PHOTO II matition.#) SC _ LAT 41 _ 0 54 _ 1.0.93 _ " LONG _ 73 _ 0.01 _ y oad Crossing Railroad Crossing Dam Footbridge Geological F CROSSING SHAPE: # BARRELS: MATERIAL: ALG Arch Circular Single Concrete Box Box Other: Double Metal (smooth) No Bottomless Triple Other: Double Other: Double CONDITION: (Evidence of) Curve Curve Double Double Sediment deposition Failing embankment Stii Other: Other: Other Collected organic debris Other: Concrete (pourd or block) Double Exerce dealogical P Matterial: Culvet repair/replacement Beaver dealogical P Culvert repair/replacement Beaver dealogical P Matterial: Culvet raised, above stream (in) A structure such as a dam or coad culver to a 3rd order or greater stream blocking the upstream mowement of anadromous fish; no fith passage device present. Culvert r	DATE: 11 / 18 / 2010 ACH ID: TIME: 2 : 20 ANCE multiton:#) SC. C LAT 41 • 54 • 0.93 " LONG -73 • 01 • 01.03 " LM oad Crossing Railroad Crossing Dame Footbridge Geological Formation (+/- 2ft of the second construction of the second construc	Distussifie: 4305-04-1 DATE: 1 18 2010 Assess ACH ID: TIME: 2:0 AMCM PHOTO ID: (Camera-Pic #) matition:#) SC-C LAT 41 • 54 • 0.93 • LONG -73 • 01 • 0103 • LMK IMK and Crossing Gailroad Crossing Dam Footbridge Geological Formation (+/- 2ft change) Difference CROSSING SHAPE: # BARRELS: MATERIAL: Difference Box Other: Double Concrete Metal (smooth) Box Other: Double Metal (smooth) Not flow-aligned Culvert land Box Other: Other: Do not know Roadway Concrete deposition Failing embankment Slight (2° - 5°) Winterstand Collected organic debris Other: Mottared stone Gabion Other: Collected organic debris Other: Mottared stone Gabion Other: No Collected organic debris Other: Manmade Mottared stone Gabion Other: No Collected organic debris Other: Fish barrier removal Fish passage Upstream storage retroft	DSUBSHED: 4305.04-1 DATE: 11 _ 13 _ 2010 ASSESSED FY: 54,0 ACH ID: TIME: 2 _ 20 _ AN(5K) PHOTO ID: (Camera-Pic #) Iff 04-1:50 andition:#) SC LAT 41 _ 954 _ 10.93 " LONG _ 72 _ 0.01 _ 10.03 " LMK



inter noo								
WATERSH	ED/SUBSHED: 4305-04-1			DATE: 11	<u>/ 18 / 2010</u>	ASSESS	ED BY: SH, MM	1
SURVEY R	EACH ID:	TIME: 2 : 45	AM PM	Рното І	D: (Camera-Pic #	<i>‡</i>)	/# ^{04-1-SC-d.j}	pg
SITE ID: (C	Condition-#) SC	LAT 41 • 54	<u>' 04.37</u> '' LONG	73 o 00	<u>' 24.11</u> '' LM	К	GPS (Unit ID)) R1
							_1	
Type: 🔀 H	Road Crossing 🔲 Railroad	Crossing Dam	Footbridge	Geological H	Formation (+/- 2ft c	hange)	Other:	
Road or Railroad Crossing	CROSSING SHAPE: Arch Circular Box Other: Bottomless Elliptical	# BARRELS:	MATERIAL: Concrete Metal (smooth) Metal (corrugat Other:	ed)	SNMENT: ow-aligned ot flow-aligned toward LT bank toward RT bank o not know	DIMENSI Barrel dia Culvert le	ONS: (if varies skimeter: Height: ngth: 100 Width: 8	etch) (ft) (ft) (ft)
ONLY	CONDITION: (Evidence of Cracking/chipping/con Sediment deposition Collected organic deb	f) rrosion Downstre Failing en ris Dother:	am scour hole nbankment	CULY FI SI O	VERT SLOPE: at light $(2^{\circ} - 5^{\circ})$ bvious $(>5^{\circ})$	Roadway UNDERSI	elevation: 6 IZED? Yes 🗌 Unsure	(ft)
DAMS	TYPE:	e M.	ATERIAL: Concrete (<u>poured</u> Mortared stone	or <u>block</u>) [] Gabion [Dry stone Other:		Height:	(ft)
	Old/Aban	doned Beaver	Large woody debris	S 🗌 Small	woody debris		Height:	(π)
If yes for fish barrier (> 6 in drop or flow < 1/2 inch)	ING AS GRADE CONTROL EXTENT OF PHYSICAL Total Temporary U: CAUSE: Culvert raised, above Drop too high, water of Shallow flow, water d	L No BLOCKAGE: urtial nknown stream (in) frop: (in) enth; (in)	A structure such as a of culvert on a 3rd order of stream blocking the up movement of anadrom fish passage device pr	Amown BLOC dam or road or greater istream ous fish; no esent.	A total fish blockage tributary that would significant reach of s partial blockage that interfere with the mi anadromous fish.	: (circle #) : on a isolate a stream, or : may gration of	A temporary barrier as a beaver dam or blockage at the ver of a stream with ver viable fish habitat a natural barriers suc waterfalls.	∵such ∵a y head ry little ibove it; ih as
incn)	Other:	(III)	5	4	3	2	1	
NOTES/SK Catch basins into river wit	ETCH: along road drop directly th any treatment consideration	15. OR SAME AREA.						NO

Mon #20



viap #39											
WATERSHI	ED/SUBSHE	D: ⁴³⁰⁵⁻⁰⁴⁻¹				DA	TE: 11	/ 18 / 2010	ASSESS	ED BY: SH, MI	N
SURVEY RI	EACH ID:		TIME: 3	: 1	2 AM/PM	Рн	ото ID	: (Camera-Pic #	≠)	/# 04-1-SC-e	2.jpg
SITE ID: (C	ondition-#)	SCE	LAT 41 °	53	<u>49.49</u> LONG	73 o	01 '	07.41 '' LM	K	GPS (Unit IL) R1
										•	
TYPE: 🔀 R	oad Crossir	ng 🗌 Railroad	Crossing	Dam	Footbridge	Geol	ogical F	ormation (+/- 2ft c	change) 🗌	Other:	
Road or Railroad Crossing	CROSSING Arch Box Bottom Elliptic	G SHAPE: Circular Other: aless cal	# BARRE	LS:	MATERIAL: Concrete Metal (smooth) Metal (corrugate Other:	ed)	ALIGI Flc No t Do	NMENT: ow-aligned t flow-aligned toward LT bank toward RT bank not know	DIMENSI Barrel dia Culvert le	IONS: (if varies s umeter: 3 Height: 3 ength:	ketch) (1 (1 (1
ONLY	CONDITI	ON: (Evidence of)				CULV	ERT SLOPE:	Roadway	elevation: 6	(1
	Crackin	ng/chipping/corr ent deposition eed organic debr	osion Dow Faili is Othe	nstre ng en er:	am scour hole nbankment	bankment \square Fiat \square Slight $(2^{\circ} - 5^{\circ})$ \square Obvious $(>5^{\circ})$				IZED? Yes 🗌 Unsure	
DAMS	Туре:	🗌 Manmade			ATERIAL: Concrete (<u>poured</u> of Mortared stone	or <u>bl</u>] Gab	lock)] Dry stone] Other:		Height:	(f
		Active Bea	iver loned Beaver		ATERIAL: Large woody debris		Small w	voody debris		Height:	(f
IS SC ACTI	NG AS GRA	ADE CONTROL	Cul	vert 1	repair/replacement [] Be	aver dec	ceiver/removal] Other:		
If yes for fish barrier (> 6 in drop or flow < ½ inch)	EXTENT (Total Tempo CAUSE: Culver Drop to Shallon	OF PHYSICAL Par rary Un t raised, above s bo high, water da	BLOCKAGE: tial known tream (in rop: (in	n) n)	A structure such as a d culvert on a 3rd order of stream blocking the up movement of anadrom fish passage device pro	am or or grea stream ous fis esent.	road ter h; no	A total fish blockage tributary that would significant reach of s partial blockage that interfere with the mi anadromous fish.	: (circle #) e on a isolate a stream, or t may gration of	A temporary barrie as a beaver dam of blockage at the ve of a stream with ve viable fish habitat natural barriers su waterfalls.	er such or a ery hea ery little above ch as
incn)	Other:	w 110w, water de	pui(ii	1)	5		4	3	2	1	
NOTES/SKI	errch:										
	VEV FORMS	Completed fo	D SAME ADEA			and a		DEPOPTED T			



Map #40											
WATERSH	ED/SUBSHE	D: 4305-04-1			DATE: <u>04</u> / <u>19</u> / <u>2011</u>			ASSESSED BY: SH, MM			
SURVEY R	EACH ID :		TIME: ⁰⁹	<u>.</u> 30	AMPM	Рн	ото ID	: (Camera-Pic #	^f)	/# ^{04-1-SC-f.}	jpg
SITE ID: (C	SCFL	AT 41 • 5	3	<u>^{21.63}</u> " LONG ⁻⁷	73 <u>o</u>	00 ,	^{53.0} " LM	K	GPS (Unit I	D) R1	
TYPE: X Road Crossing Railroad Crossing Dam Footbridge Geological Formation (+/- 2ft change) Other:											
ROAD OR RAILROAD CROSSING ONLY	CROSSING Arch Box Bottom Elliptic	# BARRELS: Single Double Triple Other:		MATERIAL: Concrete Metal (smooth) Metal (corrugated) Other:		ALIGNMENT: Flow-aligned Not flow-aligned toward LT bank toward RT bank Do not know		DIMENSIONS: (if varies sketch) Barrel diameter: <u>1</u> (ff Height: <u>3</u> (ff Culvert length: <u>(ff</u> Width: <u>5</u> (ff Roadway elevation: <u>3</u> (ff		sketch) (ft) (ft) (ft) (ft) (ft)	
	CONDITIO	DN: (<i>Evidence of</i>) ng/chipping/corros ent deposition ed organic debris	ion Downstream Failing emb		m scour hole bankment		CULVERT SLOPE: Flat Slight $(2^{\circ} - 5^{\circ})$ Obvious $(>5^{\circ})$		UNDERSIZED?		
DAMS	Түре:	Manmade			ATERIAL: Concrete (<u>poured</u> of Mortared stone	or <u>bl</u> Gab	lock)] Dry stone] Other:		Height:	(ft)
		\square Active Beave	rer MIATERIAL:				Small w	voody debris		Height:	(ft)
If yes for fish barrier (> 6 in drop or flow < ¹ / ₂	DE CONTROL	LOCKAGE: al nown eam (in) p: (in)		A structure such as a d culvert on a 3rd order o stream blocking the ups movement of anadromo fish passage device pre	am or r grea stream ous fis esent.	aver deceiver/removal n BLOCKAGE SEVERITY: road ter h; no A total fish blockage tributary that would is significant reach of s partial blockage that interfere with the mig anadromous fish.		C: (circle #) A temporary barrier such as a beaver dam or a blockage at the very head of a stream with very little viable fish habitat above it; natural barriers such as waterfalls.		ier such or a ery head very little t above it; uch as	
inch)	Other:	v flow, water dept	1:(1n)		5		4	3	2	1	
NOTES/SKI	ETCH:			るして、こうない		and the second second		REPORTED T	0 AUTHORI	TIES: YES	

West Hill Pond Storm Water Runoff Survey

Barkhamsted & New Hartford, CT

Prepared For: West Hill Pond Association

July 15, 2011



TABLE OF CONTENTS

Page

Locus Map					
Introduction	1				
Lake and Watershed Description	1				
Observations and Recommendations					
Priorities	2				
Outfall Locations and Watersheds					
Outfalls Descriptions Recommendations Budget Costs	4				
Best Management Practices					
Conceptual Sketches Large Particle Separator Catch Basin with Sump Upland Settling Basin In Pond Settling Basin	33				
Inappropriate Actions					


INTRODUCTION

West Hill Pond is a high quality water resource which supports a variety of passive and active recreational uses. Many of Connecticut's water bodies have experienced "eutrophication"(caused by excessive nutrients entering the lake) which results in blooms of algae and increased weed growth. Fortunately West Hill Pond still has excellent water quality and is considered oligotropic with low levels of phosphorus, only minor rooted aquatic plants, and good transparency.

In 2011 the West Hill Pond Association (WHPA) received a grant from the Connecticut Federation of Lakes to locate and inventory the drainage area and corresponding discharges into West Hill Pond.

WHPA authorized Lenard Engineering Inc (LEI) to undertake a study to locate inflows into West Hill Pond, delineate their corresponding drainage areas, document existing conditions, create conceptual plans for improvements and prepare a preliminary priority for stormwater improvements to maintain or improve existing water quality within the lake.

LAKE AND WATERSHED DESCRIPTION

West Hill Pond is a 261 acre lake located in the towns of New Hartford and Barkhamsted, Connecticut with a maximum depth of 63 feet. The lake has a relatively small watershed of roughly three times the size of the lake area, or 790 acres. Since the watershed is relatively small related to the area and volume of the lake, the amount of runoff only replaces or flushes the lake about once every four to five years, thus any materials conveyed to the lake from the stormwater systems tend to have a long residence time.

OBSERVATIONS

LEI staff:

- 1. Visually located storm water discharge points in the impoundment and assigned a numerical rating, based possible impact to the lake. Approximate locations are depicted on the attached USGS map.
- 2. Visually located collection points and assigned a numerical rating based on contributing drainage areas. Drainage areas are depicted on the attached USGS map.
- 3. Met with the Towns of Barkhamsted and New Hartford staff to review possible information on drainage infrastructure.
- 4. Developed a priority for installation of storm water upgrades or enhancements based on the numerical rating system.
- 5. Photographically documented existing major system components and conditions.
- 6. Developed preliminary improvement concepts and conceptual budget estimates. The budget estimates do not include property acquisition or permitting costs.

About 15 inflow channel were observed and there are another 10 short overland areas with no appreciable channels. The west side of the lake is sparsely developed with residences located primarily along the shore line and a significant amount of undeveloped forested area. The south end of the lake has similar development pattern except the residences are more densely clustered along the shore line with a town road in close proximity (300 to 600 ft) to the shore. The southeast quadrant of the watershed is composed recreational land (Brodie Park) and only a few residences. The northeast portion of the watershed is the most intensely developed with many residences and small seasonal cottages. A public boat ramp, maintained by the State of Connecticut is located in the northeast corner of the lake.

TOWN OF BARKHAMSTED

The Town of Barkhamsted has limited drainage infrastructure adjacent to the lake, observed catch basins discharged to areas outside the lake's drainage basin.

TOWN OF NEW HARTFORD

The Town of New Hartford is responsible for several roads that have drainage discharging into the West Hill Pond drainage basin. West Hill Road on the south end of the lake has 10 catch basins that collect roadside drainage and discharge it to two inflow locations (6 & 7). Niles Road has 9 catch basins that discharge overland, not into a direct inflow to the lake, however the drainage paths in the vicinity of the catch basins contain road sand and silt that eventually makes it to the Lake (inflow 9). The Harriet Rd, Dorothy Dr, Davis Rd and Ricki Rd area has a limited number of catch basins (3), however the roads are predominantly gravel and during runoff events erosion from the roads is directed toward inflow 14. In terms of improvements the Town should attempt to install deep sump catch basins whenever it is necessary to repair existing or install new catch basins. The catch basins sumps should be cleaned on a yearly basis, or in the case of gravel road areas, as necessary.

PRIORITY

Based on potential impact to the impoundment and corresponding drainage areas the following priorities were assigned to the INFLOW.

INFLOW	<u>PRIORITY</u>		
1	6		
2	N/A ²		
3	10		
4	Monitor ¹		
5	N/A ²		
6	3		
7	2		
8	9		
9	8		
10	7		
11	4		
12	5 ³		
13	12		
14	1		
15	11		

- 1 Due to the drainage area and potential impact on water quality, INFLOW 4 would be assigned PRIORITY 1, however recent improvement by the Boy Scout Camps and homeowners have significantly decreased erosion. The effects of the recent construction have not yet been monitored or observed.
- 2 N/A Both Inflows assigned this priority are undeveloped upland areas and unless there is development that might expose soil, they only need to be monitored.
- 3 The results of recent storms and resultant erosion would indicate a higher priority should be assigned to this INFLOW



	6 7 Mining Content 21.3 AC 15.2 AC	shire 950-
Determined to the second secon	DRAINAGE AND DISCHARGE AREAS Drawing dote: May 27, 2011 STORM WATER SURVEY WEST HILL POND Rev Date DRAINAGE AND DISCHARGE AREAS Revision	By Drawn By: JS
(860) 659–3100 (860) 379–6669 (508) 721–760		Checked By. RPH

DRAINAGE AREA: 5.5 Ac. LAKE IMPAC.T ASSESSMENT: Moderate (2)



EXISTING CONDITIONS:

Inadequate sized CB on west side of road typically plugged or covered with leaves, overflow puddles in road and then erodes LAPOA beach.



RECOMMENDATIONS:

Install a deep sump CB with "CL" top and hood, install new pipe under the road and to the pond, regrade road and construct an in pond basin. Provide Siltfence or filtrex sox during winter months along the beach front to reduce beach erosion.

CONSTRUCTION BUDGET COSTS: \$ 6,000 -\$ 8,000 PRIORITY: 6

Lenard Engineering Inc.

L:\West Hill Pond Assoc\Project\11-105 Stormwater Recommentations\Report .doc

DRAINAGE AREA: 53.1 Ac. LAKE IMPAC.T ASSESSMENT: Low (3)



EXISTING CONDITIONS:

Stable drainage from undeveloped upland area.



RECOMMENDATIONS:

Monitor and insure entrance to culverts is kept clear to prevent overtopping roadway.

CONSTRUCTION BUDGET COSTS: 0 PRIORITY: N/A 2

DRAINAGE AREA: 18 Ac. LAKE IMPAC.T ASSESSMENT: Low (3)



EXISTING CONDITIONS:

- A. Drainage from East side of road, crosses under several private drives and is used for deposition of landscape debris.
- B. Drainage from playing fields/parking area on west side of road is collected in CB's and piped to rock lined outlet area with level spreader.



RECOMMENDATIONS:

A. Discontinue practice of filling channel with debris and brush. Insure that culvert entrances and CB grates are kept clear. B. Make sure sumps or CB's are cleaned out and monitor level spreader to insure that leaves and brush do not create a dam allowing water to pond and discharge over unprotected area causing erosion

CONSTRUCTION BUDGET COSTS: \$0 PRIORITY: 10

DRAINAGE AREA: 151.5 Ac. LAKE IMPAC.T ASSESSMENT: High (1)



EXISTING CONDITIONS:

The road was recently regraded and repaved to reduce roadside erosion and a settling pond for road runoff was created. A rock dam created to maintain a water levels in a large undeveloped wetland acts as a metering device to attenuate outflows and reduce erosion of banks below (east) of the road. Road regrading and paving appears to have significantly reduced erosion and sediment loads from road shoulders.



RECOMMENDATIONS:

Clean roadside sediment pond as necessary and monitor rock dam for debris accumulation that would cause high water levels allowing brook to overflow and erode material.

CONSTRUCTION BUDGET COSTS: \$0 PRIORITY: 15 (Monitor¹)

<u>Note:</u> Significant work has been completed in the last year, but effect on Lake has not yet been monitored or documented



DRAINAGE AREA: 4.7 Ac. LAKE IMPAC.T ASSESSMENT: Low (3)



EXISTING CONDITIONS: Undeveloped upland area RECOMMENDATIONS: Nothing



CONSTRUCTION BUDGET COSTS: 0^{2} PRIORITY: N/A²

DRAINAGE AREA: 21.3 Ac. LAKE IMPAC.T ASSESSMENT: Moderate (2)



EXISTING CONDITIONS:

Roadside drainage through a Catch Basin (6) system into a wetland area on south side of West Hill Rd and then piped to outfall at edge of pond.



RECOMMENDATIONS:

Install deep sump (2-ft min) catch basins. Regrade and vegetate roadside area to reduce exposed soil. Create a well maintained, vegetated roadside shoulder. Create roadside sediment basin for yearly cleaning. If unable to create a sediment basin (property rights or wetland issues) then install a large particle separator (equivalent of a septic tank) alongside or under the road. Particle separator could be installed on lake side of road at beginning of pipe to lake.

CONSTRUCTION BUDGET COSTS: \$ 22,000 \$ 25,000 PRIORITY: 3

DRAINAGE AREA: 15.2 AC. LAKE IMPAC.T ASSESSMENT: High (1)



EXISTING CONDITIONS:

Roadside drainage through a Catch Basin (4) system into a wetland area on south side of West Hill Rd and then culverted under the road to an open drainage to pond. End of brook is full of sediment and during high flows material is eroded into pond



RECOMMENDATIONS:

Install deep sump (2-ft min) CB's. Regrade and vegetate roadside area to reduce exposed soil. Create roadside sediment basin for yearly cleaning. If unable to create sediment basin (property rights or wetland issues) then install a large particle separator (equivalent of a septic tank) alongside or under road. Amour or maintain vegetated roadside discharge points. Remove accumulated sediment adjacent to pond to prevent ponding of storm flows and erosion into lake.

Lenard Engineering Inc.



Amour roadside discharge point



CONSTRUCTION BUDGET COSTS: \$ 20,000 - \$ 22,000 PRIORITY: 2

DRAINAGE AREA: 23.6Ac. LAKE IMPAC.T ASSESSMENT: Low (3)



EXISTING CONDITIONS:

Drainage from the Brodie Park area, and an access road to the Town Beach and then through wetlands to the lake. The road has multiple discharge points which fill up with eroded road surface material Outfall has deposits of sand covered with weedy/rush growth. Deposition can be eroded into pond during high flow events. The Beach area has a fine, silty sand which is easily eroded and drainage from parking area is directed over beach area.



RECOMMENDATIONS:

Clean road discharge points and establish vegetation.

Dredge deposited material from outfall and use boulders to establish an in pond sediment basin area at outfall which can be cleaned out as necessary.

Lenard Engineering Inc.

L:\West Hill Pond Assoc\Project\11-105 Stormwater Recommentations\Report .doc

Redirect parking lot runoff and create a vegetated swale along uphill side of beach area to redirect flows away from the beach.

Use coarser sand during future beach replenishments

Install silt fence or filtrex soxs along waters edge of beach during winter season.

CONSTRUCTION BUDGET COSTS: \$ 6,000 - \$ 8,000 PRIORITY: 9



Outfall Area



Wind Eroded Sand



Beach Erosion

DRAINAGE AREA: 46.1 AC. LAKE IMPAC.T ASSESSMENT: Low (3)



EXISTING CONDITIONS:

Multiple diagonal swales from upland area and roadside runoff enter a wetland area with no distinct outfall to lake. Some of the swales have areas of exposed or disturbed soil due to recent driveway construction. There are currently 9 catch basins along Niles Road. Drainage paths adjacent to Niles road are filled with road sand.



RECOMMENDATIONS

Stabilize areas of exposed soils Install Deep sump catch basins along Niles Road and remove accumulated sand yearly.

CONSTRUCTION BUDGET COSTS: \$ 26,000 - \$29,000 PRIORITY: 8

Lenard Engineering Inc.

L:\West Hill Pond Assoc\Project\11-105 Stormwater Recommentations\Report .doc

INFLOW 10 & 11

DRAINAGE AREA: 10 - 4 AC. 11 - 12.3AC. LAKE IMPAC.T ASSESSMENT: Moderate (2)



EXISTING CONDITIONS:

Paved access way with paved roadside swale and a very steep eroding channel at north end of development.



RECOMMENDATIONS:

Maintain existing pavement and keep roadside area and ditch clean. Install 2 catch basins with deep sumps (to trap large particles) at the bottom of hill. Stabilize channel using rip rap and stone waterdrops (steppools). Keep channels clean to prevent dams from forming and allowing bypass erosion during high flows.

CONSTRUCTION BUDGET COSTS: \$ 15,000 - \$ 18,000 PRIORITY: Roadway (10) 7 Channel (11) 4



DRAINAGE AREA: 7.2 AC. LAKE IMPAC.T ASSESSMENT: Moderate (2)



EXISTING CONDITIONS:

A paved road with roadside erosion and poorly maintained drainage paths. The lower portion of the access way is steep gravel with no drainage control.



RECOMMENDATIONS:

Reconstruct roadway (existing paved and graveled portions 0.2 miles) to allow overland drainage from shoulders. The lower south section should be paved due to steepness. Improve and maintain existing drainage swales.

CONSTRUCTION BUDGET COSTS: \$44,000 - \$47,000

PRIORITY: 5



DRAINAGE AREA: 4.4 AC. LAKE IMPAC.T ASSESSMENT: Low (3)



EXISTING CONDITIONS:

Residential area with light to moderated development, previously installed sediment catch basin that has not been maintained. Roadway appears to stay wet from hillside seepage.



RECOMMENDATIONS:

Clean and maintain existing sediment catch basins or install deep sump basins Regrade road to drain to roadside swale and existing CB.



CONSTRUCTION BUDGET COSTS: \$10,000 - \$14,000 PRIORITY: 12

DRAINAGE AREA: 26.5 AC. LAKE IMPAC.T ASSESSMENT: High (1)



EXISTING CONDITIONS:

Drainage is from a relatively densely developed residential area through a system of culverts and open channels. Most of the roads are gravel with poor shoulder drainage, allowing storm flows to erode roadway. Lower portion of the channel is blocked by debris, and has actively eroding areas.



RECOMMENDATIONS:

Install deep sump catch basins or large particle separators Create roadside grassed channels or armor shoulders with 2-in stone. Remove debris and stabilize exposed channel banks



Install Large Particle Separator



Stabilize Area with Vegetation

CONSTRUCTION BUDGET COSTS: \$45,000 - \$50,000 PRIORITY: 1



Eroded Shoulders - Install shoulder armor or create grassed swales.



Outfall below Ricki Road



Evidence of Active Erosion that Progressively Moves Toward Pond



Remove Debris That Creates Dams, Forcing Flows to Erode Around Sides

DRAINAGE AREA: 6.8 AC. LAKE IMPAC.T ASSESSMENT: Low (3)



EXISTING CONDITIONS:

Gravel access way with eroding roadside swale, culverted under access way and discharges to an open ditch alongside cottage. Large impervious paved area from former parking area.



RECOMMENDATIONS:

Stabilize roadside swale with vegetation or riprap, and install deep sump catch basin or large particle separator. Due to confined space, lower discharge will need to be conveyed in pipe system to outlet. It might be possible to create a small in pond sediment basin. Remove unnecessary impervious surface.

CONSTRUCTION BUDGET COSTS: \$24,000 - \$27,000 PRIORITY 11



Drainage goes under existing deck & is flooding yard Insufficient room to create stabilized channel, Will require piping

BEST MANAGEMENT PRAC.TICES (BMP)

The best way to reduce nutrient loading is to reduce sediment inflow by minimizing areas of impervious surfAc.e and disturbed open soil. Minimizing disturbed areas should be a primary consideration in any watershed protection plan.

The following structural or constructed BMP's vary in their effectiveness in removing pollutants. Removal capAc.ities provided should be considered guideline that most likely will differ depending on storm events, site conditions, etc.

The estimated average removal rates for total suspended solids (TSS), total phosphorus (TP), total nitrogen (TN), nitrate (NO³), and other pollutants (bAc.teria, metals) of Best Management PrAc.tices (BMP's) are presented below

Estimated Average Pollutant Removal Capacity of Different Stormwater Filter Systems							
	Removal Efficiency (%)						
Management Practice	TSS	TP	TN	$N0^3$	Other Pollutants		
Drainage Channel ¹	30	10	0	0	Bacteria negative		
Grass Channel ¹	65	25	15	0	Hydrocarbons – 65% Metals – 80-90% Bacteria - negative		
Dry Swale ¹	90	65	50	80	Metals 80-90%		
Wet Swale ¹	80	20	40	50	Metals 40-70%		
Vegetated Filter Strip ¹	70	10	65	75	Metals 40-70%		
Gravel Filter ¹	80	80	65	75	Hydrocarbons – 85% Metals 40-70%		
Catch Basin With Sump (Water Quality Inlet ²)	35	5	20	No data	Lead – 15% Zinc – 5%		
Large Particle Separator	Same as Catch Basin with larger Storage capacity						

1 From Claytor & Schueler 1996

2 From Environmental Protection Agency 1990







	ERGEOFROND US DIAMETER ROCKS, ROCKS 6-IN ABOVE WATER LEVEL	I SETTLING BASIN NOT TO SCALE	Drawina #:
rph Drown By: JS Checked By. RPH	Lenard Engineering, Inc. ivil, Environmental and Hydrogeological Consultants 210 Main Street 140 Willow Street Conbury, CT 06033 Winsted, CT 06098 3600 659-3100 (860) 379-6669	IN POND SETTLING BASIN STORM WATER SURVEY WEST HILL POND BARKHAMSTED & NEW HARTFORD CONNECTICUT	Drawing date: May 27, 2011 Job #:

INAPPROPRIATE ACTIONS

Allowing drainage channel to remain blocked by debris, creates dams and forces storm flows to create new paths, eroding material in the process




Disposal of landscaping wastes in drainage paths

Wrong gradation of beach sand, allows erosion by both wind & water





Improper grading and maintenance of drives and roads



RESULT IN

Erosion of bank material





Eventually entering the Lake





Causing infilling & vegetation growth

Connecticut 305b Assessment Results

APPENDIX D RIVERS

	ID305B	NAME	LOCATION	MILES	AQUATIC LIFE	RECREATION	FISH CONSUMPTION
	CT4303-00_04	Still River (Winsted/Torrington)-04	From confuence with Mad River (just US of Route 44/183 crossing), US to headwaters (on west side of Route 8, paralell with Exit 45 offramp), Torrington.	7.56	U	FULL	FULL*
	CT4304-00_01	Sandy Brook (Colebrook)-01	From mouth at confluence with Still River (just DS of Old Forge Road crossing), Colebrook (Southeast), US to Massachusetts border, Norfolk (Northeast corner).	8.63	FULL	FULL	FULL*
77	CT4304-00_01a	Sandy Brook (Barkhamsted/Colebrook)-01a	From mouth at confluence with Farmington River, Barkhamsted, US to confluence with Still River, Colebrook. NOTE this portion was formerly called Still River-01 (CT4303-00_01).	1.35	FULL	NOT	FULL*
	CT4304-08_01	Center Brook-01	From mouth at Sandy Brook, US to Route 183 (Colebrook Rd) crossing, Colebrook.	1.28	FULL	U	FULL*
	CT4305-00_01	Morgan Brook-01	From mouth at West Branch Farmington River, US to confluence with tributary 4305-04 (first confluence) on east side of Route 44, Barkhamsted.	0.69	FULL	NOT	FULL*
	CT4305-00_02	Morgan Brook-02	From confluence with tributary 4305-04 (end of seg-01) east side of Route 44, US to East West Hill Road crossing area (50 meters US of East West Hill Road crossing, entrance of 9/12/05 home heating fuel spill), Barkhamsted.	1.41	U	NOT	FULL*
	CT4305-00_03	Morgan Brook-03	From East West Hill Road crossing area (50 meters US of East West Hill Road crossing, entrance of 9/12/05 home heating fuel spill), US to confluence with Mallory Brook, Barkhamsted.	0.48	U	U	FULL*
	CT4305-00_04	Morgan Brook-04	From confluence with Mallory Brook, US to West Hill Pond outlet dam, Barkhamsted.	1.52	FULL	NOT	FULL*

Use Support: FULL=Designated use Fully Supported NOT=Designated use Not Supported, See 303d listing for details. U=Not Assessed ///=Not applicable to Segment I= Insufficient Information to assess use FULL*=Refer to Connecticut Department of Environmental Protection Angler's Guide, or online at www.ct.gov/dep for more information about fish consumption advisories.

	ID305B	NAME	LOCATION	MILES	AQUATIC LIFE	RECREATION	FISH CONSUMPTION
	CT4305-02_01	Mallory Brook-01	From confluence with Morgan Brook, US to Tennessee Gas pipeline crossing (near Barkhamsted and Winchester town line, south of Route 44), Barkhamsted.	1.54	U	U	FULL*
	CT4305-02_02	Mallory Brook-02	From Tennessee Gas Pipeline Crossing (end of segment-01, near Barkhamsted and Winchester town line, south of Route 44), US to headwaters, Winchester.	0.7	FULL	U	FULL*
78	CT4306-00_01	Valley Brook-01	From mouth at northwestern most portion of Barkhamsted Reservoir, Hartland, US (towards northeast) to CT/MA state line.	0.73	FULL	U	FULL*
	CT4307-00_01	Hubbard Brook-01	From mouth at northwestern most portion of Barkhamsted Reservoir, Hartland, US (towards northwest) to CT/MA state line.	0.57	U	U	FULL*
	CT4308-00_01	Farmington River, East Branch- 01	From mouth at Farmington River mainstem, New Hartford, US to Lake McDonough outlet dam.	1.11	NOT	NOT	FULL*
	CT4308-01_01	Hurricane Brook (Hartland)-01	Mouth on Barkhamsted Reservoir, just DS of Route 20 crossing, US to HW at Emmons Pond, just US of Hurricane Brook Road crossing, Hartland.	2.24	FULL	U	FULL*
	CT4308-11_01	Roaring Brook (Barkhamsted)- 01	Mouth at inlet to Barkhamsted Reservoir, parallel to Kettle Brook, US to HW near Pine Mountain road, Barkhamsted.	2.4	FULL	U	FULL*
	CT4308-13_01	Kettle Brook (Barkhamsted)-01	Mouth at inlet to Barkhamsted Reservoir, just DS of Ratlum Road crossing, US to HW just US of Route 219 crossing, Barkhamsted.	1.95	FULL	U	FULL*

Use Support: FULL=Designated use Fully Supported NOT=Designated use Not Supported, See 303d listing for details. U=Not Assessed ///=Not applicable to Segment I= Insufficient Information to assess use FULL*=Refer to Connecticut Department of Environmental Protection Angler's Guide, or online at www.ct.gov/dep for more information about fish consumption advisories.

	Connecticut 305b Assessment Results		LAKES			TABLE 2-2		
	ID305B	NAME	LOCATION	ACRES	AQUATIC LIFE	RECREATION	FISH CONSUMPTION	
	CT4303-02-1-L1_01	Burr Pond (Torrington)	South of Burr Mountain Rd, Northeast corner of Torrington.	83.39	FULL	FULL	FULL	
	CT4304-05-2-L2_01	Triangle, Lake (Colebrook)	Northwest corner of Colebrook (North Colebrook area); lake is east of Rte 183, access by Prock Hill Road on YMCA Camp Jewelll property.	49.2	FULL	U	FULL	
	CT4305-00-1-L1_01	West Hill Pond (New Hartford/Barkhamsted)	Northwest corner of New Hartford.	245.54	FULL	FULL	FULL	
	CT4308-00-1-L2_01	Compensating Res. (L. McDonough) (Barkhamsted/New Hartford)	Southeast Barkhamsted - northeast New Hartford.	385.75	FULL	FULL	NOT	
152	CT4315-05-1-L1_01	Birge Pond (Bristol)	West of Rt 69 and Pond Street, Bristol	11.84	FULL	FULL	FULL	
	CT4315-10-1-L1_01	Pine Lake (Malones Pond) (Bristol)	East Bristol, south of Pine Street	8.13	FULL	FULL	FULL	
	CT4318-03-1-L1_01	Stratton Brook Park Pond (Simsbury)	Small impoundment of Stratton Brook, Simsbury; south of Rte 309.	2.35	U	FULL	FULL	
	CT4321-00-1-L2_01	Barber Pond (Bloomfield/Windsor)	NE corner of Bloomfield, near Windsor border, N of Newberry Road.	9.4	U	U	FULL	
	CT4401-00-1-L1_01	Batterson Park Pond (Farmington/New Britain)	Southeast Farmington - northeastern border of New Britain.	145.49	FULL	NOT	FULL	
	CT4402-04-2-L1_01	Mill Pond (Newington)	Municipal park in Newington; S of Rt 175 near intersection of Rts 175 and 176	2.71	FULL	U	FULL	
	CT4500-00-1-L1_01	Shenipsit Lake (Tolland/Ellington/Vernon)	At meeting point of Ellington, Vernon and Tolland. CT Water Company watershed.	511.85	FULL	U	FULL	
	CT4500-00-3-L3_01	Union Pond (Manchester)	Impoundment of Hockanum River in Manchester at Union Street.	49.9	NOT	FULL	NOT	

Use Support: FULL=Designated use Fully Supported NOT=Designated use Not Supported, See 303d listing for details. U=Not Assessed ///=Not applicable to Segment I= Insufficient Information to assess use FULL*=Refer to Connecticut Department of Environmental Protection Angler's Guide, or online at www.ct.gov/dep for more information about fish consumption advisories.

TABLE 3 - 2. CONNECTICUT IMPAIRED WATERS LIST APPENDIX E

Waterbody Name Sandy E	Brook (Barkhamsted/Colebrook)-	01a	Waterbody Segment ID	CT43	04-00_01a	
Location From mouth at conflue Colebrook. NOTE this	nce with Farmington River, Barkhamste portion was formerly called Still River-	d, US to confluence with Still River 01 (CT4303-00_01).	Waterbody Segment Size	1.35	Miles	
Impaired Designated Use Ro	ecreation					
<u>Cause</u> Escherichia coli		Potential Source Source Unknown			<u>Category</u>	5
Waterbody Name Morgan	Brook-01		Waterbody Segment ID	CT43	05-00_01	
Location From mouth at West B confluence) on east sid	ranch Farmington River, US to confluer e of Route 44, Barkhamsted.	ce with tributary 4305-04 (first	Waterbody Segment Size	0.69	Miles	
Impaired Designated Use Ro	ecreation					
<u>Cause</u> Escherichia coli		<u>Potential Source</u> Source Unknown			<u>Category</u>	5
Waterbody Name Morgan	Brook-02		Waterbody Segment ID	CT43	05-00_02	
Location From confluence with Road crossing area (50 fuel spill), Barkhamster	tributary 4305-04 (end of seg-01) east si meters US of East West Hill Road cross d.	de of Route 44, US to East West Hil sing, entrance of 9/12/05 home heati	Il <u>Waterbody Segment Size</u>	1.41	Miles	
Impaired Designated Use Ro	ecreation					
<u>Cause</u> Escherichia coli		Potential Source Source Unknown			Category	5
Waterbody Name Morgan	Brook-04		Waterbody Segment ID	CT43	05-00_04	
Location From confluence with	Mallory Brook, US to West Hill Pond of	utlet dam, Barkhamsted.	Waterbody Segment Size	1.52	Miles	
Impaired Designated Use Ro	ecreation					
<u>Cause</u> Escherichia coli		<u>Potential Source</u> Source Unknown			<u>Category</u>	5
Waterbody Name Farming	gton River, East Branch-01		Waterbody Segment ID	CT43	08-00_01	
Location From mouth at Farming	gton River mainstem, New Hartford, US	to Lake McDonough outlet dam.	Waterbody Segment Size	1.11	Miles	
Impaired Designated Use	abitat for Fish, Other Aquatic Life and V	Vildlife				
<u>Cause</u> Other flow regime	e alterations	Potential Source Upstream Impoundments (e.g., PI-566 NRCS	Structures), Flow Alterations from Water Diversions		<u>Category</u>	4c
Impaired Designated Use Ro	ecreation					
<u>Cause</u> Other flow regime	e alterations	Potential Source Flow Alterations from Water Diversions, Up:	stream Impoundments (e.g., PI-566 NRCS Structures)		<u>Category</u>	4c

APPENDIX F

APPENDIX B: WATER QUALITY CRITERIA FOR BACTERIAL INDICATORS OF SANITARY QUALITY SEE ALSO STANDARDS # 23 AND 25

DESIGNATED USE	CLASS	INDICATOR	OR CRITERIA			
Freshwater Drinking Water Supply ⁽¹⁾						
Existing / Proposed	AA	Total coliform	Monthly Moving Average less than 100/100ml Single Sample Maximum 500/100ml			
Potential Recreation ⁽²⁾⁽³⁾	А					
Designated Swimming ⁽⁴⁾	AA, A, B	Escherichia coli	Geometric Mean less than 126/100ml Single Sample Maximum 235/100ml			
Non-designated Swimming ⁽⁵⁾	AA, A, B	Escherichia coli	Geometric Mean less than 126/100ml Single Sample Maximum 410/100ml			
All Other Recreational Uses	AA, A, B	Escherichia coli	Geometric Mean less than 126/100ml Single Sample Maximum 576/100ml			
Saltwater Shellfishing ⁽⁶⁾						
Direct Consumption	SA	Fecal coliform	Geometric Mean less than 14/100ml 90% of Samples less than 31/100ml			
Indirect Consumption	SB	Fecal coliform	Geometric Mean less than 88/100ml 90% of Samples less than 260/100ml			
Recreation						
Designated Swimming ⁽⁴⁾	SA, SB	Enterococci	Geometric Mean less than 35/100ml Single Sample Maximum 104/100ml			
All Other Recreational Uses	SA, SB	Enterococci	Geometric Mean less than 35/100ml Single Sample Maximum 500/100ml			